



From Kiruna to Giron

Reimagining Kiruna by Integrating Indigenous Perspectives
in Landscape Rehabilitation

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I would like to start thanking the Swedish Institute for the generous scholarship they offered me and that made my studies from the last two years possible. The scholarship opened so many doors for me and I will forever be grateful for the trust they put in me. I hope many others get to have this amazing chance after me.

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Abstract

This independent project addresses the decolonization of the Kiirunavaara Mine's landscape post-closure, focusing on landscape remediation, reclamation, and rehabilitation guided by Sami perspectives to promote the return of the ecosystem services, focusing on reindeer herding. Indigenous communities have the right to self-determination and deserve the restoration of their lands. This project serves as an example of decolonization and sets a precedent for land rehabilitation as other mines across Sweden close.

The project identifies a research gap due to limited literature on the decolonization of mines and the return of land to indigenous peoples. It specifically explores how the decolonization of the Laevas and Gabna Sami Villages' winter pastures, encroached by the Kiirunavaara mine, could be achieved.

To address these objectives, the research includes a comprehensive literature review on the historical and physical context of the area, theories on decolonization and sense of place, and the Sami concept of meahcci to start understanding their perspective on the landscape. Site analysis through visits and mapping exercises, along with art analysis of Duodji, roughly translated to Sami art, further inform the project. The outcome is a conceptual proposal integrating remediation, reclamation, and rehabilitation practices, presented through three consecutive scenarios spaced 15 years apart, representing the transition from Kiruna to Giron.

Key findings highlight the importance of participation and community involvement in the decolonization process, which spans decades. The project reflects an understanding of landscape decolonization through traditional Sami knowledge, learned from Sami sources, and Sami art analysis, extended to the landscape planning. However, it acknowledges limitations, particularly the absence of direct Sami participation, which is a significant gap in the research and design process.

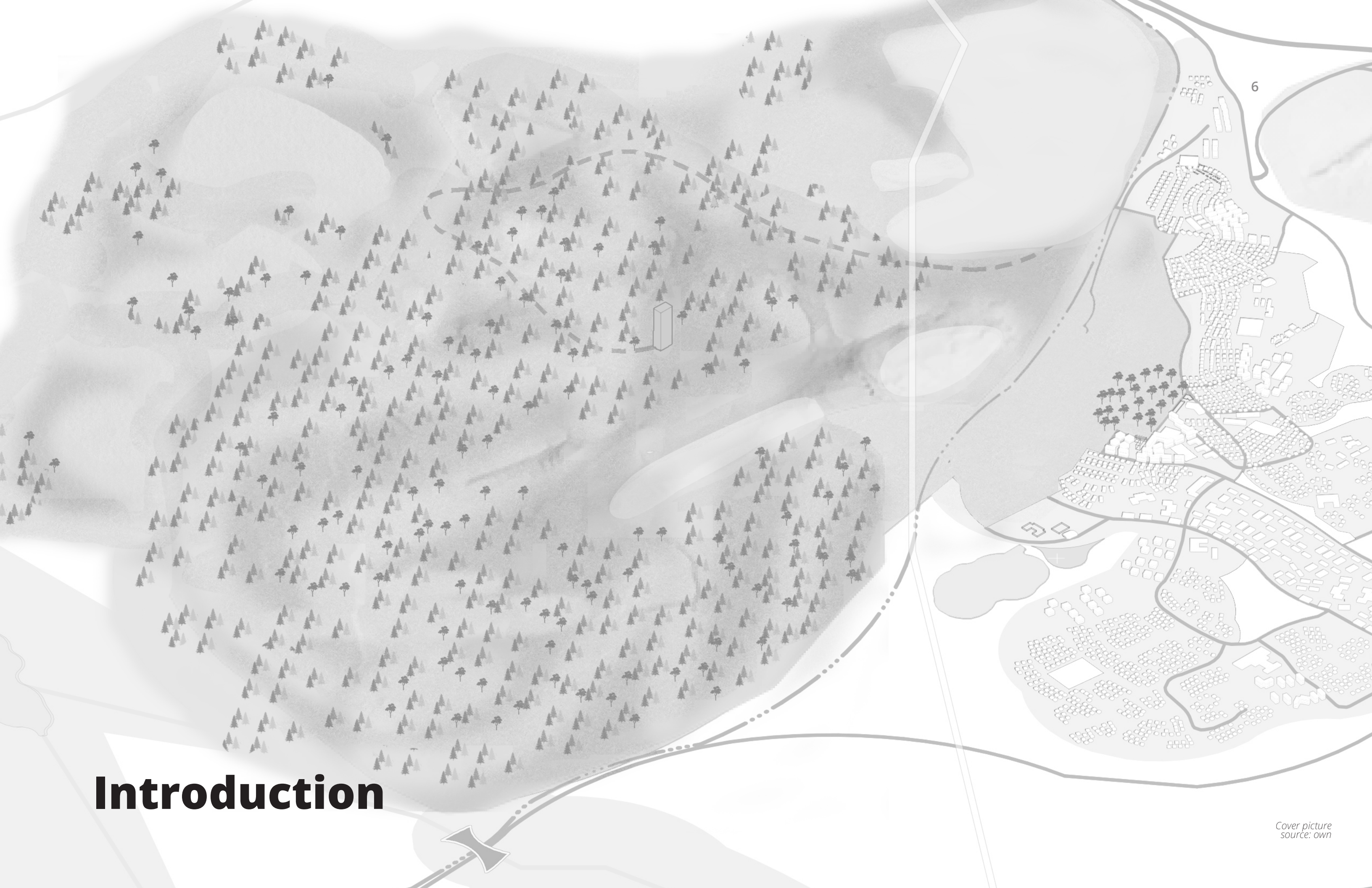
In conclusion, this thesis proposes a plan for the remediation of the Kiirunavaara mine and calls for broader recognition and respect for the Sami's cultural and environmental rights. By reimagining Kiruna as Giron, the project aims to heal the land and restore the cultural heritage of the Sami people, offering a path toward reconciliation and a new sense of place.

Key words: *Decolonization, Kiruna, Giron, Landscape Remediation, Reclamation, Rehabilitation, Sami, Sami Culture, Reindeer herding, Indigenous Traditional Knowledge, Self-Determination, Landscape Architecture*

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Introduction

Introduction

Kiruna is a town in Northern Sweden that has been under the eye of the whole world because of its ongoing transformation. It is a mining town, also known for its tourism because of the possibility to see the northern lights. Kiruna is a relatively new town with a settler colonialism background, having been founded on Sapmi territory. The settler town's main purpose for several years has been being there for the mine, creating a dependant relationship between the people of the town, like the miners, and people that provide other services to the mine through the years. In 2003, LKAB announced that the growth of the mine is making the ground of the city unstable and it has forced people to leave their homes and relocate the city center 3km away. The mine has had several repercussions throughout its history for the Sami reindeer herder community, being only one of many around Norrbotten.

This thesis dives into the history of Kiruna, understanding the historical and environmental injustices as a consequence of the Kiruna mining industry that has ruled the Municipality for more than a century. This analysis allows a better understanding of the difficulties the reindeer herding Sami Villages have endured and how they have been affected by centuries of colonialism. This historic analysis aims to inspire a project to re-imagine the future of Kiruna after the mine closes, with a proposal that gives back the land used by the mine to the herders. The project will propose a possible remediation and rehabilitation of the mine's grounds and return the land to the Laevas and Gabna Sami Villages. It can also set an example of how land rehabilitation should be carried out when the other mines of Sweden are closed as well.

The objective throughout the thesis consists of exploring the impact the Kiirunavaara Mine has had on the Laevas and Gabna reindeer herding Sami Villages. Furthermore, investigating the different remediation and rehabilitation practices dictated by the laws of Sweden for mining sites, and how they can be used and applied to the landscape for both ecological rehabilitation to fulfill the necessities of the reindeer herding communities. The research will be applied on a conceptual project for which the main inspiration will come from Sami art portraying landscapes. The proposal should help answer the question of what the remediation and rehabilitation process of the Kiirunavaara mine should look like in order to return a part of the winter pastures of the Laevas and Gabna Sami Villages after the mine closure and for it to recover its previous ecosystem services of reindeer migration?

Methodology

The methodology consists of:

- A **comprehensive literature review** on indigenous rights, Sami history and perspective, understanding the Sami reindeer husbandry industry, history of LKAB and the Kiirunavaara mine, landscape remediation, and analogue cases of mine remediation and reclamation projects.
- **Site analysis:** Evaluate the environmental, cultural, and social context of Kiruna and its surrounding landscapes through site visits and mapping exercises.
- **Art analysis:** Analyze different art pieces done by Sami artists, to understand and interpret how they understand, use and see their land and how they wish it would be. The selected artist are Ragnar Mathisen and Britta Marakatt-Labba.
- **Planning Proposal:** Generate conceptual planning proposals that integrate Sami environmental views, remediation and reclamation and rehabilitation strategies to give back the land used by the Kiirunavaara Mine to the Leavas and Gabna Sami Villages.

Positionality

As a master's student from Guatemala, I initially had little knowledge about the Sami situation before I started my thesis. However, I was immediately drawn to the deep and controversial history of the area. Coming from a country that was colonized many centuries ago and continues to experience its repercussions, I found parallels between the Sami experience and that of my own people. Land expropriation and exploitation are not new concepts to me, but researching these issues in a different context provided new perspectives and ideas on how to address them in Guatemala. Through my research on the impacts of mining and colonization on the Sami community, and my brief visit to the area, I have only begun to scratch the surface of this complex and intricate situation.

As an architect from Guatemala, I am an outsider to both Swedish and Sami cultures. My perspective is that of a third person, trying to understand the situation through scientific articles and not through lived experience or indigenous heritage. Although I have great respect and admiration for Sami culture, I recognize the limitations of my understanding. My research has highlighted that the more I learn about the Sami, the more I realize how much there is still to understand. I cannot claim to fully grasp the nuances of their situation without having had extensive, personal conversations with Sami individuals, which I have not had the opportunity to do.



*Image No. 1: Kiirunavaara Mine seen from town
source: own*

There has been a significant barrier in accessing knowledge from Sami sources. The Sami Parliament (Sametinget) and other Sami-operated websites have been invaluable, but I have found few scientific articles on Sami culture and reindeer herding written by Sami people themselves. Language has been another significant obstacle. Translating information coming from Sami or Swedish, and then from Swedish to English, which is not my mother tongue, has undoubtedly led to some misunderstandings along the way. Nevertheless, I made every effort to use the Sami names for places, following the example of other researchers on the topic, to honor the indigenous terminology and perspectives as much as possible. Despite these challenges, I can confidently say that I did my best to understand and explain the situation to the best of my ability. My aim is to make a meaningful contribution to the discourse on indigenous rights, specifically advocating for Sami rights. My thesis attempts to bridge cultural and linguistic gaps, striving to respect and accurately represent the Sami perspective while acknowledging the limitations inherent in my outsider's viewpoint.



*Image No. 2: Streetart found in Kiruna
source: own*

Personal observations from Kiruna

I had the opportunity to visit Kiruna in February 2024, in an attempt to understand the dynamic from the town as an outsider. I knew the town had to be moved because of the mine, and was so intrigued about the reasoning behind that thought. It is a kind of ironic event, since the Sami's were the first ones to be displaced by the mine, and now it is happening to the people living in the town as well... This is where I wonder, is there no end to the power of the mine? How can the mine get so many privileges, and feels so entitled to the land regardless of the damage it can be causing the people in its way?

When I was there and saw the intimidating mine, I thought even from afar, it looks like an otherworldly landscape, contrasting with the rest of the coniferous forest mountains around. The whole city seems to be dominated by the mine, with cars driving around with the logo, LKAB spreads all around the town, there always seems to be someone that works there. The explosions of the mine at midnight made the whole house where I was staying tremble and the thought of the mine swallowing the town did not let me sleep... I wonder what effect the fact that their city is sinking can have on the people from Kiruna? "The mine eats us and feeds us" was the comment from a man when asked about the moving of the city.

The old town looked nice, traditional, and Christmas postcard worthy. The Swedish houses are in different but limited colors, all the same or similar shape, all around the same size... excellent illumination infrastructure, beautiful views of the landscape and surrounding nature. The view from the famous and beautiful church is surrounded by deciduous trees, all snowed in. Nevertheless, it is a car centered town, with badly functioning public transport. The city is mainly residential, with lots of houses and very few commerce, restaurants, shops... Not much activity going on during the day or night on the streets apart from people walking their dogs. Everyone just seems to be home all the time.

The Nya Center (New Center) looks more corporate, with less character. Contemporary buildings that could easily be placed in Stockholm... And who is stopping LKAB from moving the buildings to Stockholm in a few years anyways? Instead of 2 - 3 story high buildings, now the center feels more surrounded by tall 6 story high buildings. The Municipality, accompanied by the old tower (that seems a bit out of place), dominates the main plaza, a big hotel and banks, which immediately lets everyone know, the city is not built for the Kirunians, it's a show for the visitors.

The city felt as if it was full of tourists from around the world. Coming and leaving after a few days, only spending time doing tours, going through the nature the guides (that aren't even locals) take them to. The tours put on a show, snowmobiles, dogsledding, driving through the forest. It sounds amazing, nevertheless, the amount of people, and the amount of noise pollution, of CO2 pollution, surely affect the ecology of the place, disturbs the animals and interrupts the life of the forest. Tourism seems to be profiting from the land and not giving anything back.

The municipality is focusing on growing the tourism industry, looking to provide more accommodation and improve the city for the visitors. People from Kiruna have an income from tourism as well, having AirBnBs, cleaning services, taxis, and the locals seem well accustomed to the outsiders. However, all these businesses are just making everything more expensive and promote a constant gentrification of the land. A new type of colonialism on top of the one established by the mine.

The idea came to mind of what will happen when the mine stops mining, the resources are finished and there is no more iron ore or rare earths altering. What will happen to the town that cost billions to move? Will it still be alive after its main economy is gone? Will tourism be able to keep the town alive? What happens to the big hole left behind by the mining? Who will want the land and who will use the land, after it has been damaged and polluted? According to Swedish laws, when a mine closes the company is responsible to remediate the area used for mining. This means that the area needs to be cleaned from pollutants, but it does not talk about rehabilitation. Rehabilitation means reinstating the land to its original state, which would be a great opportunity for the state to return a bit of the land that has been taken away from Sapmi, and for the Sami to recover reindeer husbandry territory. This process of decolonization of the land could take place in Kiruna and in the rest of Sapmi, and is something to consider.

These reflections over the lived experience in Kiruna led to the main idea of the independent project: the reimagining of a new Kiruna, where the mine has been remediated and the land rehabilitated for the Sami to re-occupy their place. The inspiration came when watching the artwork of the Airbnb where I was staying, a portrait of Kiruna by a Swedish artist, which portrayed Kiruna as very urban and new. This contrasted with my conception of the town when finding streetart of a sign of stolen reindeers while walking on the new part of town. Two different perspectives, but only one is socially and culturally accepted. The project will propose the change of mindset, a Kiruna not colonized by exploitation but enjoyed and rehabilitated for their Original People.

Background context and history

Kiruna is located in Northern Lapland in the Norrbotten county, Sweden. The landscape consists of Northern Boreal forests, marshes, lakes, rivers and mountains, including Kebnekaise, Sweden's highest mountain. (Visit Sweden. 2023) The Municipality is located over Sapmi territory, and 26% of it is protected nature. (Kiruna Kommun. 2020) Two Sami Villages, Laevas and Gabna, have their year round pastures in the municipality. Kiruna is the biggest municipality in Sweden with 19,447 square kilometers.

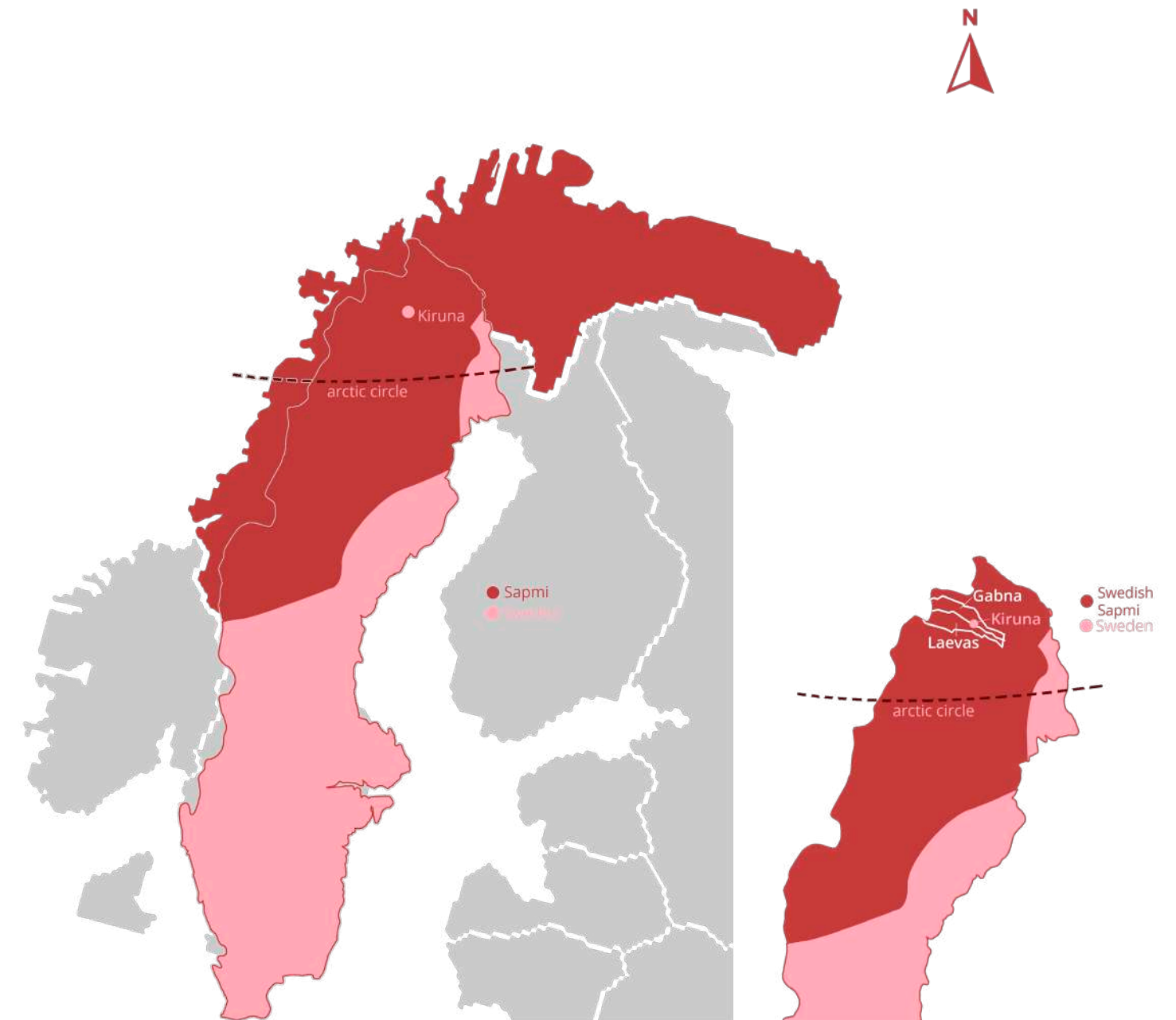
Kiruna has been populated since ancient times, its name being originally Giron in Sami language. Human remains have been found from 6,000 years ago. Kiruna has been inhabited by the Sami and Finnish people before the first Swedish colonial settlers arrived during the 17th century. (Kiruna Kommun. 2021) The town was founded in 1899 in the middle of the aforementioned 2 Sami Villages and became an official municipality in 1908. An estimate of 22,423 inhabitants live in the Municipality and an estimate of 17,513 inhabitants in the main town while the rest live in surrounding villages. (Statistics of Sweden 2022) There are several populated areas around Kiruna's Municipality, but only Kiruna has more than 1,000 habitants. (Backman 2015)

Kiruna is well known because of the LKAB Mine (Luossavaara-Kiirunavaara AB). Around 2 thirds of the population are employed by the mine. (Kiruna Municipality 2019) Other important industries in the area are tourism, space research, and reindeer husbandry, conducted by the Sami, an economy that is not always taken into consideration. The mine has had several repercussions throughout history for the Sami population especially the reindeer herders who have been severely affected.

Kiruna's Economy

Mining

The predominant industry in Kiruna is the Mining industry, which has dominated for more than 100 years now. The mine, apart from the extractive sector, provides jobs in different supporting sectors as well, such as contracting and construction, IT, transport, maintenance and business services, such as restaurants. Nevertheless, the job opportunities fluctuate depending on the iron ore price market internationally. LKAB is the main private employer from the Municipality. The Kiruna mine is expected to be mined until 2035. Exploration permits have been granted to LKAB for different deposits, like the Per Geijer deposit with rare earth metals, located north of the town. (Kiruna Municipality 2019)



Map No. 1: Location of Kiruna in Swedish Sapmi
source: own

Tourism

Tourism is another important industry for the Municipality. The visitors come mainly during the winter for skiing, mountain trekking and northern light sightseeing. Nevertheless, tourism has grown in the past years and has extended to all year round. According to the Kiruna Municipality (2018), it also attracts international visitors, who consider Kiruna as the second place in Sweden worth visiting after Stockholm. The growth in the tourism industry also demands a growth in the hospitality industry which provides different types of accommodation and entertainment like tour guides. (Kiruna Kommun 2018) Tourism has grown 7 times in 10 years during winter and has quadrupled during the summer, including national and international visitors. (Klinger, Julie & Bennett. 2023) Tourism has commercialized the Sami culture and exploited the natural phenomena of the midsummer and northern lights. (Backman 2015).

Space industry

The third industry in Kiruna is the space industry. The space oriented activities started to take place in the 1940. (Backman 2015) This one encompasses research, education and testing. Due to Kiruna's open and clear sky near the north pole, the industry has been growing. (Kiruna Kommun 2018) Esrange and The Institute for Space Physics are the facilities in charge of space research and testing. Both are planning to grow and expand, meaning a future growth in the space industry. (Kiruna Kommun 2018)

Reindeer husbandry

Finally, an important industry in Norrbotten is the reindeer husbandry, it is exclusive to the Sami people, according to the Reindeer Husbandry Act and is done by the Sami Villages or Samebys. Reindeer husbandry is done by only 10 - 15% of the Sami population and is difficult to take on, if one is not born in a reindeer herding family. (Beach 2007) The right to the herding is inherited and can be lost easily, if the sami would change professions and sell their reindeers. (Leu&Müller 2016) Other factors that can affect the reindeer industry are climate change, predators and loss of grazing rights and loss of habitat to other land uses such as mining, forestry, hydroelectric dams and recreation. This has been happening in Kiruna for a while now. (Leu&Müller 2016) The reindeer industry can also be a hard one, when the amount of reindeer possession is not enough to create enough revenue. (Leu&Müller 2016) Which has led some Sami to take on secondary complementary activities and other job opportunities, one of them being nature based tourism. (Leu&Müller 2016)

Sami Contemporary Life History of Sami spaces

The Sami are part of modern society, they use cell phones and other technology, gas for snowmobiles, GPS tracking devices for their reindeer, and technology in general like anyone else. (The history of reindeer husbandry - Same.se) Not all Sami rely on natural resources to survive anymore, many have moved to big cities and live lives as regular as Swedes. However, a significant percentage remains in Lappland and still lives their lives in communion with nature. There are around 20,000 Sami in Sweden that work in different industries. While Sami are normally linked to reindeer husbandry, they also participate in different industries. Sweden does not count ethnicity in their statistics, which makes it difficult to understand the big picture of the livelihoods of the Sami population, nevertheless, one can identify certain industries that are linked to Sami culture like: (OECD 2019)

- Reindeer husbandry companies that also carry out supplementary hunting and fishing.
- Sami companies have their traditional culture as a base such as Sami duodji (handicrafts), tourism industry, Sami food production/craft.
- Sami companies within the cultural sector based on traditional trades such as design, art, music/joik, theater, literature, photography, film, etc.
- Other companies owned by Sami but not directly linked to the Sami culture are still important from a rural perspective, for development and Sami livelihoods. (OECD 2019)

The past use of grazing lands has been negatively impacted by activities such as hydropower exploitation, construction of forest roads, logging operations, establishment of wind farms, and development of tourist resorts. Additionally, there is a lack of new lands being made accessible for grazing, creating further challenges for the reindeer herding community. (Furberg et al 2011). Many of the migrations have been affected by the new infrastructures, so many choose to move their reindeer by truck despite the extra cost. Furthermore, the need to have more reindeer to have enough income means that the soil is exploited at a speed at which it cannot recover enough, in addition to the lack of sufficient food, due to the change in the times of the seasons, which leads to the need to provide food supplements to the reindeer, resulting in extra costs. Also, extensive tourism with people moving through the mountains causes negative effects on migrations. Furthermore, the irregularity and difficult economic situation of the industry threaten the Samis who often require side jobs and discourage the youth who are not attracted to an industry under such complex conditions. Reindeer husbandry, being a valuable asset to the country's and Europe's culture, is in danger of extinction. (Furberg et al 2011)

Evolution of Socio - spatial practices

Sami have the reputation of being herders and leading a nomadic lifestyle, even though as mentioned before only a small percentage actually does this for a living and the Sami culture is not necessarily based on herding. In consequence of these stereotypes, they are known for their mobile dwellings used during the reindeer migration that takes them from summer to winter grazing lands each year. (Bjørklund 2013)

The Sami have had mobile dwellings for centuries now, and they have been evolving according to new technologies and new necessities. They started with the *lávvu*, which was the tent used by the herders, and is popularly recognized as “the real Sami dwelling”. The traditional *lávvu* consisted of wooden poles positioned in a circle, covered with two pieces of canvas. The canvas was made out of linen, hemp, or woolen blankets during the winter. (Bjørklund 2013) This structure inspired the shape of the Sami Parliament in Norway and the architecture of the Kiruna Church. Another kind of tent used by the herders was the *beallji* - goathi, which consisted of arched and straight poles, the canvas as a cover and a door, and provided an indoor space for up to 8 people. Both types of tents always had a fire in the middle, where Samis were able to warm themselves as well as cook their meals. Furthermore, both tents could be transported easily on sledges, which made them practical when moving around with the herds. (Bjørklund 2013)

Nevertheless, the need for mobile dwellings decreased once the snowmobile came into play for the herding industry, since now the herders could cover more distance and could easily come home after a day of work, instead of sleeping with the reindeers. Furthermore, the demands of the Swedish school program reduced the possibility of the whole family moving with the herd as well. The change in the industry, from milking and monitoring the herd, to only working for reindeer meat production, also gave the Sami the chance to reduce their time with the herd and settle down. With this, a new type of permanent goathi, covered in turf for isolation was introduced. The turf goathi was also later modernized with an iron stove and flooring instead of dirt floors. (Beach 2013)

Furthermore, the introduction to the use of helicopters for herding, was also a big change for the nomad lifestyle of the Sami. With helicopters, herding, spotting lost reindeers and transportation from far away grazing lands became easier and quicker. (Beach 2013) The Sami villages tend to share the helicopter services and take turns using it to mark and move their herds. This allows the Sami to go home at the end of the day, and have a permanent residence. Two permanent residences are needed to follow the grazing cycle: one in the western summer grazing lands and one in the eastern winter grazing lands. (Beach 2013)

Nowadays, the need for mobile dwellings has been extremely reduced. The turf goathi has been slowly replaced by regular Swedish frame houses. The turf goathis are protected by the government as heritage and the Sami are given a stipend to maintain their turf houses, even though they are barely used. Today, the turf goathis are mostly occupied by tourists or as a guest house. The *lávvu*, on the other hand, has been replaced by a commercial version called *Moskosel laavo*, with the same shape but made from synthetic materials and aluminum poles (Beach 2013) or by regular tents to be used for short periods during summer calf marking season.

The transition from nomad to semi nomad or almost sedentary lifestyle has not only physically changed the living environment of the Sami herders but the social environment has been altered as well. Before the permanent residences, the whole family was to move with the herd, they spent more time together as a family and as a community, and all of them were able to spend more time surrounded by nature. Furthermore, the kids were able to learn the family traits from an early stage and the Sami culture was introduced from the beginning. Furthermore, the appearance of new technology has facilitated the herding process but has reduced the need for people working in the industry. Even though it has made everything more efficient, much of the tradition and culture has been slowly fading away.



Image No. 3: Traditional lavvú
source: “Saami man with Lavvo and reindeer Lyngen Troms 1909”
by saamiblog is licensed under CC BY-NC-SA
<https://www.flickr.com/photos/28772513@N07/3568642930>



Image No. 4: Sami turf goathi
source: “Sami House in Hardangervidda - Norway”
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<https://www.flickr.com/photos/28772513@N07/3568642930>

Nevertheless, this transition and change of dwelling styles only talks about a small percentage of the Sami, since around 90% of the Sami population have occupations like farming, tourism, business, duodji - sami art making, or even live in cities and towns, after studying in university, which is why a regular Sami dwelling cannot really be defined or generalized. Furthermore, there is no conclusive or specific information, since the Swedish census does not talk about ethnicity.

Reindeer husbandry and its core key areas

In Sweden, reindeer herding is divided into 51 Sami Villages or Samebys, which consists of economic and administrative entities, and not of actual villages. (see map 2) The Sameby serves as a legal representation of the herders. (Sametinget - Ordförklaringar Rennäring) They are categorized in mountain (33), forest (10), and concession (8) villages. (Sami - Sweden. Reindeer Herding) The reindeer migration is done in an east - west direction, from the forest in winter, due to the protection the trees provide, to vast grazing lands in summer. The paths are done naturally by the reindeers who follow their instincts. The paths can be affected due to change in the landscape like new infrastructure. There are differences in behavior between forest and mountain Sami. The former tend to be more static and stay mainly in forested areas, while the latter have long migration routes. The concession Samebys on the other hand, have special permits for reindeer herding below the Lapland border extended by the County Administrative Board. (Sami - Sweden. Reindeer Herding)

According to the Manual for Pasture and land division (Manual för beteslandsindelning 2017) from the Renbruksplan developed by the Sami Parliament, there are some core key areas that the reindeer and reindeer herders need for their job. This plan was developed to get an overview of the existing conditions on Sami villages through an inventory.

First it is important to emphasize the division of the seasons for the Sami, which are divided in 8 according to weather, months and the activity done in this season. (See table 1) And the grazing lands are divided according to the seasons, and have different key areas for the migration and herding of the reindeer. Source: (Manual för beteslandsindelning 2017) These consist of:

- **Trivselland - Comfort land**

Areas within the seasonal lands, where the reindeer naturally go for grazing, shelter and rest for a longer period. They are more extensive than the collection area.



Season	Activity	Months
Spring - Winter	Move to the calving area. There should be tree lichens in the mountain forest until the ground grazing is available.	March - May
Spring	Reindeer calves are born, and are separated from their mothers with lichen and herb baits.	April - May
Early Summer	Grazing of birch forests, bogs and streams for green pastures	May - June
Summer	Move to the high mountain to escape the insects, the calf marking begins.	June - July
Late Summer	The reindeer go down the mountain into the birch forest, to graze on pasture and mushrooms. Important for muscle, mass and fat build up.	July - September
Autumn	Reindeer slaughter takes place and the route to autumn lands begin	September - November
Pre winter	The reindeer start to migrate east to the winter grazing land because of the snow. Reindeers graze grass from forest areas as much as possible, and then lichen.	October - January
Winter	The reindeer herd is moved to different grazing areas, where the herder can guard them and protect them from disturbances.	November - April

FigNo. 1: The 8 Sami seasons and their activities
source: Renbruksplan Manual för beteslandsindelning 2017
google translated

- **Uppsamlingsområde - Collection area**

These are needed in all seasons. They are areas where the herder is able to collect the reindeer, where they are directed by the wind direction and tend to stop.

- **Good pasture**

Areas with high value due to the good quality of the pastures. They are not comfort land or collection areas. During winter grazing, lichens form a central resource and can be affected by, above all, radical soil treatment methods in forestry. Hanging lichen can be an important supplement during the winter for the reindeer, due to poor ground lichen grazing when the snow cover is deep and tightly packed and when the reindeer have difficulty digging down to the ground grazing.

- **Rastbete**

Smaller areas along a moving trail, which are necessary for the trail to be used. The closer it is between these, the greater the opportunity to carry out a successful move. In difficult terrain and when several herds use the trail, even more grazing pastures are required. The resting pasture provides food and rest for the reindeer herd and makes it easier to keep it together so that the migration can continue.

- **Difficult passages**

Obstacles when moving between grazing areas, like steep slopes, fords, dense vegetation, buildings, railways. Small disturbances can cause the reindeer to refuse to move.

- **Kalvningsland - Calving area (where the babies are born)**

Areas where calving can occur - birth of baby reindeers. These areas can be located on low mountains in slightly hilly and protected terrain. Often they are also located in slopes with southern exposure or in sparse birch forest.

- **Facilities**

Huts and facilities for the use of the herders. They can be for example: working yards, transitional gardens, calf marking capes, feeding yards, temporary paddocks, slaughter houses - temporary or permanent. (Manual för beteslandsindelning 2017)

Year round pastures and winter pastures

Reindeer roam freely on their summer pastures in the Scandinavian mountains to the west, and move to lower altitudes for their winter grazing grounds in the boreal forest to the east, where they are intensively herded. The spring and autumn pastures, which include areas for reindeer calving and rutting. In the case of Kiruna, they are primarily located west of the town at lower elevations. (Fohringer et al 2021).

The herders classify their grounds in year-round and winter pastures. The year-round grounds (året runt-marker) are used for grazing throughout the whole year and, for mountain Sami villages, this area is delimited by the cultivation limit and the national border. The cultivation limit (odlingsgränsen) is a boundary defined in 1867 which prohibited the construction of new buildings beyond its border and restricted the land use only for reindeer herding. This boundary was not respected, since new buildings have been built in the last centuries, nevertheless, it is still a reference for the herders. (Sametinget - Ordförklaringar Rennäring) The winter pastures on the other hand can only be used during the period of October 1st and April 30th for reindeer grazing. These are the areas that are not part of the year-round grounds. (Sametinget - Ordförklaringar Rennäring)

The winter pastures primarily consist of boreal forests, where the reindeer feed on epiphytic lichens such as *Cladonia* spp. and *Bryoria* spp. These forests are dominated by Scots pine (*Pinus sylvestris* L.) and Norway spruce (*Picea abies* L.). The reindeer need to dig through the snow cover to be able to reach the lichen, which is why a thin cover is most important. In the forest stands the snow cover is thinner, because the branches of the conifer trees manage to catch a big part of the snow which results in lower accumulation around their trunks, resulting in more favorable snow density and depth in these areas for reindeer grazing. (Roturier & Roué 2009)

Nevertheless, the requirements for a good winter pasture varies according to several factors like tree cover, understorey vegetation and snow conditions which are influenced by biological, geographical, and climatic variables. (Roturier & Roué 2009)

The availability and quality of suitable winter pastures for reindeer are highly variable and depend on changing weather conditions. Temperature fluctuations, thawing-freezing cycles, and varying snow accumulation continuously alter the snow cover, impacting reindeer grazing potential. Sami reindeer herders adapt to these variations by using pastures at higher elevations first, where the snow cover is thinner at the beginning of winter. As these areas become grazed and trampled, making them unsuitable for further use, the herders move the reindeer further down the valley to new grazing grounds. This dynamic understanding of the effects of trees and understorey vegetation on snow cover, combined with their ability to foresee changes as winter progresses, allows Sami herders to effectively manage their herds throughout the winter season. (Roturier & Roué 2009)

How the mining industry can affect reindeer husbandry

The Sami Villages and the reindeer herding industry are affected by a myriad of reasons, ranging from climate change, new infrastructure, industrial development, increase in tourism, and exploitative industries like forestry, and mining. (Fohringer et al 2021) In this thesis the focus is put on the impact of the mining industry, nevertheless, it creates ripples that bring the other challenges into play.

The mining industry in Sweden, is heavily concentrated in the north of the country. Sami territories host around 98.5% of the value of these mining activities (Lawrence & Larsen 2017). This extensive extraction results in substantial land loss and habitat fragmentation, crucially affecting the winter grazing grounds of reindeer. These areas, naturally limited in forage quality and quantity, have to bear the weight of mining pressures, leading to detrimental impacts on the reindeer's ability to access adequate grazing lands and maintain their migratory patterns (Fohringer et al 2021).

The introduction of mining operations has led to deep changes in the landscape. Initially, the construction of railways and road systems in the early 20th century facilitated ore transportation but also encroached upon previously untouched lands (Fohringer et al 2021). In response to these constant encroachment, technical solutions like planned feeding, eco-ducts, and fencing are often proposed by the mining companies to mitigate the effects of land dispossession assuming that the adaptability of Sami communities and their reindeer herding traditions is endless (Lawrence & Larsen 2017). Despite these interventions, the decline in reindeer numbers continues due to habitat loss and fragmentation, compounded by climate change (Fohringer et al 2021). The additional efforts required for supplementary feeding, animal transport, and increased herding are a cultural and economical burden, pushing the traditional and sustainable livelihood of reindeer husbandry to its margins (Fohringer et al 2021).

The development of mining projects brings an additional infrastructural demand, energy consumption, and human presence, which increase the complications for the continuation of the reindeer herding tradition (Fohringer et al 2021). The mining activities not only cause physical land loss but also lead to difficulties during the migration due to the associated noise and dust, further fragmenting the habitats crucial for the reindeer's survival.

Sami Villages affected by mining activities around the town of Kiruna

The town of Kiruna is located in between two Sami Villages, Gabna and Laevas, where the Kiirunavaara mine was founded. The Gabna Sami Village is a mountain Sami Village with a territorial extension of 3,666km², nevertheless when analyzing the area's impediments (like water bodies and infrastructure) the available area comes to 2,754km², from which only a 30% is considered of national interest. Its year - round pastures are located in the Municipality of Kiruna, and has winter pastures in Kiruna and Pajala municipalities. There are 11 reindeer herding companies registered and 10 group responsible reindeer herders. (Sametinget - Gabna) The Sami village has its reindeer migration paths around the town of Kiruna, marked as a national interest, but also as a difficult passage because of the road and rail infrastructure.

The Laevas Sami Village is a mountain Sami Village as well, with a territorial extension of 3,658km², and after subtracting the area's impediments the available area comes to 2,664km² from which 38% is of national interest. (Sametinget - Laevas) Its year - round pastures are located in the Municipality of Kiruna, and has winter pastures in the municipalities of Kiruna, Pajala and Gällivare. Furthermore, their migration routes around the town of Kiruna are marked as national interest as well. There are around 20 group responsible reindeer herders. (Sametinget - Laevas)

Both towns have been affected during the last century by the mining activities which have encroached on their land, and put a high pressure on their migration paths. For example, the merging of the town of Kiruna with the nearby Kiirunavaara mine in the late 1960s severed a major reindeer migration route. Further developments, such as the extension of the railway to Svappavaara and the construction of mine tailing dams in the 1970s, intensified the fragmentation of reindeer pastures, increasing the difficulty of the herders to maintain their livelihood. (Fohringer et al 2021). (See Map No. 3)

Furthermore, a significant portion of the development within Kiruna municipality, such the urban sprawl, construction of roads like the E10, the Iron Line railway to Narvik, the airport, as well as the Luossa and Kiirunavaara mines, has occurred in the Gabna Sami village territories. (Spiliopoulou & Talah 2007) (See Map No. 3) Since the LKAB mining industry has announced the need for relocation of the city center, the town of Kiruna is expanding further. For the Gabna Sami Village, the growth of the town of Kiruna will affect the migration patterns, because it will encroach on their migration paths which is also marked as national interest. (Kiruna Kommun 2019) For many years, the Gabna Sami village maintained migration routes west and northeast of Kiruna. Due to the constant land exploitation, the village has been repeatedly forced to alter these migration paths. Nowadays, the migration through Kiruna predominantly relies on helicopters, which help to keep the herds together as they navigate the narrow remaining passage of their traditional migration path. (Spiliopoulou & Talah 2007)

Furthermore, there is a threatening possibility in the future that the mining of the Per Geijer deposit (See Map No. 3) could take place. This would mean the division of their lands and it would be impossible for them to do the east to west seasonal migration. The mining activities in Kiruna have only left a small passage in the Luossavaara slope, for the reindeers to roam freely. The encroachment of a new mine would mean the end of traditional reindeer husbandry for this Sami Village. (North 2023)

Additionally, a new environmental permit has been issued for a new copper mine located in Goddegobbá (Viscaria) (See Map No. 3) right next to the Kiirunavaara mine. Both Sami Villages are against this and have stated to the Land and Environment Court, that the land is already overexploited by existing infrastructure and other mining activities. (Min Odđa Giron 2024) Copperstone's proposed compensatory measures, such as creating new relocation routes and preserving winter grazing areas, were rejected by the Sami representatives of the Sami Villages since they will not fill in the requirements for the seasonal reindeer herding of the area. The Gabna Sami village is also concerned about potential water contamination. (Min Odđa Giron 2024)

Mining Laws, Acts and Codes in Sweden

Mining leaves a huge environmental imprint, due to production of waste such as rock and sand and toxins. The necessary infrastructure for the function of the mine, also creates an impact, such as railways, roads and dammed rivers, and most specifically, the towns that are built around the mine and that eventually can become ghost towns. (Avango 2020) Furthermore, there are no laws or regulations that require the consent of the affected Sami population before granting permits to mining companies. (Lawrence & Larsen 2017)

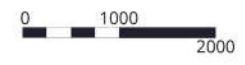
In Sweden mining is regulated under the Minerals Act (1991:45) and the environmental aspects under the Environmental Code (SFS 1998:808) (Michanek 2008). The Minerals Act defends areas of national interest, such as nature conservation, high tourism value, untouched shores and cultural areas. (Ministry of the Environment 2000) The Minerals Act also concedes exploration and exploitation permits, and defines compensation and fees for the landowners for "damage and encroachment" when the land starts being explored and exploited. It requires the mining companies to do an impact assessment on existing land uses, but does not specify that the affected people, in this case the Sami, have to be consulted before a new project is started, or have prior indigenous consent either. (Lawrence & Larsen 2017)



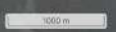
**MINING INFRASTRUCTURE
IN KIRUNA**

- Sami Villages**
 - Sami Village Limits
 - National Interest for reindeer herding area
- Urban areas**
 - New City Center (Toulvaara)
 - Planned new construction
 - Relocation limit
- Infrastructure**
 - Airport
 - E10
 - Train rails (to Narvik and Saapvaara)
- Mining - present and future**
 - Kiirunavaara
 - Kiirunavaara tailing dams
 - Per Gejjer Deposit
 - Goddegobbá (Viscaria)

Map No. 3: Mining infrastructure in Kiruna
source: own
base map from google earth



Girjas



The Environmental code talks about the after treatment of damaged and polluted land and specifies the people doing the damage to the land are responsible for the financing of the remediation. (Environmental Code SFS 1998:808 Section 2, chapter 10). The Code also talks about the protection of nature and culture in chapter 1, which may refer to the reindeer husbandry and nature reserves.

The environmental code talks about remediation, but does not define what this entails. When talking about fixing a damaged and polluted landscape, like a mine, there are different ecological terminologies that vary from author to author. These are the definitions this thesis is taking for the development of the planning proposal:

- **Remediation** consists of removing the contaminants left behind, in this case after mining and improving the soil. (Lima Mitchell O'Connell Verhoeven 2016) According to the Geological Survey of Sweden (SGU) the remediation process involves cleaning up, decommissioning the mining area and taking care of waste to minimize discharges in the long run. Strategies like bioremediation and phytoremediation, where plants are used to clean the soil can be used for remediation and reclamation processes. (Lima Mitchell O'Connell Verhoeven 2016)
- **Restoration:** aims to bring the land to its original state, replicating the pre existing ecosystem exactly as it was before the exploitation. (Lima Mitchell O'Connell Verhoeven 2016)
- **Reclamation** aims to find a cost and time efficient way to recover the original ecosystem services, without replicating the pre existing ecosystem (Lima Mitchell O'Connell Verhoeven 2016)
- **Rehabilitation** tackles the remediated site as a service for the population. It focuses on the use of the land and emphasizes the recuperation of ecosystem productivity and services. (Society for Ecological Restoration International Science and Policy Working Group, 2004).

Samis point of view

The Minerals Act does not mention the Sami, their right to reindeer husbandry, or their right to preserve their culture. The Act deals mainly with exploitation of the resources, and does not acknowledge the self determination right of the Sami people to decide on what happens to Sapmi. The Sami Parliament has published their views on the Minerals Act and statements giving their opinion on how they think the Act should be updated taking into consideration the Sami and how Sapmi should be treated.

Considering that land and water resources in Sápmi are vital for their trades and the survival of their culture, the relationship to the extraction of minerals and large-scale mining, great changes need to be made to the legislation. (Sametinget 2014) The Sami Parliament's statement published in August 2013 talks about stopping all exploration and exploitation permits, as well as the concessions, until the

Government acknowledges the right of the Sami's international rights of Free Prior and Informed Consent and the Sami Parliament is given a voice to fight over the plans on Sapmi. They remind the government that reindeer husbandry is protected by the Swedish Law and functional land areas for Sami trades are to never be threatened by short-term exploitations.

The viewpoint of the Swedish Sami Parliament on the Minerals and Mines in Sápmi also states that the exploration permit process prioritizes minimal damage to nature and cultural environments, but in practice exploration often disrupts Sami practices like reindeer husbandry. It stresses that consultation with the Sami Parliament and affected districts is crucial before granting permits. The Parliament affirms that reports detailing impacts on reindeer husbandry, Sami interests, and the environment are necessary, as well as approval or rejection from relevant Sami bodies. They demand that changes to the work plan during exploration should require approval from the Sami Parliament and affected districts, with strict financial guarantees for environmental remediation. (Sametinget 2014)

The Swedish Sami Parliament advocates for a suspension on all exploitation in Sápmi until the changes in the legislation are made. They emphasize long-term sustainable development in Sápmi and advocate for the right to veto exploitation, with particular emphasis on the principle of free, prior, and informed consent. Additionally, they propose compensation for damages to rights owners, establishment of a minerals fee for reindeer husbandry and other Sami community purposes, and stress the need for consensus among the Sami Parliament, concerned Sami, and affected districts before permitting exploitation, with any dissent halting exploitation plans. (Sametinget 2014)

The constant disregard of Sami's opinion has led to protests and demonstrations. An example is the 2013 Gállok (Kallak) protest, over a proposed mining site on reindeer grazing lands, which led to clashes between protestors and police. Demonstrators, both Sami and non-Sami, barricaded roads to prevent test drilling, and the police responded forcefully, using dogs and dismantling protester-occupied towers. (Blåhed & San Sebastián 2021)

The Sami have developed an Environmental Program called Eallinbiras, in which they express their points of view on nature and the environment, and how they wish their land to be respected. The plan is focused on explaining the Sami sustainable way of living, their culture and their beliefs. It also talks about the Sami Parliament's opinion on green energy, land exploitation and urban development, which would be useful to understand and respect, when planning in Sapmi territory.

Sami environmental Program - Eallinbiras

In Sami Language “Eallinbiras” means our living environment. Since Sami culture is so closely tied with nature and the environment, the Sami Parliament has developed a plan to conserve and protect the future of the environment, following the Sami perspective on nature. The goal of this plan is a viable and sustainable Sami living environment. The Plan was adopted in 2021 by the Sami Parliament of Sweden, and is a statement of the Sami culture belief system.

Their vision goes as follows:

“We live in a viable Sápmi that is anchored in a sustainable nature and a living Sami culture. People and nature shall have a long-term capacity to regenerate and continue to develop in a sustainable manner even in times of considerable change. Both nature and culture in Sápmi enriches the world around us.” (Eallinbiras Plan 2021)

According to the Eallinbiras Plan (2021), Sami culture revolves around nature and their livelihoods is based around the balance between using nature resources and giving it time to recover, without exhausting it. They perceive nature as a “spirited, living entity” which influences their values, customs and social structures.

The Sami living environment “Eallinbiras” consists of Social and nature’s capital. Social capital can be understood as the community, the cooperation between people, their culture expressed in their language, duodji (roughly translated as arts and crafts) and joik (a traditional way of singing), which are significant ways to strengthen their identity and create awareness and a conscientious way of living. While nature’s capital is considered to include the elements like wind, earth, water, the feeling of peace and serenity it gives, the materials used for building, the seasons, (Eallinbiras Plan 2021) and everything nature has to give as a resource, physical and spiritual.

According to the Sami point of view, to increase both the social and natural capital, the system needs a diversity in small scale sustainable businesses, local power sources from small scale renewable energy sources, local food production, traditional knowledge and a community that works together. The system should avoid unlimited growth and expansion, large scale environmental exploitation, legislation that favors big companies and social isolation. (Eallinbiras 2021)

The Sami own a deep understanding of nature and a vast traditional knowledge which has been learned and passed down from generation to generation. Their language is their main resource to do so, since it has many specific words to describe nature and its different states, like the different types of snow, for example. The disruption of their language has been an obstacle for sharing this traditional knowledge or “Árbediehtu”. (Eallinbiras 2021)

Traditional knowledge is based on the relationship between nature, animals and people, but traditions, customs and lifestyles are also included. It is the basis of the ecological and environmental Sami culture. This traditional knowledge is important to take into consideration when planning for sustainable futures. The Sami’s take on lifestyle and respect towards nature contrasts severely with the westernized point of view based on unlimited growth and exploitation. Sami’s Árbediehtu believes in natural cycles, safeguarding resources, reusing materials as much as possible, repairing, and recycling what cannot be repaired. It means being thankful towards what nature can provide. It has a holistic view of nature, people and landscape as one whole entity. (Eallinbiras 2021)

The Sami wish for a Balanced Development and sustainability, where their árbediehtu is taken into consideration as a key role and as valuable as scientific knowledge, and where Sami people are included in decision processes and treated as equals. The Sami see an opportunity in researching more on their way of food production, traditional medicine, vernacular construction, language, their way of learning, and to relate to each other as well as manage resources. (Eallinbiras 2021)

The Sami emphasize that a sustainable use of the natural resources should be balanced and should not exhaust them, leaving a cohesive landscape. Right now, the mining, windmill parks and hydroelectric projects have fragmented their landscape and have taken more resources damaging their environment and the biological diversity. The Sami aim for protection of forests and wetlands with high biological value, minimizing damaging forestry measures; protection of mountainous areas especially valuable for their culture; no more changes in the waterways or polluting groundwater and water bodies. Finally, they emphasize the need of stopping large scale exploitation, and new infrastructure that breaks connected areas is only to happen if completely necessary. (Eallinbiras 2021)

Furthermore, their view on a sustainable future environment envisions a Sami community harmonizing with an ecological system, which can be joined by other cultures as long as they respect their practices. They also put emphasis on a circular economy lifestyle, where consumption and waste is reduced, and most of the resources are reused or recycled. (Eallinbiras 2021)

The Sami’s vision for a sustainable future is deeply rooted in their cultural heritage and respect for

nature. Their holistic approach, which includes traditional knowledge and practices, offers a valuable perspective on how to live in harmony with the environment. They follow a balanced development model, where natural resources are used consciously and sustainably and respectfully, the Sami aim to preserve their culture and ensure the health of their living environment for future generations. Their commitment to protecting nature, promoting a circular economy and respecting their traditional knowledge, should be seen as an example for the rest of the world on how to take care of our environment and an invitation to follow their steps.

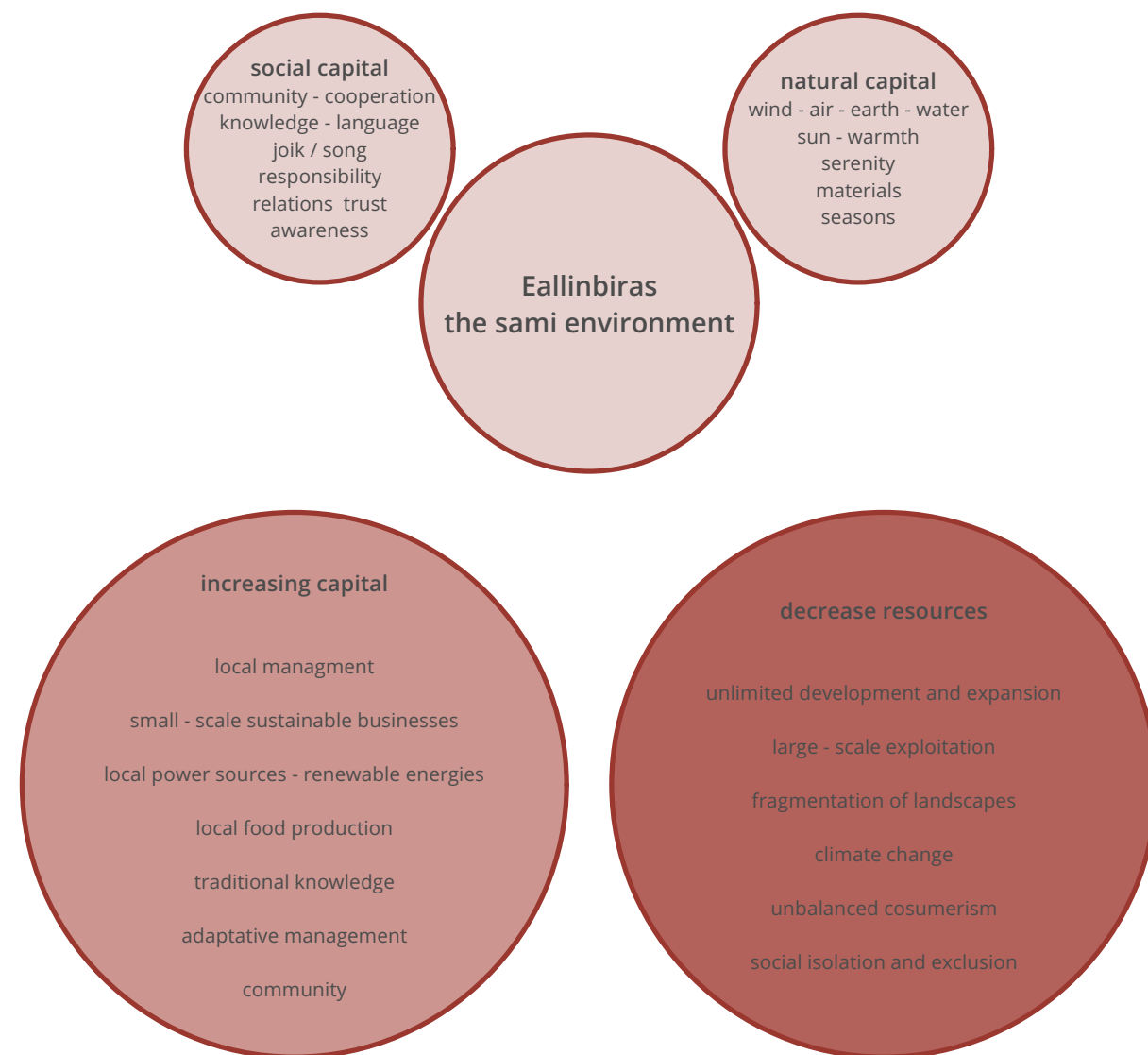


Fig No. 2: Elements that constitute the Sami Environment
source: done by author with information sourced from Eallinbiras 2021

Municipal Interests and Planning

Understanding the plans of the Municipality for the town in this decade is important to predict where the town will be at when the mining closes and the decolonization process can start. The overview plan of 2019 talks very generally about the future of the City Center. The real document taken as a guide for the development of the Kiruna town is the Overview plan made in 2014, centered around the New Kiruna Center. It is actually a revision of the master plan designed in 2006. The significant change is the location which is now in the Tuolluvaara old mining area. The proposal consists of new housing, industrial activities, a new industrial area for the railway, as well as a new connection of the railway to the center. A new area of the road E10 going north of the town center and several sport areas are also being built. Protected wetlands are also taken into consideration.

The municipality has been working on the relocation of the city center. It will host a new City Hall, hotels, shops and residential buildings. According to the Overview Plan of 2019, there is a need to relocate around 6,000 people to new homes, around 33% of the town's population. The affected area by the excavations of the LKAB mine are 3,200 residences, 750 hotel beds, the entire downtown commercial center, several major public institutions - including the town hall, the high school, a primary school, the hospital, the library, the church and bathhouse, as well as approximately 1,000 workplaces. Some of the historic buildings were selected and will be transported to the new center by LKAB including the Kiruna Church and preserved houses in the Old City Center. (Kiruna Municipality 2019)

According to the Municipality, housing shortage has affected the town since the construction of the new residential buildings has been slower than anticipated. They have planned an expansion north of Tuolluvaara, for housing on long and short term.

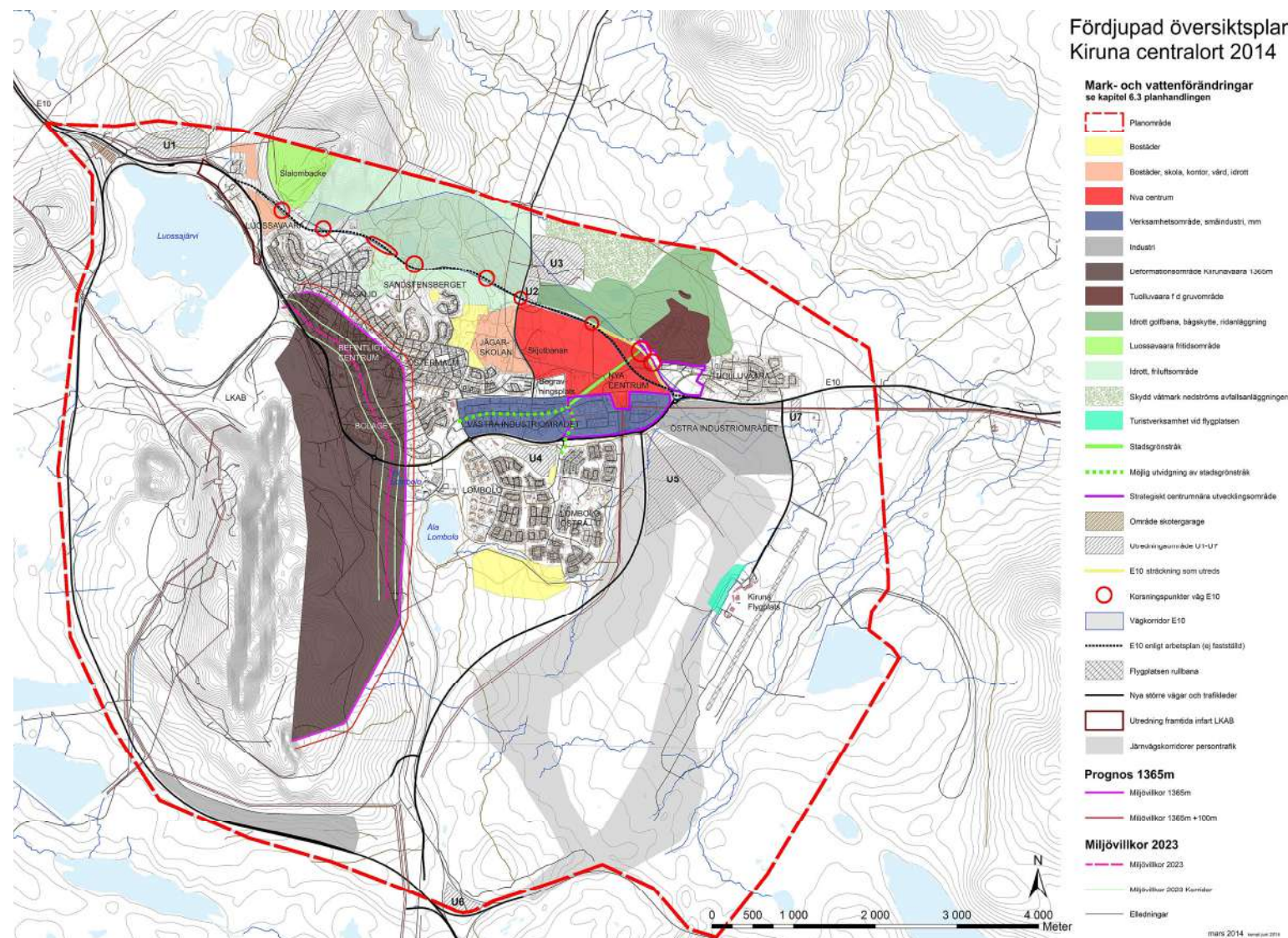
The lake Luossajärvi, closest to the Kiruna town was declared with a moderate ecological status in 2019. Lake Mettä Rakkuri, south of the mine, has suffered from emissions from mining operations and is managed under permits and supervision according to the Environmental Code. (Kiruna Municipality 2019)

Kiruna Municipality's comprehensive plan, includes the extension of the airport runway, mineral exploration projects of the Per Geijer deposit, and tourism development in the Luossavaara and Matojärvi area. The three projects can have a negative impact on the rights and interests of the reindeer herding community. The Municipality recognizes the importance of reindeer husbandry as a national interest, nevertheless, their approach demonstrated the prioritization of economic and touristic objectives over Sami rights.

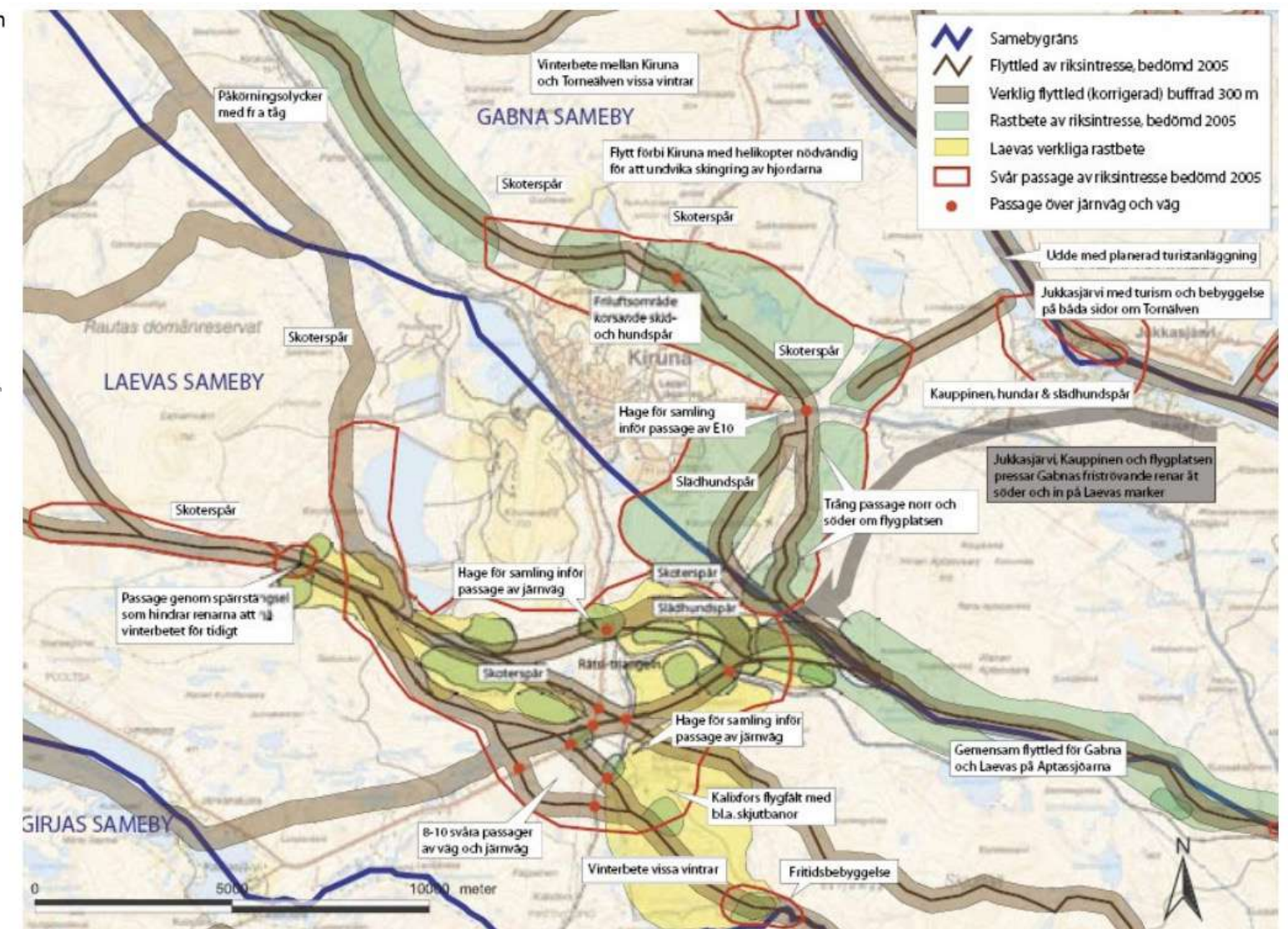
New roads will also be built after the New City Center is complete, as well as a new connection by railway from Gällivare to Kiruna, looking to improve the connection between Narvik-Kiruna-Gällivare-Luleå, and increase the opportunity for low emission travel options.

The Municipality acknowledges the challenges faced by the Gabna and Laeva's Sami Villages in herding because of the new developments of mining areas and infrastructure. Some of the areas are of national

interest, because of migration routes and resting pastures for reindeer. Particularly, they highlight the difficulties reindeer face crossing through urban areas like roads and powerlines. The expansion of settlements, roads, and railways, especially towards the north, northeast, east, and southeast, encroaches upon important areas for reindeer husbandry. Efforts like building an eco-duct over the Malmbanan railway station aim to mitigate the impact on reindeer. (Kiruna Municipality 2014)



Map No. 4: Detailed overview plan Kiruna central city 2014
 source: Kiruna Kommun - Fördjupad översiktsplan för Kiruna centralort (2014)
https://kiruna.se/download/18.70c3d424173b4900fc51e4db/1599054457503/fop-kiruna-c2014_laga-kraft.pdf



Map No. 5: Difficult passages for reindeer migration paths
 source: Kiruna Kommun - Fördjupad översiktsplan för Kiruna centralort (2014)
https://kiruna.se/download/18.70c3d424173b4900fc51e4db/1599054457503/fop-kiruna-c2014_laga-kraft.pdf

Architecture competition: A NEW CITY CENTRE FOR KIRUNA

To have a starting point for the design of the New Kiruna Center, the Municipality of Kiruna and Sveriges Arkitekter organized a competition in 2012, with participation from international architecture firms. According to the Municipality of Kiruna, the proposals were key for the development of the 2014 Overview plan and adopted several ideas from the best projects.

The brief requested for the architects to show a vision of the “Kiruna of tomorrow”, contemplating sustainability, attractiveness and identity. The vision should aim to foster growth and sustainable living patterns in urban development towards the east. It had to outline a strategy for holistic transformation, integrating new and existing elements, and propose creating a sustainable and pleasant city center within a comprehensive city-wide framework. The winning proposal was designed by White Arkitekter, Ghilardi + Hellsten, Tegmark, with the name Kiruna 4 Ever.

It is interesting that the Samis are barely mentioned, either in the competition brief or in the proposal. The constant presence of LKAB in the competition may be the reason why this lack of participation of the indigenous community happened. Nevertheless, the winning proposal tries, at some level, to remediate the situation although it could have been done in more detail.

The positionality of the architects and landscape architects in these situations is complicated. The architects working for big companies and hired by other big companies have to work for a specific goal even if it does not agree with their personal mindset, following the specific requirements. The landscape architects that are part of the team working on the project may not have the opportunity to express their real opinions or have the authority to go against the requested project. In this proposal, despite the obviation of the indigenous people on the brief, there are efforts to include Sami people in their proposal although vague and are definitely not a main focus. There is no mention of deciding this based on Sami opinion, which may seem as just proposing ideas to try and include them without really asking them what they want.

Winning proposal: Kiruna 4 Ever

The proposal envisions Kiruna in 2033 and 2100, highlighting the complete relocation away from the mine and the recovery of nature from the relocation process.

In 2033, the project presents a dense, mixed-use town developed around the main street, Malmvögen, with several landmarks along the road. The design includes numerous meeting points as nodes throughout the city to promote communication and a sense of community. For example, the “chat bubbles” in front of the Sami Parliament are intended as spaces for dialogue and cultural events, complemented by other social spaces like pavilions and sports halls. The inclusion of Sami people in this proposal is limited and not a primary focus. However, the proposal advocates for a participatory process during the town’s constant transformation, which can be facilitated by events like the Biennalen to engage with residents and the Sami. Additionally, a warehouse is proposed to store useful materials from demolished houses for reuse in new construction, enhancing sustainability.

By 2033, all buildings and houses from the risk area will have been relocated, creating a linear city expansion. If the city continues to grow, it should follow this linear concept. The main street connects the mine and the city, with improved mobility through various public transport options like buses, trains, and cable cars. The linear design, with only three blocks of width on each side of the main street, allows for better accessibility to nature.

The project also proposes more community spaces, parks, and restored natural areas where dwellings have been removed. While the town appears to grow exponentially through the years, the mine is projected to close by 2035, raising sustainability concerns due to the short-term nature of construction resources. Furthermore, this expansion encroaches on the National Interest areas for Reindeer Husbandry of the Gabna Sami Village, complicating migration passages for herders.



Fig No. 3: Masterplan 2033

source: White Arkitekter - Winning Proposal Kiruna 4Ever

By 2100, the linear concept remains, and all the old buildings and houses have been moved east. While demolishing and rebuilding all infrastructure raises sustainability concerns, the relocation leaves much of the old town area empty, allowing nature to recover. The now-restored green area, formerly occupied by neighborhoods, is proposed for recreation and reindeer migration paths. However, the proposed migration paths for the Laevas Sameby may be disturbed by the presence of people using the area for recreation and could interfere with reindeer migration.

The proposal does not suggest any use for the mine pit. However, the surrounding land has been repurposed for a windmill park, water treatment facilities, and an LKAB visitor center. Additionally, the Luossajärvi Lake has been restored partly to its original shape as well. The city is denser, occupying less space, with fewer citizens and built structures. This raises the question: who will live in Kiruna if the mine closes? Will it be the Sami, people working in tourism, or others?

The proposal envisions a small but dense mixed-use town with nature tourism as a key economic driver. This town could be located anywhere, as many westernized sustainable urban proposals promote similar ideas worldwide.

The recovered green area from former neighborhoods provides possible grazing ground and possible migration paths for the reindeer herding community although the question about its feasibility is raised, due to the closeness to town. Additionally, the mine remains a significant barrier, complicating migration routes. The proposal should encourage not only remediation but also the rehabilitation of the area. The LKAB company, responsible for the landscape damage, should support this rehabilitation, allowing the Sami to use the land as they see fit, without imposing their own solutions on them.



Fig No. 4: Masterplan 2100
source: White Arkitekter - Winning Proposal Kiruna 4Ever

Historical Background

History of Sami colonization:

The Sami are the only indigenous people of Europe. They inhabit the Arctic regions of Norway, Sweden, Finland and Russia, and have been around in the Nordic countries since before, according to the finds of settlements counting from 11,000 BC (Hansen&Olsen 2013), way before the first Germanic colonizers settled in the area. The Sami have been characterized as nomadic or semi nomadic, moving seasonally according to the resources.

Sapmi is the traditional geographic area where the Sami live, it's considered a nation without borders, and originally it covered from the South of Sweden in Dalarna until up north to the Arctic Sea. (Samiskt) Sapmi is also divided east to west, in language areas and also according to nomadic movements. (Samiskt Information Centrum) The Sami started as hunters, fishers and trappers, moving from east to west following the resources during the changing seasons. (Hansen&Olsen 2013)

An important shift started with the start of reindeer herding, since it signified a change in their way of living. Their way of reindeer herding required a year round care for the animals in an intensive way, making use of the local topography, valleys and areas for grazing. As hunters, the Sami had a defined route and dwelling places that would be used seasonally. With the shift to "reindeer pastoralism", the Sami depended more on the herd's need for grazing, which made the area for reindeer husbandry wider than before. The lands are not fixed but have flexible borders depending on the access to pasture the areas had. (Hansen&Olsen 2013) This may be the reason why the new settlers saw the land as unused and thought of it as an opportunity to settle and farm on Sapmi land.

The Sami have lived through different waves of colonization. From southern cultures that settled permanently on Sami grounds, integrating the Sami to their own economy, administration and political networks. (Hansen&Olsen 2013) This means within the centuries, trading with other communities, especially the Swedish, Danish and Norwegian Kingdoms meant being taxed. An exchange of goods between Sami and other cultures happened, which created a mutual dependency. Nevertheless, the relationship between cultures suffered a power imbalance due to military superiority. (Hansen&Bjørnar 2013) During the first stages of colonization, the colonizing state was not focused on altering Sami social structures or ways of life. Instead, the primary goal was to profit from the profitable skin trade. (Brännlund 2015) The different Kingdoms started to tax the Sami or ask for "tribute" for their land, for the use of the grazing land they had been occupying since the beginning. In 1602, Swedish King Karl IX expanded the crown's power by establishing official marketplaces in Sami winter settlements and prohibiting trade anywhere else. These marketplaces became important administrative centers for court

hearings, parish listings, trade, and information exchange. Additionally, Karl IX implemented a new tax policy, imposing higher fees on meat, dried fish, and reindeer. (Brännlund 2015) Until the year 1606 in which the Swedish King declared Sapmi to be his land. (Samiskt Information Centrum)

In the first half of the 17th century, Swedish district courts were established in inland Swedish Sápmi, where Sami people were the majority until the late 18th century. Nevertheless, due to the district judge's rare visits and limited knowledge of local customs allowed Sami communities to maintain significant influence over land use issues. For this reason, to increase its control over the Innlands, the Crown promoted the establishment of Swedish farmers in the areas, by granting special permits and tax relief. (Brännlund 2015)

Another aspect that reinforced the power dynamics was the christianization of the Sami, both religions co-existed until the end of the 17th century when the Sami religion was repressed by the Lutheran government and was accused of witchcraft. The church became a strategy for political control and forced the Sami to abandon their rituals and religious objects. (Hansen&Olsen 2013) By the end of the 17th century, after centuries of persecution and death sentences because of witchcraft accusations, there was only a small group of Samis who stuck with their religion, while most of them converted to Christianity or switched between the both. This mixture of religions, made the clergy and missionaries strengthen their christianization methods, including punishments and threats. Authorities also started collecting ritualistic drums used by the Sami, and destroyed as many as possible. Furthermore, sacrificial and holy sites were profaned by the missionaries or Samis were forced to do it themselves. (Hansen&Olsen 2013)

The further colonization of Sapmi was slow, with agreements on new borders from the Swedish - Norwegian - Finnish - Danish territory, which cut the grazing, herding and settlement areas from the Sami. With this, emerged the Lapp Codicil which fought for the right of the Sami to continue migrating with the reindeer herds. Nevertheless, the previously agreed treaty was broken and many conditions were imposed, regarding crossing the borders, acknowledging citizenship and paying rent or taxes on winter pastures. (Hansen&Olsen 2013)

The river valleys of the interior experienced immigration of Swedish and Finnish farmers which the Sami did not have the power to prevent. The Crown also demanded the forests be set aside for the use of the monarchy. And with these actions Lapland became slowly and inevitably the land of the crown in the 17th century. (Hansen&Olsen 2013)

This put a lot of pressure on the lands used by the Sami and also forced the Sami to cooperate with the

mines. Copper mines were established at Svappavaara and the extraction of silver began in Luleå lappmark. The mines depended on the assistance of the reindeer, who helped move the extracted material and bring wood to the pits. This was exhaustive work put on the hands of the Sami, who started moving away from the grounds of the mine. (Hansen&Olsen 2013) This sets the example of how the crown was exploiting and taking advantage of Sami land and forcing labor to the Sami people, forcing them to move away and reduce their area for hunting and husbandry.

During the mid 19th a policy, based on colonial and racial ideologies regarding the Sami as an inferior group because of their culture and language, provoked a bigger territorial takeover. This superiority discourse legitimized the control of the Swedish state over Sami affairs, revoking their rights to self-determination. (Brännlund 2015) During the early 20th century, the Swedish government sought to integrate the Sami people into the Swedish economy. For this purpose, the process sacrificed most of their culture and language. Children were sent to schools, where they had to learn the Swedish language and had no education on their Sami culture or language. Segregation of Sami the reindeer herders took place, especially for children who had to attend special nomadic schools. (Kortekangas 2021) Also, during this period the conception from the Swedes of the Sami being from an inferior race, led to their study by the State Institute for Racial Biology, (Kortekangas 2021) denigrating the integrity of the Sami and reflecting the deep racism promoted by nationalist ideals. These ideals were also reflected in the education the Sami got during this period, who were also christianized, resulting in big losses of culture and language. However, since the beginning of the 20th Sami political movements have aimed to reduce state control and increase Sami autonomy, which has resulted in greater control over language, culture, and reindeer husbandry, in addition to the establishment of a Sami parliament in 1993. (Brännlund 2015)

LKAB - Luossavaara Kiirunavaara Aktiebolag

The first "Swedish" settlements came to the Sami land called Giron, currently known as Kiruna, in 1647. Around 1885 the Kiirunavaara Mountain was first explored, to better understand what the riches in iron ore consisted of and in 1890 LKAB, the mining company, was founded. (Kiruna Kommun 2020)

Before the mine started working, the Ofoten Line was constructed. The also called "Ore Line" connects from Luleå via Gällivare and Kiruna to Narvik in Norway, to move the extracted material to the Atlantic Sea in the most efficient way. In 1900 the town of Kiruna was officially founded and 10 years later its

population was 7,500 inhabitants. (Kiruna Kommun 2020) In 1957 the mine that was previously half privately owned and half state property became fully property from the state. (LKAB)

Iron ore mining has been the main industry that has kept Kiruna alive for more than a century now. It created local development economically and socially (Roberts 2019) for the settlers. Although not all of it was good for the people of Kiruna, in 1970 the mine had several strikes and complaints from the employees who were working under bad conditions. (LKAB 2019).

Most recently, the expansion and further excavation and exploitation of the mine has made the ground of the city center unstable. In 2003, the mine announced that the city would have to move 3 km to the west in order for them to keep mining and the city to not crumble. The Municipality and LKAB planned the move of the houses and the building of new dwellings for the citizens of Kiruna. The new city center was inaugurated in 2022 and the full relocation is still ongoing. The mine had already taken Sami land important for reindeer husbandry, but now with the relocation of the city, more of these resources are taken away since the migration paths closest to the town have been restricted. (Overud 2019)

Furthermore, LKAB has announced the findings of rare earth metals in a nearby deposit called Per Geijer, which would be the largest in the whole of Europe. These metals are important for the elaboration of electric vehicles and wind turbines necessary for the green transition, according to LKAB. The idea of a new mine for the rare earth metals is threatening the Gabna Sameby, because the village would be split and the east and west seasonal lands would be totally disconnected, according to Karin Kvarfordt, a Sami representative. (North. 2023) (See map 6)



- Per Geijer Deposit and Samebys**
- LKAB**
- Mine area
 - Mine pit
 - Per Geijer
- Samebys**
- Sameby limits
 - Difficult Gabna Sameby passage

Map No. 6. Interruption of migration path in Gabna Sami Village due to Per Geijer Deposit
 source: own
 base map: google earth



Summary and discussion

The Endurance of the Sami: Reindeer Herding and the Impact of Mining in Kiruna

The Sami population has endured significant challenges over the past centuries, demonstrating remarkable resilience in overcoming the obstacles posed by colonization. Despite numerous difficulties, the practice of reindeer herding has adapted, evolved, and persevered, displaying the deep passion and values of the Sami people who continue this traditional livelihood.

The exploitation of Sápmi, ongoing for centuries, has provided substantial wealth and development opportunities for the Swedish population, yet it has come at a severe cost to the Sami. The Sami have depended on and protected their land since time immemorial. The exploitation began gradually with Swedish farmers, settlers supported by the Swedish Crown, and military supremacy forcing the Sami to pay tribute. This process continued with efforts to eradicate Sami language and their shamanic religion, driven by a notion of supremacy that justified to their eyes the exploitation of their land. Mining exploitation has extracted resources, scarred the landscape, often without consulting the Sami, for which they have consistently shown discontent and argued to be heard. The foundation of LKAB mining company and consequently the town of Kiruna have gradually taken over important winter pastures of the Laevas and Gabna Sami Villages that depend on them. Furthermore, the mine threatened to continue to grow and encroach on more of the National Interest area for reindeer herding through the city's expansion and new potential mines.

The LKAB Mining company is the biggest and main producer of iron ore for the EU, putting Sweden in an important position. Furthermore, the possibility of excavating rare earth metals could give the EU the materials necessary for the "green change" towards clean energy that requires the production of batteries made from the excavated material. However, the toll the exploitation has on the reindeer herding practices also has put significant pressure on the industry by making it more difficult and less profitable. Furthermore, why should the Sami who have always taken care of nature, be responsible for providing materials to stop a climate change they did not cause. The United Nations has declared that all indigenous peoples should have the right to self-determination and prior informed consent before exploitation occurs on their lands. However, large companies often disregard the Sami's reasons for opposing their projects and as stated before, the Environmental Code and Mining Act do not require the participation of Sami in any planning process.

The contrast between the Sami who seek to take only what is necessary and live a balanced life, as seen in their Ellainbiras program, sharply contrasts against the profit-driven motives of these corporations and political motives behind. Mining companies continue to undermine Sami perspectives, perpetuating segregation and power struggles where the Sami are consistently at a disadvantage as it has been historically since the LKAB mining company started. Additionally, the Mineral Act and the Environmental Code of Sweden do not provide enough protection to the reindeer grazing lands, or propose good enough remediation and reclamation conditions after the end of the mining activities. Furthermore, there are no requirements of Sami's consent on new exploitation projects.

The Gabna and Laevas Sami villages illustrate how reindeer herding can be negatively affected by mining exploitation. Reindeer herding is highly sensitive to changes in the environment and external factors, requiring extensive areas of land to meet changing weather and site conditions and to find enough resources of food. This necessity is often misunderstood by large companies who perceive their grazing lands as unused lands. The mining activities in Kiirunavaara have obstructed migration paths and created difficult passages and possibly taking away previous core key areas like comfortlands and rasbete lands. Additionally, the influx of people in Kiruna, coupled with snowmobiles, noise, pollution, and infrastructure development, further worsens the vulnerability of reindeer herding. Nevertheless, with the Sami Parliament and Sami Associations, documents and plans have started to be created to explain their needs and the voice of the herders is getting stronger.

After extensive research, I still find it challenging to fully understand the complexities of reindeer herding and the annual struggles faced by herders. This is a thing that can only be understood by experiencing it and talking to herders themselves in their own language. This complexity to understand reindeer herding, likely extends to government entities and companies involved in Sami lands during project development. Nevertheless, the Sami's determination to speak for themselves, be included, and not be marginalized or forgotten is profoundly inspiring. It is saddening that they continue to face such challenges, and that colonization persists even today, presenting itself through new projects and more exploitation arising every year. I strongly support the Sami in their quest to reclaim their land, live their culture, and herd their reindeer in peace once again.

Theoretical Framework

trying to understand Sami's conception of landscape

colonization, corporate paternalism, cultural and structural violence

Sami have a long history of colonial settlements on their land. Colonial abuse, colonial exploitation of the land. The taking of the land by the Swedish settlers has happened with no consultation and little regard of what happens to the reindeer grazing lands. The entitlement to the land has always been present, and has been thought of as the good of the many, as a means of making the whole of Sweden rich, without thinking that the native people are the ones who struggle. Little empathy is shown towards the Sami when they complain, accusing them of being against progress, growth and development, when all of this is happening on their land and is completely against their naturalistic way of life.

Sandström and Persson (2021) define corporate paternalism as "a company playing the role of the father/master/ teacher, who improves productivity, by identifying the needs of the company's laborers. Through 'paternalistic practices', ranging from 'the provision of housing, services, and amenities', to 'education, physical well-being, and moral control'" secures their loyalty. The corporate paternalism patterns shown in Kiruna by LKAB definitely has an impact on the empathy factor, and makes the power imbalance more noticeable. The power the LKAB company has over the town, the Municipality's planning and the citizens point of view makes the change in the colonialist patterns much more difficult.

The people from Kiruna, and especially the workers of the LKAB company, have had many benefits over the last century. Housing security (for the LKAB workers), schools, recreation, and job security, for several generations. This situation has a great deal of benefits but also limitations. Since the company is subsidizing all of these facilities, they can also regulate what happens in them. Furthermore, a segregation between workers and non-workers of the company takes place, creating friction between the people of the town. (MacNeil 2015) A seemingly "symbiotic" relationship turns into a dependent one.

Structural violence can be seen as a power imbalance that leads to unequal life chances. (MacNeil 2015) An example of structural imbalance perpetrated by the mine has been the exclusion of the Samis from the decision making of their land since the start. For example, in 1910 the company developed a voting system according to wages, leaving the Sami without a voting opportunity, and giving the workers of the mine more power. (Sandström&Persson 2021) Another example of power imbalance and structural violence is the constant encroachment of their land for resource exploitation, like mining or windmill parks, that affect their livelihoods without seeking consent from the Sami people.

Nowadays, everyone gets the right to vote, but that does not mean the Sami do not suffer from structural and cultural violence. The Sami are still not included in the planning of the city's growth and their right to their grazing land is viewed more as a suggestion rather than something to respect, when the opportunity for lucrative activities is visible. The fact that Sami people cannot speak their minds against the LKAB company without receiving hateful comments makes them afraid to go against the mine. Even the people residing in Kiruna can be afraid to speak against the mining company, even though the city is now being relocated and many people are displeased, they seem to just accept it without a doubt. Furthermore, the Sami were not included in the planning process for the new City Center, neither in the contest for the design nor in the detailed plan developed by the Municipality where the grazing lands are only mentioned as a problem to be dealt with later on, is a proof that they still suffer from a power imbalance. This shows how the Sami have been and keep being excluded, even when the changes concern their lands and affect them and the reindeer migration paths.

understanding meahcci, birgejupmi and extractive violence

Sami have a different relationship with nature than the westernized world does. It is an intrinsic part of their lives since their livelihoods have depended on it since time immemorial, and even today many Sami rely on nature's resources. "Sami articulate the meaning of land as generational and seasonal continuity, an inheritance to children and possible grandchildren, the same land being passed down by ancestors, replete with reciprocal, spiritual and identity making meaning." (Jääskeläinen 2020) The place attachment of the Sami to their land is deep since their lives have been tied to it in a spiritual and a practical way. That is why any impact on ancestral land, such as mining, affects the entire community. In the Sámi worldview, humans should not manipulate or exploit nature. Instead, their relationship with the land involves a deep awareness of and responsibility to that specific place. (Jääskeläinen 2020) The Sami seem to see the land, not as a place to be taken advantage of, but as a place that provides the resources to live and for that it needs to be respected and taken care of.

Understanding this point of view is difficult, since the modern world seems to predominantly lean towards consumerism and constant economic growth that requires unlimited resources. Sami instead, do not differentiate between wilderness and cultural nature or agricultural land as western culture does. (Joks, Østmo and Law 2020) The Sami have many ways of communicating their view of the land, nevertheless, the translation of their language is difficult to do to truly translate the meaning. However, there is an interesting word - Meahcci - when trying to understand how they see nature.

The word *meacci*, as Joks, Østmo and Law (2020) explain it, refers to “taskspace: Spaces where activities take place, and where resources can be found. “*meahcit* (plural of *meacci*) are task-related, shifting according to season and weather, and have little to do with cartographic space” (Joks, Østmo and Law 2020 p308) A good example of *meahcit* are the grazing lands for reindeer herding, that, as previously described, change location depending on different factors like weather conditions and the resources available in order for the grazing to take place. *Meahcit* are treated with respect, since they deal with special ancestral beings, (Joks, Østmo and Law 2020) like the lakes that provide the fish and the forest that provides the wood. The respect and the need for *meacci* is intrinsic in their culture. They don't think about the resources nature has to offer as means for their intentions and as theirs to be exploited but entities which deserve as much dignity and respect as they do. (Joks, Østmo and Law 2020) They ask permission before hunting and fishing and thank nature after finishing their tasks. The Sami have a balance in the use of resources, only taking what is necessary, always leaving behind what is not.

Another word that describes Sami's point of view towards nature is *birgejupmi*, “which refers to ‘livelihood, survival capacity, and the way people (individuals and communities) maintain themselves in a certain area with its respective resources’” (Jääskeläinen 2020 pag 50). This survival capacity is dependent on resources, and because of this it is dependent on the availability of *meahci*. Nevertheless, this concept shows the resilience of the Sami culture and their ability to adapt to changing conditions. Since *meahci* varies according to different factors, there are no defined areas for it, *meacci* happens where the conditions are favorable. Through traditional knowledge, some areas can be expected to be *meahci*, but since Nature cannot be controlled, neither can *meahci* be planned. “One year is not next years brother” is one of the many expressions the Sami use to talk about the changing conditions of nature.

This way of understanding and respecting nature contrasts abysmally with the extractivism philosophy of big mining companies found in the north of Sweden. “Extractivism (...) refers to those activities which remove large quantities of natural resources that are not processed (or processed only to a limited degree), especially for export. (McNeil 2019 p84) and a philosophical approach also poses profit driven forces that extract not only raw materials but also resources as well as culture, knowledge and experiences. (McNeil 2019) With this concept, extractive violence can also be understood as a way to inflict violence directly against nature, animals and/or and people as a result of the extractive practices. This exploitation mainly impacts the people closer to the land being exploited. (Mcneil 2019) An example of this type of violence can be seen in the Laevas Sami Village conflict against the LKAB mine, where Sami have been excluded from the decision making process of their land, and have seen their landscape change and disappear. This has resulted in a constant struggle for the community who has had to constantly fight to defend themselves and as a result, has had a negative psychological impact of distress and fatigue. (Jääskeläinen 2020)

As previously exposed, the Sami people's connection to their land is deeply rooted spiritually, emotionally, physically, and psychologically in their culture, challenging Western views. These ties not only come from the past but also focus on the future of their land in a continuous way. When extraction activities break these connections, it has a devastating impact on the Sami and continuously affects their *birgejupmi*. Therefore, extractive violence is not only harming the environment but also harms the Sami. (Mcneil 2019)

When analyzing the Sami's point of view on Nature and their land, it is easy to understand that their place attachment comes from their long term mentality, of guarding the land they have received from their ancestors for the future generations. The traditional knowledge that comes from taking care of the land for generations creates a deep place attachment and an understanding of how nature works. Their knowledge and resilience are intrinsic in their way of life since they understand how much nature can change. Nevertheless, the exploitation of the land is testing the limits of that resilience, and contrasts greatly with their view on sustainability, balance and respect towards the Land. For the Laevas and Gabna Sami Village, the fragmentation of their landscape due to the mining industry in Kiruna, threatens the availability of *meahcci* for reindeer herding and lacks the respect they show towards nature. This exploitation complicates the *birgejupmi* of the herders, due to lesser resource availability and contrast with their culture of respecting the land. The LKAB company keeps relying on the capability of the Sami to adapt to change, when actually they have spoken loudly about their rejection towards further land exploitation and how they are at their limit.

In conclusion, the analysis of the Sami people's relationship with their land has highlighted the profound and complex connection with nature. Unlike the Westernized worldview that often sees nature as a resource to be exploited for economic gain, the Sami perceive their environment as an integral part of their cultural, spiritual, and practical lives. This intrinsic bond, can be reflected in concepts like *meahcci* and *birgejupmi*, which highlights a sustainable and respectful approach to natural resources. The Sami's practices of asking permission before using resources and taking only what is necessary illustrate a harmonious existence with nature that contrasts sharply with extractivism, and helps understand better how extractive violence works.

The case of the LKAB mine in the Laevas and Gabna Sami Villages strongly shows the conflict between these two worldviews. The extractive activities of the mine, driven by profit and resource extraction, have disregarded the Sami's deep connections to their ancestral lands. The exclusion of the Sami from decision-making processes and the resultant environmental deterioration have caused big psychological distress and fatigue within the community. This study case serves as an example of how the extractivist practices not only consume and reduce natural resources but also impact cultural heritage

and disregard the rights of indigenous communities. Lastly, the Sami have raised the question of why they should be the ones affected by mining and other industries necessary for the “green change” to reduce climate change, and be forced to adapt when they themselves have not been remotely responsible for this problem.

sense of place and solastalgia

Landscapes can never be the same forever, they are bound to change with the passing of the years due to natural or cultural reasons (Butler&Sarlöv 2019), and that means Norrbotten was also bound to change. According to Veli-Pekka Lehtola “Memory in the Sámi cultural environment is often more connected with places and landscape than time. Places tell stories of the past; they retrieve experiences and memories.” (Lehtola 2022 pag 482) The Sami took care of the land for many centuries, and due to cultural reasons, the landscape was changed, with the arrival of new cultures and new uses. As Butler & Sarlöv (2019) remarks, relationships and connections to others are always geographically located, and the relation we have with the land is correlated to what is happening to it.

The place attachment of the Sami is deeply rooted in their culture and is intimately bonded to nature as stated before. Which is why the change and damage of the landscape affects the community in a deeper manner. This means that the arrival of new infrastructure and development to the landscape can have a negative impact on the connections of the Sami to their land and may have felt like an invasion.

The Sami from the Laevas and Gabna Sami Villages have seen their landscape change and be exploited. They have seen the LKAB mine and the town take more and more space from their reindeer grazing lands and migration paths, risking their livelihoods, and have not been able to stop it. The government does not seem to give enough importance to this problem, since no explicit consultation has taken place with the Samis’ interest in mind. (Blåhed & San Sebastián 2021) And no health assessment has been conducted to understand the impact these infrastructure developments have on the Sami population. (Blåhed & San Sebastián 2021)

The negative impact this can have on the Sami population is huge, since their long history creates a deep place attachment. As mentioned before, their land has a generational continuity, which has been inherited from their ancestors and will be passed down to the next generations. According to Lappegard Hauge (2007) in their study about identity, as much as people affect landscapes, they can also affect the way people see themselves. Especially if the landscape changes in a negative or nondemocratic way, they undermine the historical and close relationships individuals and communities have to their surroundings (Butler&Sarlöv 2019). These negative changes can induce solastalgia, a feeling of deep

sadness and alienation when seeing a familiar landscape change before one’s eyes. These can lead to people feeling protective of their land.

In a study about mines and landscape change, it has been shown the negative impacts the open-pit mines have on the residents living nearby after encroaching. Some have anxiety and insomnia problems, while others tend to avoid the affected landscape completely. (Blåhed & San Sebastián 2021) This feeling of solastalgia caused by the LKAB mine can affect the Sami Villages and the herders as well, since it can discourage the Sami to keep on herding and put at risk the continuation of the traditional practice, which is so dependent on the landscape.

The Sami have had to share their landscape with the town of Kiruna, and for everyone the landscape has different meanings. Both have seen the changes throughout the years, they have both seen the mine grow and take over, as well as the infrastructure, but only the Sami see the mine as a scar, possibly creating a feeling of resentment. Their place has changed from a peaceful living and commune with nature to a symbol of constant fight. Both Sami and the population from Kiruna see it as their home and livelihood, and both can feel threatened when the other one opposes their views on how it should develop. The Mining company on the other hand, seems to only see it as exploitation land, a huge lucrative means of production.

Throughout the history the managers, CEO, founders, people in charge of the mine have not even been in Kiruna and are making the decisions from afar, with no regard of the landscape and what it means for the residents of Lapland. The lack of place attachment in the decision making of the land when it comes to mining is reflected in the exploitation and damage of the landscape, and the impact it has had on the people living in it, both reindeer herders and people from the town. The unconscious exploitation of the land without permission, approval and compensation of the Sami has to stop, heal and be remediated. Landscapes can never be the same forever, they are dynamic, and for this reason Kiruna needs to change, from a mining town to a healing natural landscape.

Decolonization - Indigenous Planning

Kaewen Dang (2021) talks about how colonization starts with land and how the process of decolonizing should also be done through land. I agree that indigenous land that was invaded by settlers that made it their source of capital should be returned and respected. The Laevas and Gabna Sami Villages have experienced colonization and exploitation of their lands due to the Kiirunavaara mine, which has taken their grazing lands and hindered their reindeer herding activities. Decolonizing this land would mean that the land taken by the mine would be restored to its original ecosystem services to serve again to the people that originally were using it. Kiruna is a great example of settler colonialism feeling entitled to exploit the land which happened to the Sami expense, and for this reason can also be a great example of decolonization.

The Rights of Indigenous Peoples as defined by the United Nations, indigenous people have the right of self determination which means a right to decide for themselves on their political status and their social, cultural and financial development. The declaration also states the indigenous peoples' rights to own, use and control land, territories and natural resources. (Sametinget 2015) In a world where Sweden was to abide by this declaration and give the Sami their power back, it would mean that the Sami could choose if their land is to be exploited or not. The Sami could stop the growth of a city that is taking their grazing lands with new development and infrastructure, for a mine that will probably close in only 15 years, and a new mine that will destroy and take even more of their land.

The short amount of time left on the iron ore mine and the use of the right of self-determination of the Sami applied for the disapproval of the new mining site for the Per Geijer deposit, would mean the start of the process of decolonization of Kiruna. Taking back the land used by the LKAB mine in Kiruna could be a way to break down the power structure and send a message of hope for the rest of Norrbotten and for the rest of the Sami to feel empowered to fight for their place, their livelihoods and culture. As Kaewen Dang (2021) bravely stated, "the active erasure and replacement of Indigenous relationalities to land with settler-colonial orderings is a form of violent cultural genocide." (pag. 1009)

With decolonization comes a process of changing and reorganizing the colonial structures, and in order to erase the colonialist control. Furthermore, decolonization is a process of regrowing and repairing landscapes that have been taken and damaged and recovering or making them what the Indigenous, native, original people need it to be. (Kaewen Dang 2021) In this process, the role of indigenous plan-

ning is vital. In order to implement the right of self determination, indigenous communities should develop their own planning and regulations, to reflect their autonomy in a community's participatory process. This avoids the intrusion of outside powers and legislation. (Prusak, Walker & Innes 2015)

For indigenous planning, community involvement is necessary, and the definition and visioning of the community's values, norms and cultural practices need to be defined. The indigenous planning is faced with the challenge of reflecting the past in a contemporary reality. It should take the ancestors' knowledge and revisit them and evaluate which are still valid at this time. (Prusak, Walker & Innes 2015) In Kiruna's situation, it will also face the challenge of a temporal rupture when colonial settlers had the power of planning, which means dealing with repurposing past colonialist planning for a future indigenous one. The process of indigenous planning should seek the connection of the indigenous people, with their land, heal and vindicate their place identity and reaffirm their place attachment. The new planning should reflect indigenous traditional knowledge as well as connect it with contemporary one, always seeking the well being of the community.

With the closing of the mine, the affected Sami Villages should have the opportunity to reclaim their land and decide its future based on their needs. Decolonization and indigenous planning of the newly available land can occur through participation and collaboration with the Mining Company, which should be responsible for remediating the land and restoring its original ecosystem services. Importantly, the opinions of the Sami, who will be reclaiming the land, must guide the necessary actions. The Sami Villages and reindeer herders, whose landscape needs vary from year to year, should determine what their ecosystem services should look like, reflecting on their traditional knowledge and on the changes their culture has experienced and the needs of reindeer herders. This process of remediation and reclamation can serve as a model for decolonization practices and the involvement of indigenous communities in exercising their right to self-determination.

The town of Kiruna also needs consideration during the decolonization process, as many mining towns become ghost towns after mining activities cease. The Sami Villages might be left with the remnants of the newly built town. This should not be a problem the Sami should deal themselves with. However, the remediation of the town left by the mine, can be an opportunity to envision a Giron planned by and for the Sami. Such an exercise can reimagine a decolonized, restored, healed, and rehabilitated Giron, where Sami's authority over their land, opinions, needs, and culture are respected and reflected in the environment, aiming for a more sustainable and resilient future. Although this thesis will not delve deeply into this aspect of indigenous planning, an example of a potential approach to decolonizing the town through re economization and urban retrofitting can be found in the annex of this document.

In summary, the decolonization of Kiruna, requires the implementation of indigenous rights and self-determination. As mining activities come to an end, the Sami should have the authority to decide the future use of their reclaimed lands. This involves collaboration with mining companies and ensuring that the Sami can recover their lands to keep their reindeer herding industry alive. The process of indigenous planning is essential, as it allows the Sami community to reflect their culture and traditions in the landscape, helping to heal their connection to their land.

Remediation and Rehabilitation of the Kiirunavaara Mine

The biggest wound of Kiruna is the Kiirunavaara mine, which dominates the landscape and serves as a constant reminder of the colonial settlers to the Sami, who struggle more and more with its growth. It symbolizes the environmental and social injustices that have occurred over the past century. The mine represents one of the most dramatic changes a landscape can undergo. According to the Environmental Code of Sweden, mines need to undergo a remediation process to clean the pollution they cause. However, the remediation guidelines are vague and lack specificity. The Sami Parliament has demanded stricter regulations without success (Sami Parliament declaration 2014).

As the potential closure of the Kiirunavaara Mine approaches, the remediation process can begin to be planned. The mine is a scar on the landscape, reflecting a history of social injustices. Therefore, merely cleaning the pollution is insufficient. The true healing starts with reclamation of the land by recovering the natural ecosystem, and the rehabilitation of the Sami Villages to its original ecosystem services in the Kiirunavaara area. This raises questions about the best approach: Should the mine disappear completely? Recreating the original landscape is impossible, so what should it become? Should part of the mine be left as a memorial? Is it ethical to fill a 1km deep hole? Where will the material come from? Remediating and rehabilitating a mine is unique to each case, and this project will explore these questions further in the planning process.

According to Tsosie (2015), "remediation processes can and should be used as a process for addressing colonial and environmental injustices and for decolonising and healing land" (p. 222). However, most remediation processes focus on technical solutions, neglecting historical and social aspects (Beckett & Keeling 2019). In this project, remediation should consider the impact on the Laevas and Gabna Sami Villages. The focus on decolonization should guide the project to restore the land in a way that benefits reindeer herders and mitigates the damage done to their industry.

The remediation and rehabilitation process should help restore the sense of place and create a positive connection to the landscape for the Sami Villages. Another question arises about the infrastructure of the mine. Removing industrial buildings, retention ponds, and train rails is necessary to restore the ecosystem services for reindeer herding. However, should the mine's history be completely erased, or should there be a memento to commemorate the events of the past century? Such a memorial would not be a monument to mining but a reminder to the Sami and the visitors of the environmental toll mining has on a landscape and the constant fight against the exploitation of Sapmi land. The memento could be useful to spread information about the history of Kiruna - Giron, including Sami Villages, their reindeer herding practices, and the LKAB mine's history. While the hill could be reclaimed by nature, a piece of history would remain.

The mine is not the only scar on the landscape. The town of Kiruna has grown over the last century as an example of settler colonialism, displacing the original inhabitants. The town follows a westernized goal of constant growth and densification, seeking more residents, income, and infrastructure, even after the mine is closed. This expansion encroaches on Sami land, constantly creating new obstacles for reindeer herders along their migration routes. The planning process shows no Sami participation and the Municipality acknowledges the conflict of interests without proposing solutions. While the focus of this project is on the remediation of the mine area, the annex provides ideas on how the town's remediation could look.

Returning and restoring the land to its original glory may not be possible, but the remediation and reclamation process can help start to heal the wound and create a new sense of peace between Giron and the Sami. Additionally, healing the town, which has perpetuated settler colonialism patterns, is necessary for complete decolonization. As Beckett & Keeling (2019) suggest, remediation projects offer a unique opportunity for negotiating and articulating the morals, values, histories, and physical experiences associated with mine sites. The aim should be to reframe remediation as an ongoing, creative process of community healing. Remediation of the mine and its surroundings through indigenous planning and community participation could be a healing process for the Sami population and an opportunity for Kiruna to experience the landscape in a new way.

Analogue cases

To better understand how a remediation process can look like and be carried out, similar cases around the world were analyzed. The aim of this analysis was to understand how other mining companies have involved the indigenous communities in the process, how the open pit mines have been remediated and how towns have evolved after the closing of the mine.

Image No. 5: Kiirunavaara Mine

photograph: BeyondImages

source: iStock

<https://www.istockphoto.com/se/foto/polcirkeln-stad-med-belys-ta-mountain-gruvan-vinternatt-gm908231652-250210157?search-scope=image%2Cfilm>



Rehabilitation of Woodcutters Mine, Australia

The woodcutters mine was located in South Darwin, Australia. It was exploited mainly for lead, zinc and silver, and the open cut mining started in 1985. It was functioning until around the year 2003. The mine was built on indigenous agricultural land, which the state sold to the Woodcutters Joint Venture company, on the agreement to develop and agree on post-mining land use options to return the land to the group of indigenous stakeholders. (Barnes, et al 2020)

Consultation with indigenous landowners took place in several phases of the rehabilitation process after the mine closure. The first phase was in 2004 till 2009. The company in charge of the rehabilitation, pursued indigenous employment through environmental and rehabilitation works. A legacy manager was appointed and was in charge of organizing workshops for the development of land management plans. The plans included conservation areas and wetlands. (Barnes, et al 2020)

The rehabilitation started in 2016, with earthworks, weed spraying, fire management, and water management, and had a very engaged indigenous crew. This indigenous crew managed to increase the participation of indigenous land owners and indigenous people in the rehabilitation process. (Barnes, et al 2020) The process continued from 2017 till 2020 with the seeding and planting of wetland vegetation in the backfilled pit, reclaimed tailings dam footprint and constructed wetlands. The indigenous involvement continues with the employment of a Warai site supervisor for routine environmental monitoring, and a Kungarakanny landowner in charge of maintenance. (Barnes, et al 2020)

This project shows the importance of the involvement of the community. The land can be successfully rehabilitated through workshops and indigenous planning to benefit the landowners to which the land will be returned. Furthermore, the material needed to fill the pit came from the excavation of the wetlands desired by the community, which is a sustainable solution and a smart use of resources.

This project management of the workforce can be problematic, since hiring only indigenous workers and companies can be seen as patronizing. The companies in charge of rehabilitation should be careful of not falling into misleading stereotypes. Having said that, a positive outcome of this rehabilitation project is the consistent participation and involvement of the indigenous community. Furthermore, this involvement gives the Mining Company in charge of the remediation process a clear idea of the ecosystem services the community requires for their traditional trades. In the case of Kiruna - Giron, traditional knowledge about nature and the necessary types of landscapes for reindeer herding can be included in the planning and executing of the project.

Rehabilitation of Hazelwood Coal Mine in Latrobe Valley, Australia

Latrobe Valley is located in the southeast region of the state of Victoria in Australia. Three important coal mines are located here – Hazelwood, Yallourn and Loy Yang. Hazelwood was closed in 2017 and the other two are expected to close in the next 20 years. The Australian Mineral Resources (Sustainable Development) Act 1990 states that the mining company is responsible for the rehabilitation of the closed mine lands. Furthermore, the closure of the mines means a need for change in the region and especially in the economy of the two towns closer to the mines. Efforts by the Victoria State Government, as well as the private companies that owned the mines have been made for the development of rehabilitation strategies and re economization ideas for the towns nearby that were dependent on the mines. (Engie&Arup 2019)

The Hazelwood rehabilitation master plan developed by the mining company proposes a diversification of the town's economy through the rehabilitation of the mining site. Its main focus is assigning new land uses to the mine site. The proposal focuses on tourism, production and industry. Nevertheless, the most innovative part of the proposal is the filling of the mine pit with water, creating a big artificial lake.

The masterplan proposes a tourism belt, with a tourism center, recreational areas, and small -scale agriculture surrounding the lake. The recreation, eco tourism, agro tourism and food tourism creates new jobs and income for the town as well as an opportunity for commercial uses. The intervention proposes low density residential areas, small scale businesses like restaurants and cafés, and the creation of wetlands and parks. (Engie&Arup 2019)

The industrial and productivity area is centered around clean energy production, like biomass and solar panels, as well as food processing and packaging industry and agricultural uses. The area also proposes a technology incubator and innovation workspaces for technological developments. Furthermore, the agricultural hub is centered around animal grazing and non intensive agriculture. (Engie&Arup 2019)

Finally, the heart of the project is the lake. It will be filled with the help of groundwater, nearby rivers and the current water source of the mine. Nevertheless, there might be problems and delays filling the lake, responding to the drying climate and other water needs of the nearby towns. According to the studies, the pit can take up to 24 years to be completely filled. (Engie&Arup 2019) The aim of the lake is to be a catalyst of change in the area, a tourist attraction and an opportunity for production of different products. The artificial lake is meant for different uses:

- recreational, like boating, water sports and water based activities
- production, through aquaculture of the lake
- clean energy production through floating solar panels (Engie&Arup 2019)

The project has also been criticized by the public who are concerned by the water amount necessary to fill the lake, and the dry seasons that the region has ahead. Furthermore, there are concerns about the pollution of the pit, which can make the water of the lake toxic. (ABC News 2023)

The proposal of turning the mine pit into a lake is an interesting idea, since it provides a solution for the several problems caused by it. The water helps keep the soil's stability which avoids the pit from crumbling. Furthermore, it gives an opportunity for a new ecosystem service, where the water body can be used for recreation, tourism and aquaculture, instead of filling the pit with soil, which would just provide a flat land. And it also avoids just leaving the open pit, as a dangerous area, even when nature has taken over. However, the proposal also poses challenges to fulfill its goal, since the amount of water needed to fill the pit can create difficulties with the town and river water supply. Furthermore, if the cleaning of the pit is not done properly, the filtered water could pollute the groundwater used by the town and the river.

In general the proposal poses an interesting solution that can be considered in the mine of Kiruna, nevertheless there is an important size difference, Kiirunavaara being 4 times bigger. However, there may not be the same problem with lack of water sources, since the pit could be filled through the large amounts of snow falling every year, and with help of nearby rivers. The pit could also be connected to the Luossa lake, creating a big waterbody, which could provide different ecosystem services to the town of Kiruna - Giron. For example, the lake could attract local and international tourism, but it could also be used for fishing by the Sami, and as a winter path when frozen by the reindeer herders.

Re economization of Navajo Nation, Arizona, United States

The Navajo Nation, located in Arizona, USA, is going through changes due to coal and uranium mine closure in their land. The mine closure has affected the economy of the indigenous people, since it was an important income for the community. The State Government has given the Navajo Nation funds, in order to recover and re economize their community. For this, they have developed several strategies to overcome the challenge of unemployment, revenue decline and negative economic impacts for the indigenous community in general. (ETD, Inc. & Economic Collaborative of Northern Arizona 2017)

The strategies proposed by the Navajo Nation pose the need for diversifying the community's economy. First of all, they propose the production of renewable energy projects using solar and wind power, to reduce the dependency of fossil fuels and live a more sustainable life. (ETD, Inc. & Economic Collaborative of Northern Arizona 2017)

They also explore the opportunity of promoting tourism, taking advantage of their natural and cultural heritage. Their beautiful landscapes and rich historic background makes tourism a viable option for revenue, even though the area would need new infrastructure. Furthermore, tourism emphasizes the importance of supporting small scale business development and entrepreneurship to diversify the local economy and create employment opportunities for Navajo people. (ETD, Inc. & Economic Collaborative of Northern Arizona 2017)

A highlighted strategy is the need for workforce development and education, focused on the youth and young adults of the indigenous community to promote skill learning. This is managed through local universities and technical institutions. By investing in education and training programs, the Nation seeks to build a skilled workforce leading to economic growth and innovation in the region. (ETD, Inc. & Economic Collaborative of Northern Arizona 2017)

Overall, the strategies encompass renewable energy production, tourism, entrepreneurship, and workforce development, to build a brighter future for Navajo people and achieve long-term self-sustainable communities. These strategies can help as inspiration for the Sami people in Kiruna - Giron.

For example, promoting tourism in the area to also include the cultural Sami aspect could have great revenues for the Sami community. The changes and restored landscape can also have a big draw for visitors. Furthermore, the production of renewable energy through agricultural waste can also be a possibility. Lastly, investing in education for the Sami people to learn more about their culture and traditional trades can also be beneficial for the community and ensures the passing down of traditional knowledge.

Sami art interpretation as a guide to understanding Sami Landscape

When talking about the remediation and rehabilitation of the mine in this project, it has been considered that the reindeers need the same environments they needed 100 years ago before the mining started, but the herders have new practices that have evolved with time. The project will not try to replicate the landscape to make it seem untouched after 100 years of exploitation. It will also not impose the use of the land after it has been remediated. It will simply give a healthy environment back for the use of the herders as they wish. It will start with the inspiration of the Sami point of view, respecting and honoring nature.

The project will explore the possibility of how the landscape could be given back in a way that it will be useful and respectful for the Sami. As stated before, the Sami economy relies on traditional practices like reindeer husbandry, hunting, and fishing, which depend on shared access to land and water, but they also have other ways of earning a living. Nevertheless, this project will prioritize the reindeer herding industry and especially the Laevas Sami Village. Sami culture is intertwined with nature, and preserving it is essential for preserving their way of life.

As stated before, there is a need for indigenous planning and indigenous community participation in the remediation and rehabilitation process of the mining landscape. In this thesis, the time and place limitation made it hard to involve members of the Sami community, and especially the Laevas and Gabna Sami Villages to participate in the planning process. Therefore, the use of Sami art as a tool to further understand the Sami's connection to landscape and as inspiration for the remediation of the Mine is the methodology that will be applied for this work.

According to Lehtola (2022) due to the lack of reliable historical resources and official Sami education in the 1970 and 1980s, oral traditions became the main source for memoir, reminiscence literature and textbooks. It also resulted in history being represented and interpreted as "duodji", like paintings, poems, and theater plays. (Lehtola 2022) This means art became an important resource for the expression and narrative of Sami history and culture, and makes the interpretation of it an interesting source for understanding the Sami's relationship with landscape and nature, and to guide the planning process of the project since it can bring important insights from their culture.

The Sami word "duodji" can be mistranslated into "art," "craft," or "handicraft" found in other languages. However, this word actually represents a holistic understanding integrating the

functional with the spiritual purpose of objects, which also involves the knowledge of nature and the process of material gathering. (Hansen 2016) Maja Dunfjeld, a Sami duojár and art historian, highlights that Sami culture has a dynamism between the sacred and the profane, which means that even practical objects possess spiritual significance. The dual functions of duodji include symbolic elements that connect to Sami traditions and utilize specific materials and techniques. (Hansen 2016) Historically, the form and function of duodji evolved with social changes due to new technologies, which reflected its adaptive nature. (Hansen 2016)

In contemporary times, the institutionalization of duodji has shifted focus towards its aesthetic character, with the influence from the Western art concepts and historical contexts. This modernization has led to a reinterpretation of duodji, where objects are displayed in art institutions and subject to new interpretations and are not for practical use anymore. For this new type of elements, the word dáidda started being used in the 1970's. Despite this, there remains a strong connection to Sami heritage through the abstract elements of mythologies, legends, and spiritual practices. Contemporary artists like Marakatt-Labba draw inspiration from these mythologies, integrating them into their work and maintaining the dual properties of duodji, balancing the sacred, the practical, and the aesthetic. This reintroduction of spiritual and mythological themes ensures that duodji remains a living tradition, continuously evolving while preserving its deep cultural roots. (Hansen 2016)

To effectively interpret contemporary Sami art and develop a methodology for using it as inspiration in the planning proposal, it is essential to recognize the integral role of duodji in Sami culture. As stated before, duodji is not merely a form of art or craft; it embodies a holistic understanding that merges functional, aesthetic, and spiritual elements that are deeply rooted in the Sami relationship with nature. To incorporate the Sami vision of landscape into the planning process, the methodology should begin with a deep engagement with Sami art, viewing it not only as aesthetic objects but as cultural narratives rich with historical and spiritual meaning. This approach requires the understanding of symbology used by the Sami artists to represent mythology, legends and moments in history, as well as the materials used and the historical background of the messages they were trying to convey. The interpretation of their art and its application in planning should aim to guide the remediation and rehabilitation of landscapes in a manner that respects and reflects their view on nature and landscape.

Methodology for analyzing the selected art

As inspiration for the project, two Sami artists were found, Hans Ragnar Mathisen and Britta Marakatt-Labba, who stood out for their themes of decolonization, history, and awareness of the self-determination of the Sami population.

Hans Ragnar Mathisen Sábmi with only Sámi place names, 1975

Hans Ragnar Mathisen Keviselie (born in 1945 in Áhkkánjárga/Narvik, Norway / lives and works in Sapmi, Norway) is an artist and writer, who has been working with cartography from a young age. His most important piece, and the one used in this thesis project is “Sábmi with only Sámi place names, 1975” in which he portrays a map of Norway, Sweden, Finland and Russia with only Sami names on it, without adhering to the territorial division of the European nations states. The map was drawn by hand and consists of different sheet layers, having the main map, the illustrations and place names, and finally the colors, overlapping to have the final result which was scanned and reproduced in smaller prints. The final product shows the map accompanied by Sami objects, like drums, duodji, phrases in Sami language, ancient symbols and animals.

Since cartography has been used as a colonialist’s historic weapon to delimitate the stolen land (Benson et al 2023) this art piece is an important statement in the decolonizing process of the land. Maps have been used as tools for conquering land, dispossessing indigenous people and claiming their resources. (Benson et al 2023) Lands that were “discovered” by Europeans have been inhabited by the indigenous people for centuries, but somehow doing a map of it validates the new boundaries of the land. In return, according to George (2000) Mathisen is trying to carry out a “peaceful appropriation of his people’s land, traditions and culture” through his maps, which reflects the artist’s desire to “reclaim the Sami people’s rightful place in history”. (George 2000) Mathisen makes a “counter cartography” move (Benson et al 2023) by making a map of Sapmi contrasting the westernized maps of Norwegian, Sweden and Finland and Russia, visibilizing the often overlooked Sami community.

An important link between language, story and land are place names. According to Lehtola (2022) Original names reflect traditional knowledge coming from the ones before them, they contain history as well as communal values and meanings. They reflect “land use, human activity and even amusing



Image 6: Sábmi with only Sámi place names, 1975

Source: © Keviselie/ Hans Ragnar Mathisen

<https://rjm-resist.de/en/portfolio-item/keviselie-hans-ragnar-mathisen-2/>

incidents.” (Lehtola 2022). Hans Ragnar talks in an interview, about how original Sami place names, displayed in his map exhibition, describe specific characteristics of the landscape that later on, when translated to Norwegian would not really mean the same or even make sense. (Mathisen 2018) This shows how Sami were connected to landscape not only through the physical aspect but also through language, and how translating these names causes a distancing from their identity and their connection to the land.

When deciding the name of the map, Mathisen chose to use the word *Sábmi*, which in Sami language referred to 4 different meanings: The Sámi homeland; The people, One person and The language. The spelling of the word was later changed to “*Sápmi*”. (Mathisen 2015). This decision reflects the purpose of the map, to make the whole of Sami culture visible to the world, and also explains how the Sami community see themselves as a unified entity.

Additionally, the collection of the Sami names was a collaborative work, Mathisen used written sources like books and historical maps from the reindeer herding Lapp Codicil, but also asked Sami and non-Sami people about the names they knew for different places. Mathisen (2015) also highlights the borderlessness of the map, which aimed to show the Sami how their homeland was more extensive than they thought, and to strengthen their sense of identity by giving them something to have in common. When drawing the map, Mathisen (2015) also expressed how he was reluctant to use the shape of the lakes that were affected by dams, and preferred to show their original shape.

The map is characterized by various aspects: a critique towards colonizing cartographies of their land; collaborative work with both Sami and non-Sami people for its creation; the borderless depiction of the land; the purist depiction of nature and landscape; and most importantly, fostering identity-building through the Sami language. This map has had a significant global impact on Indigenous peoples due to its boldness and representation of Sami culture. It perfectly reflects how the Sami’s unity with the landscape and nature exist without borders from the colonizers, as they do not care about countries or counties borders when caring for and using the land. Additionally, the place names, which were based on events, people, and topography, helped the Sami identify their landscape. This was gradually taken from them when boundaries were established and languages changed. Not only was their land taken, but their identity was also slowly stripped away through the use of maps.

This work offers several lessons applicable to the project. The return of the Sami name from Kiruna to Giron is a vital part of the decolonization process and is important for fostering identity formation among the Sami people towards their remediated land. The accurate representation of geographical features on the map, such as lakes, also promotes the idea of restoring the mountain that has been

damaged, excavated, and deforested to a state as similar as possible to its original one, as well as the Luossa Lake, which has significantly reduced in size due to the mining activities. Remediation should be borderless since it is not just about returning the land in the mining area but also helping the Sami villages repair their fragmented land as a result of train lines, highways, and other infrastructure used by the mine across Sapmi. Lastly, Mathisen’s collaborative work teaches us the importance of participation and involvement of the community, which should always take place when developing planning projects.

Britta Marakatt-Labba

Britta Marakatt-Labba, born in 1951, grew up in a reindeer herding family in Swedish Sapmi, in a village near Kiruna Giron. She studied at the School of Design and Crafts in Gothenburg and started as an artist in 1979. Soon after graduating, a group of other Sami artists and her started a Sami Artists organization to express their political beliefs through art. (Galleri Helle Knudsen) Marakatt-Labba grew up immersed in Sami culture, listening to family stories, but also experiencing the community’s repression herself. Her art weaves narratives from everyday events and proverbs of her Sami heritage, blending craft with art, myth, and storytelling. (Guttorm 2018)

Marakatt-Labba’s artwork focuses on storytelling, capturing both personal and historical events of the Sami people, including political events and changes in the landscape. She aims to highlight the often-overlooked history of the Sami, repurposing stories from her childhood. The artist believes that restoring knowledge of their history, which was never taught in schools, is crucial for the Sami people. (Kreuger 2018) And as Kreuger (2018) interprets, her stitching of history serves as a form of healing. Her artwork also addresses resistance, colonization and industrialization’s impact on natural resources. Her work combines political and everyday scenes, with small, detailed figures on a light background, often reflecting the first snow over a landscape. (Moseng 2024) The spirit world is frequently present, depicted through mirrored human and animal figures or the three Sami goddesses depicted as floating heads or full body people. Marakatt-Labba’s art critiques the colonization and exploitation of Sápmi while seeking ways to overcome the limitations that hinder decolonization efforts. (Rana 2019) Marakatt-Labba expresses that she has always been politically interested, especially the climate issues about mineral exploration and mining. She believes that more land and water is being exploited and it worries her what the future generations will have to live on, which is why she uses her art to protest all of this. (Hætta 2022)

Marakatt-Labba’s work often features circles, symbolizing the *lavvú* and the cyclical essence of life and nature. This cyclical logic intertwines the material, mythological, and political aspects of her art. (Moseng 2024)

The circle of the hearth, lawú, reindeer corral, and stellar dome all reflect this interconnected universe. (Lundström 2022)

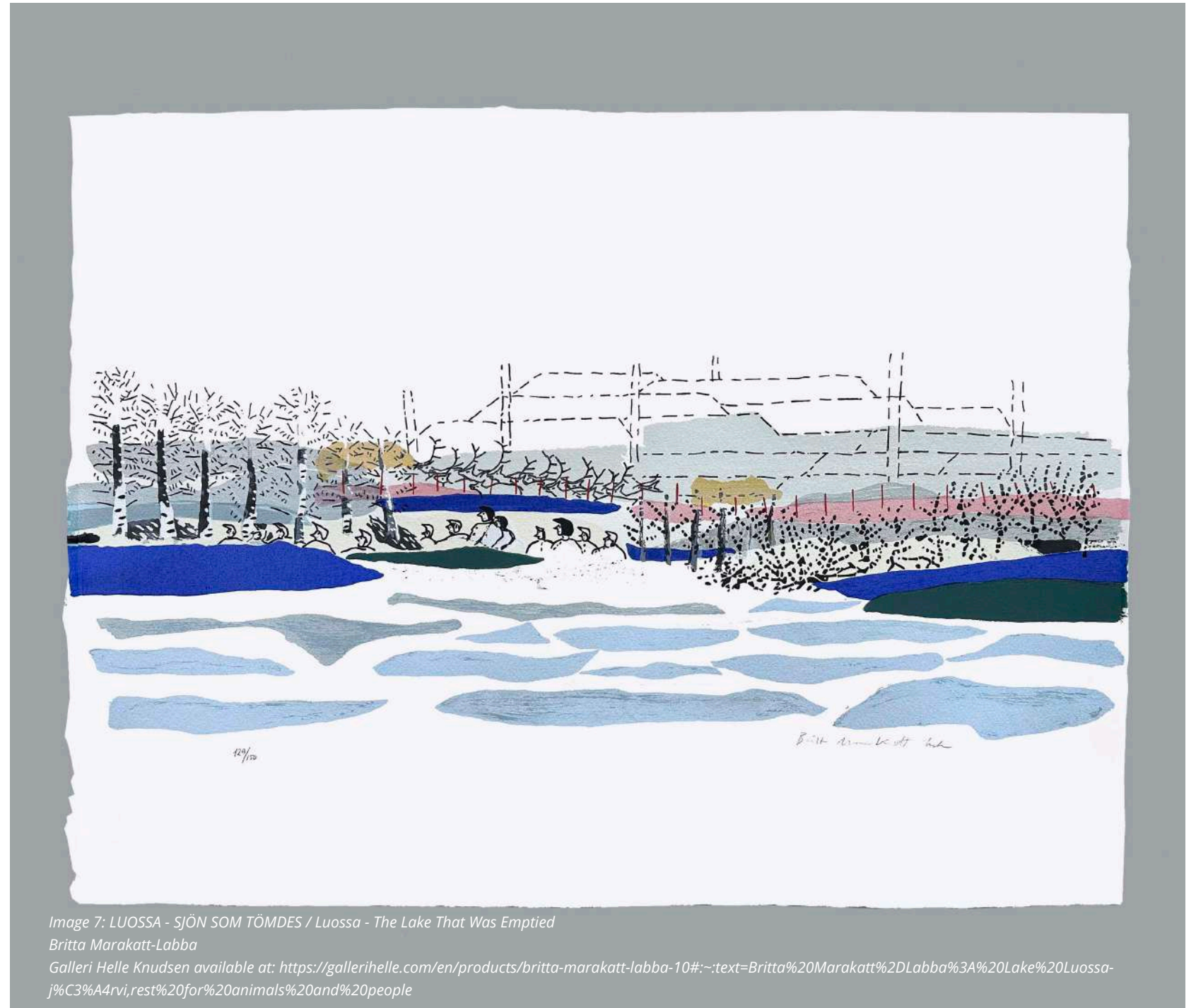
Her pieces often depict the three-part world of Sámi cosmology—the heavens, the world of the living, and the netherworld, the world of the ancestors. A recurring iconography in her artwork includes the silhouette of the birch tree, sleeping children squeezed together under one blanket, reindeer and reindeer antlers and fish, all stitched with simple lines. Another powerful element is the ladjogahpir, a Sámi women's hat which was prohibited during the colonization, which appears in red to symbolize resistance and protection and in blue to signify sorrow and mourning for exploited landscapes. Through these symbols, Marakatt-Labba visualizes Sámi cosmology, preserves cultural narratives, and responds to contemporary crises of neocolonialism, democracy, inequality, and climate change. (Lundström 2022)

Luossa - The lake that was drained

In the art piece “Luossa - The Lake That Was Drained,” we see at first glance blobs of different blues representing the lake and people sinking into it. They don't seem to have Sami indumentary. In the background, one can clearly distinguish the silhouette of the Kiirunavaara Mine, characterized by the hill that has been cut in several steps. The piece also shows reindeer running in the background towards a birch tree forest following their migration route, but also running away from the birch trees on the right that seem to be sinking or disappearing.

Some details that I find interesting are the lack of fish in the lake, which may imply that the lake is dead, with no life coming from it anymore. The lake is not being used by Sami people but instead is being exploited by non-Sami, probably people from the mine. Another detail that I find interesting is the red pathways over which the reindeer are moving, evoking resistance and a continuation of traditional Sami values to keep nature alive.

Britta has had a personal experience with the draining of this lake. She has talked about how the expansion of the mine meant giving up the lake, which was important for the migrating reindeer herders and for the people from the town who used it as a recreational area. The formerly popular lake was drained and poisoned. She has talked about how her grandparents had to live in a town next to the mine that was constantly being bombed for the iron ore, and surrounded by a familiar landscape that was constantly being transformed (Moseng 2024).



The art piece addresses an important event and a major change in the landscape that took place due to the constant exploitation of the mine. The landscape, once used by the herders of the area and the people from the town, no longer exists. This art piece represents the feeling of solastalgia, the loss of a familiar landscape. However, it also inspires remembrance. This art piece creates awareness of the toll mining has on the landscape, and how it affects not only the environment, but also the people who see it being lost and altered. It inspires me to try and give back a bit of the lake that was once so important, to try and heal this generational wound.

Lodderáridaras / Milky Way

The art piece shows recurring symbols from Britta, all happening around a circle, representing the cyclical essence of nature, where does it start, where does it end? There are different elements from the Sami culture, like fishermen on lakes and rivers, herders on snowmobiles guiding the reindeer, reindeer running through the forest following the trails, lavvús set in the forest, and the sleeping children protected by the stars.

All of their meahcit are interrupted by negative elements, like the pollution from a mine that is affecting the lake; a felled down forest next to the lavvús and the sleeping children leaving them unprotected, windmill parks interrupting the reindeer migration and the forest. All of these elements representing mining, forestry and green energy industries are interrupting the Sami cycle of life.

In the center several characters are represented: Beavi, the sun goddess, the 3 floating heads of the main goddesses and two people maybe representing ancestors, as well as several stars with floating heads outside the sun are all looking at the cycle. The 5 characters inside the sun are dressed in Sami clothes and hats, that as mentioned before, are wearing red signifying resistance and protection of Sami culture integrity, and blue signifying sorrow over exploited landscapes. At the top of the circle, the (Norwegian) Sami Parliament is represented as being full of Sami people. This can represent the self-determination, the resistance, and the involvement of the Sami community to fight against these industries that are disrupting the cycle and affecting Sapmi.

I think The Milkyway shows, through the mixture of mythology and everyday Sami activities, the history of Sami, constantly fighting and adapting to the changes in their landscape. A cycle that has been repeated time and time again since the start of colonial times. It shows the encroachment of damaging industries to their land and culture. But it also shows the traditional livelihoods of the herders and fishers, and the unity of the Sami with their community and with nature. The artwork shows the resilience of the Sami and their will to resist against this encroachment of the land. A will to recover and decolonize their land. As well as a feeling of sorrow by the damage that has been done to it.

This artwork creates awareness of the damages and the sorrow the exploitation of Sami land inflicts on the Sami population, and promotes collaborative work, the participation and the resistance towards exploitation. The presence of the ancestors in the artwork inspires the integration of traditional knowledge, through the spiritual connection from the Sami culture to the landscape. Overall, the artwork works as a wakeup call against the exploitation of Sapmi and the need for the decolonization of the land, by putting an end to exploitative industries.

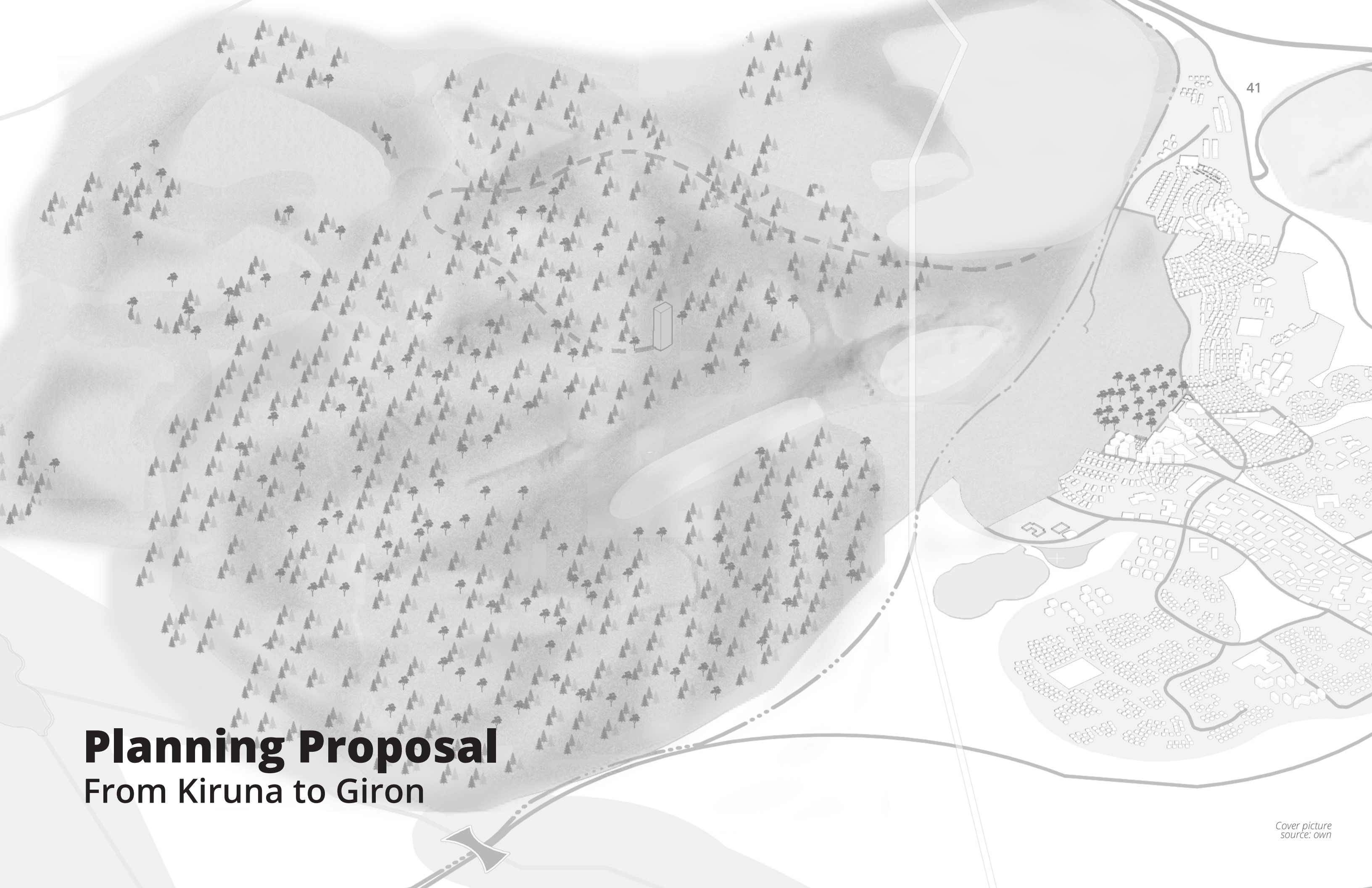


Image 8: Lodderáridaras / Milky Way

© Britta Marakatt-Labba / BONO, Oslo 2024

Photo: Stortinget

source: <https://www.nasjonalmuseet.no/utstillinger-og-arrangementer/nasjonalmuseet/utstillinger/2024/britta-marakatt-labba/>



41

Planning Proposal

From Kiruna to Giron

Reflexions before the plan development

After the research conducted on the Sami population, reindeer herding, and their relationship with nature, I have started to wonder if there is really anything I can design in this project. Instead of proposing something new, the proposal will aim to bring back what was already there. However, despite all the investigation and reading, the necessary conditions for reindeer herding and other Sami trades can only be truly understood by someone who has lived in that landscape, someone with traditional knowledge and who is dedicated to their industry. The lack of interaction and participation with the Sami during this process has created limitations in the planning proposal. My attempts to propose something may be far from the reality that the Sami community needs, despite my efforts to understand. However, the focus is on the ecological aspects to begin the decolonization process with a sensible approach towards the community, and aiming to decrease the fragmentation of their landscape that has affected the reindeer industry, in hopes they find the remediated and reclaimed landscape useful.

Firstly, the decolonization of the land that was encroached upon by the Kiirunavaara mine will be done through remediation, reclamation and rehabilitation. According to Swedish Environmental Code, the Mining Company is responsible for the remediation, so they must execute this process. This should include the vacant area left behind after the city's relocation by 2032. The remediation should start by 2035 when the mine is supposed to stop mining. The first steps should be as follows:

- **Removing infrastructure:** Eliminate the buildings and conduct grading work to return the mountain to a more natural, organic, and accessible form.
- **Restoring the lake:** Reclaim the lake that was removed for the mine as an area for reindeer herding and recreation, inspired by the work of Britta Marakatt-Labba.
- **Adding topsoil:** Apply topsoil to the mountain to enable vegetation growth.

From all the infrastructure to be removed, one structure will be left as a memento. The structure should be visible and representative of the hill's silhouette. This memento should symbolize the history of the mine, its effects on the landscape and on Sami culture, what it meant for Giron, and how the remediation serves as an example of decolonization, raising awareness in the process. Furthermore, It's important to note that the mountain will not return to its original form, as it's impossible to obtain the amount of material needed to fill the mine pit and reconstruct the mountain. However, vegetation will recover and transform the industrial landscape into a natural one.

Secondly, supporting the creation of favorable conditions for the reindeer herders is crucial. They will be able to decide how to use the reclaimed landscape, but the goal is to provide them with a dignified landscape. Ecological aspects will support the future of reindeer herding by fostering favorable

conditions for the trade. Efforts will be made to help the Sami reclaim their meahcci through vegetation, native trees, and lichen growth.

Thirdly, restoring the sense of place of the Sami Villages through the renaming of the area back to Giron, inspired by Hans Ragnar Mathisen, is essential. Since the landscape has changed so much over more than a century, the Sami of today have never known Giron without the mine. Creating a sense of place in the newly remediated and nature-reclaimed area is important for the Sami to feel a sense of ownership and entitlement towards their decolonized landscape. This sense of place should come with time and through the rehabilitation of the landscape. However, having a dignified landscape is the first step.

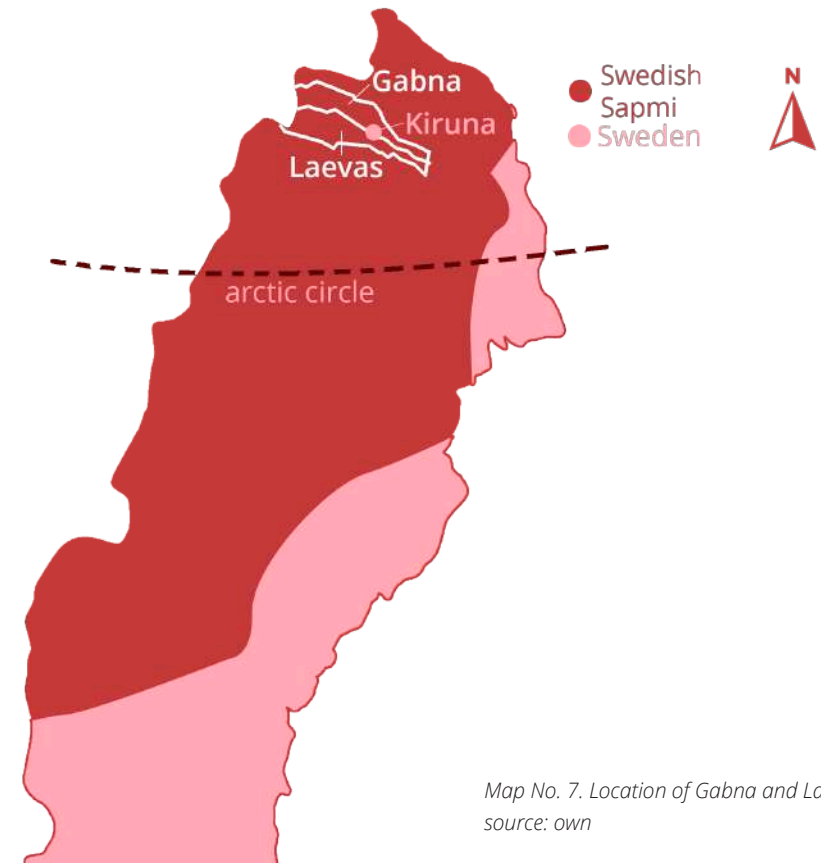
Lastly, as previously discussed, one of the major disadvantages of the mining industry is that, upon closure, they leave behind ghost towns. This is a sustainability problem, as abandoned houses and buildings due to a lack of job opportunities can also create social issues. Mining towns need to face a form of re-economization, which in this case could be directed to benefit the Sami as part of decolonization. This topic goes beyond the scope of the thesis, but ideas for re-economizing the town can be seen in the project developed in the annexes.

In conclusion, the The Proposal: From Kiruna to Giron should reflect what the artist and their art pieces analyzed previously have inspired and transmitted: decolonization, integration of traditional knowledge through the use of native vegetation, restabilizing of the Sami cycle by erasing the mining legacy, remembrance of the previous landscapes through the recovery of the lake and awareness of the toll that mining has on the environment and Sami community through the memento. The project will be presented in plans 15 years apart, starting in 2035 with the remediation, 2050 with the reclamation of nature, and in 2065 with the opportunity of the Sami for rehabilitation of their ecosystem services, when the vegetation has settled in and the landscape has started to heal.

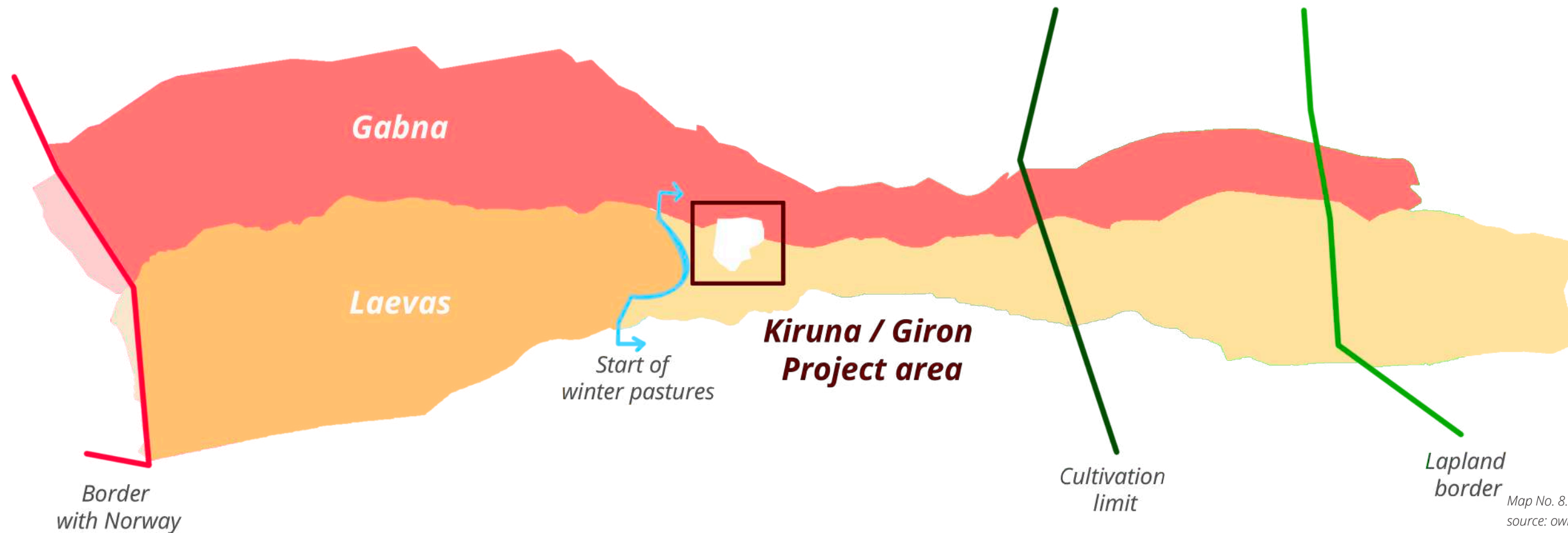
Site Analysis

Sami Villages - Laevas and Gabna

To give some context to the delimited project area, Figure 8 shows the size and location of the Sami Villages. As stated before, the Laveas and Gabna Sameby are north of Swedish Sapmi. The Sami Villages are neighbors and as seen on Fig. 8, they expand from east to west, having a bit of land over the Norway border. As seen on the map, the Sami Villages also expand over the cultivation limit and Sapmi border. The town of Kiruna is centered in the middle of the two Sami Villages, surrounded by Laevas winter pastures that comprises pre winter, winter and spring winter activities. Due to the lack of information on Gabna Sami Village year round pastures and migration paths, the project is going to assume that the project area located on that side of the Sami Village are winter pastures as well.



Map No. 7. Location of Gabna and Laevas Sami Villages
source: own



Map No. 8. Gabna and Laevas Sami Villages
source: own

Landscape description

Kirunas landscape is constituted by a mix of flat lands, hills, mountains, lakes and mires. The vegetation surrounding the town is conformed by a high altitude boreal forest which has a mix of coniferous and deciduous trees. Here the predominant species is the Norway Spruce and in a less frequent base, the birch tree. The forest is also accompanied by the pioneer species, salix ssp, which is categorized as a shrub or small tree. Other dwarf shrubs can be found, like the blueberry and lingonberry, which are native species. (Godeau 2019)

These plant species form the perfect environment for lichen growth, which is the most important source of food for the reindeer. The different types of lichen can grow on rocks, tree trunks, or hang from branches. The mires or peatlands are important ecosystems for reindeer herders as well, since they provide nutritious pasture and help avoid blood sucking insects. (Reindeer Herders' Association)

Winter pastures

As explained before, the needs of the reindeer and the herders vary according to several factors like tree cover, understory vegetation and snow conditions which are influenced by biological, geographical, and climatic variables. (Roturier & Roué 2009) and are never the same. This topic has been already discussed in a past chapter dwelling on the complexities of the migrations and grazing pastures. Nevertheless, to the best of this project's understanding, given the complexity of the topic, the criteria to understand winter pastures will be as follows. During the pre-winter, winter, and spring-winter seasons, the reindeer mainly migrate from west to east and back, looking for food. They mostly graze on grass when possible and then lichen. The lichen is found buried under the snow which is why the forest is important for grazing, since the snow cover is thinner under the tree covered areas, making it easier for the reindeer to access the buried lichen. The common strategy is to start grazing uphill and go down gradually to the valleys.



Img. 9: Norway Spruce (*Picea Abies*) and Scots Pine (*Pinus Sylvestris*)
Photo: Jenny Svernnäs-Gillner, SLU



Img. 10: Birch (*Betula Pubescens*)
Photo: Jenny Svernnäs-Gillner, SLU



Img. 11: Pioneer Shrub - *Salix*
By BCB - Own work, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=2004880>



Img 12: European Blueberry, *Vaccinium myrtillus*
Photo: Jenny Svernnäs-Gillner



Img. 13: Lingonberry flowers (*Vaccinium vitis-idaea*)
Photo: Jenny Svernnäs-Gillner, SLU



Img. 14: Haircap moss (*Polytrichum commune*)
Photo: Jenny Svernnäs-Gillner, SLU



Img. 15: Birch trunk with *Hypogymnia physodes* lichen
Photo: Jenny Svernnäs-Gillner, SLU



Img. 16: Lichen (*Cetraria* spp)
Photo: Rob Hille



Img. 17: Lichen (*Bryoria*)
Photo: Jenny Svernnäs-Gillner, SLU



Img. 18: Lichen (*Cladonia*)
Photo: Jenny Svernnäs-Gillner, SLU

Mine topography and infrastructure

The Kiirunavaara hill and its surroundings have undergone a tremendous transformation due to the mining activities that have taken place. Figure 6 shows the changes over the last century, beginning with a historical map from 1889, right before the start of mining activities, in which the hill looks untouched. By 1932, mining of the hill had started, the train rail to Narvik had already been built, and the town had begun to grow. In 1978, the mined area had turned into a mine pit, the hill had been altered to have different terraces, and the train infrastructure had expanded around the hill. Finally, in the map from 2024, the current size of the mine can be seen. The mine pit has grown, there are new tailings ponds for polluted waters, the rail infrastructure has expanded even more, and the town appears to have grown by at least a third of its size.

In Figure 5, the current state of the mine can be seen, with its rail and road infrastructure surrounding the whole hill, as well as the Luossa Lake. The different terraces created on the hill's topography and the industrial buildings surrounding the hill are visible. In a darker red, the highest structure can be noticed, which is an old tower that was once an elevator to extract iron ore but is now inactive. The tower is an identifiable landmark of the mine's silhouette due to its height and can be seen from different angles in the town (see image 19). The inactive elevator on top of Kiirunavaara hill could be repurposed as a memento after the remediation and reclamation process, representing the history of Kiruna - Giron and creating awareness of the landscape changes that have occurred and continue to occur.

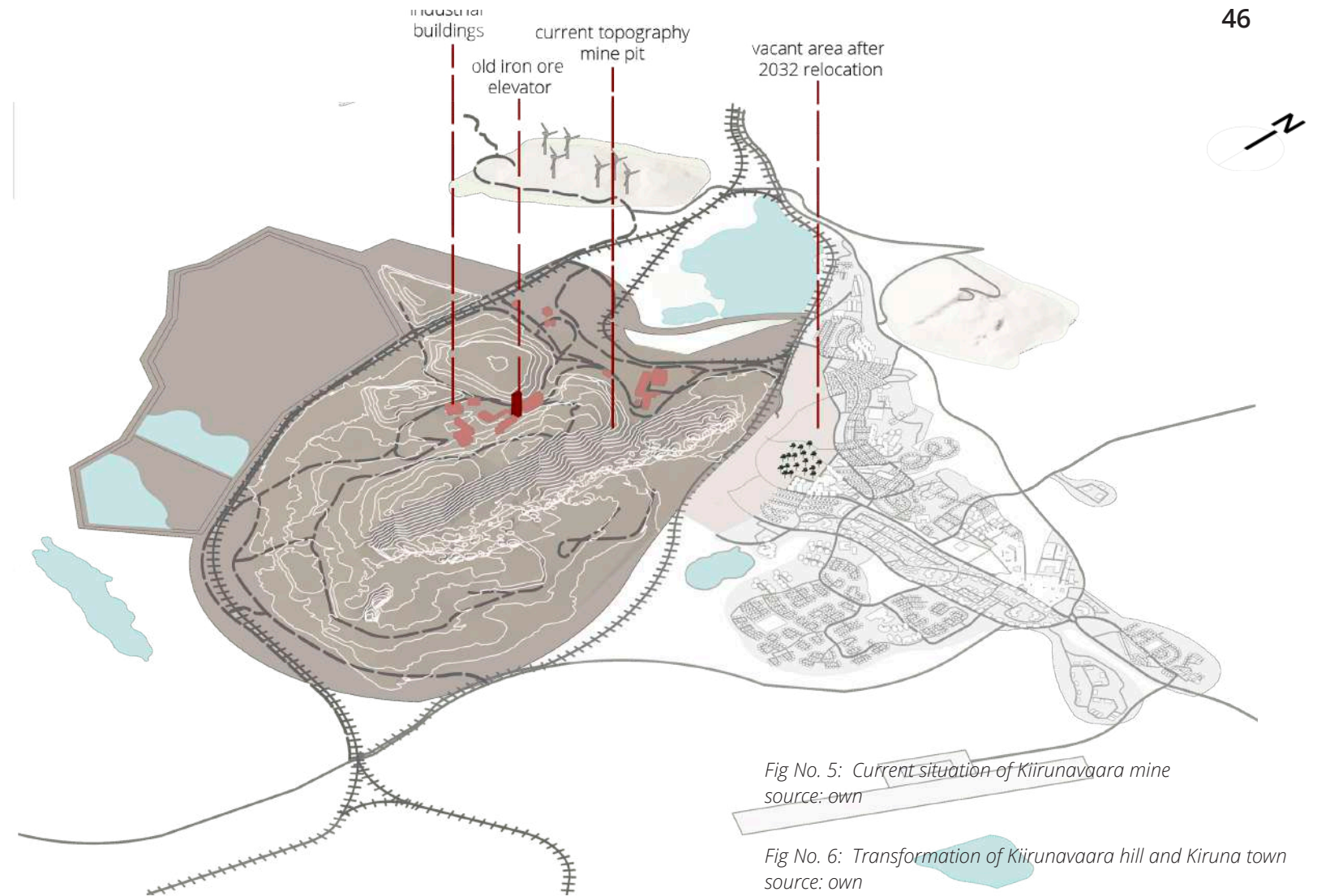
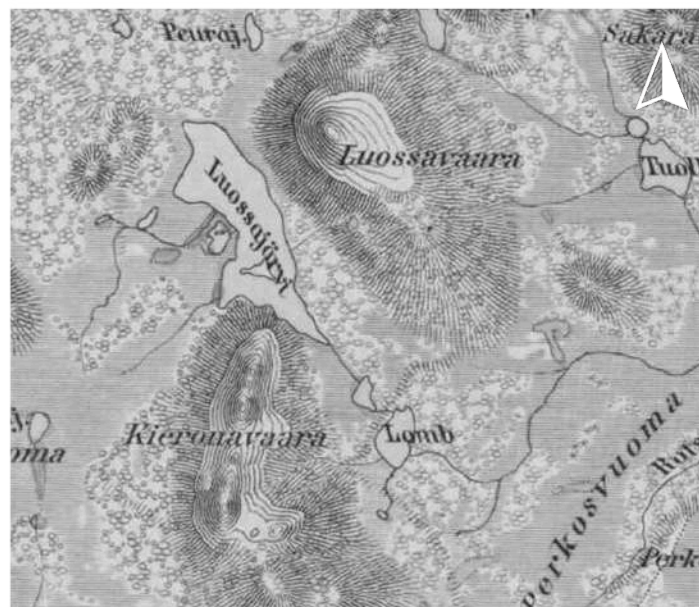
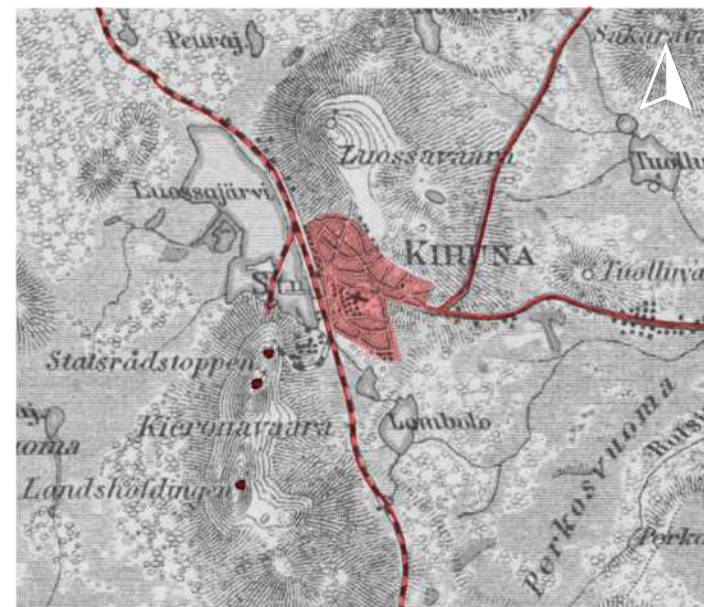


Fig No. 5: Current situation of Kiirunavaara mine source: own

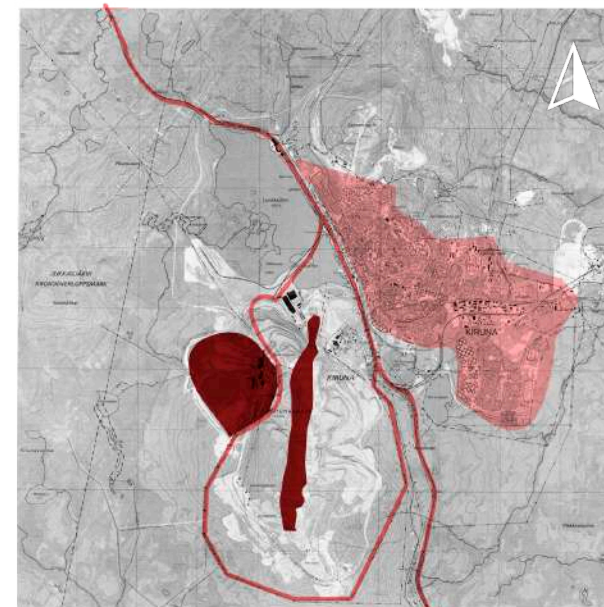
Fig No. 6: Transformation of Kiirunavaara hill and Kiruna town source: own
Historical maps: © Lantmäteriet



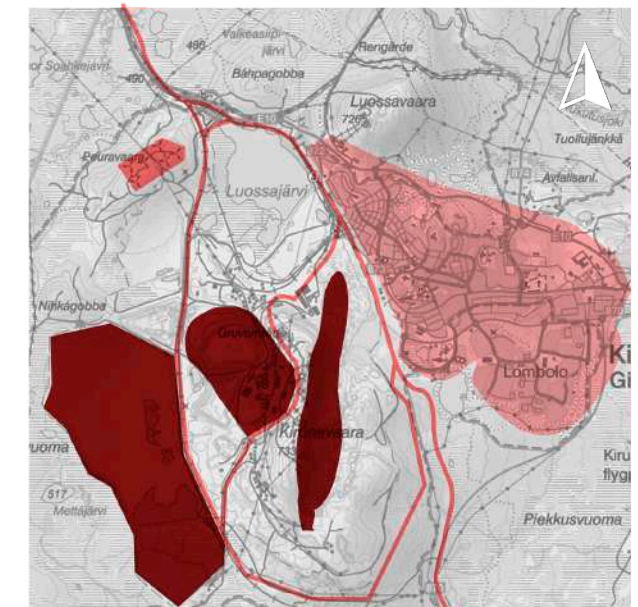
1889



1932



1978



2024

Image No. 19: Kiruna, Sweden

Photo ID: 978590684

photo: Alexander Farnsworth

Source: iStock

<https://www.istockphoto.com/se/foto/kiruna-sverige-gm978590684-265965501?searchscope=image%2Cfilm>



Evolution of Luossajärvi

As highlighted by the Sami artist Britta Marakatt-Labba, the Luossa lake has been drained due to mining activities over the past century. According to her experience, the lake was an important area for herders during their migration as well as for the people from the town. In Figure 9, the transformation of the lake can be seen in a sequence of historical maps, starting from 1889 when the lake was untouched and had its original size. In 1932, the construction of the train rail to Norway surrounding the lake and a new entrance to the Kiirunavaara hill reshaped and divided the lake in two. By 1978, the expansion of the mining area and infrastructure had reduced the southern part of the lake. Today, due to constant mine expansion, the lake has been reduced to less than half of its original size, with a major part of it being excavated. Further infrastructure has also taken the place of the lake. The Luossajärvi was declared with a moderate ecological status, according to the Kiruna Municipality (2019), which means the lake will have to undergo a cleaning process as well as part of the remediation, to remove any possible pollutants.

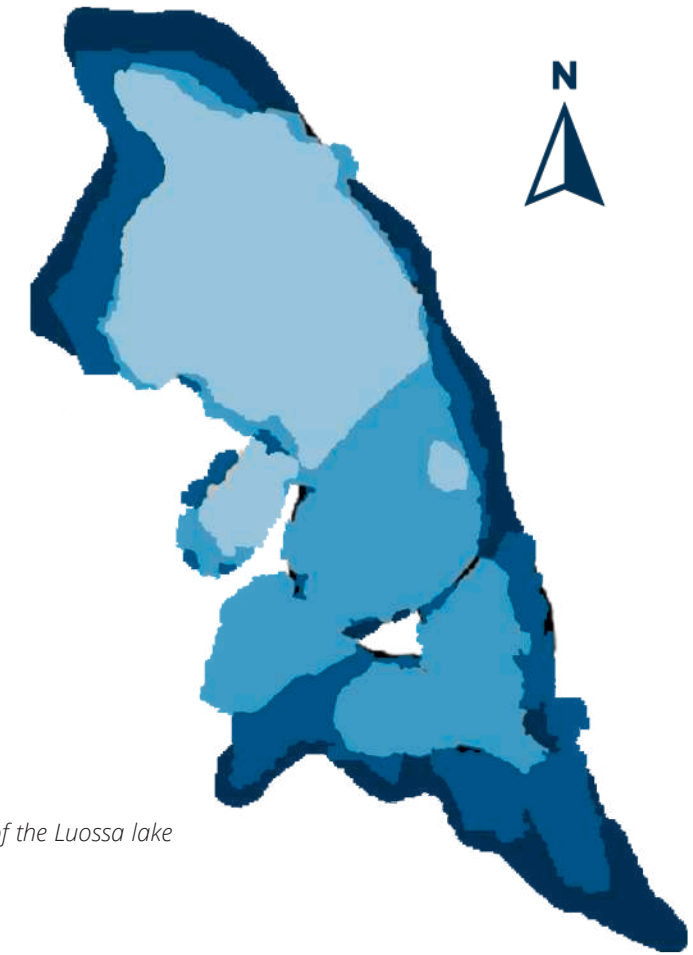
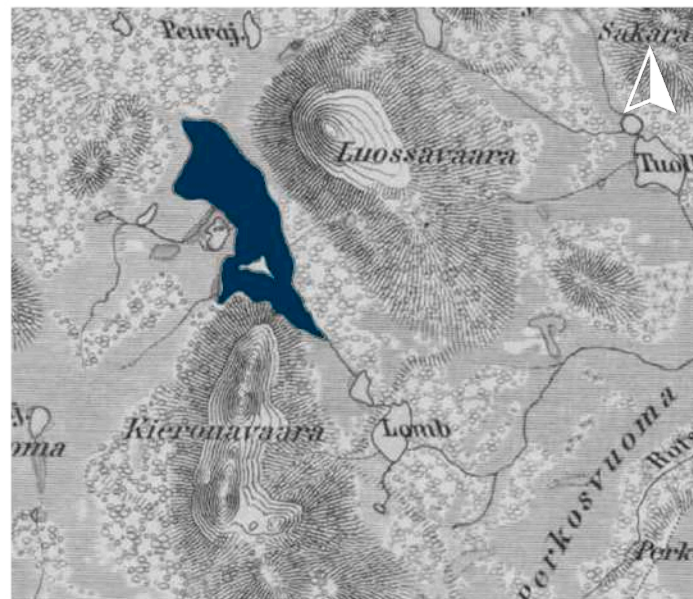
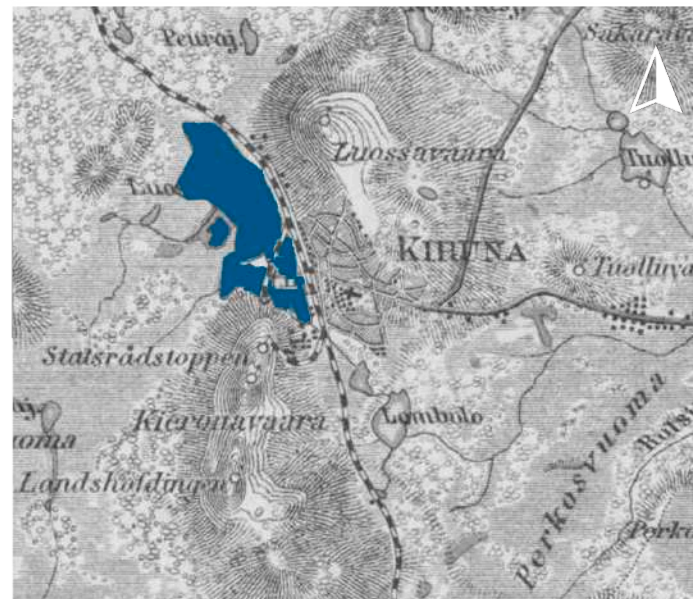


Fig No. 7: Yuxtaposition of the transformation of the Luossa lake through the years
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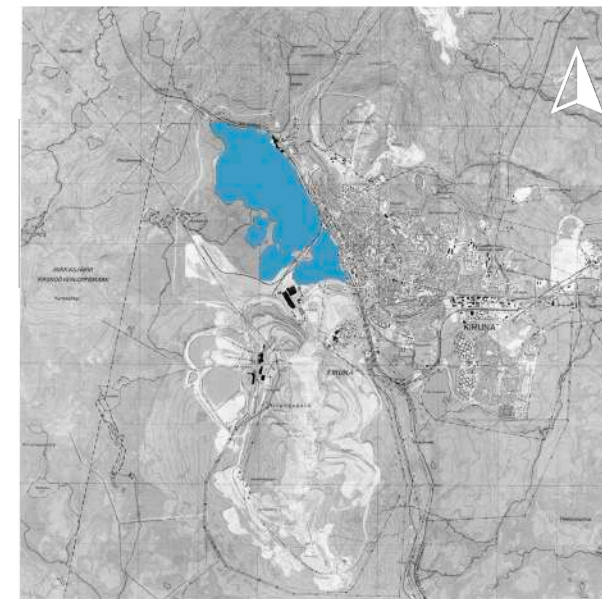
Fig No. 8: Transformation of Luossa Lake
source: own
Historical maps: © Lantmäteriet



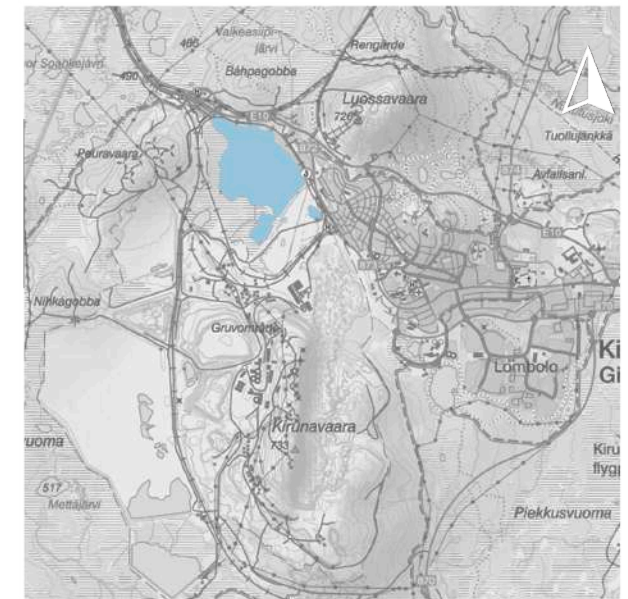
1889



1932



1978



2024

Migration paths and key areas for reindeer herding of Laevas Sami Village around the town of Kiruna

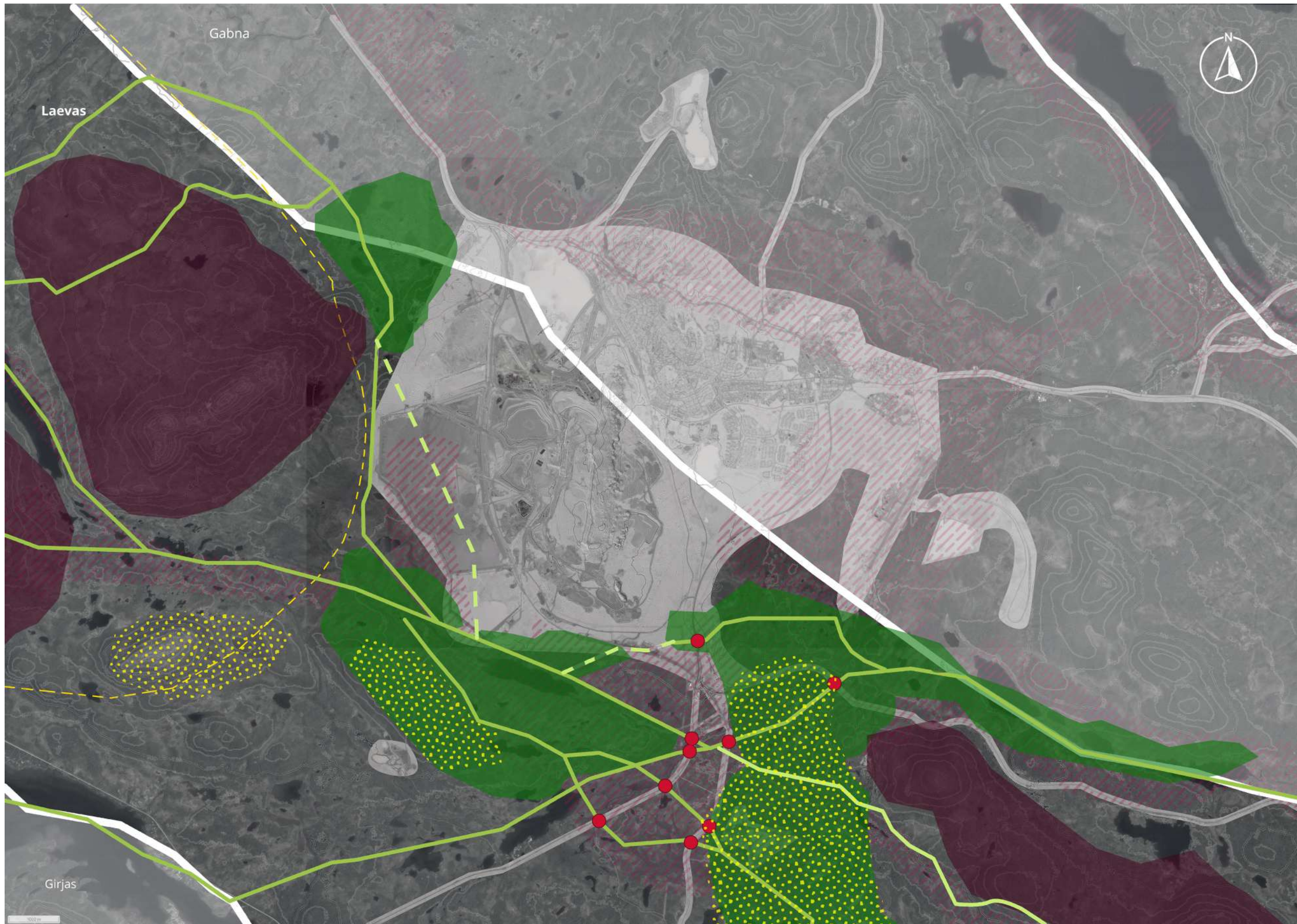
The Sami Parliament participates in community planning, to ensure that the land use of Sapmi for reindeer herding is respected. The Sami Villages have developed plans describing their land use and infrastructure with general info. Nevertheless, the plans only describe the herding in a normal reindeer herding year, without considering conditions that could affect and change them since the herding varies from year to year. (Sametinget - Rennäringens markanvändning)

The Renbruksplan - Clean Use Plan, is another initiative from the Sami Parliament, which consists of plans that describe the land use of the Sami Villages through maps that describe their core key areas. These plans are made with the purpose of providing the Sami Villages with tools to explain the industry when dealing with other land users, like the mining, forestry and wind power industries, as well as Municipal planning and issues that may arise from snowmobiles and hunting, which all affect the reindeer husbandry. (Sametinget - Vad är en renbruksplan?)

This thesis is focusing on the effects of the Kiirunavaara mine on the Reindeer herder community from the Laevas and Gabna, and how it can be remediated and given back to them. Nevertheless, a special focus is being put on the Laevas Sameby, since the mine is located on its territory for the most part. With the aforementioned plans, the summary of the information can be seen in the map No. 9.

The area selected for this project consists of year - round pastures but is mainly used during winter, and a small area for pre winter season to the west. On the map No. 9, the area used by the Sami Village, around the town of Kiruna can be seen in a stronger shade. Around this area, there are comfortlands, collection areas and "rasbete" areas, which all follow the migration paths. Additionally the National Interest areas can be seen usually following the paths as well.

The whole area surrounding Giron is considered by the Sami Parliament as a Difficult Passage area. The map marks some specific points that have a physical difficulty due to the roads and railways coming from the town. These points have been identified by the Municipality of Kiruna in their Comprehensive plan. Furthermore, the map shows some of the paths that have been disabled because of the mine. Several comfort areas are located nearby the town. To understand what the use of key areas are, check chapter "Reindeer husbandry and its core key areas" on the Background.

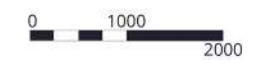


KEY AREAS FOR LAEVAS SAMEBY

-  Scarred areas
-  National interes for reindeer herding
-  Sameby limits
- Key Areas**
-  Comfort land
-  Paths
-  Erased paths
-  Difficult passages
-  Rasbete
-  Collection area
-  Pre winter land limit



Map No. 9. Key areas for Laevas Sami Village
 source: own
 base map: Google Earth
 Altered with information from Rennsbruk-plan



Girjas

Gabna

Laevas

Kiruna 2035

By 2035, the situation in Kiruna is expected to involve the LKAB Company closing the Kiirunavaara Mine after completing all excavations and the end of the land concession. Hopefully, the Per Geijer Deposit will not be excavated, as it encroaches further on national interest land for in reindeer herding. The relocation of buildings and houses should be complete, and the land left behind should be vacant. Following these changes, the mining company should begin the remediation process, which should involve Sami participation to ensure the process benefits the Sami community of reindeer herders and the local ecology.

With this scenario as the premise, the proposal for this thesis begins. As previously explained, since there was no opportunity for Sami participation in this project, the proposal focuses solely on improving the ecological aspects of the area to benefit reindeer herding, considering the researched information in the Background chapter and the understanding of the landscape in the Theoretical Framework chapter. The proposal will not dictate what the Sami can do with the land but will instead propose landscape rehabilitation that aims to meet their needs.

Figure 15 shows the starting point of the project, with the current topography of the mine, the current size of Luossa Lake, and the migration paths that surround the area, as well as other key areas for herding activities. The figure also depicts the mine's infrastructure on and around the hill, including industrial buildings, roads, railways, and tailing dams for polluted waters.

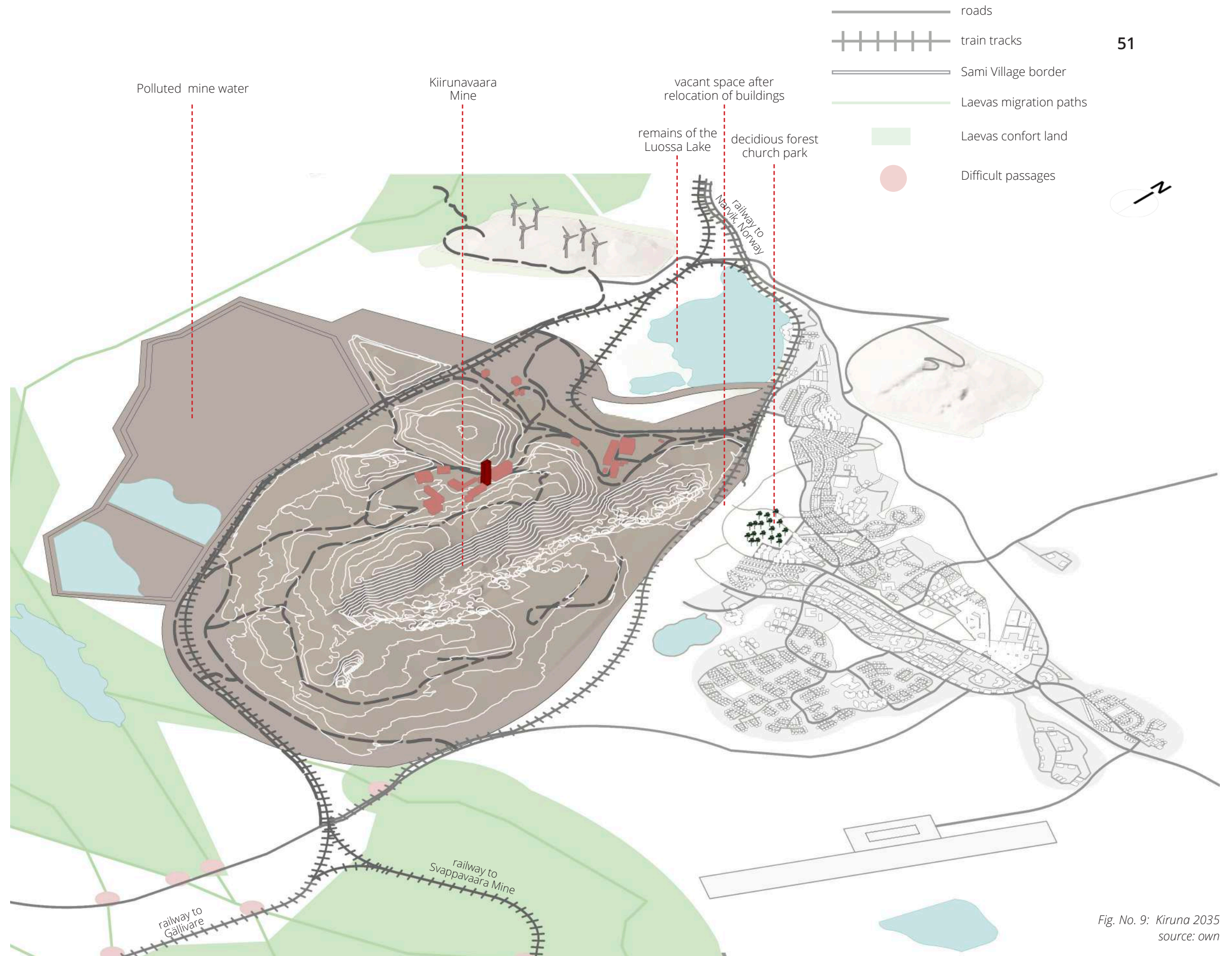


Fig. No. 9: Kiruna 2035
source: own

Kiruna remediation

2035

The remediation process involves removing all pollutants left behind by the mine and improving the soil to support vegetation growth.

Infrastructure

The first step in this process is removing the pollutants and infrastructure. By removing the roads and railways, the hill can revert to a more natural state. Furthermore, removing the train rails that were used to transport the iron around the mine will improve the possibility of circulation of migration paths, since these obstacles often scare the reindeer. This way, the reindeer will have an easier access to the hill. The main railway that will be removed is the one connecting to the other mine near Kiruna called Saapvaara. Cleaning the tailing dams is of utmost importance, as the polluted water could infiltrate the soil and contaminate the groundwater.

Additionally, removing industrial buildings that may still contain harmful pollutants is necessary. Only one building should remain: an old elevator tower once used to extract iron ore. The tower has a prime location that can serve as a lookout spot and is part of the hill's silhouette. Moreover, the tower can serve as a memento of the hill's history with the Sami and the mine. The tower could host a small exhibition about the history of Kiruna, raising awareness of the impact mining has had on Sapmi land.



Fig. No. 10: Remediation of Kiruna
source: own



Grading

The Kiirunavaara mining area needs some grading work, to re-stabilize the pit, and decrease the slope of the cliff. The Mining Company is responsible for filing the underground excavations to avoid the risk of collapse.

Grading work on the mine to smooth out the hill, can facilitate future vegetation growth and make the hill more accessible for humans and animals.

The flatland where the tailing dams were located can be transformed into a wetland, since these environments are useful for the Sami reindeer herders as grazing and resting areas.

The lake Luossa needs grading as well, to make it bigger. It cannot be restored to its original shape but it can be expanded to 1/2 of its original size to give a bit back of the ecosystem services it once provided for the reindeer herders. (See figure 16 b)

Top soil

After the grading work is done, top soil needs to be distributed on the former mining area, to make the reforestation and the growth of vegetation possible.

Top soil should be added to the vacant area where the relocated houses were as well.

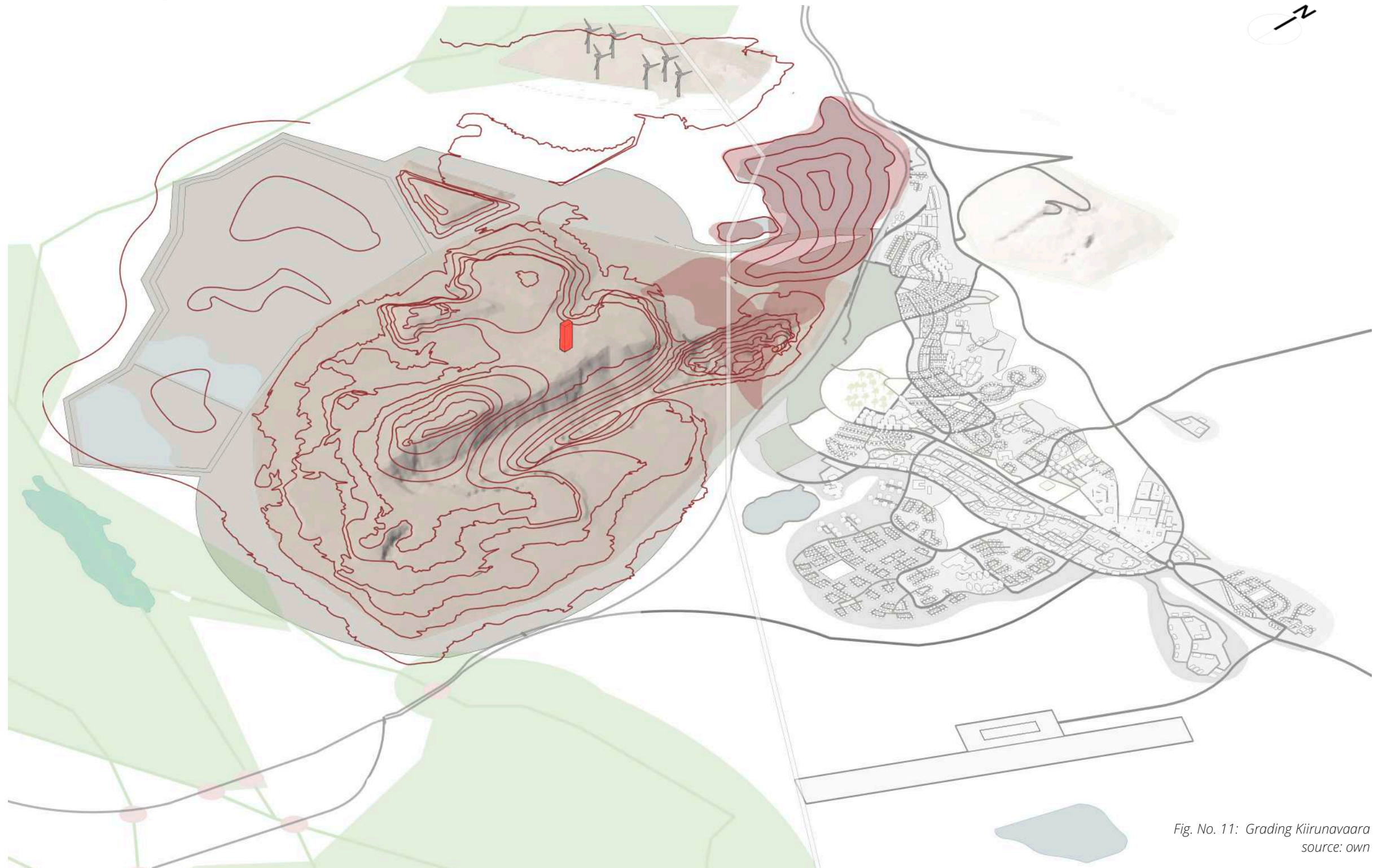


Fig. No. 11: Grading Kiirunavaara
source: own

Kiruna - Giron transition reclamation 2050

With the remediation process done, the land can start to be reclaimed. Reclamation has the goal to recover ecosystem services without replicating the pre-existing ecosystem. In this case, restoring the hill to its original state, exactly as it was before the mine's exploitation, would be impossible and unsustainable due to the resources required to fill the mine pit. To reclaim the land and recover ecosystem services, it has to offer beneficial ecological aspects for the herders. As described earlier, the winter pastures consist of boreal forest, and specific dwarf and tall shrubs found in the area that serve as grazing land. As seen in Figure 13, the current comfort land surrounds the hill, as well as the migration paths. Hopefully, with the reforestation and regrowth of vegetation of the hill, the Sami will be able to include this area in their migration routes and find more suitable grazing areas. The reforestation plan shows the location of the different different species. Figure 12 explains the meaning of the textures.

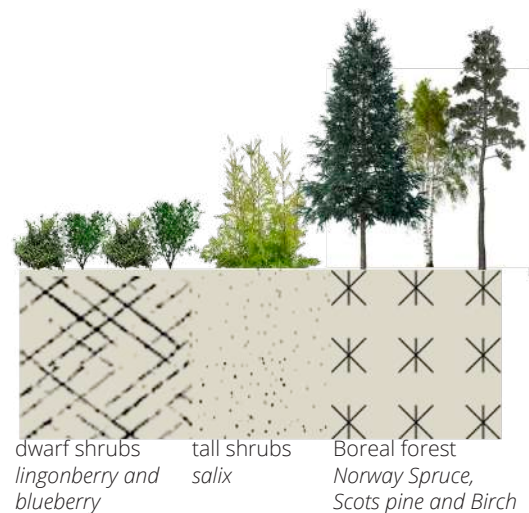


Figure 12. Symboly of the textures in Reforestation mao

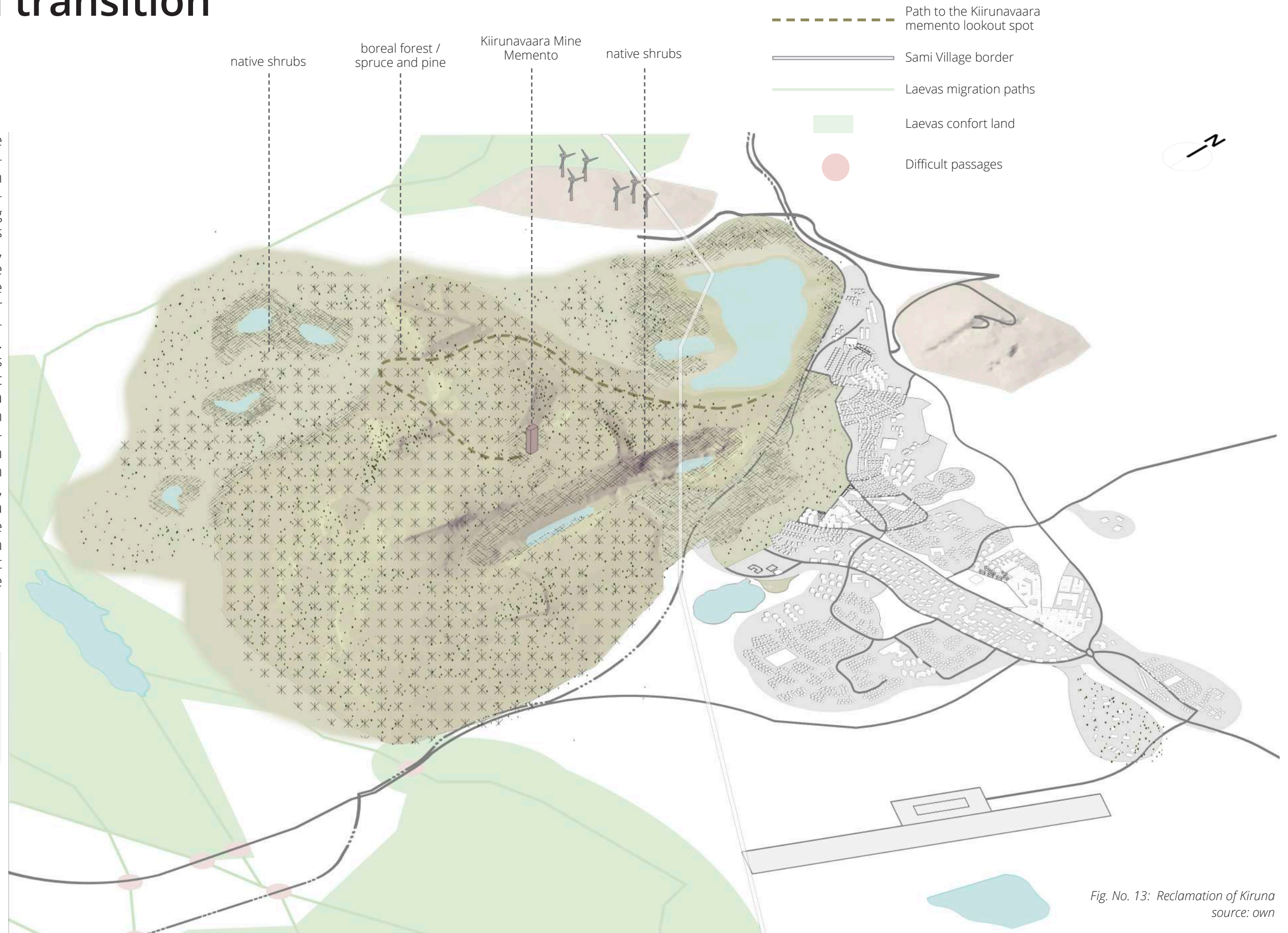


Fig. No. 13: Reclamation of Kiruna
source: own

The hill will be forested, aiming to replicate the ecosystem shown in image 21. The areas around the wetland and the lake will be surrounded by tall and dwarf shrubs, as seen in image 20. Moreover, the flat land surrounding the hill, as well as the vacant space from the house relocation, can be composed of a mixture of forest and tall shrubs (see image 22). The mine pit, due to its steep slope, can support the growth of shrubs that will help stabilize the soil and prevent further erosion. The topography has been proposed with different steps to help with erosion control (see Figure 14, section diagrams).

At the top of the hill, the tower can serve as a lookout spot, offering a perfect view of the mine's transformation, accessible via a pedestrian path. The expanded Luossa Lake can start to fill naturally, along with the mine pit, due to the accumulation of snow and rainwater. The accidental creation of the new Kiirunavaara lake can serve as a replacement for the missing area of the original Luossa Lake.



Img. 20: Example of dwarf shrubs near Kiruna
source: google earth



Img. 21: example of forest with pine, spruce and birch near kiruna
source: google earth



Img. 22: example of tall and dwarf shrubs near Kiruna
source: google earth

Recovering Giron rehabilitation

2065

The rehabilitation of the land aims to recover the pre-existing ecosystem services of the community, specifically reindeer herding. With the reclaimed landscape that, after 15 years, has started to regenerate. The Sami can return to the land that was encroached upon by the mine for so long and find new uses for it. The forest will still be young after 15 years and has a long time before it reaches maturity but can already be used by the Sami. As stated before, this project does not propose what the Sami should do with the reclaimed land but merely suggests a landscape that can be useful for them.

With the reforestation of the hill, the area is now covered in boreal forest and surrounded by flat lands with shrubs that support lichen growth. The lake has reached its full size, and the Kiirunavaara lake is filling up as well. Some difficult passages have been resolved with ecoducts that allow safe crossings over train tracks and roads. Nevertheless, due to the closed mine, car and train traffic has decreased significantly, making the crossings even safer.

The surrounding comfort land has new areas that complement the needs for successful and stress-free migration, with abundant vegetation and possible grazing. The lake also provides a safe space and a nice resting stop for the herders.

The town uses the newly recovered land for respectful recreation, thanks to the awareness created by the Kiirunavaara Museum in the tower at the top of the hill, highlighted red to signify resistance and protection.



Fig. No. 14: Rehabilitation
source: own

*Fig. No. 15: Reclaimed landscape, rehabilitated land being used for reindeer herding, reforested hill, recoverd lake, and new Kiirunavaara lake.
source: own
base image: Alexander Farnsworth
Source: iStock*



reflections and discussion

This project aimed to answer how to return the land to the Sami who formerly used the land as winter pastures for reindeer herding before it was colonized through the remediation and rehabilitation process of the mine. The result after researching about the historical and economic context of Kiruna, as well as trying to understand the Sami reindeer herding better and the Sami's relationship with nature through scientific articles, but especially through Sami art, as well as the reflexion on landscape through planning, resulted in a conceptual proposal of how the remediation, reclamation and rehabilitation of the Kiirunavaara mine can be conducted. It shows how the land can be remediated for it to be useful again as winter pastures and / or migration paths, returning to its previous ecosystem services, for the Gabna and Laevas Sami villages.

With the resulting plan proposal, the project aims to improve the situation for the reindeer herding community by working to decolonize the land, which has suffered from the fragmentation of their landscape caused by the mine and the expanding city that have encroached upon their national interest areas. Additionally, the project aims to promote the reactivation of old migration paths or the creation of new ones, ensuring that the reindeer herding community can continue their traditional practices with improved access to essential grazing areas.

Impact on the Sami Community:

The proposal of the rehabilitation of the Kiirunavaara Mine represents a long process of decolonizing the area, serving as an example for others to come. This slow but necessary rehabilitation process is something the Sami community deserves after years of exploitation, of being victims of structural violence and being excluded by corporate paternalism. The decolonization of this piece of land is a small piece of justice for centuries of encroachment and discrimination suffered by the community.

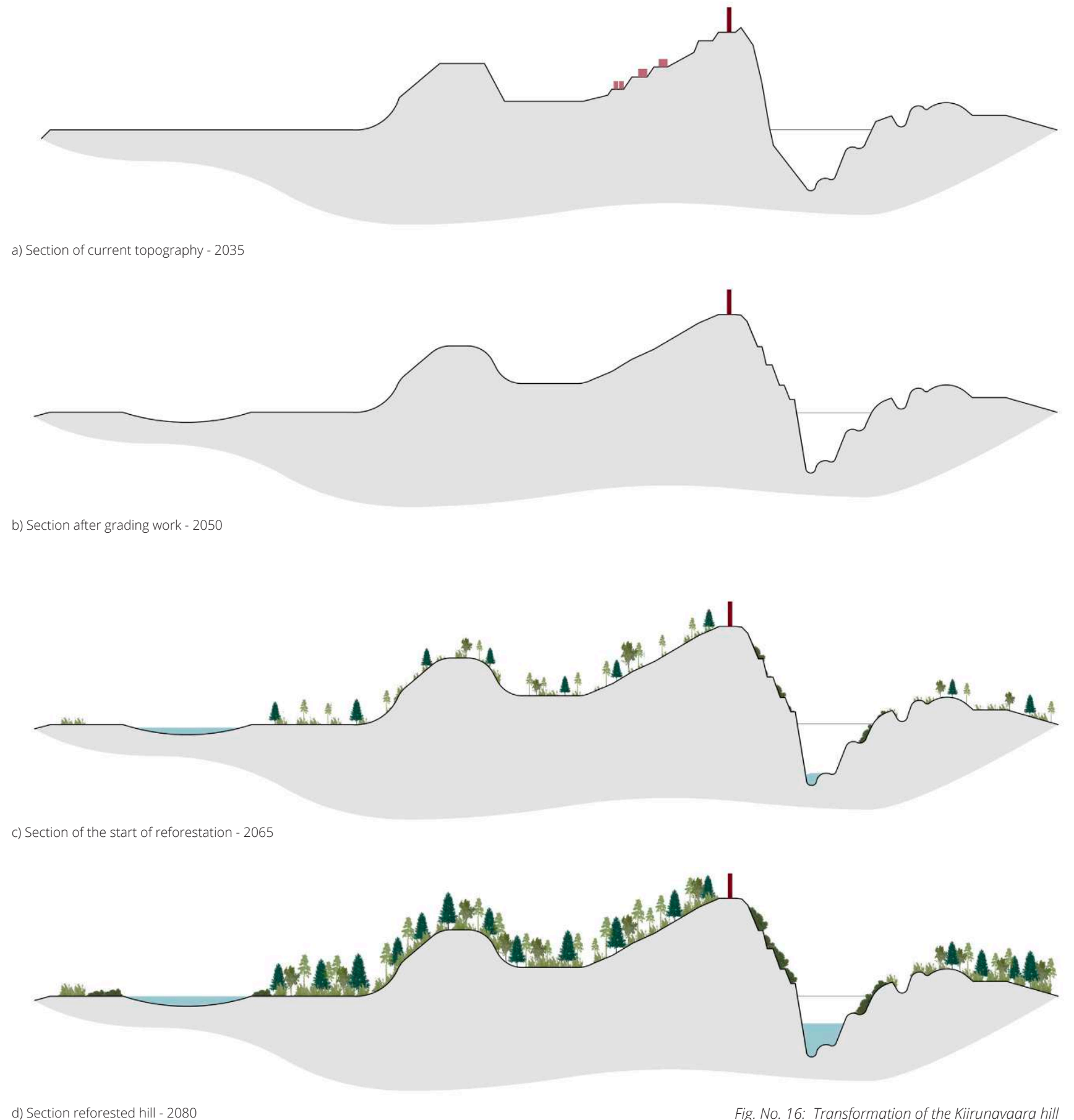
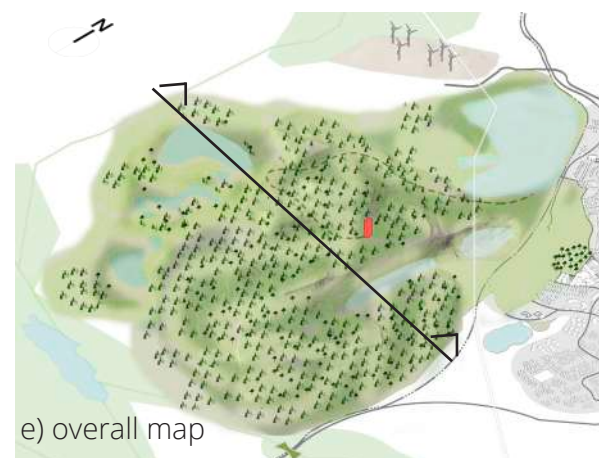


Fig. No. 16: Transformation of the Kiirunavaara hill

Influences from Sami figures like Hans Ragnar and Britta Marakatt-Labba highlight the importance of decolonization through their art. Their influence is reflected in different aspects of the proposal. Starting with the proposed name change from Kiruna to Giron, which aims to make Sami culture more visible, and to help regenerate a place attachment towards the landscape. The partial restoration of Luossa Lake adds a personal layer to the plan, inspired by anecdotes of Sami reindeer herders. Traditional Sami knowledge, particularly from Sami cosmology, inspired elements like the red color of the museum, signifying resistance and protection. Furthermore, the traditional knowledge learned from the Eallinbiras and the Sami Parliament, as well as other Sami sources extend to the planning of the landscape, including the selection of plants and the understanding of winter pastures. While I don't possess traditional knowledge, extensive research into Sami resources informed my proposal.

It is important to highlight that, while there is a planning proposal, it only shows the remediation and reclamation of the landscape. However, the rehabilitation process where the ecosystem services can take place, is only proposed as a blank canvas on a recovered natural ecosystem, for the herders to use it as they will. The rehabilitation process can only be decided by the Sami who are gonna use the land. The proposed elements on the proposal are inspired by the voices of the Sami artists that talk about decolonization, but should only be taken as concepts rather than an actual plan for the land.

The project acknowledges its limitations, particularly due to the absence of direct participation from Sami people, which is a significant gap when planning the proposal. As stated before, the need for participation and community engagement in the process of indigenous planning is vital for decolonization of the land. Engaging with the Sami would have provided a better understanding of their needs, vision, and traditional knowledge for this proposal. Due to this lack of specific and valuable knowledge, the idea of The Kiirunavaara Museum surged, which aims to be an educational cornerstone for the town of Kiruna, its visitors, and future Sami generations. It will highlight the impact of mining on the landscape and reindeer herding, promoting a more respectful relationship towards nature and the Sami way of life, as well as a more respectful tourism and recreation around the town where reindeer herding practices take place.

Ecological Restoration:

The sustainability of the project can be viewed from two perspectives. On one hand, the resources required for remediation and the debris generated from demolishing infrastructure are major. On the other hand, the environmental toll the mine has had for the last century is enough reason to justify the ecological benefits of restoring the landscape and creating a habitat that can support various animal species. Although the focus is on creating an ecological environment for reindeer, the project proposes using only native pioneer species. This approach encourages the growth of a diverse range of flora and fauna, thereby promoting biodiversity.

Feasibility:

Implementing this extensive project requires a significant financial and time investment from the mining company and considerable effort from the Sami to share their knowledge and participate. The proposed method of filling Luossa Lake and the Kiirunavaara hill relies on the accumulation of melted snow and rainwater over the years. However, there are no precise calculations, meaning this process may take longer than anticipated or might not occur naturally at all. Alternatively, the LKAB company could invest in filling the Kiirunavaara mine pit, but the required water volume could potentially affect other water bodies nearby.

Future:

Ongoing maintenance and constant monitoring are vital to ensure the vegetation's growth and the success of the reclamation process. A question remains whether the inclusion of plant species more resistant to warmer climates should have been considered to account for future climate change. However, using such plants would require additional research to determine their compatibility with promoting lichen growth, which is vital for reindeer herding.

Further research needed

In this thesis the topic of the impact of the closure of the mine on the town has been shortly discussed. Since the town has been expanding and is planning to grow still, there is a need for a sustainable solution to the decrease in inhabitants that the town will suffer, after the mine closure. The significant decrease in job opportunities will create a need for re economization and probably a change in the planning strategies of the town. Further research should be done on this subject. Nevertheless, a preliminary proposal of the re economization of the town accompanied by the rehabilitation of the Kiirunavaara Mine is to be found in the annexes of this document, which focuses on how to involve indigenous planning and benefit the Samis with this significant change in the future of the town.

conclusions

Reimagining Kiruna - from Kiruna to Giron: This thesis argues for the remediation of the Kiirunavaara mine as a process of decolonizing the land taken from and denied to the Sami people, particularly affecting the Laevas and Gabna Sami Villages. This remediation aims to enable rehabilitation once nature has recovered.

The background analysis paints the situation of the Sami and the colonization process experienced by Sweden's indigenous population for centuries. It is important to consider the cultural context of the Sami, who were nomadic and relied on nature as their main resource. The Sami culture has changed throughout the years with the evolution of technology but have also faced constant assimilation pressure from Nordic governments and settler colonialism. Most Sami have abandoned their nomadic lifestyle and traditional professions, such as reindeer herding. Today, approximately only 10% of the Sami population works in this industry. The mining industry's pressure on reindeer herding is significant, through the ongoing encroachment on Sami lands. Reindeer herding requires extensive lands for grazing and migration, but these needs are often ignored by companies and the government. The background emphasizes the importance of recognizing the Sami's rights to self-determination, which are often overlooked and not supported by Swedish laws. This thesis discusses the case of the Gabna and Laevas Sami Villages, affected by the Kiirunavaara mine, that have had their landscapes fragmented, complicating winter migrations.

The theoretical framework seeks to understand the Sami perspective on the landscape and its impact on their industry, culture, and identity. Colonization, corporate paternalism, and cultural violence have alienated the Sami, and resulted in an altered sense of place. Furthermore, the constant change in their landscape has caused them solastalgia. An understanding of the Sami word *meacchi*, which views landscapes as taskscapes used by the Sami for activities and resources, helped shape the remediation and rehabilitation process, envisioning landscapes where reindeer herding can occur again. Furthermore, when talking about decolonization, the resolution for the need of participation and involvement of the community that wants their landscape back was seen as vital and a key aspect of the process. However, due to time and place constraints, direct interaction with the Sami was not possible. Instead, Sami art guided the understanding of their views on landscape and decolonization.

The research question, "How should the remediation and rehabilitation process of the Kiirunavaara mine be conducted to return part of the winter pastures of the Laevas and Gabna Sami Villages after the mine closure and to restore its previous ecosystem services for reindeer herding?" is answered through a conceptual planning proposal. This proposal focuses on the ecological and contextual aspects necessary to resume reindeer herding and rehabilitate the ecosystem services in the mined area. The process starts with cleaning pollutants and grading the hill, restoring part of the drained Luossa lake, and replicating similar landscapes with native species. The mine's only remnant will be the old tower, left as a historical reminder of the mine's impact on the Sami population and to create awareness.

The conceptual plan was developed with the reindeer herding background research in mind, following site analysis and an understanding of migrations. The messages of decolonization, sense of place, and remembrance conveyed through the art of Sami artists Britta Marakatt-Labba and Hans Ragnar Mathisen are reflected in the conceptual proposal. This includes renaming the area to its original Sami name, Giron, restoring the lake, and emphasizing the need for participation and community involvement. It is important to highlight the absence of planning of a rehabilitation process for the restoration of ecosystem services, but the presence of the possibility that poses a renovated landscape that can be used for reindeer herding again by the Sami following their own criteria.

Throughout this process, the intricacies of Sami culture, which differ greatly from Western culture, became apparent. Their views on sustainability, a balanced attitude towards nature, and their connection to the landscape were inspiring. The richness of their traditional knowledge, passed down through generations, cannot be fully understood through reading alone. Language barriers also pose challenges, as their language holds significant cultural understanding and is difficult to translate into Swedish or English. These barriers hindered the full understanding of this culture, but barely let me scratch the surface but still allowed me to get to know more about a culture that I find fascinating. Furthermore, as a Guatemalan student in Sweden, I faced significant challenges in understanding two very different cultures from my own: Sami and Swedish, along with an unfamiliar historical background. However, my outsider perspective allowed me to approach the topic differently, potentially bringing new conversations to the table, which is crucial for discussing difficult topics.

The Proposal: From Kiruna to Giron

The following proposal aims to depict how the transition from the closure of the mine until the complete decolonization of Kiruna would look like. The proposal poses the scenario of a Kiruna that in 2035 will no longer have a functioning mine, and the ongoing relocation of houses will already be over. A scenario where the opportunity to re economize and decolonize the town is possible!

The Sami community plays an important part in the planning of the future of the town. The involvement and participation of the community lays the base for the start of indigenous planning of the town. Here, the traditional knowledge, the history, and the Sami values can be reflected in the transition to a new Giron.

The next pages present consecutive comprehensive plans proposals from different years, 15 years apart (as these types of plans usually are), showing the gradual change from an industrial and mining town to a Contemporary Sami community, following the culture and values of sustainability of their planners. The transition shows how nature and the natural landscape go through different phases of remediation and reclamation (done by LKAB company) in which the sites are cleaned and prepped; following the rehabilitation and decolonization of the landscape and town, where the values of the Sami community can be seen and lived.

The concepts present in the previous art analysis play an important role and serve as a guide post to integrate the Sami point of view to the comprehensive plans. The influences can be seen from the change of name (from Kiruna to Giron), to the vital elements the town will have, and even to the restoration of the natural elements like the Luossa Lake.

vision

“In 2100 Giron is a self-sustained community, with a variety of small scale businesses, and economies, ranging from agriculture and reindeer husbandry to eco tourism. The town has decreased its habitants amount but not its value and culture.

Giron has evolved into the cultural, economic and political Sami capital of Swedish Sapmi. Here, Sami are free to live and learn about their culture and take care of their land following their tradition. The Sami live surrounded by reclaimed and restored landscapes, that provides them ecosystem services, and allows them to live a self sustainable life through a circular economy, having as little impact on the environment as possible.

The town provides both a urban and rural life to appeal for the Sami living close to nature, but also for the city Samis that want to go back.”



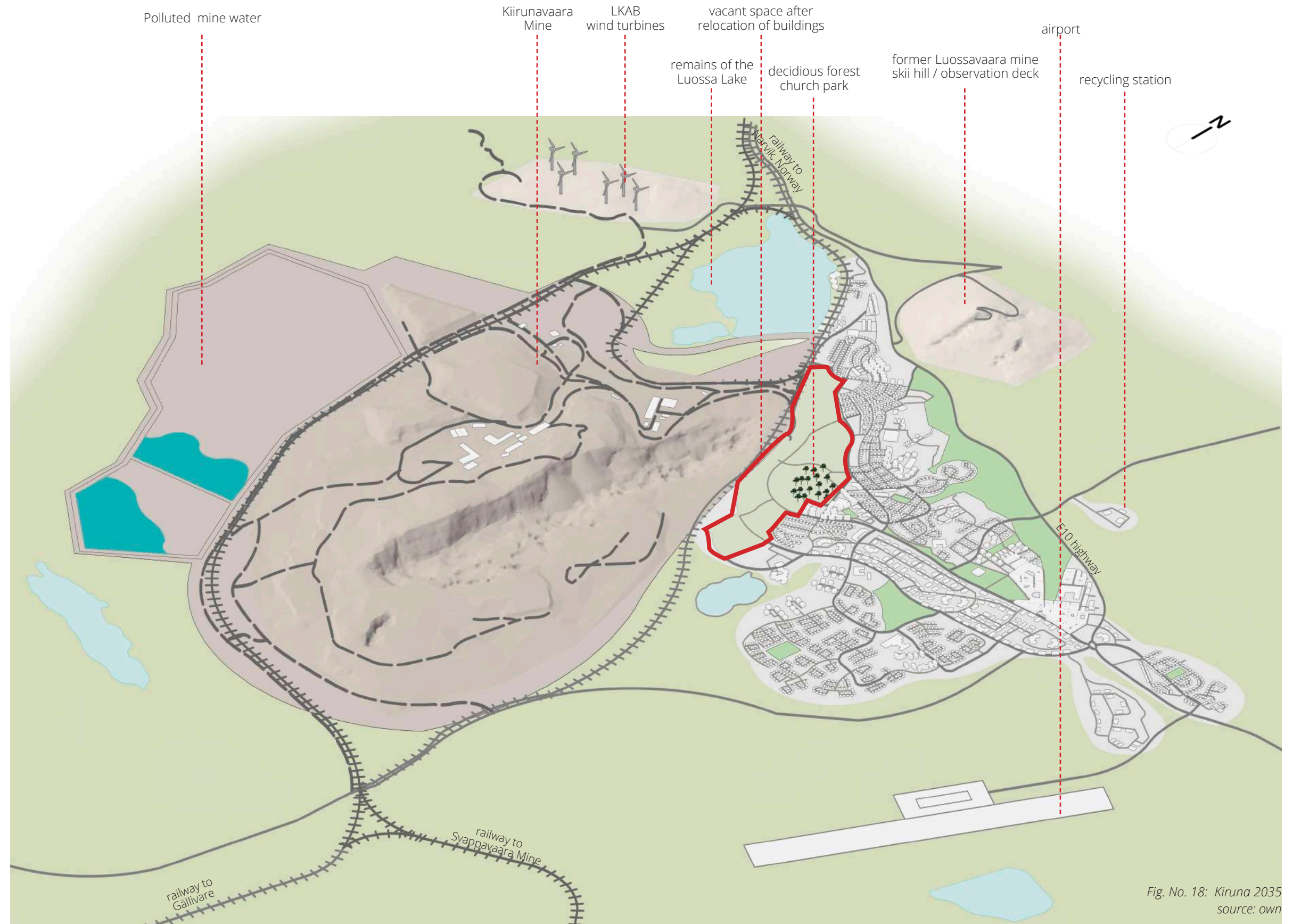
Fig. No. 17: Transition from Kiruna to Giron
source: own

Kiruna remediation

2035

The scenario for 2035 is as follows:

- The LKAB Mine is done excavating and is being closed.
- The Per Geijer Deposit is not going to be excavated, because it interferes with the national interest for reindeer husbandry.
- The relocation of houses is complete.
- The LKAB mining company is about to start the process for remediation of the mine site
- The remediation work provides jobs for the people of the town but a big amount of the town's population moves away.
- The municipality, instead of attracting new Swedish citizens, attracts Sami people.
- Housing is affordable, since there is a surplus of vacant houses.
- Sami participation and advice during the remediation allows the process to be beneficial to the Sami community of reindeer herders and the ecology of the area.
- Sami participation and involvement promotes the start of indigenous planning for the future of the town.





Remediation

- Remediation will require a lot of workforce, which can come from the town.
- The town can be supported by the mine for a decade more in the remediation process.

Infrastructure

The infrastructure of the mine, like railways, roads, industrial warehouses, buildings, need to be taken out, dismantled or demolished.

The infrastructure can be reused in other sites, but is up to the company to take this path

The LKAB windturbines can be left behind to benefit and support the town.

Cleaning of polluted waters

The polluted waters need to go through a water treatment to eliminate the toxic pollutants, before releasing it or letting it absorb into the ground.

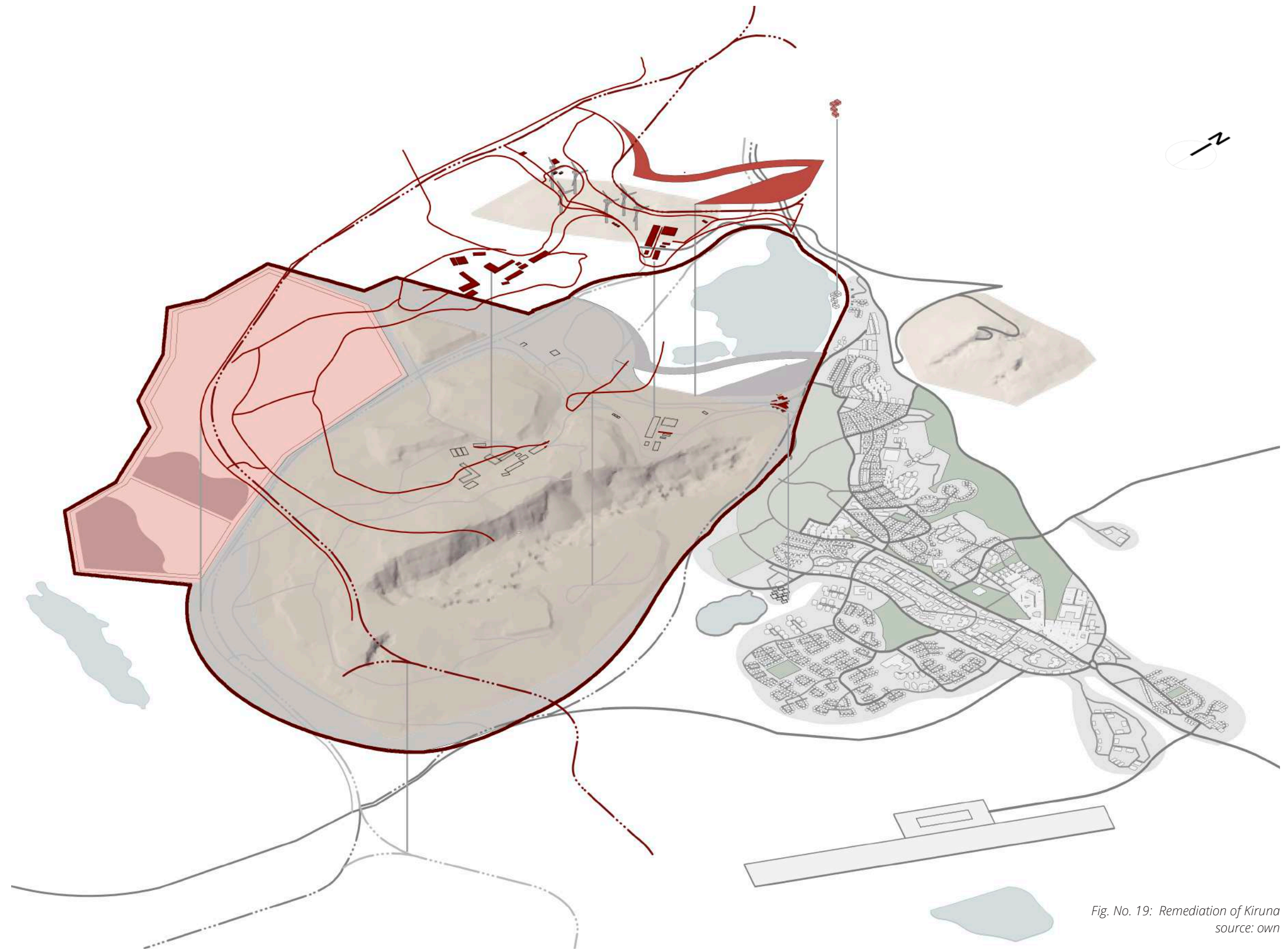


Fig. No. 19: Remediation of Kiruna
source: own

Remediation

Grading

The Kiirunavaara mining area needs some grading work, to re-stabilize the pit, and decrease the slope of the cliff. The Mining Company is responsible for filling the underground excavations to avoid the risk of collapse.

Grading work on the mine to smooth out the hill, can facilitate future vegetation growth and make the hill more accessible for humans and animals.

The flatland where the mining water was collected can be transformed into a wetland, since these environments are important and useful for the Sami reindeer herders as grazing and resting areas.

The lake Luossa needs grading as well, to make it bigger. It cannot be restored to its original shape but it can be expanded to 1/3 of its original size to give a bit back of the ecosystem services it once provided as recreational and resting place for the reindeer herders.

Top soil

After the grading work is done, top soil needs to be distributed on the former mining area, to make the reforestation and the growth of vegetation possible.

Top soil should be added to the vacant area where the relocated houses were as well.

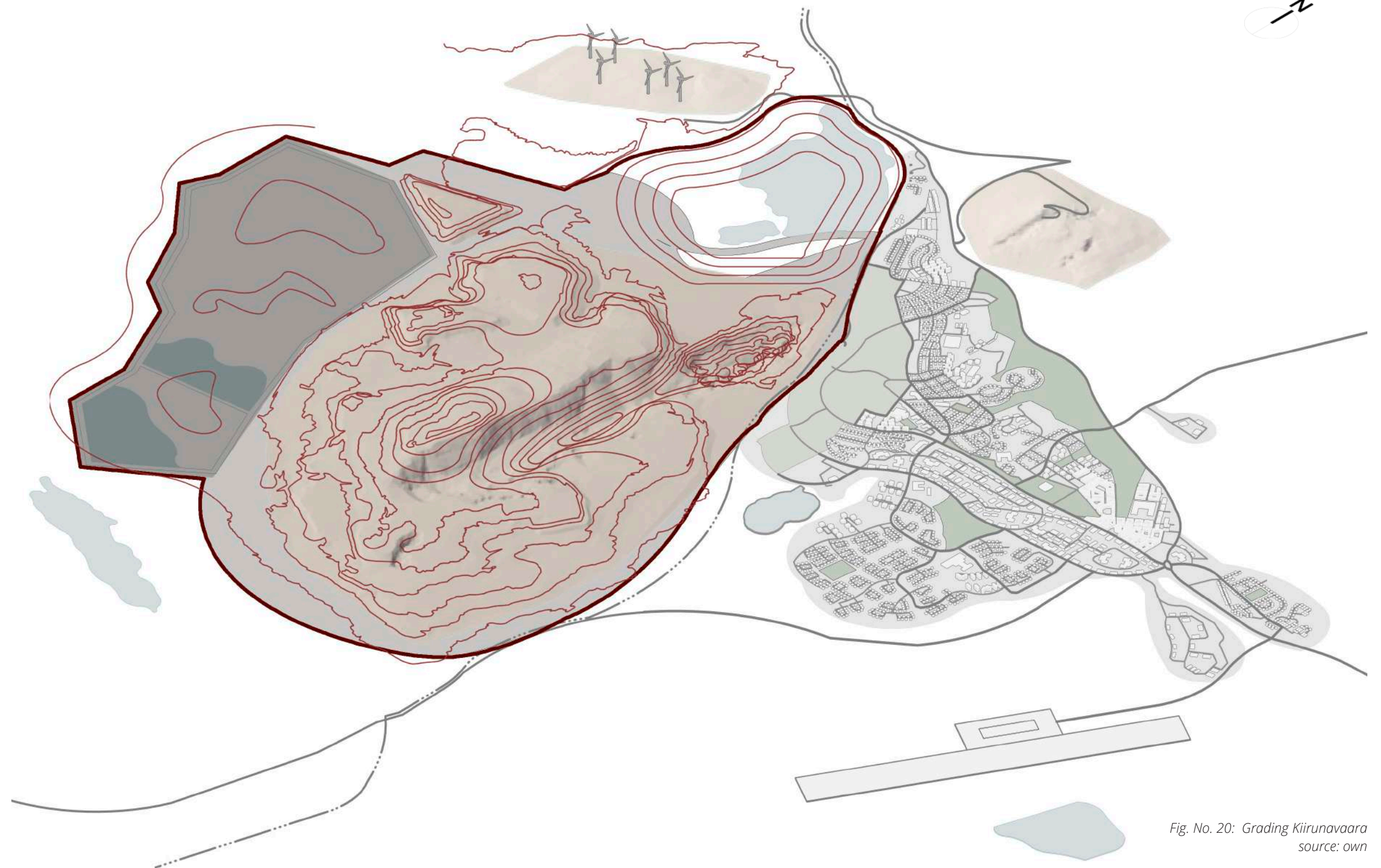


Fig. No. 20: Grading Kiirunavaara
source: own

Kiruna - Giron transition

reclamation 2050

In 2050 the remediation has been finished. It is possible to start planning the transformation of Kiruna into Giron. The Kiirunavaara hill has already been altered, the peatlands in the flat area are starting to form.

The Luossa Lake is starting to fill again, with water coming from a nearby stream. The lake can take up to 20 years to get filled, assuming a similar process as Hazelwood mine in Australia, which has a mine pit with a similar size.

Now that the remediation is done, the rehabilitation process is starting. The landscape needs to be recovered to its natural state. The Municipality deeply involves the Sami community for planning the future of Kiruna, and promotes indigenous planning.

The need for re economization of the town is vital, and the Municipality guided by the Sami community aim to focus on:

- Sami tourism
- Small scale businesses
- Education
- Renewable energy
- Circular economy
- Restoration of natural landscape
- Walkability and means of transport

Several steps need to take place in the next 15 years, in order to follow the Sami principals and goals and to benefit the community. The planning takes into consideration traditional knowledge from the Sami culture, and its holistic views on sustainability.



Fig. No. 21: Reclamation of Kiruna
source: own

Reforestation

As previously described, Kiruna is surrounded by boreal forest, with Norway spruce as its main species and birch trees in lesser frequency and the pioneer shrub such as the salix.

To start the reforestation, the planting of the pioneer species as the Norway spruce and the salix will be done mimicking the original landscape. These species are also helpful to the reindeer herding community, since they facilitate the growth of lichen which is the main feeding source of the reindeer.

Even with the grading work, the mine pit will still have high slopes prone to erosion. There, the planting of shrubs is proposed to help secure the soil.

The peatland is especially important for reindeer herding during the autumn / winter and winter / spring periods, since mosses and lichens also grow in these sites. The peatland will be planted with salix as a pioneer and other native shrubs like the lingonberry and blueberry, which are native from the area.

The Luossa Lake may be in a semi-filled state, which means it is closer to a wetland. Spontaneous vegetation will be allowed to grow and evolve during the filling process of the lake.

The area that freed up after the relocation, also needs to be reforested, following the species planted on the hill.

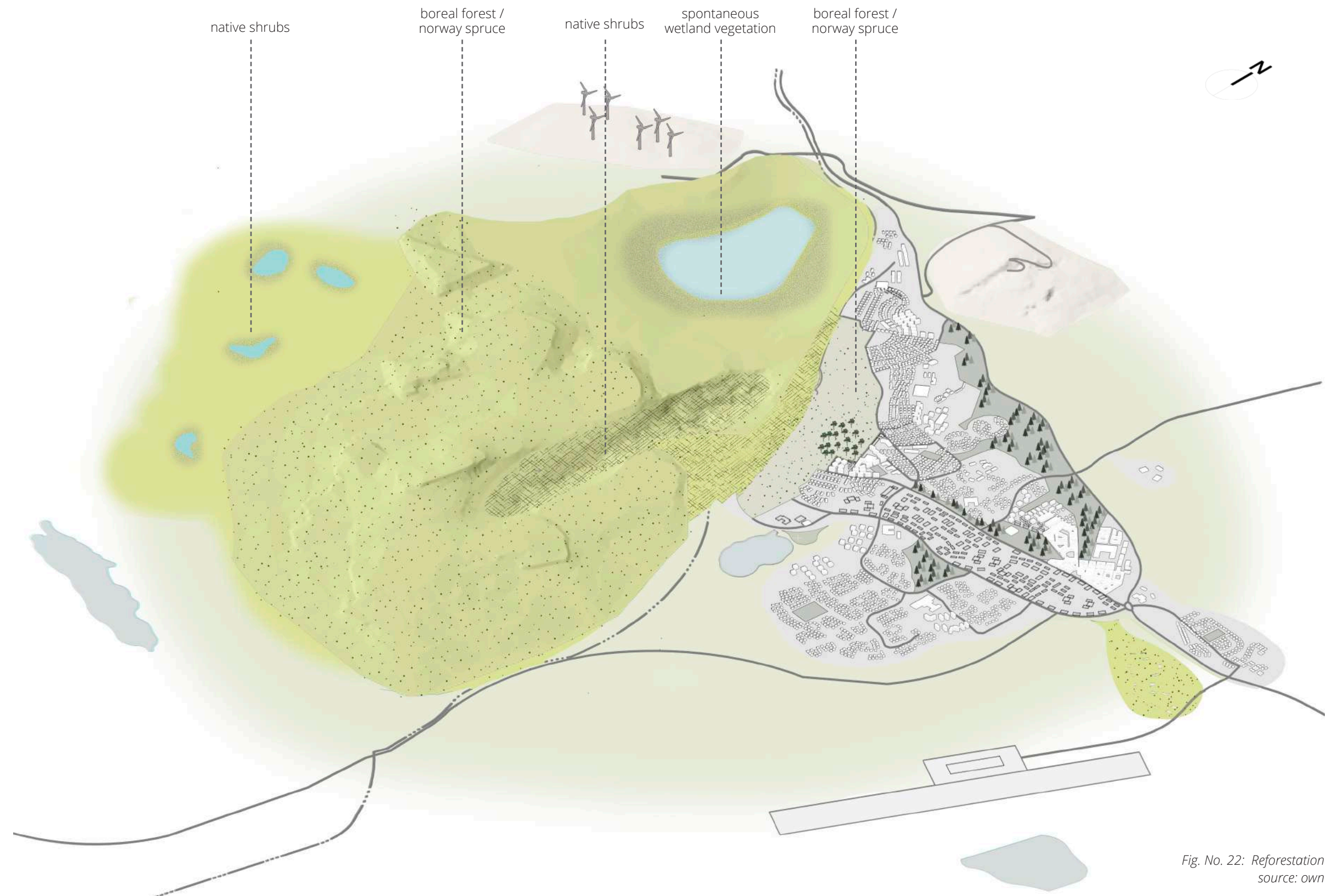


Fig. No. 22: Reforestation
source: own



Former land use

Since the town is going through a decrease in population and a plan of re-economization, several buildings will find themselves vacant, abandoned or in need for a change of use. As demolishing and building new is not sustainable and does not comply with the sami principals, the buildings should be retrofitted, altered and assigned a new use. The buildings that, inevitably should be removed, can be dismantled in a way in which the materials can be reused for remodeling and retrofitting other buildings in town.

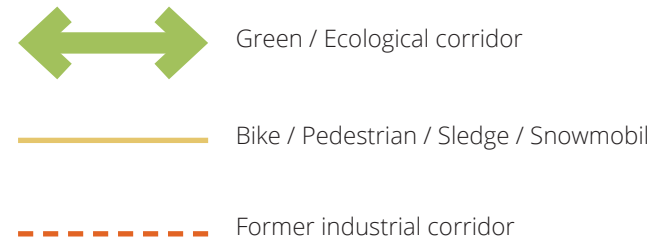
For this purpose, an analysis of the current land use of the town has been done through orthophotos and Googlemaps. The analysis shows the predominant industrial use of the town derived from the mining activities. The map shows a central corridor of industrial warehouses. The second most frequent use is for dwelling, specifically small scale one or two story houses.

Furthermore, a small amount of commercial use or mixed use is noticeable, which is a problem, since that is what makes a city feel more alive.

Last but not least, an important lack of parks and green infrastructure integrated into the urban fabric denotes an impersonal and segregated community, which needs to be changed.



Fig. No. 23: Former Land use
source: own



Integrating a green corridor

An important pillar in Sami culture is the proximity to nature. The Sami have a special connection and a deep understanding of their natural surroundings. As stated before, Kiruna currently has limited green infrastructure, and mostly relies on private gardens to have any interaction with nature at all. Furthermore, the town has become an obstacle for reindeer migration and other animal species that used to roam freely through these areas. This is the result of any urbanization, nevertheless, in this case it can be remediated through green corridors.

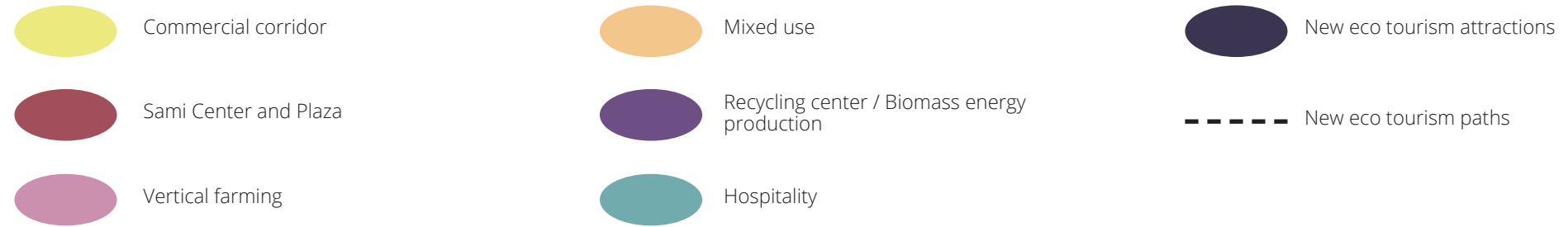
The plan proposes the integration of a main green corridor, which will substitute part of the industrial corridor, bringing life back to an abandoned sector of the town. The green corridor will serve as an ecological pathway for the species coming from the south and wanting to move north. It will hone the native plant species, like the norway spruce and birch tree, as well as native shrubs.

The green corridor will provide direct access to nature, since it will connect the town to the outside landscape. It will also improve connectivity through the town, integrating walking and bike paths during the summer but also sledge and snowmobile tracks during snow season.

Smaller green corridors are proposed as well, connecting the existing green spaces in town and creating smaller passages all leading towards nature.



Fig. No. 24: Green corridors
source: own



Land use change

The appearance of the green corridor will also promote the change of land use around town. To bring life to the town, a new commerce center will be created next to the green corridor and one of the main streets in town, retrofitting and remodeling the existing industrial buildings already standing. This commercial corridor can host small scale businesses, Sami artists, traditional restaurants and in general provide services for the town, while being connected to nature.

A change of use can also be seen south of the green corridor, where the other industrial warehouses can be turned into vertical farming facilities, which will provide food for the town. The vertical farming can take place inside most of the year, and outside of the building's walls as well, when the weather gets warm enough. This vertical farming helps fulfill the goal of a self sustained society. Moreover, the biological waste produced by the vertical farming as well as the town's waste, can be used to produce biogas and energy, to sustain the farming all year round. This production of renewable energy through biomass and the wind turbines left from the mine could be enough to sustain the energy consumption of the town.

New areas for tourism will be made available around the green corridor as well, which will take them to the different tourist attractions the town can offer, like the skii slope, the Luossa lake, and the recovering Kiirunavaara hill.

Finally, a change of use near the green corridor to accommodate the Sami community buildings is in order. The Sami Parliament will be moved to a bigger building, where it will be also able to hone a Sami school of language, Sami theater, Sami outdoor museum / Sami museum, Restaurants with typical sami food, and Sami Research Center for the Sami community to be able to create records of their traditional knowledge as well as teach it and learn it. All of these amenities will be located around a big plaza where Sami people will be able to meet, celebrate events, protest, and overall interact as a community.

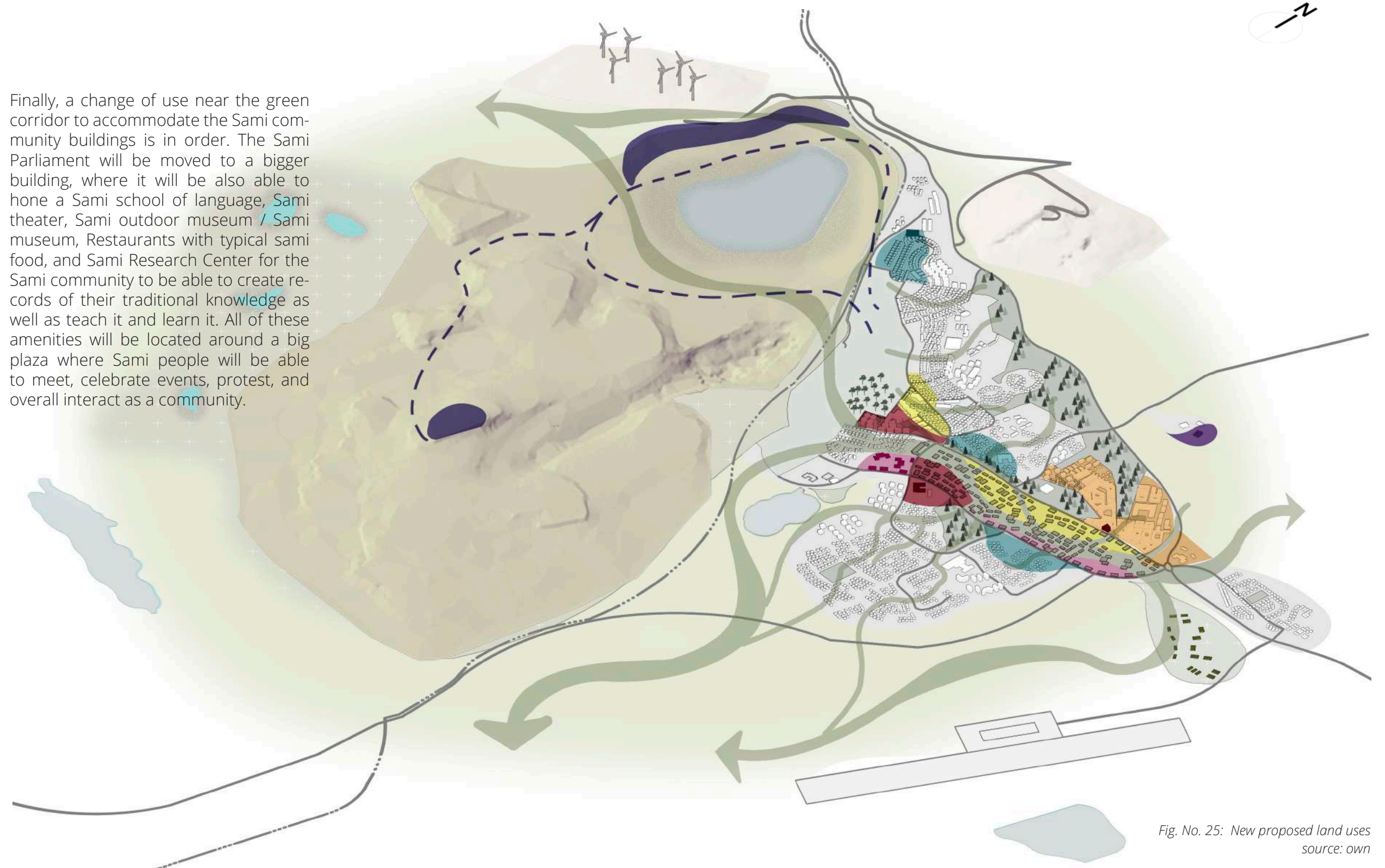


Fig. No. 25: New proposed land uses source: own

Recovering Giron

rehabilitation

2065

In 2065, the rehabilitation of Giron is already in full steam ahead. Nature is starting to take over the Kiirunavaara hill and the peatland is starting to grow, as well as to have different vegetation. The Luossa lake is already full and is one of the favorite recreational places in town.

The change in the urban fabric is taking place through the implementation of the green corridor, and the town's economy is booming due to the tourist visits that want to learn more about Sami culture and want to take a look at the northern lights from the top of the former mine's hill.

The pit is starting to fill naturally, from storm water and snow accumulation, and new ecosystems are starting to grow in it.

The town is living sustainably and the Sami community is living a happy and rewarding life in a town that has the perfect mix of urban feeling and the connection to nature. Nevertheless, the Sami planners need to rehabilitate the landscape that is almost recovered.



Fig. No. 26: Recovering Giron 2065
source: own

- Sami Village border
- Laevas Sameby migration path
- Re instituted migration path
- Gabna Sameby migration path
- Newly available migration paths
- Wildlife crossing
- Newly available comfort zone
- New Autumn / Winter - Winter / Spring grazing land

Rehabilitated reindeer herding paths

Now that the landscape is reclaimed it can be rehabilitated by the reindeer herders and the Sami villages. The newly recovered natural landscapes can be taken advantage of with new paths, new areas to rest and graze during the migration.

Furthermore, new pathways for the migration and old ones that had been disabled can start to function again. For this to work, the difficult passages (where roads or train tracks operate) need to be solved through wildlife crossings. These will be spread out, in order to make the migration easier, not only for the reindeer but for all wildlife surrounding Giron.

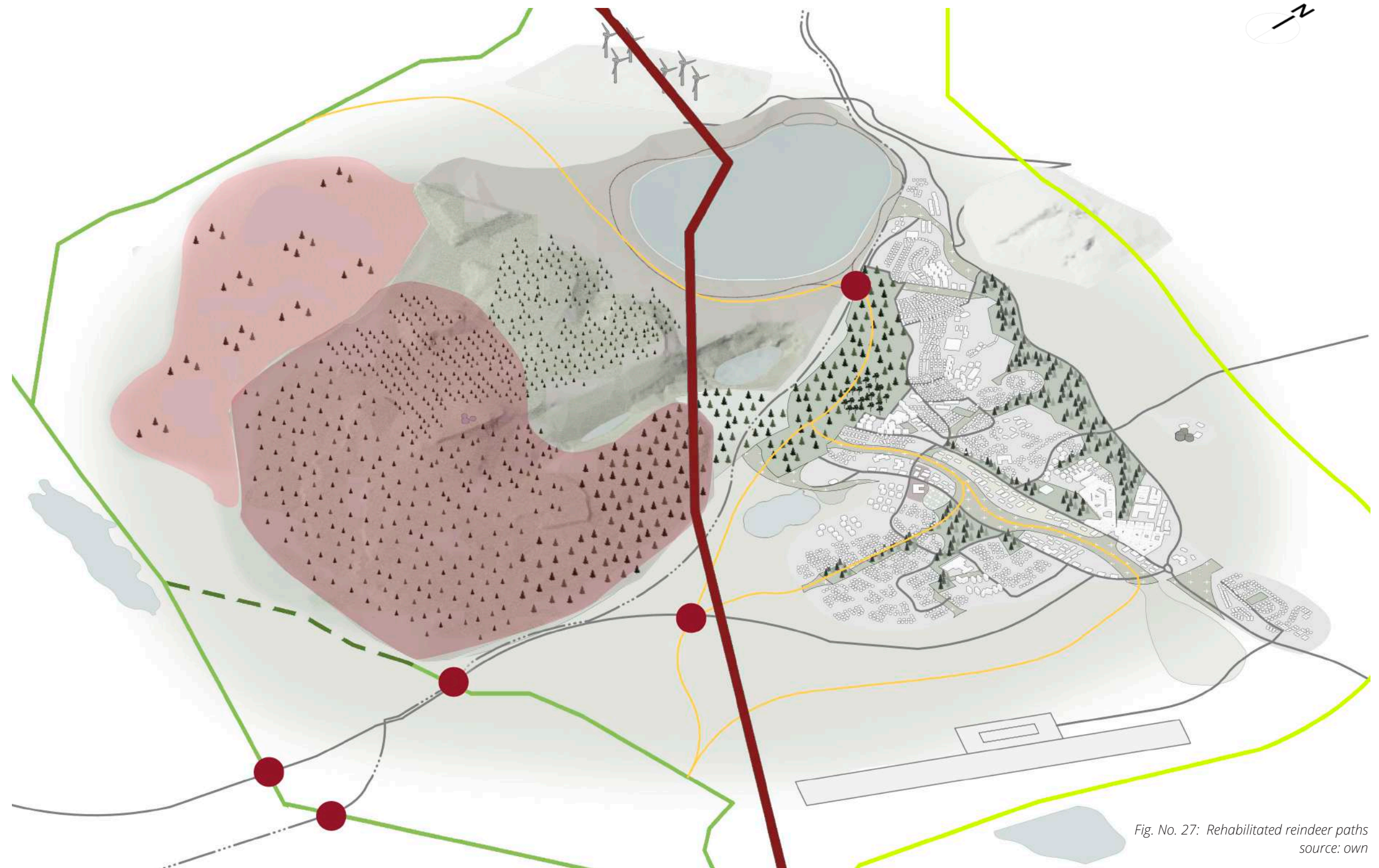


Fig. No. 27: Rehabilitated reindeer paths
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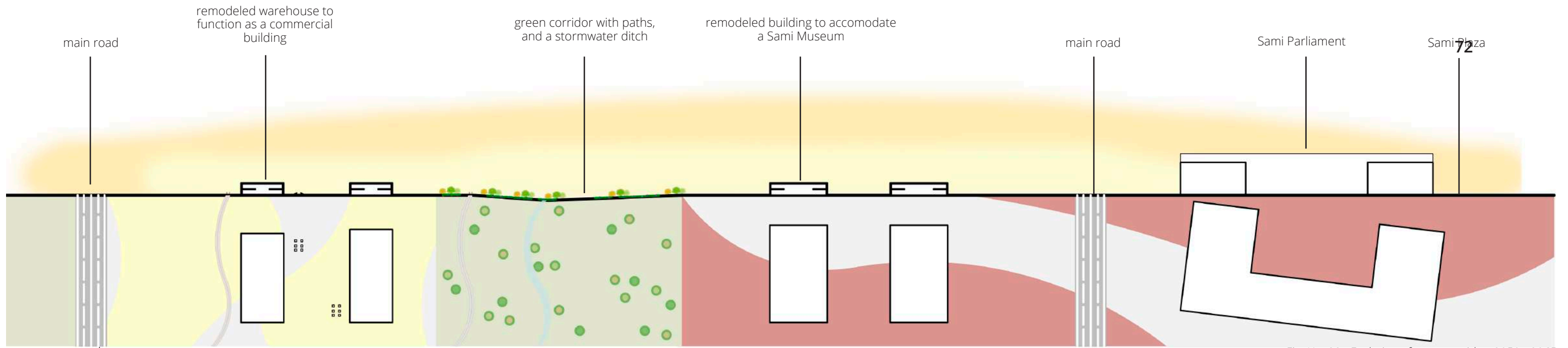


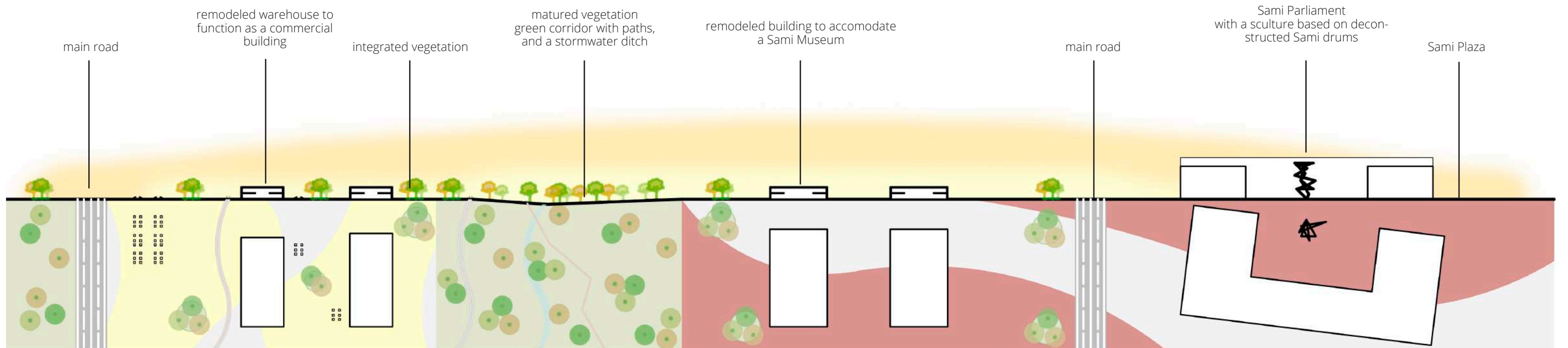
Fig. No. 28: Evolution of green corridor 2050 - 2065 seen in cross section source: own

2050

The evolution of the green corridor is visible. At first, only shrubs can be seen in the corridor, and small trees begin to grow. The planted trees are similar to the ones on the hill, especially the spruce, but some deciduous trees are also added to the mix. Some buildings are starting to be renovated and remodeled, and the activity is starting.

2065

The green corridor has grown and has welcomed more species, different shrubs, and a good mix of coniferous and deciduous trees. Nature has even started to spread out of the corridor into the commercial plazas. Paths to habilitate the access to nature are available for the people of Giron. The Sami Plaza has started to be adorned and filled with valuable art expressions, so that the people are able to feel a stronger attachment and a sense of belonging.



Giron

decolonization

2100

After almost 70 years of a long process of remediation, rehabilitation and reclamation, in 2100 the new generations of Sami only know the restored natural landscape of Giron. The reindeer roam happily through the land, that is accommodated to make their migration easier. The vegetation around has developed into a rich ecosystem that provides enough natural fodder for the herds, with lichen and moss.

The people of Kiruna live a balanced life with nature and urban environments. The town has not grown, since it is not based on a constant growth pattern but in a constant and balanced consumption economy. The vertical farming provides enough food for the town, and the biomass and wind turbines provide enough energy for the town's needs. The houses have been adapted with help of traditional knowledge and architecture science to insulate as efficiently as possible, reducing energy consumption.

The Sami Parliament and the other buildings surrounding the Sami Plaza have the records of Sami history and knowledge, and has become a political center of importance for the community to learn more about their culture.

The Luossa Lake is now accompanied by the Kiirunavaara Lake which has formed with the passing of the years and is now a treasured and visited area of the town.

Kiruna has been decolonized - welcome to Giron!

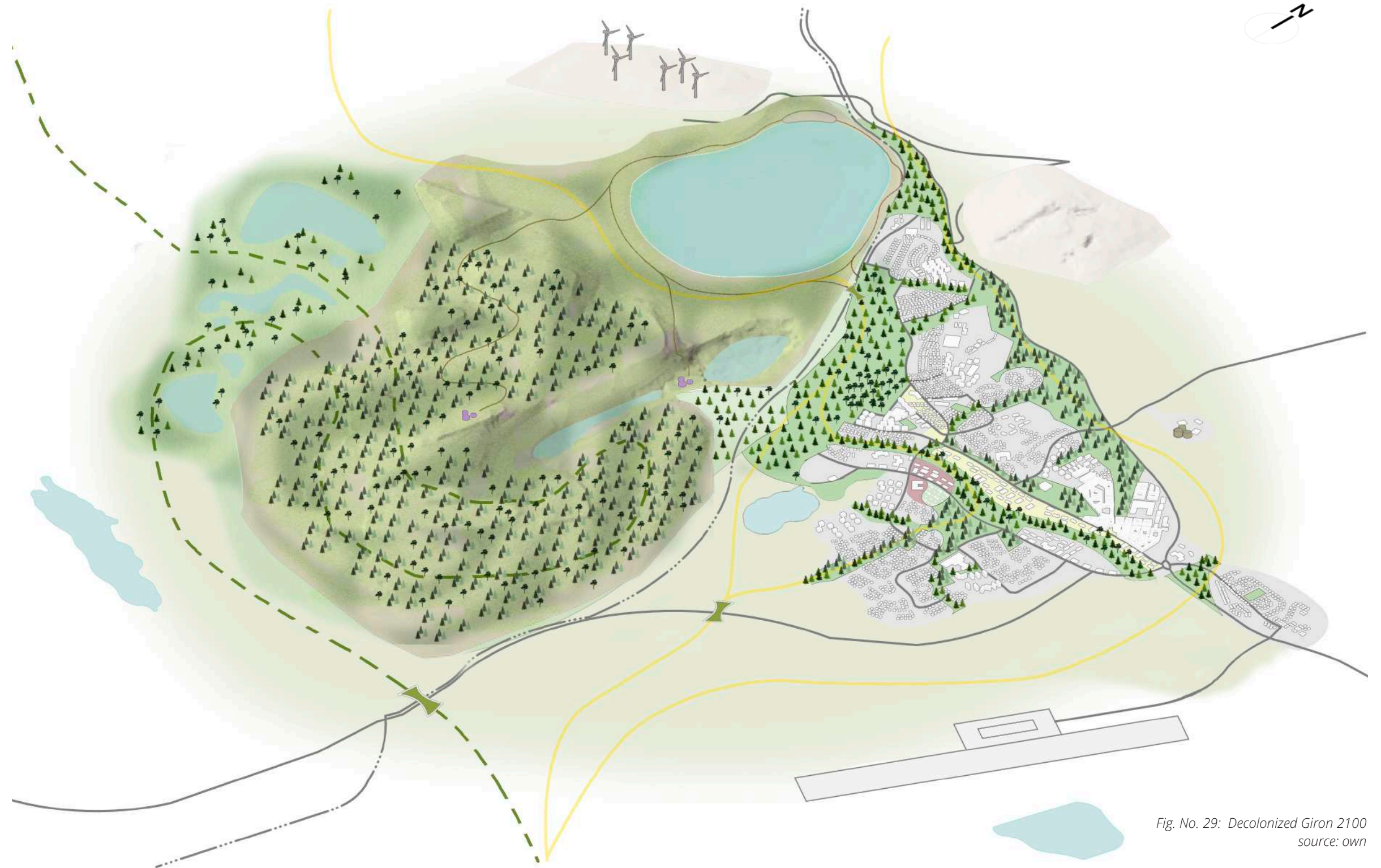


Fig. No. 29: Decolonized Giron 2100
source: own

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Popular scientific summary

From Kiruna to Giron: Re imagining Kiruna

Did you know that the Sami are the indigenous people of the Nordic countries? They are the only indigenous people in Europe. Their land, called Sapmi, spans large areas of Norway, Sweden, Finland, and Russia. A small group within the Sami community still practices the traditional trade of reindeer herding, which is protected by law in Sweden. This trade requires extensive land, much of which is now encroached upon by the mining, forestry, and hydroelectric industries. This thesis focuses on two Sami villages that still practice reindeer herding and have been affected by the mining industry: the Laevas and Gabna Sami Villages, which are in conflict with the Kiirunavaara mine in Kiruna.

To understand the current situation, we need to look at the historical context. Sapmi has been inhabited by the Sami since time immemorial, long before the Swedish, Norwegian, and Danish people began populating the Nordic region. However, the Nordic kingdoms eventually started taxing the Sami and attempting to integrate them into their societies. The Sami, who have a deep connection with nature and traditionally lived as nomads following reindeer migrations, faced colonization. They were forced to adapt to Swedish lifestyles and were oppressed and discriminated against when they resisted. This oppression also led to the invasion of their land for resource exploitation by companies like LKAB, which founded the Kiirunavaara mine and the town of Kiruna on land used by the Sami for their migration routes.

The Kiirunavaara mine was established around 1890 and has continually expanded since. The landscape around Kiruna, formerly known as Giron by the Sami, has changed dramatically due to mining activities. The mine has created a 1km-deep pit and built a town with 20,000 inhabitants. These changes have disturbed the reindeer, making them easily scared, and added significant challenges for the Sami reindeer herders. Now, after more than a century, the mine might close in 2035, presenting an opportunity to reimagine the landscape. Swedish law requires the mining company to clean up after mining operations cease. However, this project aims to go beyond merely cleaning pollutants; it envisions recovering the landscape to its former state to support reindeer herding, and to revert the effects of colonization, promoting decolonization instead.

The landscape restoration process should involve the Sami people, allowing them to share their vision of the landscape they need for successful reindeer herding. However, due to limited time and resources, direct participation was not possible, so instead, Sami art - called duodji - was used as the primary inspiration to understand their unique perspective on the landscape. Research on the ecological needs of reindeer herders was conducted, leading to a proposal for landscape recovery. This process would begin with the mine's closure in 2035, followed by reforestation starting in 2050, and would end with a recovering landscape ready to be used by the Sami again in 2065.

The project also proposes the change of name back to its original Sami name, to promote a sense of belonging among the Sami people that will be returning to use the land. This is one of the strategies used to counter the colonization of this land. The project aims to raise awareness of the impact of land exploitation on Sami culture and inspire further decolonization efforts throughout Sapmi.

Publishing and archiving



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