An Bord Pleanála

Inspector's Report
ABP-312146-21

Development	Expansion of the Bauxite Disposal Area, extension to the existing Salt Cake Disposal Cell and extension of the permitted borrow pit at Aughinish Alumina Limited
Location	In the townlands of Aughinish East, Aughinish West, Island Mac Teige, Glenbane West, and Fawnamore at or adjacent to Aughinish Island, Askeaton, Co. Limerick
Planning Authority	Limerick City and County Council
Planning Authority Reg. Ref.	Not Applicable
Applicant(s)	Aughinish Alumina Ltd
Type of Application	Application under the provisions of S37(E)
Planning Authority Decision	Not applicable
Observer(s)	Michelle Hayes – Environmental Trust Ireland

Pat Geoghegan – Cappagh Farmers Support Group

Emanuela Ferrari – Future Proof Ireland

Mary Kate Bolger – Dolphin Watch

Transport Infrastructure Ireland – TII

Development Application Unit

Date of Site Inspection	June 10th 2022
Inspector	Paul Caprani

Contents

1.0 Introduction and Background 6

2.0 Site Location and Description 6

2.1. Location 6

2.2. The Site 7

2.3. The Bauxite Residual Deposit Area 7

2.4. Salt Cake Disposal Area 9

2.5. Drainage 9

2.6. The Borrow Pit 9

3.0 Proposed Development 10

3.1. Proposed Works to the BRDA 10

3.2. Proposed Works to the Salt Cake Disposal Cell (SCDC) 12

3.3. Proposed Borrow Pit Extension 12

4.0 Planning History 13

5.0 Submissions 17

5.1. Submission from Prescribed Bodies 17

5.2. Submissions from Third-Party Observers 17

6.0 Applicants Response to the Submissions 27

7.0 Planning Policy Context 34

7.1. National Planning Framework 34

7.2. Regional Spatial and Economic Strategy for the Southern Region 35

7.3. Strategic Integrated Framework Plan for the Shannon Estuary 35

7.4. Limerick Co Development Plan 37

7.5. Draft Limerick and County Development Plan 2022-2028 38

7.6. Natural Heritage Designations 40

8.0 Assessment 40

8.1. Introduction 40

8.2. Structural Integrity Concerns Regarding the Proposed Raises of the BRDA 41

8.3. Liquefaction Issues in the Case of a Catastrophic Breakout 47

8.4. Concerns Regarding the Hazardous Nature of the Bauxite Residue 50

8.5. Fugitive Dust Issues 52

8.6. Surface Water and Groundwater Contamination as a result of seepage from the BRDA 53

8.7. Impact on the Bottlenose Dolphin 59

8.8. Other Miscellaneous Issues 60

9.0 Environmental Impact Assessment 67

9.1. Statutory Provisions 67

9.2. Compliance with legislation 68

9.3. Alternatives 71

9.4. Likely Significant Effects on the Environment 73

9.5. Archaeological, Architectural and Cultural Heritage 73

9.2. Population Human Health and Agriculture 84

9.3. *Assessment Population Human Health and Agriculture* 87

9.4. Soils Land and Geology 88

9.5. Hydrology and Hydrogeology 97

9.7. Noise and Vibration 106

9.8. Material Assets -Traffic and Transport 111

9.9. Material Assets – Site Services 114

9.10. Major Accidents and Disasters 115
9.11. Climatic Impacts 125
9.12. Interactions of the Foregoing and Cumulative Impacts 127
9.13. Mitigation and Monitoring 129
9.14. Reasoned Conclusion on the Significant Effects 130
10.0 Appropriate Assessment 132
10.1. Introduction 132
10.2. Stage 1 Screening 132
10.3. Stage 2 Appropriate Assessment 138
10.4. Assessment of the NIS submitted 150
11.0 Conclusions and Recommendation 152
12.0 Decision 153
13.0 Reasons and Considerations 153
14.0 Appropriate Assessment 154
15.0 Conditions 156

1.0 Introduction and Background

1.1. ABP312146 relates to a planning application made under the provisions of Section 37(E) of the Planning and Development Act 2000, (as amended) for an extension to the existing Bauxite Residual Disposal Area (BRDA), Salt Cake Deposition Cell (SCDC) and an extension the existing borrow pit on site in order to supply aggregate to the proposed extensions to the BRDA and SCDC, at the existing Aughinish Alumina facility at Aughinish Island on the southern banks of the Shannon Estuary in west Limerick.

1.2. In its decision dated 1st April 2021, the Board determined that the proposed development constitutes development which falls within the definition of strategic infrastructure in the Seventh Schedule, and it is considered that the proposal is of strategic importance by reference to the requirements of Section 37(A)(2)(a), and (b) of the Planning and Development Act 2000, as amended. On this basis it was determined that the application be made directly to An Bord Pleanála under the provisions of Section 37(E) of the Act. The application was made by Tom Phillips and Associates on behalf of the applicants, Aughinish Alumina Ltd (AAL) which operates an Alumina Refinery which commenced operations in 1983. The Refinery and associated BRDA is located on a 601 Ha site in the townlands of Aughinish East, Aughinish West, Island Mc Teigh, Glenbane West and Fawnmore c.6 km west of Askeaton and c.30km west of Limerick City. The Application was accompanied by and EIAR and an NIS. No Oral Hearing was held in relation to the application as per the Boards Direction dated 06/05/2022.The site currently operates in accordance with the conditions of the Industrial Emissions Licence issued by the EPA Ref No. P0035-07.

2.0 Site Location and Description.

2.1. Location

2.1.1. Aughinish Island, on which the AAL is situated, is located on the southern side of the Shannon Estuary approximately 8 kilometres north-west of Askeaton and c.30 kilometres west of Limerick City. The northern portion of the island accommodates the Aughinish Aluminium Processing Plant. The island is separated from the

mainland by the Poulaweala Creek, which separates the south-eastern coast of the island from the mainland. The Robertstown Creek separates the south-western coastline of the island from the mainland. The village of Foynes and Foynes Port facility is located approximately 2 kilometres further west of the site. The Limerick Foynes railway line, which ceased operation in 2002, runs to the south of the island, as does the N69 National Secondary Route between Limerick and Foynes. This road comprises of a two-way single lane carriageway.

2.1.2. The access road from the N69 to Aughinish Plant runs northwards in close proximity to the existing eastern boundary of the BRDA. The company sports facility is located in close proximity to the eastern boundary of Phase 1 of the BRDA between the landfill area and the access road. A municipal waste water treatment plant is located to the south east of the BRDA Phase 2. The Robertstown River runs along the south-western boundary of the existing landfill area.

2.2. The Site

2.2.1. Lands to the south-west of the processing plant accommodate Phase 1 and Phase 2 of the bauxite residual disposal area (BRDA). Two local roads off the N69 provide access to the site. One directly to the south-east of the site and one further east beyond the outskirts of Askeaton (both roads are referred to as the 'L1234'). The site is approximately 222 hectares in size. It comprises of 3 main elements. (a) the BRDA area (phases 1 & 2) (including the SCD Cell which is located on the eastern side of the BRDA Phase 1 Area) which amounts to 184 Ha. (b) the existing borrow pit which is to be extended and is located to the northeast of the site, it is currently 4.5 ha in size and under the current application it is to extend to 8.4 ha in size (and increase in size of 3.9 ha). (c) separately a stockpile area of c12.5 ha in size is located to the south-east of the site adjacent to the municipal WWTP.

2.3. The Bauxite Residual Deposit Area

2.3.1. The BRDA landfill area accommodates residual or leftover bauxite residue associated with the processing plant in the production of alumina. It comprises of two phases. Phase 1 to the north of the site is c104 Ha in size. Phase 2 in the southern part of the site amounts to c.80 Ha. It principally comprises of perimeter walls or

raises each c.2 meters in height which enclose a basin of bauxite residue which is pumped from the refinery. Each raise or terrace is building on the foundation of the previous stage raise, known as the 'up-stream method' which has according to the information submitted, has been identified as the Best Available Technique. Thus, the footprint of enclosed area becomes progressively smaller with each stage raise. The structure comprises of 10 successive stage raises in the case of phase 1, whereas the newer phase 2 has been raised to stage 4 at present. The elevation of the BRDA varies from approximately 32m OD at the centre to between 22 and 24m OD at the perimeter. Bauxite residue resulting from the process is dewatered in the plant using vacuum plant filters and a deep thickener, which is aimed at reducing the caustic content. Water is then added is pumped via two pipelines at c.58% solid content to two discharge platforms (one in Phase 1 and one in Phase 2) in the BRDA at an average pressure of 6,500 kPa. These discharge platforms feed a network of fixed spigot points (referred to as mud points) for layered deposition within the cells. The distribution network for the discharge platforms and the mud points are raised vertically in 1 to 2 m high intervals corresponding with the increase in height of the BRDA. The residues is 'mud-farmed' (since 2009) using amphirol to enhance drying and to increase density.

2.3.2. The perimeter stage raises, or walls are constructed of rock fill. Currently the fill is not derived from the borrow pit but is sourced from a quarry outside the site. As the bauxite or red mud is continually deposited on site, these stack walls are raised systematically in 2 metre stages and are stepped inward from the outer perimeter with each additional stage. (See Figure 5.2 in the Planning Report). The current layout of the layered deposition cells for phase 1 (Cells 1 -24) and Phase 2 (Cells 26-46) are set out in anti-clockwise and clockwise form respectively. Residue farming within the cells, allows for the reduction on pH to <11.5 and to allow an increase in density and strength parameters of the deposited bauxite layer. Areas for deposition are partitioned by bauxite residue berms up to 3m in height using a bull-dozer. The majority of bauxite residue is being place within phase 2. The current average rate of production of bauxite residue is c. 1.57 million tonnes per annum which has on average a dry density of 1.60 tonnes / m^3.

2.4. Salt Cake Disposal Area

2.4.1. Within the centre of the BRDA, a salt cake disposal area is also located. This is located within the higher elevations of the BRDA, as the salt cake residue from the production process is classed as a hazardous waste, because of the caustic nature of the substance and is located centrally within the BRDA, in order reduce potential for contamination. The Salt Cake is located within a lined cell to confine the substance. Salt cake is transport from the AAL facility by truck as is tipped into the SCDC.

2.5. Drainage

2.5.1. The existing BRDA is surrounded by a perimeter interceptor channel (PIC) which allows surface water flow outwards from the deposition area. A collection drain has been formed in the bench of the uppermost stage raise to collect seepage and runoff and divert the waters towards a piped drainage system (300mm and 450mm OD twin-walled HDPE pipes at 100 m centres) leading directly to the PIC. This system allows for the progressive restoration of lower benches as the BRDA increases in height by eliminating the trickle down of alkaline water over vegetation. This water is transferred for to a Storm Water Pond to the northeast of the BRDA. Water from this pond is treated at the facility and returned to the Liquid Water Pond located adjacent to the immediate east. Water is used for the sprinkler systems located throughout the BRDA in order to damping down fugitive dust from the deposition area during periods of dry weather. Treated water from the storm water pond, is discharged to the River Shannon via under licence.

2.6. The Borrow Pit

2.6.1. The Borrow pit is essentially an area of quarried stone which is exclusively used to source aggregate to construct the stage raises. It is 4.5 Ha in size and is located to the northeast of the BRDA, near the surface water storage pond. While historically the borrow pit has served the aggregate needs of the BRDA. Until very recently the pit was not operational and aggregate to supply the construction of the stage raises was sourced from a nearby quarry outside the site. However, on foot of a grant of planning permission in 2018 for the recommencement of excavation of aggregate

from the borrow pit, it is intended to recommence excavations at the borrow pit at the time of writing the report. Blasting takes place at the pit in order to extricate the aggregate from the rock face, it occurs on average approximately 9 times per year.

2.6.2. The permitted borrow pit has a depth of c.8.5 m OD. The permitted borrow pit is expected to provide 375,000 m^3 of rock fill material which is considered to be sufficient to construct the BRDA to stage 10 and to implement the closure design.

2.6.3. The area into which it is proposed to extend the borrow pit area in an eastly direction comprises of low scrubland with some semi-mature vegetation. It also accommodates some semi-improved grassland. The total extraction area of the planned expansion is 3.9 ha.

The Stockpile Area

An aggregate stockpile area is located at the southeast of the application site. It occupies an area of approximately 12.5 ha. It is located to the immediate south of Limerick City and County Council's WWTP. It accommodates rock and topsoil which have been imported into the site from a nearby quarry to construct the BRDA stage raises and to progressively restore the BRDA.

3.0 Proposed Development

3.1. Proposed Works to the BRDA

3.1.1. The proposed development is to increase the volumetric size of the existing bauxite residue disposal area (BRDA) in order to increase its capacity to accommodate additional bauxite residue in order to facilitate the continued operation of the permitted Alumina refinery plant. The proposed increase in the disposal capacity will result in an increase in the height of the disposal facility by 12 meters raising the existing height from 32m AOD to 44m AOD (from stage 10 to stage 16). It will involve 6 x 2m high stages. The bench at each stage will be 4.5m with the exception of the first stage (stage 10) which will incorporate a bench of 12.5m.

3.1.2. It will involve the construction of rockfill embankments in 2-meter-high vertical lifts. The overall BRDA Will be raised systematically as the stages are filled with bauxite residue. That permitted BRDA has capacity to provide for bauxite residue until

c.2030 at the current rate of alumina production. It is anticipated that if the current application is granted, it will extend the lifetime of the BRDA up to 2039 based on current disposal rates. The proposed development will provide for the deposition of c.900,000 – 1 million m^3/per annum, which will allow for a projected deposition of c.8.million m^3 of bauxite in total.

3.1.3. In terms of construction methodology, the stage raises will be constructed of hard durable, graded limestone rock fill with a maximum gravel size of 300mm. The rock will be sourced from the permitted borrow pit and the proposed extension of the borrow pit. It is estimated that approximately 380,000 m^3 of aggregate will be required to construct the BRDA to stage 16. Additional volumes will also be required to implement the closure design.

3.1.4. In addition to the deposition of the bauxite residue in the BRDA, process sand which is also a byproduct of the alumina production process will be used to construct additional ramps and access roads within the expanded BRDA. This process sand will be transported from the refinery plant by truck using the existing road network.

3.1.5. The BRDA is surrounded by a perimeter interceptor channel which collects water emerging from seepage sprinkler water and surface water runoff and conveys this water via pumps to the effluent clarification system or the stormwater pond or liquid waste pond. A number of improvements to the water management system will be implemented to allow for the existing water management system to accommodate inflow design flood of a greater return, in accordance with Canadian Dam Association Guidelines. These will include alterations to the perimeter interceptor channels, alterations to culverts and changes to the design of the perimeter interceptor channels.

3.1.6. It is intended that the side slopes and terraces of the BRDA will be progressively restored. This will consist of the installation of a permeable rock filter layer and the deposition of subsoil and topsoil to provide cover. The final restoration will include the completion of the proposed side slope restoration planting scheme on the implementation of grassland and planting on the BRDA dome.

3.2. Proposed Works to the Salt Cake Disposal Cell (SCDC)

3.2.1. The salt cake consists of the organic degradation products from naturally occurring humates in the bauxite. These include sodium hydroxide, aluminium oxide, sodium carbonate, sodium sulphate and sodium oxalate. Salt cake is classified as a hazardous material according to the European Waste Catalogue. As such it is deposited within a specially engineered composite lined cell. Since 2013 AAL have stored the salt cake in an independent composite lined, c. 1 ha in size. The SCDC is accessed from a central access ramp from the phase 1 BRDA. The EIAR makes reference to a Wet Air Oxidation Process which will commence from the first half of 2023. When operating with will result in the cessation of the production of salt cake. In the interim and during periods of maintenance of the new system an extension to the salt cake disposal cell will be required and is proposed as part of this application.

3.2.2. The total current volume of the SCDC is estimated to be 72,800 m^3 at crest level (29m OD). The proposed development seeks a vertical extension to the existing SCDC to a Crest height of 31.25m OD And the maximum overall height of 35.50m OD when capped at cell closure. The increase in height will allow for a disposal of an additional 22,500 m^3 of salt cake. The SCDC extension will take place over one phase. Approximately 27,000 m^3 of processed rock fill material will be required to construct the perimeter wall. It will be lined with c 4,500 m^2 of geosynthetic materials. Other ancillary developments associated with the construction of the SCDC raise will include gabion rock fill a decant tower consisting of a high density polyethylene structured wall pipe, a crash barrier, concrete posts, plinths and path and a conveyor belt. Salt cake will continue to be transported from the refinery to the SCDC by truck. Leachate generated within that salt cake deposition area is collected in a decant chamber which is transferred by an enclosed pipeline to a holding tank. From there the leachate is pumped back to the plant an via enclosed pipe to the caustic recovery stream.

3.3. Proposed Borrow Pit Extension

Existing borrow pit is located to the northeast of the BRDA. It currently occupies an area of approximately 4.5ha in size. This facility exclusively serves the BDRA by providing processed rock which is required to cover and build up the stage raises

around the BRDA perimeter as residue is deposited. The current borrow pit has a permitted depth of 8.5 m and has enough rock, estimated to allow the development to be completed up to stage 10. Under the current application it is proposed to extend the borrow pit eastwards to increase the area by 3.9 ha which will result in a total area of 8.4 ha. The Borrow pit will be extended and extracted from over a number of phases during the lifetime of the development. The pit would be extracted firstly in an northerly direction from the existing borrow pit area, and then in an easterly direction. The extraction will coincide with the phase developments over the lifetime of the BRDA extension. An extraction rate of 50,000m^3 per annum is anticipated. The quarrying activities at the borrow pit will involve the continuation of existing activities including the blasting of rock faces, crushing and screening and the stock piling of material. Operations will take place 08.00 to 18.00 Monday to Friday. Existing access arrangements will continue serve the borrow pit and the BRDA

4.0 Planning History

The planning history associated with the subject site is extensive and is set out in the Table below:

File No.	Application Date	Description	Decision	Decision Date
74/8580	15/02/74	The construction of a plant for the processing of bauxite to alumina including berthing pier, bulk storage, handling ancillary plant and buildings	Grant	30/09/74
79/15737	21/12/78	Partial change of location of bauxite impoundment area	Grant	09/02/79
79/15820	21/12/78	Erection of Aughinish Alumina Plant Signage	Grant	09/02/79
84/24461	14/06/84	Erection of sport complex and associated site works	Grant	03/08/84
88/29312	11/10/88	Erection of three bay portal framed sheeted shed over retained in-site cast concrete for slab for filter sand drainage	Grant	02/12/88
89/511	04/04/89	Erection of 3 heater towers adjacent to existing bauxite	Grant	26/05/89
90/242	31/01/90	Erection of single storey metal corrosion testing shed at plant	Grant	

90/811	01/06/90	Construction of second storey office extension over existing single storey service building	Grant	20/07/90
90/871	14/05/90	Construction and operation of an auxiliary liquor quality control facility within existing Extraction Plant	Grant	03/08/90
90/966	05/07/90	Erection of 1 storey office and control room building	Grant	31/08/90
91/154	21/12/90	Erection of single storey instrument/electrical maintenance workshop	Grant	15/02/91
93/465	23/04/93	Construction and operation of a clarifier feedwater surge pond as part of the effluent treatment plant	Grant	21/05/93
93/1133	17/09/93	Extension of existing bauxite residue storage area	Grant	12/11/93
95/737	06/06/95	Construction of alumina hydrate seed filtration plant	Grant	21/07/95
95/839	19/06/95	Installation of product conveyer and loading machine on marine terminal	Grant	11/08/95
95/1021	08/08/95	Extension to sports complex	Grant	29/09/95
96/1781	07/06/96	Construction of first floor extension to existing marine terminal administration building	Grant	26/07/96
96/1946	10/07/96	Extension to red mud processing building	Grant	30/08/96
96/2165	29/08/96	Erection of hydrate storage building	Grant	04/10/96
97/672	06/05/97	Extension to sports complex	Grant	27/06/97
97/961	20/06/97	Ground floor & first floor extension to existing local amenity building	Grant	10/10/97
00/900	20/04/00	Construction of a 300 MW CHP Plant & conversion later to a 390 MW gas turbine station to include a gas turbine generator, stacks control building, gas and switchgear compounds, oil tanks etc.	Grant	09/06/00
04/262	30/01/04	Construction of a) extensions to north and south ends of existing bauxite storage shed no.2; b) covered and elevated conveyor; c) bauxite storage silo; d) grinding mill building; e) slurry storage tank.	Grant	26/03/04
05/1836	28/06/05	Extension to Bauxite Residual Disposal Area and increase in production of Alumina production to 1.95 million tonnes per annum (including retention of	Grant	15/05/06

		planning permission for increase in production from 1 million tonnes per annum to 1.6 million tonnes per annum).		Decision upheld on appeal PL13.217976
10/548	03/06/10	Construction of a sodium hydroxide cleaning process steel tank24.4 m high and associated foundation slab	Withdrawn	
12/343	02/05/12	Installation of a 150 tonne per hour gas-fired steam boiler with a maximum length of 31.32m, max width of 24.15m and max height above ground of 18m inc. 32m exhaust stack with a diameter of 3m and all associated work above and below ground level.	Grant	25/06/12
12/992	17/12/12	Installation of a 150 tonne per hour gas-fired steam boiler with a maximum length of 31.32m, max width of 24.15m and max height above ground of 18m inc. 32m exhaust stack with a diameter of 3m and all associated work above and below ground level.	Withdrawn	
13/161	22/03/13	Demolition of all farm structures within a disused farm complex including dwelling and 7 sheds/barns and outdoor yards. Restoration of the site to greenfield state. All mature trees and hedgerows will be retained together with boundary wall and access	Grant	15/05/13
13/164	22/03/2013	Amendment to planning reference no. 12/343 for the provision of 2 no. 150 tonne per hour gas-fired steam boiler with a maximum length of 31.32m, max width of 24.15m and max height above ground of 18m inc. 32m exhaust stack with a diameter of 3m and all associated work above and below ground level.	Grant	15/05/13
14/1083	15/10/14	Installation of a second gantry crane ship unloader on the northern side of the marine terminal. The gantry crane ship unloader comprise a prefabricated steel structure with a liftable boom, control cabin, mechanical and electrical equipment and other elements. It will have a maximum height of c57.2m with a boom in the horizontal position and74.2m with the boom lifted. The unloader will be positioned on the existing crane rails to the east of the existing gantry crane ship	Grant	09/12/14

		unloader, which is c 47.7 meters high and 63.6 meters high with the boom lifted to enable both unloaders to move along the marine terminal. An existing non-utilized alumina loader is located on the same crane rails but will be removed as part of the proposed development. The proposed development includes all other ancillary site development works		
16/418	18/05/2016	10 year permission for a development which will consist of the installation of 2 no. deep thickeners (steel vessels with a diameter of c.22m and a maximum overall height of c. 21.9 m) and ancillary elements, including stairs, access platforms and walkways linking to adjacent vessels, pumps, cabling and pipework. The development will also consist of: the provision of a hardstanding, and internal road (c.40m in length) to the east of the thickeners and other site works above and below ground level	Grant	08/16/15
17/714	26/07/17	Ten year permission for the construction of a borrow pit with an extraction area of 4.5 Ha to extract c.374,000 m^3 of rock over a 10 year period. The extraction area is sought up to a maximum depth of c.8.5 m OD with the extraction to occur between April and September each year. The proposal included the demolition of a contractor shed and all ancillary site development including landscaping and boundary treatment and eventual restoration of the extracted area.	Grant	22/02/18 Decision unhelp on appeal under ABP 301011
20/1325	11/12/20	the provision of a nature trail and upgraded the existing nature trail, the construction of 29 no. car parking spaces, new vehicle access and associated landscaping and boundary treatment works. It is also sought to demolish existing derelict structures and a bird hide and to construct a new bird hide in its place. A Natura Impact Statement was submitted with the application.	Grant	18/05/21

5.0 Submissions

5.1. Submission from Prescribed Bodies

5.1.1. Submission from Transport Infrastructure Ireland

National Strategic Outcome 2 of the National Planning Framework includes the objective to maintain the strategic capacity and safety of the national roads network. References to maintaining the national road network is set out in other national planning documents also. The TII notes the subject development site accesses the local road network prior to accessing the N69 National Secondary Route and notes the traffic analysis set out in Chapter 14 of the EIAR. Noting the contents of the chapter, the Authority have no specific comments to make on the impacts of the proposal in relation to the safe and efficient operation of the national network in the area, or any other comments for that matter.

5.1.2. Submission from the Development Applications Unit

It is noted that no underwater archaeological impact assessment was submitted. The Department recommends that the mitigation measures in section 5.5 of the EIAR be mitigated in full.

In terms of nature conservation, it is noted that the site adjoins the Lower River Shannon SAC and SPA. However, there is to be no increase in the footprint of the BRDA facility. The borrow pit is also located outside any designated area. Any further communications in respect of the application should be forwarded to the Department.

5.2. Submissions from Third-Party Observers

5.3. Submission by Mary Kate Bolger – Dolphin Watch

- The observer has a qualification in zoology and marine biology specialising in bottlenose dolphins. The estuary is the home of a resident group of bottlenose dolphins (130-150 in number) which are protected under Annex II of the EU Habitats Directive. They play a vital role in the eco-system by balancing populations of predatory fish and squid thereby protecting the entire eco-system of the estuary. They have been present in the estuary for a long time.

- Long-term exposure to bauxite residue is well known to have toxic impacts on the internal organs of humans and animals. The dolphins in the Shannon Estuary are exposed to this residue from the insufficient lining in the BRDA and from fugitive dust blown from the red mud pond. The residue could also impact on fish populations in the Estuary on which the dolphins predate.

- Skin lesions in dolphins occur in response to environmental stressors. Skin lesions are occurring on the dolphins in the Shannon Estuary. While the exact cause of this is not known, it is apparent that the overall health is declining.

- On October 4th 2010, a BRDA dam at the Ajka alumina plant in Hungary failed, releasing approximately 1,000,000 tonnes of bauxite residue resulting in the deaths of 10 people and leading to severe chemical burns among the local population. Such an event at Aughinish would severely affect the birth-rate of livestock and could cause the collapse of an entire ecosystem.

- Noise pollution from rock blasting could also have an unacceptable impact on dolphins as these creatures rely heavily on echolocation to navigate and communicate. The dolphins are already exposed to noise from shipping and other marine traffic within the estuary and it is noted that noise propagates faster through water. The bathymetry of the Shannon Estuary will result in sound being reverberated off the seabed and will be amplified, causing extreme stress and further physiological damage to the dolphins which could be detrimental to their survival.

- Nature tourism is one of the fastest growing industries in the world and dolphin watch Carrigholt has been operating since 1992 and has attracted many international and Irish tourists.

- Even without the Aughinish Alumina plant there are likely significant health and social problems for dolphins in the Shannon Estuary. Losing the Dolphin population could cause a great environmental and economic toll.

5.4. <u>Submission by Pat Geoghegan – Cappagh Farmers Support Group</u>

- The observation objects to the increase in height of the BRDA as it will exacerbate the potential for an environmental disaster and it would put huge pressure on the existing embankment walls, which merely comprise of crushed rock. This is argued that to increase the height of this structure further contravenes

condition no.38 of the original grant of planning permission which requires the mud pond to be *'effectively sealed to prevent leakage of its contents'*. It further states that *'the embankments are to be of adequate strength to resist mud pressure and storm condition in the estuary'*. The BRDA is unlined. To place more bauxite residue on top of the existing BRDA would place untold pressure on the existing substrata already within the BRDA, resulting in it seeping into the Shannon Estuary.

- Water from the estuary will continue to undermine the foundations and perimeter of the BRDA leading to a massive environmental disaster. To allow blasting in such close proximity to the wall of the BRDA would also be considered to be reckless. No certificates that can ensure and vouch for the structural integrity of the BRDA have been submitted.

- The increased elevated nature of the BRDA will enable higher winds to blow the toxic mud and cancerous Salt Cake greater distances from the BRDA. Humans and animals will be exposed to these toxic chemicals. The pH of red mud typically exceeds 13 and contains toxic elements such as arsenic, zinc and lead. It is also argued that the red mud is radioactive.

- Concerns are expressed that the expansion of the SCDC which contains a very dangerous and hazardous waste product. It is contended that salt cake is carcinogenic. It is suggested that salt cake, mixed with red mud represents a lethal cocktail which when airborne in periods of strong winds can lead to human health problems.

- Reference is made to an article contained in a local newspaper where is it stated that properties around the Aughinish area were coated in red dust. Residents have expressed concern in regard to the health implications of this airborne dust.

- The Board, The EPA and Limerick Co Council have been negligent in allowing the enterprise to expand under previous applications. The radioactive material so close to the Shannon Estuary could have untold damage on the environment and ecosystem of the area.

- The existing facility also results in excessive concentrations of heavy metals on surrounding farming lands. The proposal represents a risk to the farming sector

including infertility in livestock. It is firmly believed that these issues are derived from red dust blowing from the BRDA and the emissions from the Aughinish stack.

- Concerns are expressed that the location of the storm water ponds are in an area that was once tidal. The outer walls of the BRDA and the Storm Ponds are being eroded by tidal activity and these walls are not being kept in appropriated upkeep and repair.

- A rise in sea water levels over the next ten years due to climate change could inundate the BRDA Area and would erode the outer walls of the BRDA which could lead to failure and a release of millions of tonnes of red mud.

- The Aughinish Alumina Plant has failed to evaluate the use of alternatives to stockpiling red mud waste in the BRDA.

- Concerns are expressed that blasting in the borrow pit could undermine the structural stability of the walls containing the BRDA. It would be An Bord Pleanála's responsibility if the containment walls were breached, and a catastrophic mudslide occurred. It is suggested that continuing to import rock aggregate would represent a cheaper and safer option than blasting rock at the existing borrow pit. No scientific evidence has been put forward to suggest that rock blasting is safe at this location. As an alternative source of aggregate exists, there is no need to initiate blasting at this location.

- It is concluded that if an environmental disaster occurs at this location as a result of a grant of permission, the Bord will have nowhere to hide.

5.4.1. Submission from Emanuela Ferrari for Futureproof Clare

- Concerns are likewise expressed that rock blasting so close to the BRDA structure could result in a possible breakout of bauxite residue which would have disastrous consequences on the ecosystem in the area. Work undertaken by an American NGO notes that the rate of serious dam failures is increasing primarily due to lack of investment because they are not creating economic value. There is a high correlation between dam failure and dam height, particularly when dam walls are built on existing tailing deposits.

- It is suggested that the vibration readings used for calculating seismic activity are based on a study carried out at Galmoy Mine and do not directly relate to or are

applicable the application before the Board. There is a need for parameters in this instance to be accurate and site specific. The setback distances to ensure that vibration limits are kept below 25 PPV are also questioned. The recommendations for explosive use are erring on the side of major risk taking. Again, it is suggested that rather than rock blasting, rock can be sourced from other local quarries.

- Reference is made to climate change and the risks resulting from increases in sea level rises, which is occurring at a faster rate than anticipated. Furthermore, the submission states that the most common cause of dam failure is the due to an excessive rainfall event. Tidal surges, flooding and storms can all undermine the integrity of the containment barrier around the BRDA. The precautionary principle should be applied in this instance.

- Reference is made to various industrial disasters concerning tailing dams which have occurred in Europe and the Americas. The assessment of a major disaster at the BRDA is based on the Canadian Dam Association Guidelines and it is considered that the criteria used in these guidelines are skewed in favour profit making rather than environmental. It is suggested that the Global Industry Standards on Tailings Management 2020 may be a more suitable guidance to use in this instance. The latter gives a much less optimistic outlook as to what 'high risk' implies. It is not sufficient or appropriate to merely state that any protected species of wildlife or plants that could be affected by an environmental disaster at the plant would be replaceable. Any magnitude of risk should not be considered to be 'high' in this instance but rather should be classed as 'unacceptable'.

- The condition makes reference to a leaked EPA memo which states that there has been and "extensive contamination of groundwater" and "air emissions that are double the WHO standards" in the area. Concerns were also expressed in relation to the sulphur dioxide emissions from the plant.

- The Non-hazardous classification on the red-mud deposits are also questioned in the submission. It contains caustic soda Iron, alumina, silicium, sodium, calcium, titanium, manganese, lead and cadmium. Thus, it can be very toxic to aquatic life and farm animals. At present there is no alternative use for this by-product.

- It presents a significant threat to groundwater as iron, silica, titanium, gallium and uranium are all present in the residue. Rock blasting also presents a threat to

groundwater. The conclusion that the impact of water seepage through historic layers of bauxite residue would have a negligible impact on groundwater contamination is questioned, particularly as red water seepage has been witnessed by various groups leaking into the estuary.

- Notwithstanding the sprinkler system, airborne red mud has been observed in the wider area. Specific reference is made to the aftermath of a storm in February 2014. There have been many complaints to the EPA on this issue.

- The presence of Natura 2000 sites in the vicinity is a concern. It is noted that the potential impact on sites beyond the 15km radius were not considered and this is a concern. It is considered that impacts on Natura 2000 sites in the vicinity would be grave and significant. EU assessments of biodiversity across the continent are a cause of concern and the Board are urged not to sacrifice any more conservation areas to industry.

- Community groups in the area have outlined concerns with regard to alleged weaknesses in the BRDA wall and other concerns. These have been ignored by Aughinish Alumina Ltd. There has a track record of environmental mishaps at the facility, and these have been downplayed. The alleged mishaps are set out in the submission.

- Concerns about how the Aluminium Industry globally is run is set out in the submission. It is argued that it is run as a monopoly or cartel. The industry results in extremely levels of exploitation and destruction of the environment. The industry is reliant on the extraction and processing of minerals which is unsustainable. It is suggested that the production of aluminium is not crucial to human life or comfort.

- Bauxite production at the facility relies on the Bayer process which is energy-intensive and uses large amounts of fuel /oil. There is no clear intention to tackle the imbalance of energy consumption afforded to large scale polluters such an Aughinish Alumina Ltd.

<u>Submission from Environmental Trust Ireland</u>

- The proposal is an environmental catastrophe waiting to happen. It produces 1.95m tonnes of alumina per year which is 30% of the alumina produced in Europe.

It is a mere 100m form the Lower River Shannon SAC. Reference is made to the environmental mud spill at Ajka in Hungary in 2010.

- There has been no radiological assessment of the site since 2010 notwithstanding the fact that the BRDA has expanded considerable since.
- Groundwater monitoring has revealed excessive amounts of arsenic and mercury.
- Many Natura 2000 sites were ruled out on an arbitrary basis. Cumulative and in-combination effects were not properly considered at all. No proper assessment has been undertaken as to the impact of water and air emissions on ecosystems, species or European sites. Reasonable scientific doubt remains as to whether the proposed development will have an impact on European Sites.
- The applicant applied for planning permission immediately after obtaining a licence this is disjointed and constitutes project splitting.
- In-combination effects have not been adequately assessed, the cumulative impacts arising from the power generation at Moneypoint, Tarbart and the large cement factory at Mungret should all be assessed in terms of possible in-combination effects.
- The EIAR is inadequate and not in accordance with the 2014 EIA Directive.
- The documentation provided by the applicant is not conducive to meaningful public participation and therefore contravenes the requirements of the Aarhus Convention.
- The HSE expressed concerns to the EPA during the licence application regarding the close proximity of the quarrying to the BRDA which could have an impact on the structural integrity of the BRDA.
- The applicant has failed to properly address the impact of climate change on the proposal. Storm surges on the Shannon Estuary is a major factor on flooding which has been ignored. A storm surge would have a devastating impact on the BRDA. Likewise extreme weather events factor not been factored into the assessment.

- Leachate runoff from the hazardous salt cake disposal cell and the bauxite residue disposal area into the estuary and the subjacent groundwater have not been properly considered.

Limerick County Council Planning Report

5.4.2. A briefing workshop was held on January 11th at 11.30am to brief the Members of the Adare Rathkeale Electoral Area on the contents of the proposed development. Details of the existing and the proposed development are set out. It is noted that the purpose of the proposed development is to facilitate an expansion of capacity within the existing disposal area. Details of the planning policy context is set out with specific reference made to the following documents

- Project Ireland 2040 - National Planning Framework
- Regional and Economic Spatial Strategy for the Southern Region
- Midwestern Area Strategic Plan 2012 -2030
- Strategic Integrated Framework Plan for the Shannon Estuary.
- Limerick County Development Plan 2010-2016 as extended.
- Draft Limerick Development Plan 2022-2028

5.4.3. Section 7 of the report sets out a summary of the key planning issues and the assessment. This section essentially summarises the details of the proposed development and notes that the application site is zoned for '*Marine Related Development*' in the Shannon Integrated Framework Plan and in the County Development Plan 2010-2016. Details of the AA Screening, the Natura Impact Statement submitted, and the Environmental Impact Assessment Report are summarised in the assessment section.

5.4.4. In relation to the NIS, it is noted that the information submitted was assessed by the LCCC Heritage Officer who recommends that conditions be attached regarding the proposed upgrades of the proposed water management system and the operation and management of the borrow pit. A sampling regime should be put in place to monitor the levels of metals to inform any mitigation measures that will be required. Overall, it is considered that the proposed development individually or in combination with other plans at projects would not adversely affect the integrity of the Lower Shannon SAC (002165) and the River Shannon on the River Fergus Estuaries SPA

(004077) or the Barrigone SAC (00432) or any other European Site in view of the sites conservation objectives.

In relation to the EIAR the report details the contents of the EIAR chapter by chapter. For many of chapters, the report merely states that 'the information has been considered and the planning authority have no further comment'. Any comments specific to chapters are summarised below:

- In relation to archaeology and cultural heritage, the chapter was assessed by the LCCC archaeologist, and the proposal as deemed to be acceptable.
- The planning authority note the assessment in relation to flora and fauna and the Heritage Officer seeks further clarity in relation to the area of Meadow Barely in the Area of the proposed borrow pit extension (see appendix 1 of report).
- In relation to Population and Human Health, it is considered reasonable that the operator of the facility should contribute towards the cost of environmental, recreational or community facilities which would be of benefit to the community. A condition requiring the establishment of a community gain fund should be attached to any approval issued.
- In relation to hydrology and hydrogeology, further information is required to clarify the status of the groundwater vulnerability of the extension to the proposed borrow pit. The applicant is to take into consideration the impact of water strikes at 7.30m OD and 8.03m OD with the proposed 2.5m buffer zone between the groundwater table and the base of the proposed borrow pit (8.5mOD) (see appendix 1 of the submission).
- The air quality and noise and vibration chapters have been assessed by relevant sections of Limerick Co. Council and conditions are recommended where appropriate. It is considered that blasting should only be carried out a maximum of 6 to 7 times per year in line with the provisions of planning permission 17/714.
- Any issues in relation to traffic and transportation can be dealt with by way of condition.

In respect of a community gain fund, the planning authority acknowledge the contribution that the developer has already made to the wider community in terms of the recreation and community facilities including the upgrade of the existing nature trail as permitted. As the proposal would extend the life of the plant to 2039, the planning authority consider that a formal community gain scheme be put in place to provide additional community support to the local community.

In terms of the overall conclusion, the council consider that a) the application submitted is well prepared with a comprehensive list of supporting documentation to ensure that any environmental impact would be minimised. Further clarification is required in respect of the status of the meadow barley at the borrow extension site and the buffer zone between the base of the proposed borrow pit and the underlying aquifer.

In terms of financial contributions, Limerick Co Council request that the use of land for the deposit of refuse or waste is charged at €1,000 per hectare. The use of land for quarrying of rock, sand and gravel at €6,000 per hectare.

The Council recommend that a total of 8 conditions be attached in the event that planning permission is granted. These conditions include:

- A financial contribution condition.
- All mitigation measures contained in both the EIAR and the NIS be implemented in full.
- The establishment of a community gain fund.
- A standard condition is respect of archaeological monitoring.
- All vegetation removal shall take place outside the bird season, preferably between mid-September and mid-October to minimise disturbance both to nesting birds and wintering wildfowl.
- Blasting shall be restricted to a maximum of 7 occurrences and shall be between the months of April and September only.

6.0 Applicants Response to the Submissions

6.1. A response was received on behalf of the applicant by Tom Phillips and Associates on the 6th July, 2022. The contents of the response is summarised below.

6.2. In relation to the submission from the Environmental Protection Agency for the purposes of clarity it is stated that the licence review application (Ref. No. P0035-08) is currently with the EPA and incorporates the proposed development. It is not required or intended to update the licence application further.

6.3. The DAU submission notes that there are no works proposed in any designated areas and recommends that the mitigation measures set out in Section 5.5 of the EIAR should be implemented in full.

6.4. It is noted that the TII had no specific comment to make in relation to the subject development.

6.5. In relation to the submission by **Mary Kate Bolger** the following is stated:

- The NIS submitted notes that bottlenose dolphins are largely concentrated near the mouth of the Shannon Estuary and are infrequently present upstream of Glin which is 15 kilometres from the subject site.

- Any claims that exposure to bauxite residue may be harmful to dolphins are strongly disputed. It is noted that the observation primarily attributes any impact on dolphin health not directly to the operations of AAL but rather to the general operation of industry in general. A recent publication from *Rogan et al* (2018) has found that the dolphin population of the Shannon Estuary which has been studied intensively for almost 30 years has remained relatively stable with a marginal increase of overall abundance.

- The NIS is accompanied by a conceptual site model prepared by RSK Environmental Limited. It considered the available scientific evidence to evaluate potential pathways that could connect the subject site with the immediate marine and terrestrial environments. Sampling data indicated that there are no pathways being realised that may impact on metal concentrations within the sediment in the immediate marine environment. Sediment concentrations are in line with typical background concentrations for the marine environment. Hence, it is concluded that there is no pathway for heavy metals and no evidence that heavy metal

concentrations are elevated. The data also indicates that there is no pathway between the subject site and designated areas of intertidal estuary for feeding birds.

- In relation to skin lesions on the dorsal fins of the bottlenose dolphins, it is stated that these have been observed in populations of dolphins from all over the world. A number of theories have been put forward as to why this is happening. However, there is nothing unique in the Shannon population showing skin lesions.

- Concerns are also raised in relation to noise pollution from rock blasting. It is noted that a marine mammal risk assessment on potential impacts of blasting has been carried out (Appendix 6.4 of the EIAR) and it concluded that there was no risk of likely significant effects on the dolphin species arising from noise and vibration impacts. Noise and vibration levels from the blast will attenuate quickly and the nearest potential bottlenose dolphin habitat is located over 1.3 kilometres from the borrow pit.

- The applicants fully concur with the observer's sentiments on the benefits of social, economic and educational nature-based tourism.

6.6. The response goes on to address concerns raised in the observation submitted the **Cappagh Farmers Support Group**.

- It is noted that the submission repeatedly refers to bauxite residue as being "hazardous waste". Bauxite residue is in fact categorised as a non-hazardous waste under the European Waste Code.

- It is also stated that the height of the BRDA is below 32 metres AOD and has been carried out in accordance with the permission granted under ABP Ref. PL13.217576 (granted by the Board in 2006).

- With regard to the stability and safety of the proposed stage raises, a Stability Assessment is provided in Appendix D of the Engineering Design Report.

- Reference to Condition No. 38 of the original grant of planning permission in 1974 as referred to in the observation is incorrect. The original BRDA was constructed between 1980 and 1982 under a grant of planning permission dating from 1979.

- With regard to the potential undermining of the embankments reference is made to Appendix H of the Engineering Design Report which concluded that there is

negligible seepage through the base of the facility, either in the unlined or lined areas due to the underlying depth of bauxite residue. No evidence has been provided by the observers in relation to any seepage issues with the BRDA.

- With regard to the impact of blasting, two production blasts have been conducted to date at the permitted borrow pit and the monitoring data for both blasts (carried out in June, 2022) have returned values in compliance with licence requirements under IELP-0035-07. No adverse effects have been identified for the BRDA for either the structural integrity of the BRDA or the gas transmission pipeline. Furthermore the borrow pit extension is at a greater distance from the BRDA over that already permitted. All necessary certification of the structural stability of the BRDA is certified and recorded in accordance with conditions associated with Schedule C7 of the EPA Licence issued.

- The air quality chapter of the EIAR has evaluated fugitive dust emission scenarios as a result of the increase in height of the BRDA. The human health assessment also considered these scenarios and adverse impacts were not predicted as a result of the proposed development.

- Contrary to what is stated in the observation, there is a detailed breakdown of the composition of both the bauxite residue and salt cake in the EIAR. These were evaluated in the human health assessment. It is noted that all chemical and natural occurring radioactive materials have been addressed in detail in the human health chapter of the EIAR.

- The observation also includes an entirely inaccurate statement that red mud was deposited 40 feet below the land surface. Bauxite residue has never been deposited below the land surface.

- It is also contended that the article provided in the observation related to an incident at a farm in County Mayo and clearly states that following an investigation by the EPA and the comparison of samples taken at the farm and the AAL facility that there was no link between the two. The claim in relation to the ceasing of milk production on the farm due to heavy metals is not supported by any evidence.

- It is not accepted that the subject site is located in a tidal area. The ordnance survey map of 1840 details that the site was a network of irregular fields at the time with a number of structures throughout.

- The suggestion that the outer walls are being eroded and that sections are coming away is incorrect. The applicant carries out routine maintenance works to the embankments on an on-going basis. It should also be noted that this embankment does not form part of the containment infrastructure for the BRDA. Notwithstanding this, the applicant monitors the structures and maintains it on an on-going basis.

- It is acknowledged that climate change has the potential to alter weather patterns. Appendix G of the Engineering Design Report assesses the potential risk due to the impact of climate change. It concluded that the risk associated with a containment breach or bauxite residue release was either 'highly improbable' or 'very unlikely'.

- Likewise, Chapter 10 of the EIAR has investigated the issue of flooding and found that there is currently no flood risk either pluvial or coastal for the site. If additional storage for bauxite residue cannot be provided on site, there is a significant risk for the future viability of the facility post 2030 which would have adverse consequential economic impacts for the local area and the region.

- It is rejected that the applicant has not provided any scientific evidence in relation to the blasting of rock at this location. All extraction from the borrow pit will be located above the groundwater table.

- It is confirmed by Ecology Ireland Limited that meadow barley is not present within the application footprint and that the borrow pit extension is dominated by scrub habitat. It is stated that there is no potential for meadow barley to occur at this area. The borrow pit will be the subject of a restoration masterplan which is detailed in the EIAR and the Engineering Design Report. The borrow pit will incorporate planted landscape pockets created in localised areas.

In relation to the submission by **Environmental Trust Ireland** the following is stated.

- This observation makes specific reference to the catastrophic breakout of bauxite residue which occurred at a storage facility in Ajka, Hungary, suggesting that the same thing could occur at the BRDA at Aughinish. The response argues that the

method of bauxite residue storage is entirely different to that which operated in Hungary. It is stated that the facility in Hungary used an older technology referred to as "wet ponding". The AAL facility incorporates a "dry stacking system". This method ensures that there is a negligible amount of fluid in the bauxite residue and therefore it will not flow. Any suggestion that the existing facility at Aughinish will exacerbate threats to the environment and to human and animal health is not supported by evidence.

- Contrary to what is stated in the observation, AAL have undertaken additional radioactive assessments of the bauxite residue subsequent to 2008. More recent tests carried out in 2021 showed values slightly lower across the spectrum than the previous 2008 assessment referred to in the observation.

- Claims that groundwater monitoring revealed excess amounts of arsenic and mercury are not accepted. With the implementation of mitigation measures set out in the EIAR and the CEMP, the predicted residuals impacts on groundwater were assessed as being 'negligible', 'non-significant' and 'slight in nature'. The conceptual site model undertaken as part of the NIS indicated that there were no pathways identified which could potentially impact on groundwater or benthic sedimentation in the estuary. Data showed that metal concentrations in the estuarine sediment were typical background concentrations for the marine environment.

- With regard to the 15-kilometre zone of influence which was used for the purposes of determining the boundary of the zone of influences for the purposes of appropriate assessment, it is stated that this is a standard approach and follows national and international guidelines. The NIS clearly identifies potential for impacts upon more distant designated sites in the event that any significant likely effects are identified beyond this zone. Furthermore, contrary to what is stated in the observation the potential for cumulative and in combination effects were considered in detail in the NIS.

- The suggestion that no adequate or proper assessment has been carried out under the Habitats Directive and under the Environmental Impact Assessment Directive is completely unfounded.

- Any reference to project splitting is not applicable in this instance as project splitting refers to dividing up projects in order to avoid carrying out EIAR.

Furthermore, it is entirely appropriate that the applicant would seek planning permission and a licence separately.

- Public consultation has been carried out in accordance with the Aarhus Convention and the applicant has gone further in engaging in community consultation.

- Arguments set out in the observation stating that the applicant has failed to properly address the impact of the proposal on climate change is incorrect. Flooding and other climate change related impacts are considered in the EIAR.

- It is incorrect to suggest that leachate and run-off from the hazardous salt cake disposal cell and bauxite residue disposal area has not been properly considered in the EIAR. The BRDA is surrounded by a perimeter interceptor channel which is compositely lined. Water is then transferred to the effluent clarification system or to the stormwater pond which is compositely lined. Waters inside the SCDC comprise of dissolved salt cake which are diluted by the rainfall catchment of the cells. Drainage of the internal catchment within the SCDC is naturally conveyed to a decant power where waters flow by gravity to a storage tank located to the north and at a lower elevation than the SCDC and are then pumped to the AAL plant for caustic recovery.

- Finally, it is stated that the observations submitted does not acknowledge the detailed analysis and data in relation to the environment, health and protected areas that are contained in both the EIAR, and the NIS submitted.

6.7. The response finally goes on to address the issues raised in the observation by **Future Proof Clare.**

- With regard to blasting, it is reiterated that competent authorities have already granted planning permission and an EPA licence with respect to the operation of a borrow pit which is closer to the BRDA than the proposed expansion under the application.

- It is not accepted that subjacent levels of bauxite residue can liquify.

- The monitoring data from two initial blasts from the permitted borrow pit has been used to calibrate and model the peak particle velocity. This clearly indicates that any blasting from the borrow pit does not pose a threat to the containment of the BRDA.

It is reiterated that the borrow pit extension is at a greater distance from the BRDA than that already permitted. Climate change factors have also been properly assessed in the engineering design report.

- With regard to the reliance on this CDA Guidelines (Canada Dam Association Guidelines). It is stated that these are internationally recognised best practice standards for the design, operation and management of tailing facilities which promotes a risk-informed approach to safety analysis. While the observation makes reference to the Global Industry Standards on Tailings Management 2020. It is stated that the CDA Guidelines have an advantage over the other guidelines on the basis that they provide target level criteria thresholds for stability in the form of 'factors of safety' (FoS) for the various stages in the life of the facility and the various scenarios. The most extreme scenarios have been modelled and assessed in the engineering design report particularly in relation to maximum precipitation and high astronomical tide.

- It is reiterated that the bauxite residue does not present radiation hazard and is not classed as a hazardous waste.

- Trails progressed with the University of Limerick have indicated that the capping containment to be used for the BRDA will permit and facilitate the appropriate remediation of the subject site.

- The observation appears not to differentiate between the Stage 1 and Stage 2 Appropriate Assessment undertaken. Any reference to potential harmful impacts were acknowledged during the Stage 1 Screening Process which could occur in the absence of mitigation. However, the 3 sites that were brought forward to NIS stage were appropriate mitigation measures will be put in place will ensure that no adverse impacts will arise on the Natura 2000 sites in question.

- It is reiterated that there is no meadow barley on the application site.

- The applicants have an excellent record in maintaining and remaining in compliance with the parameters established by the EPA licence in respect of the facility.

- Any concerns in relation to the global alumina industry are not relevant to the subject site.

- All audits carried out at the facility are independent. Furthermore, it is stated that aluminium which is ultimately produced from alumina is of increasing importance as the global economy transition towards a low carbon future particularly due to the aluminium metal's lightweight nature and corrosion resistant qualities as well as its recyclability. The production of alumina is therefore critical to facilitate the production of renewable technologies.

- With regard to energy consumption at the plant, it is stated that AAL generate 99.85% of their own electricity and export 97 megawatts of their electricity to the National Grid. The response goes on to detail how energy exported to the Grid has the lowest carbon content of any fuel source outside renewables.

- Furthermore, AAL operates under an EU emissions trading scheme which is licensed by the EPA. It is also stated that the aims and objectives of the greenhouse gas reduction at the AAL facility is fully in accordance with the aims of the Climate Action Plan 2021.

6.8. In conclusion, it is stated that the proposed development is wholly compliant with national, regional and local policy and that prescribed bodies have not raised any concerns in relation to the proposed development. It is stated that the EIA and NIS fully explore and assess the potential environmental impacts arising from the proposed development and the proposal will assist in the long-term economic sustainability of the facility and of the region. On this basis it is argued that the proposed development is fully in accordance with the proper planning and sustainable development of the area.

7.0 Planning Policy Context

7.1. National Planning Framework

7.1.1. The Shannon Estuary Integrated Framework Plan is identified as a case study in the NPF. It notes that as a deep-water port, the Shannon Estuary routinely caters for ships of up to 200,000 deadweight tonnes. It serves a number of largescale industrial and bulk installations. Chapter 3 of the NPF relates to Effective Regional Development. It identifies the Atlantic Economic Corridor as a separate case study, the overarching objective of the AEC initiative is to 'maximise the infrastructure,

talent and enterprise assets along the western seaboard and to combine the economic hubs, clusters and catchments of the area to attract investment, improve competitiveness, support job creation and contribute to an improved quality of life for people who live there. The future growth of the Midwest area will be based on leveraging national and international connectivity, higher education capacity and quality of life to secure strategic investment. This must be underpinned by sustainable employment and housing development focused on the broader Limerick-Shannon metropolitan area and strengthening the urban cores of county towns and principal settlements as well as rural areas'.

7.2. Regional Spatial and Economic Strategy for the Southern Region

7.2.1. RPO 79 specifically relates to the Shannon Estuary and other harbour plans. The RSES recognizes the national and international importance of the Shannon estuary, its potential to attract multinational development and the significant work that has been undertaken to progress its promotion and development. It is an objective to support and promote the delivery of strategic development locations as set out in the Shannon Integrated Framework Plan for the Shannon Estuary subject to the implementation of mitigation measures outlined in the Strategic Environmental Assessment and Appropriate Assessment undertaken as part of the framework plan and zoned in the local authority development plans.

It is the objective to promote the Strategic Integrated Framework Plan for the Shannon Estuary (SIFP) initiative as a good practice model for the southern region and to seek the preparation of similar initiatives for Cork and Waterford harbours.

7.2.2. It is the objective to support the promotion, marketing and seeking of financial and expert support for the SIFP on specific projects emerging within the plan area. Such initiative shall be subject to the relevant environmental assessment requirements including SEA, EIA, SFRA and AA as appropriate.

7.3. Strategic Integrated Framework Plan for the Shannon Estuary

7.3.1. The Strategic Integrated Framework Plan for the Shannon Estuary is an interjurisdictional land a marine based framework plan to guide the future development and management of the Estuary. The area encompasses the lands

from Limerick westwards to Loop Head in County Clare to Kerry Head in Co. Kerry. The plan recognises that Aughinish Alumina is a major employer in the area. It is an objective of the development plan to ensure that Shannon, as a linked gateway with Limerick, is a driver of county and regional prosperity by harnessing its strategic location and access on the Atlantic corridor in addition to its employment base, International Airport and other competitive advantages. Aughinish Island is designated as 'Strategic Development Location F'. Section 5.4.4 sets out the strategy for marine related industry and other industry. It notes that in the case of Aughinish, the site incorporates a well established strategic industrial complex where further growth in the primary industry is anticipated. This is likely to include the potential extension of existing deepwater berthing facilities to take advantage of the potential for larger vessels and upgrading of loading machinery. The alumina facility anticipates remaining as a significant working industrial plant for the foreseeable future, generating considerable contributions and employment to the local and regional economy. The facility in recent years has developed a Combined Heat and Power facility which provides steam energy to the industrial process and feeds electricity into the National Grid.

Specific policies set out in the SIFP include the following:

SIFP MRI 1.2.9 – Aughinish Alumina

- *'To safeguard the role and function of Aughinish Alumina as a key driver of economic growth in the region, encouraging its sustainable growth, expansion and diversification to facilitate greater and more competitive trade potential.*

SIFP MRI 1.2.10 – Aughinish Marine Related Industry

- *'To support and facilitate the sustainable development of marine related industry online within this strategic development location, which harnesses the potential of the deep water, large hinterland and existing infrastructure. Other sustainable land uses may be acceptable where they are considered compatible or complementary with the level of flood risk, and where the ability to deliver the primary use (marine related industry) is not compromised. Development will be subject to compliance with the criteria set out in Objective SIFP MRI 1.2.*

7.4. Limerick Co Development Plan

7.4.1. The Limerick County Development Plan 2010-2016 will continue to have effect until the Limerick city and county development plan 2022 to 2028 is adopted. According to the Limerick County Council website, the Draft Plan has progressed to Stage 3 and the Chief Executive's report has been prepared and issued to elected members of the City and County Council on the 10th of May 2022. A special meeting of Limerick city and County Council has been scheduled for the 17th of June 2022 at which elected members will make the plan with or without proposed amendments. The draft plan therefore it's likely to come into effect sometime after late July.

7.4.2. Thus, for the purposes of this assessment the operative plan is the Limerick County Development Plan 2010 to 2016 although this may conceivably change at the time of the Board's deliberations of the application. The subject site is zoned for 'Marine Related Industry'.

7.4.3. The importance of industry to Limerick is acknowledged in S.5.4.1 where itis noted that 'Industry and enterprise together as sectors are crucial as drivers of economic growth. These sectors play and a leading role in improving Ireland versatility and technological advancement, giving it a greater competitive edge in international markets, thereby creating revenue and employment'. The following policies should also be noted.

Objective ED 04: – Safeguard Strategic Development Locations along the Estuary

It is an objective of the Council to safeguard the Strategic Development Locations at Foynes Port, Foynes Island and Aughinish Island for the sustainable growth and development of marine related industry and industrial development at Askeaton.

Objective SE O2: - Promoting Development:

The Council will seek to promote the economic and industrial development of the Shannon estuary in order to capitalize on its location in the Midwest industrial and business region. Sufficient land will be zoned or identified for industrial and business use through local area plans or zoning within this plan' including zoning in the Strategic Integrated Framework Plan for the Shannon Estuary.

Objective ED O26 – Mineral Extraction and Environmental Impacts

It is the objective of the Council to:

(a) Minimise environmental and other impacts of mineral extraction through rigorous application of development management and enforcement requirements for quarry and other developments; and

(b) In particular, to have regard to visual impacts, methods of extraction, noise levels, dust prevention, protection of rivers, lakes and other water sources, impacts on residential and other amenities, impacts on the road network (particularly with regard to making good any damage to roads), road safety phasing, re-instatement and landscaping of worked sites.

Objective ED 04 – Safeguard Strategic Development Locations along the Estuary

It is the objective of the Council to safeguard the Strategic Development Location at Foynes port, Foynes Island and Aughinish Island for the sustainable growth and development of marine related industry and industrial development at Askeaton.

All proposed developments shall be in accordance with regional and national priorities and the SEA Directive, Birds and Habitats Directive, Water Framework Directive, Shellfish Waters Directive, Floods Directive and EIA Directive.

Buffer zones shall be incorporated into proposals for development where necessary to preserve potentially valuable habitats, for example areas of the estuary, shallow bays and inlets, mudflats, lagoon, salt marsh and woodland habitat which occur at or surrounding Strategic Development Locations. The extent of such buffer distances shall be established in consultation with relevant statutory bodies. Detailed botanical, faunal and ornithological surveys shall be undertaken in relation to proposed development at these Strategic Development Locations to fully consider the potential effects of the development and inform how to best avoid significant ecological effects.

7.5. Draft Limerick and County Development Plan 2022-2028

7.5.1. There is no significant departure from the existing plan in the Draft Limerick and County Development Plan 2022-2028 in respect of policies relating to Aughinish Alumina Ltd. Chapter 4 of the Draft Plan is entitled 'A Strong Economy'. Section 4.7.17 relates to Mineral Extraction.

7.5.2. It states *that 'it is recognised that the aggregates (stone, sand and gravel) and concrete products industry contribute to economic development and are essential building materials. However, they can give rise to land use and environmental issues which are required to be mitigated and controlled through the planning process.*

Objective ECON O32 - Mineral Extraction and Environmental Impacts -It is an objective of the Council to:
a) Minimise environmental and other impacts of mineral extraction through rigorous application of development management and enforcement requirements for quarry and other developments; and

b) In particular, to have regard to visual impacts, methods of extraction, noise levels, dust prevention, protection of rivers, lakes and other water sources, impacts on residential and other amenities, impacts on the road network (particularly with regard to making good any damage to roads), road safety, phasing, re-instatement and landscaping of worked sites'.

Objective ECON O43 - Safeguard Strategic Development locations along the Estuary - It is an objective of the Council to safeguard the Strategic Development Locations at Foynes Port, Foynes Island and Aughinish Island for the sustainable growth and development of marine related industry and industrial development at Askeaton. All proposed developments shall be in accordance with regional and national priorities and the SEA Directive, Birds and Habitats Directive, Water Framework Directive, Shellfish Waters Directive, Floods Directive and EIA Directive. Buffer zones shall be incorporated into proposals for developments where necessary to preserve potentially valuable habitats, for example, areas of estuary, shallow bays and inlets, mudflats, lagoon, salt marsh and woodland habitat, which occur at or surrounding these Strategic Development Locations. The extent of such buffer distances shall be established in consultation with relevant statutory bodies. Detailed botanical, faunal and ornithological surveys should be undertaken in relation to proposed developments at these Strategic Development Locations, to fully consider the potential effects of the development and inform how to best avoid significant ecological effects.

7.6. Natural Heritage Designations

The Lower River Shannon SAC (Site Code 002165) is located c.100m to the north of the subject site. The River Shannon and River Fergus Estuary SPA (Site Code 004077) is also located c.100m to the north of the site. The Barrigone SAC is located c 500m to the south east of the southern boundary of the site.

8.0 Assessment

8.1. Introduction

I have read the entire contents of the file including the EIAR, Planning Report and supporting documentation and the NIS all submitted with the application. I have visited the subject site and its surroundings. I have read in full the observations submitted in respect of the application including the third-party observations, the observations from the Planning Authority and the observations from prescribed bodies. I consider the critical issues in determining the current application and appeal before the Board are as follows:

- Structural Integrity Concerns Regarding the Proposed Raises of the BRDA
- Concerns Regarding the Hazardous Nature of the Bauxite Residue
- Surface Water and Groundwater Contamination as a Result of the BRDA
- Groundwater Monitoring
- Fugitive Dust Issues
- Liquefaction Issues in the Case of a Catastrophic Breakout
- The Suitability of the Guidelines Used to Inform the Stability of Dam Construction
- Other Miscellaneous Issues

8.2. Structural Integrity concerns regarding the proposed Raises of the BRDA

8.2.1. The existing grant of planning permission issued by the Board under Reg. Ref. PL13.217976 provided an additional area for the disposal of bauxite residue to a final perimeter elevation of 24 metres OD and a maximum dome crown elevation of 30 metres OD. The current application before the Board seeks to increase the area to accommodate additional bauxite residue disposal capacity in order to extend the permitted life of the disposal area for an additional 9 years; from circa 2030 to circa 2039. The lifetime of the future capacity of the BRDA is based on the current rate of residue disposal and production rates (c.1.95 million tonnes per year).

8.2.2. Under the current application before the Board it is not proposed to incorporate any amendments or expansion to the existing BRDA footprint. The proposal seeks to facilitate an increase in height from Stage 10 to Stage 16. This would provide a perimeter elevation of 36 metres OD and a maximum dome crown elevation of 44 metres OD. The proposed development would provide for the deposition of c.1 million cubic metres per year of bauxite residue. The proposed method of raising the BRDA from Stage 10 to Stage 16 will be the 'upstream method'[1]. This involves the construction of rock fill embankments (stage raises) upon previously deposited and farmed bauxite residue. Each raise will involve 2 metre high vertical lifts to be contained within graded limestone rockfill with a maximum particle size of 300 millimetres (referred to as Type B material). The material is to be sourced from the borrow pit onsite and is to be sufficiently permeable to allow the draining of water from the bauxite residue paste which will discharge into the perimeter interceptor channel.

8.2.3. The various third party concerns raise a number of potential threats to the integrity of the containment perimeters associated with the BRDA which include the following:

- A catastrophic breakout of bauxite residue due to a breach in the perimeter walls
- Undermining of the structural integrity of the BRDA perimeter due to blasting

[1] This metod according to the EIAR constitutes best practice for Tailings Dam Design

- Undermining of the structural integrity of the BRDA perimeter due to climatic factors including climate change
- Undermining of the structural integrity of the foundations of the BRDA due to proximity to tidal incursion.

Each of these issues will be dealt with in turn.

Catastrophic breakout of bauxite residue due to a breach in the perimeter walls

8.2.4. The potential for a catastrophic breakout of bauxite residue due to a breach in the perimeter walls is primarily predicated on the structural stability of the walls and any undermining of the structural stability due to shortcomings in construction and engineering techniques. The stability of the walls in question are assessed in detail in Appendix D of the Engineering Design Report and in Section 7.5 of the Engineering Report itself. Stability analysis were conducted on critical and representative stability sections of the BRDA. The stability sections were assessed using the limit equilibrium modelling software (SLOPE/W Version 10.0017401). The analysis included both drained (effective stress) and undrained (total stress) and strained conditions within the bauxite residue and the estuarine deposits. The factor of safety (FoS) for the BRDA raised development were applied to the structures based on the principles set out in the Canadian Dam Association Guidelines. A minimum FoS of 1.5 is considered a safe requisite for all static long-term drained analysis. A reduced factor of 1.3 may be considered acceptable for the short-term undrained condition following embankment construction provided that sufficient understanding of the materials strained parameters and their behaviour exists and that appropriate risk assessment has been undertaken. All stability sections analysed returned a factor of safety in compliance with the target criteria of 1.5 for Phase 1 and Phase 2 of the BRDA.

8.2.5. Similar stability analysis were carried out for the stormwater pond and the liquid waste pond. While no alterations to these ponds are proposed under the current application, concerns were nevertheless raised in the third-party observations regarding a potential breach in these water retention ponds. A stability analysis was undertaken for both the stormwater pond and the liquid waste pond in March 2018 as part of the overall risk assessment for the BRDA and again all the pond sectors analysed returned a factor of safety in excess of 1.5 with the exception of one sector

(Sector M). However, this sector does attain the original design factor of safety for this structure of 1.3 (and the long-term drained analysis does attain a factor of safety in excess of 1.5). The target factor of safety criteria attained are consistent with current international guidelines for tailing dam safety management and best practice.

8.2.6. Furthermore, the Board are requested to note that historically the stability analysis of the BRDA was required to achieve a target factor of safety of 1.3 for undrained conditions. Thus, the design of Phase 1 and Phase 2 to Stage 10 which was approved by An Bord Pleanála in 2006 required the perimeter raises to achieve a target factor of safety of 1.3 as opposed to the more stringent standard of 1.5. Thus, the Board in its decision of 16 years ago considered a factor of 1.3 to be acceptable. The Board will be aware that there has been no non-compliance concern with regard to the stability of the raises under this less onerous target in terms of the factor of safety. On the basis of the above therefore, I am satisfied that the methodology and modelling used in assessing the stability of the stage raises in engineering terms allows the Board to come to the conclusion that there will be no concerns in respect of structural integrity of the stage raises proposed.

8.2.7. Finally in relation to this matter I would refer the Board to Condition C.7 of the EPA Licence. This condition requires strict monitoring of the structural integrity of the embankments of the BRDA and the areas around the BRDA on an on-going basis. This includes a standard walk over on a daily basis and routine stability checks for settlement and movement. The applicant is therefore required under licence to monitor the structural integrity of the embankments of the BRDA.

Condition C7 – Monitoring at Bauxite Residue Disposal Area

Location	Parameter	Monitoring Frequency	Analysis Method /Technique
BRDA embankment	Phreatic surface	Quarterly	Dip meter
BRDA embankment	Hydrostatic pore pressure	Quarterly	Agreed method
BRDA embankment wall	Standard walk over and condition & stability checks Settlement / movement Annual review	Daily	Visual

	Independent audit SEED audit	Quarterly Annually Every 2 years As agreed	Agreed method Agreed standard Agreed standard Agreed standard
BRDA and residue	Volume of residue disposed Tonnage of residue disposed Used Capacity Remaining Capacity	Continuous Monthly Annually Annually	Flow meter Dry Density Agreed method Agreed method
BRDA perimeter interceptor channel	Water level Quantity of seepage loss from the BRDA	Weekly As agreed	Dip meter/gauge Agreed method
Area around BRDA	Seismicity	As required by the Agency	Agreed method

Undermining of the structural integrity of the BRDA due to blasting

8.2.8. The proposed borrow pit development is located to the north-east of the BRDA. The Board will note that the existing borrow pit where the blasting and excavation of rock takes place, is at its closest point, c.170 metres from the stormwater pond and the liquid waste pond. Golder and Associates report carried out in 2017 presented a stability review of the potential impact of the BRDA raises arising from sharp increase in peak particle velocity that can be expected to be caused by blasting. The design blasts are limited to produce a maximum peak PPV of approximately 25 millimetres per second. The stability analysis undertaken found that the blast analysed resulting in a maximum PPV of approximately 25 millimetres per second at the BRDA embankment would not cause instability of the BRDA due to the vibration of the blast or the air over pressure resulting from the blast.

Condition B5 of the vibration and air overpressure limit values limits the vibration level of the nearest monitoring location to 12 millimetres/second and the air overpressure to 1.25 DB(Lin) max peak.

8.2.9. Furthermore, the applicant has indicated in his response to the observations submitted that two production blasts have been conducted to date at the permitted borrow pit on foot of the grant of planning permission under An Bord Pleanála Ref. 301011-18. These blasts have been carried out on the 17th June, 2022 and the 28th June, 2022. The monitoring data according to the response has returned values in compliance with the licence requirements (IDLP0035-07) for both vibration and air overpressure. The monitoring has been conducted by Golder and Associates. It is noted in the response that no adverse effects have been identified for either the BRDA or the gas transmission pipeline in proximity as a result of the two blasts. The Board will note that details of the two production blasts carried out on separate dates in June, 2022 are not appended to the applicant's response. The Board if it has any concerns in this regard, may wish to seek details of the information referred to in order to ensure compliance with the limits set out in the licence. However, the applicant is required in any event to fully comply with the specified conditions set out in the existing licence. The Board will be aware that under the stipulations of Section 99(f) of the EPA Act as amended, the Board if it is satisfied that the proposal would not result in an unacceptable impact on the receiving environment, and considers it appropriate to grant permission, it is precluded from attaching conditions for the purposes of controlling emissions from the activities undertaken. This would include noise and vibration emissions. Thus, if the Board are satisfied that eh proposal has an acceptable impact on the environment, the control of any such emissions falls under the remit of the EPA and not An Bord Pleanála.

8.2.10. However, the Board have already determined that blasting was acceptable at the existing borrow pit which was granted planning permission under ABP301011-18. The blasting permitted under the extant permission is closer to the perimeter of the BRDA than that proposed under the current application. It is logical to conclude therefore based on the fact that vibration and air overpressure dissipates over distance that any impact arising from blasting under the current application will be less than the impact already permitted by the Board. On the basis of the above therefore, I consider it reasonable to conclude that any impact arising from blasting on the structural integrity of the perimeter walls of the BRDA on stormwater ponds in the vicinity would be acceptable and would not pose a threat to the structural integrity of this structures.

Undermining of the structural integrity of the BRDA perimeter due to climatic factors including flooding, tidal surges and other climate change factors

8.2.11. In relation to flooding, the EIAR acknowledges that flooding events have been recorded by the Office of Public Works both to the east and west of the Aughinish site and these are recurring flood events. However, no flood events have been recorded at the AAL plant facility or the BRDA footprint. Having consulted the OPW flood maps this assertion appears to be correct. It is noted that the BRDA footprint and surrounding catchment is defended by the OPW constructed flood protection works on the north and western banks of the island where a flood tidal defence berm has been constructed to a maximum height of 5 metres OD.

8.2.12. Section 17.3.1 of the EIAR assessment the proposed development in terms of its vulnerability to climate change. The proposal has been assessed inter alia in the context of more intense storms and rainfall events and increased likelihoods and magnitude of river and coastal flooding, including tidal surges. A noticeable feature in the recent weather has been an increase in the frequency and severity of storms. Section 3.4 of the engineering design report assesses the potential impact of the proposed development in terms of climate. Appendix G of the same report also assesses a potential breach analysis due to the impact of climate change in terms of rising sea levels and increased rainfall amounts. It again concluded that the risk associated with a containment breach was either 'highly improbable' or 'very unlikely' depending on the scenario modelled.

Undermining of the structural integrity of the foundations of the BRDA

One of the observations submitted argues that the BRDA, specifically the northern section has been placed upon the estuarine and tidal area of the Lower Shannon Estuary. This, it is argued makes the foundations of the BRDA structurally vulnerable to being undermined from tidal incursion. It is also suggests that the foundations of the BRDA maybe unstable due to the estuarine deposits on which the embankments were built upon. Having consulted the historical OS Maps of the area, it is clear that the BRDA has been built upon a patchwork of fields, that according to the OSI Maps are located beyond the any flood plain or areas of tidal inundation. Therefore based on this evidence I have no reason to believe that there is nothing other than solid foundations beneath the BRDA.

Conclusions regarding the Structural Integrity of the BRDA

I consider that detailed modelling and risk analysis has been undertaken for the various scenarios in relation to a potential breakout or release of bauxite residue due to catastrophic failure in the containment walls due to the various potential threats set out above. The risk analysis and modelling undertaken clearly indicates that any potential breakout, while it cannot be exclusively ruled out, is highly improbable and very unlikely. Furthermore, I consider that the third party observations submitted have not provided any substantive evidence that the BRDA is structurally deficient to the extent that any such breakout of bauxite residue is likely or imminent. The evidence presented before the Board overwhelmingly suggests that any such breakout ranges from 'very unlikely' to 'negligible' in accordance with the annual probabilities on failure as described in Appendix G of the engineering design report. The implication of any potential breakout is assessed in further detail below.

8.3. Liquefaction Issues in the Case of a Catastrophic Breakout

8.3.1. Concerns are expressed in one of the observations submitted that in the event of a breach in the containment walls due to seismic or other activity, that the bauxite residue could liquify causing the bauxite residue to flow rather than remain static. Liquefaction is a phenomenon whereby soils and sands which are saturated with a high moisture/water content take on the characteristics of a liquid (due to intense shaking of an earthquake) and therefore result in the material flowing rather than remaining static or slumping. Appendix C of the engineering design report specifically deals with the threat of liquefaction arising from the proposal. An initial screening methodology was undertaken to assess the estuarine soils beneath the bauxite residue and an assessment of the bauxite residue itself in terms of susceptibility to seismic liquefaction. The estuarine deposits were determined not to be susceptible. The bauxite residue was determined to be in the range of moderate susceptibility thus requiring further analysis.

8.3.2. One of the third party observations submitted suggested that the foundations of the BRDA was located on a tidal estuarine area associated with the Lower Shannon and this in itself could undermine the very foundations of the BRDA. As referred to above, it is quite evident from the earlier additions of maps produced by the

ordnance survey, that the BRDA is in fact located on lands which previously accommodated a patchwork of fields to the south of the estuary rather than any estuarine deposits and floodplains associated with the Shannon Estuary. The foundations of the BRDA therefore would not appear to be affected by or indeed structurally undermined by tidal activity associated with the estuary.

8.3.3. The liquefaction analysis for bauxite residue for a seismic event (i.e. earthquake) which on the island of Ireland is estimated to have a return period of 1 in 2,475 years for a magnitude 5 earthquake with an epicentre within 1 kilometre of the BRDA meets the required factor of safety against triggering liquefaction in that the factor of safety exceeds 1.0.

8.3.4. Furthermore, and perhaps more importantly and notwithstanding the fact that a containment failure is assessed as being very unlikely to almost impossible in the cases of Phase 1 and Phase 2 respectively,[2] according to the risk assessment carried out for the BRDA these values are significantly less than the annual average probability worldwide of tailing down failures based on statistical data which equate to a 1 in 2,000 chance of an annual containment failure. Therefore, contrary to what is argued in one of the third-party observations, the potential for containment failure has been assessed in the context of international standards and has been found to compare more favourably with international standards. The estimated volume of bauxite residue that could potentially be released in a breach scenario has been assessed by two methods and is considered to be in the range of 40,000 cubic metres to 90,000 cubic metres. This is considerably less than the volume of bauxite residue under the Ajka Alumina Plant accident in Hungary which occurred in 2010. Under the Ajka catastrophe approximately 1 million cubic metres of liquid waste was released.

8.3.5. It also appears from information supplied on behalf of the applicants that the Ajka Alumina Plant used a wet ponding form of waste containment which had a considerably higher liquid content in the bauxite residue. As referred to already in my report, the bauxite residue in the case of the AAL plant is 'mud farmed' which churns and exposes the deposited bauxite to the atmosphere which significantly reduces the

[2] Very unlikely amounts to a 1 in 10,000 possibility on an annual basis and almost impossible relates to a 1 in 1 million chance of occurrence on an annual basis.

liquid content in the residue whereby the solid content increases to approximately 75%.

8.3.6. Where the bauxite residue is farmed (which has been the case since 2009) the material would slump rather than liquify and therefore the distance travelled in any potential breakout would be small - estimated to be in the order of 12.1 metres downstream from the toe of Phase 2 of the BRDA and into the perimeter interceptor channel. Where the material is potentially able to liquify (bauxite deposited pre-2009) this material is confined to the lower slopes of Phase 1 to Phase 6 of the elevation. Again, the distance travelled is estimated to be a maximum of 224 metres under an absolute worst case scenario. The area between the flood tidal defence berm and the BRDA excluding the bird sanctuary and Natura 2000 sites is capable of retaining c.750,000 cubic metres of tailings provided the flood tidal defence berm remains intact. It appears therefore that any potential breakout would not result in any significant threat to settlements in the vicinity or environmental degradation in the Shannon Estuary or elsewhere.

8.3.7. Again, I consider that the applicant in this instance has undertaken a comprehensive analysis which had included modelling and risk assessments associated with various scenarios. Based on the evidence presented by the third-parties which relate to generic global concerns in relation to dam tailing failures (which in my view are real and genuine concerns), and having regard to the risk assessment carried out by the applicant which specifically in relate to the nature of the residue contained in BRDA, I considered that the Board can be satisfied that the potential for liquefaction in the case of a breakout can be adequately contained to areas in close proximity to the site. The modelling and risk assessments undertaken indicate that any potential breach is under a worst-case scenario very unlikely and furthermore where a breach occurs would not result in any significant threat to human life or environmental degradation.

8.4. Concerns Regarding the Hazardous Nature of the Bauxite Residue

8.4.1. A number of issues were raised in the various third-party observations in relation to the nature of the bauxite residue being deposited in the BRDA. Among the concerns raised include:

- That the waste itself is hazardous in nature and should be classed as so.
- The bauxite residue emits radiation and therefore constitutes a radiation hazard.
- Fugitive dust generated during periods of heavy wind has the potential to contaminate surrounding farmland on settlements.

Each of these issues are dealt with below.

Hazardous Classification of Bauxite Material

8.4.2. With regard to the hazardous nature of the bauxite residue, the applicant points out in various statements contained in the EIAR and the response to the observations submitted that the bauxite residue (sometimes referred to as 'red mud') is not classified as a hazardous waste under the European Waste Code. The most up to date Waste Classification Codes issued by the EPA (applicable from the 5th July, 2018) sets out a list of wastes including those considered hazardous (marked with an asterix). Waste Class 1 relates to waste resulting from the '*exploration, mining, quarrying and physical and chemical treatment of minerals*'. Waste classification 01 03 09 refers to '*red mud from alumina production other than wastes mentioned in Class 01 03 010*'. Class 01 03 010 classes '*red mud from alumina production containing hazardous substance other than wastes mentioned in 01 03 07*. There appears to be therefore to be some level of interpretation as to whether the bauxite residue could contain hazardous material.

8.4.3. Appendix 2 of the waste catalogue provides a step by step guidance in determining whether the waste is hazardous or non-hazardous.

8.4.4. In relation to waste composition details reference is made to the presence of contaminated soil and the classification could be based on the quantities of hazardous substances in the soil. Furthermore, it appears the information contained

on file that the bauxite residue does not contain persistent organic pollutants as outlined in Regulation EC No. 850/2004.

8.4.5. Annex 3 of the Council Directive 91/689/EEC refers to properties of waste which render them hazardous. These include wastes that are (i) explosive, (ii) exhibit highly exothermic reactions when in contact with other substances particularly flammable substances, (iii) irritants when they come into repeated contact with skin and cause inflammation, (iv) harmful if they are ingested, (v) toxic, (vi) carcinogenic, (vii) mutagenic or (viii) release very toxic gases.

8.4.6. The bauxite residue does not appear to display any of the characteristics set out in Annex 3 of the Council Directive that would render them hazardous. It would therefore not be unreasonable to come to the conclusion that the nature of the bauxite residue produced at the AAL facility falls within the definition of European Waste Code 01 03 09.

Radiation Hazard

8.4.7. With regard to whether or not the bauxite residue constitutes a radiation hazard is assessed below. Chapter 7 of the EIAR relates to population, human health and agriculture. It notes that the bauxite residue is a low level source of naturally occurring radioactive material (NORM). Other natural resources that are extracted from the ground including coal, natural gas and other mineral ores contain various amounts of natural radioactivity. When these resources are extracted and processed their natural state can be modified and may result in the enhancement of natural radioactivity content than that originally present. The EIAR makes reference to a report prepared in 2008 by the Radiological Protection Institute of Ireland. The report notes that the Institute examined four large industries operating in Ireland in order to determine the level of radiation to which workers and members of the public were exposed to as a result of the work practices and this included the bauxite residue refining for the production of alumina at the Aughinish site. In each case, a thorough examination of the industrial processes were carried out. None of the four industries reviewed were found to give rise to an effective dose to workers or members of the public in excess of 1 mSv above background in any 12 month period. As such, it is considered that they do not come under the scope of Irish Regulations as far as ionising radiation is concerned.

Notwithstanding what is suggested in one of the observations that the radiation levels in the Bauxite residue has not been tested in recent years, it is also clear from the EIAR that Aughinish Alumina commissioned more recent testing in 2021 and it is evident from the more recent study that levels of naturally occurring radioactive materials are similar to that found in the RPII Report of 2008. It stands to reason that the results would be similar as the nature of processing and the nature of deposition of bauxite residue has not changed over the intervening period.

Therefore, notwithstanding the contention put forward in the observations submitted and relying on the independent assessment carried out by the Radiological Protection Institute of Ireland, it is in my view reasonable to conclude that the nature of the bauxite residue being deposited on the site does not pose any adverse impact on human health due to radiation.

8.5. Fugitive Dust Issues

With regard to fugitive dust emissions, Chapter 11 of the EIAR specifically deals with the issue of air quality. As part of the assessment, the EIAR undertook an air dispersion modelling exercise (the AERMOD model). It was used for the purposes of determining the dispersion of fugitive dust from the site into the surrounding area. It is clear from the average mean background concentrations for both PM_{10} and $PM_{2.5}$ that the existing baseline environment recorded dust deposition levels well below the limits set out in the EU Regulations (Café Directive). Results of dust deposition monitoring at 35 locations around the AAL boundary were likewise all considerably below the TA Luft limit value of 350 mg/l. In fact, there was no exceedance of 190 mg/l during the survey period and most of the monitoring stations recorded levels considerably below 190 mg/l. The evidence presented in the EIAR would be supported from the observations gleaned during my own site inspection which took place on Friday June 10th. There was relatively little rainfall in the proceeding four days (less than 10 millimetres over the entire period). I did note however during my site inspection that the sprinkler system was operating and this would have assisted in reducing the amount of fugitive dust emanating from the proposed development.

It is clear from the modelling undertaken, and notwithstanding the increases in elevation arising from the various stage rises, the modelling indicates that there

would be a negligible increase in additional fugitive dust beyond the site boundary and that the increase in the height of the BRDA will not result in any appreciable increase in dust deposition levels which would raise concerns or impact on the amenity of residences in the vicinity or biodiversity surrounding the deposition area.

The newspaper article attached to the submission on behalf of the Cappagh Farmers Support Group relates to an organic farm in County Mayo and therefore does not relate to any farm in the vicinity of the site. Furthermore, the article specifically states that:

"*The EPA considered several sources that might be causing the contamination, include the Aughinish Alumina Factory at Askeaton, County Limerick. Samples were taken by them from the lagoons of wastewater outside the Limerick plant and compared with those found from Jimmy Kelly's farm. But there was nothing in the Aughinish samples to specifically link them with samples from Kelly's farm".*

Therefore, the independent analysis undertaken by the EPA did not identify a link between the pollution episode which occurred in Castlebar with the Aughinish plant.

On the basis of the assessment above therefore, it is not considered that the proposed development poses a human health or biodiversity threat in terms of airborne bauxite residue fugitive dust emissions.

8.6. **Surface Water and Groundwater Contamination as a result of seepage from the BRDA**

Surface Water Monitoring

8.6.1. Concerns are expressed in a number of observations that water discharges from the bauxite residue is contaminated and could have profound adverse impacts on biodiversity associated with the Shannon Estuary and this in turn could have adverse consequences for the qualifying interests associated with both Natura 2000 sites designated within the estuary namely; the Lower River Shannon SAC (Site Code: 002165) and the River Shannon and River Fergus Estuaries SPA (Site Code: 004077). The potential impact which could arise from the proposed development on the integrity of the qualifying interests associated with the Natura 2000 sites in question are dealt with under a separate heading below entitled Appropriate Assessment (Section 10 of this report)..

8.6.2. The surface water management system associated with the BRDA is outlined in detail in the EIAR and is briefly summarised below. The BRDA is surrounded by a perimeter interceptor channel (PIC). It collects water discharged from the BRDA through general seepage, bleed water, sprinkle water and surface water run-off. This water (see photographs 19-22 attached) is pumped to the effluent clarification system (ECS) and to the stormwater pond/liquid waste pond both of which are located to the north-east of the BRDA. The function of the stormwater pond is to provide surge capacity for surface water that cannot be immediately processed in the effluent clarification system. It also provides a continuous flow of water that is used for dilution or wash water within some parts of the alumina plant. The liquid waste pond located adjacent receives treated water from the effluent clarification system and the retention time within this pond allows for cooling and settlement prior to discharging either to:

- Controlled discharge into the River Shannon.
- Onto the BRDA via the sprinkler system during dry and wind weather or for recirculation within the plant.

8.6.3. Separately the salt cake disposal cell which is located completely within the confines of the BRDA and is compositely lined has a separate system of treatment for surface water. The waters inside the SCDC comprise of dissolved salt cake which is diluted by the rainfall catchment within the cell. The water has a high caustic content. Water within this internal catchment area is funnelled towards the perforated decant tower located at the north east corner of the cell. The decant pipe located at the base of the tower transfers water by gravity to a storage tank and waters are then pumped to the plant for caustic recovery.

8.6.4. All waters in the external catchment area i.e. associated with the access ramp and access roads trickle down a flow path through the rockfill stage raises into the PIC.

8.6.5. All surface water monitoring and surface water discharge from the plant are covered in detail in the industrial emissions licence (P0035-07). Currently three licenced locations are monitored for surface water discharge namely (i) Mangan's Lough along the northern boundary of the BRDA and the north-western boundary of the stormwater pond. (ii) The Office of Public Works channel at the north-western boundary of the BRDA and, (iii) Robertstown Gate along the western boundary of the

BRDA. The parameters required to be monitored in the EPA Licence include the following:

Condition B.2 Emissions to Water

Name of Receiving Waters – Shannon Estuary

Location: Aughinish Island

Volume to be emitted: Maximum in any one day: 30,000 m^3

Maximum rate per hour: 1,250 m^3

Parameter	Emission Limit Value Daily Average		
pH Toxicity	6 – 9 5 TU		
	Daily Average mg/l	Mass Emission Limit kg/day	Annual Average mg
BOD	-	2360	-
Suspended Solids	50	-	35
Total Organic Carbon	200	-	150
Total Phosphorous	-	-	2
Oils fats and greases	15	-	-

Schedule C.2.3 Monitoring of Storm Water Emissions

Parameter	Monitoring Frequency	Analysis Method/Techniques
pH	Monthly	pH electrode /meter
Conductivity	Monthly	Standard Method
Visual Inspection	Daily	Examine for colouration
Soda	Monthly	As agreed by agency

Schedule C 6 of the Licence relates specifically to Ambient Monitoring. This condition requires monitoring at specific points along Estuarine Stream in relation to the following:

Parameter	Monitoring Frequency	Analysis Method/Techniques
pH	Quarterly	pH electrode /meter
Conductivity	Quarterly	Standard Method
Soda	Quarterly	As agreed by agency

In addition, 3 separate monitoring points in the Shannon Estuary which are to be approved by the Agency. Monitoring points shall be 500m upstream, 500m downstream and 1km downstream of the Emission Point Refence No; W1-1

Parameter	Monitoring Frequency	Analysis Method/Technique
TOC	Four samples per year	Standard Method
BOD	Four samples per year	Standard Method
Conductivity	Four samples per year	Standard Method
DO	Four samples per year	Standard Method
Suspended Solids	Four samples per year	Standard Method
Other	Four samples per year	Standard Method

8.6.6. It is clear from the above licence issued by the EPA that there are stringent limits and monitoring conditions to enforce these limits set out in the licence. The applicant is required under law to comply with the limits set out in the IED licence. Details of the monitoring results of the various parameters referred to are set out in Figures 10.15 to 10.42 in the EIAR. It is clear that a strict monitoring regime is in place in relation to surface water discharge and if the Board are satisfied that the proposal will not have an adverse impact on the environment and were minded to grant planning permission for the proposed development, matters in relation to emissions from the facility during the operational phase are a matter for the EPA and not An Bord Pleanála. The facility discharges surface water into the River Shannon the

largest river on the island of Ireland with significant levels of assimilative capacity in the receiving waters. On the basis of the above I consider that the Board can be satisfied that the proposed development will not have any adverse impacts on water quality in the Shannon Estuary primarily on the basis that (a) water discharges from the proposed development are already subject to strict limits and monitoring and (b) there is huge assimilative capacity in the receiving waters associated with the Shannon Estuary.

Groundwater Monitoring

8.6.7. In respect of groundwater quality, a similar conclusion can be reached in my opinion on the basis that the overall Aughinish site operates under an industrial emissions licence which carries out detailed and routine groundwater monitoring. As the EIAR indicates the principle contaminant of concern arising from the alumina production process is dilute sodium aluminate which is characterised by elevated PH, elevated alkalinity and elevated aluminium relative to ground water. Fluoride is also a common element in the bauxite residue and is a potential contaminant of concern. Groundwater monitoring wells and observations wells have been installed around the perimeter of the BRDA. 45 wells in total monitor groundwater and these are indicated on Figure 10.28. Observations undertaken and presented in the EIAR (Figures 10.29 and 10.30) show that the observation wells recorded PH levels between 6.6 and 8.0 in all the observation wells between 2008 and 2021.

8.6.8. In terms of electrical conductivity high levels have been recorded along the northern boundary of the BRDA and this in my view can be attributed to saline intrusion associated with the estuarine area adjacent. Other observation wells to the east, west and south have lower levels of electrical conductivity which would support the argument that higher levels of salinity units in the groundwater would contribute to higher conductivity levels. Some wells also show slightly elevated conductivity levels and this again can be attributed to saline intrusion. They relate to the same observation wells where high levels of electrical conductivity has been formed.

8.6.9. Results for heavy metal concentrations are set out in Table 10.7. On occasion elevated levels of arsenic, cadmium, iron, magnesium, nickel and zinc were recorded. However, these exceedences occur in isolation to other parameters and do not form part of a continuing trend which could be attributed to consistent

groundwater contamination associated with the BRDA. The Board are requested to note the contents of Table 10.7 which clearly shows that there is no consistent trends in terms of elevated heavy metal concentrations in the groundwater monitoring in the observation wells. Furthermore, the NIS assesses potential impacts on groundwater using the source pathway receptor model. Sampling data indicated that no pathways have been identified or are apparent which could impact on groundwater. The data contained in the EIAR and NIS show that metal settlement concentrations in estuarine deposits to the north of the site reflected typical background concentrations for the marine environment in Ireland and no elevated or raised concentrations of heavy metals were identified that could adversely impact on biodiversity and aquatic health associated with the estuarine environment.

8.6.10. Furthermore, as part of the industrial emissions licence issued by the EPA, detailed groundwater monitoring is required as per Condition C6 – ambient monitoring which is set out in the table below.

Condition C 6 Ambient Monitoring

Parameter	Monitoring Frequency	Analysis Method/Technique
pH	Quarterly	pH electrode/meter
Water level in AOD	Quarterly	Dip meter
Total alkalinity (as CaCo3)	Quarterly	Standard method
Conductivity	Quarterly	Standard method
Chloride	Quarterly	Standard method
Fluoride	Quarterly	Standard Method
Soda	Quarterly	As agreed by the Agency
Sulphate	Quarterly	Standard Method
Mg, Al, As, Cd, Cr, Cu, Fe, Hg, Ni, Pb, Zn, Ti	Bi-Annually	Standard Method
Organics (DRO & PAH)	Annually	As agreed by the Agency
Relevant hazardous substances	Bi-Annually	Standard Method

Other (parameters as required by the Agency).		

8.6.11. In conclusion therefore and based on the data and information contained in the EIAR together with the monitoring regime required under the IED licence, I consider that the Board can be satisfied that the proposed development is not contributing to groundwater pollution or contamination and furthermore that the extension to the proposed development will likewise not contribute to groundwater pollution or contamination.

8.7. Impact on the Bottlenose Dolphin

8.7.1. With regard to the impact of the proposed development specifically on the bottlenose dolphin which form the basis of the observations submitted by Dolphin Watch, I would note the following. Bottlenose Dolphins are listed in Annex 2 of the EU Habitats Directive and the Lower Shannon is one of two Special Areas of Conservation designated for this species in Irish waters. I have consulted the document referred to the applicant's response to the observation which relates to a scholarly article prepared by *E. Rogan et al* entitled '*Bottlenose Dolphin Survey in the Lower Shannon SAC 2018*'. It is clear from this article that extensive surveys have been carried out in respect of the abundance of Bottlenose Dolphins in the Shannon Estuary from 1997 to 2018. The abundance estimates of the species within the Shannon Estuary ranges from between 121 to 160. This compares with an abundance estimate of between 95 to 160 in 1997, 80 to 125 in 2010 and 85 to 140 in 2015. The highest abundance estimate dates from 2007 where numbers were estimated to be just less than 180. It is clear from the figures presented in Figure 7 of the said article that notwithstanding modest fluctuations, numbers generally remain steady and between 80 and 160. The data collected in 2018 confirm previous findings showing a high degree of site fidelity of dolphins using the estuary with numbers decreasing during the winter. The article concludes by stating that the latest estimate for the Lower Shannon Estuary site has a level of abundance which is *"similar to all previous estimates and it indicates that the population status appears to be stable*". Detailed research therefore suggests that contrary to what is

suggested in the observations submitted, the population of bottlenose dolphins in the estuary appears to be stable and is not in any way adversely affected by the workings of the Aughinish plant.

8.7.2. With regard to skin lesions, my research having consulted a number of scholarly articles suggest that skin lesions in dolphins is a global phenomenon and it appears to be attributed to global warming generally as opposed to any localised impact associated with the Aughinish facility. In this regard I would refer the Board to an article entitled "*Skin Lesions on Common Bottlenose Dolphins from 3 sites in the North West Atlantic*" prepared by *Burdett Hart et al (2012).*

8.7.3. Concerns in respect of pollution issues from either groundwater or surface water on the bottlenose dolphin has been addressed already in this assessment.

8.8. Other Miscellaneous Issues

Use of Appropriate Guidelines

8.8.1. The observation submitted on behalf of Future Proof Clare notes that the applicant used the Canadian Dam Association Risk Assessment Guidelines whilst suggesting that a more recent report which is global in scope, namely Global Industry Standards on Tailings Management (2020) perhaps should have been used as the basis of assessment. The applicant in his response to the observation argues that the latter document referred to in the observation provides a similar 'consequence classification metrics' for tailings facility. However, unlike the Canadian Dam Association Guidelines, it does not provide target level criteria thresholds for stability in the form of Factors of Safety (FoS) for the various stages in the life of the facility or for varying scenarios. The Canadian Dam Association Guidelines document was first published in 2007 and was revised again in 2013. The Guidelines set out principles that are applicable to all dams and an outline of the processes and criteria for management of dam safety in accordance with specified principles. Having consulted both documents I note that both set out a similar set of principles for the design, construction and operation of tailings facilities and provide a somewhat similar matrix in Annex 2 which classifies the risk assessment and consequence of a dam failure. Having consulted the documents I have no reason to believe that the

2020 document provides any greater level of technical guidance over and above that used by the applicants in applying the Canadian Guidelines.

8.8.2. The observation goes on to note that the risk [of dam collapse] can be classified as high if "the potential area of impact could be between 10 and 20 square kilometres...." It is clear from the breach analysis contained in Appendix G of the Engineering Design Report that were a major breach to occur, the potential area of impact would be nowhere near the region of 10 to 20 square kilometres in scale.

8.8.3. I further note that the observation does not explicitly argue that the Global Industry Standards on Tailings Management (2020) should be used instead of the Canadian Dam Association Guidelines. It merely ponders why the Global Industry Standards on Tailings Management was not used. It appears that both documents offer appropriate guidance on the construction and operation of dams with the Canadian Guidelines offering more technical guidance in respect of factors of safety etc. On this basis I have no reason to believe that the assessment carried out by the applicants is in any way flawed or substandard as a result of using the Canadian Guidelines.

Impacts of Blasting on Estuarine Ecology and Biodiversity

8.8.4. With regard to the impact arising from blasting at the borrow pit, I note that at its closest point, the borrow pit is c.700 metres from the mouth of the Shannon Estuary. The Board have already granted planning permission for further excavation of the borrow pit under ABP301011. Operations on foot of this permission have recently commenced on site. Any further blasting to take place under the current application will take place on lands further removed from the mouth of the Shannon Estuary and therefore any impact arising from blasting under the current application is likely to be less than that already granted by the Board under its previous permission. The fact that blasting under the current application will be located almost a kilometre from the mouth of the Shannon Estuary will ensure that any noise and vibration associated with the blasting will dissipate significantly over this distance. Furthermore, the Shannon Estuary is a busy waterway for shipping accommodating Limerick Port and Foynes Port as well as other boating and recreational activities. These activities in themselves are likely to generate significant noise and therefore the baseline noise

environment within the estuary is likely to be relatively high due to existing anthropogenic disturbance.

8.8.5. Finally, in relation to this matter I refer the Board to Appendix 6.4 which specifically relates to Marine Mammal Risk Assessment in relation to blasting operations at the borrow pit. This risk assessment was prepared on foot of a request from the Environmental Protection Agency as part of the Industrial Emissions Licence Review, due to concerns over the proximity of the blasting activity to the Lower River Shannon SAC, and its potential impact on marine mammals in particular Bottlenose Dolphins due to noise and vibration associated with blasting activities at the borrow pit. It concludes that given the terrestrial location of the development site and the fact that all blasting activities will take place on land and not in the underwater environment that the project is not considered to pose any risk of death, injury or disturbance to marine mammals. Any such impacts have been ruled out and no mitigation measures beyond those stipulated in the EIAR are deemed necessary. It notes that the development site is located within a highly disturbed environment where anthropogenic noise levels are already elevated due to the presence of industrial activities and shipping primarily associated with Foynes Port. It suggests that Bottlenose Dolphins are habituated to these noise levels and they regularly use deepwater berths that are the main shipping routes uses on the estuary. The fact that blasting will occur no more than 7 times a year and that the borrow pit operations are located c. 1 kilometre from the nearest Bottlenose Dolphin habitat the impact is likely to be imperceptible. The fact that the bottlenose dolphins numbers have remained stable over the previous 25 years would support the conclusion that the species has become habituated to human activities at the mouth of the Shannon Estuary.

8.8.6. On the basis of the above assessment undertaken I am satisfied that the proposed blasting will no impact on the species concerned.

Global Issues Surrounding Alumina Production

8.8.7. Concerns in relation to global industrial monopolies in the aluminium industry is not a matter for An Bord Pleanála. The Board is mandated to determine the application before it and whether or not the proposed development is in accordance with the proper planning and sustainable development of the area. It is clear that national

policy supports on-going industrial enterprises subject to qualitative safeguards in respect of human health in the environment. I have argued above that I am satisfied that the proposed development will not compromise or adversely affect either human health through the probability of a natural disaster or adversely impact on ecological and biodiversity in the area and will therefore overall, will have an acceptable environmental impact. I further note that on-going operations at the plant are the subject of an EPA licence. It is my considered opinion that it would be inappropriate and disproportionate to refuse planning permission for the proposed development on the basis of any perceived corporate imperialism or industrial monopoly in the aluminium worldwide.

8.8.8. Any issues regarding energy use of the industry overall is likewise not strictly pertinent to the application before the Board. The AAL facility operates a CHP Plant at Aughinish which produces energy in excess of requirements utilised at the plant. As such applicant is a net contributor to the national grid.

Conditions Attached to Previous Permissions

8.8.9. With regard to Condition No. 38 associated with Planning Ref. No. 8580 which was highlighted in the Cappagh Farmers submission, stipulated that "*the red mud pond shall be constructed and maintained in a sound structural condition and it shall be effectively sealed to prevent the leakage of its contents. The embankments are to be of adequate strength to resist mud pressure and storm condition in the estuary*". I have argued in my above assessment that I am satisfied that the containment dams are of sufficient structural integrity to ensure that no breach occurs. In this regard I consider Condition No. 38 is being adhered to regardless of whether or not Planning Reg. Ref. 8580 is applicable to the facility which was subsequently constructed under a subsequent grant of planning permission. I further note that Condition C7 of the EPA licence (No. P0035-07) specifically relates to monitoring at the bauxite residue disposal area. This condition is set out in full below.

Condition C7 – Monitoring at Bauxite Residue Disposal Area

Location	Parameter	Monitoring Frequency	Analysis Method /Technique
BRDA embankment	Phreatic surface	Quarterly	Dip meter

BRDA embankment	Hydrostatic pore pressure	Quarterly	Agreed method
BRDA embankment wall	Standard walk over and condition & stability checks Settlement / movement Annual review Independent audit SEED audit	Daily Quarterly Annually Every 2 years As agreed	Visual Agreed method Agreed standard Agreed standard Agreed standard
BRDA and residue	Volume of residue disposed Tonnage of residue disposed Used Capacity Remaining Capacity	Continuous Monthly Annually Annually	Flow meter Dry Density Agreed method Agreed method
BRDA perimeter interceptor channel	Water level Quantity of seepage loss from the BRDA	Weekly As agreed	Deep meter/gauge Agreed method
Area around BRDA	Seismicity	As required by the Agency	Agreed method

Project Splitting

8.8.10. In respect of the assertion that the proposed development constitutes project splitting, this assertion is not accepted. Project splitting specifically relates to splitting largescale developments into smaller applications in order to result in a subthreshold EIA development so as to circumvent the requirement for a full EIA. The applicant has submitted and EIAR and the project as proposed is presented to the Board in its entirety. As a separate matter, the applicant is obliged to obtain a licence from the EPA as the proposed development falls within the Third Schedule of the EPA Act and therefore constitutes a scheduled activity for which a licence is required. The applicant is therefore obliged to obtain planning permission for the proposed development and obtain a licence from the EPA as a separate development consent.

Inadequacy if EIAR and NIS

8.8.11. With regard to the contention that both the EIAR and NIS are inadequate, it is noted that this assertion is not qualified in respect of any specific references as to how the EIAR and NIS falls short of the statutory requirements set out in both the EIA Directive and the Habitats Directive. Both the EIAR and NIS have been assessed under separate headings below and I have concluded that both assessments are adequate and comply with the requirements of both Directives.

Public Participation

8.8.12. With regard to the issue of public participation, and the assertion that the proposal contravenes the Aarhus Convention, Irish Planning legislation requires that the applicant publish notices and allow comments and observations be made in respect of any planning application before the statutory authorities. The applicant, in submitting the current application has fully complied with this requirement. In addition to the above the applicant has also carried out a stakeholder and community consultation as outlined in Section 1.9 of the EIAR and Appendix 1.3 of same. I am therefore satisfied that the applicant has fully complied with the requirements in respect of public participation and the Aarhus Directive.

Other Issues not Specifically Raised in the Observations Submitted

8.8.13. All other issues in respect of the proposal generally in the context of the proper planning and sustainable development of the area and the potential impacts on the environment which were not specifically raised in the observations submitted are assessed separately in Section 9 and 10 of this report under the headings Environmental Impact Assessment and Appropriate Assessment.

Observations From Prescribed Bodies

8.8.14. Two concerns were raised by Limerick City and County Council in the planning report submitted to An Bord Pleanála under the provisions of Section 37E(4) of the Act.

8.8.15. The applicant was requested to provide further information with regard to the groundwater vulnerability at the proposed borrow pit. The applicant is to take into consideration the impact of water strikes at 7.32 metres OD and 8.03 metres OD with the proposed 2.5 metre buffer zone between the groundwater table at the base

of the proposed borrow pit. In relation to this issue the applicant points out in his response to the observations that monitoring wells BH1, MW05, MW06 and MW07 are all present within the borrow pit extension footprint. The groundwater elevation range in these monitoring wells range from 1.604 metres OD to 8.073 metres OD. As the maximum point of excavation associated with the borrow pit is 8.5 metres OD the lowest ground level of the borrow pit will remain circa half a metre above the maximum groundwater level in this area. The excavation of the borrow pit therefore will at all times be above the level of the water table and therefore no pumping of groundwater will be required and no groundwater contamination will occur. As already referred to in my report, there is extensive groundwater monitoring in place at the facility so that any potential adverse impacts on groundwater arising at the facility or the borrow pit extension in particular can be appropriate monitored. Based on the information supplied in the application, I am satisfied that the proposed borrow pit extension does not pose a threat to groundwater.

8.8.16. With regard to concerns in relation to the status of meadow barley in the area of the proposed borrow pit extension, the applicant in his response to the observation submitted confirmed that meadow barley is not present within the application footprint and that the borrow pit extension area is dominated by scrub habitat and that there is no potential or meadow barley to occur in this area. Having inspected the borrow pit area in early June I found no evidence of meadow barley growing in the area of the proposed extension of the borrow pit.

8.8.17. Finally, in relation to the submissions by prescribed bodies I would note the following:

- The Environmental Protection Agency had no particular issues in respect of the proposed development and it is noted that the existing facility is subject to an Industrial Emissions Licence and is therefore currently regulated by the EPA.
- The submission from the Development Applications Unit highlighted no issues other than the requirements that all mitigation measures to protect the Natura 2000 Sites in the Shannon Estuary be implemented in full. This can be adequately addressed by way of condition.

- Finally, the submission from Transport Infrastructure Ireland states that the Authority has no specific comment to make in relation to the subject development in terms of impacts relating to the safe and efficient operation of the national road network in the area. It is sufficient to note that the extension of the borrow pit will result in a reduction in traffic on the public road network as aggregate sourced for the raising of the BRDA will be restricted to the confines of the application site.

9.0 Environmental Impact Assessment

9.1. Statutory Provisions

9.1.1. The European Union Directive 2014/52/EU, amending Directive 2011/92/EU, on the assessment of the effects of certain public and private projects on the environment, requires Member States to ensure that a competent authority carries out an appraisal of the environmental impacts of certain types of projects, as listed in the Directive, prior to development consent being given for the project. The EIA Directive was transposed into Irish law under the Planning and Development Regulations 2001 to 2018 (as amended). Part 1 of Schedule 5 of the 2001 Regulations, includes a list of projects for which mandatory EIA is required. Part 2 of Schedule 5 provides a list of projects where, if specified thresholds are exceeded, an EIA is also required.

9.1.2. The proposed development falls within the definition of a project under the EIA Directive as amended by Directive 2014/52 and falls within the scope of two separate classes of Part 2 of the Fifth Schedule of the Planning and Development Regulations 2001, as amended, namely:

2. Extractive Industry

(b) Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares.

The proposal seeks to extend the permitted borrow pit by c.3.9 hectares which would create an overall borrow pit of 8.4 hectares and thus exceed the threshold.

11. Other Projects

(b) Installations for the disposal of waste with an annual intake greater than 25,000 tonnes not included in Part 1 of this Schedule.

The proposal seeks the disposal of c1.57 million tonnes of bauxite residue per annum which would exceed this threshold.

9.1.3. Directive 2014/52/EU amending the 2011 EIA Directive was transposed into Irish legislation on September 1st, 2018 under the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018. The EIAR was submitted to the Board with the application on the 5th of October 2021 and is therefore assessed under the most recent version of the Directive.

9.1.4. The EIAR submitted with the application consists of 3 separate volumes:

- Volume 1: Main Text which is set out in a grouped format structure whereby each environmental factor as prescribed in the Directive is presented and assessed in an individual chapter (chapters 1 to 20).
- Volume 2 (Folder 1): Appendices 1-7. (Folder 2) Appendices 8-18. These appendices provide additional and technical data associated with each of the chapters.
- A separate folder provides two additional appendices which contains a separate detailed Engineering Design Report (Appendix A) and a Construction and Environmental Management Plan (Appendix B)
- A separate Photomontage Booklet and a non-technical summary are also submitted as standalone documents.

9.2. Compliance with legislation

9.2.1. The impact of the proposed development is addressed under all relevant headings with respect to the environmental factors listed in Article 3(1) of the 2014 Directive, which include:

(a) population and human health

(b) biodiversity, with particular attention to the species and habitats protected under Directive 92/43EEC and Directive 2009/147/EC

(c) land, soil, water, air quality and climate

(d) material assets, cultural heritage and the landscape

(e) the interaction between the factors referred to in points (a) to (d).

9.2.2. There are also separate chapters on Agriculture and Human Health, Noise and Vibration, Material Assets (Waste Management, Site Services, Major Accidents and Disasters).

9.2.3. Chapter 1 includes an introduction to the EIA process, the screening for EIA, details of the format and structure of the document and details the competent persons that make up the EIAR project team. Chapter 1 also provides details of the scoping and consultation undertaken as well and providing details of the various methods impact assessment undertaken. It is also stated that no general difficulties or limitations were encountered in compiling the documentation. The alternatives considered by the applicant are discussed in Chapter 2 and a description of the development is provided in Chapter 3. Interactions in respect of each of the environmental factors are set out in Chapter 15.

9.2.4. Article 3(2) of the Directive requires the consideration of effects deriving from the vulnerability of the projects to risks of major accidents and/or disasters that are relevant to the project concerned. A full chapter is devoted to this issue (Chapter 16) and a detailed Engineering Report regarding construction methodology and stability assessment is contain in a separate folder (Appendix A).

9.2.5. The EIAR complies with Article 5 of the Directive and Schedule 6 of the Planning and Development Regulations 2001, as amended. It provides a comprehensive description of the project comprising information on the site, design, size, construction and operation of the project and other relevant features associated with the development of the project (Chapter 3). It describes and assesses the likely significant effects and potential impact of the project on the relevant environmental factors, and it provides a description of the measures envisaged in order to avoid, prevent or reduce and, where possible and applicable, offset likely significant effects on the environment.

9.2.6. The Directive requires that the description of likely significant effects should also include an assessment of cumulative impacts that may arise from the proposed development in combination with other plans or projects. Chapter 18 of the EIAR sets out a summary of all the potential interactions and cumulative impacts which could arise from the project. Cumulative effects are also considered, (where

applicable), under the various environmental factors in the individual chapters of the EIAR.

9.2.7. The EIAR includes a standalone Non-Technical Summary of the information referred to in Article 5 (a) to (d) and additional information specified in Annex IV. It provides an adequate description of the forecasting measures used to identify and assess the significant effects on the environment. The Non-Technical Summary is concise and comprehensive and is written in a language that can easily be understood by a lay member of the public.

9.2.8. In compliance with the provisions of Article 5(3), the EIAR tabulates the inputs and qualifications of the study team and contributors in Section 1.8 of the document. I am satisfied that the EIAR has been prepared by competent experts to ensure its completeness and quality. I also consider that the information contained in the EIAR is based on relevant data which is up to date up to date.

9.2.9. Details of the consultations entered into by the applicant as part of the application are set out in Section 1.9 of the document. It details the stakeholder consultation including consultation undertaken with prescribed bodies and consultation with the public. Local residents in the area were issued with a brochure providing details of the proposed development and informing them that the SID application will be accompanied by and EIAR and an NIS. I am satisfied participation by the public has been facilitated, and the application has been made accessible to the public with adequate times afforded for submissions in accordance with the requirements of Article 6 of the Directive.

9.2.10. I am satisfied that the information provided in the EIAR is reasonable and sufficient to allow the Board to reach a reasoned conclusion on the significant effects of the project on the environment, taking into account current knowledge and methods of assessment. I also consider that the information is up to date and relevant to enable a full assessment to take place.

9.2.11. Chapter 2 of the EIAR sets out details of the site location and description and provides details of the processes undertaken at the facility and the characteristics of the bauxite residue deposits and the development and structure of the Bauxite Residue Disposal Area (BRDA). Details of the cell layout within the BRDA and the salt cake disposal cell is also detailed in this chapter. The planning policy context

both national and local as it relates to the project is set out in the chapter. Details of projects that may arise in the future are also set out in this chapter.

9.2.12. Chapter 3 sets out details of the proposed project. These details have been set out above in section 3 of my report. It is not proposed to reiterate the details in this section of the EIAR.

9.3. Alternatives

9.3.1. Under the provisions of Article 5(1)(d) of the 2014 Directive it is a requirement that an EIAR contain:

"(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment".

9.3.2. Chapter 4 of the EIAR addresses the matter of alternatives and explores and evaluates alternative locations, layout/design, the do-nothing alternative.

9.3.3. In terms of alternative locations, the applicant has already invested significantly in the existing site. Its contiguous location to the refinery offers great advantages in terms of proximity and efficiency. Thus, alternative locations away from the existing facility is considered to unfeasible and inappropriate as it would require significant capital investments.

9.3.4. Likewise, a horizontal expansion of the existing BRDA and SCDC were also ruled out as it would necessitate additional infrastructure rather than utilising the infrastructure already in place. It also ensures that the existing footprint of the BRDA is maintain and not expanded.

9.3.5. Consideration was given to utilising existing quarries in the area, including a Roadstone quarry c2.5 km from the development. However, the expansion of the permitted borrow pit was considered to be more beneficial as it would minimise impacts on the surrounding traffic network and minimise dust and noise impacts arising from traffic movements to and from the surrounding quarries.

9.3.6. With regard to alternative technologies in managing bauxite residue, it is stated that the industry as a whole continues to search with growing interest and success for

technically and economically viable options for residue management. The solutions and practices used at each refinery a further influenced by local climatic, common geographic, and environmental conditions as well as regulatory frameworks and community factors. Examples of the current research being undertaken are set out in the EIAR. While these research projects are ongoing, there are at present no alternative methods which would eliminate the existence of bauxite residue as a by-product from the refinery process.

9.3.7. With regard to alternative technologies and treatment of salt cake, Wet Air Oxidation should eliminate the need for salt cake storage within the SCDC. This process is currently being developed at the subject plant. There are no additional environmental emissions associated with this process and this is fully compliant with all relevant EU 'Best Available Technology'.

9.3.8. With regard to the borrow pit extension, the preliminary design of the extension provided for a larger extraction area of c. 4.5 ha of land. However, the revised design of the borrow pit extension area will increase the separation distance and therefore reduce the potential impact on the context and setting of a recorded monument situated in the area (see section below on archaeology and cultural heritage).

9.3.9. In a 'do-nothing' option, the site would remain as it currently is, and the refinery would have to cease operations by 2030 and the restoration plan would be implemented. This would result in the loss of one of the state's major industrial manufacturing facilities and would result in a significant loss of employment. This would have significant adverse knock-on effects for the local economy.

9.3.10. It is concluded therefore that the proposed development represents the most appropriate option to ensure the ongoing operation of the facility.

9.3.11. I consider that the matter of examination of alternatives has been satisfactorily addressed in the EIAR. I consider that the level of detail is reasonable and commensurate with the project. Reasonable alternatives for the preferred option have been explored and the basis for opting for the preferred option have been explained and justified. It indicates how the proposed design of the development before the Board evolved and how it was adjusted to take into consideration environmental effects. I am satisfied that the process is robust and that the requirements of the Directive are fully complied with.

9.4. Likely Significant Effects on the Environment

This section of the EIA assessment identifies, describes and assesses the potential direct, indirect and cumulative effects of the project under each of the environmental factors referred to in Article 3(1) of the Directive. The assessment follows the headings used in the EIAR which are as follows:

- Archaeological, Architectural and cultural heritage
- Biodiversity
- Population human health and agriculture
- Land, Soils & Geology
- Landscape And visual impact
- Hydrology and hydrogeology
- Air quality
- Noise and vibration
- Material Assets - Waste management
- Material assets - Traffic and transport
- Material assets - Site services
- Major accidents and disasters
- Climatic factors
- Interaction and cumulative impacts
- Mitigation and monitoring
- Difficulties encountered

Each of these chapters in the EIAR are assessed and evaluated below in the context of the requirements with the Directive.

9.5. Archaeological, Architectural and Cultural Heritage

Chapter 5 of the EIAR relates to archaeological, architectural and cultural heritage. The chapter sets out the impact assessment methodology that was undertaken to

evaluate the impact of the proposal on the cultural heritage and archaeology of the area. Details of the archaeological background is set out it is noted that the is no evidence of mesolithic or neolithic activity in the vicinity of the site. A pit-burial dating from the bronze age has been excavated c.75m near the south-eastern extent of the BRDA. Other bronze age sites discovered in the area include two fulachtai fia which have been fully excavated. Other traces of settlement from this period located in this area are identified and described in the EIAR. There is no evidence of any archaeological material dating from the Iron Age in or surrounding the site. A number of ringforts dating from the early medieval period are located throughout the study area. There are no confirmed medieval sites recorded within the study area of the planning application site, the site recorded to the immediate to the northeastern extent of the planning application site has been suggested to represent a possible moated site (LI010-108). The upstanding remains of Dysert Castle are located c360 m to the south of the site. Details of previous archaeological excavations are contained set out in the EIAR. Details of any archaeological evidence derived from cartographic sources are also set out in the assessment. It is noted that Enclosure LI010-014 is depicted on the OS Map from 1900 and this feature is located within the confines of the site.

In summary it is noted that there 19 archaeological sites located within the immediate vicinity of the planning application. Ten of these are recorded monuments and the remaining 9 are listed in the SMR only and do not receive statutory protection as they represent a record of excavation only. Details of all the recorded archaeological sites within 250 meters of the site of the proposed development are set out on Table 6.1 of the EIAR.

Aerial photographic analysis and a field inspection were also undertaken as part of the baseline studies.

In terms of built heritage, the study notes that there are no protected structures located within 250 meters of the planning application site. There are no Architectural Conservation Areas located within the study area. The are no NIAH structures located within 250 meters of the planning application site. There are no historic gardens or demesne landscapes within 250 meters of the subject site.

In terms of conclusions, it is noted that 19 archaeological sites within the study area were identified, the most significant is enclosure LI010-108, adjacent to the north-eastern section of the planning application site. Enclosure LI010-014 which lies within the planning application site has previously been proven to be non-archaeological in origin but has yet to be delisted or re classified within the current record as being non-archaeological. There are no recorded structures of built heritage located within 500 meters of the proposed site. There are also no features or sites of specific cultural heritage identified within the planning application site and the study area.

An examination of the available aerial photography and satellite imagery has shown the west of the planning application site is entirely located within lands already impacted upon with previously approved industrial development. The northeastern parcel of the planning application site remains primarily as an undisturbed greenfield area which is of high archaeological potential. A field inspection confirmed the undisturbed nature of the northeastern parcel land. No previously unknown features of archaeological significance were identified within the planning application site. While no evidence of enclosure LI010-108 in the southern part of the planning application site was identified, a group of boulders were identified to the south of this approximate location. Given the history of quarrying activity in the area, it is likely that the boulders were a result of modern intervention rather than being of archaeological significance.

With regard to potential impacts arising from the development, there is potential for previously unidentified archaeological features or deposits to survive within the planning application site which were not identified in the geophysical survey. Groundworks associated with the proposed development may have a direct significant impact on archaeological features or deposits, if they survive.

In terms of mitigation measures to be employed, it is proposed that targeted archaeological test trenching will be carried out within the northeastern previously undisturbed section of the planning application site. These works will be carried out under licence issued by the National Monument service. Any features of archaeological potential, if discovered, maybe the subject of preservation in situ or by record. As there are no potential impacts associated with development in the western and south eastern sections of the planning application, no mitigation

measures are deemed necessary. No cumulative impacts have been identified. It is concluded that no monitoring is required in relation to archaeology.

Assessment of Archaeology and Cultural Heritage Chapter

9.5.1. I consider that the information provided in the planning application documentation is sufficient to allow the impacts of the proposed development to be fully assessed. I am satisfied that the impacts identified on archaeology, architecture and cultural heritage would be negligible having regard to the general lack of such features in the area of where the proposed barrow pit extension is proposed. The extension to the BRDA area is to take place upon man-made ground and therefore will not result in any disturbance of archaeology. There are no features or buildings of architectural or cultural merit which would be adversely affected by the proposal extension to the facility. Any potential impacts that could arise will be avoided, managed or mitigated to an acceptable extent by measures forming part of the proposed scheme. I am, therefore, satisfied that the proposed development would not have any unacceptable direct, indirect or cumulative impacts on the archaeological, architectural or cultural heritage of the area.

9.1. Biodiversity

9.1.1. Biodiversity is addressed in Chapter 6 of the EIAR. Details of the competent experts involved in preparing the biodiversity chapter are set out. Details of the existing baseline environment is set out from a range of surveys, which include desk-top and field surveys. The following field surveys were carried out:

- Habitat and Botanical Surveys (2019-21)
- Bird Surveys in winter and summer (2019-20)
- Mammal trail camera surveys (Aug 2019 – Jan 2021)
- Mammal walk over surveys (2019-21)
- Passive bat detector surveys (summer 2019 – winter 2021).
- Additional monitoring at badger sett located c.210m from the application site (October 2019-June 2021)
- Casual recording of other taxa (amphibians, orthoptera, lepidoptera).

Details as to how these surveys were undertaken are set out in the EIAR. Details of the qualifying interests associated with all Natura 2000 sites within 15 km of the site are set out. Details of all nationally designated sites (NHA's and pNHA's) are also set out in this section of the EIAR.

Rare and protected plant species that have previously been recorded within 2km by the Botanical Society of Britain and Ireland are set out in Table 6.2 of the EIAR. Surveys undertaken of the borrow pit revealed the presence of japanese knotweed. However, this appears two have been successfully eradicated.

A list of the main habitats recorded within the site is set out in the Table below

Fossit Code	Habitat Type	Habitat Evaluation
GS2	Dry Meadows and grassy verges	Local Importance, (Higher Value)
WSI	Scrub	Local Importance, (Higher Value)
WL1	Hedgerows	Local Importance, (Higher Value)
GA1/GS1 Mosaic	improved agricultural grassland/Dry calcareous and neutral grassland mosaic.	Local Importance, (Lower Value)
ED2	Spoil and bare ground	Negligible Value
BL3	Buildings and artificial surfaces	Negligible value
WS2	Immature woodland	Local Importance (Higher Value)
FL8	Artificial lakes and ponds	Negligible value
ED5	Refuse and other waste (Bauxite Residue)	Negligible value

Each of the habitats are described in detail in section 6.3.3.3 to section 6.3.3.11 of the EIAR.

Details of the bird survey results recorded in the tetrads overlapping the subject site are set out on Table 6.4. A total 95 species of bird are listed. Red-listed and amber-listed species are noted. The estuary to the east of the proposed borrow pit extension is known as Poulaweala Creek is known to be an important area for a

range of wintering waterbirds. The diversity of water birds recorded in nearby estuarine and aquatic habitats is unsurprising given the proximity of Aughinish Island to the River Shannon and River Fergus Estuaries SPA's. Between the various surveys carried out a total of eight species of the River Shannon and River Fergus estuaries SPA were recorded within the application site. These birds were all recorded in flight and were not associated with any of the terrestrial habitats within the application site boundary. Several further water bird species of special conservation interest have been recorded in dedicated waterbird surveys in Poulaweala Creek.

In terms of mammal species historically identified in the tetrad overlapping the proposed development, these include:

- The brown long-eared bat
- Daubentons Bat
- Badger
- Otter
- Irish Stoat
- Leislers Bat
- Fox
- Soprano Pipistrelle

No breeding or resting places of rare or protected mammal species were recorded within the proposed development site. Otter signs where widespread around the coastal margins of the site and otters have been observed on occasion in Poulaweala Creek in recent years. An artificial badger sett c120 m from the site boundary was monitored between October 2019 and June 2021 and there were signs of sporadic activity. Mammals identified on the wildlife camera record 2019 to 2021 are set out in the Table below:

Common Name	Conservation Status
Badger	Protected Species
Fox	Least Concern
Mink	n/a
Irish Hare	Least Concern
Wood Mouse	Least Concern
Rat	n/a
Greater White-toothed Shrew	Invasive n/a
Stoat	Least concern
Otter	Protected
Red Squirrel	Least Concern
Pine Marten	Least Concern

Surveys also confirmed the presence of eight species of bat all of which attract protected status. The various species are set out below

- Daubenton's bat
- Natterer's bat
- Whiskered bat
- Common pipistrelle
- Soprano pipistrelle
- Brown long-eared bat
- Leisler's bat
- Lesser horseshoe bat.

There were also several sightings of the common frog as well as a wide diversity of invertebrates.

In terms of potential ecological impacts, the EIAR assesses the impacts of the proposed development on Natura 2000 sites in the vicinity. Any potential impacts on

European Sites are detailed and assessed under a separate 'Appropriate Assessment' heading below and for this reason are not summarised and evaluated as part of this EIAR assessment.

With regard to impacts on habitats and flora, it is noted that no Annex 1 habitats listed under the EU habitats directly our presence within the proposed application boundary. No botanical species protected under the Flora (Protection) Order (1999), listed in the EU Habitats Directive or listed in the Irish Red Data Books are present within the application boundary. No Third Schedule Invasive Plant Species are present within the application site. As part of the restoration plan of the BRDA, extensive landscaping and planting will take place with managed grasslands and hedgerows. The localised loss of vegetation cover primarily associated with the development of the borrow pit extension will have a localised non-significant negative impact on the habitats present. The landscaping measures proposed as part of the restoration plan is likely to have a slight to moderate positive effect on habitats present within the application site.

The habitats at present in the BRDA are not attractive to non-volant mammals. No non-volant mammals were recorded in the BRDA during the surveys. It is highly unlikely that there will be any direct impacts on any protected mammal species or its habitat as a result to the proposed raises to the BRDA and SCDC. Potential impacts arising from the proposed development upon non-volant mammals which are qualifying interests of nearby designated Natura 2000 sites or assessed elsewhere in this report.

The noise and visual disturbances associated with the movement and operation of planting machinery during the active phase of the construction after raises are likely to be similar to that which currently occurs on site. Mammals in the vicinity of the proposed application are likely to be habituated to the daily workings of the facility.

The proposed borrow pit extension will require the clearance of an area of scrub that may lead to localised displacement or loss of species including small mammals such as pygmy shrew and hedgehog. Similarly, there will be a loss of some grassland dominated habitats that provide some foraging opportunities for non-volant mammals. Any such losses will be relatively limited in extent and similar habitats are well represented in the wider area.

Blasting has the potential to cause localised disturbance of non-volent mammals. However, blasting is infrequent and will only occur during the daytime. The development of the borrow pit will potentially decrease the foraging lands available. Activities associated with the operation of the borrow pit (i.e. crushing and screening of stone) could also result in some disturbance however given the nature of the exposed rock in this area and the lack of suitable habitat for non-volant mammals, the impact is likely to be modest. The impact therefore on non-volent mammals is considered to be imperceptible, not-significant and localised.

With regard to the impact on bats, the surveys indicate that there are no known bat roosts within the boundary of the application site. It is acknowledged that a diverse bat community has been recorded in the wider Aughinish Island area. There are no features within the BRDA that are attractive for use by roosting foraging or commuting bats. Bats may occasionally forage or commute over the BRDA but this area clearly represents a sub-optimal habitat for bats. There will be no significant changes in the nature or extent of artificial illumination within the proposed development area. It is likely that bats will continue to occur in the vicinity of the application site in similar fashion to that which presently exists. In the longer term, with the implementation of the post closure landscaping plan, the proposed hedgerows and other woody vegetation will provide improved foraging and commuting opportunities for bats in the area.

As in the case of bats, the majority of the application site is of low value for birds. Birds located in the area are likely to be habituated to some extent to anthropogenic disturbance due to the presence of an existing manufacturing and refinery plant. Activity levels on the BRDA makes it very unlikely that the site would be used by any significant numbers of daytime roosting birds. Noise associated with blasting and other operations at the borrow pit has the potential to cause disturbance and displacement to birds in the immediate vicinity. In the absence of mitigation there is potential for likely significant negative impacts on birds occurring locally at the borrow pit area. It is intended to limit all blasting activity outside the period of overwintering for birds.

The loss of some areas of scrub and grassland associated with the development of the borrow pit extension is likely to see a highly localised impact on the diversity and abundance of other taxa.

In terms of cumulative and in-combination effects, the EIAR contains a record of all major planning applications which have taken place within 15 kilometres of the planning boundary. These are summarised in Table 6.18 of the EIAR. Some of the larger projects identified which could potentially impact include the capacity extension at Shannon Foynes Port and the Foynes to Limerick N69 Road scheme. However, no potential for significant cumulative or in combination effects on the local biodiversity were identified in relation to any of the plans or projects considered.

In terms of indirect effects, it is stated that the proposed development will facilitate the extension of the life of the existing facility and therefore will extend the levels of anthropogenic activity in the area. The nature of the activities in the processing area will be essentially unchanged. The existing facility is in place and there is an extensive infrastructure and a management system to contain or treat potential pollutants. It is considered therefore that there will be no indirect effects on the biodiversity or local ecology of the area. The final section of the biodiversity chapter sets out various mitigation measures which would be implemented as part of the proposal in order to minimise the effect on the biodiversity of the area.

Details of a Biodiversity Management Plan which has been prepared for the overall site is contained in Appendix 6.5.of the EIAR. In addition to the measures set out in the Biodiversity Management Plan, specific mitigation measures are set out in the EIAR in respect of:

- Avoiding clearance of woodland to periods outside the bird breeding season.
- Ensuring that specialist contractor is used to remove Third Schedule Invasive Plant Species.
- Incorporating mammal gates and any fencing erected around the borrow pit.
- Blasting will be restricted to the period of April to September and will restricted to c. 7 times per year.
- All emissions during the operational phase will be controlled so that there will be no impact on key faunal species.
- There will be no alterations to the existing artificial illumination at the site.
- Bat boxes and bird boxes will be provided on lands within the applicant's control.

- All edible or putrescible waste will be stored and disposed of in an appropriate manner.
- The biodiversity management plan will be reviewed and updated on a 5 year basis.

Assessment of the Biodiversity Chapter

9.1.2. I consider that the potential impacts of the proposed development on the biodiversity of the site have been comprehensively assessed in the EIAR and the surveys and assessments have been carried out in accordance with best practice and by competent experts. I consider that the nature and scope of the surveys is robust, acceptable and proportionate.

9.1.3. I accept that the impacts of the proposed development on habitats and species on the site have been reduced by avoidance and design. The habitats inherent in the BRDA is of very low ecological value. The site is suboptimal for fauna identified as key ecological receptors including badger, otter.

9.1.4. With regard to the extension of the borrow pit area, there is potential for some impact on foraging and commuting of fauna and avifauna, particularly during the active phase of excavation. But through standard mitigation and monitoring, management and habitat enhancement there will be no significant impacts arising from the development.

9.1.5. The proposed development avoids watercourses, and no instream works are proposed.

9.1.6. Having regard to all the submissions received in respect of the application, I consider that the information provided in the planning application documents is sufficient to allow the impacts of the proposed development to be fully assessed. I am satisfied that the impacts identified on biodiversity would be avoided, managed or mitigated by the measures forming part of the proposed scheme. I am, therefore, satisfied that the proposed development would not have any significant adverse direct, indirect or cumulative effects on the biodiversity of the area.

9.2. Population Human Health and Agriculture

9.2.1. Chapter 7 of the EIAR identifies, describes and assesses the impact of the proposed development in the context of demographic, socio-economic and amenity impacts. The primary study area is defined as the Aughinish District Electoral Division. The surrounding area is described as predominantly rural in character. The demographic and employment profile of the area is described and compared with the same statistics nationally. It is noted that the population of the study area has grown by just 0.1% between 2011 and 2016. The Aughinish Island Alumina Refinery employs a total of 482 people with 385 maintenance and contractor employees. The economic outlook is positive, and the facility is well positioned to take advantage of this economic forecast. The existing operation is a major economic generator and employer on an local and regional scale.

9.2.2. Details of the existing services and amenities available which are mainly centred in the villages of Foynes and Askeaton are set out in the EIAR. The Aughinish Nature Trail to the east of the site is an important local recreational amenity.

In terms of potential impacts, the following is stated:

- Under a do-nothing scenario the facility would continue to operate as normal up to c.2030 at which point the permitted capacity of the BRDA will have been reached and the facility would close.
- Were the proposed development to proceed the facility can operate beyond 2030 and continue to provide significant levels of employment which will have a significant positive impact on the local economy and the wider area including population and service centres in the vicinity.
- Impacts of the proposed in terms of landscape and traffic are identifies and addressed elsewhere in the EIAR.
- In terms of health and safety, details of the management systems and external emergency plans that have been put in place are set out in the EIAR.

No mitigation measures are envisaged to be required in respect of population. The proposal, if it proceeds, will have a positive impact in terms of population.

In terms of the human health assessment, it is noted that the EPA code of practice: Environmental Risk Assessment for Unregulated Waste Disposal sites defines risk

assessment as a means of considering "*the likelihood of occurrence and the consequences of the occurrence of an event. It represents a systematic means of determining and evaluating the nature and extent of exposure a vulnerable receptor may experience in relation to a particular hazard*". The methodology used in the assessment predicts the magnitude of the impact from 'no-change' to 'high'. And the sensitivity of the receptor from 'negligible' to 'high'.

The major potential health hazards during the construction phase relate to traffic and air pollution. These are dealt with in other chapters of the EIAR. The borrow pit will also give rise to the periodic blasting and crushing of rock. Dust deposition is likely to occur in the vicinity of the works to be undertaken and will not impact on sensitive receptors in the vicinity.

Bauxite residue is a low-level source of naturally occurring radioactive material. A specific report undertaken by the Radiological Protection Institute of Ireland in a report specifically looked at radiation emissions from bauxite refining for the production of alumina was found not to give rise to an effective dose to workers or members of the public in excess of 1 mSv above background in any 12 month period. As such they do not come under the scope of the Irish Regulations as far as ionising radiation is concerned. Since the publishing of the above report the applicants have carried out more recent testing for radionuclide content the result was consistent with the previous tests carried out by the RPII.

In terms of potential impacts on the surrounding community it is noted that there are no residential receptors near the project. The nearest residential receptor is located over 900 meters away. The nearest school Scoil Naisiunta Sheeanain, a primary school is located 1.9 km away.

In terms of construction impacts, noise, vibration and air pollution are identified at the major potential impacts. These impacts have been the subject of separate assessments in the EIAR (see below) where it was concluded that with the appropriate mitigation measures the impact on sensitive receptors would not be discernible.

In terms of potential impact on the water environment, a separate assessment in the EIAR has concluded that the potential pathways for water runoff from the BRDA to interact with groundwater or surface water are intercepted by appropriate barrier and drainage systems to intercept any runoff, subject to treatment and prevent it from

entering groundwater or surface water. Any water discharges from the plant are subject to EPA licensing. In respect of the borrow pit, the maximum depth of extraction is to 8.5 meters OD is circa 2.5 meters above the groundwater table. The distance between the site and any potential groundwater users in the vicinity of the site is c. 1.7km to the east, which is a considerable separation distance and will not give rise to any adverse impacts on other groundwater users in the area.

In terms of potential impact on human health, reference is made to report contained In appendix 7 entitled "*Human Health Assessment for Bauxite Residue and Salt Cake in Support of the Environmental Impact Assessment for the Expansion of the Alumina Production Facility, Askeaton County Limerick Ireland.*" It concludes that based on the findings of the human health assessment predicated on the use of the maximum predicted exposure concentrations of PM_{10} and $PM_{2.5}$ and in combination with the use of overly conservative exposure assumptions applied in the risk analysis, bauxite residue and salt cake do not pose a health concern to human receptors in the nearby primary school and nearby residences.

In terms of mitigation measures, the measures in respect of noise vibration air quality and water set out in the foregoing chapters of the EIAR will be applied.

In terms of cumulative impacts, there are no nearby sources with significant admissions to air or significant emissions in terms of noise or vibrations which could contribute to any in combination effects. It was concluded therefore that there are no significant predicted residual impacts on the water environment, noise environment or on air quality.

With regard to impacts on animal health, it is noted that there are no agricultural activities immediately adjoining the proposed development site. The predominant land use to the south of the site is pastoral farming and to the west there is a mixed area of pastureland together with industrial and commercial activity. It is stated that an equine facility located some distance to the east of the facility will not be affected due to the separation distances involved. The proposal will not result in the loss of agricultural land as all works are to take place within the existing footprint of the site. There will be virtually no change in the noise environment relative to the existing operations on site. Impacts in terms of noise will be imperceptible and will have no impact on animal health or farming practices.

As in the case of human activity, there has been no evidence that emissions from the AAL facility generally or from the BRDA will cause any adverse effects in relation to agricultural animals. There has been no specific attribution made between respiratory or other adverse animal health impacts and emissions from industrial installations in the region. Furthermore the separation distances from the proposed development to the nearest farming activity as such that the level of any emissions concentrations will be significantly below requisite standards.

In terms of dust deposition dust gauges at the boundary of the facility recorded levels of between 1-10mg/m^2/day indicating that the dose levels detected are significantly below the TA Luft standard and are compatible with what can be expected in a rural area. Consequently, it is reasonable to conclude that those levels will not give rise to any adverse effect on agriculture or animal health in the surrounding area.

In terms of water discharges, AAL site discharges clean storm water which is subject to and EPA IED licence. As this discharge has been subject to licensing, it is concluded that there will be no impact on adjoining agricultural activity or animal health. There are no discharges to groundwater and therefore there will be no impact on wells or other groundwater sources used in agricultural activity.

9.3. *Assessment Population Human Health and Agriculture*

9.3.1. The main issues in the submissions raised relate to impacts on human health, through excessive noise, vibration and air quality. Detailed assessments have been carried out on in respect the impact arising from human health primarily through fugitive dust emissions from the BRDA. The bauxite residue has been tested and found to be a low-level source of naturally occurring radioactive material. Air dispersion modelling was conducted for fugitive emissions for both the bauxite residue and salt cake. Even with the overtly conservative modeling assumptions, the risk analysis concluded that the proposal does not pose a health concern to sensitive receptors be they humans or animals.

9.3.2. The continuing operations of the facility will have a positive impact on employment and the local economy.

9.3.3. I consider that the information provided in the planning application documents is sufficient to allow the impacts of the proposed development to be fully assessed. I am satisfied that the impacts identified on population and human health can be avoided, managed or mitigated by the measures forming part of the proposed scheme. I am, therefore, satisfied that the proposed development would not have any direct, indirect or cumulative significant effects on population and human health.

9.4. Soils Land and Geology

The mapped quaternary sediments (GSI 2021) are stated to comprise a spoil heap, estuarine silts and clays, till derived limestones and bedrock outcrop and subcrop at the BRDA site. However, this mapping does not reflect the development of phase two of BRDA and it is more accurate to describe the entire BRDA as spoil heap. The GSI's quaternary sediments mapping indicates that the soils at the permitted borrow pit sites are a mix of till derived from limestone and karstified bedrock outcrop and subcrop. The north-west of the BRDA site is composed of the Liquid Waste Pond (LWP) and the Storm Water Pond (SWP) both of which are artificially lined. The mapped bedrock geology comprises Waulsortian formation limestones beneath the eastern sector of the BRDA and in the area of the borrow pits and plant. The overlying Rathkeale formation limestones and mudstones underly the central and western portions of the BRDA. Structurally no major faults had been identified by the GSI at the site. Details of the bedrock geology are elaborated upon in section 8.6.5 of the EIAR. Geotechnical monitoring is carried out on a continuous basis as part of the EPA licence conditions. The assessment of current data indicates that the BRDA is performing in compliance with the target Factor of Safety (FoS) criteria. Visual inspection of the BRDA indicates no signs of distress on the containment walls. Details of the various geotechnical instruments and readings currently installed in the BRDA is set out in the EIAR. Details in relation to naturally occurring radioactive material including radon and uranium isotope testing are set out in detail in the EIAR.

The stability analysis for Phase 1 and Phase 2 of the BRDA have returned Factors of Safety (FoS) in compliance with the target FoS criteria for the permitted BRDA

constructed to Stage 10 and for the BRDA Raise to Stage 16[3]. These FoS criteria are consistent with the current international guidelines for tailing dam safety management and best practice.

The main potential impacts and associated effects which could arise from the proposed development include:

- Removal of superficial and bedrock deposits at the proposed borrow pit extension.
- Activities or events that might impact on bedrock or soil during operations such as leaks or spills from machinery.
- A trigger event such as blasting at the proposed or permitted borrow pit causing instability failure within the BRDA or the SCDC.

No removal of superficial deposits or bedrock will be required within the BRDA or SCDC sites as they are both vertical extensions on top of existing structures. Superficial deposits and bedrock will be removed at the proposed borrow pit extension site. The stability of the excavation and stockpiles generated within the proposed borrow pit extension will be monitored and managed by contractors in accordance with appropriate Guidance and Regulations. The risk assessment for a breakout of the BRDA has been assessed and updated from the previous breakout studies carried out in 2006 and 2013. The report identified that the annual probability of slope failure for the sectors of the BRDA closest to the borrow pit as being almost 'impossible' to 'highly improbable'. The site for the borrow pit extension is at a greater distance from the BRDA then the permitted borrow pit and therefore instability resulting from blasting within this area is considered to be even less likely. If failure of the BRDA where to occur, it would be confined to the eastern flank our northeastern flank of phase one. Given the almost impossible to highly improbable likelihood and the localised containment within these areas the impact is predicted to be negligible. The impact of a breech scenario is largely dependent on the volume of material discharged and the distance travelled by the material discharged. Both

[3] Further details of the stability analysis are contained in Appendix A of the EIAR – The Engineer Design Report.

these factors are dependent on the ability of bauxite residue to liquefy. As the bauxite residue is now farmed (since 2009), the moisture content decreases and the density of material increases. As a result if a breakout was to occur, the material would slump rather than liquefy and flow. The estimated volume of bauxite residue that could potentially be released in a breach scenario ranges from 40,000 m^3 to 90,000 m^3.

Any breakout from the SCDC would be contained in the BRDA and therefore would remain within a composite lined area.

Fuel and other substance leaks or spills from stored substances could potentially affect the chemistry of the soil and lead to ground contamination. There will be no underground tanks, septic tanks and re-fueling will take place using a mobile browser fueling plant only in designated areas suitable for refueling. Therefore, there are no planned discharges to ground and hazardous materials would be managed and stored appropriately.

The main mitigation measures will be incorporated into the design that will reduce the potential impact on soil lands and geology. It will include regular checks, inspections, audits and stability inspection on the BRDA and SCDC Raises. Other relevant mitigation measures will be incorporated into CEMP.

In terms of cumulative impacts, the proposed development has been designed to integrate and complement the existing structures with the proposed structures. No cumulative impacts are anticipated with the addition of the proposed extension. No difficulties were encountered in undertaking the assessment.

Assessment of the Soils and Geology Chapter

I am satisfied that the applicant has identified the potential direct and indirect significant effects that the proposed development may have on soil land and geology during both the construction, operation and closure phases of the proposed development. Both the borrow pit extension and the planned raises of the BRDA and SCDC have the potential to be affected by geotechnical issues during the operation and aftercare phases. The assessment undertaken has identified the potential impacts including the potential for bauxite breakout and salt cake breakout from a structural failure in the perimeter boundary. However, this would not lead to

significant effects as the bauxite would slump rather than travel significant distances. Any breakout in the SCDC would be within the composite lined BRDA area. There will be no loss of productive land or further land take to facilitate the proposed development. No geological heritage sites have been identified in the receiving environment and therefore there will be no adverse impacts on such sites. Where additional mitigation measures could be incorporated to reduce any potential adverse impacts these mitigation measures have been identified and included in the design of the project. The conclusion set out in the EIAR that the potential impact of the proposal would be overall imperceptible and not significant is a reasonable conclusion in my opinion.

Landscape and Visual Impact

Chapter 9 of the EIA or assesses the visual impact of the proposed development on the receiving landscape. This chapter should be read in conjunction with the photomontages submitted with the application. The chapter sets out details of the methodology employed for the assessment of the impact proposal on the landscape. The five categories used to classify the magnitude of the impact and the sensitivity of the visual receptor range from negligible to very high. Details of the methodology in presenting the photomontages and the 3D modeling undertaken are also set out.

Section 9.3 of the EIAR details then receiving environment and the visual characteristics of the site and its surroundings. It is noted that the AAL plant and the BRDA can be seen across much of the Shannon Estuary. The characteristic red / brown coloring of the bauxite residue renders it prominent in visual terms particularly on the surrounding landscape on the southern side of the estuary. The landscape surrounding to the south of the Shannon Estuary is low lying and is well enclosed by mature hedgerows, many of which accommodate mature trees which help screen the development from many vantage points in the surrounding area. The EIAR goes on to outline the various landscape policies and designations contained in the Limerick and Clare County development plans. In terms of Landscape Character Areas, it is noted that the proposed development site is located entirely within the Shannon Estuary Integrated Coastal Management Zone. Due to the presence of largescale industrial activity in the area, with the presence of Foynes Port, the AAL Refinery and other industrial facilities in the area the area cannot be considered to

be a pristine rural environment. One of the main features of the area is the presence of the estuary which is the most defining characteristic of the landscape character. The landscape itself generally comprises of enclosed farms with a mosaic of fields enclosed by mature and semi-mature hedgerows. There is one protected view and prospect designated in the Limerick Development Plan located along the N69 adjacent to the Shannon Estuary from Foynes to Glin. In terms of the Clare County Development Plan, the nearest landscape character types on the northern side of the Shannon estuary are LCT 8 – 'Farmed Lowland Ridges' and LCT 10 – 'Flat Estuarine Farmland and Islands'. There are a number of scenic routes listed in the Clare County development plan which are of relevance. These include

- Scenic route SR 18 – Along the coast road from Carrigaholt to Doonha
- Scenic route SR 19 – Coast Road south east of Cappagh to Carrowdotia South
- Scenic route SR 20 – R473 from outside Labasheeda to T junction before Killadysert.

In terms of potential impacts, the EIAR states that the construction phase will have a relatively minor landscape effect. The sensitivity of the receiving landscape fabric is considered to be low given the presence of the industrial activity of the site including the BRDA the aluminum refinery and the existing borrow pit. The existing BRDA is set in low lying relatively open landscape where the existing AAL facility dominates the view. The construction of the additional 6 raises, each 2 m in height will be set entirely within the footprint of the proposed development. The increase in height will make the BRDA more prominent in the landscape in comparison with the baseline condition. However, the nature of the mound geometry results in a smaller surface area of bauxite residue being exposed with the filling of each consecutive stage and such the surface area of the red-brown bauxite residue will be reduced. The proposed extension however. will enable the continuation of the operation of the BRDA for almost another decade and this in itself will have an impact on the visual amenities of the area. Having regard to the existing disposal facility on site, it is not considered that the proposed development will have a significant impact on the landscape character of the area.

In respect to the extension of the borrow pit, it is noted that this feature is already established on site and the extension of this area is not considered to be significant. The impact on the context of the existing landscape is considered to be negligible.

When viewed from Co Clare, the proposed extension to the BRDA will not result in any discernible alteration to key elements or features. The proposal will only be seen at a distance from the Clare coast as such the magnitude of change would be imperceptible.

The post closure and restoration with the incorporation of capping and planting would result in a gradual transition to neutral effect after the period of restoration. From elevated and distance viewpoints, the primary visual effect arises from the red/brown nature of the residue itself. Due to the sloping profile of the BRDA geometry the visible surface area of the residue decreases with each increase in height and thus the visual effect would be reduced over the lifespan of the operational phase. However, this reduction in visual effect of the residue is counterbalanced to an extent by the raising of the overall height and the increased vertical extent of the side-slopes.

The visual impact has been assessed from the photomontages submitted and these are summarized in the EIAR as follows:

View no.	Location	Sensitivity	Magnitude of Impact pre closure	Magnitude of impact post closure
1	Poulaweala Creek 1.5km NE of the BRDA and 1 km from the borrow pit	Low /Medium	Slight moderate negative long term	Slight Negative long term
2	Local Road Morgans North 1 km to the E	Medium	Moderate/negative long term	Sligh/Moderate negative long term.
3.	Bridge over Limerick - Foynes Rail 0.75 km SE	Low/medium	Slight/ moderate negative long term	Slight/ moderate neutral long term
4.	Reilig Mhuire Cemetery on the N69 3km to the E	Low /Medium	Negligible / imperceptible	Negligible / imperceptible
5.	View from N69 at Goulding's Fertilizer Plant	Low/ Medium	Slight/ Moderate	Sligh negative long term

6.	N69 Glenbane East 1km to the SE of BRDA	Low /Medium	High magnitude and the effect will be Slight/ moderate negative long term	Slight/ moderate neutral long term
7.	N69 near quarry at Ballyculhane 1km from BRDA	Low /Medium	High magnitude and the effect will be slight moderate negative long term	Slight/ moderate neutral long term
8.	N69 at Glenbane c.1 km south of the BRDA	Medium	Medium/High magnitude and the effect will be slight moderate negative long term	Moderate / neutral long term
9.	From L6069 E of Robertstown Creek 1Km S of BRDA	Low	High magnitude and the effect will be slight negative long term	Slight / neutral long term
10.	From N69 E of Robertstown Creek 1Km S of BRDA	Low / Medium	Medium/High magnitude and the effect will be slight moderate neutral long term	Slight/moderate positive long term
11	South of Robertstown Creek c1km S of the BRDA	Low/ Medium	Medium/High magnitude and the effect will be slight moderate neutral long term	Slight/moderate positive long term
12.	Robertstown Graveyard c. 1km S of BRDA	Low/ Medium	Medium/High magnitude and the effect will be slight moderate neutral long term	Slight /moderate neutral long-term
13.	N69 at Shrule c.1.5km to the SW of BRDA	Low /Medium	High magnitude and the effect will be slight moderate neutral long term	slight moderate neutral long term
14.	N69 on southern edge of Foynes at Ardineer 1.5km W of BRDA	Medium	Low and the effect will be slight negative long term	Negligible not significant, neutral and long term
15.	Dernish Ave Foynes c1.5 km west of BRDA	Medium	Magnitude will be low and the effect will be slight negative and long term	Not significant neutral and long term.
16.	View from Corgrig Wood Foynes c.1.7km west of the BRDA	Medium	Negligible, not significant neutral and long term	Negligible, not significant neutral and long term
17.	Marine Cove western end of Foynes c2.1 km west of the BRDA	Low	Magnitude of change will be medium-high and	Medium and the effect will be

			the effect will be slight negative and long term	slight, neutral and long term.
18.	West from the western edge of Foynes on N69 c 2.3 km west of BRDA	Low	Magnitude of change will be low and the effect will be slight negative and long term	Low, slight positive long term
19.	Knockpatrick Graveyard c.3 km t the SW of the BRDA	Medium	High magnitude and the effect will be moderate neutral long term	Slight /moderate positive long term
20.	R473 in Cahiracon, Co Clare c5km NW of the BRDA	Medium	Low medium magnitude of change. The effect slight moderate neutral long-term	The magnitude of change will be slight positive and long term
21.	View from River Shannon 2km to the north west of BRDA	Medium/High	Magnitude of change will be medium and the effect will be moderate negative long-term	Slight/ moderate neutral long term
22.	Rathbrouder c6km SW of the BRDA	Medium High	Magnitude of change will be low/medium and the effect will be low/medium and the effect will be slight moderate neutral and long term	With mitigation the magnitude of change will be low and the effect will be slight, positive and long term.

In terms of cumulative effects, there are two permitted/proposed developments of a scale and type likely to cause cumulative effects; these are (a) the capacity extension at Shannon Foynes Port and (b) The Foynes to Limerick Road scheme which is currently with An Bord Pleanála for deliberation and determination. Cumulative effects on the local landscape character are likely to be notable for areas around the eastern edge of Foynes but are not expected to be significant in the wider landscape. There is potential for cumulative visual effects to occur where both the port extension and the BRDA can be seen in the same view. This is most likely to occur at locations around the northeastern edge of Foynes and from elevated views most notably Knockpatrick Hill c. 3km to the southwest. These views should be seen

in the context of other established large scale industrial developments relating to both the refinery and the existing port. In terms of the N69 upgrade, this road passes through low lying land with frequent screening features and it is likely that views of the road upgrade will be limited to localised areas. Views from the elevated location around Knockpatrick Hill is substantially screened by landform and other screening elements, primarily natural vegetation.

Assessment and Visual Impact Chapter

9.4.1. I consider that the EIAR as accurately assessed and demonstrated that proposed development can be accommodated without resulting in significant adverse effects on the overall landscape character. The existing BRDA comprises of a relatively large and expansive and low-lying feature within the landscape. The most distinctive feature of the existing site is the red/brown color of the bauxite residue. The area immediately surrounding the site does not attract any significant landscape or sensitive designations. I consider that the applicant has comprehensively demonstrated that there will be 'slight' to, in some cases 'moderate' impact, but the extension will not result in wider significant effects on the area. The moderate effects will mainly be confined to the study area around Alumina Plant, particularly along the N69 to the south. The area is already characterised by large scale industrial development with the establishment of the existing refinery to the north of the BRDA, the presence of a large port facility at Foynes and to a lesser extent the Goulding Fertiliser Factory on the N69, c. 2 km to the east of the BRDA. While the proposed development will increase the overall height of the deposition area by 12 m, the site is relatively flat which limits the potential for open views over long distances. The main impact will in fact arise from the extension of the longevity of the deposition area from 2030 to 2039. The proposal will postpone the restoration of the deposition area for approximately 10 years and will ensure that the red/brown deposits will remain prominent feature of the landscape until such time As the site restoration plan is implemented.

9.4.2. In terms of the key visual receptors identified in the EIAR, I accept that the proposed development will not result in significant adverse effects on views from designated amenity routes, settlements, recreational/tourist destinations, recreational routes or transport routes. The visual impacts are for the most part restricted to the central portion of the study area. Views beyond 5km are assessed as being slight and

imperceptible. The photomontages submitted with the application would support this conclusion.

9.4.3. The photomontages submitted also demonstrate that the impact arising from the extension of the borrow pit would be imperceptible.

9.4.4. There is little potential for cumulative visual impacts, the two identified projects which could give rise to impacts represent expansions and upgrading of existing features in the area. The photomontages support the view that there are no significant cumulative impacts.

9.4.5. Post restoration, the impact arising from the development would be imperceptible.

9.4.6. I consider that the applicant has provided a comprehensive assessment of the landscape and visual impacts of the proposed development on the landscape and visual amenities of the area. Detailed assessments and photomontages from 22 separate vantage points within a 6 km radius of the subject site have been undertaken. Each of these locations have been assessed in terms of visual receptor sensitivity, visual impact magnitude and the significance of the visual impact for the various stages of the BRDA and for the post restoration stage. I consider that the information provided in the planning application documentation is sufficient to allow the impacts of the proposed development to be fully assessed. I am satisfied that the proposed development would not give rise to any significant additional adverse visual impacts on scenic views, scenic routes, settlements, recreational/tourist destinations or transport routes.

9.5. Hydrology and Hydrogeology

9.5.1. The potential significant effects of the proposed development on the water environment are considered in Chapter 10 of the EIAR. The assessment describes the existing environment and identifies the likely significant effects on surface water and groundwater during the construction, operational and decommissioning stages of the proposed development. It also sets out a suite of mitigation measures to offset any potential impacts. The EIAR also assesses potential cumulative impacts. Details of the guidance and legislation informing the assessment is set out. Details of the assessment methodology to be employed in the assessment of any potential impact

arising from the proposal is also set out. Details of the receiving environment including the details of various soils samples undertaken are set out.

9.5.2. The soil quality monitoring report indicated that there was no noticeable significant impact from industrial activities. The pH ranged from 7.69 to 8.44. The range of concentration of aluminium arsenic and heavy metals where typical of those associated with soils. With regard to the made ground areas associated the BRDA, the five principal compounds associated with the residue are moisture, aluminium Geothite, hermatite, Calcium Cancrinite and bayer sodalite – none of which attract a hazardous classification. The majority of the material is clay and silt size. Moisture content values typically range from 32 to 45%. The process sand is extracted from the bauxite and is classified as poorly graded medium sand.

9.5.3. Salt cake, the byproduct of the process of purification of the caustic soda liquor used in alumina extraction is classified as hazardous waste and is required to be segregated from the bauxite residue. A dedicated independent composite lined SCDC is located within the BRDA Phase 1. Details of the bedrock geology is also set out in this section of the EIAR (for details see chapter 8 above).

9.5.4. In terms of hydrology, the region in which the site is located drains into the Shannon Area Estuary. Rivers within the study area drain predominantly to the Robertstown River before being discharged into the Shannon Estuary. Aughinish Island is located within the Lower Shannon Estuary Transitional Waterbody. On the island 18 groundwater discharge points of measurable flow are identified. No streams are present in the vicinity of the proposed borrow pit extension or the permitted borrow pit site. Streams within the BRDA have been backfilled and culverted to create drains.

9.5.5. The perimeter interceptor channel (PIC) is a composite lined channel between the raises, which collects surface water runoff, sprinkle water and seepages and transfers water to the surface water pond and subsequently to the effluent clarification system (ECS). Separately, a perimeter drain discharges clean surface water from the low-lying area between the 'Toe Drain' and the flood tidal defence berm.

9.5.6. In terms of flooding, the EIAR notes that flooding events have occurred to the east and west of Aughinish Island. These flood events are reoccurring. However, no flood

events have been recorded at the AAL Plants or the BRDA footprint. The BRDA is located on lands which are defended by flood protection works.

9.5.7. Details of the interceptor channel are set out in section 10.6.8.2 of the EIAR. There are 6 no. Phase 1 PIC's segments that collect run-off from the Phase 1 BRDA. There are 5 Phase 2 PIC segments that collect run-off from the Phase 2 BRDA.

9.5.8. Both the Surface Water Pond (SWP) and the Liquid Waste Pond (LWP) are located in the north-east sector of the BRDA. The function of the SWP is two-fold (a) to provide surge capacity for surface water that cannot be immediately processed at the ECS. And to provide a continuous flow of water that is used for dilution or wash water within some parts of the alumina plant. The liquid waste pond receives treated water from the ECS and conditions this water (cooling and settlement) prior to discharge in the River Shannon or to be used in the sprinkling system on the surface of the BRDA during periods of dry weather.

Surface water monitoring is carried out routinely for surface water bodies in the vicinity of the BRDA. This is done in accordance with the Industrial Emissions Licence. Three locations are regularly monitored, one to the north of the BRDA adjacent to the surface water pond and 2 separate locations along the western side of the BRDA. A slight elevation in pH, soda and electrical conductivity were recorded in the waterbodies. The elevated levels may be attributable to saline intrusion associated with the estuaries in the vicinity or could be attributable to the BRDA.

In terms of underlying aquifers, the western half of the BRDA is underlain by a locally important bedrock aquifer (Rathkeale Formation). It is moderately productive in local zones. The eastern portion is underlain by a regionally important karstified aquifer (Waulsortian Formation). The SCDC and the borrow pit is located above the latter aquifer. No shallow gravel aquifers have been identified beneath the application site. This karstic aquifer is an important water resource for Co. Limerick. Groundwater flow is dominated by the location of karstified fracture zones. The depth of groundwater is between 1.5m and 10m below the ground level. Groundwater flow beneath the site is somewhat confused but is generally in a southwest direction across the BRDA. In terms of groundwater vulnerability, the area underlying the BRDA is classified as varying between 'Extreme' (mainly the eastern and central portion of the site, and 'Low' western portion of the site. The recharge co-efficient is,

as can be expected, higher in the areas of higher vulnerability on the eastern side of the BRDA, while the less vulnerable western side has a lower recharge co-efficient.

A number of karst features have been identified in the vicinity of the site, but none within the footprint of the site. Possible areas of fractured bedrock and karst were identified in the borrow pit. Borehole investigations indicated a very low level of transmissivity in the underlying bedrock.

In terms of groundwater quality, the principal contaminant of concern arising from the alumina production is dilute sodium aluminate which is characterised by elevated pH, elevated alkalinity and elevated aluminium relative to groundwater. Fluoride is a common element in bauxite ore is also a potential contaminant of concern. Details of the annual pH levels, soda, conductivity, fluoride, chloride, alkalinity and sulphate in the water monitoring boreholes are set out in figures10.29 to 10.42 of the EIAR. There were slight elevations in pH and sulphate in the monitoring undertaken. pH levels during the monitoring period are within the threshold level of 6.0-9.0. High soda and conductivity levels were recorded in MW2, these recordings it is stated, were influenced by the saline intrusion from coastal waters as this monitoring station is located along the margin of Poulaweala Creek.

Results for heavy metal concentrations are set out in Table 10.7. Elevated levels in aluminium, magnesium, iron, zinc were recorded in some of the monitoring boreholes. The EIAR states that these exceedances occur in isolation to other parameters i.e. just a single metal exceeding a threshold value in the round of readings. They are isolated occurrences rather than consistent trends. They are therefore considered to be neutral.

In terms of regulated emissions there are no licence discharges to surface water or groundwater from the BRDA. There are two licenced discharges from the refinery. However, they are not affected as a result of the current application. There are no source protection areas or preliminary source protection zones within the study area. The nearest source protection area is 11 km away. On well is identified within the site and is mapped as being below the footprint of the SWP. The well is currently defunct. There are 14 wells within the wider area, only 2 of which are being used, one for domestic use and the other for agricultural and domestic use. However, the groundwater present beneath the application site comprises of a freshwater lens that

is both downgraded and isolated laterally from the main aquifer and is hydraulically isolated by Poulaweala Creek and the Robertstown River and as such the 14 wells are not identified as being part of the same regional hydrogeological system in which the site are located.

In terms of potential impacts, The EIAR states that no water management system is required for the proposed borrow pit extension or the existing borrow pit as there is no interaction with groundwater. Details of the water balancing system for the BRDA is indicated in figure 10.53. Improvements to be implemented include:

- Provision of additional culverts for several PIC's
- Increases to PIC crest elevations for several PIC's
- New pump arrangements and upgrades for PIC's
- Alterations in pumped flows to the PIC system so as to reduce the volume of water discharging to the PIC.

The main potential effects during the construction operation and closure of the proposed development are identified as follows:

- Mobilisation of leachate by operational works through proposed earth movements which could impact on water quality and use.
- Changes in groundwater levels and flow regimes.
- Activities that might impact on water quality in use through the release of suspended solids leaks and spills from machinery another stored substances are discharges which could potentially impact on water quality.

The evaluation of the predicted impacts is set out in Table 10.10 of the EIAR. All the identified impacts on groundwater and surface water use which are identified as being of medium or high sensitivity, are considered to be of relatively low magnitude. The level of potential effect is identified in all instances as being 'slight'. Similar conclusions are arrived at in respect of the closure phase.

In terms of mitigation, the proposed project design is predicated on design principles and standards in order to avoid adverse environmental effects. In this respect construction and operation undertaken will be within defined codes of practice and

guidelines including procedural commitments such as the use of various instrumentation and monitoring. The elements of the proposed development design that reduced potential impacts to the water environment include the following:

- Rockfill materials will be sourced from the proposed borrow pit. No rockfill materials are anticipated to be needed from external sources.
- Soil and organic soil improver will be imported to implement the landscape design. The materials to be imported will not result in ground contamination.
- There will be no septic tanks or underground storage tanks during construction or after use that could result in leaks to groundwater or the surface water environment.
- The BRDA and the SCDC are existing structures which are compositely lined. Any proposed raises would also incorporate such lining.
- All surface water run-off, bleed water, sprinkler water and seepage from the bauxite residue will continue to percolate through the rockfill stage raises and discharge into the PIC's.
- There will be no requirement for a connection to a watermains or abstraction from groundwater to facilitate the proposed development.
- There are no planned discharges to groundwater during the operations and this will reduce the potential impacts to water quality.
- A suite of other standard mitigation measures to address potential leaks and spills during the construction phase are also set out.
- A monitoring program at the site will continue to regularly monitor water levels within the proposed BRDA and SCDC and borrow pit areas.
- Regular visual inspections of the containment raises to ensure its integrity will be undertaken by a suitably qualified engineer for both the BRDA and SCDC raises and the proposed borrow extension pit.
- Monitoring of piezometric levels will take place regularly to monitor the phreatic surface head in the bauxite residue.

No cumulative impacts are anticipated from the proposed development. In all cases the residual effect is determined as being 'not significant' and 'not greater than slight'.

Assessment of the Hydrology and Hydrogeology Chapter

The EIAR considers the potential direct and indirect significant effects the proposed development may have on the water environment both groundwater and surface water during the construction operation and closure phases of the proposed development. The assessment notes that there are no surface water features directly connected with the application site and that the Natura 2000 sites in close proximity to the application site are unlikely to be affected. The groundwater aquifer beneath the majority of the BRDA comprises of a locally important aquifer, while the eastern section after site overlies a regionally important groundwater aquifer. However, within the application site, underlying groundwater is largely subject to saline intrusion and does not present a significant resource potential for groundwater use. The borrow pit extension will not impact on groundwater. There are no surface water features present in the vicinity of the proposed borrow pit extension. Any elevated water quality parameters such as soda, conductivity, or pH levels are associated with a high saline concentration in the groundwater and are not attributable to any contamination from the existing operations on site. As the proposed development in this instance seeks to provide additional layers of bauxite residue over and above the existing deposition area and the fact that there are no surface water receptors in the vicinity of the site it is reasonable to conclude that the proposal does not present a threat significant or otherwise to the water environment in the vicinity.

9.5.9. I am satisfied therefore that the impacts identified can be avoided, managed or mitigated by these measures and through suitable conditions. I am, therefore satisfied that the proposed development would not have any unacceptable direct, indirect or cumulative impact on surface water or groundwater in the area. I consider that the information provided in the planning application documentation is sufficient to allow the impacts of the proposed development to be fully assessed.

9.6. **Air Quality**

9.6.1. The potential direct and indirect effects of the proposed development on air quality from each phase of the development are considered in Chapter 11 of the EIAR. The document sets out the background to the relevant legislation and guidance on air quality. Details of the air dispersion modelling methodology (the AERMOD model) is set out.

9.6.2. In terms of the operational emissions, it is noted that due to the high moisture content in the SDCD (approximately 45%) that it will not be a significant source of dust. There will be a slight increase in heavy vehicular traffic on the external road network associated with the importation of soil and soil improver. But the proposal will not result in an increase in light vehicles. The closest dwellings to the site are located c.900m away.

9.6.3. Dust, PM_{10} and $PM_{2.5}$ emissions will be elevated during the excavation from the borrow pit and from the raises associated with the BRDA. Dust particles are generally 1 to 100µm in diameter. Particles greater than 75 microns fall rapidly out of atmospheric suspension and are deposited close to the source. To minimise dust generation, sprinklers have been installed to manage fugitive dust on the surface of the BRDA. Details of the emission rates form the site specific particle size distribution for bauxite residue is outlined in Tables 11.5 and 11.6 of the EIAR.

9.6.4. In terms of the receiving environment, the subject site is located in Air Quality Zone D – 'Rural Area'. Average mean background concentrations of PM_{10} for area ranges between 8.2µg/m^3 and 17.2µg/m^3. This is lower than the 40-50µg/m^3 limit set out in the EU Regulations. Likewise, the annual mean $PM_{2.5}$ levels range from 5.0µg/m^3 to 7.4µg/m^3 which is also below the EU Directive limit value of 25µg/m^3.

9.6.5. Results of dust deposition monitoring at 35 locations within the AAL boundary from January 2019 and December 2020. All are within the TA Luft limit value of 350mg/l. In fact, there is no exceedance of 190mg/l during the survey period.

9.6.6. The main emissions likely to be generated during the construction phase are identified as dust emissions through earth movement works and excavation activities at the borrow pit.

9.6.7. Modelling has been undertaken for 5 phases of the BRDA. In the case of PM_{10}, the predicted 24-hour 90th percentile and annual concentration at the worst-case off-site location peak at 4.7 and 1.4 µg/m^3, with the peaks occurring generally at the site

boundary. When the background concentrations are added the emissions from the BRDA and the borrow pit are estimated to be a maximum of 11.4 µg/m^3. This is significantly below the annual limit value of 40 µg/m^3.

9.6.8. In the case of $PM_{2.5}$, The predicted annual concentration at the worst-case off-site location is estimated to be a maximum of 1.4 µg/m^3. With the peaks occurring generally at the site boundary. When the background concentrations are added the emissions from the BRDA and the borrow pit are estimated to be a maximum of 8.4 µg/m^3. This is significantly below the annual limit value of 25 µg/m^3. As in the case of PM_{10} the results under the 5 modelling scenarios are broadly similar.

9.6.9. In the case of PM_{10}, The predicted 24-hour 90th percentile and annual concentration at the worst-case off-site location peak at 4.7 and 1.4 µg/m^3. With the peaks occurring generally at the site boundary. When the background concentrations are added the emissions from the BRDA and the borrow pit are estimated to be a maximum of 11.4 µg/m^3. This is significantly below the annual limit value of 40 µg/m^3.

9.6.10. Modeling was also carried out in respect of heavy metals, the results indicate that based on the reported heavy metal concentrations over the period, all the concentrations of heavy metals emitted are in compliance with the relevant ambient annual mean air quality standards.

9.6.11. In terms of odour, the bauxite residue and the salt cake are odourless and therefore the works to be undertaken will not have any adverse impact in terms of odour.

9.6.12. In terms of mitigation, a series of measures, mainly in the form of good management practices and housekeeping in order to ensure that dust nuisance is kept to a minimum. Water sprinklers and other dust suppression measures will also be included in the design. Detailed monitoring of all dust deposition will also be undertaken. Frequent cleaning of the Liquid Waste Pond and other biological odour control will be undertaken at regular intervals to mitigate against odour. In terms of cumulative impact, there are no nearby sources with emissions of $PM_{2.5}$ and PM_{10}. There are no significant residual impacts on air quality or odour due to the proposed development which involved the rising of the BRDA and extending the borrow pit. As part of the IED licence there will be a requirement to monitor PM_{10} and $PM_{2.5}$.

Assessment of Air Quality Chapter

9.6.13. I consider that the information provided in the planning application documentation is sufficient to allow the impacts of the proposed development to be fully assessed. I am satisfied that the impacts identified in respect of air quality would be negligible having regard to the existing PM_{10} and $PM_{2.5}$ levels at the site boundary, which are considerably below the standards set out in the Regulations. Dust deposition levels are already monitored and controlled by way of a EPA IED licence. Furthermore, and potential increase in dust levels can be avoided, managed or mitigated by measures forming part of the proposed scheme and I am therefore satisfied that the proposed development would not have any unacceptable direct or indirect impacts on air quality.

9.7. Noise and Vibration

9.7.1. The noise and vibration impacts associated with the proposed development are assessed in Chapter 12 of the EIAR. As part of the background assessment, details of the methodology and the noise modelling undertaken are set out in the document. As part of the operating licence annual noise monitoring results are required to be submitted to the EPA. Details for the Noise Guidance standards for both the construction and operational phase are set out in Chapter 12.

9.7.2. 5 no. noise sensitive locations were identified and are used to establish typical background noise levels as part of the monitoring programme associated with the operating licence. The locations are indicated on Figure 11.6 of the EIAR.

NSL 1– c.600m south-east of the facility adjacent to Poulaweela Creek.

NSL 2 - is located approximately 1,200m to the south-east of the facility in the vicinity of a residential dwelling.

NSL3 – is located 3km to the south of the facility in the townland of Oorla.

NSL4 – NSL 4 is located approximately 2.6km to the south-west, at the eastern end of Foynes Port.

NSL5 – is located 1.9km directly south of the facility in the vicinity of a residential building at a crossroads.

Noise surveys were conducted at each of the locations for daytime, evening and night-time.

Details of the ambient and background noise at each of the NSL are provided in Table 12.1. L_{Aeq} recorded levels during the daytime/ evening ranged from the mid 40's to mid-50's in terms of dB(A). At most NSL's, continuous sound from the AAL facility is audible but not predominant. Traffic and port related activities predominate at most of the NSL's. At NSL 5 to the south of the facility BRDA sources are audible at times but are not predominant. Many of the readings particularly in relation NSL 4 and NSL 5, non-site related activity dominated the L_{Aeq} values. The EIAR suggests that L_{A90} Values which in general range from the mid 30's to mid-40's in terms of dB(A) are more reflective of the site noise.

The results of the annual noise surveys confirm that noise emissions from the existing AAL facility are in compliance with the emission limit values set out in the EPA licence.

For a development of this nature the construction and operation impacts are considered together.

The guidance limits set out in the Licence and more generally in the guidelines for noise and vibration are set out in S.12.4.1 of the document. The main noise generating activities and equipment for the borrow pit and the BRDA (excavators, crushers, tractors, bulldozers, dump trucks etc) and the noise generated by each of this activities / machinery are detailed. The noise levels at each of the nearest NSL are modelled based on the activities to be undertaken at the borrow pit and the BRDA. The information is presented in Table 12.9. The assessment shows that the calculated noise level at all locations for all scenarios considered is below the daytime criterion set out in the Licence of 55 dB(A). Based on the comparison of the noise emissions from the general operation of the proposal, the existing soundscape inherent in the area will not be altered.

In terms of blasting, up to 7 blasts per year will be required. The EIAR calculates the calculated air overpressure level for a range of distances from the blast. The details are set out on the table below:

Distance from the Blast, (meters)	Air Overpressure dB(Lin)
150	106
400	96
900	88
1300	84
1750	81

9.7.3. The closest residential dwellings are all in excess of 900m away to the borrow site. At this distance the air overpressure will be of the order of 88 dB(Lin) and well below the limit value of 125 dB(Lin). In terms of noise levels resulting from blast it is estimated that the nearest sensitive location to the borrow bit is over 900m away and therefore any blast noise will have attenuated by almost 60 dB(A), and this is in the absence of attenuation due to the borrow pit walls and the soft ground cover and vegetation between the blast and the receiver.

9.7.4. In terms of mitigation a number of measures are set out to control the noise at source, including the provision of acoustic covers on certain plant, intermittent shut down where and if required, orientation of machines away from sensitive receptors. Furthermore, blasting will only be undertaken in liaison with the public, where the public will be notified of a blasting operation. Air overpressure and vibration can be controlled at source by careful attention to design. Other detailed mitigation measures to reduce, air overpressure and vibration are set out in S.12.5.2 of the EIAR.

9.7.5. In terms of cumulative impacts noise surveys undertaken indicate that the overlap between the activities carried out on site and other developments in the area are insignificant. The overall noise impact is determined to be 'imperceptible' whereas the impact from blasting is considered to be 'slight'.

Assessment of Noise and Vibration Chapter

9.7.6. I consider that the noise assessment which represents a worst-case scenario is robust and identifies all of the potential impacts associated with the construction and operational stages of the development. The noise environment associated with the

construction / operational phase will be similar to that associated with the existing baseline environment which essentially involves the same type of operations and activities as that proposed. Again as with other emissions, noise levels generated at the plant must comply with limits set out in the IED licence. I accept that subject to the mitigation measures outlined in the EIAR that noise associated with the development is not likely to result in significant effects on sensitive receptors, the nearest of which is located almost 1 km away. I would also accept the conclusion that no significant vibration effects are predicted which would impact on nearby receptors.

Material Assets - Waste Management

Chapter 13 of the EIAR deals with waste management. The BRDA does not import and accept waste from external sources and the AAL facility does not export bauxite residue wastes to other sites. Details of the waste management legislation and policy informing the assessment is set out. Specific reference is made the policies contained in the Southern Region Waste Management Plan (2015-2021) and waste management policies contained in the county development plan. Both of which seek to minimise waste generation and maximise recycling.

As required by the industrial emissions licence (P0035-07), a waste manual has been developed it sets out waste controls in accordance with the principles of the waste hierarchy in accordance with the principals of the Waste Management Act 1996 (as amended). Details of how existing waste is re-used and recycled is set out in the EIAR. Any waste transported off site is undertaken by AAL via licenced waste contractors. Details of the estimated amount of waste may vary depending on construction methodologies and the approach of the main contractor. Any plan will incorporate elements to promote sustainable waste management. None of the stripped overburden from the borrow site extension will be transported off site. Geosynthetic materials, including geotextile clay liner, geomembrane and concrete canvas will be used in the construction of the BRDA stage raises. Scrapes and off cuts not suitable for reuse will be placed in the appropriate recycling area. All maintenance wastes including lubricants will be transported back to the waste transfer storage areas. Details of the expected hazardous and non-hazardous waste streams associated with the proposed development are listed in the document.

In terms of potential effects, a summary of the potential wastes arising from the proposed development is set out below:

Broad Categories of Waste Material	Anticipated Annual Tonnage for off-site Disposal (tonnes /year)
Scrap Metal	<1
Scrap and offcuts from geosynthetic materials	<2
Cardboard and other packaging	<1
Plastic including wrapping and packaging	<1
Waste wood	<1
Paper	<1
Glass	<1
Damaged Material geosynthetic materials	<2
Batteries	<1
Oils fuels and lubricants from machinery and equipment	<2
Oily rags and cloth	<1

The amount of waste generated has been conservatively over-estimated, as such of the waste will be reused, but the exact proportion of which is impossible to quantify at this proposal stage. It is estimated that the anticipated quantities of the annual amounts of waste generated at the facility would be approximately 0.0002% of the total national construction and demolition wastes available. The impact is estimated to be adverse and imperceptible.

The chapter goes onto identify the waste protocol which will be put into place to deal with all waste. Monitoring of all waste generated and the proportion of which will be recycled will be implemented as part of the waste strategy.

Assessment of Waste Management Chapter

It is clear from the information contained in the EIAR, that there is little scope for the generation of significant amounts of waste off site from the proposed development.

The main waste generated is the bauxite residue itself and to a lesser extent the salt cake residue the environmental impact of both have been robustly and comprehensively assessed in the various other chapters of the EIAR. Waste disposal issues associated with the operation of the development is the subject of a separate IED Licence issued by the EPA as in this regard a waste manual has been developed which ensures that waste is treated and disposed of in accordance with the principles of the waste hierarchy. Waste generation other than the residues referred to above, is negligible in extent. I am satisfied that the EIAR has adequately assessed issues in relation to waste and its potential impact on the environment and furthermore I'm satisfied that any impact would be negligible.

9.8. **Material Assets -Traffic and Transport**

Chapter 14 of the EIAR specifically deals with transport and traffic issues. Bauxite residue is piped in to the BRDA and is not delivered by vehicles. The main source of internal transport movement is the transfer of process sand from the refinery to the BRDA using a dumper trucker. Salt cake material is also moved from the facility to the SCDC by HGV and dumper truck.

External HGV movements are associated with the sourcing of rock material and other plant activities such as importation of certain raw materials. External HGV trips sourcing rock material will cease when planning permission granted under a previous application in 2018 for the extraction of c.374,000 m^3 of rock on a 4.5 ha site commences. Information in the EIAR indicates that this was due to commence in April 2022.

In terms of road infrastructure, the L1234 provides access to the subject site from the N69 at either Glenbane (east) to the immediate south east to the subject site or Toomdeely further east approximately midway between the subject site and Askeaton. The access road at Glenbane is the primary access road to the site, and it is access through this section of the roadway that forms the basis of the assessment undertaken in the EIAR. The L1234 varies in width from between 6 and 8 metres. No footpath is located on either side of the road. There is no street lighting and the 80kmph applies. There are intermittent areas of hard shoulder along the alignment. The survey undertaken indicates that traffic volumes and speeds were low. Low

numbers of pedestrians and cyclists were observed on this section of access roadway.

To the south of the site the L1234 intersects with the N69, a national secondary route linking the Limerick City with Tralee. It comprises of a two-lane carriageway (one lane in each direction) with intermittent hard shoulders. The L1234 is connected to the N69 via a priority (stop) controlled junction. A dedicated right-hand turning lane is provided for traffic accessing the L1234 from the N69 from the northeast. The junction has been the subject of layout enhancements.

A 24-hour survey was conducted on Tuesday April 2021 at the site access to the plant. The EIAR states that the site was unaffected by COVID-19 pandemic travel restrictions. A summary of the survey undertaken is presented in the Table below:

Time Period	Southbound		Northbound		Two-way	
	Light Veh.	Heavy Veh	Light Veh	Heavy Veh	Light Veh	Heavy Veh
07:00- 07:59hrs	37	1	342	3	379	4
16:00-16.59hrs	324	3	13	4	337	7
00:00-23:59hrs	734	63	739	63	1,473	126[4]

The AADT on the N69 (pre- covid) was recorded as 5,026. In terms of collision data analysis, it is noted that there were no recorded collisions on the L1234 between 2005 and 2016 (the most recent periods for which data is available). There is no other recorded permitted development within the vicinity of the site that would have an impact on the traffic environment.

Details of the proposed upgrades in the area including the upgrade of the Foynes to Limerick Road (including the Adare by-pass) are set out. For the purposes of the assessment the road improvements have not been factored into the assessment.

In terms of likely significant impacts, it is stated that no significant impacts are anticipated during the construction phase. A small number of seasonal workers will

[4] This includes HGV movements associated with the importation of rockfill which amounts to 74 two-way movements over a 24hr period.

be required in the weeks in which blasting occurs. This will require 6 additional car parking spaces.

In terms of the operational phase, details of the forecasted growth in traffic on the surrounding road network in the event of the proposed development going ahead is indicated in the Table below:

Year	Scenario	L1234	Difference from do nothing	Difference from do minimum	N69	Difference from do nothing	Difference from do minimum
2019	Base Year	-	-		5026		
2021	Base Year	1599	-		-		
2023	YoO[5]	1529	-4.58%	0.0%	5224	-1.38%	0.0%
2028	YoO+5	1542	-3.73%	0.82%	5730	1.04%	0.22%
2038	YoO+15	1529	100%	100%	6318	16.55%	16.55%
2042	YoC[6]	21	100%	100%	5,501	0.39%	0.39%

It is apparent from the above table that compared with the 'Do Nothing Scenario', the 'Do Something Scenario' will result in a decrease in traffic on the L1234 in the year of opening and in the case of 5 years after the opening and the year of closing scenarios. In the case of the 'Do Something Scenario', the 2028 assessment year includes HGV trips associated with HGV trips associated with the importation of soils, soil improver and these trips are envisaged between 2028 and 2035 only. In terms of the impact on the N69 a very slight increase is anticipated on the N69 (0.39%) post closure. The highest anticipated traffic levels of 6,318 on the N69 is anticipated in 2038, a year prior to closure of the BRDA. This falls back to 5,501 on in 2042 is well within the carrying capacity of the road which is estimated conservatively 8,600 AADT.

Internally the main traffic trips will be via dumper trucks to the BRDA as required. No additional car parking is required under the operational stage

[5] Year of opening

[6] Year of closing

As the proposal will have no material impact on the operation of the surrounding roads, no mitigation measures are required or proposed. In terms of cumulative impacts, the only identified impact would be positive in nature with the opening of the Foynes to Limerick scheme which will decrease traffic volumes on the N69 and will also improve its safety performance.

Assessment of the Traffic and Transport Section

I am satisfied that the EIAR has identified, described and assessed potential impacts arising from the proposed development in terms of traffic and transport. Due to the commencement of extraction from the borrow pit in April 2022, HGV movements to and from the site will decrease below existing levels until 2028. Increases in traffic beyond that date will be marginal and will not have any appreciable or perceptible impact on the road network. Based on the surveys and modelling undertaken it is considered that the traffic impact arising from the proposed development will not be significant and will be acceptable.

9.9. **Material Assets – Site Services**

This chapter examines the potential impact arising from the proposed development on the built services and infrastructure serving the site including gas, electricity, telecommunications, water supply infrastructure, surface water drainage and sewerage.

Details of the existing ESB network is set out including the location of 38kV LV and MV lines which traverse the site, all of which are located in the south-eastern corner of the site. In terms of gas infrastructure, one 300mm transmission pipe runs along the eastern boundary of the site. The gas line feeds a CHP at the main site where two gas powered turbines provide power and steam for plant processes. The CPH generates approximately 160 MW of electrical energy per annum, approximately 120 MW of which is supplied to the national grid.

In terms of wired telecommunications there is an underground cable running from the N69 northwards approximately 65m to the east of the application site boundary.

In terms of the water supply network a 750mm diameter pipe passes to the south-east of the application site, at its closest point it is approximately 20m from the BRDA site. AAL operates a dedicated WWT management system for both the

BRDA and the plant site which incorporates a surface water and storm water run-off system.

In terms of potential effects arising from the proposal on site services the following is noted:

- There will be no changes in terms of electricity supply and very little change in electricity demand.
- There will be no requirements for any new gas connections to service the proposed development.
- The proposal will not require any additional telecommunication connections. The height of the increase in sought to the BRDA is well below the average height utilised by microwave links.
- The proposed development will continue to use the water mains connection and there will be no increase in demand arising from the proposed development.
- As AAL manage internally all the surface and foul waters generated by the BRDA, and no changes are proposed it is considered that there will be no impact surface and foul waters in the area.

In terms of mitigation measures, statutory protocols will be put in place to ensure that any proposed works to be undertaken in proximity to pipelines and cabling will be strictly adhered to. These will also form part of the CEMP. No cumulative impacts are anticipated.

Assessment of the Site Services Chapter

Having assessed the chapter on site services and having regard to the fact that the footprint of the proposal will not impact on any such services and will not result in an appreciable increase in demand for these services, it is considered that the proposal will not have an impact, significant or otherwise on existing services serving the site.

9.10. Major Accidents and Disasters

The EIAR describes identifies and assessment the potential impact of the proposed development in terms of the potential for major accidents and disasters. The EIAR

note that the site is not a SEVESO Site as defined in the COMAH Regulations. As required by the Waste Management Regulations, AAL have put in place an Accident Prevention Policy, a Safety Management Plan for Implementing it and an Internal Emergency Plan which specifies the measures to be taken on site in the event of an accident. In addition, Limerick City and County Council have an external emergency plan specifying the measures to be taken off site in relation to and accident which could occur at the BRDA.

There is no specific Irish guidance available for the assessment of major accidents or disasters in the context of EIA. However, a number of alternative guidance documents have been considered in the course of the assessment which are set out in the EIAR.

Likewise, there are no specific guidance in Ireland with regard to the design classification and assessment of tailing dams. Directive 2006/EC (Management of Waste from Extractive Industries) makes reference to the two set of Guidelines, including the Canadian Dam Association Guidelines which is used for the purposes of the EIAR. The EIAR classifies the BRDA as a 'high' risk facility. This classification is on the basis that the population at risk is deemed to be 10 or fewer. Even though a failure at the facility is likely to affect wildlife habitat, the low mobility of the frictional flow of the residue and the mitigation measures incorporated into the design of the facility will mean that restoration of the area is highly possible. Failure of the BRDA will in all likelihood result in minimal economic losses to third parties beyond the footprint of the lands owned by AAL. Any breach in dam raises has the potential to impact on Natura 2000 sites in the Shannon Estuary.

Any breach in the Storm Water Pond or Liquid Waste Pond is classified as 'Low' as both contain relatively low volumes of water.

The assessment assumes that the proposed development will be designed constructed and operated in accordance with best practice. AAL have recently undertaken an independent Dam Safety Review (DSR) of the BRDA it consisted of a 3 Stage Assessment Comprising of:

- Stage 1 – Establishing the Contexts of the Area including sensitive receptors and Infrastructure
- Stage 2 – Identifying the Potential Hazards including the proposed development's vulnerability to accidents and or disasters.

- Stage 3 - Risk Assessment which classifies risks from 'minor' to 'catastrophic'
- Stage 4 – Which assesses the likelihood of the event happening.

The EIAR goes on to describe and assess each of the above stages. It describes the existing baseline environment, including population centres, infrastructure and utilities. It notes that, while the AAL Site is not a SEVSO Site but there are three SEVSO sites in the vicinity. Two Upper-Tier (i) Atlantic Fuel Supplies at Foynes Harbour 850 m to the west of the site and (ii) Goulding Chemicals Askeation c. 2km to the east of the proposed development, and one Lower Tier SEVESO Site – Exolum Shannon Ltd c. 1 km to the west of the site.

With regard to the vulnerability of receptors, it is noted that alkaline water associated with the residue paste released into the estuary may impact on aquatic life. The communities most likely to be affected are sessile sublittoral and littoral communities and benthic communities (barnacles, mussels oysters and crabs etc.). However, it is considered that the impact of release of alkaline water release would be minimal due to the assimilative capacity of the Shannon Estuary. A release of bauxite residue could also release sediments and suspended solids into the estuary.

The major accident and disaster risks that were identified and are assessed in summary in the table set out below:

Risk Scenario	Potential Cause	Effect	Likelihood Value[7]	Basis of Likelihood	Consequence Value[8]	Basis of Consequence	Score Value[9]
Vulnerability to Seismic Events							
Vulnerability of the SCDC to seismic Events	Natural seismic activity	Damage and breach of the SCDC with potential mobilisation of salt cake into the BRDA	Highly Improbable or negligible	Vulnerability of the surrounding area seismic events was assessed in accordance with CDA Guidelines	Minor (1)	Without failure of the overall BRDA the salt cake would break in the surrounding BRDA. There would be no	Low (1)[10]

[7] Score based on a range from 1 (highly improbable or negligible) to 6 (extremely likely)

[8] Score based on a range from 1 (minor) to 5 (catastrophic)

[9] Likelihood value multiplied by consequence value.

[10] Score Value based on risk matrix set out in Table 16.4 of EIAR

						impact on sensitive receptors	
Vulnerability of the BRDA to seismic Events	Natural seismic activity	Damage and breach of the BRDA with potential mobilisation of salt cake into the BRDA	Highly Improbable or negligible	Vulnerability of the surrounding area seismic events was assessed in accordance with CDA Guidelines	Very Serious (4)	Failure of the BRDA and subsequent failure of the SCDC may result in the remobilisation of bauxite residue and salt cake off site in adjoining Natura 2000 Sites	Low (4)
Vulnerability of the Borrow pit extension to seismic Events	Natural seismic activity	Failure of the borrow pit extension face with the potential impact to personnel operating in the immediate area surrounding the face this includes the potential for fatality	Extremely unlikely (2)	Vulnerability of the surrounding area seismic events was assessed in accordance with CDA Guidelines	Limited (2)	Work practices will ensure that faces are managed to reduce rock fall. Work practices will ensure staff work away from the rock faces as far as practicable	Low (4)
Vulnerability to Storm (Extreme Rainfall) Events							
Overtopping of the BRDA ancillary Structures	Extreme Storm events (cyclones hurricanes and Climate Change)	Damage to water management system structures. Potential for slope failure; damage to infrastructure including local water resources, injury or fatality	Highly improbable or negligible (1)	Due to the design of the system and the capacity to accommodate various storm and flood events in accordance with 2014 criteria.	Minor (1)	Storm events have the potential to result in slope failure of the BRDA which may result in the remobilisation of bauxite residue and slat cake into adjacent Natura 2000 sites	Low (1)

Induced slope failure of the SCDC walls	Extreme Storm events (cyclones hurricanes and Climate Change)	Remobilisation of the salt cake into the BRDA	Highly improbable or negligible (1)	A 1 m freeboard is maintained within the cell. There is capacity to pump and discharge from the cell. The is constructed of free draining rockfill	Minor (1)	Without failure the overall BRDA, the saltcake would slowly remobilise into the surrounding BRDA. There would be no impact on receptors	Low (1)
Vulnerability to Tidal Surges or Wave Events							
Tidal Surges or wave events	Extreme Storm events (cyclones hurricanes and Climate Change)	Damage to structures such as the erosion of the toe of the inner perimeter wall and exposing the bauxite residue leading to slope instability and the release of bauxite residue from the facility; impact on environmental receptors; damage to infrastructure including local water resources, injury of fatalities	Highly improbable or negligible (1)	Estimated increase in sea level, tidal events and surges have been assessed to be below the tolerance for overtopping of the BRDA perimeter infrastructure. Vulnerable of the surrounding area to storm event was assessed in line with the CDA guidelines	Very Serious (4)	Tidal and wave surge events have the potential to result in slope failure of the BRDA which may result in the remobilisation of bauxite residue and slat cake into adjacent Natura 2000 sites	Low (4)
Vulnerability to Sink Holes beneath the BRDA							
Sink Holes	Sink Holes beneath the BRDA	Damage and breach of the BRDA with potential mobilisation of bauxite residue off site impacting on environmental receptors; damage to infrastructure including local water resources, injury of fatalities	Extremely unlikely (2)	Extensive site investigation and assessment of the BRDA footprint during the feasibility studies and detail design of phase 1 , phase 1 extension and the phase 2 of the BRDA	Very Serious (4)	Failure of the BRDA and the subsequent failure of the SCDC may result in the remobilisation of bauxite residue and salt cake off site in	Low (4)

						adjacent Natura 2000 sites.	
Vulnerability to incidents at Seveso Sites in the vicinity.							
Incident at nearby Seveso site resulting in an off-site environmental impact	Fire/ explosion failure of infrastructure or equipment	damage to infrastructure including local water resources, injury of fatalities	Extremely unlikely (2)	Strict safety protocols and management provisions to govern the assessment and treatments of major risks at Seveso sites in proximity	Very Serious (4)	Potential for slope failure at the BRDA which may result in the remobilisation of bauxite residue and salt cake off site and into Natura 2000 site in the vicinity.	Low (8)
Vulnerability to incidents at the adjacent AAL Plant Area							
Incident at the AAL plant area resulting in environmental impact at the BRDA	Fire/ explosion: failure of equipment or infrastructure	damage to infrastructure including local water resources, injury of fatalities	Extremely unlikely (2)	Strict safety protocols and management provisions to govern the assessment and treatments of major risks at AAL facility	Limited (2)	The AAL facility stores quantities of dangerous substances below the lower and upper tier Seveso categories. Therefore there are no dangerous substance storage of sufficient size which could result in significant impacts to the BRDA or the borrow pit.	Low (4)
Potential for Structural Failure of the BRDA and the SCDC							
Failure of the BRDA and proposed raises	Static Slope failure / foundation Failure; blast event	Damage and breach of the BRDA with potential mobilization of bauxite residue	Highly Improbable or negligible	Design of the BRDA in accordance with appropriate standards-based	Very Serious (4)	Failure of the BRDA and subsequent failure of SCDC may	Low (4)

leading to the failure of the SCDC	internal / external erosion overtopping due to poor operational practices	offsite impacting on environmental receptors: damage to infrastructure including local water resources; injury and fatalities.		criteria for tailings dams; mud farming two thicken and densify the bauxite residue leading to improved strength parameters; ongoing site investigation to confirm bauxite residue strength parameters; geotechnical monitoring instruments installed in the BRDA to monitor deformation and pore water pressure in the bauxite residue and the foundation soil; adherence to all plans including Stability Monitoring Plan. Basting to take place in accordance with appropriate protocols.		result in the remobilisation of bauxite residue and salt cake off site into adjoining Natura 2000 sites	
Failure of the SCDC dell without failure of the BRDA	Static Slope failure; foundation al failure; blast event; Internal / external erosion overtopping due to poor operational practices	Damage and breach of the SCDC with potential mobilisation of salt cake into the BRDA	Highly improbable or Negligible	Design of the SCDC in accordance with appropriate standards-based criteria for tailings dams; adherence to the AAL BRDA Operational safety and Maintenance Manual Basting to take place in accordance with	Minor (1)	Without failure of the overall BRDA the Salt Cake would slowly remobilise in to the surrounding BRDA. There would be no impact on receptors	Low (1)

				appropriate protocols.			
Potential cause of fire or explosion							
Fire/ Explosion	Vehicle collision; failure of equipment or infrastructure: employee complacency or negligence	Damage to vehicles equipment, injury or fatality of users, localised and simple contamination as a result of damaged equipment	Unlikely (4)	Level of management governance, protocols and practices in place	Limited (2)	Limited potential for injuries or a fatality. Environmental contamination would be simple and localised. No anticipated damage or disturbance to the local community	Low (8)
Potential Failure of Bauxite Residue Pipeline Transfer							
Failure of Bauxite residue pipeline transfer	Failure of equipment or infrastructure; employee complacency or negligence	Localised and simple contamination as a result of the damaged equipment / pipeline	Unlikely (4)	Level of management protocols Shutdown provision, patrols and practices in place.	Minor (1)	Limited potential for injuries or fatalities. Environmental contamination would be simple and localised. No anticipated damage or disturbance to local community	Low (4)
Potential of contamination of underlying soils or groundwater from fuel spills							
Fuel or other hydrocarbon spillages. Leaks and releases at the BRDA	Spillage and / or overflow from fuel tank or mobile plant during fill. Human error or negligence	Contamination of groundwater, surface water and land	Unlikely (4)	Level of management practices – shut down provision to be put in place.	Limited (2)	Any contamination would be localised. No anticipated damage or disturbance to local community. No anticipated potential for	Low (8)

						fatalities or injury	
Fuel or other hydrocarbon spillages. Leaks and releases at the borrow pit extension	Spillage and / or overflow from fuel tank or mobile plant during fill. Human error or negligence	Contamination of groundwater, surface water and land	Unlikely (4)	Level of management practices – shut down provision to be put in place.	Limited (2)	Any contamination would be localised. No anticipated damage or disturbance to local community. No anticipated potential for fatalities or injury	Low (8)
Potential to Cause Falling Debris or the Collapse of benches or Quarry faces							
Collapse of Borrow pit extension face	Improper design and management of extraction process	Injury or fatality to persons working in close proximity	Very Unlikely (3)	Designed and managed in accordance with best practice. Geotechnical assessments to be undertaken in accordance with relevant HAS requirements	Serious (3)	Potential for greater than one fatality depending on the work scenario, however anticipated to be less than 5	Low (9)
Potential to Cause Damage or Rupture of the Gas Transmission Line from Borrow Pit Blasting Activities							
Rupture to GNI gas transmission Line	Improper design and management of blasting activities	Rupture and damage to GNI gas transmission infrastructure, injury or fatality to persons in close proximity, localised contamination as a result of damaged infrastructure.	Very Unlikely (3)	Strict protocols surrounding blasting activities: blasting to be undertaken by appropriately trained personnel, in accordance with defined blast parameters	Serious (3)	Potential for greater than one fatality depending on the work scenario, however anticipated to be less than 5	Low (9)

It is apparent from the above risk assessment table that the design measures included in the development of the existing facility are sufficient to ensure that none of the potential hazards or major accidents pose a high risk at the facility. The emergency scenarios which entail a breach in the BRDA have been identified and planned for in Limerick City and County Council External Emergency Plan for the Bauxite Residue Disposal Area (2019). AAL have emergency response procedures in place to manage other such emergency scenarios. Shannon Foynes Harbour have also prepared an emergency response plan, in the event of an emergency situation involving a Seveso Site.

The main mitigation measures to be employed involve the periodic review of emergency plans already in prepared in the event of an emergency. The full implementation of the Physical Stability Monitoring Plan prepared by Golder and Associates ensuring that all geotechnical instruments are installed in the BRDA will be monitored. Construction works will be carried out in strict accordance with all monitoring provisions identified.

Assessment of the Major Accidents and Disaster Chapter

The chapter in my view carries out a robust a comprehensive assessment of the potential risk that could occur in the event of a major accident or emergency at the BRDA or borrow pit. It should be read in conjunction with the Engineering Design Report : Prepared by Golder and Associates (November 2021) and containing in appendix A of the EIAR. Each of the potential risks that could occur have been identified and assessed. These include:

- A structural failure of the BRDA or SCDC.
- A potential fire/explosion at identified Seveso sites in the vicinity
- Incidents at the existing AAL Plant
- Potential storm events, seismic events, development of a sink hole beneath the BRDA or flooding or tidal surges.
- Potential damage to the gas pipeline or the bauxite sludge transfer site.

Of the all the potential risks identified all are considered to be low risk, due primarily to the highly improbable risk of the event occurring, notwithstanding the very serious consequences of some of the potential impacts. The inherent design of the deposition area and borrow pit together with the emergency response plans put in

place result in the likelihood of any significant adverse impacts to be 'very unlikely' and 'highly improbable'. Notwithstanding the concerns raised in the various submissions to the Board, I consider that the design approach together with the existing geotechnical monitoring put in place will ensure that the potential for a likely adverse impact in terms of a major impact arising from an accident will not arise.

9.11. Climatic Impacts

Chapter 17 of the EIAR relates to climatic factors. It details the various climate agreements policies and guidelines which are in place to arrest climate change. Reference is also made to Limerick County Council's document on the *Climate Change Adaptations Strategy 2019-2024.* This document outlines the responsibility for implementing the various adaptation actions, key indicators and targets for measuring outcomes and actions to be implemented to address these potential adverse outcomes. The assessment methodology has been carried out in line with the guidance outlined in the European Commission publications "*Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment*", as well as over more general guidance on EIA. It is noted that there is no specific Irish or UK Guidance on Industrial facilities and climate change.

The chapter notes that various emissions will occur during the construction phase and there will be an increase in HGV trips during the operational phase, specifically with the importation of soil and soil improver associated with the various raising of the BRDA stages. These will equate to approximately 12 HGV movements per day. Excavators and other equipment will be used for mud farming within the BRDA cells. There will also be dump truck movements associated with the deposition of salt cake in the SCDC. 27,000 m^3 pf processed rock will be required to raise the height of the cell by 2.25m.

Activity with the borrow pit will include occasional blasting and on site breaking and crushing of material as well as dump truck movements to stockpile the aggregate.

The chapter goes on to outline the significance criteria in respect of the vulnerability of the proposed scheme to climate change. These are identified as:

- More intensive rainfall events

- Increased likelihood and magnitude of river and coastal flooding
- Water shortages and drought
- Adverse impacts on water quality
- Change and distribution of biodiversity.

In terms of likely significant impacts, the construction and operational phases are assessed together as the operational phase of the development involves the construction the stage raises of the BRDA and the SCDC. The potential sources of GHG emissions are associated with the borrow pit extension and the vehicles associated with the stage raises (50,000m^3) per annum and the importation of soil and soil improver. The cumulative impact of GHG emissions from the development (construction and operation) from the BRDA and SCDC extension together with the borrow pit extension is estimated to be 1,165 tonnes of CO_2 / annum. This is deemed to be negative but not significant. It equates to 4 transatlantic flights or the annual carbon footprint of 93 individuals.

In terms of the impact on exogenic climate change factors, such the likelihood of extreme weather events and flooding on the BRDA or SCDC extension, this potential impact is assessed as being low or very low and therefore constitutes a low risk and thus a non-significant impact. A detailed risk assessment of a potential break out has been undertaken as part of the EIAR (Appendix G of Engineering Design Report) where it was concluded that under a flooding or extreme weather event the risk associated with a containment breach or red mud release was either 'highly improbable' or 'very unlikely' leading to a finding of low risk and a non-significant impact.

In the event of a do-nothing impact, the plant would close c.2030. However, the demand for aluminium would still exist and the demand would be transferred to another facility and emissions would merely be displaced and transferred somewhere else. AAL operates under a ETS Permit Register Number IE-GHG038-10363-3 with an annual allocation in 2020 of 721,490 tonnes CO_{2eq} and an annual emission total of 1,450,000 tonnes of CO_{2eq}. If the BRDA and SCDC raises are permitted, it is likely that the GHG will continue to be emitted in line with BAT and under the conditions of the sites IE and ETS Licences.

Section 17.5.1 sets out a series of mitigation measures to address GHG emissions, they in the main, relate to the operation and maintenance of vehicles. Furthermore, the plant will have to meet its emissions reduction target of 4.2% per annum are required under the ETS Permit.

In terms of cumulative impacts, there are no nearby non-ETS sources with emissions of GHG of sufficient magnitude to overlap with site emissions from the BRDA and SCDC. Cumulative impacts therefore do not arise. GHG generation will continue to be quantified at the facility.

Assessment of the Climate Change Chapter

The chapter assesses the likely significant impacts that could arise in terms of climate change. The main impacts which were correctly identified and assessed include the potential impact on GHG arising from the proposed stage raises of the BRDA and SCDC as well as potential impacts from extreme weather events arising from climate change - most notably flooding. In relation to the former, the total additional annual GHG arising from the proposed stage raises amount to average GHG emissions of c.1,165 tonnes of CO_2 per annum which equates to the same CO_2 footprint of 23 no. 3 bed houses or 93 people. This impact cannot be considered significant. In terms of impacts arising from extreme weather events, these issues was assessed in the previous chapter (Major Accidents and Disasters) and in the Engineering Design Report, (Appendix A) a detailed document submitted as part of the EIAR. Both conclude that there is a very low risk on an extreme weather event resulting in a breach of or impacting on the structural integrity of the BRDA or the SCDC. I am satisfied, notwithstanding the concerns raised in the observations submitted, that the proposal has be fully and expertly assessed and that the proposal will not be adversely affected by, or will not contribute to, climate change. Furthermore, I consider that the information provided in the planning application documentation is sufficient to allow the impacts of the proposed development to be fully assessed.

9.12. Interactions of the Foregoing and Cumulative Impacts

9.12.1. Interactions between the various environmental factors are discussed in Chapter 18 of the EIAR. A matrix is provided in Table 18.1 which outlines potential interactions of the various environmental factors.

9.12.2. The main potential for interactions which would give rise to potential effects are set out below:

- The potential stripping of lands and soils associated with the expansion of the borrow pit could impact on archaeology.
- The potential stripping of lands and soils associated with the expansion of the borrow pit could impact on habitats associated with biodiversity.
- The restoration landscaping of the BRDA during the various stage rises is likely to result in a positive impact on biodiversity.
- Improper management of waste has the potential to negatively impact on biodiversity.
- Stockpiling of aggregates have the potential to cause increased sedimentation in surface water drains which could in turn impact on local biodiversity and aquatic ecology.
- Increased dust emissions have the potential to affect habitats and species within and in the vicinity of the subject site.
- Noise and vibration have the potential to impact on species within the site or within the vicinity of the site.
- Local population in the area could be adversely affected by the visual impact arising from the proposed development. This impact is regarded as temporary and progressive restoration and landscaping of the stage raises will mitigate against any adverse visual impact.
- Improper waste management could also negatively affect population and human health. It is anticipated however that appropriate waste mitigation measures will adequately address this potential impact.
- Noise and vibration impacts could also adversely impact on population and human health however, with the employment of the appropriate mitigation measures including the reduction in the number of blasts per year, this will ensure that any impact will not be material.
- Excavation on earth movements represent potential sources of suspended solids and could impact hydrology and the hydrogeology of the area. However, the ongoing

management of these activities and the fact but the borrow pit will not excavate below the water table will ensure that any potential impacts are minimised.

- Interactions between soils land and geology, will not be significant as rock will be sourced internally from the borrow pit areas. Imported soil for the purposes of progressive restoration will be minimal.

- Impacts in terms of air quality from traffic and transportation will also be minimal due to traffic movements being mainly confined to within the site.

- Emissions associated with vehicle traffic during the construction and operation of the proposed development will not be significant and was not result in any adverse impacts.

- Interactions between traffic and transportation and noise and vibration will not be significant.

In terms of cumulative impacts, a survey of all existing and approved projects in the area within a 15 km radius of the site was undertaken to determine whether or not cumulative impacts will arise. The projects identified are listed in Appendix 18.1 of the EIAR. A list of the projects identified were distributed to the expert consultants. Notable projects which have the potential to result in cumulative impacts include the capacity extension at Shannon/ Foynes Port and the upgrade of the N69 road. However, the issue of cumulative impacts where appropriately assessed in each of the chapters of the EIAR, and no significant cumulative impacts were identified.

9.13. Mitigation and Monitoring

Chapter 19 summarises all the mitigation measures proposed to ensure that any potential adverse impacts are minimised as a result of the proposed development. They are grouped in accordance with the various chapter headings set out in the EIAR. It is not proposed to summarize the various mitigation measures contained in the EIAR here. Where appropriate and relevant the mitigation measures have been identified and referred to under the various sections above.

9.14. **Reasoned Conclusion on the Significant Effects**

Having examined the environmental information contained in the EIAR submitted by the applicant, together with the written submissions on file, I would conclude the following in relation to significant effects:

(a) The most significant effects will be the extension in the life of the facility for approximately 9 years which will have subsequent beneficial consequences for the local economy and local employment in the area. This can be considered a likely significant positive impact.

(b) The habitat inherent in the BRDA is of very low ecological value. The proposed development occupies a proportion of the overall BRDA area being located within the existing footprint of the BRDA and on top of existing bauxite residue, with the vast majority of the disposal area remaining undisturbed. The site is suboptimal for fauna identified as key ecological receptors including badger, otter. With the extension of the borrow pit area, there is potential for some impact on foraging and commuting, particularly during the active phase of excavation. But through standard mitigation and monitoring, management and habitat enhancement there will be no significant impacts on fauna arising from the development.

(c) Detailed assessments have been carried out on in respect the potential impact on human health primarily through fugitive dust emissions from the BRDA. The bauxite residue has been tested and found to be a low-level source of naturally occurring radioactive material. Air dispersion modelling was conducted for fugitive emissions for both the bauxite residue and salt cake. Even with the overtly conservative modeling assumptions, the risk analysis concluded that the proposal does not pose a health concern to sensitive receptors be they humans or animals.

(d) The existing BRDA comprises of a relatively large and expansive and low-lying feature within the landscape. The most distinctive feature of the existing site is the red/brown color of the bauxite residue. The area immediately surrounding the site does not attract any significant landscape or sensitive designations. Furthermore, with the proposed landscape and restoration plan the development will be BRDA area will be progressively restored to the extent that when completed and landscaped it will assimilate and integrate into the landscape. Any impact in landscape terms cannot therefore be considered significant or profound.

(e) In respect of major accidents and natural disasters, each of the potential risks that could occur have been identified as:

- A structural failure of the BRDA or SCDC.
- A potential fire/explosion at identified Seveso sites in the vicinity
- Incidents at the existing AAL Plant
- Potential storm events, seismic events, development of a sink hole beneath the BRDA or flooding or tidal surges.
- Potential damage to the gas pipeline or the bauxite sludge transfer site.

Of the all the potential risks identified all are considered to be low risk due primarily to the highly improbable risk of the event occurring, notwithstanding the very serious consequences of some of the potential impacts. The inherent design of the deposition area and borrow pit together with the emergency response plans put in place result in the likelihood of any significant adverse impacts to be very unlikely and highly improbable.

Conclusion

The EIAR has considered that the main significant direct and indirect and cumulative effects of the proposed development on the receiving environment. Following mitigation, no residual significant long-term negative impacts on the environment or sensitive receptors would occur. Any potential accident or natural disaster occurring at the facility which could have major adverse consequences are assessed as being very unlikely and highly improbable. I am therefore, satisfied that the proposed development would not have any unacceptable direct, indirect or cumulative effects on the environment during the construction or operational phase.

I am satisfied that the information provided is reasonable and sufficient to allow the Board to reach a reasoned conclusion on the significant effects of the project on the environment, taking into account current knowledge and methods of assessment. Overall, I am satisfied that the information contained in the EIAR complies with the provisions of Article 3, 5 and Annex (IV) of EU Directive 2014/52/EU.

10.0 Appropriate Assessment

10.1. Introduction

10.1.1. Article 6(3) of the Habitats Directive requires that any plan or project not directly connected with or necessary to the management of the site but likely to have a significant effect thereon, either individually or in combination with other plans or projects shall be subject to appropriate assessment of its implications for the site in view of the site's conservation objectives. The competent authority must be satisfied that the proposal will not adversely affect the integrity of the European site.

10.2. Stage 1 Screening

10.2.1. The application site is not located within but is adjacent to two Natura 2000 sites. The application was accompanied by a Stage 1 Screening for Appropriate Assessment and by a Natura Impact Statement on foot of the screening undertaken. The AA Screening set a nominal study area of 15km from the facility boundary. The potential for impacts upon more distant designated sites is considered in the event that significant impacts are identified further afield. The operation of the overall AAL Facility has been the subject to the terms of an existing IE Licence and AAL report on the monitoring of licenced emissions at agreed intervals.

10.2.2. A total of 6 Natura 2000 Sites were identified and being located within the 15km radius of the subject site. These Natura 2000 sites and the qualifying interests associated with the sites are set out in the Table below:

Site Name and Code	Qualifying interests / Species of Conservation Interest	Minimum Distance to subject site
Lower River Shannon SAC (002165)	Sandbanks which are slightly covered by sea water all the time [1110] Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140] Coastal lagoons [1150] Large shallow inlets and bays [1160] Reefs [1170]	0.01Km

	Perennial vegetation of stony banks [1220] Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330] Mediterranean salt meadows (Juncetalia maritimi) [1410] Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0] Margaritifera (Freshwater Pearl Mussel) [1029] Petromyzon marinus (Sea Lamprey) [1095] Lampetra planeri (Brook Lamprey) [1096] Lampetra fluviatilis (River Lamprey) [1099] Salmo salar (Salmon) [1106] Tursiops truncatus (Common Bottlenose Dolphin) [1349] Lutra (Otter) [1355]	
River Shannon and River Fergus Estuaries SPA (004077)	Cormorant (Phalacrocorax carbo) [A017] Whooper Swan (Cygnus cygnus) [A038] Light-bellied Brent Goose (Branta bernicla hrota) [A046] Shelduck (Tadorna tadorna) [A048] Wigeon (Anas penelope) [A050] Teal (Anas crecca) [A052] Pintail (Anas acuta) [A054] Shoveler (Anas clypeata) [A056] Scaup (Aythya marila) [A062] Ringed Plover (Charadrius hiaticula) [A137] Golden Plover (Pluvialis apricaria) [A140]	0.01km

	Grey Plover (Pluvialis squatarola) [A141] Lapwing (Vanellus vanellus) [A142] Knot (Calidris canutus) [A143] Dunlin (Calidris alpina) [A149] Black-tailed Godwit (Limosa limosa) [A156] Bar-tailed Godwit (Limosa lapponica) [A157] Curlew (Numenius arquata) [A160] Redshank (Tringa totanus) [A162] Greenshank (Tringa nebularia) [A164] Black-headed Gull (Chroicocephalus ridibundus) [A179] Wetland and Waterbirds [A999]	
Barrigone SAC (000432)	Juniperus communis formations on heaths or calcareous grasslands [5130] Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] Limestone pavements [8240] Euphydryas aurinia (Marsh Fritillary) [1065]	0.5km
Stacks to Mullaghareirk Mts., West Limerick Hills and Mt Eagle SPA (004161)	Hen Harrier (Circus cyaneus) [A082]	6.6km
Askeaton Fen Complex SAC	Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] Alkaline fens [7230]	8.1km
Curraghchase Wood SAC	Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]	11.1km

(000174)	Taxus baccata woods of the British Isles [91J0] Vertigo moulinsiana (Desmoulin's Whorl Snail) [1016] Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303]	

10.2.3. The flowing screening criteria were taken into consideration when assessing the potential impact on sites:

- Size, scale, area, land take of the project.
- Physical changes that will occur as a result of the plan
- Any resource requirements including water abstraction
- Construction and operational requirements
- Emissions and Waste (disposal to land, water and air)
- Duration of construction and operation
- Disturbance and displacement
- Cumulative impacts with other projects and plans (extension to Foynes Port, upgrade of the upgrade of the Foynes to Limerick Road Scheme).

The Stage 1 Assessment evaluates and predicts the potential impacts for this site within the zone of influence in light of the above criteria. It notes that the application site is located outside the boundary of any of the Natura 2000 sites identified. There is however potential for indirect impacts from runoff or discharge into the aquatic and intertidal area from excessive nutrient release and/or contamination of water from the site particularly in relation to The Lower River Shannon SAC and the River Shannon and River Fergus SPA. It could also result in the disturbance and displacement of fauna of key species, most notably otter, primarily through blasting activity at the extended borrow pit. These impacts could also see a reduction in species density in the Natura 2000 sites effected. The proposal, in the absence of mitigation has the potential to impact on the structure and function of Natura 2000 sites in the vicinity, including the Barrigone SAC to the south-east. The screening assessment concludes therefore that on the basis of the relevant scientific information available and in the

absence of mitigation, adverse effects cannot be excluded in the case of the three closest sites, namely:

- The Lower River Shannon SAC
- The River Shannon and River Fergus SPA and
- The Barrigone SAC.

Other Natura 2000 sites in the vicinity can be excluded for the purposes of a stage 2 appropriate assessment on the basis that there is no hydrological, hydrogeological or other connection with the Natura 2000 sites, and that the other sites are too far removed from the site to be impacted upon by the proposed works.

Screening Determination

Based on my examination of the NIS report, which includes an AA screening report and supporting information, the NPWS website, aerial and satellite imagery, the scale of the proposed development and likely effects, separation distance and functional relationship between the proposed works and the European sites, their conservation objectives and taken in conjunction with my assessment of the subject site and the surrounding area, I would on the whole, agree with the conclusions contained in the Stage 1 screening assessment. I note that the subject site is hydrologically and hydro-geologically connected to the Shannon Estuary and is geographically located in close proximity to the Natura 2000 Sites in question. Furthermore, both Natura 2000 sites associated with the Estuary incorporate qualifying interests that could be potentially adversely impacted upon as a result of the expansion of the BRDA and the borrow pit and therefore should be screened in. The qualifying interests that could potentially be affected include disturbance to various birds of conservation interest associated with the River Shannon and River Fergus SPA during the construction of the BRDA and the extension of the borrow pit and potential impacts on fauna and other aquatic species associated with The Lower River Shannon SAC through accidental spillage or contamination of discharges to the estuary.

While the Barrigone SAC is located a further distance from the proposed development, (c.0.5km) and the qualifying interests primarily comprise of habitats, which will not be directly or indirectly affected by the proposed works, Euphydryas

aurinia (Marsh Fritillary) is also listed as a qualifying interest. The Board will note that there have been no recent verified records of marsh fritillary located within the SAC in the previous three decades. It is my considered opinion the Board might consider omitting this SAC from a Stage 2 Appropriate Assessment on the basis that the proposed development has no real likelihood on impacting on the SAC, due to the nature of the qualifying interests and due to the separation distance involved. The primary threat to the Barrigone SAC is quarrying[11]. Grazing is also an important factor; over-grazing would cause damage to the vegetation, while under-grazing would allow scrub encroachment at the expense of grassland species which require more open conditions. A balance between scrub and grassland is also important for invertebrate species. It is reasonable to assume therefore that the works to be undertaken as part of the proposed development are not identified as a risk to the SAC.

Notwithstanding my conclusion, I note that the NIS has included the Barrigone SAC for the purposes of a Stage 2 Appropriate Assessment, based on an ultra-precautionary approach. The NIS does nevertheless conclude that with the incorporation of appropriate mitigation measures the proposed development will have no adverse impact on the qualifying interests of the SAC in question. I would agree with the conclusion in the NIS that the proposed development would not impact on the SAC.

I would conclude that a Stage 2 Appropriate Assessment is required for 2 of the European sites referred to above, namely:

- The Lower River Shannon SAC
- The River Shannon and River Fergus SPA

The remaining sites referred to in the table above, can be screened out from further assessment because of the scale of the proposed works, the nature of the conservation objectives, qualifying and special conservation interests, the separation distances and the lack of a substantive linkage hydrological or otherwise between

[11] The Site is located contiguous to a large Roadstone Quarry, whereas the extension to the Borrow Pit is located c.2km away. Any threat to the qualifying interests therefore are much more likely to arise from the existing Roadstone Quarry rather than the extension to the borrow pit.

the proposed works and the European sites. It is therefore reasonable to conclude that on the basis of the information on the file, which I consider adequate in order to issue a screening determination, the proposed development, individually or in combination with other plans or projects would not be likely to have a significant effect on these 4 European Sites in view of the sites' conservation objectives and a Stage 2 Appropriate Assessment is not therefore required for these sites.

10.3. **Stage 2 Appropriate Assessment**

The Natura 2000 Sites which are the subject of assessment are described below.

Lower River Shannon SAC

This very large site stretches along the Shannon valley from Killaloe in Co. Clare to Loop Head/ Kerry Head, a distance of some 120 km. The site thus encompasses the Shannon, Feale, Mulkear and Fergus estuaries, the freshwater lower reaches of the River Shannon (between Killaloe and Limerick), the freshwater stretches of much of the Feale and Mulkear catchments and the marine area between Loop Head and Kerry Head. Rivers within the sub-catchment of the Feale include the Galey, Smearlagh, Oolagh, Allaughaun, Owveg, Clydagh, Caher, Breanagh and Glenacarney. Rivers within the sub-catchment of the Mulkear include the Killeenagarriff, Annagh, Newport, the Dead River, the Bilboa, Glashacloonaraveela, Gortnageragh and Cahermanallia.

The Shannon and Fergus Estuaries form the largest estuarine complex in Ireland. They form a unit stretching from the upper tidal limits of the Shannon and Fergus Rivers to the mouth of the Shannon Estuary. Both the Fergus and Inner Shannon Estuaries feature vast expanses of intertidal mudflats, often fringed with saltmarsh vegetation. In the transition zone between mudflats and saltmarsh, specialised colonisers of mud predominate. For example, swards of common cord-grass (*Spartina anglica*) frequently occur in the upper parts of the estuaries. Less common are swards of Glasswort (*Salicornia europaea* agg.). In the innermost parts of the estuaries, the tidal channels or creeks are fringed with species such as Common Reed (*Phragmites australis*) and club-rushes. Saltmarsh vegetation frequently fringes the mudflats. Over twenty areas of estuarine saltmarsh have been identified

within the site, the most important of which are around the Fergus estuary and at Ringmoylan Quay. The dominant type of saltmarsh present is Atlantic salt meadow occurring over mud. The intertidal reefs in the Shannon Estuary are exposed or moderately exposed to wave action and subject to moderate tidal streams. Known sites are steeply sloping and show a good zonation down the shore. Well-developed lichen zones and littoral reef communities offering a high species richness in the sublittoral fringe and strong populations of the Purple Sea Urchin *Paracentrotus lividus* are found. The communities found are tolerant to sand scour and tidal streams. The infralittoral reefs range from sloping platforms with some vertical steps, to ridged bedrock with gullies of sand between the ridges, to ridged bedrock with boulders or a mixture of cobbles, gravel and sand. Kelp is very common to about 18 m. Below this it becomes rare and the community is characterised by coralline crusts and red foliose algae.

Other coastal habitats that occur within the site include stony beaches and bedrock shores (these support a typical zonation of seaweeds such as *Fucus* spp., *Ascophyllum nodosum* and kelps), shingle beaches (with species such as Sea Beet, Sea Mayweed - *Matricaria maritima*, Sea Campion and Curled Dock - *Rumex crispus*), sandbanks which are slightly covered by sea water at all times (e.g. in the area from Kerry Head to Beal Head) and sand dunes. Hairy Violet (*Viola hirta*) occurs in the Askeaton/Foynes area.

In terms of bird populations overall, the Shannon and Fergus Estuaries support the largest numbers of wintering waterfowl in Ireland. The highest count in 1995-96 was 51,423 while in 1994-95 it was 62,701. Species listed on Annex I of the E.U. Birds Directive which contributed to these totals include: Great Northern Diver (3; 1994/95), Whooper Swan (201; 1995/96), Pale-bellied Brent Goose (246; 1995/96), Golden Plover (11,067; 1994/95) and Bar-tailed Godwit (476; 1995/96). In the past, three separate flocks of Greenland White-fronted Goose were regularly found, but none were seen in 1993/94.

Other wintering waders and wildfowl present include Greylag Goose (216; 1995/96), Shelduck (1,060; 1995/96), Wigeon (5,976; 1995/96), Teal (2,319; 1995-96), Mallard (528; 1995/96), Pintail (45; 1995/96), Shoveler (84; 1995/96), Tufted Duck (272; 1995/96), Scaup (121; 1995/96), Ringed Plover (240; 1995/96), Grey Plover (750; 1995/96), Lapwing (24,581; 1995/96), Knot (800; 1995/96), Dunlin (20,100;

1995/96), Snipe (719, 1995/96), Black-tailed Godwit (1,062; 1995/96), Curlew (1,504; 1995/96), Redshank (3,228; 1995/96), Greenshank (36; 1995/96) and Turnstone (107; 1995/96). A number of wintering gulls are also present, including Black-headed Gull (2,216; 1995/96), Common Gull (366; 1995/96) and Lesser Black-backed Gull (100; 1994/95). This is the most important coastal site in Ireland for a number of the waders including Lapwing, Dunlin, Snipe and Redshank. It also provides an important staging ground for species such as Black-tailed Godwit and Greenshank.

There is a resident population of Bottle-nosed Dolphin in the Shannon Estuary. This is the only known resident population of this E.U. Habitats Directive Annex II species in Ireland. The population is estimated (in 2006) to be 140 ± 12 individuals.

Otter, a species also listed on Annex II of this Directive, is commonly found on the site.

Five species of fish listed on Annex II of the E.U. Habitats Directive are found within the site. These are Sea Lamprey (*Petromyzon marinus*), Brook Lamprey (*Lampetra planeri*), River Lamprey (*Lampetra fluviatilis*), Twaite Shad (*Allosa fallax fallax*) and Salmon (*Salmo salar*).

There is a wide range of land uses within the site. The most common use of the terrestrial parts is grazing by cattle, and some areas have been damaged through over-grazing and poaching. Much of the land adjacent to the rivers and estuaries has been improved or reclaimed and is protected by embankments (especially along the Fergus estuary). Further reclamation continues to pose a threat, as do flood relief works (e.g. dredging of rivers).

Domestic and industrial wastes are discharged into the Shannon, but water quality is generally satisfactory, except in the upper estuary where it reflects the sewage load from Limerick City. Analyses for trace metals suggest a relatively clean estuary with no influences of industrial discharges apparent. Further industrial development along the Shannon and water polluting operations are potential threats.

This site is of great ecological interest as it contains a high number of habitats and species listed on Annexes I and II of the E.U. Habitats Directive, including the priority habitats lagoon and alluvial woodland, the only known resident population of Bottle-nosed Dolphin in Ireland and all three Irish lamprey species. A good number of Red Data Book species are also present, perhaps most notably the thriving populations of

Triangular Club-rush. A number of species listed on Annex I of the E.U. Birds Directive are also present, either wintering or breeding. Indeed, the Shannon and Fergus Estuaries form the largest estuarine complex in Ireland and support more wintering wildfowl and waders than any other site in the country. Most of the estuarine part of the site has been designated a Special Protection Area (SPA), under the E.U. Birds Directive, primarily to protect the large numbers of migratory birds present in winter.

The River Shannon and River Fergus Estuaries SPA

The River Shannon and River Fergus Estuaries SPA is an internationally important site that supports an assemblage of over 20,000 wintering waterbirds. It holds internationally important populations of four species, i.e. Light-bellied Brent Goose, Dunlin, Black-tailed Godwit and Redshank. In addition, there are 17 species that have wintering populations of national importance. The site also supports a nationally important breeding population of Cormorant. Of particular note is that three of the species which occur regularly are listed on Annex I of the E.U. Birds Directive, i.e. Whooper Swan, Golden Plover and Bar-tailed Godwit. Parts of the River Shannon and River Fergus Estuaries SPA are Wildfowl Sanctuaries

The site has vast expanses of intertidal flats which contain a diverse macro-invertebrate community, e.g. *Macoma-Scrobicularia-Nereis*, which provides a rich food resource for the wintering birds. Salt marsh vegetation frequently fringes the mudflats and this provides important high tide roost areas for the wintering birds. Elsewhere in the site the shoreline comprises stony or shingle beaches.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Whooper Swan, Light-bellied Brent Goose, Shelduck, Wigeon, Teal, Pintail, Shoveler, Scaup, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew, Redshank, Greenshank and Black-headed Gull. It is also of special conservation interest for holding an assemblage of over 20,000 wintering waterbirds. The E.U. Birds Directive pays particular attention to wetlands and, as these form part of this SPA, the site and its associated waterbirds are of special conservation interest for Wetland & Waterbirds.

The site is the most important coastal wetland site in the country and regularly supports in excess of 50,000 wintering waterfowl (57,133 - five year mean for the period 1995/96 to 1999/2000), a concentration easily of international importance. The site has internationally important populations of Light-bellied Brent Goose (494), Dunlin (15,131), Black-tailed Godwit (2,035) and Redshank (2,645). A further 17 species have populations of national importance, i.e. Cormorant (245), Whooper Swan (118), Shelduck (1,025), Wigeon (3,761), Teal (2,260), Pintail (62), Shoveler (107), Scaup (102), Ringed Plover (223), Golden Plover (5,664), Grey Plover (558), Lapwing (15,126), Knot (2,015), Bar-tailed Godwit (460), Curlew (2,396), Greenshank (61) and Black-headed Gull (2,681) - figures are five year mean peak counts for the period 1995/96 to 1999/2000. The site is among the most important in the country for several of these species, notably Dunlin (13 % of national total), Lapwing (6% of national total) and Redshank (9% of national total).
The site also supports a nationally important breeding population of Cormorant (93 pairs in 2010).
Other species that occur include Mute Swan (103), Mallard (441), Red-breasted Merganser (20), Great Crested Grebe (50), Grey Heron (38), Oystercatcher (551), Turnstone (124) and Common Gull (445) - figures are five year mean peak counts for the period 1995/96 to 1999/2000.
Apart from the wintering birds, large numbers of some species also pass through the site whilst on migration in spring and/or autumn.

Potential Impacts Arising from the Proposed Development

Potential effects associated with the proposed development to the qualifying interests of the Natura 2000 sites within the zone of interest include:

- Emissions arising from the BRDA, SCDC and the extended borrow pit and associated project elements. This would include emissions to air (fugitive dust) and water.
- Noise
- Movement of plant and personnel and night-time illumination.

Air Pollution and Dust

In terms of emissions to air, the following emissions are monitored and reported upon as part of the IEL requirements. Details of the dust emissions for show for all years between 2014 and 2020 show 100% compliance with the TA Luft limit of 350 mg/m^2/d limit. All report annual and bi-annual grab sampling and the 33 dust monitoring locations were compliant with the emission limit values for dust as outlined in the licence. There was no significant contribution, above background levels form the BRDA to locally deposited dust. Details of the ambient are monitoring from 2014-20 are set out in Table 6.1.

In terms of air quality, the predicted PM_{10} and $PM_{2.5}$ concentrations at the AAL boundary are all, under a worst-case scenario (BRDA deposition, extraction from the borrow pit and associated traffic movements are all considerably below the limits set out in the CAFÉ Directive).

The emissions of heavy metals from the BRDA was also modelled based on the assumption that the percentage of heavy metals identified in the sampling also indicate that all heavy metals are in compliance with the relevant ambient annual mean air quality standards.

It can therefore be concluded that there is no emission pathway associated with the AAL facility which could have a negative impact on the nearby Natura 2000 sites. Any potential impact would be further reduced with the appropriate application of mitigation measures.

Water Discharges from the Development

The main sources of water emissions from the plant are

- Discharge from the WWTP
- Sanitary effluent via the sanitary effluent plant
- Storm water from the northern section of the site which Is directed into the Shannon Estuary. This stormwater is sent to the on-site effluent treatment plant and discharged to the Shannon Estuary.

All water is discharged from the site via licenced discharge point W1-1. The AAL is required by EPA Licence to control and monitor water emissions from the site. A maximum daily volume of 30,000m^3 is permitted. The monitoring of emissions to water includes monitoring of slow, temperature, pH, BOD, suspended solids, total

organic carbon, total of phosphorus, soda, aluminium, oils, fats and greases, toxicity, and heavy metals. surface water monitoring is carried out routinely for surface water bodies in the vicinity of BRDA in accordance with schedule C.2.3 of the licence. The Surface water monitoring locations are indicated in section 6.6.1 of the NIS. They include

- Robertsown Gate on the western boundary of the BRDA.
- The OPW Channel on the northwestern boundary of the BRDA.
- Mangan's Lough on the northern boundary of the site adjacent the surface water pond.

The monitoring results undertaken to date indicate the following:

- annual average pH levels for the surface water monitoring points between 2008 and 2020 have been within the range of 6.8 to 8.2 for all data this is below the recommended threshold for rivers and lakes at 9.0 pH.
- Soda levels between 2008 and 2013 maintained averages of between 0.08 g/l and 0.22 g/l. From 2013 to 2015 and upward trend was observed for soda at Mangan's Lough. Since 2015 a downward trend which averaged 0.18 g/l for 2020 at Mangan's Lough and 0.48 g/l at the OPW channel. The warning level in respect of soda is 1.5 g/l. The levels are well below this limit.
- Electrical conductivity between 2013 and 2017 showed slight elevation against normal levels at Mangan's Lough. Since 2017 the electrical conductivity has steadily decreased to an average of 921 µS/cm this is considerably below the levels of 2000 µS/cm. Levels at the OPW Channel and Robertstown Gate are higher between 2000 – 3400 µS/cm. This could be attributed to saline intrusion.
- Details of other effluent parameters are summarised below:

Parameter	2014	2015	2016	2017	2018	2019	2020	Licence Limits
Vol. of processed effluent	5,239,106	5,479,337	4,844,726	4,977,404	4,656,823	5,131,610	5,560,123	10.950,123
BOD (tonnes)/yr	367.4	160.3	372.9	256.7	292.1	196.2	296.4	861.4
Sus. Solids (tonnes)/yr	68.5	70.3	80.1	78.8	54.3	66.4	57.3	547.5
Oils, Fats and Grease (Tonnes)?yr	5.2	5.5	5	5	4.7	5.1	12.7	164.3
Toxicity Units (TU)	<5	<5	<5	<5	<5	<5	<5	5 TU

It is clear from the above that the limits set out in the licence are being met. Details of assimilation in the pollutant parameters, (including heavy metals) within the Shannon estuary are also detailed in the NIS. The monitoring results found the following:

- Volatiles, phenols and BTEX[12] were non-detectable upstream, and downstream of the jetty.
- Mercury levels were all below the method limits of detection at all sampling locations (<0.03 µg/l).
- Zinc levels were lower than the previous sampling event in 2018. The highest concentration of zinc detected was 82 µg/l on a mid-flood tide 500 m upstream of the jetty. The levels of zinc in the water were higher than other heavy metals (lead, mercury, copper, nickel, vanaduim, chromium, cadmium and barium).
- Total dissolved solids (TDS) were significantly higher than the previous sampling event on 2018.

A review of the effluent monitoring results contained in the NIS shows that effluent quality meets the requirements of the ELV's given in the IEL. Although no ELV's are

[12] This refers to a group of volatile organic compounds

set out in the licence for heavy metals, heavy metal concentrations in the receiving waters are low. Micro benthic communities are good indicators of pollution in the marine sediments in the vicinity of the discharge. They provide a true reflection of environmental conditions. The sediments analysed the vicinity of the discharge point (indicated in Table 6.8) with the exception of zinc levels in a localised area, indicate concentrations of heavy metals in the marine sediments were low. Additional sampling was carried out in February 2020 by Aquafact in respect of heavy metals and the results are contained in Table 6.10. Details of the various heavy metals contained in the marine sediments our set out in the Table. The levels of heavy metals detected in the marine sediment and in the soil samples taken around the site in recent sampling programs are generally typical background levels for marine sediments and soils around the Limerick/Shannon area. With the exception of the aluminium at one location, the level of heavy metals in the sediment sun samples are representative of background levels with no significant effects predicted on designated Natura 2000 sites There is no evidence that heavy metal concentrations are elevated in the marine sediments and consequently no evidence that toxic impact would occur to the marine benthic biota as a result of the existing and proposed development.

The NIS submitted also presents a conceptual Site Model (RSK 2021: Appendix B) to consider whether there was potential for bioaccumulation in the sensitive marine environment as a result of the emissions from the refinery plant. It used risk-based methodologies to consider source-pathway-receptor models for assessing likely pathways through which pollutants or chemicals of concern might enter the environment from the activities being undertaken specifically in relation to direct or fugitive discharges to water and fugitive dust emissions to the surrounding environment including soils and water. Marine sediment data was collected and analysed in May 2021 to assess the significance on any potential releases from the refinery plant. The sampling data from the study indicated that no pathways have been detected that indicate elevated metal concentrations in the marine sediments in the immediate environment. The data showed that the metal sediment concentrations were around the typical background concentrations for the marine environment in Ireland. Thus, there is no evidence that toxic impacts would occur to the marine benthic biota. Furthermore, there would be no negative impact on

designated species of intertidal feeding birds and other higher fauna in the designated estuarine Natura 200 sites.

Groundwater Impacts

The application site is underlain by two separate aquifer units, a locally important bedrock aquifer in the western portion of the site and a regionally important karstified bedrock aquifer in the eastern portion of the site. The borrow pit extension is located above the karstified aquifer. Under the BRDA the groundwater vulnerability is classified as between 'low' to 'extreme'. There are 34 observation wells (OW's) at the BRDA.

Since 2010 the average pH ranges between 6.6 to 8.2 for the OW's. The electrical conductivity in the groundwater is heavily influenced by the level of saline intrusion. Details of levels of soda, fluoride, Chloride and various heavy metals are also set out.

A detailed assessment of the risks to groundwater arising from the operational and post closure phases of the proposed development has been carried out. Existing controls mean that the predicted effect on groundwater in the absence of additional mitigation would be 'slight adverse'. With the implementation of the mitigation measures presented in the EIAR and the CEMP, the predicted residual impacts on groundwater are assessed as being 'negligible non-significant' / 'slight' in nature.

Noise and vibration

The potential sources of noise and vibration primarily relate to the activities associated with the borrow pit extraction and the internal vehicle movements within the BRDA. The sound power level for each of the machinery and plant used in the operational works are set out in the NIS. The calculated air over pressure for a range of distances from the blast are also set out. Details of the background noise levels are also set out, much of which are attributed to the existing activities on site as well and shipping traffic and aircraft associated with Shannon Airport. As the site has been in operation for almost four decades, it is suggested that the fauna in the area, including protected bird species will have been made accustomed to the ambient noise levels in the area. In terms of marine mammals within the estuary, it is noted that is part of the recent IEL review for AAL facility, a marine mammal risk assessment was requested from the EPA. A report was submitted and concluded that given the terrestrial location of the borrow pit site and the fact that all blasting

activities will take place on land and not in the underwater environment the extension of the barrow pit did not pose any risk of death, injury or disturbance to any marine mammals in the estuary. The same conclusion applies in respect of activities on the BRDA.

The Otter is the only other faunal qualifying interest associated with the SAC. Otter sightings or signs have tended to be restricted to the coastal area around the island. It is unlikely that otters occur within or adjacent to the application site with any regularity. Works at the borrow pit will normally be confined to daylight hours when otters are much less likely to be present in the area. On this basis it is not considered that the proposal will have any impact on otters in the area.

There is no suitable habitat for breeding cormorant in the site. As there is extensive suitable habitat in the wider area (inter tidal mudflats etc.) these areas will attract birds associated with the SPA rather than the BRDA or the borrow pit area. As such there is potential for adverse impacts relating to noise and vibration on the faunal species associated with nearby designated sites. Low level blasting which will only occur between the months of April to September is unlikely to result in a significant adverse impact on bird species of nearby designated sites.

The proposed development will see little change in the scale and type of activity within the application site. While the borrow pit is to be extended, it will operate in line and in accordance with the extant permission for the extraction activities on site. Noise and vibration levels associated with the operational plant and equipment would be expected to be well within adopted criteria values and therefore will not have a significant impact on wildlife in the area. The control of blasting will be effective in terms of minimising the potential for adverse impacts on flora and fauna. Post closure therefore would be relatively low levels of anthropogenic sources of noise and vibration.

Light Pollution

The lighting regime at the facility has remained largely unchanged for many years. The BRDA is largely in darkness during the nighttime hours with minimal lighting at locations such as the access track to the SCDC. The lighting is cowled inwards to restrict any potential light spill. No significant change or intensification of lighting is proposed as a result of the proposed development. There will be no permanent lighting of the borrow pit or spoil storage areas. A lighting study was carried out as

part of the NIS for the EPA licence review. A total of 45 points were surveyed over a duration of 2 nights. The study confirmed that there is no likelihood that nighttime illumination could impact on any of the Natura 200 Sites in the vicinity, given that lighting is sparse, is cowled inwards towards the site, and the separation distance between the lighting columns and the designated sites (including the Barrigon SAC), and the large distribution of the qualifying interests over the large geographical areas of the SAC's. Sampling locations 21 and 22 at the northern edge of the BRDA adjacent to the boundary to the SAC both had a reading of 'zero lux' indicating no appreciate influence of artificial lighting on the designated Natura 2000 sites in question. The sampling points close to Poulaweala Creek also confirmed a negligible influence in terms of artificial illuminance. The NIS also states that most bird species habituate rapidly to sources of artificial lighting but anthropogenic sources of light have been shown to impact on the feeding ecology and territorial behavior of birds. However, there is no evidence that the nighttime lighting at AAL has been a source of significant disturbance, displacement or disturbance to birds in the area. The design of the lighting of the will not lead to any significant change in the baseline environment.

Cumulative and in-combination effects

The potential cumulative impact of the proposed development with other existing and or approved projects have also been assessed in the NIS. The projects identified as part of the survey carried out are listed in Appendix 8.1 of the EIA or and Table 5.1 of the NIS. All major developments within a 15-kilometre radius of the subject development were included. Notable projects which were highlighted include the cumulative effects arising from the capacity extension at Shannon/ Foynes Port and the Limerick - Foynes Road upgrade. Given the distances involved, the nature of the activities to be undertaken and the fact that these major projects were the subject of their own AA assessment and where applicable, specific mitigation measures where incorporated to minimise impacts on the receiving environment, the NIS reasonably concludes in my opinion that there was no potential for significant cumulative or in combination effects on local biodiversity and specifically on the qualifying interests associated with the Natura 2000 sites in question.

10.4. **Assessment of the NIS submitted**

The only potential impacts which could arise are comprehensively identified in the NIS namely; water pollution, fugitive dust and air pollution, disturbance due to noise and vibration and light pollution. The subject site is hydrologically connected to the Lower River Shannon Estuary SAC and Lower River Shannon SAC and River Fergus SPA. The subject site however has been and continues to be, the subject of an EPA IED licence and Licence Review. Annual Environmental Reports are also submitted to the EPA which provide up to date details of air, water and groundwater monitoring data. There is an extensive monitoring data regime in place at the BRDA facility. Furthermore, the applicant has already undertook and NIS as part of the EPA Licence Review in 2020. As such there is a wealth of detailed information available on which to assess potential impacts arising from the proposed development on the designated sites in question. The monitoring results undertaken and presented in the NIS, together with the mitigation measures incorporated into the design clearly indicate that the proposed development:

- Will not impinge or result in the physical fragmentation as to how the Natura 2000 sites in the vicinity functions as a habitat or ecosystem.
- Will not change the dynamics of the relationships that define the structure and function of the designated Natura 2000 sites in the Shannon Estuary.
- Will not alter the water environment or chemical composition of the receiving waters to as to adversely affect the qualifying interest of the Natura 2000 sites.
- Will not reduce areas of key habitats or key species associated with the Natura 2000 Sites.
- Will not impact or adversely affect the diversity of any of the Qualifying Interests associated with the designated sites.
- Will not result in any appreciate disturbance that would affect the population size or density associated with the key species associated with the Natura 2000 sites
- Will not result in any fragmentation of the designated sites and

Will not result in the loss or reduction of any key features associated with the Natura 2000 sites in question.

Finally, and specifically in respect of the issues raised in some of the observations submitted, I do not accept that Natura 2000 sites were arbitrarily omitted from the assessment process. The screening exercise identified all Natura 2000 sites which could potentially be affected by the proposed development. Natura 2000 sites in the wider area that had no hydrological connection or other connection with the subject site where in my view rightly ruled out for further evaluation. No details were provided in the observations as to which Natura 2000 sites should have been additionally screened in and on what basis they should have been screened in to a Stage 2 Assessment.

A similar conclusion can be reached in respect of the potential in-combination effects, where one of the observations suggested that the cumulative impacts were not appropriately assessed. It is my considered opinion that the proposed development in itself will not give rise to any impacts on surrounding Natura 2000 sites. On this basis alone, in-combination effects will not arise as the site is subject to strict environmental monitoring which prohibits discharges or emissions which would adversely impact on the environment per say. Thus, any in-combination effects arising from potential discharges or emissions from the Mungret Cement Factory, upstream, or the Tarbert or Moneypojnt Power Stations downstream, all of which are located in excess of 20 km from the subject site, will not arise. Notwithstanding this conclusion, the NIS did consider the proposal in the context of other planned developments closer to the site, and correctly in my view came to the conclusion that the proposal will not adversely impact on the integrity of qualifying interests of Natura 2000 sites in the vicinity.

Having reviewed the NIS and the supporting documentation, I am satisfied that it provides adequate information in respect of the baseline conditions, clearly identifies the potential impacts, and uses best scientific information and knowledge to assess any potential impacts. It also provides details of mitigation measures (set out in detail in the EIAR) to ensure that no adverse impacts arise in respect of Natura 2000 Sites in the vicinity. I am satisfied that the information is sufficient to allow the Board to carry out an appropriate assessment of the proposed development.

The proposed development has been considered in light of the assessment requirements of Sections 177U and 177V of the Planning and Development Act 2000 as amended.

Having carried out screening for Appropriate Assessment of the proposed development, it was concluded that it would be likely to have a significant effect on Lower River Shannon SAC (002165) and River Shannon and River Fergus Estuaries SPA (004077) . Consequently, an Appropriate Assessment was required of the implications of the project on the qualifying features of those sites in light of their conservation objectives.

Following an Appropriate Assessment, it has been determined that the proposed development, individually or in combination with other plans or projects would not adversely affect the integrity of the European site No.'s 002165 or 004077, or any other European site, in view of the sites Conservation Objectives.'

This conclusion is based on a complete assessment of all aspects of the proposed project and there is no reasonable doubt as to the absence of adverse effects.

11.0 Conclusions and Recommendation

11.1. Arising from my assessment above and having particular regard to the contents of the EIAR and the NIS together with the Engineering Design Report in relation to the BRDA disposal area, I am satisfied that the proposed extension to the BRDA area, borrow pit and all associated works would not have an unacceptable or significant adverse impact on the receiving environment and I consider that the proposed development is in accordance with the proper planning and sustainable development of the area and I therefore recommend that planning permission be granted for the proposed development.

11.2. For the purposes of the application of conditions I refer the Board to Section 99F of the Protection of the Environment Act 2003, as amended. It notes that notwithstanding Section 34 of the Planning and Development Act 2000, or any other provision of that Act, where a licence or revised licence under this part has been granted or is or will be required in relation to an activity the Planning Authority or An Bord Pleanála shall not where it decides to grant planning permission of the Act in

respect of any development comprising or for the purposes of an activity, subject to the permission to the conditions which are for the purposes of:

(a) controlling emissions from the operation of the activity, including the prevent, elimination, limitation, abatement or reduction of those emissions, or

(b) controlling emissions relating to or following the cessation of the operation of the activity.

The Board therefore in attaching any conditions where it is minded to grant planning permission should have regard to the provisions of Section 99F(1) of the said Act referred to.

12.0 Decision

Grant permission under Section 37G of the Planning and Development Act 2000, as amended, for the proposed development as described in accordance with the said plans and particulars based on the reasons and considerations under and subject to the conditions set out below.

13.0 Reasons and Considerations

Having regard to the established use of the site and as an alumina processing plant, together with the existing residential bauxite disposal area, the existing activities on the site licenced under Industrial Emissions Licence P0035-07 issued by the Environmental Protection Agency on 28th day of September, 2021 and the mitigation measures set out in the Environmental Impact Assessment Report and the Natura Impact Statement received by the Board it is considered that subject to compliance with conditions set out below, the proposed development would not be prejudicial to public health, would be acceptable in terms of its impact on the amenities of the area, would be acceptable in terms of traffic safety and convenience and would therefore be in accordance with the proper planning and sustainable development of the area.

14.0 Appropriate Assessment

The Board agreed with the screening assessment and conclusion carried out in the inspector's report that the Lower Shannon SAC (Site Code: 002165) and the River Shannon and River Fergus Estuaries SPA (Site Code: 004077) are European Sites for which there is a possibility of significant effects and which must therefore be subject to Appropriate Assessment.

The Board considered the Natura Impact Statement and all other relevant submissions and carried out an appropriate assessment of the implications of the proposed development for these European sites in view of the site's conservation objectives. The Board considered that the information before it was sufficient to undertake a complete assessment of all aspects of the proposed development in relation to the site's conservation objectives using best available scientific knowledge in the field.

In completing the assessment, the Board considered, in particular, the following:

(i) The site specific conservation objectives for these European sites,

(ii) The current conservation status, threats and pressures of the qualifying interest features,

(iii) The likely direct and indirect impacts arising from the proposed development both individually or in combination with other plans and projects,

(iv) The view of the National parks and Wildlife Service, Department of Housing, Local Government and Heritage, and

(v) Mitigation measures which are included as part of the current proposal.

In completing the appropriate assessment, the Board accepted and adopted the appropriate assessment carried out in the inspector's report in respect of the implications of the proposed development on the integrity of the aforementioned European Sites, having regard to the site's conservation objectives.

In overall conclusion, the Board was satisfied that the proposed development would not adversely affect the integrity of the European Sites in view of the site's

conservation objectives and there was no reasonable scientific doubt as to the absence of such effects.

Environmental Impact Assessment

In compliance with Section 172 of the Planning and Development Act 2000, as amended, the Board completed an Environmental Impact Assessment of the proposed development taking into account

- the nature, scale, location and extent of the proposed development,
- the environmental impact assessment report and associated documentation submitted with the application,
- the submissions from the applicant, the observers, the planning authorities and the prescribed bodies, and
- the planning inspector's report.

The Board considered that the Environmental Impact Assessment report supported by the information submitted by the applicant including the Engineering Design Report, identifies and describes adequately the direct, indirect and cumulative effects of the proposed development on the environment. The Board is satisfied that the information contained in the EIAR complies with the provisions of the EU Directive 2014/52/EU amending Directive 2011/92/EU. The Board agreed with the summary and examination set out in the inspector's report, on the information contained in the EIAR and associated documentation submitted by the applicant and the submissions made in the course of the application. The Board is satisfied that the inspector's report sets out how these were addressed in the assessment and recommendation (including environmental conditions) and are incorporated into the Board's decision.

The Board completed an Environmental Impact Assessment in relation to the proposed development and concluded that, subject to the implementation of the mitigation measures proposed, as set out in each of the Chapters 5 to 17 of the EIAR, Volume 1 and also the Schedule of Mitigation and Monitoring Measures set out in Chapter 19 and subject to compliance with the conditions set out herein, the effects on the environment of the proposed development by itself and cumulatively with other development in the vicinity would be acceptable. In doing so, the Board adopted the Report and Conclusions of the reporting inspector.

15.0 **Conditions**

1.	The development shall be carried out and completed in accordance with he plans and particulars lodged with the planning application, except as may otherwise be required in order to comply with the following conditions. Where such conditions require details to be agreed with the planning authority, the developer shall agree such details in writing with the planning authority prior to commencement of development and the proposed development shall be carried out and completed in accordance with the agreed particulars. **Reason:** In the interest of clarity.
2.	The mitigation and monitoring commitments identified in the Environmental Impact Assessment Report and other plans and particulars submitted with the application including the Schedule of Mitigation Measures shall be implemented in full. **Reason:** In the interest of clarity and the protection of the environment during the construction and operational phases of the proposed development.
3.	The mitigation measures identified in the Natura Impact Statement shall be implemented in full. **Reason:** In the interest of clarity and the proper planning and sustainable development of the area and to ensure the protection of European Sites within the Shannon Estuary.
4.	The developer shall facilitate an archaeological appraisal of the area of the proposed borrow pit extension and shall provide for the preservation, recording and protection of archaeological materials or features which may exist within the site. In this regard the developer shall: (a) notify the planning authority in writing at least four weeks prior to the commencement of any site operation (including hydrological and geotechnical investigations) relating to the proposed development, and

	(b) employ a suitably qualified archaeologist prior to the commencement of development. The archaeologist shall assess the site and monitor all site development works. The assessment shall address the following issues: (i) the nature and location of archaeological material on site, and (ii) the impact of the proposed development on such archaeological material. A report containing the results of the assessment, shall be submitted to the planning authority and, arising from this assessment, the developer shall agree in writing with the planning authority details regarding any further archaeological requirements (including if necessary, archaeological excavation) prior to the commencement of construction works. In default of an agreement of any of these requirements the matter shall be referred to An Bord Pleanála for determination. **Reason:** In order to conserve the archaeological heritage of the area and secure the preservation (in situ or by record) and the protection of any archaeological remains that may exist within the site.
5.	The bauxite residue disposal area (Phase 1 and Phase 2) shall be adequately protected with perimeter fencing and access shall be restricted to authorised personnel only. Details shall be the subject of a written agreement with the planning authority prior to the commencement of development on site. **Reason:** In the interest of the proper planning and sustainable development of the area and public safety.
6.	All vegetation removal shall take place outside the bird nesting period, preferably between mid-September and mid-October to minimise disturbance to both nesting birds and wintering wildfowl. **Reason:** In the interest of protecting biodiversity.

7.	Construction and demolition waste shall be managed in accordance with a construction waste shall be managed in accordance with a construction waste demolition shall be managed in accordance with a construction waste demolition management plan, which shall be submitted to and agreed in writing with the planning authority prior to the commencement of development. This plan shall be prepared in accordance with the "Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects" published by the Department of the Environment, Heritage and Local Government in July, 2006. **Reason:** In the interest of sustainable waste management.
8.	Blasting at the borrow pit shall not take place outside the period between April and September in any year and shall be limited to a maximum of 7 blasting events annually. **Reason:** In the interests of orderly development and to limit the extraction of blasting to the period specified in the application.
9.	Details of the construction and environmental management plan shall be agreed in writing with the planning authority prior to the commencement of development. The construction and environmental management plan shall include but not be limited to operational controls for dust, noise and vibration, waste management, protection of soils and groundwaters and surface water and the protection of flora and fauna, site housekeeping, emergency response planning, site environmental policy, project roles and responsibilities during the construction phase. **Reason:** In the interest of environmental protection and orderly development.
10.	A community gain fund shall be established to support facilities and services which would be of benefit to the community in the local area. Details of the specific contribution amount, the management and operation of the community gain fund, which shall be lodged in a special community fund account, shall be submitted for the written agreement of the planning authority prior to the commencement of development.

	Reason: It is considered reasonable that the operator of the facility shall contribute towards the cost of environmental recreation or community facilities which would be of benefit to the local community.
11.	The developer shall pay to the planning authority a financial contribution in respect of public infrastructure and facilities benefiting development in the area of the planning authority that is provided or intended to be provided by or on behalf of the authority in accordance with the terms of the Development Contribution Scheme made under section 48 of the Planning and Development Act 2000, as amended. The contribution shall be paid prior to commencement of development or in such phased payments as the planning authority may facilitate and shall be subject to any applicable indexation provisions of the Scheme at the time of payment. Details of the application of the terms of the Scheme shall be agreed between the planning authority and the developer or, in default of such agreement, the matter shall be referred to An Bord Pleanála to determine the proper application of the terms of the Scheme. **Reason:** It is a requirement of the Planning and Development Act 2000, as amended, that a condition requiring a contribution in accordance with the Development Contribution Scheme made under section 48 of the Act be applied to the permission.

Paul Caprani,
Senior Planning Inspector.

25th July, 2022.