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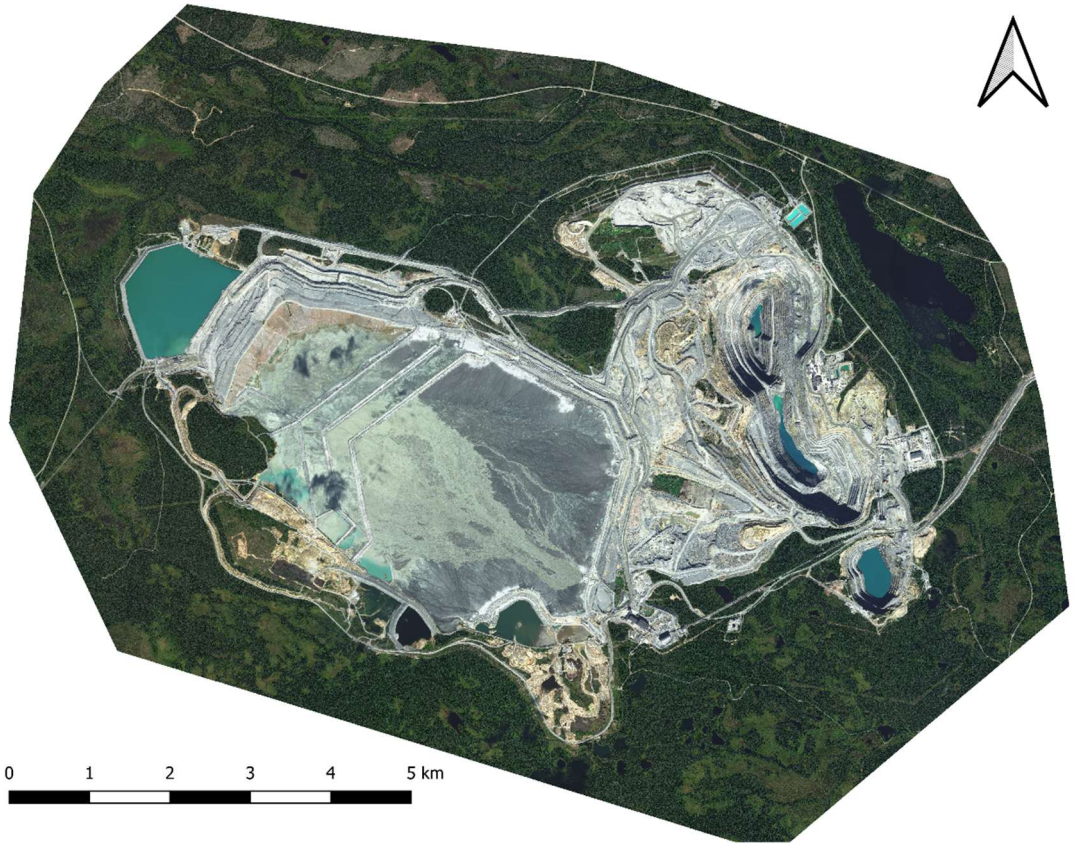
Public Disclosure Regarding Aitik Tailings Facility



2025-08-01

Approved by:
Tomas Eriksson-Ek
Dam Safety Accountable Aitik

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Contents

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 full compliance with the Standard. The Standard also requires that adhering members annually issue a status report on their implementation of and compliance 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 Aitik tailings facility to fully provide the required information.

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

This document is a partially updated version (where relevant) of the document that was issued and published in December 2024.

1. Description of the tailings facility

The Aitik mine is situated 15 km southeast of the town Gällivare in Sweden, see Figure 1. The coordinates (latitude, longitude) of the main entrance are 67°05'14.4"N 20°57'55.7"E.

Operation commenced in 1968 and Aitik is today one of the largest copper mines in Europe, with a permitted production rate of 45 Mton per year.

The mine is an open pit mine and the ore is processed to a mineral concentrate at site. The mineral concentrate is transported by train to the smelters in Rönnskär, while the waste products, waste rock and tailings, are deposited on site. See Figure 2 for an aerial photo of the Aitik mine.

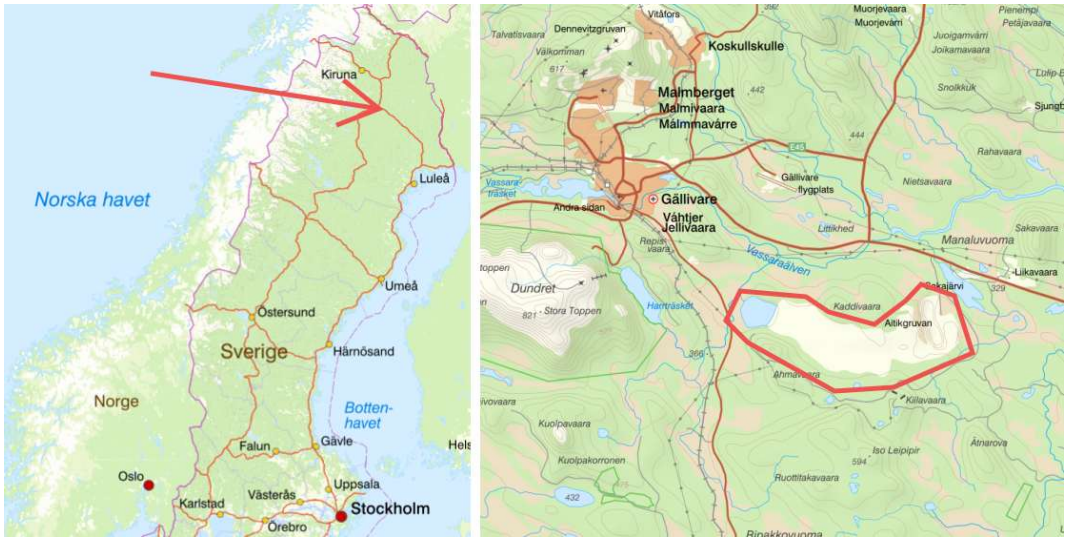

Figure 1 **Geographic location of the Aitik Mine in red**

The tailings facility consists of the Main TMF, the High Sulfur TMF, a Water Pond and the Clarification Pond, see Figure 3 for an aerial photo, and Table 1 for a description of the main structures. For more information regarding the dams, see Chapter 5.

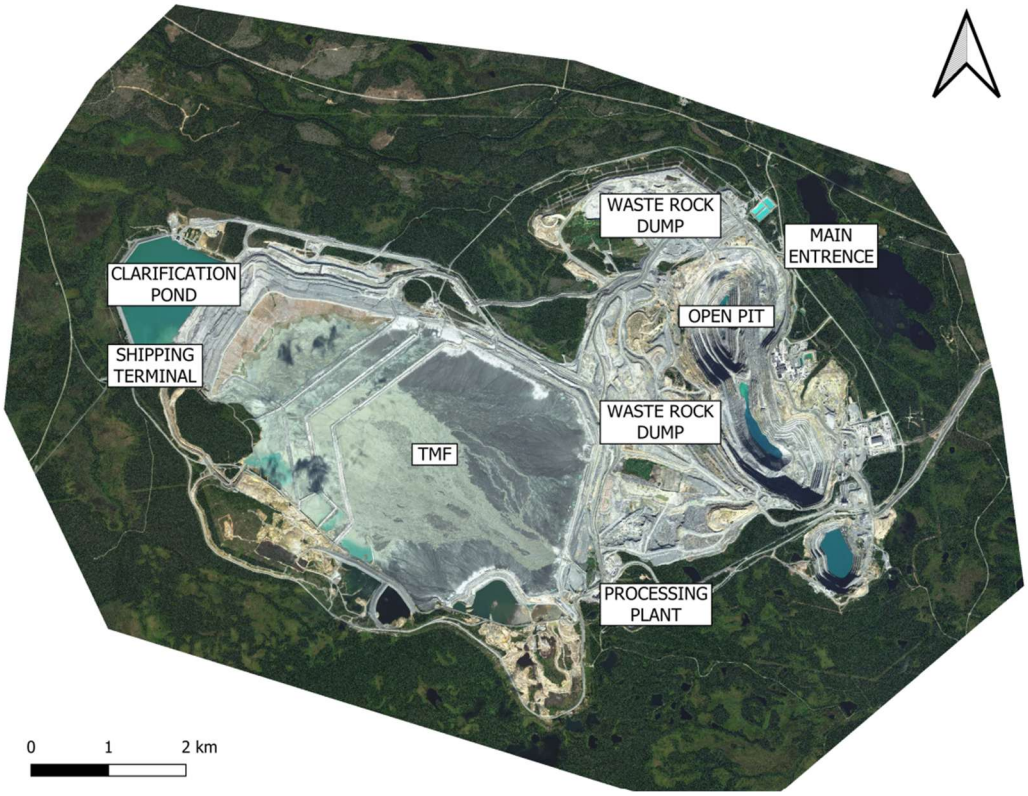

Figure 2 **Aerial photo (August 2024) of the Aitik mine**

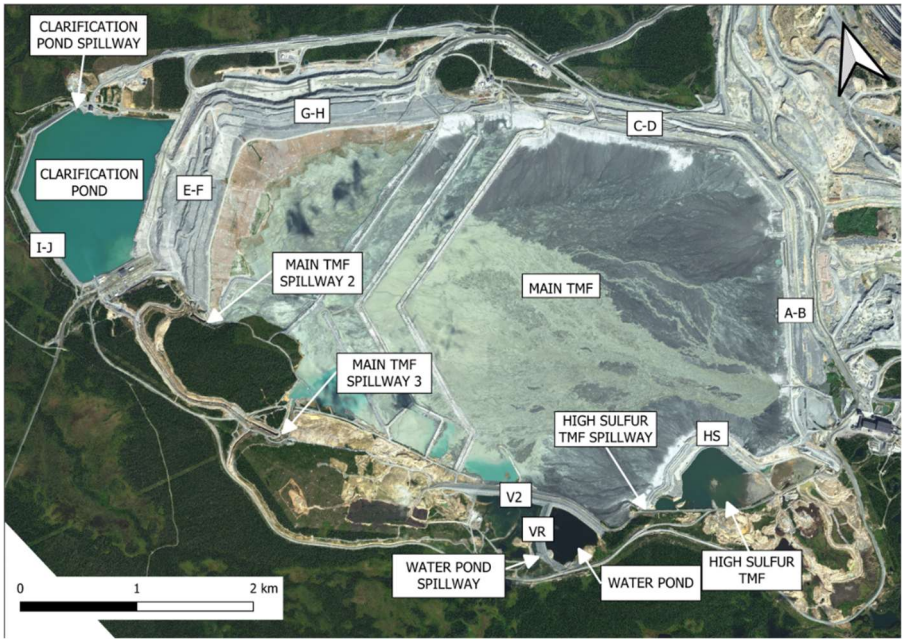

Figure 3 **Aerial photo (August 2024) of the Aitik tailings facility**

Table 1 Description of main structures of the Aitik tailings facility

Structure	Description
Main TMF	Commenced in 1968. Receives the low sulfur tailings from the process plant by hydraulic deposition (approx. 98% of total tailings). Contained by the A-B, C-D, G-H, E-F, HS and V2 dams and natural ground. It covers an area of approximately 16 km^2 [1]. Approximately 1 000 Mton of tailings and water is stored. Process water exits the tailings facility by gravity, through an active spillway, to the Clarification Pond.
High sulfur TMF	Commenced in 2019. Receives the high sulfur tailings from the process plant (approx. 2% av total tailings). Is contained by the HS and HS2 dams and natural ground. It covers an area of approximately 0,4 km^2. Less than 5 Mton is stored. Process water exits the facility by gravity, through a passive spillway, to the Main TMF.
Water Pond (VR Pond)	Commenced in 2020. Inflow is currently limited to run-off from the catchment area of the pond. Is contained by the V2 and the VR dam and natural ground. It covers an area of approximately 0,2 km^2. The storage capacity is about 3,3 Mm^3. Water exits the pond by gravity, through a passive spillway, to the Clarification Pond.
Clarification Pond	Commenced in 1985. Receives supernatant water from the Main TMF and High Sulfur TMF for sedimentation and storage. Contained by the I-J dam and natural ground. Covers an area of approximately 1,3 km^2. The storage capacity is about 13,5 Mm^3. Water is pumped back to the process plant. Excess water exits by gravity, through an active spillway, to the recipient Leipojoki.

[1] Including footprint of both pond and dams.

2. Consequence classification

The consequences in the event of a tailings facility failure in Aitik are estimated from breach analyses. The consequence classifications refer to conditions within the current permit as well as suggested classifications for the new permit application, which was submitted to the Environmental Court in December 2023.

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

Suggested consequence classifications for the new environmental permit application is shown in

Table 3.

The consequence classification of the tailings facility according to Swedish legislation is "Dammsäkerhetsklass B"[2]. The classification was approved by the national regulatory authority for dam safety (County Administrative Board) in 2016[3] and 2019[4]. 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 Very High[3].

[2] All dams are classified individually and "Dammsäkerhetsklass B" respectively "Very high" is the highest classification of any of the dams in Aitik.

[3] Dam A-B, C-D, E-F, G-H and I-J

[4] Dam HS and HS2

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

Dam	Consequence class according to:	
	Swedish legislation (Miljöbalken)	Global Industry Standard on Tailings Management (GISTM)
A-B	U	Very High
C-D	U	Very High
G-H	B	Very High
E-F	B	Very High
HS	C	Significant
HS2	B	Very High
I-J	B	Very High
V2	B[5]	Very High
VR	C[5]	High

Table 3 **Recommended consequence classes for all dams of the Aitik tailings facility according to the new permit application**

Dam	Suggested consequence class for new permit application according to:	
	Swedish legislation (Miljöbalken)	Global Industry Standard on Tailings Management (GISTM)
A-B	U	Low
A-B2	B	Significant
C-D/ C-D2	U	Low
G-H	B	Very High
E-F	B	Very High
K-L	B	Very High
HS	B	Significant
HS2	U	Low
I-J	B	Very High
V2	B	High
VR	B	High

[5] The classification is not yet approved by the national regulatory authority for dam safety

3. Risk assessment

Aitik 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 likelihood of occurrence and consequence of a critical hazard. Based on risk level, risks are managed according to Table 4.

Table 4. 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 2024, after remediation work on the TMF, with the conclusion that previously identified risks in the categories extreme and high have been managed and/or mitigated through a series of actions, including extensive dam remediation work as well as improvement on the operation, monitoring and surveillance systems and practices.

Therefore, in the 2024 risk assessment only medium and low risks were identified, and all current medium risks considered acceptable as they are meeting the ALARP principle ("As Low As Reasonably Practical").

In Table 5, the identified medium risks are listed, along with the associated management and/or monitoring 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 5 Medium class risks and associated mitigation plans

Dams	Failure mode	Identified risks	Current mitigation used to manage and monitor identified risks
E-F, I-J	Overtopping	Overtopping due to: • Large flood with blocked spillway • Wave action • Sabotage • Negligence	• Spillways with dual outlets with redundancy to pass design flood. • Insulated spillway gates to limit ice build up • Freeboard and beach management • Surveillance and monitoring program, including daily monitoring and inspection of pond levels, beach and spillway operation and function
A-B, C-D, G-H, E-F, HS, I-J	Instability	Instability due to: • Undetected weak materials • Unexpected pore pressure generation in foundation or embankment • Liquefaction of cohesionless soils and cyclic softening of cohesive soils. • Seismic event • Weak materials in structural portion of the dam	• For TSF, rockfill buttressing constructed, based on post peak/ liquefiable strengths in tailings and foundation, along with conservative piezometric conditions • Additional site investigations and characterization study underway • Surveillance program, with comprehensive monitoring of groundwater levels, seepage and deformations, daily inspections, and TARP execution.
E-F, I-J	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 • Toe erosion due to excess seepage	• For E-F, extensive rockfill buttressing constructed, that limits gross enlargement and instability of the toe. Internal erosion risk assessment shows negligible risk. • Beach management for TSF. • For I-J, 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.

4. Impact assessment

The impact assessments for the Aitik tailings facility are based on breach analyses of credible flow scenarios. 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 assessments presented in this document refer to conditions within the current permit.

The impact assessment according to Swedish legislation (Miljöbalken) is based on breach analyses from 2015[6] and 2018[7], se Table 6. 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 7.

[6] Dam A-B, C-D, E-F, G-H and I-J

[7] Dam HS and HS2

Table 6 **Summary of the Aitik 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. Environment	7. Economy
A-B	Small							
C-D	Small							
G-H	Large	X			X		X	
E-F	Large	X			X		X	
I-J	Large	X			X		X	
HS	Moderate						X	
HS2	Large	X			X		X	
V2	Large	X			X		X	
VR	Moderate or Small						X	

Table 7 Summary of the Aitik impact assessment according to the GISTM

Consequence Criteria	Classification	Impact assessment
Potential Population at risk (PAR)	High (Between 10 and 100)	Impact varies from dam to dam but for every dam the population at risk is less than 100 (A-B and HS2; staff in open pit. C-D; impact on road E10, bridges. GH, EF, I-J, K-L, V2; houses and camp site, bridges, road)
Potential Loss of Life (LOL)	Very High (Between 10 and 100)	Estimated to be likely (between 10 and 100 people) commensurate with the numbers in PAR and derived from the damage parameters values.
Environment	Very High (Permitted levels) to potentially extreme (Life of Mine)	Very high local and regional losses due to volume of tailings and water in Natura 2000 areas High and long term effect, benthic fauna, reindeer pastures Process water quality – low toxicity ARD or metal leaching potential – high (due to time of restoration) Potential area of impact greater than 20 km^2 Restoration potential – greater than 5 years (if possible, for LOM)
Health, Social and Cultural	High	Disruption of business, services, or social dislocation – high (500 to 1000 people Impact on regional/national heritage, recreation, community or cultural assets – High- national interest for reindeer herding and Swedish Armed Forces Human health effects – Potential for short term health effect
Infrastructure and Economics	Very High (Permit) to potentially extreme (LOM)	High economic consequences for Boliden due to remediation costs and production loss. Potentially significant local and regional consequences for employees and contractors due to production loss Significant local and regional impact on infrastructure Economic consequences for the community due to limitations in land use and effect on tourism industry and reindeer herding

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5. Description of the design of the tailings facility

See Table 6 for a description of the design of the main dams. For a description of the overall tailings facility and the location of the dams is presented in Chapter Error! Reference source not found..

Table 8 Description of the design for the dams in the Aitik tailings facility

Dam	Description
A-B	External dam in the main tailings facility. Part of the dam has a lower part that is designed to be impermeable and the upper to be drained, and part of the dam is designed to be drained from foundation to top. Method of raise has been upstream from the start. Dam length is about 3 300 m and the maximum dam height is about 85 m. Dam A-B is partly integrated with the Waste Rock Dump (WRD).
C-D	External dam in the main tailings facility. The lower part is designed to be impermeable and the upper to be drained. Method of raise has been upstream from the start. Dam length is about 1 600 m and the maximum dam height is about 48 m. Dam C-D is partly integrated with the WRD.
E-F	External dam in the main tailings facility. One section of the dam has a lower part that is designed to be impermeable and the upper to be drained, and another section of the dam is designed to be drained from foundation to top. Method of raise was downstream from the start and later changed to upstream. Dam length is about 1 600 m and the maximum dam height is about 70 m.
G-H	External dam in the main tailings facility. The lower part is designed to be impermeable and the upper to be drained. Method of raise was downstream from the start and later changed to upstream. Dam length is about 2 100 m and the maximum dam height is about 75 m.
HS	Internal dam between the main tailings facility and the high sulfur tailings facility. The dam is designed to be impermeable. Method of raise has been upstream (into the main tailings facility) from the start. Dam length is about 1 600 m and the maximum dam height is about 38 m.
HS2	External dam for the high sulfur tailings facility. The dam is designed to be impermeable. Method of raise has been downstream from the start. Dam length is about 500 m and the maximum dam height is about 30 m.
V2	Internal dam between the main tailings facility and the Water Pond and external dam in the main tailings facility. The dam is designed to be impermeable. The dam has never been raised. Dam length is about 1 500 m and the maximum dam height is about 25 m.
VR	External dam in the Water Pond. The dam is designed to be impermeable. The dam is not intended to be raised. Dam length is about 600 m and the maximum dam height is about 30 m.
I-J	External dam in the Clarification Pond. The dam is designed to be impermeable and has previously been raised with the downstream method. The dam is not intended to be raised further. Dam length is about 2 100 m and the maximum dam height is about 25 m.

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 (PAG) will be covered by moraine/ bentonite and soil improvement materials.
- Waste rock dumps with no potential for PAG will be covered by moraine and soil improvement materials.
- Main TMF will be covered by a combination of moraine/ bentonite or moraine, depending on degree of saturation in deposited tailings.
- High sulfur tailings (in the HS-facility) will be kept saturated and covered by low sulfur tailings and a moraine cover.
- The Clarification Pond will be decommissioned and transformed into a wetland.
- The VR-pond will be filled with LS-tailings, a moraine cover and vegetation.

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:

- Buttressing and remediation works on dams:
    - The A-B, C-D, E-F, G-H and HS dams have been remediated according to the remediation plan, and an updated buttressing plan to ensure continuous stability against the relevant safety criteria for future raises has been produced.
- Piers on TMF surface for deposition and water management.
- Dam raises (A-B, C-D, E-F and H-S).
- ITRB review, see Chapter 9.
- Updates of several tailings management documents and routines, such as OMS-manual, standard operating procedures (SOP), Trigger Action Response Plan (TARP) and Emergency Preparedness Response Plan (EPRP)

The annual performance review report for 2024 issued jointly by the Designer of Record (KCB) and the Boliden Engineer of Record concluded that the facility performance is satisfactory.

BOLIDEN

7. Environmental and social monitoring program

The environmental performance of the tailings facility is monitored according to an established environmental monitoring program.

Groundwater monitoring is carried out at 16 monitoring wells installed around the perimeter of the tailings facility, as well as in a downstream wetland area. The water is sampled and analyzed 2-3 times a year. Comparing with criteria published by the Swedish geological survey, sulfate concentrations are considered to be “very high” while nickel concentrations are “high” to “very high”.

Surface water monitoring is carried out in the creek Leipojoki upstream and downstream of the discharge from the clarification pond, as well as downstream Vassara and Lina rivers. Water samples in downstream sampling points are collected monthly. When water is being emitted from the clarification pond, the sampling frequency is increased to twice a week.

Settling dust is measured monthly at 24 stations surrounding the operations. The concentration of particles in air is measured in four nearby villages.

Dam seepage through the I-J dam is collected in a ditch which leads to a collection pond from where the water is pumped back into the clarification pond.

Dust control measures involve planning of release of tailings slurry through different spigots in order to keep the beach moist. Water and/or road salt are applied to roads and beaches. Polymers are sometimes applied to inactive areas of the tailings pond. Temporary vegetation, grass, is established on beach surfaces.

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, the municipality of Gällivare and the county administrative board. Measures exist to record and address any potential grievance. A human impact risk assessment has been carried out in 2024.

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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), see Chapter 3.

When the EPRP is triggered by a dam safety related incident, the dam safety emergency group is activated to support the Aitik 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 Aitik 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 Gällivare municipality".

Emergency response simulations are held at five years interval.

The EPRP is reviewed yearly and updated when necessary. The EPRP has been reviewed and updated during 2024 based on an updated dam breach analysis. For 2025 training of staff and an emergency response simulation, based on the updated EPRP is scheduled.

9. Independent review

An Independent Tailings Review Board (ITRB) has been established for Aitik, with online meetings and a site inspection scheduled annually.

A Dam Safety Review (DSR) was undertaken by the Designer of Record (DoR), Klohn Crippen Berger (KCB) with the results presented in 2024. The recommendations from the DSR have been incorporated in the risk assessment, as well as in the design for new base permit application, in the design and construction of the dam safety remediation works as well as in the ongoing work with Operation, Maintenance and Surveillance (OMS) undertaken by Aitik's dam safety organization.

The reviews are scheduled every five years as required based on the consequence classification.

Table 9 Conducted and planned independent reviews

Type	Conducted/planned	Year	By
ITRB	Conducted	2022-2024	ITRB
Independent reviewer	Conducted	2022-2024	Independent reviewer
DSR	Conducted	2024	KCB
ITRB	Planned for September 2025	Annually	ITRB
DSR	Planned	2028	-

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 tailings 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 Aitik 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 (October 2024) indicated a few minor items that required actions during Q4 2024. These were addressed and Aitik is assessed in conformance with GISTM, as of the end of 2024.

To validate the results of the self-assessment, Boliden Aitik went through an external audit of GISTM conformance status. The external independent auditor (Knight Piesold UK(Ltd) conducted the audit according to the ICMM conformance protocol during Q1 2025 and issued a conformance status report in Q2 2025 confirming that the Aitik TMF is in full conformance with GISTM.