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Public Disclosure Regarding Luikonlahti 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 Luikonlahti tailings facility to fully provide the required information. In addition, Chapter 11 of this document presents the status of implementation of GISTM for Luikonlahti.

1. Description of the tailings facility

The Kylylahti operations in Eastern Finland comprises two locations; the Kylylahti mine site in Polvijärvi municipality and the Luikonlahti mill site in Kaavi municipality, see Figure 1. Kylylahti is supported by Boliden Kevitsa and shares the same General Manager, Financial Manager, and other support functions.

The mine was closed at the end of 2020 and has undergone remediation work that will continue into 2026 and beyond, see Figure 2 for an aerial photo of the mine site.

The mill operated until December 2020 and has since been in a Care & Maintenance phase. The TSF used for storing tailings from the milling process is located at the Luikonlahti mill site and is thus called Luikonlahti TSF, see Figure 2 for an aerial photo. The coordinates (latitude, longitude) of the main entrance to the mill site are 62°55'53"N 28°42'22"E. The TSF was in operation between 1968–2020 (with a hiatus between 2006–2011), storing tailings from multiple operators and concentration processes.

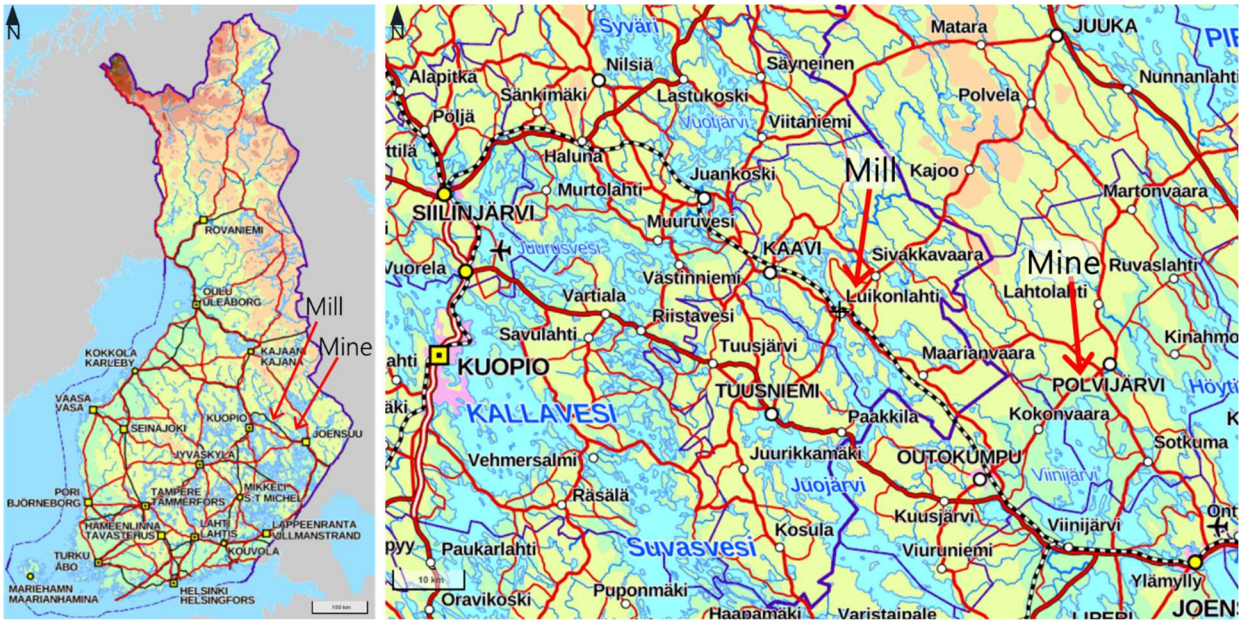

Figure 1 Geographic location of Kylylahti mine site and Luikonlahti mill site indicated with red arrows.

At the mill site there are several structures disclosing a long mining history in the area. The overview in Figure 3 shows the old mine and mining structures, the mill, the TSF with subsequent clarification ponds CP1 and CP2, as well as the CoNi and Martikkala ponds. The last two (colloquially called CoNi-ponds together) are filled with a cobalt and nickel rich pre-concentrate that could be enriched to extract cobalt and nickel. Boliden does not regard these as tailings facilities in their current configuration. Water treatment areas are also shown in the figure.

Table 1 gives a description of the main structures at the mill area. For more information regarding the dams, see Chapter 5.

Figure 2 Aerial photo of the Luikonlahti mill site and Kylylahti mine site.

Table 1 Description of main structures of the Luikonlahti mill site.

Object	Description
TSF	Commenced in 1968 and is contained by dam 1, dam 2, middle dam and southeast dam as well as natural ground. Operation ceased in December 2020. Initially the TSF received sulfide tailings from the mine at the site, with magnesite tailings from processing talc ore from Polvijärvi municipality added from 1979. Between 1983–2006, only magnesite tailings were deposited. The TSF was then dormant until 2011 when the Kylylahti mine opened and those tailings were deposited on the facility. In total, around 12 Mton of tailings are stored in the facility, which covers an area of 0,5 km^2 (including CP1). Process water was initially discharged through an overflow weir and later through a spillway tower on the east side of the TSF. Today, the tailings are mostly dry and only a small amount of seepage and rainwater is discharged through the spillway.
Clarification pond 1	Commenced in 1968 and acts as a clarification pond but was initially part of the TSF with no separating dam. CP1 is contained by dams 3 and 7 and natural ground. Covers an area of approximately 0,15 km^2. The storage capacity is around 11 Mm^3 of water. Process water exits the facility by gravity, through a spillway tower with stop-logs, and lime is added before water reports to CP2.
Clarification pond 2 (Heinälampi)	Commenced in 1968. Inflow comes from treated water from CP1, and CP2 acts as a second clarification pond. Is contained by dams 4 and 5 and natural ground. Covers an area of approximately 0,4 km^2. The storage capacity is about 1,85 Mm^3 of water. Water is discharged from the facility to the recipient twice a year (during spring and autumn).
CoNi and Martikkala pond	The CoNi and Martikkala ponds (together called CoNi-ponds) are double lined (bentonite mat + HDPE-liner) rockfill structures constructed between 2011-2018. Together they store approx. 1,2 Mm^3 of cobalt-nickel pre-concentrate. The combined area of the two ponds is 0,15 km^2.

Water treatment area	The water treatment area is a constructed wetland that consists of four cells where seepage water from the TSF, CP1, and the CoNi-ponds is treated.

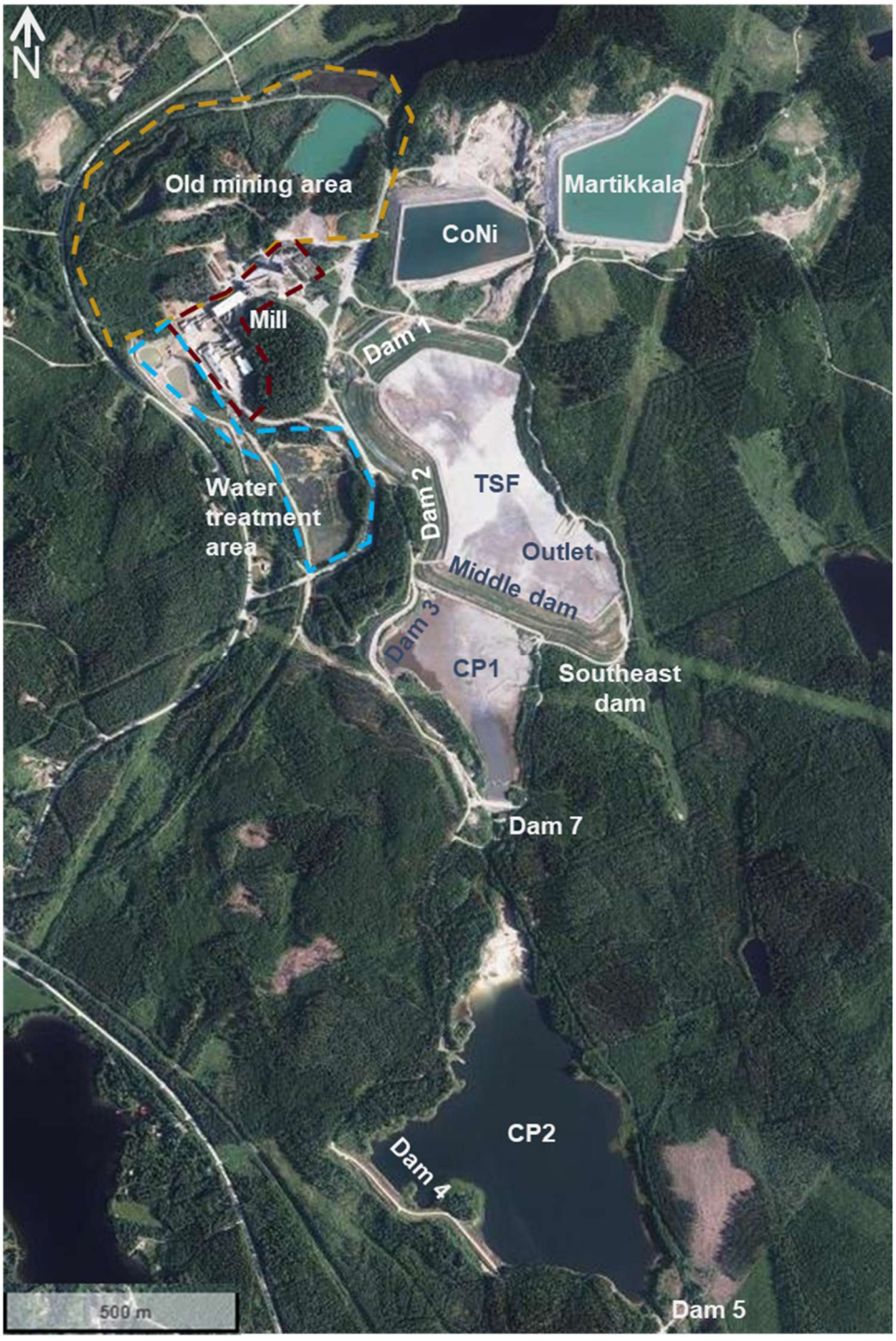

Figure 3 Aerial photo of the Luikonlahti mill area with the different ponds, dams, and areas marked.

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2. Consequence classification

The consequences in the event of a tailings facility failure in Luikonlahti are estimated from breach analyses. The current consequence classification for the Luikonlahti tailings facility have been defined both according to the Finnish Dam Safety Guideline[1] and according to GISTM, see Table 2. The consequence classification after closure has also been defined, see Table 3.

Table 2 Overview of current consequence classes for the Luikonlahti tailings facility.

Facility	Dam	Consequence class according to:	
		Finnish Dam Safety Guidelines	Global Industry Standard on Tailings Management (GISTM)
TSF	Dam 1	3	Low
	Dam 2	3	Low
	Middle dam	2	Significant
CP1	Dam 3	2	Significant
CP2	Dam 4	2	Significant
	Dam 5	3	Low

Table 3 Overview of consequence classes after closure for the Luikonlahti tailings facility.

Facility	Dam	Consequence class according to:	
		Finnish Dam Safety Guidelines	Global Industry Standard on Tailings Management (GISTM)
TSF	Dam 1	3	Low
	Dam 2	3	Low
	Middle dam	3	Low
CP1	Dam 3	3	Low
CP2	Dam 4	2	Significant
	Dam 5	3	Low

[1] https://www.doria.fi/bitstream/handle/10024/86120/Raportteja_89_2012.pdf

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3. Risk assessment

Luikonlahti 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 have 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.

The risk assessment was based on the current understanding of the facility and its surroundings. Since the work on compiling the knowledge base for the facility is ongoing, the risk assessment will be updated as needed going forward to reflect the increased understanding of the TSF.

Except for risks related to dusting, no high or intolerable risks were identified in the risk assessment. The tailings surface has been vegetated to minimize dusting to the extent possible. A number of other medium risks that need to be managed and mitigated were identified and are being acted upon, mainly through investigations to increase the understanding of the risks.

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 Emergency Preparedness and Response Plan (see Chapter 8).

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4. Impact assessment

The impact assessments for the Luikonlahti 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 the Finnish Dam Safety Guideline and according to the Global Industry Standard on Tailings Management (GISTM). Both assessments were made in 2024 and are presented in Table 4 (current conditions) and Table 5 (after closure).

Table 4 Summary of the Luikonlahti impact assessment according to the Finnish dam safety guidelines and the GISTM, for current conditions.

Facility (deciding dam)	Finnish classification	GISTM classification	Classification driver
TSF and CP1 (Middle dam, with cascading failure of dam 3)	2	Significant	Flooding of an electrical substation and connected infrastructure
CP2 (dam 4)	2	Significant	1-10 persons at risk in buildings downstream

Table 5 Summary of the Luikonlahti impact assessment according to the Finnish dam safety guidelines and the GISTM, after closure.

Facility (deciding dam)	Finnish classification	GISTM classification	Classification driver
TSF and CP1 (Middle dam, with cascading failure of dam 3)	3	Low	-
CP2	2	Significant	1-10 persons at risk in buildings downstream

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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 1. It should be noted that the crest of the TSF is continuous, and it is not immediately clear from aerial photos where one dam ends, and the next one begins.

Table 6 Description of the design for the dams in the Luikonlahti tailings facility

Dam	Description
Tailings Storage Facility	
Dam 1	External dam in the main tailings facility. Initially constructed with impermeable starter dams, later raised upstream using tailings. The outer slope of the dam has been vegetated to prevent dusting. Dam length is about 380 m and the maximum dam height is about 14 m.
Dam 2	External dam in the main tailings facility. Initially constructed with impermeable starter dams, later raised upstream using tailings. The outer slope of the dam has been vegetated to prevent dusting. Dam length is about 505 m and the maximum dam height is about 16 m.
Middle dam	Separating dam between the TSF and the clarification pond. Originally constructed as a flow-through limestone dam, later raised upstream with tailings to confine the deposited tailings in the TSF. The outer slope of the dam has been vegetated to prevent dusting. Dam length is about 300 m and the maximum dam height is about 16 m.
Southeast dam	External dam in the main tailings facility. Designed with upstream tailings raises from the start. The outer slope of the dam has been vegetated to prevent dusting. Dam length is about 210 m and the maximum dam height is about 13 m.
Clarification Pond 1	
Dam 3	External dam in CP1. Constructed with a till core with downstream filters and rockfill as support. Later raised centerline with some additional support fill added downstream during the latest raise 2011. The dam is designed to be impermeable. Dam length is about 320 m and the maximum dam height is about 17 m.
Dam 6	Former external dam of CP1. A channel has been excavated through the dam, so it no longer acts as a confining structure.
Dam 7	External dam of CP1, constructed downstream of dam 6. The dam is constructed as a homogenous till dam and has never been raised. The spillway for discharge from CP1 runs through the dam. Dam length is about 80 m and the maximum dam height is about 9 m
Clarification Pond 2	
Dam 4	External dam of CP2. The dam was constructed with a wide till ore and downstream gravel support fill, designed to be impermeable. A minor raise was done centerline to increase the freeboard of the dam. Dam length is about 590 m and the maximum dam height is about 9 m
Dam 5	External dam of CP2, constructed in the same way as dam 4. The dam is designed to be impermeable. The spillway for discharge to the recipient runs through the dam. Dam length is about 46 m and the maximum dam height is about 6 m

The main goal for mine closure is to leave an area free of hazards which allows for alternative use of the area. 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 be incorporated into the landscape.

• The facility needs a minimum of maintenance and supervision.

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

• The TSF and CP1 will be covered by a combination of moraine/ bentonite which will then be vegetated.

• CP2 will keep a water cover to avoid mobilization of elements from the bottom sediments. Water from the TSF and CP1 will be led here by gravity to ensure sufficient water inflow.

• Buildings and affected soils at the mill area that pose a hazard will be demolished and removed.

6. Annual Performance Review

In conformance with GISTM and Boliden's framework for tailings management, an annual performance review has been conducted for the Luikonlahti tailings facility. The facility was assessed to have satisfactory safety with need for additional actions.

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

- Geotechnical field investigations, including conventional borings, cone penetration tests, and sampling
- Geotechnical lab testing
- Site visit by EoR and DoR
- Updated Dam Breach Analysis for all dams
- Closure workshop
- GIS web portal for geotechnical data
- 3D model of facility, including material properties (Leapfrog)
- Drone survey of the site
- Site Characterization Report, volume 1
- Monitoring of water levels in standpipes and online water flow measurement
- GISTM conformance benchmarking and gap identification
- Internal validation of GISTM conformance self-assessment

The main recommendation from the review was to follow the plan to implement the GISTM, as that will ensure full implementation of the tailings management system at the site.

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 in 11 monitoring points around the perimeter of the tailings facility. The water is sampled and analyzed twice a year.

Surface water monitoring is carried out in 9 sampling points around the tailings facility area, as well as in the downstream recipients Lake Retunen and Luikonlahti Bay. Water samples are collected 2-5 times per year, depending on sample point. Water originating from the old mining activities on the north end of the area contribute more to the environmental load than the water released from Heinälampi during discharge campaigns.

Dam seepage from dams 1, 2, and 3 is collected and before being steered or pumped to the wetland and treated before release to the recipient.

The results from each round of sampling are reported to the municipal and governmental monitoring authority, as well as a yearly report.

The area is scarcely populated, meaning the impact of the operation on third partis is limited. The RTFE is in direct contact with authorities as well as the closest neighbors living in the area. Boliden uses the Borealis system to record and address any potential grievance. A human impact risk assessment was carried out in 2024 and will be updated as a part of developing the closure design for the facility.

8. Emergency Preparedness and Response Plan (EPRP)

The Emergency Preparedness and Response Plan (EPRP) is triggered by a failure or a near failure, according to the triggers specified in the EPRP.

When the EPRP is triggered by a dam safety related incident, the local emergency group is activated. At the same time, the Kevitsa emergency group is activated because Luikonlahti is managed by Kevitsa as described in chapter 1. The local emergency group is responsible for assessing the situation as well as proposing and leading dam safety related measures but is subordinated to the Kevitsa emergency group. The structure of the local emergency group is similar to the dam safety organization in normal operation.

In case of an emergency, the EPRP provides routines for cooperation with local emergency authorities.

The EPRP is reviewed and updated when necessary. The EPRP will be updated during 2025 based on the updated dam breach analyses. After the update, training and practice for the affected staff will be scheduled.

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9. Independent review

A team of Senior Independent Reviewers (IRs) reviewed the Luikonlahti site during 2021, see Table 7. A new IR was engaged in 2024, and a first review meeting and site visit was held during the first half of 2025. Continued review of the site will consist of both digital meetings and site visits.

The current work of compiling the knowledge base and updating the understanding of the facility conducted by Ramboll is considered comparable to a comprehensive DSR. For that reason, the next DSR is scheduled to be performed within the next ten years as set by the consequence classification. The exact schedule will be decided as part of the current work.

Table 7 Planned, ongoing, and conducted independent reviews (2021-2026).

Type	Conducted/planned	Year	By
Independent review	Online meeting (May 31 – June 1)	2021	Tatyana Alexieva (Alexieva Consulting) Bob Chambers (KCB) Nigel Goldup (Tetra Tech)
Independent review	Online meeting (May 8) Site visit (June 9-10)	2025	Christina Winckler (TailRiskReview)

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10. Reclamation securities and other financial safeguards

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 the operator has sufficient financial capacity to cover estimated costs of planned closure, early closure, reclamation, and post-closure of the tailings facility and its appurtenant structures. In addition, insurance is used to cover sudden and unexpected tailings related incidents.

Boliden's current provisions for reclamation works can be found in the Annual and Sustainability Report for 2024, published on the public web.

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11. Implementation of the Global Industry Standard on Tailings Management

A self-assessment of the conformance to GISTM, based on the guidance in the ICMM Conformance Protocols, has been conducted by the personnel at site together with other sites in Boliden. The results show that Luikonlahti is in partial conformance with the Standard. While significant progress has been made towards conformance, there are still several actions that need to be taken for the tailings facility to be in full conformance with all requirements. These actions have been summarized in a corrective action plan that has been submitted and approved by the management team. Based on the plan it is expected that Luikonlahti meets all GISTM requirements during 2026.