

TBR22 – Mine Waste

Curraghinalt, Gortin

December 2025

Response to Transboundary Consultation Representations – [REDACTED] (SRK Consulting Ltd)

Representation Ref	Comment/Issue	Addressed in applicant's submissions to date?	Applicant's Response
TBA1493 - An Taisce – Pg. 2-3	Tailings failure - Dr [REDACTED], expert consultant hydrologist for Save Our Sperrins, clarified that it will not be dry, as they need to prevent blow off, and will contain at least 15% water. And this water level cannot be stable in an area such as the Sperrins – which receives an average of 200 days of rain per year, and in Ireland – where the effects of climate change will lead to higher probabilities of heavy rain and heavy snowfall, leading to sudden flooding events (EPA). Therefore, he states, "there is a major risk of catastrophic failure of the filtered tailings stack, with loss of life."	Yes	Mine Rebuttal RR22 Mine Waste Management - Paragraph 2.24. Specifically, we note that the filtered stack at Greens Creek in Alaska has been successfully operated for over 30 years in an analogue climatic setting to Curraghinalt. The nearest city to Greens Creek (Juneau, Alaska) received an average of 230 annual rainfall days of rain per year covering period 1991-2020. The average annual rainfall over the period was 1699mm. (https://forecast.weather.gov/product.php?site=AJK&product=CLA&issuedby=AJK) Appendix B of the Addendum to The Mine Waste Facility Design Report for the Curraghinalt Project (contained with Appendix G Mine Waste Management Plan - Appendix B3 Addendum to the Environmental Statement 2019), includes a case study of Greens Creek filtered stack, which has been safely constructed despite the operational challenges associated with rainfall and flooding at that location.

Pg. 7	We would highlight modelling carried out by a Dr. ██████████, submitted on behalf of the Save Our Sperrins group, which very clearly highlights a considerable risk to ROI waterbodies in the event of a Dry Stack Facility failure:	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11. SRK does not recognise a failure mechanism in which appreciable amounts of tailings could be released from the filtered stack. Dr ██████████ analysis is overly simplistic and fundamentally flawed (it considers the mechanical properties of conventional slurry tailings, which will not be generated at the Curraghinalt project.) Simplistic modelling results presented by Dr ██████████ are therefore meaningless in the context of this planning application.
Pg. 2	Dalradian proposes to store the waste in a huge 54 metres high, 17 storey “Dry Stack Facility” which is also known as a “Filtered Tailings Stack” in the industry. Technically, it is not “dry” as it contains at least 15% water. According to Dr ██████████, an eminent hydrologist and global expert on mining, “there is a major risk of catastrophic failure of the filtered tailings stack, with loss of life.” He says it would slide down the mountain, devastating all in its way, due to its composition of toxic waste, and follow the path of the rivers (as stated above) flowing into Lough Foyle and on to the Irish Sea.	Yes	<p>Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10, 2.11 and Section 10.</p> <p>SRK has undertaken detailed seepage analysis, which simulates the extent of saturation in the filtered stack during each stage of operations. Filtered stacks are clearly not fully drained in project settings such as Curraghinalt. We understand this well based on our practical experience at filtered stacks in much wetter climates. We have modelled both normal and “upset” conditions with a high phreatic surface in the stack. Results from seepage analyses were used thereafter to design multiple provisions to prevent slope failure (i.e. internal drainage to combat build-up of porewater pressure and appropriate external slope angles which meet required minimum factors of safety against slope failure). The maximum height of 54m (less throughout much of the landform) is also taken into account in our stability analyses, which indicate that the slope geometry as designed is not only safe, but exceeds the minimum requirements set out in Canadian Dam Association/EU guidance. The tailings itself will be compacted to a specified moisture content, forming a dense, dilative material which cannot physically be subject to the flow failures which are described by Dr ██████████. He appears to confuse filtered stack technologies with other classes of structure (conventional slurry dams).</p>
Pg. 2	The failure of tailings dams happens unfortunately frequently - Dr. ██████████, in his expert opinion, states that it is not a matter of if tailings stacks will fail, it is a matter of when. He says that failure is due to the volume and type of waste material stored, and the heavy rainfall of the locality, which increases the water content of the filtered tailings stack. Another expert,	Yes	<p>The authors make repeated mistaken references to tailings dams (Brumadinho and Baia Mare), which are a different class of structure compared with the filtered stack considered in this planning application. Refer to Mine Rebuttal RR22 Mine Waste Management - Sections 2.2, 2.3, 2.4 and 2.5.</p> <p>Whilst historic filtered stack facilities failures have occurred, the consequences of failure are dramatically lower than those associated with conventional slurry tailings dams. The filtered tailings at Curraghinalt will be mechanically placed and compacted to form a dense, dilative mass, which will not be prone to flow slide type</p>

Dr [REDACTED] states: "Closure design is unlikely to be maintained much beyond 100 years. For closure, system failure is inevitable, so closure risk depends solely on failure consequences." A recent example of a failed tailings facility can be seen in the devastating disaster in Brumadinho, Brazil, in 2020, where the collapse of a dam killed 272 people, flattened entire villages and led to massive environmental destruction. In 2024, another landslide occurred in a mine waste pile at the Turmalina Mine, in Brazil, which was the same design as Dalradian's proposed Curraghinalt project. For an example within Europe, in 2000 the Baia Mare waste dam collapsed in Romania, sending 100,000 cubic metres of cyanide contaminated waste water into rivers that spread across three countries, killing fish and disrupting water supplies for millions of people (Antypas and Gulacoy, 2001)."

failures. This is based on the fundamental facets of soil mechanics, which have been applied at Curraghinalt and are backed up with detailed laboratory test work, analysis of stress path data and stability/seepage analyses.

SRK is not in a position to speculate on the specific failure mechanisms which resulted in the 2024 failure of the Turmalina Mine Filtered Stack (very little information on the design in the public domain).

We do however note that tailings were placed in that facility with a significantly higher moisture content (25-30%) than what is being proposed at Curraghinalt (15%). This is referenced from the most recent 43-101 listed document <https://minedocs.com/28/Turmalina-Complex-TR-03312025.pdf>. Given the significantly higher moisture content of the Turmalina tailings, the rheological properties of the material will be very different (the material will be more likely to behave in an undrained manner during and following placement). Placement of tailings at higher moisture contents in filtered stacks can be challenging, especially in climatic settings such as Minas Gerais (1650mm of annual rainfall, which predominantly falls between the October-March wet season each year).

SRK has included multiple provisions to prevent prov in the stored tailings at Curraghinalt. These are discussed at length in TR22 Mine Waste Management – Section 8. Internal drains will be installed to prevent build-up of porewater pressure or saturation within the filtered stack at each stage of operations. All tailings will be compacted to specification, to create a dense, low permeability dilative mass, which will not be subject to liquefaction. Perimeter drainage features have been designed to divert surface water flows away from the external slopes of the facility. Underdrainage prevents build-up of porewater pressure in the foundations. These design features are intended to form additional layers of protection against saturated conditions forming in the filtered stack. These are over and above mechanical dewatering of tailings in the filter circuit, which results in in a tolerable moisture prior to transport of the tailings between the plant and stack.

TBA0010; 0015; 0020; 0031; 0037; 0044; 0046; 0047; 0048; 0049; 0050; 0052; 0053; 0057; 0065; Dalradian state that the rock will be crushed into the fine consistency of flour and floated in a "simple chemical solution" to remove the gold ore. The waste would be stacked in the "Dry Stack Facility" which Dalradian states would need to be sprayed

Mine Rebuttal TR22 Mine Waste Management - Sections 12.6 + 12.7.

The potential impacts of wind associated with the filtered stack have been captured in AERMOD numerical modelling. The uppermost layers of filtered stack will be sprayed on daily basis to actively prevent dusting. However transient spraying of

0067; 0068; 0069;
0079; 0082; 0086;
0100; 0112; 0115;
0129; 0135; 0137;
0149; 0155; 0157;
0164; 0176; 0185;
0187; 0192; 0200;
0205; 0209; 0213;
0216; 0222; 0233;
0235; 0244; 0247;
0251; 0256; 0263;
0273; 0277; 0278;
0280; 0282; 0285;
0286; 0291; 0292;
0294; 0297; 0298;
0299; 0305; 0311;
0324; 0325; 0331;
0348; 0356; 0365;
0370; 0375; 0376;
0377; 0380; 0384;
0390; 0407; 0417;
0428; 0429; 0434;
0439; 0442; 0448;
0450; 0456; 0477;
0481; 0483; 0486;
0491; 0492; 0509;
0514; 0518; 0523;
0524; 0528; 0532;
0537; 0538; 0540;
0543; 0544; 0546;
0550; 0556; 0560;
0574; 0578; 0588;
0607; 0614; 0619;
0625; 0640; 0647;
0651; 0656; 0662;
0666; 0670; 0671;

with water to prevent the dust, containing heavy metals such as arsenic, mercury, lead, cadmium, chromium, etc, from blowing in the wind. On the other hand, they also state it would have to be kept dry to prevent Acid Mine Drainage from forming. (That is a dilemma for them, how to keep it wet and dry at the same time!) Dalradian's proposed elevated site in the Sperrin mountains experiences strong winds as well as heavy rainfall. When dry, the toxic dust could be blown across the island of Ireland. When wet it could leach into the water table. A study in Finland found the fine dust, 2.5 particulate matter containing arsenic and mercury, had blown on to the leaves of trees 60 kilometres from a goldmine at Kittila. Jari Natunen, a Finnish Biochemist, said that this fine particulate matter was very dangerous as it could enter people's lungs causing respiratory diseases and cancers and that children are particularly vulnerable.

water on the uppermost layers of tailings will not result in saturation of the lower layers in the stack. The underlying tailings will remain in a fully drained condition due to:

- 1) the internal drainage features included in the design; and
- 2) the fact that the tailings have been compacted to form a low permeability, dense, dilative material, thus minimising seepage flows through the tailings.

SRK has proven through seepage analysis that flows in the lower reaches of the stack will be negligible under both normal and extreme operating conditions. The tailings material has a relatively low permeability value (average $1E^{-7}$ m/s), hence infiltration from rainfall (or mechanical spraying for dust suppression) will be negligible.

0676; 0681; 0692;
0697; 0699; 0706;
0712; 0717; 0720;
0728; 0730; 0740;
0762; 0766; 0785;
0786; 0787; 0791;
0795; 0798; 0801;
0805; 0813; 0816;
0817; 0820; 0825;
0830; 0831; 0833;
0838; 0841; 0847;
0850; 0852; 0875;
0877; 0881; 0885;
0893; 0894; 0898;
0905; 0907; 0910;
0911; 0914; 0917;
0922; 0932; 0935;
0948; 0950; 0954;
0958; 0963; 0965;
0966; 0970; 0978;
0979; 0984; 0993;
0997; 1002; 1010;
1023; 1031; 1039;
1049; 1056; 1072;
1075; 1077; 1081;
1089; 1096; 1101;
1107; 1117; 1122;
1126; 1130; 1140;
1147; 1149; 1153;
1158; 1164; 1167;
1173; 1180; 1185;
1189; 1194; 1204;
1207; 1222; 1226;
1227; 1230; 1243;
1245; 1253; 1255;
1258; 1259; 1261;

1264; 1266; 1267;
 1269; 1271; 1281;
 1287; 1289; 1300;
 1304; 1308; 1312;
 1318; 1322; 1327;
 1331; 1332; 1335;
 1338; 1344; 1352;
 1358; 1359; 1363;
 1365; 1369; 1378;
 1381; 1382; 1384;
 1391; 1392; 1394;
 1401; 1415; 1421;
 1432; 1440; 1446;
 1452; 1457; 1472;
 1480; 1481; 1482;
 1485; 1491; 1507;
 1515; 1520; 1540;
 1541; 1556; 1563;
 1573; 1574; & 1591-
 Pg. 1

<p>Response from Donegal County Council TB Consultation 9.5.25 – Pg. 4-5</p>	<p>The Planning Authority request that the CLIPH fully assesses the concerns raised in An Taisce’s submission and specifically those issues raised in relation to the long-term management of “dry stack tailings” associated with mined crushed rock, given potential climate change impacts including the possible increase in annual rainfall and the potential risk of “catastrophic failure” of the filtered tailings stack referenced in the submission. The planning authority has its own experience of a catastrophic peat slippage event associated with a windfarm development at Meenbog in south Donegal which had significant environmental transboundary impacts and in this regard the planning authority asks the Commissioner to fully assess appropriate peat management, “dry stack tailings” management</p>	<p>Yes</p>	<p>Mine SoC TR22 Mine Waste Management - Sections 7.5 and Section 11 Mine Rebuttal RR22 Mine Waste Management - Page 24 Table 3</p>	<p>The filtered stack facility will not be constructed on peat. All peat and loose material will be stripped beneath the entire footprint area of the filtered stack and adjacent ponds. The risk of peat slippage is therefore not considered to be a credible failure mode beneath these structures.</p>	<p>SRK has completed an extensive suite of stability analysis, to ensure that the slope geometry of the filtered stack, as designed, meets the required minimum factor of safety (FOS) against slope failure under all loading conditions (considering normal, seismic and “upset” conditions where zones of saturation exist in the filtered stack). Under all scenarios (both drained and undrained), the minimum acceptance criteria were either met or exceeded (as set out by both EU and Canadian Dam Association guidelines).</p>
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	<p>planning, and any associated lagoons or dams associated with the development proposals to ensure the existing hydrology of the site and existing onsite drainage remains in-situ to relieve any build-up of water pressure in the ground and if appropriate to consider the application of adequate security bonds on the development, if approved, to ameliorate any future negative environmental events associated with the operation of the mine</p>		<p>SRK also completed sensitivity analyses to assess the tolerance of the filtered stack to withstand extreme loading scenarios (for instance lower than anticipated strength of foundation materials or high water levels in the filtered stack). The required FOS values were met even under these circumstances, which indicates there is significant redundancy in the design to mitigate the risks associated with slope failure.</p>
<p>TBA0506 Wild Ireland Defence – Pg. 1</p>	<p>The waste would be stacked in a 54m high dry stack facility which they state would have to be sprayed with water to prevent the heavy metal dust from blowing every which way in the wind. However, it is not entirely dry as it contains 15%+ water and should an accident occur this toxic soup would follow the path of rivers flowing into Lough Foyle and the Atlantic Ocean</p>	<p>Yes</p>	<p>Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11.</p> <p>The uppermost layers of filtered stack will be sprayed on daily basis to actively prevent dusting. Transient spraying of water on the uppermost layers of tailings will not however result in saturation of the lower layers in the filtered stack. The underlying tailings will remain in a fully drained condition due to 1) the internal drainage features included in the design 2) the fact that the tailings have been compacted to form a low permeability, dense, dilative material.</p> <p>SRK has proven through seepage analysis that flows in the lower reaches of the stack will be negligible under normal and extreme operating conditions. The tailings material has a relatively low permeability value (average $1E^{-7}$ m/s), hence infiltration from rainfall (or mechanical spraying for dust suppression) will be negligible.</p>
<p>TBA0545 – Pg. 2</p>	<p>The waste would be stacked in a 54m, 17 storey, high dry stack facility. Technically it is not entirely dry as it contains 15%+ water. According to Dr Emmerman, there is a major risk of catastrophic failure of the filtered tailings stack.</p>	<p>Yes</p>	<p>Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11.</p> <p>The tailings material will not be dry, and this is clearly acknowledged throughout the Applicant's documentation. The tailings will be dewatered mechanically in the plant to a moisture content of 15%. This, combined with multiple provisions to prevent saturation in the filtered stack (described at length in RR22 and TR22), ensures that</p>

			the material will be placed and compacted to specification (akin to any engineered embankment landform in Northern Ireland). Filtered tailings is considered a best available technique, an established method designed for the sole purposes of reducing geotechnical risk associated with tailings storage.
TBA0596 – Pg. 1-2	Dalradian proposes to store the waste in a huge 54 metres high, 1 “Dry Stack Facility” to store their waste over the proposed 25 year life of the mine and in perpetuity thereafter. When thousands of tons of rock are removed from the mine by the use of explosive twice daily. Dalradian state that the rock will be crushed into the fine consistency of flour and floated in a 'simple chemical solution' to remove the gold ore. The waste would need to be separated with water to prevent the dust, containing heavy metals such as arsenic, mercury, lead, cadmium, chromium etc from blowing in the wind. One the other hand, they also state it would have to be kept dry to prevent Acid Mine Drainage from forming. Dalradians proposed elevated site in the Sperrin Mountains experiences strong winds as well as heavy rainfall. When dry, the toxic dust could be blown across the island of Ireland. When wet it could leach into the water table.	Yes	Mine Rebuttal TR22 Mine Waste Management – Section 12.6 + 12.7. As discussed above, air quality modelling has been completed to assess potential impacts on local receptors. The uppermost layers of filtered stack will be sprayed on daily basis to actively prevent dusting. Transient spraying of water on the uppermost layers of tailings will not however result in saturation of the lower layers in the filtered stack. SRK has included multiple provisions to ensure no saturation in the filtered stack, which has been designed to remain in a drained, dense, dilative state throughout the operations and closure phases of the project.
TBA0991 – Pg. 1	Dalradian plans to blast rock from the mountain twice a day for 25 years, crush it to a fine powder and use chemicals to extract the gold. The leftover waste - full of toxins - would be piled up in to a 17-storey high 'Dry Stack Facility' beside the mine. Independent experts including Dr E [REDACTED] warn this type of tailings stack carries a high risk of collapse. And when it falls, it wont just be a local disaster, it will slide down the mountain, follow the rivers and end up in Lough Foyle and the Sea.	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
TBA1206 – Pg. 1	Technically the DSF is not dry as it contains at least 15% water and should and accident occur this toxic	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11

	soup would slide down the mountain and follow the paths of rivers flowing in to Lough Foyle and out in to the Atlantic ocean.		
TBA1492 – Pg. 3	What happens if the stack collapses.	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.12
Pg. 5-6	Failure by DGL to investigate the potential risk to the proposed DSF from earth tremors. County Donegal has been a hotbed of seismic activity including small earthquakes some of which have been recorded, most recently on 1 October 2024.	Yes	Mine Rebuttal RR22 Mine Waste Management - P25 Table 3 Extreme seismic and flood conditions have been considered in the design. Use of 1:2500 ARI seismic event for stability analyses meets UK requirements and exceeds best practice guidance such as GISTM (2020). Use of the 1:1000 ARI rainfall event is aligned with GISTM (2020) and CDA (2013) Guidance.
TBA1494 – Pg. 5 -9	There are a number of ways in which the waters of County Donegal would be affected by the proposals. These are: failure of the DSF, acid mine drainage, water discharges and water abstraction	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
TBA1495 – Pg. 3	Risk of failure of the DSF	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
TBA1496 – Pg. 9 -12	There are a number of ways in which the waters of County Donegal would be affected by the proposals. These are: failure of the DSF, acid mine drainage, water discharges and water abstraction	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
TBA1557 - Feminist Communities for Climate Justice – Pg. 7-8	Failure of the DSF	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
TBA1558 - Communities Against Mining – Pg. 2	Risk of tailings flow in to river systems (see appended [REDACTED] Report)	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
Pg. 2	Failure to meet international and UK standards for seismic events (see appended [REDACTED] report)	Yes	Mine Rebuttal RR22 Mine Waste Management - Section 2.17 Extreme seismic and flood conditions have been considered in the design. Use of 1:2500 ARI seismic event for stability analyses meets UK requirements and exceeds best practice guidance such as GISTM (2020). Use of the 1:1000 ARI rainfall event is aligned with GISTM (2020) and CDA (2013) Guidance.

TBA1564 – Pg. 3	Ecojustice Ireland Waters of Donegal could be affected via the failure of the DSF, acid mine drainage, water discharges and water abstraction.	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
Pg. 3	Risk of toxic tailings which could ruin the integrity of lough foyle.	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11
TBA1581 - Jesuit Centre for Faith & Justice – Pg. 4	The failure of tailings dams happens unfortunately frequently. A recent example of failed tailings facility can be seen in the devastating disaster in Brumadinho, Brazil in 2020, where the collapse of a dam killed 272 people, flattened entire villages and led to enormous environmental destruction.	Yes	Mine Rebuttal RR22 Mine Waste Management - Sections 2.9, 2.10 + 2.11 Brumadinho TSF is a different class of structure (slurry tailings dam) to what is being considered in this planning application (filtered stack). Comparison between the two is therefore meaningless.