



Annual Environmental Report (AER) 2021

Company Name: **Boliden Tara Mines DAC**

Licence Number: **P0516-04**

Address: **Knockumber, Navan, Co Meath C15 NH**

Class of Activity¹: **Class 1.3 (a) (b) and Class 11.5**

¹ See Appendix I

Purpose of this Report

One of the functions of the Environmental Protection Agency (EPA) is to licence and regulate the activities² of large scale industrial (e.g. chemical, food processors, power plants) and waste facilities. Submitting an Annual Environmental Report (AER) is a requirement of all EPA licences.

An AER is a public document. To this end, this format has been developed for industrial and waste licence holders (other than the intensive agriculture sector) to use as a template. This is to assist any member of the public to interpret and understand the environmental performance of the licensed facility.

The AER is a **summary** of environmental information for a given year. It includes:

- Details of the licence holder's environmental goals achieved, goals to maintain compliance and/or improve their environmental performance;
- Answers to questions regarding their facility's activities;
- Tables of results from monitoring emissions such as air, water, noise, and odour; and
- Details of waste generated, accepted and treated.

An AER does **not** provide detailed technical data. Such information is available in three ways:

- 1) Contacting the licence holder directly. The Contact Us section of this template enables the licence holder to provide details of where a member of the public can obtain further information on topics reported in this document.

² See Appendix I

- 2) Some documents³ are available on the EPA website via the licence details page for each individual licence. This can be found by browsing either the <http://www.epa.ie/licensing/> or <http://www.epa.ie/enforcement/> pages of the EPA website.
- 3) All formal enforcement correspondence exchanged between the EPA and a licence holder during the regulatory process is available for public viewing by appointment at any EPA Office.

If you have a question or query about an AER or an individual EPA licensed facility see the EPA's website or contact the relevant EPA office. See <http://www.epa.ie/about/contactus/> for contact details.

³ This includes EPA site inspection and compliance monitoring reports, licence holders' self-monitoring reports, AERs and special reports

Contents

Glossary	5
Declaration	8
1) Introduction	9
Contact Us	9
2) How we Manage our Facility	10
3) Energy & Water	12
Energy	12
Water	14
4) Environmental Complaints	16
5) Environmental Incidents	18
6) Our Environmental Emissions	21
Storm Water	22
Waste Water	24
Air	28
Fugitive Solvent Emissions	31
Groundwater	32
Noise	34
7) Waste	36
Waste Generated	36
Waste Accepted	38
8) Financial Provision	40

Glossary

Abatement Equipment	Technology used to reduce pollution
AER	Annual Environmental Report.
CRAMP	Closure, Restoration and Aftercare Management Plan.
ELRA	Environmental Liability Risk Assessment.
Emission Limit Value	Limits set for specified emissions, typically outlined in Schedule B of an EPA licence.
EMS	Environmental Management System.
Environmental Goal	An objective or target set by a licensee as part of an environmental management system (EMS).
Environmental Pollutant	Substance or material that due to its quantity and/or nature has a negative impact on the environment.
Facility	Any site or premises that holds an EPA industrial or waste licence.
FP	Financial Provision.
GJ	Giga joules, an international unit of energy measurement.
Groundwater	All water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil.
Incident	As defined by an EPA industrial or waste licence.

Inert Waste	Is waste that will not undergo physical, chemical or biological change thereby, is unlikely to cause environmental pollution or harm human health.
List of Wastes (LoW)	A list of wastes drawn up by the European Commission and published as Commission Decision 2014/955/EU.
Noise Sensitive Location	Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other installation or area of high amenity which for its proper enjoyment requires the absence of noise at nuisance levels.
Non-Renewable Resource	A resource of economic value that cannot be replaced at the same rate it is being consumed e.g. coal, peat, oil and natural gas.
Oil Separator	Separator system for light liquids (e.g. oil and petrol).
PRTR	Pollutant Release and Transfer Register.
Renewable Resource	Wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases.
Sanitary Waste	Waste water from toilet, washroom and canteen facilities.
Storm Water	Rain water run-off from roof and non-process areas.

Surface Water	Lakes, rivers, streams, estuaries and coastal waters.
Trigger Level	A value set for a specific parameter, the achievement or exceedance of which requires certain actions to be taken by the licence holder.
Volatile Organic Compounds	Gases produced from solids or liquids that evaporate readily in ambient conditions.
Waste	Any substance or object which the holder discards or intends or is required to discard.

Disclaimer

These are **not** legal definitions. Legal definitions can be found in the corresponding legislation.

Declaration

I, Ailish Mc Cabe, Environmental Engineer, confirm that by ticking the box below, all information in this report is truthful and accurate to the best of my knowledge and belief.

In addition, I confirm that all monitoring and performance reporting required by our EPA licence and summarised herein is available for inspection by the EPA.

Tick here

1) Introduction

See below a brief description of our facility and a summary of our environmental performance this year.

Boliden Tara Mines (BTM) is the largest zinc mine in Europe. Its activities include exploration, mining, processing, shipping of concentrates and the storage of related tailings waste. In 2021, 2.15 million tonnes of ore was mined which yielded 205,591 tonnes of zinc concentrate and 24,430 tonnes of lead concentrate and 1.92 million tonnes of 'tailings' waste.

During 2021 there was: two incidents with environmental impact (INC1022322 and INC1022097); 72 external complaints received; no non-compliances of licence conditions and no Compliance Investigations opened.

The following site visits were carried out on behalf of the Agency: 1 planned annual site visit (SV21941); 1 site visit following INC1022097 (SV23036); a planned site visit conducted by *Elementis Materials Technology* (SV20787) as part of air emissions monitoring programme and 1 site visit (SV21224) as part of emissions monitoring programme.

Contact Us

If you have any questions or would like further information on any aspect of this report, please contact us directly.

See below details:

Ailish Mc Cabe
Environmental Engineer

Boliden Tara Mines
Knockumber, Navan, Co. Meath C15 NH63
Tel: +353 (046) 9082563
Mobile: +353 (0)872909220
Ailish.mccabe@boliden.com
www.boliden.com

2) How we Manage our Facility

Explanation

To ensure our facility's activities do not cause environmental pollution we are required to have detailed documentation systems in place to help us manage and track our environmental performance. These systems are referred to as Environmental Management Systems (EMS). We review our EMS every year and set up-to-date **environmental goals** to continually improve our environmental performance.

The information below sets out the environmental goals for our facility to help us prevent environmental pollution and reduce our impact on the environment. Target dates for completing each goal and progress towards achieving the goal are outlined in Table 1.

Table 1 Environmental Goals

Environmental Goal	Target Date	Progress
Restoration and closure of historic onsite landfill	4 Q 2022	Plan awaiting Agency approval
Protection of groundwater - Replace tailings and reclaim pipelines	4Q 2022	Project commenced
Better measurement of groundwater inflows into mine	Throughout 2022	Ongoing
Phase 2 passive treatment trials to treat run-off at Tailings Storage Facility (TSF)	Throughout 2022	Ongoing Report by Q4
Extend capping and vegetation trials at tailings storage facility	Throughout 2Q 2022	7 Ha successfully completed in 2021
Protect groundwater - Upgrade groundwater model at TSF	4 Q 2022	Ongoing
Waste Reduction - Identify alternative use for surplus mine rock	Throughout 2022	Currently used as construction material at Tailings facility
Biodiversity - Continue with programmes – bees, forestry management	Throughout 2022	Ongoing

Environmental Goal	Target Date	Progress
Generate electricity from renewable sources to used: solar PV systems on site buildings and owned property	Throughout 2022	Ongoing
Generate electricity from renewable sources to used onsite - Pumps as Turbines (PAT) project	Throughout 2022	Ongoing
Mine compressed air optimisation	Throughout 2022	Ongoing
Mine ventilation on demand	Throughout 2022	Ongoing
Optimise mine water pumping	Throughout 2022	Ongoing

Add rows as necessary

Comment

Environmental Management has always been at the core of operations since the development of the mine in 1973. Today the EMS ensures the company achieves best practice in all areas of environmental management and compliance and makes the necessary resources available to include human resources, specialised skills, organisational infrastructure, technology and financial resources.

In 2017, the National Standards Authority of Ireland (NSAI) certified the Company to ISO 14001:2015 EMS.

Consistent with Environmental Policy environmental objectives and associated targets are set annually to continuously improve the Company's environmental performance. Progress towards achieving targets is reviewed periodically.

The Company is always looking at new ways to improve environmental management and environmental practices on site and reduce its impacts on the environment. These practices are often not identified as an actual environmental objective for the year but can lead to fewer complaints, increased compliance with IEL conditions and improved environmental management practices.

3) Energy & Water

Energy

Explanation

Fossil fuels such as coal, gas and oil are non-renewable resources. As a result, our EPA licence requires that we measure our energy use and set targets to improve the energy efficiency of our activities and reduce our overall use, where possible. Where we have the means and technology on-site to generate energy, this is also captured in this report.

The information below summarises the energy used this year compared to the previous year and includes renewable and non-renewable energy types.

Table 2 Energy Used

Energy Used	Quantity (GJ)	% Increase/ decrease on previous year
Electricity	717,389	+2.35%
Heavy Fuel Oil	-	-
Light Fuel Oil	136,411	- 5.97 %
Natural Gas	-	-
Coal / Solid Fuel	-	-
Peat	-	-
Renewable Biomass	-	-
Renewable Energy Generated On-site	28.764	+100%
Total Energy Used	853,828	+0.93%

Comment

BTM has established an energy efficiency and CO₂ emissions reduction strategy and programme based on our ISO 50001:2018 certified Energy Management System.

During 2021/2022 the following energy efficient improvement projects that are part funded by the SEAI EXEED scheme will be implemented;

- mine ventilation on demand;
- mine water pumping optimisation;
- ore handling/conveyor optimisation;

Once fully implemented, the above projects, in addition to ongoing 3RAR ventilation optimisation and the pilot renewable energy projects are estimated to provide energy savings of approximately 5.2GWh/yr.

The information below summarises the energy we generated on our site this year with specific focus on renewable energy generation.

Table 3 Energy Generated

Energy Generated	Quantity (GJ)	% Increase/ decrease on previous year
Renewable Energy	28.764	100%
Total Energy Generated	28.764	100%

Comment

BTM is developing a renewable energy strategy.

In 2021, the following pilot scale renewable energy projects were implemented:

- Canteen roof solar PV system was operational in March 2021 and generated 7,990 kWh (28.764 GJ) during 2021. It is expected that in a full year, the solar PV system will generate approximately 11,150 kWh/y (40.14 GJ) of renewable energy for direct site use.
- A bank of 10 x Electric Vehicle Chargers were installed in the staff car park in July 2021.
- A Pumps as Turbines (PAT) pilot project was installed in the mine in October 2021. The PAT generates renewable energy from the flow and pressure of water pumped from surface into the mine. It is expected that the PAT will be operational in April 2022 and is estimated to generate c. 277,000 kWh/y (997.2 GJ) of renewable energy for direct site use.

As part of our renewable energy strategy, the following investigations are ongoing;

- Further solar PV opportunities eg. roof and ground mounted Solar PV on BTM owned lands.
- Roll out of further PAT installations at up to 10 locations across the mine.

Water

Explanation

Water is a natural resource and we are required by our EPA licence to identify ways to reduce our use where possible. Water used in industry can be extracted from groundwater, rivers and lakes (surface water), taken from public water supplies (Irish Water), recycled from the facility's processes or harvested from rainwater.

The information below summarises and compares the quantity of water used this year compared to the previous year.

Table 4 Water Used

Source of Water Used	Quantity (m ³ /year)	% Increase/ decrease on previous year
Groundwater	5,554,963	+ 6.1%
Surface Water	2,400	+ 88%
Public Supply	51, 188	- 14%
Recycled Water	4,610,871	+9.3%
Rainwater	-	
Total Water Used	10,291,422	

Comment

The onsite 'water management system' supplies the Processing and Mining operations and also manages the significant intakes of groundwater from the underground workings. Process water is *re-circulated* and *re-used* in the underground mining and surface milling processes.

Potable water from the Navan town urban supply network is used for canteens and other utilities. Flow meters are installed at various outputs to identify and monitor usage.

Surface rainwater from the mine site and tailings storage facility is also collected and becomes part of the overall onsite water management system.

There are a number of projects ongoing in the underground mine looking at reducing the quantity of service water brought from surface. This involves building holding reservoirs that water can be extracted from. This will also a saving from not pumping this water to surface.

Because of the recirculation system, an excess of water ($> 600 \text{ m}^3/\text{h}$) is accumulated which is carefully managed. This excess water is discharged to the River Boyne, at Emission Point Reference SW1, under licence conditions. In addition clean groundwater, derived from an area of the mine that has minimal or no contact with the orebody, is collected in a dedicated reservoir and pumped directly to surface for discharge to the River Blackwater at Emission Point Reference SW2.

The discharged water flow and quality is continuously monitored and controlled to satisfy the conditions specified in the licence.

4) Environmental Complaints

Explanation

Our EPA licence requires that activities do not cause environmental nuisance such as odour, dust or noise. Our licence also requires that we have procedures in place to record, investigate and respond to environmental complaints if or when they arise.

We have an environmental complaints procedure in place where you can contact us⁴ directly. You can also contact the EPA⁵ if you wish to make an environmental complaint, confidentially or not.

See the information below for a summary of **all** the environmental complaints relating to our activities made directly to us and to the EPA this year.

Table 5 Summary of All Environmental Complaints Received in

Type of Complaint	Number of Complaints Received	Number Closed
Odour / Smells		
Noise	2	2
Dust	3	3
Water	22	-
Air Quality		
Waste		
Litter		
Vermin/Flies/Birds		
Soil Contamination		
Vibration	40	40
Other	5	5

⁴ See Section 1, Introduction – Contact Us

⁵ If you wish to contact the EPA to make an environmental complaint about an EPA licenced facility, please go to <https://lema.epa.ie/complaints>

Comment

During 2021 a total of 72 external complaints of an environmental nature were received:
40 in relation to ground vibration from underground blasting;
2 in relation to noise associated with site activity;
22 in relation to domestic well water levels;
3 in relation to dust and traffic on local roads near Randalstown and
5 in relation to seismic study

Of these 4 complaints were made directly to the EPA: COM013984, COM013178, COM012789 and COM012308.

All complaints were responded to in an appropriate manner. A record of the response made to each complaint is maintained.

5) Environmental Incidents

Explanation

It is our responsibility as an EPA licensed facility to ensure we have systems in place to prevent incidents that have the potential to cause environmental pollution. If an incident occurs, we are required to report it to the EPA, investigate the cause and fix the problem.

The EPA classify environmental incidents into 5 categories based on the potential impact on the environment:

- Minor
- Limited
- Serious
- Very Serious
- Catastrophic

See Table 6 for the number of the environmental incidents we reported to the EPA this year.

Table 6 Number of Environmental Incidents

Incident Category	Minor	Limited	Serious	Very Serious	Catastrophic
Abatement Equipment Offline					
Breach of Ambient ELV					
Breach of Emission Limit					
Explosion					

Incident Category	Minor	Limited	Serious	Very Serious	Catastrophic
Fire		1			
Monitoring Equipment Failure					
Odour					
Spillage					
Breach of trigger Level					
Uncontrolled Release					
Other		1			

Comment

There was two incidents with environmental impact during 2021.

INC1022097

On November 20th the pilot hole for the Tara Deep ventilation shaft broke through into the Tara Deep exploration drift producing a water make at an approximate flow rate of 2200 m³/hour which continued until successfully plugged with high pressure packers on December 2nd. This water was stored in the Tara Deep exploration drift and in the lower SWEX area of the mine. Dewatering of this flood water commenced on December 13th focusing on the SWEX area.

Daily and weekly groundwater level monitoring is being carried out in monitoring and domestic wells around the exploration drift and pilot hole and surrounding areas and in all others areas of mining operations (Nevinstown/Licarton/Rathaldron and SWEX area). A weekly update report is submitted to the EPA, Meath County Council and the GRSO.

An extensive programme of clean up, ground support and refurbishment works will be undertaken when flood water has been pumped out.

Investigations (to include a third party investigation by BTM and External Authorities) into the cause of water inflow are being undertaken. Time for delivery of these reports in end of April 2022.

INC1022322

On December 27th December a fire was detected at the head of the 5-3 conveyor belt system in the underground mine. An emergency was declared and the emergency response procedure initiated. Mine rescue teams were deployed to evacuate personnel from critical refuge stations and assess and deal with the fire.

There was approximately 22.5m³ of water used to fight the fire. This firewater was collected in the nearby 5-3 sump and isolated from the main mine water management system.

This fire water was transported to surface surface awaiting treatment offsite by external waste contractor. On January 6th 26,420 Kg of firewater (LoW 161002) was removed by ENVA and transported to their Greenogue Facility for treatment.

Investigations indicate a bearing on the take up pulley failed which generated heat and ignited the rubber conveyor belt.

All Incidents with an environmental impact are reported to the Environmental Department who in turn notify the regulatory bodies as per IEL Condition 11. All incidents are investigated and appropriate corrective and preventative action carried out.

6) Our Environmental Emissions

Explanation

We are required to ensure the emissions from our activities do not cause environmental pollution.

We are required to monitor any of the following emissions that we make:

- Storm water
- Waste water
- Air
- Groundwater
- Noise

We regularly test any such emissions for specific pollutants and materials to ensure they do not contain levels of pollution that exceed emission limit values (ELVs) or cause environmental pollution. If monitoring of an emission indicates an ELV is exceeded, we are required to report this to the EPA⁶.

The next sub-sections of this report summarise our compliance with any ELVs set in our EPA licence. Some emissions monitored do not have specific ELVs, but we still carry out monitoring and report all incidents that may give rise to environmental pollution.

⁶ See section 5, Incidents

Storm Water

Explanation

Storm water is rain water run-off from roof and non-process areas of a facility, e.g. carparks, and generally shall not contain any pollution. Storm water is usually released into a local water body after a basic form of treatment. Our EPA licence requires that we manage storm water to ensure no polluting substances or materials are released into the environment.

The information below summarises how the storm water from our facility is treated, where it is released and the results of monitoring this year.

1. Storm water from our facility is managed prior to release by;

All rainwater and surface run-off is collected and becomes part of the onsite water management system. All sources of water undergoes three stages of treatment / clarification before eventual discharge to the River Boyne under licence conditions. The discharged water flow and quality is continuously monitored and controlled to satisfy the conditions specified in the licence.

2. Storm water from our facility is released into the following water bodies:

Treated water is discharged to the River Boyne at Emission Point Reference SW1.

Table 7 Summary of Storm Water Monitoring

Parameter measured	No. of Samples	% Compliant⁷	Comment

Add rows as necessary

Comment

Refer to Table 8 Summary of Waste Water Monitoring.

⁷ % compliant = [(number of samples compliant) / (number of samples taken)] x 100. Compliance could refer to emission limit values or trigger levels. The EPA commonly use trigger levels on stormwater discharges.

Waste Water

Explanation

There are two types of waste water that can be produced:

- Process waste water produced from the activities and;
- Sanitary waste water from toilets, washrooms and canteens.

Our EPA licence requires us to manage our waste water on or off-site and ensure that it does not cause environmental pollution when discharged into the environment.

The information below summarises how we treat the waste water produced from our activities, where it is released and the results of monitoring this year.

1. Waste water produced by our activities is treated as follows before discharge to a receiving waterbody;

There are three sources of water that are considered process water:

- Water ingress to the mine that is pumped out to maintain a suitable dry working environment
- Surface run-off
- Water from processing plant

Water from these three sources is collected, pumped and treated prior to discharge to the River Boyne at Emission Point Reference SW1.

All water from the process plant is pumped to the tailings storage facility for treatment and subsequently returned to the reclaim pond on site. Minewater and surface run-off, representing a low risk effluent are treated in the onsite water treatment system.

The water treatment system comprises three stages of clarification in sediment-aeration ponds prior to discharge to the River Boyne.

At present, minewater is pumped and collected at a central underground pumping station. The water enters a large settling sump where suspended solids settle out and is subsequently pumped to surface to a minewater pond, acting as a primary settlement pond. Overflow from this minewater pond decants by controlled overflow to a secondary stage of settlement/clarification in the Reclaim Water Ponds. Water from the Reclaim Water Pond decants, via a controlled overflow, to a Clear Water Pond (Discharge pond).

The discharge from the Clear Water Pond to the River Boyne is via a weir structure, which measures and controls the discharge. The rate of discharge from the Clear Water Pond is dictated by the flow in the River Boyne, as a minimum dilution rate of >100:1 is required under licence conditions.

An automatic hydrometric gauging station installed on the River Boyne provides a real time record of water levels and flow in the river. Discharge from the site is controlled based on River Boyne flows.

2. Treated waste water from our facility is released into the following water bodies:

Treated water is discharged to the River Boyne at Emission Point Reference SW1.

Table 8 Summary of Waste Water Monitoring

Parameter measured	No. of Samples	% Compliant	Comment
Flow	Continuous	100%	SW1 - 24hr composite sample
pH	Continuous	100%	SW1 - 24hr composite sample
Temperature	Continuous	100%	SW1 - 24hr composite sample
DO	Continuous	100%	SW1 - 24hr composite sample
Suspended Solids	Daily	100%	SW1 - 24hr composite sample
Zinc (as Zn)	Daily	100%	SW1 - 24hr composite sample
Lead (as Pb)	Daily	100%	SW1 - 24hr composite sample
Copper (as Cu)	Daily	100%	SW1 - 24hr composite sample
Iron	Daily	100%	SW1 - 24hr composite sample
Cadmium (as Cd)	Daily	100%	SW1 - 24hr composite sample
Arsenic (as As)	Daily	100%	SW1 - 24hr composite sample
Antimony (as Sb)	Daily	100%	SW1 - 24hr composite sample
Sulphate	Daily	100%	SW1 - 24hr composite sample
Cyanides (as Cn)	Weekly	100%	SW1 - 24hr composite sample
Chromium (as Cr)	Weekly	100%	SW1 - 24hr composite sample
Mercury (as Hg)	Weekly	100%	SW1 - 24hr composite sample
Ortho-phosphate (as PO ₄)	Weekly	100%	SW1 - 24hr composite sample
Total phosphorous	Weekly	100%	SW1 - 24hr composite sample
Ammonia (as N)	Weekly	100%	SW1 - 24hr composite sample
Nitrate (as No)	Weekly	100%	SW1 - 24hr composite sample
Nitrite (as N)	Weekly	100%	SW1 - 24hr composite sample
Kjeldahl nitrogen	Weekly	100%	SW1 - 24hr composite sample
Total phosphorous	Weekly	100%	SW1 - 24hr composite sample
BOD	Weekly	100%	SW1 - 24hr composite sample
COD	Weekly	100%	SW1 - 24hr composite sample

Comment

BTM has two 'point source emissions' to surface water:

- Emission Point Reference **SW1** of process effluent to the River Boyne
- Emission Point Reference **SW2** of groundwater to the River Blackwater

Discharge at SW1 includes treated wastewater from the process plant, drainage water from the mine and surface drainage water that is captured in the site water management system. This excess, treated water is discharged to the River Boyne at a flow dilution ratio of >100:1 and is recorded and controlled from the Processing Departments automated ABB system.

Discharge at SW2 is clean groundwater, derived from the 'Nevinstown' mine area that has minimal or no contact with the orebody. This groundwater, collected in a dedicated reservoir, is pumped directly to surface for discharge to the River Blackwater. Discharge is recorded and controlled from the Processing Departments automated ABB system.

In accordance with IEL P0516-04 conditions control and monitoring of process effluent emissions to water is carried as per Schedules C.2.1 and C.2.2.

Emissions to water during 2021 are in full compliance with emission limit values set out in IEL Schedule B.2.

Air

Explanation

Generally, three types of air emissions are monitored from industry in Ireland: gases, dust (particulates) and odour. Our EPA licence requires us to ensure that any air emissions from our activities do not cause air pollution or create an odour nuisance.

The information below details the number of air emission points we monitor, the results from testing the air emissions and any odour assessments carried out by us and the EPA this year.

1. We monitor air emissions from the following number of emission points at our facility.

Control and monitoring of emissions to atmosphere are carried out as per Schedules C.1.1 and C.1.2 at emissions reference points: A2-4, A2-6, A2-7, A2-8, A2-9, A2-10 and A2-11.

Emissions from the processing plant are from a single remaining point source ventilation stack on the concentrate storage building (A2-4). The remaining air emission sources are from mine return airshafts that serve to ventilate the underground workings in the mine.

Table 9 Summary of Air Emissions Monitoring

Parameter measured	No. of Samples	% Compliant	Comment
Total Particulate	36	100%	A2-4 Monthly; A2-6, A2-7, A2-8, A2-9, A2-10, A2-11 Quarterly
Zn	12	100%	A2-4 Monthly
Pb	12	100%	A2-4 Monthly
As	12	100%	A2-4 Monthly
Cd	12	100%	A2-4 Monthly
Hydrogen Sulphide	24	100%	A2-6, A2-7, A2-8, A2-9, A2-10, A2-11 Quarterly

NOx (as NO2)	24	100%	A2-6, A2-7, A2-8, A2-9, A2-10, A2-11 Quarterly
Ammonia	24	100%	A2-6, A2-7, A2-8, A2-9, A2-10, A2-11 Quarterly

Add rows as necessary

Comment

The company uses an INAB accredited contractor, Air Scientific, to carry out compliance monitoring at air Emission Points that meets with ISO 17025:2005 requirements and the EPA Air Emissions Monitoring guidance (AG2).

All emissions to atmosphere during 2021 are in full compliance with emission limit values set out in IEL Schedule B.1.1.

There as a planned site visit conducted by *Elementis Materials Technology (SV20787)* as part of the EPA's routine air emissions monitoring programme.

Table 10 Summary of Odour Assessments Carried Out

Assessment Conducted By	No. of Odour Assessments	% Compliant⁸	Comment
Licence Holder	-		
EPA	-		

Add rows where necessary

Comment

100 word limit

⁸ A compliant odour assessment is based on EPA Odour Impact Assessment Guidance available at <http://www.epa.ie/pubs/advice/air/emissions/ag5-odourassessment.html>

Fugitive Solvent Emissions

Are you are required to monitor fugitive solvent air emissions from your facility?

Yes

No

Explanation

The use of solvents is regulated under Irish and European Union (EU) Regulations⁹. Solvents are chemicals that, by their nature, are volatile (evaporate readily under ambient conditions). Solvents can be found in many inks, glues and cleaning agents. Due to the volatility of solvents some emissions may be released into the atmosphere during our activities before being captured in our air treatment system. This type of emission is called a **fugitive solvent emission**.

The information below summarises the quantity of solvents used this year, the percentage of fugitive solvent emissions (% of total quantity used) and whether the percentage complied with the targets set in the EU Regulations.

Table 11 Summary of Fugitive Solvent Emissions

Quantity of Solvents Used (Kg)	% Fugitive Solvent Emissions	Compliant

Comment

100 word limit

⁹ See Annex VII of the Industrial Emissions Directive

<https://ec.europa.eu/environment/industry/stationary/ied/legislation.htm>

Groundwater

Explanation

Groundwater is an important and sensitive resource in Ireland. Our EPA licence requires that we monitor groundwater to ensure our activities do not cause groundwater pollution.

Understanding how groundwater flows through soil and rock layers and eventually into surface and coastal waters is a complex science. Sometimes groundwater pollution that occurred in the past can take years and even decades to disappear. Therefore, it is important that experts help us monitor and interpret results from groundwater monitoring and testing.

The information below is a basic summary of the condition of the groundwater this year.

1. Do you have a groundwater monitoring programme in place?

Yes

No

2. Have the groundwater monitoring results over the last 5 years indicated the presence of groundwater pollution?

Yes

No

Table 12 List of Groundwater Pollutants Identified

Pollutants

Chemicals of Potential Concern (COPCs) in close proximity to the TSF are sulphate and magnesium.

The existing groundwater monitoring network in the vicinity of the TSF involves monthly sampling at 38 locations in superficial deposits/overburden (OB) and bedrock (BR) boreholes and quarterly sampling from 14 domestic wells.

All groundwater quality data is reviewed in line with relevant water quality standards, EC Environmental Objectives (Groundwater) Regulations SI No. 9 of 2010 and amendments.

In compliance with IEL Condition 6.21, an independent review and assessment of all hydrogeological, hydrological and water quality data collected is undertaken.

3. Give details of the investigations and subsequent actions taken, where applicable, to manage the groundwater pollution.

In 2015, a remedial strategy was developed to address known impacts on groundwater in the vicinity of the TMF, in AECOM's *Risk Screening and Technical Assessment Report*. The Strategy included setting of compliance points, trigger values and intervention values for the Chemicals of Potential Concern (COPCs) at the TMF (sulphate and magnesium).

The tailings water is known to be naturally high in sulphate, and to a lesser extent magnesium, and elevated concentrations of these chemicals have been recorded in groundwater in the immediate vicinity of the TMF and documented for many years.

In 2019 this remedial strategy was reviewed and a remediation Action Plan developed that provides other potential remedial actions that could be taken in the long-term. It is a live document and the remedial strategy, as well as a conceptual model will be reviewed and updated on an annual basis.

Arising from the 2021 annual site visit (SV21941) the Remediation Action Plan for the TMF was further reviewed to provide a remedial options assessment of corrective actions available (LR065459).

Comment

Groundwater monitoring is carried out in accordance with Schedule C.7 of Tara's IEL. The existing groundwater monitoring network in the vicinity of the Randalstown TSF involves monthly sampling at 38 locations in superficial deposits/overburden (OB) and bedrock (BR) boreholes and quarterly sampling from 14 domestic wells.

In compliance with IEL Condition 6.21, an independent review and assessment of all hydrogeological, hydrological and water quality data collected is undertaken and reported upon by AECOM.

All groundwater quality data is reviewed in line with relevant water quality standards. The EC Environmental Objectives (Groundwater) Regulations SI No. 9 of 2010 and amendments.

Noise

Explanation

Our EPA licence requires that we monitor noise emissions from our facility. Noise monitoring can be conducted at the boundary of our facility and/or at locations beyond the boundary referred to as “noise sensitive locations”. Noise monitoring requires the use of special noise monitoring equipment. Our EPA licence requires that noise produced by our facility shall not exceed the noise limit values and/or give rise to nuisance.

The information below gives a summary of when and where we conducted noise monitoring this year and if results complied with our EPA licence limits.

1. We conducted noise monitoring on the following dates this year:

Continuous noise monitoring is carried out at four fixed stations around the Knockumber mine site and at one fixed station at the TSF.

2. Was the noise monitoring carried out at:

- i. the boundary of our facility,
- ii. noise sensitive locations off-site, or
- iii. both?

Continuous noise monitoring is carried out at noise sensitive locations off-site around the mine site and one at the boundary of the TSF.

3. Were measured noise levels compliant with your EPA licence limits?

Yes

No

If No, we took the following actions to address the noise level exceedances?

Comment

Noise monitoring is carried out as per ISO 1996 Part 1.

Noise emissions from the mine site plant are continuous and the same for daytime and night-time due to the continuous nature of the operation. The noise environment around the mine site is dominated by anthropogenic sources most notably road traffic from the busy road network.

The TMF lies in a rural setting and existing noise levels are typical of such an environment. Normal operations at the facility do not generate any discernible noise. The most significant noise sources are those associated with the ongoing construction works of Stage 6.

All site operations are at a level significantly below noise level limits set out in IEL Schedule B.4.

7) Waste

Waste Generated

Explanation

Our EPA licence requires us to manage the waste we generate in a manner that does not cause environmental pollution.

We manage, store and record hazardous, non-hazardous and inert waste we generate in accordance with our licence. We ensure that this waste is subsequently treated or disposed of in accordance with the relevant waste Regulations.

The information in table 13 is a summary of waste we generated this year and the percentage increase or decrease on the previous year. The percentage recovery is the amount of total waste generated that was reused, recycled or recovered.

Table 13 Waste Generated

Type	Quantity (Tonnes)	% Increase/ decrease on previous year	% Recovery
Hazardous	175	-8.6%	100%
Non-Hazardous	2,145,348	-1.4%	100%
Inert	1,905	+30%	73%
Total Tonnes	2,147,428		

Comment

Treatment and transfer of waste generated on-site and treatment of waste accepted is in accordance with IEL conditions and with National and European legislation and protocols.

Inert waste consists of waste generated from general site operations (waste packaging, general waste, cardboard, steel).

Non-hazardous waste generated is Extractive Waste of which:

640,667 tonnes of tailings pumped to underground mine as backfill (EWC 01 03 06)

1,278,334 tonnes of tailings pumped to the TSF (EWC 01 03 06)

226,347 tonnes of surplus rock used as construction material in the Stage 6 TSF (EWC 01 01 01).

Details of all waste generated during 2021 have been reported in the *Environmental Performance Report (LRD0036381)*.

There was no rejected consignments in 2021.

Waste Accepted

Did you accept waste onto your facility for storage, treatment, recovery or disposal this year?

Yes

No

Explanation

Our EPA licence requires us to manage the waste we accept in a manner that does not cause environmental pollution.

We manage, store and record all incoming and outgoing hazardous, non-hazardous and inert waste. The waste we accept may be treated, recovered, disposed or stored at our facility depending on our licence requirements.

The information in Table 14 provides a summary of waste we accepted this year and the percentage increase or decrease on the previous year. The percentage recovery is the amount of total waste accepted that was reused, recycled or recovered.

Table 14 Waste Accepted

Type	Quantity (Tonnes)	% Increase/ decrease on previous year	% Recovery
Hazardous			
Non-Hazardous			
Inert	15,555	-96%	100%
Total Tonnes	15,555		

Comment

The TSF accepts recovered material, greenfield Soil and Stone (EWC 17 05 04), that is used for purpose agreed by the Agency, use as fill material in the construction of Stage 6 TSF.

In line with IEL Condition 11.12 a computer-based record for each load of material arriving at the facility is maintained to include full details of the source of the material, dates and times of acceptance, list of waste codes and haulier details. A record of any compliance testing conducted of this material prior to its acceptance on site as well as compliance sampling conducted at the licenced facility is also maintained.

8) Financial Provision

Explanation

Our EPA licence requires us to assess the risk our activities pose to the environment if we cease our activities or if an incident occurred. If we are identified as a high risk facility¹⁰ by the EPA, we are required to put provision in place such as a financial bond or insurance to cover the cost of restoring our site to a satisfactory condition. This financial provision can then be used to cover the cost of managing the restoration or clean up should such an event occur.

1. Are you required to have an agreed financial provision in place?

Yes

No

2. What year was your Closure, Restoration and Aftercare Management Plan (CRAMP) last agreed by the Agency?

The CRAMP was last agreed in 2016.

A full review of the closure plan and costings for the TSF and mine site was undertaken and submitted in 2020.

Funding and drawdown has been agreed, financial instrument remains outstanding.

3. What year was your Environmental Liability Assessment Report (ELRA) agreed by the Agency?

BTM is obligated in accordance license conditions to undertake a comprehensive and fully costed Environmental Liabilities Risk Assessment (ELRA) to addresses the liabilities from past and present activities.

The original ELRA was carried out in 2002 and subsequent reviews in 2013 and 2018 after license reviews. A further review was undertaken in 2020 to update the costings of the plausible worst-case environmental liability scenario (dam wall breach).

A further revision was submitted in April 2021 (LR034778) and was agreed by the Agency.

¹⁰ See Appendix II

4. Has there been any significant changes on your site since the last agreements?

Yes

No

If yes, have you submitted details to the EPA?

Yes

No

N/A

Appendix I

Class of Activity

Industrial and waste facilities are classed into different sectors depending on the nature of their activity and its potential impact on the environment. The EPA Act 1992 as amended, outlines these as follows:

Class 1	Minerals and other materials
Class 2	Energy
Class 3	Metals
Class 4	Mineral fibres and glass
Class 5	Chemicals
Class 6	Intensive Agriculture ¹¹
Class 7	Food and drink
Class 8	Wood, paper, textiles and leather
Class 9	Fossil fuels
Class 10	Cement, lime and magnesium oxide
Class 11	Waste
Class 12	Surface Coatings
Class 13	Other Activities

¹¹ This reporting template is not applicable to the **intensive agriculture sector**. Their annual environmental reporting structure is different and can be found at <http://www.epa.ie/pubs/advice/aerprtr/aerguid/>

Appendix II

High Environmental Risk Categories

If an industrial or waste licence falls into one of these categories it is deemed, by the EPA, as a high environmental risk. As a result, the licence holder is required to have financial provision in place. See section 8, Financial Provision.

1. Landfills
2. Non-Hazardous Waste Transfer Station
3. Incineration and Co-Incineration Waste Facilities
4. Category A – Extractive Waste Facilities
5. Upper and Lower Tier Seveso Facilities
6. Hazardous Waste Transfer Stations
7. High Risk Contaminated Land
8. Exceptional Circumstances

NOTE:

This list is subject to change.

See the link below for further information.

<http://www.epa.ie/pubs/advice/licensee/fp/epaapproachtoenvironmentalliabilitiesandfinancialprovision.html>