Our Case Number: ABP-312146-21

An Bord Pleanála

Emanuela Ferrari for Futureproof Clare
4 Glenview Road
Ennis
Co. Clare
V96H9T0

Date: 10 February 2022

Re: 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
In the townlands of Aughinish East, Aughinish West, Island Mac Teige, Glenbane West, and Fawnamore at or adjacent to Aughinish Island, Askeaton, Co. Limerick

Dear Sir / Madam,

An Bord Pleanála has received your recent submission in relation to the above mentioned proposed development and will take it into consideration in its determination of the matter. A receipt for the fee lodged is enclosed.

The Board will revert to you in due course with regard to the matter.

Please be advised that copies of all submissions / observations received in relation to the application will be made available for public inspection at the offices of Limerick City and County Council and at the offices of An Bord Pleanála when they have been processed by the Board.

More detailed information in relation to strategic infrastructure development can be viewed on the Board's website: www.pleanala.ie.

If you have any queries in the meantime please contact the undersigned officer of the Board. Please quote the above mentioned An Bord Pleanála reference number in any correspondence or telephone contact with the Board.

Yours faithfully,

Jennifer Sherry
Executive Officer
Direct Line: 01-8737266

PA04

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Emanuela Ferrari for Futureproof Clare

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Ennis, Co. Clare

To:

An Bord Pleanála,

64 Marlborough Street,

Dublin 1

RE: OBSERVATION TO STRATEGIC INFRASTRUCTURE DEVELOPMENT APPLICATION FOR EXPANSION OF THE BAUXITE RESIDUE DISPOSAL AREA AT AUGHINISH ALUMINA LIMITED, IN THE TOWNLANDS OF AUGHINISH EAST, AUGHINISH WEST, ISLAND MAC TEIGE, GLENBANE WEST, AND FAWNAMORE AT OR ADJACENT TO AUGHINISH ISLAND, ASKEATON, CO. LIMERICK

A chara,

In reference to the planning strategic infrastructure development (SID) application in object, we wish to submit an observation, with the aim of opposing the granting of the license unless further consideration of the implications on sustainable development, human health, and the environment is carefully given.

We find problematic the proposed expansion of the disposal capacity at the existing Bauxite Residue Disposal Area (BRDA) to a height of up to 44 m and of the Salt Cake Disposal Cell (SCDC), to a height of c.35 m to accommodate further disposal of these two toxic by-products from the processing plant, for the reasons outlined below.

1. Rock blasting possible breakage of the BRDA containment structure

The dangers of tailing dams collapse and the devastating effects this can have on the ecosystem and the people who depend upon it are well documented. When a high-impact activity like rock blasting is carried out in the proximity of the dam, the already existing risk is multiplied manifolds, and

should become a serious matter of concern for planners and developers and the Environmental Protection Agency (EPA).

The EIAR (2021) of the proposed development in Aughinish concludes that the probability of BRDA failure resulting in containment breach and release of bauxite residue is in the range *Very Unlikely to Almost Impossible*, based on possible events such as:

[...]

• Fire and explosion events due to plant and work activities causing borrow pit face collapse and representing a threat to groundwater quality;

• Inadequate borrow pit design causing borrow pit face collapse;

• Seismic events causing borrow pit face collapse; and [...]

These points are not supported or are even contradicted in the rest of the report.

a. Inadequate borrow pit design.

Earthworks, an American NGO specializing in the impacts of mining, warns that the rate of serious dam failures is increasing. Half (33 of 67) of serious tailing dam failures in the last 70 years occurred in the 20 years between 1990 and 2009 (Earthworks 2019, Lyu et al. 2019).

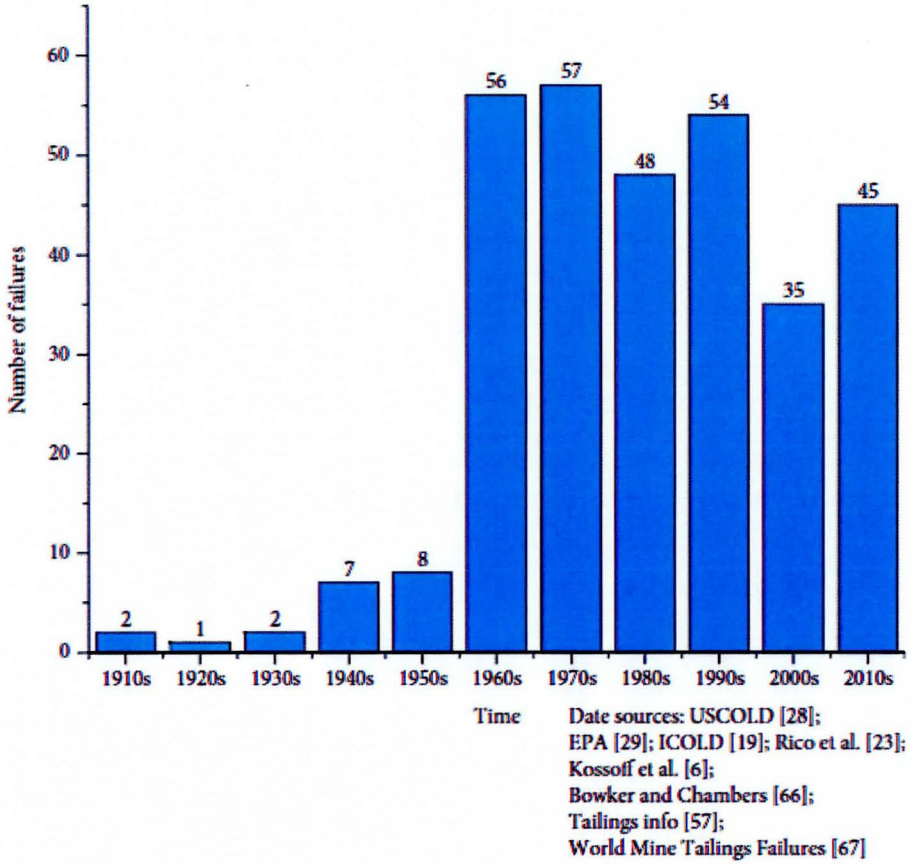

FIGURE 3: Failure events over time.

This is because from an economic standpoint, mining companies have an incentive to invest as little as possible in tailings storage because the dams are not creating economic value. A main reason tailings dams are unsafe is because it is too expensive to build them safely and mining companies do not have an incentive to invest the resources (Earthworks, 2019).

Because tailing dams are built gradually over time, (as opposed for example to hydro dams), safety oversight can change significantly *if the mine changes operators, if the type of ore changes as the mine reaches deeper deposits, or if the mining company comes under economic pressure*. We believe these are all possibilities that might concern the Rusal facility.

Moreover most dam failures over the decades have happened in the global north, with the US and the UK both ranking within the top three locations (Lyu et al, 2019). Europe ranks in second place in reported accidents (18%) according to another similar review of the literature (Rico et al 2008). Accidents are mainly dis-tributed in the United States, Chile, the United Kingdom, and Peru. See figure below.

Advances in Civil Engineering

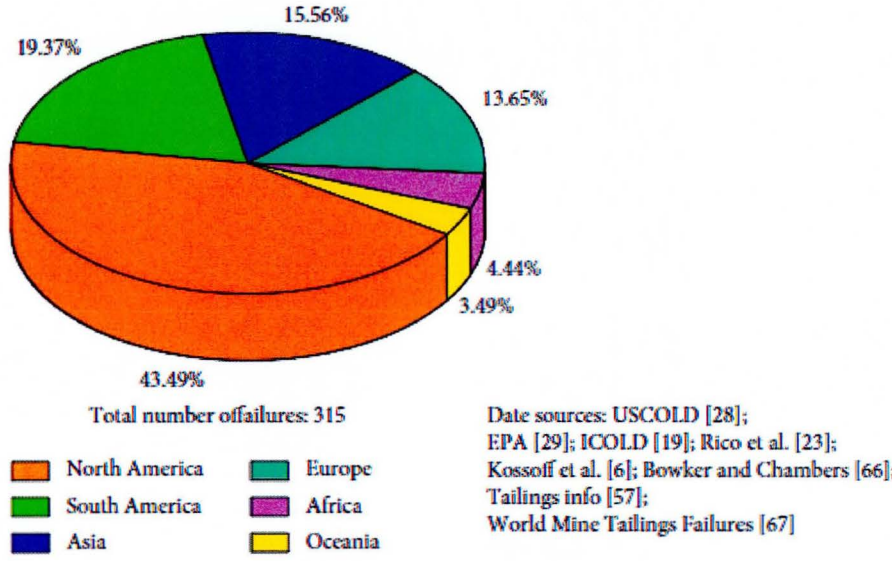

FIGURE 5: Failure distribution by continent.

In that respect concerns of dam failure cannot be ascribed to lack of know-how or looser environmental regulations, which might apply to countries in the global south with less availability of technical expertise and loser environmental protection measures, but it is to be found in the nature of the dam infrastructure itself.

More worryingly the same two reviews quoted above warn that the majority of tailing dams collapse are correlated with the height of the deposit area, and the type of dam.

The planning Report in support of the application states that:

"The BRDA is progressively raised by the upstream method, identified by the European Commission as the 'Best Available Technique'. The upstream method involves constructing a permeable rock fill berm (stage raise) at the perimeter which is founded on the previously deposited and farmed bauxite residue." (p 13). It also states that the BRDA and the salt-cake deposits will have a height of 45 m and 35 m respectively.

However the literature points out the dangers of tailing dams of the type and heights specified in the AAL planning report.

Upstream design consists of those dams where new levels of the raises of the dam are built on top of previously-deposited tailings. This method is particularly dangerous because the underlying tailings can liquify and collapse, giving way for the whole structure to topple (Earthworks).

Lyu et al. (2019) warn that upstream dams have a high (58%) probability of damage, see figure below, as opposed to downstream and centerline dams which have better stability and less dam failure events.

Moreover engineers have found that tailings dams tend to be safest, i.e. most resistant to failure and collapse, when they are not built on top of or using previously-deposited tailings (Davies 2002).

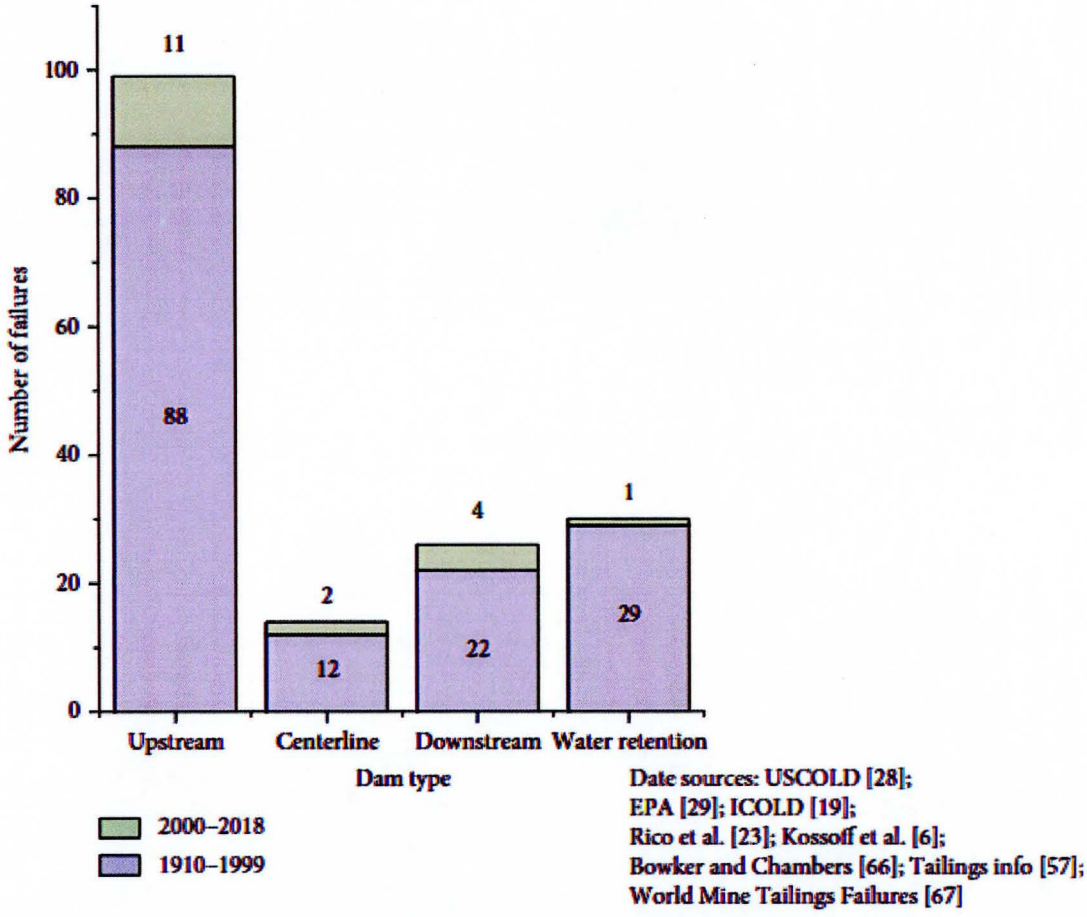

FIGURE 8: Failure distribution by the tailings dam type.

With regard to the height of the deposits, a majority (85%) of tailings dam failures have occurred in dams of less than 45 m high (Lyu et al 2019, Rico et al. 2008).

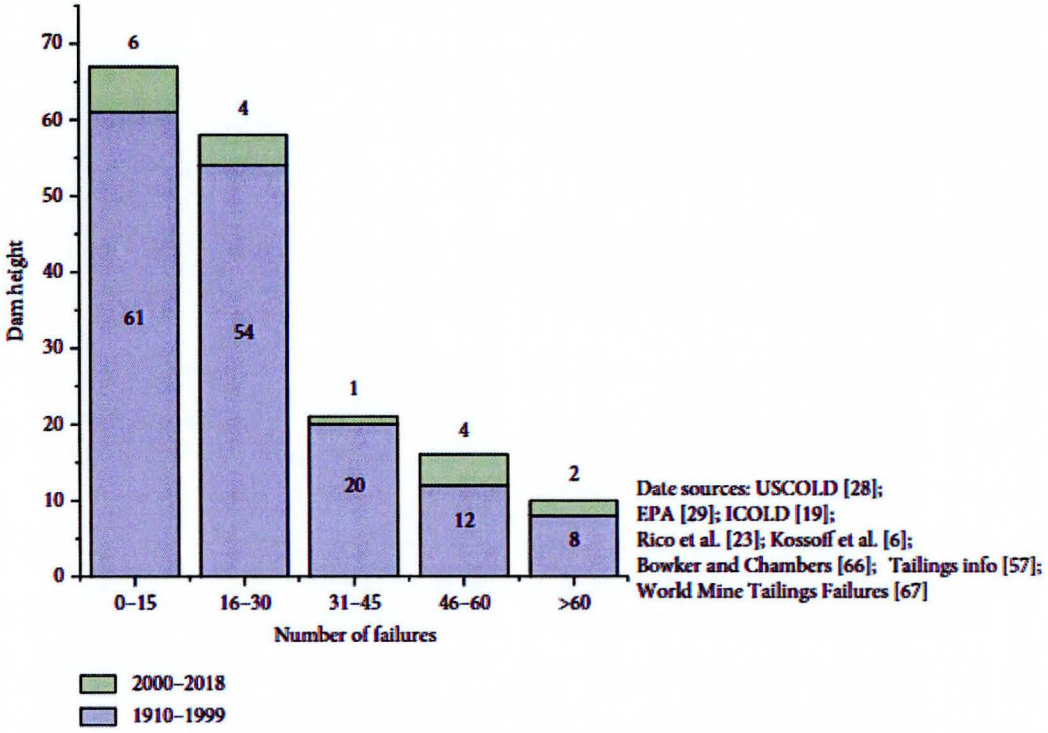

FIGURE 7: Failure distribution by tailings dam height.

b. Fire and explosion events due to plant and work activities and seismic events.

The above considerations alone put into serious question the stability of the tailing dam due to the design alone. However much more alarming is the extension of the borrow pit, adjacent to the deposits of red mud, and the ongoing explosions that will be taking place in order to expand it, which classify as explosion events and cause seismic activity.

We fear that the applicant may have underestimated important factors in the assessment of the effects of an extremely high-risk, and difficult to control activity, like rock blasting on a dam containing a potential environmental disaster of unprecedented magnitude and severity. While the planning application vaguely mentions "best practices and safety", it does not mention which ones or what they entail (EIAR pg 76).

In their assessment, they classify the red mud deposits dam of the type found in Aughinish as having the lowest threshold (PPV Limit, mm/s) to seismic waves, such as the ones produced by explosions, measured as 25 ppv, due to its sensitivity to vibration, see table below.

Table 1: General Guidelines to Vibration Damage Thresholds for Blasting Near Dams

Dam Construction	PPV Limit (mm/s)
Dams constructed of or having foundation materials consisting of loose sand or silts that are sensitive to vibration.	25
Dams having medium dense sand or silts within the dam or foundation materials	50
Dams having materials insensitive to vibrations in the dam or foundation materials	100

Notes: *From Charlie et al. (1987)

The information presented in Table 1 can be used as general guidelines for assessing the potential for blast vibration damage to structures. Considering the material types present within the dam walls and the BRDA foundations a conservative PPV limit of 25 mm/s would be recommended for the embankment.

(Appendix A to EIAR)

This already entails a considerable risk, but more importantly the assessment is admittedly based on doubtful values to calculate the PPV. The report recognizes that the K and b values used for the assessment are:

"[...] very site-specific and are dependent on a number of factors including rock mass formation, jointing, direction of planes etc." It moreover recognizes that "Golder [the subcontractor for the report] conducted a review of the measured vibration data from the blasting conducted during the construction of the Phase 2 BRDA (2008 to 2011) to back-calculate appropriate parameters for k and b. Unfortunately, the data scatter was sufficiently large that a reliable estimate was not able to be used. In order to implement a reliable model it was decided to use the results of a Golder vibration attenuation study carried out at the former Galmoy Mine blasting operations. [...] Based on the results of the ground vibration monitoring to date, a maximum explosive charge weight for a given set-back distance from a blast to a given receptor while maintaining a PPV within the 25 mm/s and 50 mm/s limits".

This contradiction, the need for the parameters to be accurate and site specific, joined with the impossibility to find reliable parameters and the utilization of the parameters from a different mine altogether, point out the fact that the results are not to be trusted, especially in such a high-risk endeavor like the blasting of rock adjacent to a deposit of millions of tons of highly toxic material in the vicinity of an inhabited and wildlife rich area, or any area for that matter.

The report continues: "Estimated set-back distances from blasts at the Borrow Pit to limit the PPV to < 25 mm/s, assuming a maximum instantaneous explosive charge weight of 35 kg (MIC), are:

- 53 m to the BRDA embankment, and
- 50 m at the end of the life of the Borrow Pit to the GNI gas transmission pipeline".

These distances can be easily breached, and the margin of error has not been considered. Given that human and technical error occur all the time, these estimates are too risky for the type of operations proposed, and as noted above, are based on unreliable data. Notice moreover that the distance is only 3 meters more, due to the presence of a gas transmission pipeline. While the blasting may not have a direct impact on this pipeline, indirectly should the walls be breached or damaged containing huge amount of stone, coupled with large volumes of red mud been released then this would have a serious knock-on impact on the pipe-line. We feel this has not been assessed properly on health and safety grounds.

The report goes on to recommend ongoing monitoring of the blasting operations and adjustments to the results of the assessment, in reflection of the in-built inaccuracy of the assessment and the huge risk of the operations conducted. We find it peculiar that in such a volatile scenario the recommendation is to reduce the explosive charge if the effects of the blast are in excess of the predicted maximum values, rather than staying within the boundaries of a conservative estimate that would take into account possible breakages and leakages. Citing from the EIAR:

"Following an assessment of the monitoring data from the initial blasts and subsequent blasts in the Borrow Pit at conservative distances from the BRDA, these k and b values may be adjusted to better calibrate the model. A number of measures can be put in place to reduce the PPV should predicted maximum values occur."

This means that the recommendations for explosive use are erring on the side of a huge risk taking.

c. Climatic changes.

Another important oversight regards the predicted effects of climatic change on the site, that could easily affect the calculations carried out in the assessment. It is now unanimously recognized that climate breakdown is occurring at unprecedented pace and with unpredicted effects that will be felt as early as 2030, and are already evident now.

The report recognizes that "the following natural hazards have the potential to lead to a structural failure of the BRDA, the SCDC or both, and would constitute a major accident or disaster:

- Seismic event;
- Storm event;
- Tidal surge;
- Wave event;
- Significant Karst features." (EIAR 2021)

However, without evidence, the report excludes the likelihood of any of these events becoming severe enough to affect the embankment. Then it contradicts itself by specifying in a subsequent paragraph that because of projected climatic changes the severity in these events will increase:

"Commentary on the Future Baseline and Climate Trends Future climate change could alter the water environment at the Site by changing temperatures, recharge rates, changing flood risk and sea levels, and by affecting demand from public water supplies. Predicted changes in average precipitation include decreases in average precipitation amounts during spring and summer months with likely reductions in rainfall ranging from 0% to 13% (medium to low emission scenario) and from 3% to 20% (high emission scenario) (EPA, 2015). Heavy precipitation events are also predicted to show notable increases of c. 20% over the year as a whole, and most notably in the winter and autumn months (EPA, 2015). Sea level may change as a result of either change in the elevation of the sea, due to a change in the elevation of the land (isostatic change) or an increase/decrease in volume (eustatic change). Satellite observations of sea level rise around Ireland indicate a rise of c. 2 – 3 mm per year since the early 1990s which is consistent with global trends (Walthers, et al., 2021)" (EIAR, 2021).

A report by the EPA warns: "The rate of global sea level rise for 2006–2015 of 3.6 mm per year, is unprecedented over the last century, and about 2.5 times the rate for 1901–1990. Sea level is projected to continue to rise at this rate or greater. All major cities in Ireland are in coastal locations

subject to tides, any significant rise in sea levels will have major economic, social and environmental impacts. Rising sea levels around Ireland would result in increased coastal erosion, flooding and damage to property and infrastructure."

This is another contradiction that we believe deserves further and careful consideration at the time of making a decision on the proposed development. A review of tailing dams accidents by Rico et al. (2008) show that in Europe the most common cause of failure is related to unusual rainfall.

The likelihood of exceptional tidal surges, storms, waves and flooding is a reality that humanity will have to live with, it cannot be predicted and if occurring the effects on the red mud deposits breaking into the surrounding environment will be devastating, as discussed below.

Our concern is based on the precautionary principle, which should be used in the assessment of the environmental impact of new and existing infrastructure development and have the priority over economic considerations. Several international treaties endorse the precautionary principle, for example the principle 15 of the Rio Declaration on Environment and Development in 1992 states: "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

Preventing damage of any kind to human and non-human life, and the life supporting ecosystem upon which we all depend should constitute the criteria upon which the decision about the AAL application should be based on, and according to this principle there are no grounds for approving the extension to the Rusal facility.

Rock blasting on-onsite moreover is not a necessity other than cutting the costs of operations. Not rock blasting on-site would not put jobs at risk, nor would it stop production. This rock can be easily sourced from the local quarries. Aughinish cite additional traffic on main road as one reason given for blasting on-site but there is widespread awareness of Limerick County Council (LCC) facilitating the similar leases, such as the one to Cadence up in Shangolden, which will allow huge volumes of traffic, should it go ahead in taking waste through villages to the proposed gasification plant. Because of these precedents it is reasonable to believe that LCC might not consider travelling a shorter distance to retrieve stone as being a traffic problem. The quarry across the road approximately 300 yards from their main entrance should be considered as a possible alternative.

d. Precedents of disasters and consequences.

Industrial disasters concerning tailing dams are well documented and their effects on the environment are devastating to say the least.

The tailing dam breach at the Mount Poley Mine in British Columbia, in 2015, released 5 million cubic meters of toxic waste in the waterways; the Samarco Mine catastrophe in Brazil the following year, sent mine waste 600 km downstream into the Atlantic Ocean. Especially close to this situation however is the Ajka disaster in Hungary in 2010, when 1 million cubic meters of toxic red sludge escaped from a breach in the deposit and which was the worst environmental disaster in the history of the country (see pictures in Appendix A of this observation) (Earthworks 2019).

The red mud deposits in Aughinish amount to 50 million cubic tons, and are predicted to grow by an additional 28 million tons by 2039, the year up to which the new development will extend the facility production time" (AAL Planning Report, p 31).

A National Geographic article on the Hungary red mud spillage warns:

"The recent reservoir failure that flooded several towns in Hungary with toxic red mud is the latest environmental insult to Europe's Danube River. But it is not the first, nor the worst, disaster of its kind, experts say. And unless steps are taken to safeguard similar industrial plants and mining facilities around the world, these kinds of accidents will continue to happen, they warn" (Than, 2010).

The proportions and effects of an Aughinish spillage in such a delicate and connected ecosystem such as the Shannon estuary and on the livelihoods of the many residents of the area are unthinkable. While these accidents might be unlikely, they are not impossible and we argue that it would be immoral, criminal and suicidal to take such a risk.

The EIRA itself tries to 'quantify' the damage of a possible spillage on areas surrounding the plant site, which in itself is an indication of the possibility of its occurrence. Because there is no specific Irish standard or guidelines for the design and classification (of risk) of tailings facilities (dams) (in itself a worrying fact, considering that Ireland is hosting the largest alumina refinery in Europe), Aughinish Alumina have chosen to classify the BRDA and ancillary infrastructure in accordance to the 2013 Canadian Dam Association (CDA) guidelines, below:

Dam Class	Population at Risk	Incremental Losses		
		Loss of Life	**Environmental and Cultural Values**	**Infrastructure and Economics**
Low	None	0	Minimal, short-term loss, no long-term loss	Low Economic losses, area contains limited infrastructure or services
Significant	Temporary Only	Unspecified	No significant loss or deterioration of fish or wildlife habitat, loss of marginal habitat only, restoration or compensation in kind highly possible	Losses to recreational facilities, seasonal workplaces and infrequently used transportation routes
High	Permanent	10 or fewer	Significant loss or deterioration of important fish or wildlife habitat, loss of marginal habitat only, restoration or compensation in kind highly possible	High economic losses affecting infrastructure, public transportation, and commercial facilities
Very High	Permanent	100 or fewer	Significant loss or deterioration of critical fish or wildlife habitat, loss of marginal habitat only, restoration or compensation in kind possible but impractical	Very high economic losses affecting important infrastructure or services (e.g., highway, industrial facility, storage facilities for dangerous substances)
Extreme	Permanent	More than 100	Major loss of critical fish or wildlife habitat, restoration or compensation in kind impossible	Extreme losses affecting critical infrastructure or services (e.g., hospital, major industrial complex, major storage facilities for dangerous substances)

Table 16.1: Canadian Dam Association Dam Classification. Source: Table 2-1 of CDA 2013.

(EIRA, 2021)

"Tailings dams are classified according to the consequence in the event of failure and takes into account the incremental loss of life, environmental impact and economic impact that a failure of the dam may inflict on downstream or upstream areas, or at the dam location itself.[...] Based on the criteria presented in Table 16.1, Golder has classified the BRDA, as a facility with a 'High' HPC."

We argue that the assessment criteria and the terminology used to calculate the level of risk is reductionist, biased towards the profit-making mentality of the industry and neglectful and unaware of the requirements and functioning of life on our planet.

This classification is based on the following factors:

" • The population at risk is deemed to be 10 or fewer and is temporary. [...]. The population at risk is confined to BRDA staff, subcontracted staff or third parties during its operation (40 hrs per week), subcontracted staff or third parties farming the land to the north of the BRDA (short period during summer months) and occasional attendance by inspection, monitoring or maintenance staff (subcontracted or third party) during its operation and following closure. There is no resident population downstream of the BRDA within the break-out zone."

Here only numerical parameters are used to calculate the risk to human life, and considered 'temporary'. We also wonder how this number has been calculated, given that the location of a factory is a populated farming area, and farmers reside on the farms all year around, not 'for short periods over the summer months'. It looks like the effects of a potential disaster have been applied only to the workers of the facility, with no consideration of how a sea of tons of highly toxic red mud extending many kilometers would affect medium and long term the health and livelihood to the affected people.

"• Even though a failure is likely to adversely affect wildlife habitat, the low mobility of the frictional granular flow and the consequence mitigating measures incorporated into the design of the facility will, in all likelihood, mean that restoration of the area is highly possible. There are no notable protected species of wildlife or plants and/or habitats that would be considered irreplaceable."

The consideration that restoration is 'Highly possible' is very vague and based on the assumption that damage of the high toxicity of red mud on the environment is easily reversible, an assertion that denotes a simplistic understanding of biological processes and a disregard for the delicate balance of biodiversity. There is no mention of what type of restoration is planned, and based on which parameters/baselines. While the report recognizes that "the potential for significant loss of important wildlife / fish habitat in the adjacent SAC and SPA designated areas [exists]" we find unacceptable the risk category is based on the unsubstantiated consideration that some species are replaceable in the current situation of biodiversity extinction.

The Un Convention on Biodiversity states that: "Biological diversity – or biodiversity – is the term given to the variety of life on earth and the natural patterns it forms. The biodiversity we see today is the fruit of billions of years of evolution, shaped by natural processes and, increasingly, by the influence of humans. It forms the web of life of which we are an integral part and upon which we so fully depend [...]. It is the combination of the life forms and their interactions with each other and with the rest of the environment that has made Earth a uniquely inhabitable place for humans" (UN Convention on Biological Diversity). This means that all species should be considered as irreplaceable and not sacrificed to the greed of humans.

We also observe that the applicant has used the CDA risk assessment guidelines, while a more recent report which is global in scope exists, the Global Industry Standards On Tailings Management

2020, and we wonder why has not the latter been used instead. According to the most recent guidelines, the risk is classified as high if: "the potential area of impact could be between 10-20 km2, restoration or compensation would be possible but difficult and could take more than 5 years." Notice that according to the more recent classification the possibility of restoration is not necessarily feasible or successful (unlike the 'highly possible' qualifier of the previous CDA version), which gives a much less optimistic outlook on what a 'high' risk implies.

It also mentions the requirement of the "Operators to take responsibility and priorities the safety of tailings facilities, through all phases of a facility's lifecycle, including closure and post-closure." This requirement makes it harder for the company to evade responsibility and forces is to be more accountable an accident should happen. The report recommendations for AAL operations should abide to the updated guidelines.

Ultimately however both guidelines define the risk as high and we find it disconcerting that although classified as high risk the report recommends the development to go ahead. We argue that any magnitude of risk is not only high, but should be classified as 'unacceptable'.

A large leakage of 'red mud' into the estuary would be catastrophic. In The Irish Daily Mail on Wednesday the 13th of October 2010, Dr Edward Horgan (a former employee at the AAL plant) describes: "All you need is a combination of high tides in the estuary and an hour of prolonged rain fall and you have a potential disaster .... The mountain [of red mud] will burst northwards into the estuary ... It won't just go westwards towards the sea at Ballybunion, but eastwards to Limerick City, and towards nearby Shannon airport and up the River Fergus estuary, as the tides come in twice a day".

We argue that a possible tailings dam failure in the AAL facility will amount to 'Ecocide', meaning unlawful or wanton acts committed with knowledge that there is a substantial likelihood of severe and either widespread or long-term damage to the environment being caused by those acts (*Independent Expert Panel for the Legal Definition of Ecocide, June 2021).*

2. Effects and consequences of the increase of 'red mud' and salt cake deposits

While residents of the area surrounding AAL have been raising concerns about the possible health effects of the BRDA particulate matter on families and farm animals, no valid independent investigation has taken place. "A €5m investigation by the EPA and the health board failed to find a precise cause of the mysterious health problems [...], however a leaked memo expresses concern about "extensive contamination of the groundwater" and air emissions at double the WHO air-quality guidelines. It refers to the "serious concern" raised by the Mid-Western Health board at the level of sulfur dioxide emissions from the plant. And it says: "Because of the caustic properties of the process, sand and the salt cake would be classified as hazardous wastes. The red mud would also be classed as hazardous because of caustic pH and ability to generate a caustic leachate" (FOIE).

The EPA classified red mud deposits in AAL as non-hazardous in a 2004 report, despite the leaked 1997 memo written by EPA inspectors to its board says the material - clearly visible at the plant near Foynes, Co Limerick - is hazardous (FOIE). This move exonerated the industry from a number of

environmental duties and created environmental externalities. We question the non-hazardous classification of red mud deposits, with the lower threshold of environmental regulations and monitoring/mitigating requirements on the industry that this entails:

"Red mud contains caustic soda, iron, alumina, silicium, sodium, calcium, titanium, manganese, vanadium, hexavalent chromium, lead and cadmium. Because of the accumulation of all these metals and minerals red mud is a waste toxic for aquatic life, pets and farm animals. Cattle were intoxicated in Australia following the spreading of 20 tons of red mud per hectare which contained 1.8 kg of alumina, 24 kg of chloride and 6 kg of chrome. In fresh water, alumina is deadly for trout from 1.5 mg/liter and 3 mg of iron per liter is sufficient to inhibit the reproduction and to slow down the growth rate of numerous fish species. These figures are to be considered in the light of one million m3 which spilt out of the confinement dam in Hungary. It should be noted that red mud a by-product of bauxite processing is slightly radioactive. Red mud is a TENORM Technologically Enhanced Naturally Occurring Radioactive Material it contains radium 226 and thorium 232. This characteristic of red mud is recognized by the European Union and France. Red mud is three times more radioactive than bauxite (Robin des Bois, 2010).

It is recognized that this highly toxic by-product poses a serious environmental and human health threat all over the world. There is no viable way to reutilize or dispose of this toxic material, and the predicted increase in aluminum production means the issue of red mud disposal will only get worse, in the absence of investments in research and development to deal with the issue.

"Worldwide bauxite residue disposal areas contain an estimated 2.7 billion tones of bauxite residue, increasing by ~120 million tpa. The future management of this residue is of increasing environmental concern. Ideally it would be utilized as an industrial by-product for other applications (the zero waste situation), but realistically the drivers for zero waste are not high and there are significant cost and liability barriers to implementation. Any future utilization will most likely be based on contemporary production and residue currently consigned to long-term storage is unlikely to be recovered, thus the environmental impact risk remains" (Gräfe & Klauber, 2011).

Rehabilitation attempts do far has been unsuccessful, and we have reason to believe that this would be the case for the AAL facility.

"Practical environmental rehabilitation attempts to date have been more concerned with BRDA closure in a cosmetic sense. These have had some limited success and probably reflect the aim of the work to achieve re-vegetation, relying on a limited understanding of the residue chemistry and lacking detailed information on individual plant responses and tolerances. It is proposed that research design for bioremediation should commence with a more rigorous plant, fungi and microbe selection in conjunction with a better understanding of residue chemistry. [...] Without intervention BRDA environments would remain sterile for an extended period of time." (ibid)

Even if the material is re-utilized, concerns about its toxicity remain: "Possible concerns over liability of contaminating surrounding land may be a particular issue if the product is used in some way where the leachate from the building, structure, aggregate, etc., could leach into a water course" (Evans, 2016).

In sum, given the toxicity, red mud represents a huge environmental threat, and this should be reflected in environmental regulations and its status for the environment accordingly classified as

'hazardous'. Its production and storage should be limited, and we believe that the expansion of the disposal area is a step in the wrong direction.

a. Effects on groundwater contamination.

"Red mud tends to contaminate the groundwater over a large area, with dangerous, desiccating effects, despite recent attempts at 'dry packing'. Iron, silica, titanium, gallium and uranium are among over 40 elements present in bauxite, which exist as highly toxic, destabilized heavy metals in red mud, making it radioactive' (Padel and Das, 2010).

The EIAR identifies medium to high risk for water contamination, especially for human use and conservation areas, two elements that cannot be sacrificed to the profits of the industry on moral grounds.

Table 10.9: Water Receptors

Receptor	Importance and Reasoning
Groundwater	**Medium** (There is a combination of regionally and locally important aquifers underlying the Site but there is a limited future resource potential at the Site due to salinity issues as a drinking water source. There are groundwaters users in the area, but they are upgradient and not identified to be part of the same hydrogeological system as the Application Site. The groundwater present beneath the Application Site comprises a freshwater lens that is both downgradient and isolated laterally from the mainland by being laterally hydraulically isolated by Poulaweala Creek and the Robertstown River. Regulatory requirements to maintain water availability and quality status.
Surface water	**High** (There is connection to internationally designated areas i.e., Special Areas of Conservation (SAC) and Special Protection Areas (SPA), which have regulatory requirements to maintain water availability and quality status. In addition, there are protected surface water bodies in the vicinity of the Site.)
Humans	**High** (There are human receptors i.e., existing water users, which require maintenance of water availability and quality status.)

The report identifies that potential sources of impact, that could result in a change in water quality, are among others:

- Seepage from the BRDA site;
- Leaks and spills of substances during storage, transport, use and/or disposal; and
- Operational activities such as excavations and earth movement represent potential sources of suspended solids."

These are all operations that routinely take place on site, with the added threat of the rock blasting adding to the likelihood of spillages occurring. In this respect we stress that the potential impact on water table at 8.5m depth of the rock blasting has not been taken into account.

Similarly neglected are the effect of the extension to the volume of the BRDA to the groundwater contamination. The report recognizes that:

"There is potential that increased height of the BRDA and thus a greater hydraulic head could potentially increase the risk for seepage through the base of the BRDA. However, the seepage assessment (Golder 2021) for the BRDA Raise concluded that there is negligible seepage through the base of the facility, either in the unlined or lined phases due to the underlying depth of bauxite residue, the characteristics of the underlying estuarine soils and the composite basal lining system (natural and geosynthetic)."

We question the reliability of the seepage assessment that concludes the seepage is *'negligible'*, based on the methodology. The assessment has been done through computer modelling, and the possibility exists that it might have overlooked potential factors for contamination. Current contamination is dismissed despite that evidence of the red mud seeping into the water exists already: the local group CFSG witnessed red leakage in the estuary water, visible from the air: pointing at a two-way water flow, which comprises the notion that the 'dry' stack method prevents water contamination.

Because of the seriousness of water contamination on which people depend, the leakage assessment should be done continuously and by careful monitoring and observation. Also dismissing the seepage as negligible means no mitigation measures are in place to prevent contamination, which we believe constitutes an unacceptable risk.

Table 10.10: Evaluation of Initial Impacts and their Effect Significance

Project Phase	Receptor	Sensitivity	Source of Impact/Description of Change*	Impact Magnitude*	Level of Effect *
Construction and Operational	Groundwater	Medium	Mobilisation of leachate or activities impacting water quality or use, e.g., seepage, leaks and spills caused by bauxite residue and/or salt cake within the BRDA/SCDC or the unmanaged spillage of fuels or lubricants from plant or vehicles within the BRDA area or Borrow Pit sites.	Low (adverse), direct, long term, reversible (BRDA and SCDC) Negligible (adverse) indirect, medium term, reversible (Borrow Pit sites)	Slight Slight
			Changes in groundwater flows or levels within the Borrow Pit sites.	Negligible (adverse), direct, medium term, reversible	Slight
	Surface Water	High	Mobilisation of leachate or activities impacting water quality or use, e.g., seepage, leaks and spills caused by bauxite residue and/or salt cake within the BRDA/SCDC or the unmanaged spillage of fuels or lubricants from plant or vehicles within the BRDA area or Borrow Pit sites.	Low (adverse), indirect, long term, reversible	Slight
	Human water users	High	Mobilisation of leachate or activities impacting water quality or use (seepage, leaks and spills caused by bauxite residue and/or salt cake or the unmanaged spillage of fuels or lubricants from plant or vehicles)	Negligible (adverse), indirect, long term, reversible	Slight

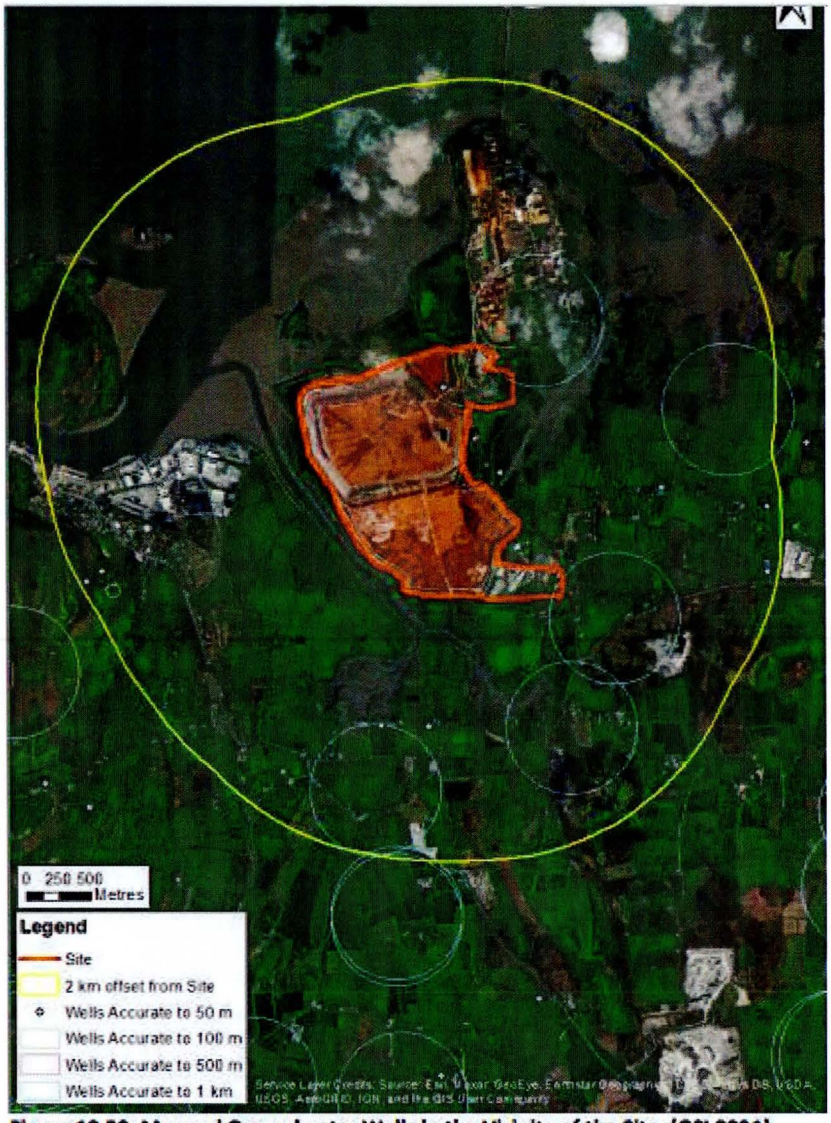

Figure 10.50: Mapped Groundwater Wells in the Vicinity of the Site, (GSI 2021)

b. Red mud dust dispersal over surrounding areas.

Despite the sprinkler system used by AAL to prevent red mud dispersal, there is evidence that the dust blows off the open-air deposits, with observable effects. In 2014 the Limerick Leader reported that following a storm in February that year, nearby houses were coated in red dust. Not only that, but reports of red dust contamination have been made in County Clare across the estuary, suggesting that the red dust is transported over many kilometers and especially that the containment measures are failing and that no monitoring is in place. Fianna Fáil TD Cathal Crowe has recently called for tangible action in respect and noted that 10 complaints have been received by the EPA over only one year, pointing to the extent of the issue. Similar dramatic occurrences as well as less visible ongoing air contamination due to red dust particles easily becoming airborne is likely to increase as the red mud deposit increases in height as planned.

3. Presence of Natura 2000 sites

Operational license issued by the EPA to the refinery requires non survey or regular monitoring of marine wildlife in the vicinity of the facility (from Michelle Hourigan documentary).

We are particularly worried about the large amount of conservation areas located in the immediate surroundings of the facility.

First of all the EIAR only considers only those conservation areas within the 15 km radius from the facility, noting that ones outside are "not likely to be affected by likely significant effects":

"Following this initial screening of Natura 2000 sites, there were no sites identified beyond 15km from the application boundary, which were adjudged likely to be affected by likely significant effects associated with the proposed development. This finding is in keeping with the NIS from the overall AAL facility, prepared for the IEL Review in 2020 (Ecology Ireland 2020; Appendix A) which considered all sources of emission (EIAR 2021)".

We argue that the 15 km radius is an arbitrary measure, the language is vague and the observation unsubstantiated by evidence of such effects and their magnitude. For those conservation areas within the 15 km radius the scenario looks admittedly grim:

"The potential for habitat loss or degradation was assessed along with the potential for disturbance and displacement of faunal species arising from the proposed development [...].

Given the proximity of these Natura 2000 sites (Lower River Shannon SAC, Barrigone SAC and River Shannon and River Fergus Estuaries SPA) and the sensitivity of the qualifying and special conservation interests of these sites, the potential for likely significant effects on these designated areas (in the absence of appropriate mitigation) cannot be discounted at Screening Stage.

As outlined in Section 5.1 above, it is deemed that the proposed development could lead to significant effects on three Natura 2000 sites within the project ZoI (Zone of Impact); [...]

There are a range of existing and potential emissions from the application site. These emissions, particularly the emissions to air and water have the potential to impact on the three designated Natura 2000 sites within the ZoI in the absence of adequate monitoring and mitigation. (EIRA 2021)"

We believe that while the report acknowledges the likelihood of harmful impacts on special conservation areas, there is no adequate treatment of how these affects will be tackled. In our register, this denotes a complete disregard towards life on earth and equates to sacrificing it to economic profits and a logic of greed. The potential harm to conservation areas constitutes an unacceptable risk, and the economic logic needs to come after the imperative to preserve life on earth.

The climate crisis is part of a deeper ecological crisis: the loss of biodiversity, widespread pollution, land and water shortages. The EU nature directives – which coordinate conservation efforts across the EU Member States with the aim of maintaining them at or restoring them to a favourable conservation status – urge member states to achieve conservation objectives exactly with the purpose of avoiding environmental collapse. In its lates report however the European Environmental Agency warns that: "biodiversity in the EU continues to decline and faces deteriorating trends from changes in land and sea use, overexploitation and unsustainable management practices, as well as water regime modification, pollution, invasive alien species and climate change. Although some species and habitats show improvements, progress has not been sufficient to meet the objectives of the EU Biodiversity Strategy to 2020. [...] Only 15 % of habitat assessments have a good conservation status, with 81 % having poor or bad conservation status at EU level and 4 % reported as unknown.

Over 50 % of dune habitats and bog, mire and fen habitats have a bad conservation status. Compared with the previous reporting period, the share of habitats with bad conservation status has increased by 6 % (EEA 2020).

Given this dire scenario we urge planners not to sacrifice any more conservation areas for the needs of the industry. Biodiversity on earth is of uttermost importance. In reflection of this, increasingly scientists, attorneys, economists, authors, business leaders and politicians are advocating for the Rights of Nature, a system of jurisprudence that sees and treats nature as a fundamental, rights bearing entity and not as mere property to be exploited at will (Global Alliance for the Rights of Nature) and as such recognizes the 'irreplaceability' of all species on earth. We argue that the assessment should be based on these progressive grounds.

In reflection of these concerns recently, Limerick County Council Chief executive report sought clarification on the status of the Meadow Barley and sets out the development levels to be imposed at 16,000 per hectare for the BRDA 6000 per hectare in the borrow pit (Limerick Leader, 6 February 2022).

Cllr Sean Hartigan of the Green Party has also noticed that the Askeaton facility is turning nature value into industrial wasteland. At a recent council hearing he asked about status of the meadow Barley and for a full investigation on the expansion area of the borrow pit (ibid.)

4. Corporate power/malpractice

a. Lack of participation.

While an interested party, the Cappagh Farmers Support Group (CFSG) formed by local residents adversely affected by the presence of the plant in the area, have highlighted the alarming weakness of the retaining walls of the BRDA, there is no evidence in the EIAR that repairs have been carried out.

Both Aughinish and Limerick County Council have a track record in ignoring Foynes and what one would consider an extremely detailed and worrying objection from Foynes community Council in 2005 to stop the second Mud BRDA 2 pond being constructed, storing millions of tons of red hazardous/toxic waste next to their village.

The group has highlighted a worrying number of incidents that have occurred over the years, which were downplayed and received very little publicity and for which any penalty/remediation was paid:

- causing a spray of 5000 litres of lime, bauxite and caustic soda slurry erupted into the air after a pressure failure in March 2006
- overflow of tons of caustic soda from a storage tank in 2005. The EPA were alerted by member of public after 3 hours; Aughinish Alumina did nothing even though they're obliged to report such incidents.
- a boiler malfunctioned in 2003 causing plume of black smoke and in the same year, an EPA survey discovered emissions in some cases seven times that permitted,
- In May 2002, a power failure caused a caustic vapour cloud to form over the Plant

- Huge disaster in May 2001, when the Plant was owned by a different Company: 500,000 liters of a highly toxic alkaline solution ked from the Plant; much reached the Shannon River, killing all life. Again the EPA were alerted not by the Company but by a member of the public - and Company went on to lie about the quantity of spillage when an investigation was carried out (declaring it was ten times smaller).

Elisa O Donovan (social democrat councilor for Limerick) spoke to CFSG who had written detailed letter to the then council chief executive Conn Murray alleging breaches to previous planning regulations by the company, and no response was received, nor investigation carried out in the alleged breaches.

b. Industry monopoly.

This examples of malpractice and neglect of democratic principles is not surprising. Aluminum industry is one of the oldest and most powerful in the world. The economic interests at stake are huge and the connivance with political forces to maintain advantages and favorable treatment have come to the fore on multiple occasions.

"In every deal there is a multitude of factors and power games. Aluminum company mergers and take-overs world-wide represent a new kind of monopoly or cartel. Changes also involve advances in technology, leading to an extraordinary new range of applications, as well as claims that environmental impacts are much less." (Patel and Das, 2010. P 52)

These deals represent de facto cartels: "The combination of economic meaning (price control and monopoly) and political alliance is significant, since the power represented by cartels joins governmental power with economic control." (ibid, p310)

"The essence of the aluminum cartel is that it cuts between governments, banks and industry, and that it prevents a 'free market' in bauxite, its hand is plain in the ruthless undermining of opposition to [...] aluminum companies [...] - control exercised among other channels, through the WB and CIA, and aptly termed corporate imperialism [...]" (ibid p319)

Assessment and inspections regarding the operation of the sector facilities are also characterized by a lack of independence: "Auditors continue to act as advisers to the companies that they audit. They are hired and remunerated by the very organizations that they are supposed to be auditing. The auditor's dependence for fees on corporate barons makes it impossible for them to be independent" (ibid p 295).

c. Responsibility towards the Global South.

There is a heavy reliance on externalities to keep production costs low: "[Aluminum industry economic] conceals a pattern of extreme levels of exploitation and destruction of the environment [...]. The essence of this pattern is *externality* - how the industry externalizes its real costs. In other words, *aluminum economics does not make economic sense - it is uneconomic*" (Patel and Das 2010, p 294).

Most of the bauxite used in AAL originates in Guinea -the second largest bauxite producer - where Rusal also have shares. The mineral gets extracted with no environmental and human rights oversight and the crops and livelihoods of people living in the proximity of mines are destroyed and they are plunged into poverty (Human Rights Watch 2018). We argue that any country in the Global

North should take responsibility towards the global south as part of climate and social justice principles, in the context of Extractivism, neo-colonial practices driven by the rising demand for consumption in the global north, especially a country like Ireland with a long a dark history of colonial exploitation itself.

5. Aluminum uses and Green transition

a. Greenwashing.

The strategic infrastructure status of the alumina refinery comes - partially at least - from the misconception that aluminum is a green material (based on the fact that it is lighter so vehicles containing aluminum consume less energy, its role in the green transition towards renewables and the fact that it can be partly recycled).

We argue that this is a green washing argument. Green transition is over-reliant on extraction and processing of minerals. Aluminum is a case in point being crucial for electric cars and transition towards renewables. However electric cars are not the only strategy towards tacking the climate crisis. Like many other of these strategies they are based only on Co2 emission reduction strategy, with no concerns over other aspects of planetary health (like biodiversity loss and pollution). They also offset the cost on the individual consumer and do not take into account the huge economic inequality created by our economic system and the imperative of coupling climate justice with social justice. In terms of transition to renewables, we need to review a green transition strategy that revolves around extractivism, environmental destruction and creation of sacrifice zones. The scale at which renewable energy facilities are currently projected to be built does not respond to human needs, but to the need to provide increasing levels of energy to a growing number of industries, as demanded by an economy based on the myth of green growth. We argue this myth has to be questioned, and economic growth adjusted to the planetary limits, which we have currently reached.

Other main uses of aluminum are in defense/offence, satellites, packaging and construction. None of these are crucial for human life on the planet or even a comfortable lifestyle, but they are to sustained production and corporate profits, and the madness of war. Nation-states around the world are spending almost $5 billion a day on war, aggregated. Alternatives exist and are only a matter of political will: peace, reusable packaging and localised production/consumption, degrowth and public transport.

More disturbingly, in recent decades aluminum production has become more linked to financial speculation than material production and manufacturing of objects.

"Several big companies have established important places within the industry focused on trading and speculating more than on production, a trend Marc Rich ('Aluminum Finger') pioneered in Russia/Switzerland, with offshoots in Glencore/Xtrata. The emphasis on speculation and futures trading has shifted the aluminum's profits, as in most other sectors of the economy, away from manufacturing" (Padel and Das, 2010, p57).

b. Energy Consumption

Bauxite processing in Aughinish relies on Bayer process, an energy-intensive technology and consumes large amounts of fuel oil and energy. To satisfy the refinery's demand for energy, a 160 megawatt Combined Heat & Power Plant (CHP Plant) was built on the site of Rusal Aughinish. Currently, the CHP Plant generates steam and power for the refinery and supplies surplus power to the national power grid. All fuel requirements use not natural, but fossil gas at Aughinish. The Aughinish CHP facility is the largest in Ireland and UK combined (AAL website).

The Aughninish plant uses about half the electricity coming from the largest dam (Ardnacrusha) of the largest river in the British Isles. There is a valid argument that if this energy was transferred to Irish grid it would significantly reduce the strain on the grid (add to base load grid requirements). This renewable hydropower could replace fossil gas and coal as a reliable and clean back up to wind and solar power.

The 2021 Climate Action Plan recognizes that the biggest share of enterprise emissions in Ireland comes from a small number of large companies, it mentions Aughinish Alumina explicitly. Yet there is no clear intention to tackle this imbalance of energy consumption afforded to these large scale polluters in the Climate Action Plan.

Conclusions

Given all of the above, we request that a license is not given in relation to the planning application in object in its current form.

We demand that the company seriously considers modifications and alternatives – including the possibility of foregoing expansion altogether – unless modifications are adopted that guarantee and demonstrate that the precautionary principle in relation to the huge risks to the environment and human health is respected, for each of the points addressed above.

We believe several alternatives are currently under development which could be considered. For example funds could be re-directed towards research and development of initiatives like the creation of a zero-waste BR valorization industry in Europe, in order to make it valuable as soon as possible (see European Training Network for Zero-Waste Valorisation of Bauxite Residue (Red Mud)).

This would be a first step, but it is not sufficient on its own. A change in mindset from relentless profit seeking to responsibility towards life and the earth that makes it possible needs to occur. Aluminum cost needs to be adjusted to include all externalities, which currently are offset on people and planetary life. Profits need to be channeled towards restoration and rehabilitation of the environment and only the volume of operation that guarantees that no further harm is done to the environment and the life it sustains should be allowed.

We furthermore request that a public hearing is held by the Board, given the strategic status of the development under consideration, in order for the interested parties to expand on their concerns and ensure that they are heard and taken into uttermost consideration by the planning authority and developers, as by the Aarhus Convention which Ireland has undersigned (Aarhus Convention - Environment - European Commission (europa.eu)).

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APPENDIX A

Photographs from the 2010 red mud disaster in Hungary.

Figure 1The red hue of the sludge is caused by Iron(III) oxide. 30 million tons of waste is estimated to be stored here in open air ponds–an outdated measure to secure waste for this type of facility.


Cracks appearing in wall
Reservoir
The initial breach site
New dam
Kolontar
REUTERS

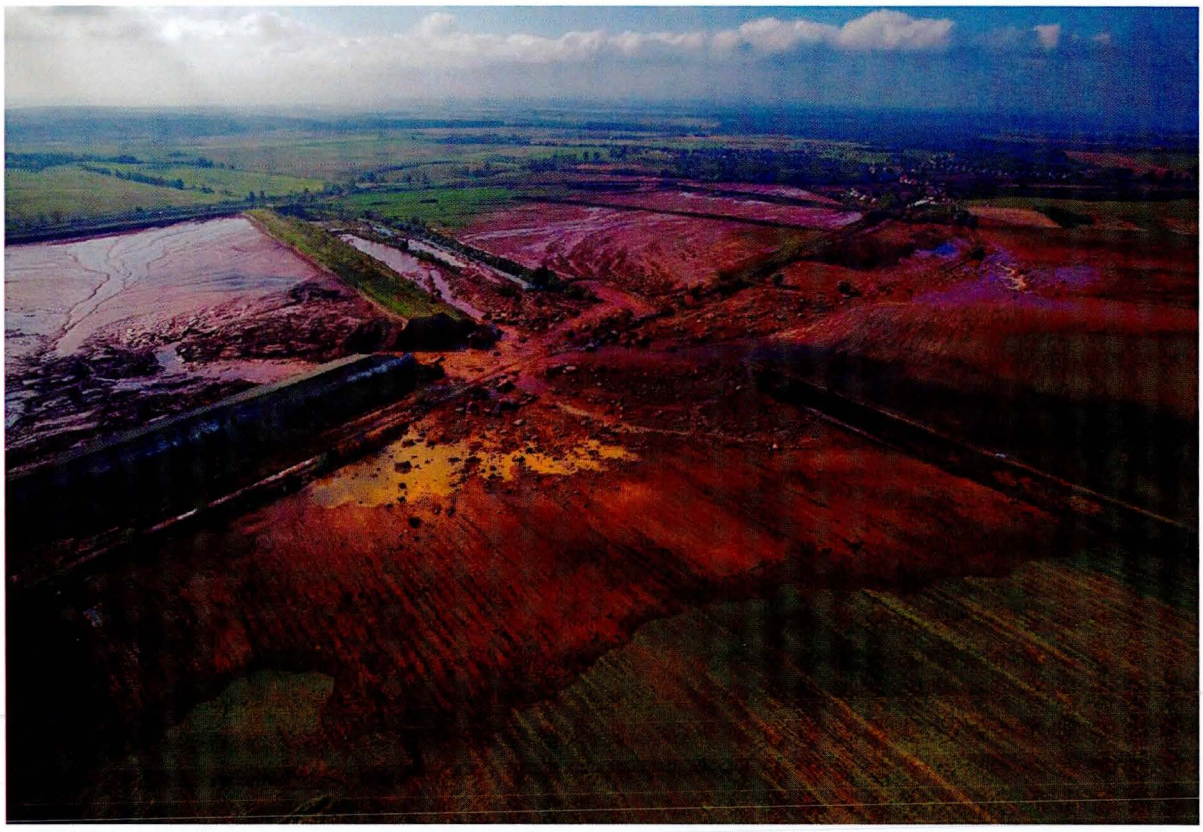

Figure 2 Alan Taylor. 2011. "A Flood of Red Sludge, One Year Later." The Atlantic. Available here.

Figure3 Palíndromo Mészáros. 2010. "The Line". Designboom.

Figure 4 A photo gallery of the street during the time of the flood. A Flood of Toxic Red Sludge: The Hungarian Villages of Kolontár & Devecser 10 Years Later (middleworldadventures.com)

A Flood of Red Sludge, One Year Later - The Atlantic

Figure 5 A Hungarian soldier wearing a chemical protection gear walks through a street flooded by toxic in the town of Devecser, Hungary, on October 5, 2010. #

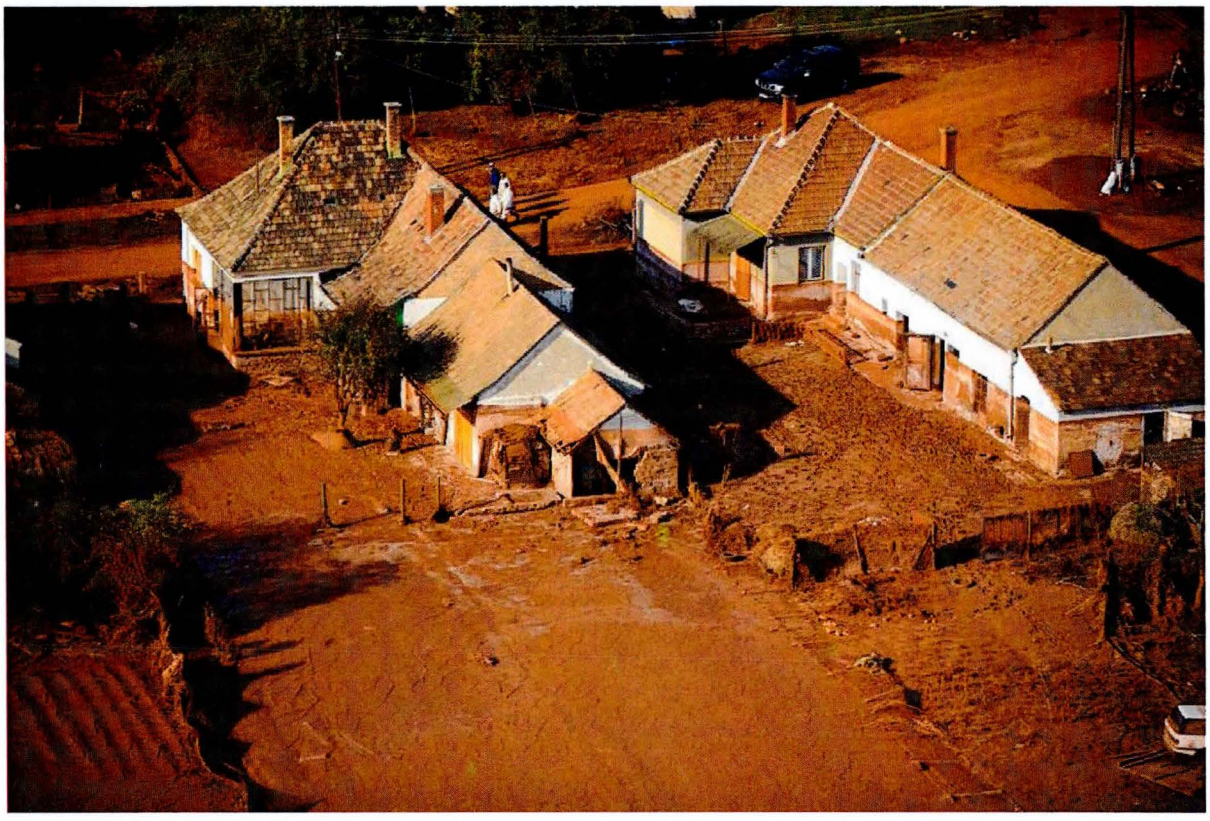

Figure 6 An aerial view of Kolontar village covered by toxic red mud on October 12, 2010. #

Figure 7 A grain field is flooded by toxic mud outside the village of Kolontar, Hungary, on October 5, 2010. #

Figure 8 A police officer wears a protective mask as he stands guard at an alumina plant reservoir which cracked and unleashed a torrent of toxic red sludge in Kolontar, Hungary, on October 10, 2010. #

Figure 9 An aerial view of Kolontar village covered by toxic red mud, 164 km southwest of Budapest, Hungary, on October 12, 2010. #

Figure 10 a toxic waste cleanup specialist cleaning the street in Devecser, Hungary, which had been inundated by a flood of toxic red sludge, on October 8, 2010