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Public Disclosure Regarding Kristineberg Tailings Facility

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INTRODUCTION

Boliden has committed to apply the Global Industry Standard on Tailings Management (GISTM), adopted by the International Council for Mining and Metals (ICMM) in 2020, setting a precedent for the safe management of tailings facilities, towards the goal of zero harm (the "Standard" or "GISTM").

The Standard contains 77 specific requirements that need to be fulfilled to be in conformance with the Standard. The Standard also requires that adhering members annually issue a status report on their implementation of and conformance with the requirements to support public accountability. In accordance herewith, Boliden as the operator of its tailings facilities is to publish and regularly update information on its commitment to safe tailings facility management, implementation of its tailings governance framework, its organization-wide policies, standards and approaches to the design, construction, monitoring and closure of its tailings facilities

A separate document available via Boliden web, named Public Disclosure Regarding Boliden´s Tailings Management Framework, provides a general description concerning Boliden´s tailings and dam safety management for all sites, in which much of the information within requirement 15.1 is met.

This document provides additional information specifically related to Kristineberg tailings facility to fully provide the required information.

In addition, Chapter 11 of this document presents the status of implementation of GISTM for Kristineberg TSF.

1. Description of the tailings facility

The Kristineberg mine is situated 50 km north of the town Lycksele in Sweden and approx. 1 km north of the village of Kristineberg with around 200 citizens, see Figure 1. The coordinates (latitude, longitude) of the main entrance are 65°3'49.6"N 18°33'52.2"E. Operation at the site commenced in the beginning of 1940s and until 1991 the site had its own concentrator and produced tailings. The mine was from the beginning an open pit mine but nowadays Kristineberg is an underground mine. The mine mainly produces zinc and copper ore. After 1991 the ore have been transported by trucks to be processed to a mineral concentrate at the concentrator in Boliden site in Boliden. Kristineberg mine is since 1991 not producing any waste of tailings but waste rock and sludge from water treatment are still deposited on site.

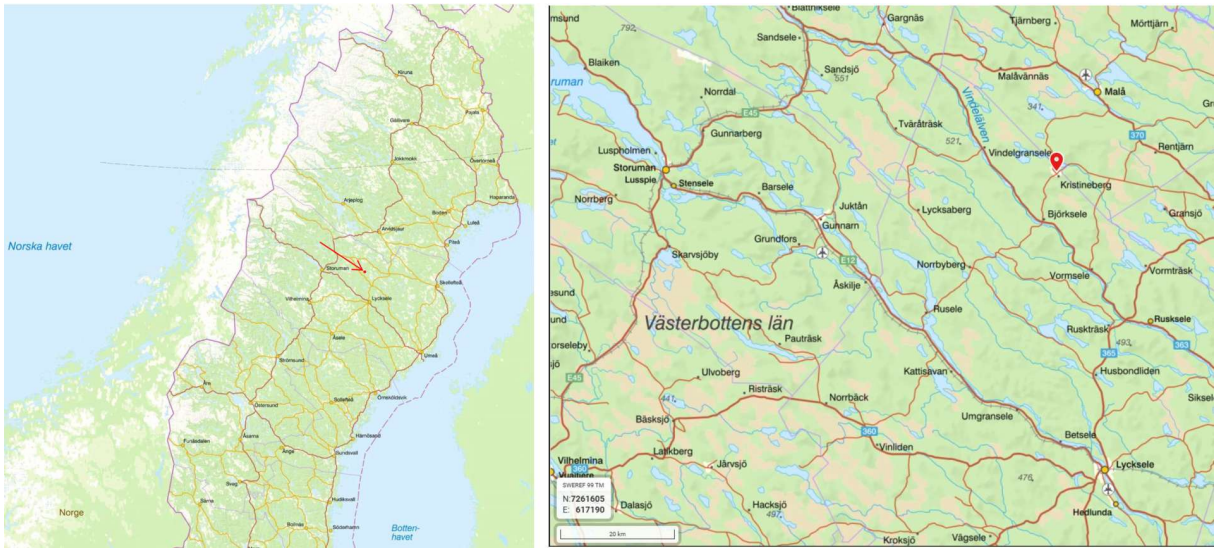

Figure 1 Geographic location of Kristineberg Mine in red

The tailings facility in Kristineberg is placed in a valley with pond 1B to 4 in a row downwards the valley, see Figure 2 for an aerial photo, and Table 1 for a description of the main structures. For more information regarding the dams, see Chapter 5.

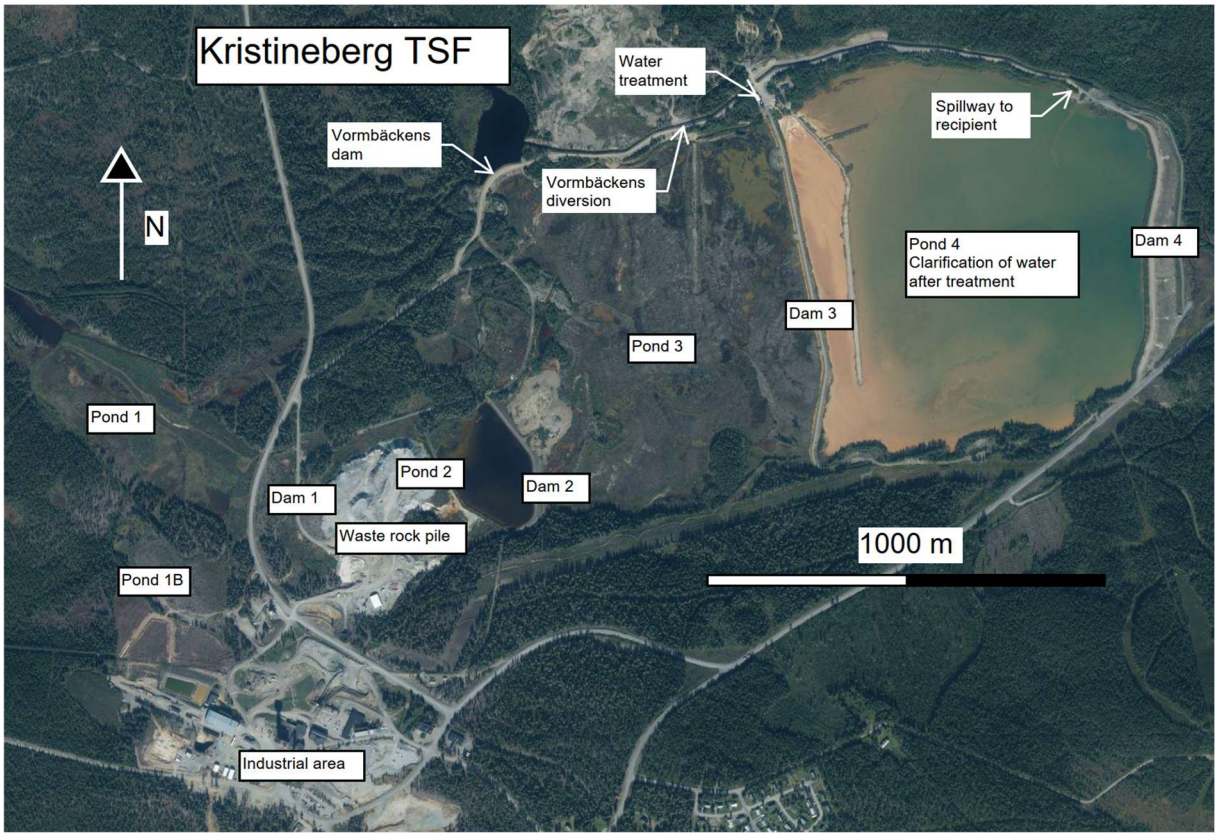

Figure 2 Aerial photo (2022) of the Kristineberg TSF and Industrial area

Table 1 Description of main structures of the Kristineberg tailings facility

Object	Description
Pond 1 and 1B	Pond 1 and 1B were the first tailing ponds in the Kristineberg mine. The mine was started up in the early 1940s. Pond 1 is contained by dam 1 and natural ground. The ponds were decommissioned in 1950s and the tailing surface are now treated with a dry cover. The ponds 1 and 1B cover an area of approximately 0.17 km^2. Approximately 1.3 Mton of tailings are stored. Runoff water exits the pond area by gravity, through ditches, to pond 2 and 3.
Pond 2	Commenced in the late 1940s. Pond 2 is contained by dam 2 and natural ground. The pond was decommissioned in 1950s and the tailing surface is now partly treated with a dry cover of till and partly with water cover. The pond covers an area of approximately 0.12 km^2. Approximately 1.2 Mton of tailings and 40 000 m^3 of water are stored in pond 2. Runoff water exits the pond by gravity, through a passive spillway, to pond 3. On top of the tailings area with dry cover a waste rock pile has been filled.
Pond 3	Commenced in 1950s. Pond 3 is contained by dam 3 and natural ground. The pond was decommissioned in 1991 and the tailing surface is now treated with a dry cover of till. The pond covers an area of approximately 0.42 km^2. Approximately 9.5 Mton of tailings are stored in pond 3. Treated process water from the mine enters pond 3 in an open ditch and exits, together with runoff water, through a passive spillway by gravity to pond 4. The exit water is treated with lime through the spillway (Fenton light).

Pond 4	Commenced in 1950s. Pond 4 is contained by dam 4 and natural ground. The pond was decommissioned in 1991 and the tailing surface is currently covered with a water cover. The pond covers an area of approximately 0.74 km^2. Approximately 8 Mton of tailings and 1.5 Mm^3 of water are stored in pond 4. Treated process water from pond 3 receives in to pond 4 where hydroxide sludge is settling. Excess water from pond 4 exits by gravity, through an active spillway, to the recipient Vormbäcken creek. Seepages water from dam 4 is pumped back to pond 3.
Vormbäckens dam/Diversion channel	Commenced in 1980s. The purpose with the dam is to raise the water level to manage the diversion of Vormbäcken creek outside the tailing facility.

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2. Consequence classification

The consequences in the event of a tailings facility failure for dam 4 are estimated by breach analyses. Classification for dams 2, 3 and Vormbäckens dam are estimate by a breach assessment.

The consequence classification for the Kristineberg tailings facility have been defined both according to Swedish legislation (Miljöbalken) and according to GISTM, see Table 2.

The consequence classification of the tailings facility according to Swedish legislation is "**Dammsäkerhetsklass B**". The classification was approved by the national regulatory authority for dam safety (County Administrative Board) in 2017. The classification is currently being reviewed, and an updated consequence classification will be submitted for approval to the authorities.

The consequence classification of the tailings facility according to the Global Industry Standard on Tailings Management (GISTM) is **High**.

Table 2 Overview of consequence classes for all dams of the Kristineberg tailings facility

Dam	Consequence class according to:	
	Swedish legislation (Miljöbalken)	Global Industry Standard on Tailings Management (GISTM)
2	U	Low (preliminary)
3	U	High (preliminary)
4	B	High
Vormbäckens dam/ diversion channel	U	High (preliminary)

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3. Risk assessment

Kristineberg has assessed risks in a manner consistent with the risk management instruction established by Boliden. Assessment of risks related to the operation and closure of tailings facilities has been undertaken by a team of multidisciplinary specialists. The risks have been evaluated regarding potential consequences related to a range of aspects, including but not limited to health and safety, environment, infrastructure, social aspects and local communities.

Within Boliden's risk framework, risks are categorized into four levels, based on the likelihood of occurrence and consequence of a critical hazard. Based on risk level, risks are managed according to Table 3.

Table 3 Required actions for different risks

Risk	Action
Extreme	Intolerable – Requires immediate actions to reduce the risk
High	Generally unacceptable – Detailed action plan required and mitigation plan during transition
Medium	Acceptable if ALARP – Monitor and manage as appropriate
Low	Acceptable – Monitor and manage as appropriate

An update of the risk assessment was undertaken in late 2024, after results from the geotechnical investigations work 2024 on the TSF were analyzed. The conclusion was that previously identified risks in the category's extreme have been managed through developing the knowledgebase. There still are actions to be taken to reduce the High to Medium risks.

A new risk assessment, planned for Q3 2025, will reflect the actions taken to lower the risk, with most risks expected to meet the ALARP principle ("As Low As Reasonably Practical"). Table 4 provides a list of the highest identified risks as well as the status of associated mitigation measures.

The identified events which can potentially lead to flow failure events, are used as input for the dam breach analysis (see Chapter 4), as well as for the Trigger Action Response Plan and the Emergency Preparedness Response Plan (see Chapter 8).

Table 4: High and medium class risks and associated mitigation plans

Dams	Failure mode	Identified risks	Current mitigation used to manage and monitor identified risks
2, 4, Vormbäckens dam	Overtopping	Overtopping due to: • Large flood that exceeds capacity of spillway (class 1/cascade failure) • Large flood with blocked spillway • Wave action • Uncontrolled rupture of a tailings slurry delivery or water reclaim pipeline	• Design spare spillway for >5 000-year flow scenarios • Clear instruction and actions which are practiced regularly • Additional site investigations and stability analysis
4, Vormbäckens dam	Instability	Instability due to: • Undetected weak materials • Incorrect strength assumptions • Unexpected pore pressure generation • Liquefaction of cohesionless soils and cyclic softening of cohesive soils. • Seismic event • Weak materials in structural portion of the dam	• Additional site investigations, characterization study and stability analysis (sensitivity) • Automatic monitoring of pore pressures and seepage • Surveillance program, with comprehensive monitoring of groundwater levels, seepage and deformations, daily inspections, and TARP execution.
2, 4, Vormbäckens dam	Seepage and erosion	Seepage and/ or erosion due to: • Material incompatibility • Elevated pore water pressure and increased hydraulic gradients • Pipes and decant towers through dam, seepage along pipes or pipe collapse • Underground features that could cause internal erosion	• Internal erosion risk assessment • For dam 4, toe drains and seepage collection system along with buttress constructed. Surveillance program, with comprehensive monitoring of groundwater levels, seepage and deformations, daily inspections, and TARP execution. • Additional site investigations, characterization study and stability analysis (sensitivity)

4. Impact assessment

The impact assessments for the Kristineberg tailings facility dam 4 are based on breach analysis of credible flow scenario. Dam 2, dam 3 and Vormbäckens dam has been assessed without a dam breach analysis. The results are used to evaluate the consequence classification (see Chapter 2) of the dams and to develop the Emergency Preparedness Response Plan, see Chapter 8.

The impact assessment has been evaluated within two different frameworks, according to Swedish legislation (Miljöbalken), and according to the Global Industry Standard on Tailings Management (GISTM).

The impact assessment according to Swedish legislation (Miljöbalken) is based on breach analyses from 2013, see Table 5. The impact assessment is currently being reviewed, and an updated assessment will be submitted for approval to the authorities.

The impact assessment according to the Global Industry Standard on Tailings Management (GISTM) is based on breach analyses from 2021, see Table 6.

Table 5 Summary of the Kristineberg impact assessment according to Swedish legislation (Miljöbalken)

Dam	Impact assessment (major, large, moderate, small)	Risk for loss of, destruction of or disturbance of:						
		1. Human life	2. Cultural values	3. Electricity infrastructure	4. Infrastructure	5. Essential services	6. Environmental	7. Economy
2	Small							
3	Small							
4	Large	X		X	X		X	
Vormbäckens dam	Small							

Table 6 Summary of the Kristineberg impact assessment to the GISTM

Consequence Criteria	Classification	Impact assessment
Potential Population at risk (PAR)	Significant	Between 1-10 people in the risk of harm due to that the large flood will reach the road 1005 shortly after initiation of failure.
Potential Loss of Life (LOL)	High	Between 1-10 people in the risk of harm due to that the large flood will reach the road 1005 shortly after initiation of failure.
Environment	High	There is a risk for damage to habitat and water quality downstream in Vormbäcken river. No health effects are expected from the changes in water quality due to no protected areas for drinking water in affected downstream areas. The land area affected by studied dam failure is below 20 km2. The recreation of the affected area is estimated to be possible but complicated and takes longer than 5 years.
Health, Social and Cultural	Low	Minimal effects and disruption of business and livelihoods. Might affect usage areas for fishing.
Infrastructure and Economics	Low High	The economic loss is expected to be lower than 1 million dollars for restoration for the three small roads affected by the flooding. If including the clean up cost.

5. Description of the design of the tailing facility

See Table 8 for a description of the design of the main dams. For a description of the overall tailing facility and the location of the dams, it is presented in Chapter 1.

Table 3 Description of the design for the dams in the Kristineberg tailings facility

Dam	Description
2	Internal dam between pond 2 and 3. Dam 2 was designed to be impermeable and have been raised at least 2 times between 1950s until 1996. Dam length is about 400 m and the maximum dam height from foundation is about 16 m. Downstream of dam 2 in pond 3 there are deposit tailings resulting in maximum dam height now being only 8 m.
3	Internal dam/dyke rebuilt in 1987 with main purpose to separate the dry cover and the water cover of tailing in pond 3 and 4. Dam 3 have also purpose to lead the process water to the treatment plant (Fenton light). The length is about 950 m and the maximum dam height is about 6 m.
4	External dam in pond 4, the last dam in the valley. The dam was designed to be impermeable and have been raised 7 times between 1950s until 1987. The method of raise was downstream from the start and later changed to upstream. The 2 latest dam raises were again downstream. Dam length is about 850 m and the maximum dam height is about 20 m.
Vormbäckens dam/ diversion	Vormbäckens dam is a water retention dam and is designed to be impermeable. The dam was built in 1980s and the purpose with the dam was to raise the water level in Vormbäcken creek to manage a diversion of the creek outside the tailing facility. Dam length is about 200 m, and the maximum height is about 8 m. The diversion of Vormbäcken creek have been redirected 3 times during the years. The current diversion length is about 2 000 m and is located north of the tailing facility.

The main goal for mine closure is to leave an area free of hazards which allows for alternative use of the area, for example recreation, hunting and forestry. To achieve the main goal the facility will be treated so that:

• The environmental impact from pollution is restricted in accordance with environmental requirements set in the approved closing plan for the mine.

• The facility will melt into the landscape using morphology.

• The facility needs a minimum of maintenance and supervision.

Methods to reduce the environmental impact from pollution are for example:

• Waste rock dumps with potential for acid generation will be progressively filled back in to the mine.

• Main TSF will be covered by a combination of moraine/ bentonite or moraine, depending on degree of saturation in deposited tailings.

As far as possible, objects of cultural and historical importance will be kept.

6. Annual Performance Review

The following activities relating to dam safety and tailings management were undertaken during 2024:

• Geotechnical investigations of foundation dam 4 – risk mitigation measure.

• Geotechnical and geochemical investigations of tailings, dams and foundation – increase knowledge base.

• Geohydrological and hydrological investigations of groundwater levels and flows – increase knowledge base.

• Establishment of a hydrological model, calculation of design flows – increase knowledge base.

• Surveillance and maintenance according to plan.

• IR site visit and review, see Chapter 9.

• Updates of tailings management documents and routines, such as OMS manual, Trigger Action Response Plan (TARP) and Emergency Preparedness Response Plan (EPRP).

Based on the review, the facility was assessed to have satisfactory safety with need for actions.

7. Environmental and social monitoring programme

The environmental performance of the tailing's facility is monitored according to an established environmental monitoring program. Groundwater monitoring is carried out at 12 monitoring wells installed around the perimeter of the tailing facility, as well as in a downstream wetland area. The water is sampled and analyzed 2-3 times a year.

Surface water monitoring is carried out from the start of recipient Vormbäcken, which flows out from the lake Hornträsket upstream. Downstream the discharge point, from impoundment 4, there is surface water sampling along the creek until it connects to the Vindel River. Surface water is also monitored at several locations in TSF and side-wide. All sampling points measure different parameters and with different frequencies. The permit refers to discharge water from pond 4, sampled as a monthly collection sample.

Dam seepage through Dam 4 is collected in a ditch which is re-pumped back to pond 3 for water treatment and leads back into pond 4.

Settling dust is measured monthly at 3 stations surrounding the operations. One location is by the nearby village, one at the ramp opening and one is by the TSF.

Dust control at TSF is controlled by reclaimed areas and by water covers on impoundments. There is no active deposition of tailing at site since the year 1991 when the concentrator in Kristineberg was decommissioned. Water and/or road salt are applied on roads and in the industrial area.

The results from the environmental monitoring are reported quarterly to the supervising authority (the county administrative board). An annual environmental report is uploaded to the Swedish portal for environmental reporting (SMP).

External stakeholder meetings are held with e.g. neighbors, the local Sami community and the county administrative board. Measures exist to record and address any potential grievance. A Social- and Socioeconomic sustainability analysis (SSESA), as well as a Human right impact assessment (HRIA) has been carried out for the whole Boliden Area in 2025.

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8. Emergency Preparedness and Response Plan (EPRP)

The Emergency Preparedness and Response Plan (EPRP) is triggered by a failure or a near failure. The triggers of the EPRP are defined in the Trigger Action Response Plan (TARP).

When the EPRP is triggered by a dam safety related incident, the dam safety emergency group is activated to support the Kristineberg mine emergency group with technical dam safety expertise. The dam safety emergency group is responsible for assessing the situation as well as proposing and leading dam safety related measures but is subordinated to the Kristineberg mine emergency group.

The structure of the dam safety emergency group is similar to the dam safety organization in normal operation. Each role in the group has one responsible individual and at least one substitute. For each role, a checklist is available.

In case of an emergency, the EPRP provides routines for cooperation with local emergency authorities "Räddningstjänsten in Lycksele, Malå and Norsjö municipality".

Emergency response simulations are held at three years intervals.

The EPRP is reviewed yearly and updated when necessary. The EPRP has been reviewed and updated during 2025 based on the latest dam breach analysis. For 2025 training of staff and an emergency response simulation, based on the updated EPRP is scheduled.

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9. Independent review

An Independent Reviewer (IR) has been established for Kristineberg TSF, with 2 online meetings yearly and a site inspection scheduled bi-annually.

A Dam Safety Review (DSR) was undertaken by the consultant company Tyréns with the results presented in 2022. The recommendations from the DSR have been incorporated in the risk assessment as well in the ongoing work with Operation, Maintenance and Surveillance (OMS) undertaken by Kristinebergs dam safety organization.

The Dam Safety Review are scheduled every five years as required based on the consequence classification, next DSR is planned in 2027.

10. Reclamation securities and other financial safeguards

Boliden makes provisions in its accounts for future reclamation costs. Boliden´s current provisions for reclamation works can be found in its Annual and Sustainability Report. In addition, insurance is used to cover sudden and unexpected tailings related incidents.

Mining operations, including tailings management, are subject to court/authority approved environmental permits, including the posting of mandatory reclamation securities, usually in the form of bank guarantees. These securities are intended to make sure that there are sufficient financial resources available to cover estimated costs of planned closure, early closure, reclamation, and post-closure of the tailing facility and its appurtenant structures, even in a situation where the operator is unable to cover these costs.

11. Implementation of the Global Industry Standard on Tailings Management

At Kristineberg a second self-assessment of the conformance to GISTM, based on the guidance in the ICMM Conformance Protocols, has been conducted by the site personnel with involvement from the management team and staff support function. The result of the self-assessment (May 2025) indicated a few minor items that required actions during Q2 2025. These were addressed and Kristineberg is assessed in full conformance with GISTM, as the 5 of August 2025.

To validate the results of the self-assessment, Boliden Kristineberg will undergo an external review of GISTM conformance status through an external independent auditor, with review of tailings management system and site visit planned during Q1 2026 and a conformance status report issued in Q2 2026.