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BOLIDEN AITIK

**BIODIVERSITY
GRI REPORT
2021**

BOLIDEN

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1. GENERAL INFORMATION

The purpose of this document is to compile and publicly report data regarding the impacts of Boliden's operations that are affecting certain aspects of biodiversity (directly and indirectly). By following a more structured method (GRI standards), the company takes initiative to improve its sustainability reporting, show its environmental contribution and prove accountability towards its stakeholders.

Boliden is operating the Aitik mine, which consists of two open pit mines – Aitik and Salmijärvi. It also has an ongoing planning for the Liikavaara open pit mine, which will be a satellite deposit (see figure 1).

Aitik is one of Europe's largest copper mines and is located east of the town of Gällivare, 100 km north of the Arctic Circle. Aitik is a Cu-Au-Ag open pit mine. Aitik began to be excavated in 1968 and is today about 3.5 km long, 1.5 km wide with a 480 m depth (projected depth: 700 m). Extracted ore tonnage in 2021 amounted to 41.7 Mt, which is processed into a metal concentrate containing copper, silver and gold.

Aitik's operations also cover the smaller Salmijärvi open pit, which began to be mined in 2010. Today, it measures approximately 900 m in length, 650 m in width and is 225 m deep.

The Liikavaara deposit is located 3 km east of Aitik. Extraction is planned to start in 2023, with an expected 8 years of total mine life. The plan is that the open pit will be 800 m long, 500 m wide and 200m deep. Liikavaara's ore production is estimated to be between 7-12 Mt a year.



Figure 1. Visualization of the (The Aitik site. No scale given. In: Aronsson., A. "Boliden Aitik; Nytt tillstånd 2023" (2020): 1)

The Aitik mine site is located close (within 5-15 km) to the following Natura2000 areas:

- **Torne and Kalix river system (SE0820430):** Enclose most upper parts of Myllyjoki, Lejpojoki, Vassara and Lina River, which are flows belonging to the same river system.
- **Dundret (SE0820211):** Low Mountain Dundret includes diverse habitat types, mostly western taiga and alpine heaths, often used for outdoor recreation.
- **Lina fjällurskog (SE0820209):** A virgin western taiga in varied types of landscape with entrenched valleys.

2. IMPACTS OF ACTIVITIES, PRODUCTS AND SERVICES ON BIODIVERSITY

Boliden is continuously monitoring and evaluating impacts on biodiversity. Impacts are evaluated on water (surface/groundwaters and biology), on land through dust monitoring and for specific species like moss. From time-to-time, specific evaluations are done for fish, berries and reindeer grazing.

2.1. Surface/Ground Water Quality

The following map shows surface water bodies and ground water bodies in close vicinity of Boliden Aitik's industrial area (see figure 2). Note that the facility does not sample all the water bodies shown on this map and some water samples are collected both within and outside of the industrial area.

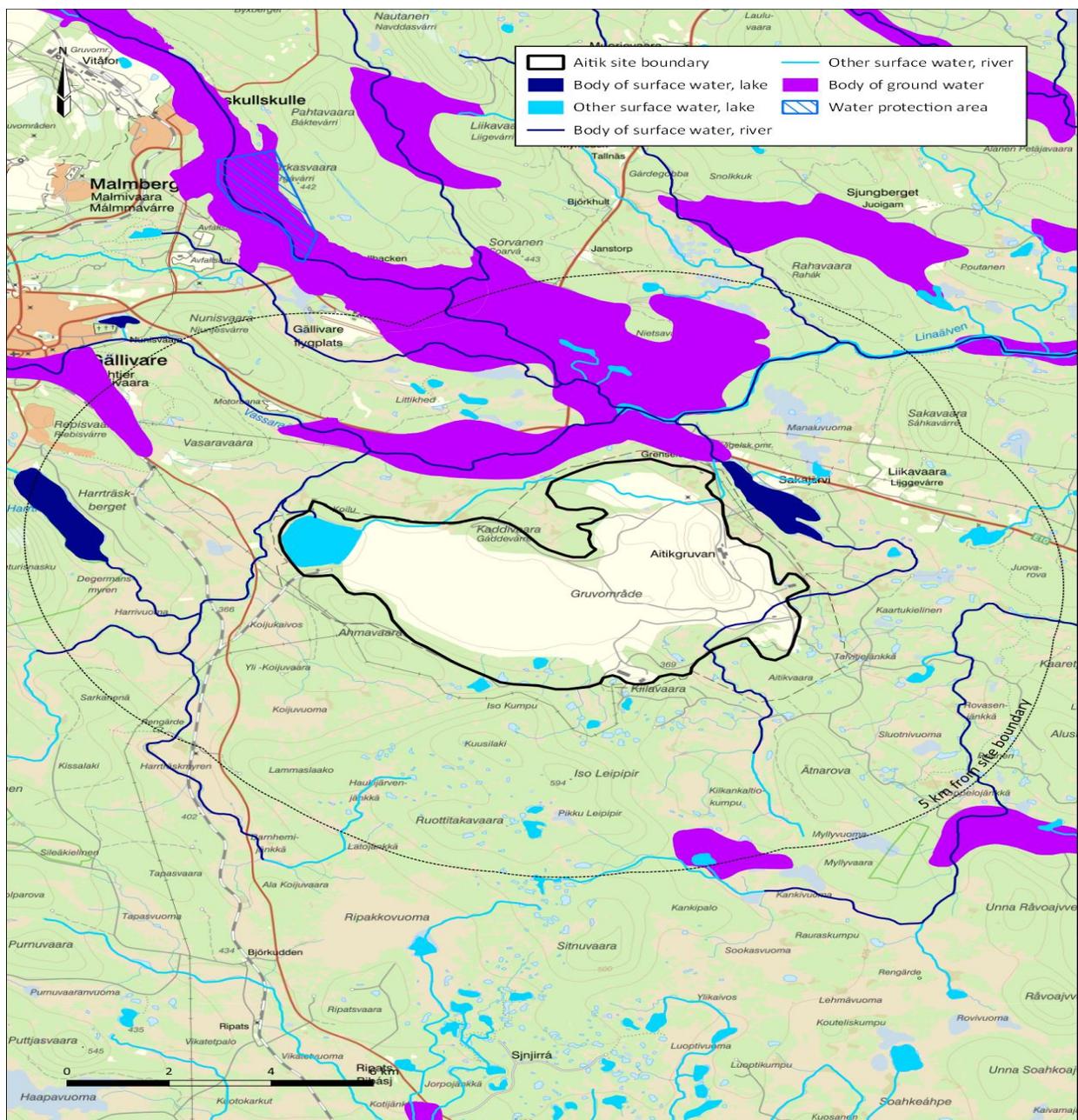


Figure 2. Map illustrating surface and ground waterbodies near the Aitik site

(5 km radius)

2.2. Natura2000 Evaluation

The following section describes the Natura2000 areas in the vicinity of the Aitik site (see figure 3).

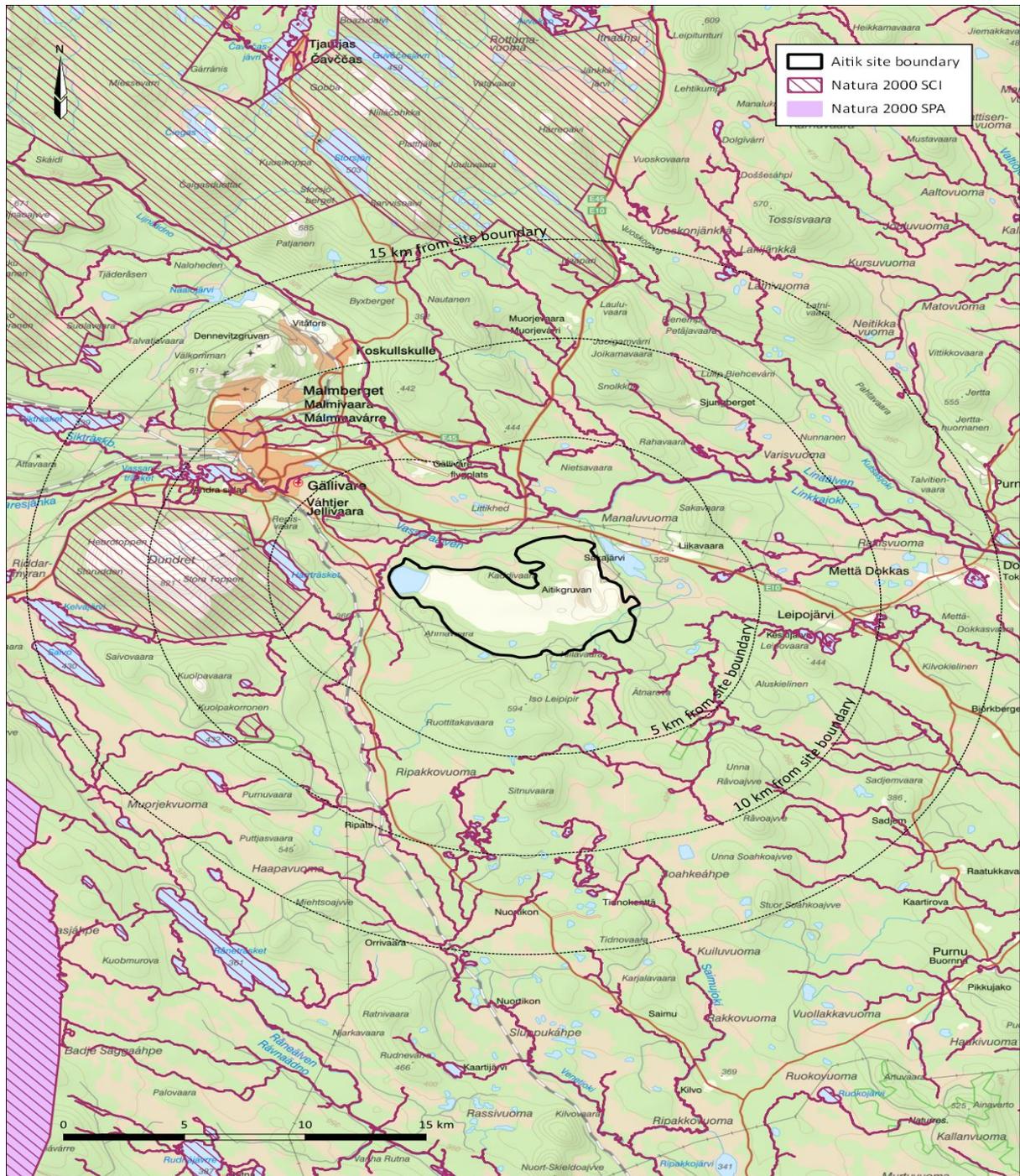


Figure 3. Map Illustrating Natura2000 areas near the Aitik site (15 km radius)

Torne and Kalix Rivers

The assessment is that the water quality within the Torne and Kalix rivers' catchment areas is generally good. The status of nutrients is estimated to be high or good at over 90% of the sampling stations and the assessment is also that neutral conditions regarding pH and alkalinity prevails in the watercourses. In general, there is a good status regarding pollutants (As, Cd, Cr, Cu, Hg, NH₃-N, Ni, Pb, U and Zn), with some exceptions where there is a local influence from nearby activities.

- **Leipojoki**

Leipojoki, which is the main recipient of the operation's surplus water, is locally clearly affected by the mining operations during periods of flooding. However, as a result of dilution, biological processes and determination, the degree of impact decreases further downstream, partly in Vassara älven and to an even greater extent in Lina älven.

- **Vassara älv**

Leipojoki runs on a distance of about 12 km before it flows together with the Vassara älven. From the confluence of the overflow ditch with Leipojoki and down to the confluence with Vassara, it is about 2.7 km, which is the stretch of watercourse where the clearest impact from Aitik can be observed. This section also constitutes a separate body of water.

- **Lina älv**

Vassara älv empties in Lin älven, which itself empties into Ängesån, which flows into Kalixälven. Lina älven's water quality is also affected by other operations, of which LKAB's mine in Malmberget is the single largest. For this reason, it can periodically be difficult to comment on Aitik's relative contribution and impact on water quality and ecological status, especially in the Lina River.

Liikavaara

Water that needs to be taken care of from the planned Liikavaara open pit will be pumped to the already existing process water system in Aitik. Apart from this, Liikavaara has a risk to a minor extent (4 %) to influence flows in Myllyjoki and during dry seasons a risk to influence the water level of Laurajärvi with a maximum of 10 cm.

2.3. Ambient Air / Dust Monitoring

Diffuse dust from Boliden Aitik was investigated monthly by measuring the amount of settling dust and its metal content in 24 dust buckets during 2021. The analyzes focus on the amount of dust and copper content in the dust as well as arsenic (As), beryllium (Be), cadmium (Cd), chromium (Cr), nickel (Ni), Pb (lead), antimony (Sb) and zinc (Zn).

MAP OF SAMPLE POINTS



Figure 4. Overview of the dust sample points around Aitik

2.4. Evaluations of Specific Species

National Moss Evaluation

- In the area around the Aitik mine, densification surveys of metal levels in moss have been carried out in 1995, 2000, 2007, 2011 and 2015.
- 27 moss samples were collected in the densification survey around the Aitik mine 2020 to be analyzed for levels of arsenic (As), lead (Pb), iron (Fe), cadmium (Cd), copper (Cu), chromium (Cr), mercury (Hg), nickel (Ni), vanadium (V), zinc (Zn), aluminum (Al), cobalt (Co), molybdenum (Mo), antimony (Sb), manganese (Mn) and nitrogen (Kj-N).
- Results from the national moss survey 2020 showed that, in most of the surveyed area, the level of lead, mercury, nickel, antimony and nitrogen in the environment was low.
- Likewise, the level of arsenic, cadmium, copper, chromium, zinc, aluminum, molybdenum in the surveyed area was low, but there were also some smaller areas with higher concentrations.
- Note that the level of iron, vanadium and cobalt in the background environment was high, especially in the northwestern part of the area, but often the level of these metals was lower in regions within 3 to 70 miles of the Aitik mine.
- Overall, there is an impact from the Aitik mine when measuring metal concentrations in the moss samples. The levels of arsenic, lead, chromium, nickel, zinc, aluminum, antimony, vanadium, molybdenum, manganese and nitrogen in the densification samples were similar to the levels of the background test, for which at most 30% of the samples showed higher levels in these substances compared to the background samples in the area.

- Lastly, it is also concluded that the results from the 2020 moss survey show that the method of using mosses to measure loading of various metals and nitrogen in the area has continued to work very well. Then mosses almost exclusively taking up substances from the air, the method gives a good picture of atmospheric precipitation.
- Local differences can be traced and provide information on both local emission sources and long-distance transported emissions.

Reindeer Grazing Species

- The measured concentrations indicate that there is an increasing concentration for some elements in the vicinity of the mining area of the Aitik. This applies, for example, to copper (Cd) and chromium (Cr) in willow and lichen.
- There is no corresponding trend for the levels of these elements in grass and sedges (*Carex*).
- Levels identified are however over all lower than what is accepted in reindeer feed.

Berries

- Blueberries (Figure 5), cloudberries, and mushrooms (*Boletus* and *Leccinum*) are tested every few years in the vicinity of Aitik.
- The Different lifestyles of these berries and fungus mean that the uptake and accumulation of metals are different. In addition, some metals are vital, which is why regulation systems to achieve optimal levels can be found in living organisms.
- The levels of metals are higher in mushrooms, compared to berries.
- Regarding copper (see figure 7), higher levels than background were recorded. The latter is located close to the train terminal, where copper concentrate is reloaded daily to trains.
- The mining business is, therefore, considered to be the cause of the increased copper levels in blueberries.
- As for cloudberries and mushrooms, no clear correlations were found between copper levels in relation to mining operations, and possibly varying copper content in the soil types have greater significance for these content levels.

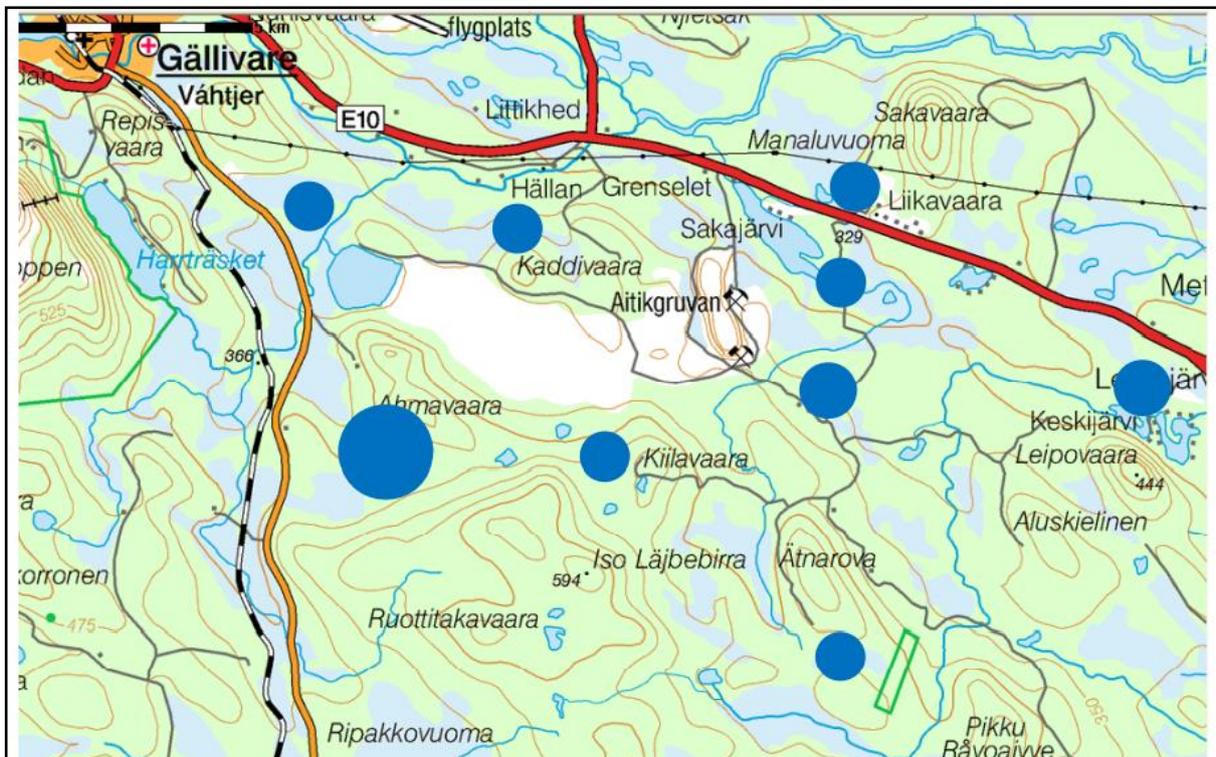


Figure 5. Illustration of copper concentrations in blueberries around Aitik (autumn of 2012). Sizes of the filled circles explain copper levels in different areas (6-12 mg/kg TS).

- Overall, examinations' results show that the impacts of mining operations in terms of copper on berries and mushrooms in the vicinity of the Aitik (train terminal) are not considered to pose any risks of adverse effects to humans or animals.

Fish

- Generally, the species *Oncorhynchus*, *Thymallus arcticus*, *Salvelinus fontinalis* and *Phoxinus phoxinus* occur in the watercourses around Aitik.
- Salmon have also been observed in Lina River, which is an unusual occurring in the area. The species have spread to the water system thanks to a Lina waterfall at the confluence of the Lina River with Ängesån.
- In the lakes, the Sander *Lucioperca* are also found. Overall, there is a generally good status regarding the results from electrofishing.
- The clearest impact from Aitik can be expected to occur in Leipojoki, as overflow of excess water from the clarification reservoir takes place in the watercourse.
- The surveys from 2014, 2017 and 2019 show, however, that there is good ecological status in the impact location, and that more species and individuals are typically caught in that recipient.
- Electrofishing results from 2019 were worse in the reference room and the status was classified as moderate.
- Levels of metals in fish liver show minor differences between premises and comparisons from the 2014 survey. Even though an increased load of metals could manifest itself under higher liver values, this still can be explained by the organism's treatment plant. Overall, no clear differences between reference rooms and influence rooms can be observed in the studies that have been carried out.
- The results are not surprising given that the metal levels are generally low in the aquatic environment and that the bioavailability is small, particularly in the impact premises where competing ions (e.g., macro-elements such as Ca, Mg, K, Cl) reduce the proportions of bioavailability.

Elk meat

- Analysis of elk/moose (*Alces alces*) meat and liver has also been conducted in 2014. The analysis showed metal levels on par with similar analysis from other parts of Sweden, and within acceptable limits for human consumption.

3. HABITATS PROTECTED OR RESTORED

This chapter delivers a thorough portrayal of the different Natura2000 areas close to the Aitik, key biotopes along with nature reserves and compensation areas protected by Boliden.

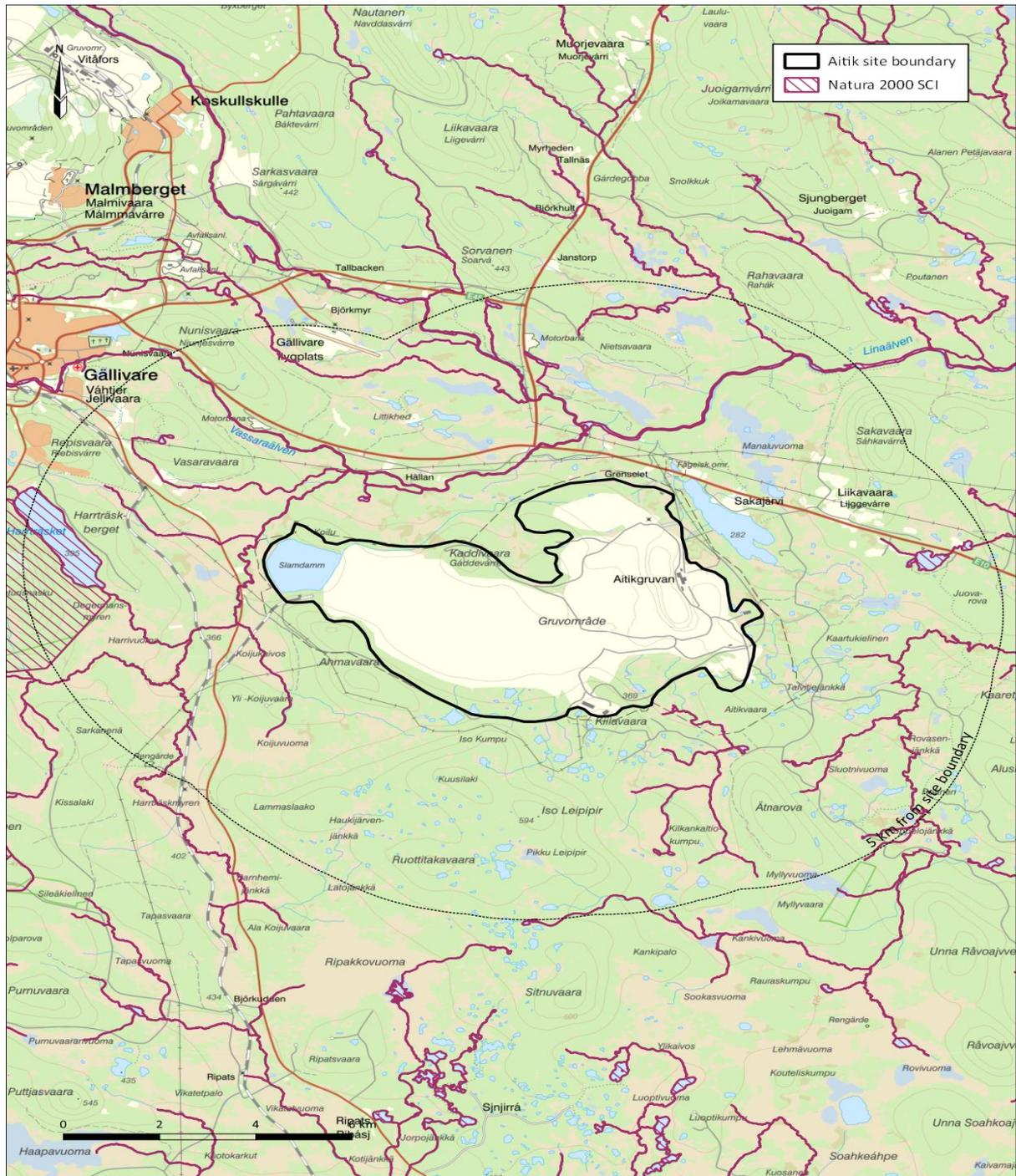


Figure 6. Map illustrating Natura2000 water and land areas around the Aitik site (up to 5 km radius)

Torne and Kalix river system Natura 2000 (SE0820430, Area SCI type)

- Comprises two vast rivers, untouched by waterpower plants, which connect through the river bifurcation Tändö river, where most of Torne River flows into Kalix River.
- Torne and Kalix river system and its catchment area cover around 46,000 Km². They are two of the largest rivers in Europe and one of a kind in Western Europe.
- Annual average water flow in Torne River amounts to 428 m³/s while it is around 316 m³/s in Kalix River.
- This river system has not been exploited for hydroelectric purposes. It has one of the largest bifurcations in the world and is also considered a crucial reproduction area for salmon and trout.
- The river system is affected by deforestation, ditches and peat excavation. Despite the restoration efforts, substantial parts remain impacted (fragmentation caused by public roads along with widespread forest road network (County Administrative Board of Norbotten county 2007).
- The lake Torneträsk is the source for the Torne River, and it is one of Sweden's largest lakes and the second deepest in the country.
- The rivers have well developed vegetation along the beaches and in the water. They are important migration routes for many migratory birds and the islets in the river are important breeding areas where the birdlife is rich.
- Otters are regularly seen at the site and freshwater pearl mussel (*Margaritifera margaritifera*) is found in some of the tributaries of the river.
- *Trisetum subalpestre* is found in the alpine region while again the freshwater pearl mussel and the green snaketail (*Ophiogomphus cecilia*) are spotted in the boreal region
- Atlantic salmon (*Salmo salar*), Eurasian otter (*Lutra lutra*) and European bullhead (*Cottus gobio*) are found in both alpine and boreal region as well.

Area or maybe length of waterbodies within 5, 10,15 km

Dundret (SE0820211, Area SCI type)

- Comprises over 200 variety of plants, of which 30 hold mountain-like characteristics.
- The soft bare mountain consists of a dry alpine heath while beneath the tops, grass-heaths are concentrated.
- In the valleys there are bogs and willow-scrubs (housing around 16 different *Salix*-species).
- The diverse forest below the bedrock consists of birch and spruce. Bilberries or the European blueberries are mostly dominating around the ground field.
- The low mountain Dundret was protected as a nature reserve in 1970 due to the social values of the recreation area around the mountain.

Area within 5, 10, 15 km

Lina fjällurskog (SE0820209, Area SCI type)

- Lina fjällurskog is a nature reserve covering 98 049.7 ha.
- The area embodies entrenched valleys and a mosaic of bogs and forests known as "Veiki moraine".
- Spruce forests dominate the higher parts while there are found more pines on the south directed slopes.
- The forest is estimated to have an age nearing 350 years.

3.1. Nature Reserves and Other Protected Areas

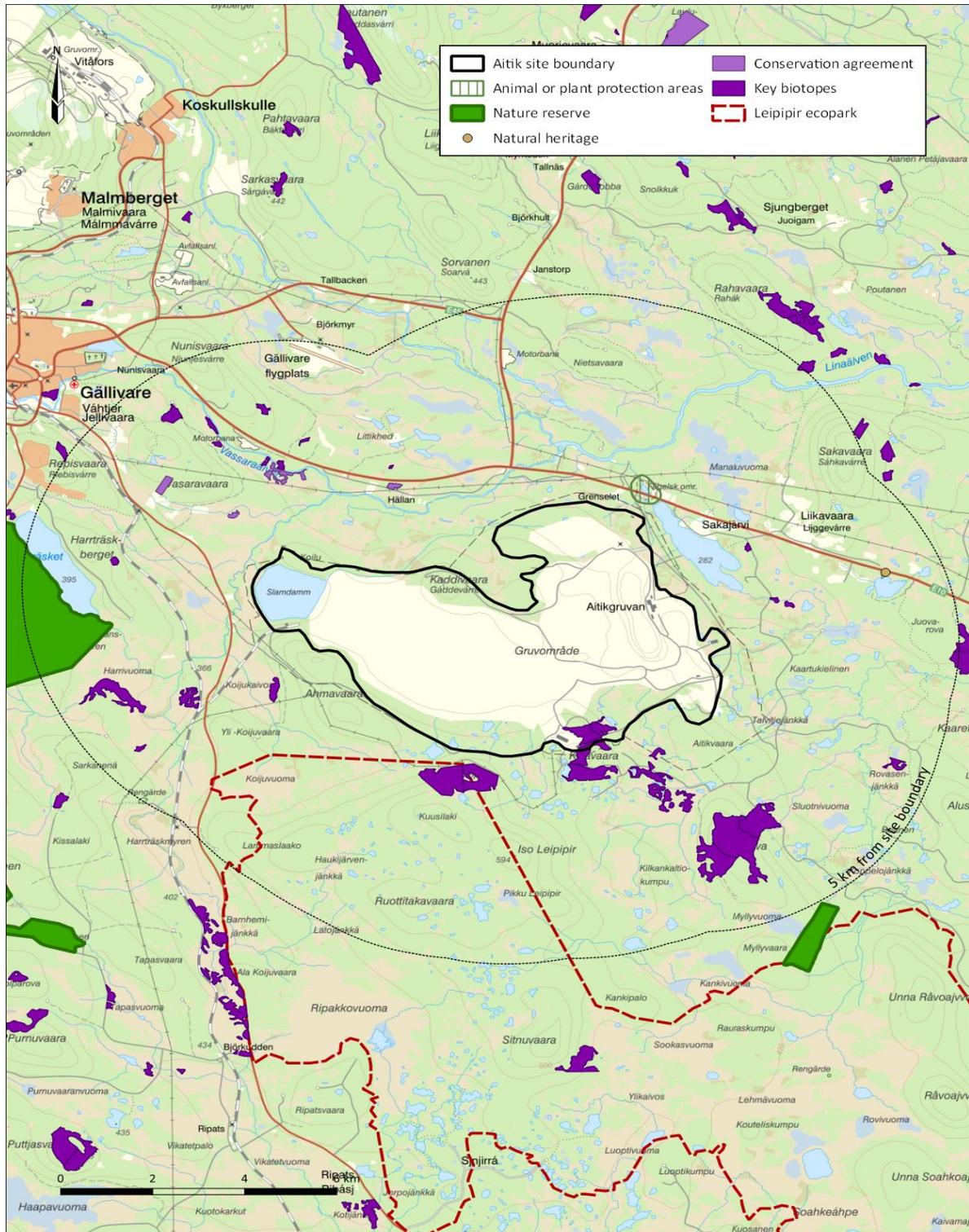


Figure 7. Map illustrating nature reserves and other protected areas around Aitik (up to 5 Km radius)

Key biotopes

- In the surroundings of Aitik, there are several of key habitats identified by forest management agency, Skogsstyrelsen:

Ätnarova (Area within 5, 10 15 km)

- Ätnarova is a small nature reserve founded in 1971 with an area of 0,8 square kilometers. It is located about 20 kilometers southeast of Gällivare.
- Inside the pine forest, smaller areas with spruce and birch forest are concentrated. The northern part of the nature reserve is quite mountainous, with numerous mighty moraine-like formations.
- The southern part comes with a flat moraine land with sparsely grown pine forest and rocky stable forest. Across the reserve goes a wide marsh, which narrows into a stream to the east.

Kuolpajärvi (Area within 5, 10 15 km)

- The nature reserve spreads out on the southern slope of Mount Kuolpakorronen all the way down towards Lake Iso Kuolpajärvi (figure 10). The area is also rich with old, dead trees that offer important habitats to the species residing within.
- Towards the upper parts of Kuolpajärvi, ground structure is drier, and the pine trees are low, rough and have low-profile branches. In the lower parts of the reserve, the slope levels out and the stock turns into a sparse spruce forest with a lot of birch trees.
- Kuolpajärvi reserve is rich in species such as *Amylocystis lapponica*, *Postia lateritia* and *Fomitopsis rosea*.



Figure 8. View of Kuolpajärvi nature reserve (Lansstyrelsen, Norrbotten Norrbotten County Administrative Board)

Sieleäkienien (Area within 5, 10 15 km)

- The area covers 90 ha.

3.2. Other Areas of Interest

Leipipir (Area within 5, 10 15 km)

- Eco-park Leipipir is located 20 kilometers southeast of Gällivare in Norrbotten County, and directly south of Aitik. It holds a size of 13 100 ha, of which 7 450 ha are forest land.
- Leipipir's eco-park was opened in 2006 and essentially consists of a large pathless mountainous forest area with neighboring woods in the north and fire-affected pine forests in the south.

- The park also holds hilly mountains, and several lakes. One of the species registered within the area is the three-toed woodpecker. Likewise, Leipipir offers teeming bird-rich wetlands, rich wildlife, hunting grounds and fine mushroom and berry fields. The area has always been vital for reindeer husbandry.

Sakalombolo (Area within 5, 10 15 km)

- A lake directly north of Aitik, by the road E10.
- It is an animal and plant protection area that covers around 32 ha.
- The main reason for protection is migrating birds.

3.3. Compensation Areas Protected by Boliden

- Currently, the compensation area consists of two sub-areas: Sarkanenä, which borders Ekopark Leipipir's northwestern corner, and Sjnjirrá, located directly south of it, just northwest of the village of Nuortikon (figure 9).
- The areas, which are located 5 km west-southwest and 10 km south of the impact area, are characterized by older forest in moorland and larger contiguous areas with older, leafy self-rejuvenated coniferous mixed forest that has been affected to varying degrees by dimensional felling. The forests have never been clear-cut, but generally have a lack of important natural forest structures, especially dead wood.
- In both sub-areas, however, there are smaller parts with natural forest-like forest that can function as important core areas in the forthcoming compensation work.
- Scattered in the areas grow coarse deciduous trees that are often crowded with growing spruce. In the sub-areas, there are a number of nature conservation species, some of which have been identified in previous inventories.

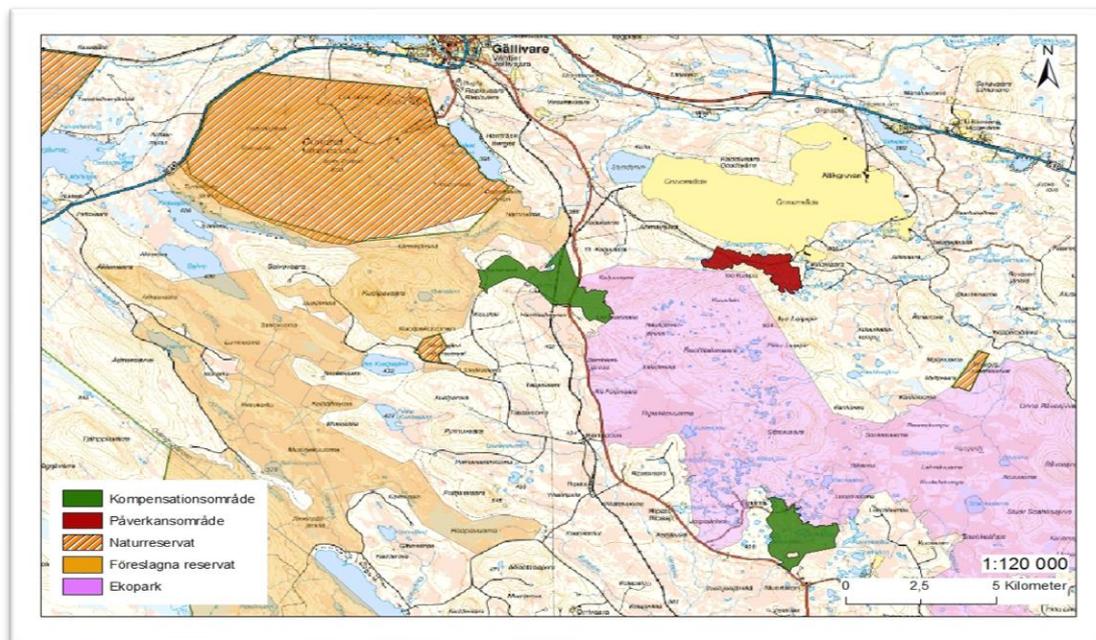


Figure 9. Overview map with the Aitik area, the impact area and the compensation area (Sarkanenä in the west and Sjnjirrá in the south). (Översiktskarta med Aitikområdet, påverkansområdet och kompensationsområdet 1:120 000. In: Forsgren A. "Kompensationsplan: utökning sandmagasin Aitik" (2016): 6)

Sarkanenä

- The sub-area Sarkanenä is an approximately 527 ha area (productive forest land) located directly west of Ekopark Leipipir, about 2,500 km south of Gällivare, Norrbotten County (see figure 10).
- The forest on Lammaslako's western slope is characterized by a fir-dominated coniferous forest in slightly broken terrain and smaller ravines. The forest is consistently old (> 150 years) with occasional pine overhangs, but clearly affected by dimensional felling.

- Where the area borders the eco-park, the forest is late-growing and here the element of really old pine (> 500 years) increases. The supply of dead wood is generally low with occasional standing dry trees and spruce flames with e.g., *Inonotus leporinus* (NT), wood tick (*Dermacentor variabilis*, NT) and the purple bean (*Villosa perpurpurea*, NT).
- Further to the northwest, the forest is significantly younger (80-130 years) and the leaf cover is larger, mainly of bouquet-shaped birch and older deciduous trees, including tree lungwort (NT) and textured lungwort (NT).
- Traces of older forest fires are found in the form of old pines with fire sounds. Lichen warbler and three-toed woodpecker (NT) occur in the area, and on older spruces both old spruce bow (NT) and bluegrass bluegrass ridge gnarl (NT) grow (Enetjärn Natur 2014b, Sveaskog 2014b-c).
- Along the southern edge of the subarea Sarkanenä, runs a marked hiking trail, Hermelin's riding trail. The trail then extends further through Ekopark Leipipir. In total, Sarkanenä covers 327 hectares of forest land and 144 hectares of wetlands.

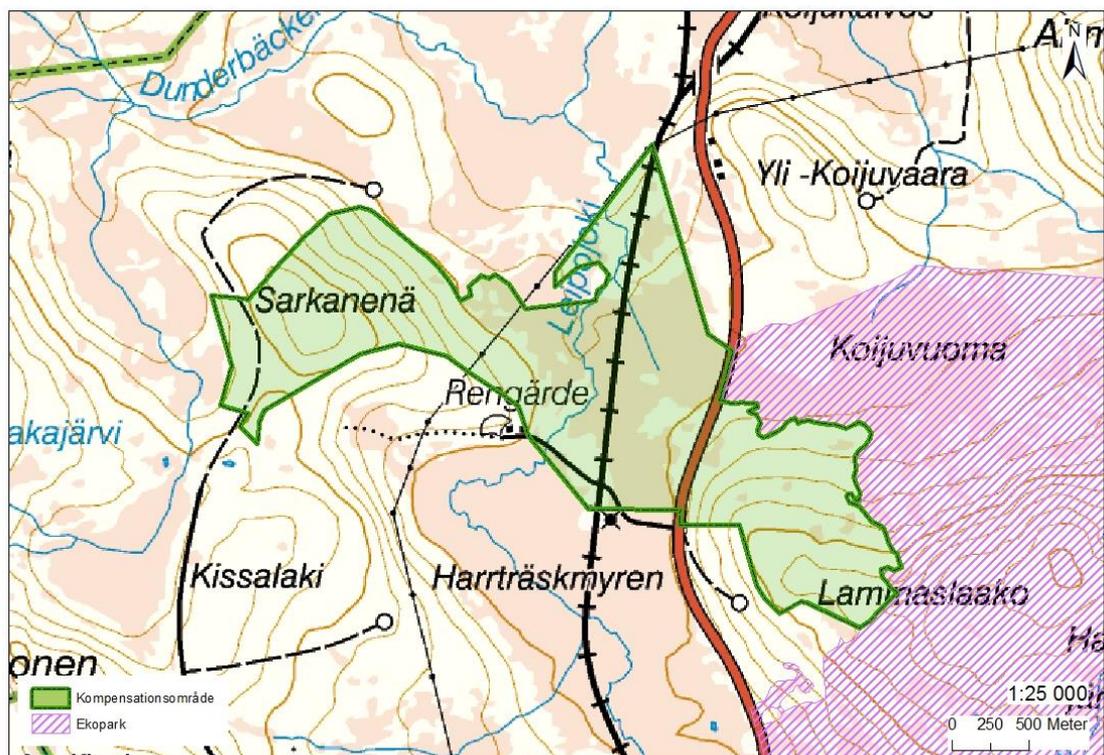


Figure 10. Sarkanenä sub-area (Delområde Sarkanenä. 1:25 000. In: Forsgren A. "Kompensationsplan: utökning sandmagasin Aitik" (2016): 8)

Sjnirrä

- Sub-area Sjnirrä is an approximately 370 ha forest and marsh area located directly south of eco-park Leipipir (figure 11).
- The forest in the area has a very varied age structure and tree species composition. Closest to the eco-park in the north are fire-marked, hilly pine fields that were cut down in the 1950s. There are still a few pinecones up to 400 years old left.
- The supply of lying dead wood here is good and consists mainly of medium-coarse and coarse shabby flames in varying stages of decomposition. On pine flames, red-listed species such as boreal species *Antrodia albobrunnea* (VU) and *Anomoporia kamtschatica* (NT) have been found, as well as fungus species *Hydnum repandum* (VU) on the ground under old dead wood.
- Standing dead trees, however, occur sparingly. In the area there are several smaller ponds and stretches of bogs.



Figure 11. Sub-area Sjnjirrá (Delområde Sjnjirrá. 1:25 000. In: Forsgren A. "Kompensationsplan: utökning sandmagasin Aitik" (2016): 10)

- In the central parts, pine dominates the coniferous forest. Here, the average age is significantly lower (about 100 years), but individual pines and spruces are assumed to have an age of 200-250 years. The leaf element is clear with older birch and occasional willow. The supply of dead wood in the form of rotten spruce and spruce flames is good. On the latter, fungus species like *Porodaedalea chrysoloma* (NT), *Phellinidium ferrugineofuscum* (NT) and *Asterodon ferruginosus* (NT) have also been found. To the east, a larger wetland area spreads out, which in the wetland inventory was judged to have the highest nature value class, and to the southwest there is a smaller stand with deciduous forest (> 70%) which is partly swamp forest-like.
- In the far south, a forest-bog mosaic spreads out to the southwest. The area is classified as a key biotope and consists of old spruce forest with a clear element of birch and pine and crossed by smaller streams. The part of the key biotope (approx. 13 ha) located north of Nattavaaravägen is included in the compensation area.
- In the sub-area Sjnjirrá, no more detailed species inventories have been carried out, which is why identified species should be seen as an indication of which species other species may be present in the area.

3.4. Planned ecological compensation

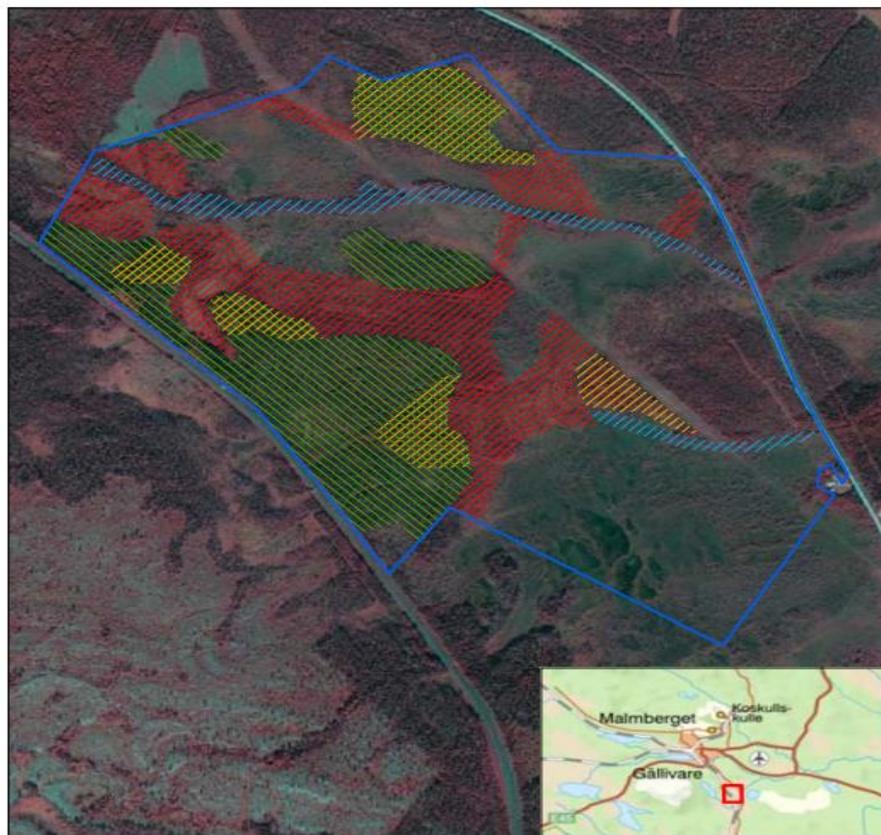
In connection with the planned activities at Liikavaara's open pit, Boliden will claim land where certain parts have high natural values. This land consists of smaller areas with natural cross-type forest and is deemed important for different species associated with varied and affected wetlands. Some wetlands and water courses restoration plans at *koijukaivos Norra* are illustrated in figure 12.

The company has started an investigation into the possibilities of compensating for the natural values that will be affected or likely to disappear. The work has resulted in a compensation study that aims to identify and justify relevant measures to:

- Offset the loss of natural environments that will occur;
- The impact on conservation species that are expected to occur; and
- The impact on reindeer husbandry.

This plan is based on the previous compensation investigation and forms a strategy on how the work of securing the function of the compensation is carried out and followed up. The plan outlines how the compensation measures are to be implemented. For all natura2000 habitat types, there is a definition of what constitutes a favorable conservation status for that particular habitat type, as well as follow-up methods to ensure the conservation status.

The care and restoration rates of habitats proposed in this plan are designed in a way that outweighs the losses of habitats that occur in the impact area. Particularly, using natura2000 habitat types as a target, the planned methods can be used to qualitatively and quantitatively, verify the follow-up towards the other habitats and species of interest to the ecological function of each habitat type.



- Legend:
- Proposed delimitation- kojukaivos Norra
 - Dam of ditches in bog
 - Dam of ditches in forest
 - Recreate natural furrows in watercourses
 - Create and add dead wood

Figure 12. Introduction of kojukaivos Norra compensation plan as planned in various sub-areas for proper care and restoration measures (Ecogain "Kompensationsutredning och kompensationsplan för Liikavaara" (2020) 43))

4. RED-LISTED SPECIES AND CONSERVATION LIST SPECIES IN AREAS AFFECTED

For this section, the following information were compiled from an investigation on the species occurring in the area around the Aitik. This investigation was run by one of Boliden's consulting companies (Ecogain) and involved an analysis regarding species covered by Artskyddsförordningen.

Table 1: Species listed in the species protection act that has been identified in or close to the Liikavaara mine development project (see Appendix 1 and 2)

Area	Present in the investigated area	Not identified
Åkergroda (<i>Rana arvalis</i>)		X
Bred gulbrämad dykare (<i>Dytiscus latissimus</i>)		X
Common european viper / Huggorm (<i>Vipera berus</i>)		X
Viviparous lizard / Skogsödla (<i>Lacerta vivipara</i>)		X
Vanlig Groda (<i>Rana temporaria</i>)	X	
European toad / Vanlig Padda (<i>Bufo bufo</i>)		X
Lappranunkel (<i>Coptidium lapponicum</i>)	X	
The Heath spotted orchid / Fläcknycklar (<i>Dactylorhiza maculata</i>)	X	
Fragrant orchid / Brudsporre (<i>Gymnadenia conopsea</i>)	X	
Creeping lady's-tresses / Knärot (<i>Goodyera repens</i>)	X	
Heartleaf twayblade / Spindelblomster (<i>Neottia cordata</i>)	X	
Early marsh-orchid / Ängsnycklar (<i>Dactylorhiza incarnata</i>)	X	
Leathery grapefern / Höstlåsbräken (<i>Botrychium multifidum</i>)	X	
Northern firmoss / Lopplummer (<i>Huperzia selago</i>)		X
Stag's-horn clubmoss / Mattlummer (<i>Lycopodium clavatum</i>)	X	
Groundcedar / Plattlummer (<i>Diphasiastrum complanatum</i>)	X	
Interrupted clubmoss / Revlummer (<i>Lycopodium annotinum</i>)	X	

Species	Red list category	Birds' directive appendix 1	Documented occurrence	Probable /Possible Occurrence
Brambling / Bergfink (<i>Fringilla montifringilla</i>)			X	
Fieldfare / Björktrast (<i>Turdus pilaris</i>)	NT		X	
Eurasian blue tit / Blåmes (<i>Cyanistes caeruleus</i>)				X
Eurasian wigeon / Bläsand (<i>Mareca penelope</i>)	VU		X	
Common chaffinch / Bofink (<i>Fringilla coelebs</i>)			X	
Black kite / Brun glada (<i>Milvus migrans</i>)	EN	X	X	
Whinchat / Buskskvätta (<i>Saxicola rubetra</i>)	NT		X	
Two-barred crossbil / Bändelkorsnäbb (<i>Loxia leucoptera</i>)				X
Willow Ptarmigan / Dalripa (<i>Lagopus lagopus</i>)			X	
Eurasian bullfinch / Domherre (<i>Pyrrhula pyrrhula</i>)			X	
Mistle thrush / Dubbeltrast (<i>Turdus viscivorus</i>)			X	
Northern goshawk / Duvhök (<i>Accipiter gentilis</i>)	NT			X
Little bunting / Dvärgsparv (<i>Emberiza pusilla</i>)	VU		X	
Common snipe / Enkelbeckasin (<i>Gallinago gallinago</i>)			X	
Common greenshank / Gluttsnäppa (<i>Tringa nebularia</i>)			X	
Common chiffchaff / Gransångare (<i>Phylloscopus collybita</i>)			X	
Spotted flycatcher / Grå Flugsnappare (<i>Muscicapa striata</i>)			X	
Common redpoll / Gråsiska (<i>Acanthis flammea</i>)			X	
House sparrow / Gråsparv (<i>Passer domesticus</i>)				X
Mallard / Gräsand (<i>Anas platyrhynchos</i>)				X
Wood sandpiper / Grönbena (<i>Tringa glareola</i>)		X	X	
European greenfinch / Grönfink (<i>Chloris chloris</i>)	EN		X	
Eurasian siskin / Grönsiska (<i>Spinus spinus</i>)			X	

Yellowhammer / Gulsparv (<i>Emberiza citronella</i>)	NT			X
Western Yellow Wagtail / Gulärta (<i>Motacilla flava</i>)			X	
Common cuckoo / Gök (<i>Cuculus canorus</i>)			X	
Eurasian wryneck / Göktyta (<i>Jynx torquilla</i>)			X	
Northern hawk-owl / Hökuggla (<i>Surnia ulula</i>)		X		X
Short-eared owl / Jorduggla (<i>Asio flammeus</i>)		X		X
Dunnock / Järnsparv (<i>Prunella modularis</i>)			X	
Hazel grouse / Järpe (<i>Tetrastes bonasia</i>)	NT	X		X
Common goldeneye / Knipa (<i>Bucephala clangula</i>)			X	
Common blackbird / Koltrast (<i>Turdus merula</i>)				X
Common raven / Korp (<i>Corvus corax</i>)			X	
Eurasian teal / Kricka (<i>Anas crecca</i>)	VU		X	
Hooded crow / Kråka (<i>Corvus cornix</i>)	NT		X	
Goldcrest / Kungsfågel (<i>Regulus regulus</i>)				X
Barn swallow / Ladusvala (<i>Hirundo rustica</i>)			X	
Grey-headed chickadee / Lappmes (<i>Poecile cinctus</i>)	NT			X
Siberian jay / Lavskrika (<i>Perisoreus infaustus</i>)			X	
Willow warbler / Lövsångare (<i>Phylloscopus trochilus</i>)			X	
Red crossbill / Mindre Korsnäbb (<i>Loxia curvirostra</i>)				X
Eurasian woodcock / Morkulla (<i>Scolopax rusticola</i>)			X	
Eurasian jay / Nötskrika (<i>Garrulus glandarius</i>)				X
Black grouse / Orre (<i>Lyrurus tetrrix</i>)		X		X
Eurasian tree sparrow / Piffink (<i>Passer montanus</i>)				X
Boreal owl / Päruggla (<i>Aegolius funereus</i>)		X		X
Common wood pigeon / Ringduva (<i>Columba palumbus</i>)			X	
European robin / Rödhake (<i>Erithacus rubecula</i>)			X	
Common redstart / Rödstart (<i>Phoenicurus phoenicurus</i>)			X	

Redwing / Rödvingetrast (<i>Turdus iliacus</i>)	NT		X	
Smew / Salskrake (<i>Mergellus albellus</i>)		X		X
Bohemian waxwing / Sidensvans (<i>Bombycilla garrulus</i>)			X	
Common blackbird / Skata (<i>Turdus merula</i>)			X	
Green sandpiper / Skogssnäppa (<i>Tringa ochropus</i>)				X
Eurasian sparrowhawk / Sparvhök (<i>Accipiter nisus</i>)				X
Eurasian pygmy owl / Sparvuggla (<i>Glaucidium passerinum</i>)		X		X
Black woodpecker / Spillkråka (<i>Dryocopus martius</i>)	NT	X		X
Merlin / Stenfalk (<i>Falco columbarius</i>)	NT	X		X
Northern wheatear / Stenskvätta (<i>Oenanthe oenanthe</i>)			X	
Great spotted woodpecker / Större hackspett (<i>Dendrocopos major</i>)			X	
Parrot crossbill / Större Korsnäbb (<i>Loxia pytyopsittacus</i>)				X
Eurasian blackcap / Svarthätta (<i>Sylvia atricapilla</i>)				X
Coal tit / Svartmes (<i>Pariparus ater</i>)				X
Spotted redshank/ Svartsnäppa (<i>Tringa erythropus</i>)	NT			X
Spotted redshank / Svartvit Flugsnappare (<i>Tringa erythropus</i>)	NT		X	
White wagtail / Sädessärla (<i>Motacilla alba</i>)				X
Common reed bunting / Sävsparv (<i>Emberiza schoeniclus</i>)	NT		X	
Great tit / Talgoxe (<i>Parus major</i>)			X	
Pine grosbeak / Tallbit (<i>Pinicola enucleator</i>)	VU			X
Willow tit / Talltita (<i>Poecile montanus</i>)	NT		X	
Song thrush / Taltrast (<i>Turdus philomelos</i>)			X	
(<i>Tetrao urogallus</i>) / Tjäder (<i>Tetrao urogallus</i>)		X	X	
European crested tit / Tofsmes (<i>Lophophanes cristatus</i>)				X
Common kestrel / Tornfalk (<i>Falco tinnunculus</i>)			X	
Common swift / Tornseglare (<i>Apus apus</i>)	EN		X	

Common crane / Trana (<i>Grus grus</i>)		X		X
Eurasian three-toed woodpecker / Tretåig Hackspett (<i>Picoides tridactylus</i>)	NT	X		X
Garden warbler / Trädgårdssångare (<i>Sylvia borin</i>)				X
Eurasian treecreeper / Trädkrypare (<i>Certhia familiaris</i>)				X
Tree pipit / Trädpiplärka (<i>Anthus trivialis</i>)			X	
Rustic bunting / Videsparv (<i>Emberiza rustica</i>)	NT		X	
Meadow pipit / Ängspiplärka (<i>Anthus pratensis</i>)				X
Lesser whitethroat / Ärtsångare (<i>Curruca curruca</i>)	NT			X

Table 2: List of appointed species in area Natura 2000 in Torne and Kalix river system (SE0820430)

Identified species	Number
River pearl mussel (<i>Margaritifera margaritifera</i>)	1029
Green river dragonfly (<i>Ophiogomphus cecilia</i>)	1037
Salmon (<i>Salmo salar</i>)	1106
Stensimpa (<i>Cottus gobio</i>)	1163
Utter (<i>Lutra lutra</i>)	1355
Venhavre (<i>Tristum subalpestre</i>)	1977

Table 3: List of appointed habitats found in area Natura 2000 in Torne and Kalix river system (SE0820430)

Identified Habitat	Number	Total Area Percentage
Ävjestrandsjöar- oligo-mesotrophic lakes	3130	36
Myrjöar- dystrophic lakes and smaller waters	3160	4
Larger watercourses	3210	27
Alpin watercourses	3220	1
Smaller watercourses	3260	0.02

Table 4: Presence of bird species covered by the species protection ordinance (artskyddsförordningen) that was identified during the Aitik45 project (Appendix 1)

Area	Presence in the investigated area	Likely to exist
Whooper swan / Sångsvan (<i>Cygnus cygnus</i>)		X
Smew / Salskrake (<i>Mergellus albellus</i>) - Near Threatened (Nt)		X
European honey buzzard / Bivråk (<i>Pernis apivorus</i>) - Vulnerable (Vu)		X

Blue marsh hawk / Blå Kärrhök (<i>Orthetrum glaucum</i>) - Nt		X
Rough-legged buzzard / Fjällvråk (<i>Buteo lagopus</i>) - Nt	X	
Peregrine falcon / Pilgrimsfalk (<i>Falco peregrinus</i>) - Vu	X	
Merlin / Stenfalk (<i>Falco columbarius</i>)		X
Hazel grouse / Järpe (<i>Bonasa bonasa</i>)	X	
Black grouse / Orre (<i>Tetrao tetrix</i>)		X
Capercaillie / Tjäder (<i>Tetrao urogallus</i>)	X	
Common crane / Trana (<i>Grus grus</i>)		X
Wood snpiper / Grönbena (<i>Tringa glareola</i>)	X	
Nothern hawk owl / Hökuggla (<i>Surnia ulula</i>)		X
Eurasian pygmy owl / Sparvuggla (<i>Glaucidium passerinum</i>)		X
Tengmalm's owl / Päruggla (<i>Aegolius funereus</i>)		X
Black woodpecker / Spillkråka (<i>Dryocopus martius</i>)		X
Three-toed woodpecker / Tretåig hackspett (<i>Picoides tridactylus</i>) - NT	X	
Siberian tit / Lappmes (<i>Parus cinctus</i>) - NT		X
Siberian jay / Lavskrika (<i>Perisoreus infaustus</i>) - NT	X	
Rustic bunting / Videsparv (<i>Emberiza rustica</i>) - NT		X

Table 5: Presence of species within the investigation area of the Aitik mine development project (Aitik 45) (Appendix 1)

Area	Presence in the Study Area	Likely to Exist
Nothern bat / Nordisk fladdermus (<i>Eptesicus nilssonii</i>)		X
Bear		X
Eurasian Lynx / Lodjur (<i>Lynx lynx</i>)		X
Moor frog / Åkergröda (<i>Rana arvalis</i>)		X

Lapland buttercup / Lappranunkel (<i>Ranunculus lapponicus</i>)	X	
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Table 6: Presence of species within or likely in the area of the study for Aitik45 (Appendix 1)

Area	Presence in the Study Area	Likely to Exist
Common european viper / Huggorm (<i>Vipera berus</i>)		x
Viviparous lizard / Skogsödla (<i>Zootoca vivipara</i>)		x
European common frog / Vanlig groda (<i>Rana temporaria</i>)		x
European common toad / Vanlig padda (<i>Bufo bufo</i>)		x
<i>Goodyera repens</i> / Knärot		x
Lesser twayblade or heartleaf twayblade / Spindelblomster (<i>Neottia cordata</i>)	x	
Heath spotted orchid / Jungfru marie nycklar (<i>Dactylorhiza maculate</i>)		x
Yellow coralroot / Korallrot (<i>Corallorhiza trifida</i>)		x
the northern firmoss / Lopplummer (<i>Huperzia selago</i>)		x
Revlummer (<i>lycopodium annotinum</i>)	x	
Stag's-horn clubmoss / Mattlummer (<i>Lycopodium clavatum</i>)	x	
Northern running-pine / Plattlummer (<i>Diphasiastrum complanatum</i>)	x	
Dofticka (<i>Haploporus odorus</i>)		x

5. Appendix

Appendix 1: Investigation of species covered by Artskyddsförordningen, occurrence and impact



Artskyddsutredning Boliden Aitik 2130416 .pdf

Appendix 2: List of S Species listed in the species protection act that has been identified in or close to the Liikavaara mine development project



Species Liikavaara.pdf

6. References

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