



## **Land use, biodiversity and social responsibility management at LKAB**

LKAB is a high-tech supplier of iron ore pellets to the global steelmaking industry and a growing supplier of industrial minerals for other sectors. The business is built upon the unique magnetite ore, mined in the north of Sweden. Since the beginning of the 1900s, primarily three mining sites have dominated LKAB's iron ore supply.

When planning, conducting and exciting mining and supporting operations LKAB, as stated in our land use guide lines, works according to the mitigation hierarchy where feasible.

### ***Mitigation hierarchy***

#### *Avoidance*

In accordance with both landuse guidelines and swedish national law avoidance and/or alternative locations are considered and has to be exhibited in the EIA-process. In addition LKAB also works with local consultations with affected parts in particular the samiis to avoid important areas for reindeer herding. LKAB has together with the samii villages established routines for informationexchange based on the FPIC manual (free prior and informed consent).

Nature inventories are conducted in and around mining sites both when planning new mining sites as well as our existing sites. This to ensure basic knowledge about natural values in the surrounding area. Mining sites are located where ore is found therefore avoidance can be tricky. However, to some extent supporting activities, such as heaps for waste rock as well as crushing and processing sites, can be design to avoid areas with high natural values.

#### *Minimization*

Impact on areas with high natural values are minimized by placement and design for supporting activities and transportation. For example when planning exploration LKAB times the operation to when there is snow to minimize damage on biodiversity and/or interference with reindeer herding. Another example of minimization is adjusting the form of waste rock heaps to find a balance between area and hight that minimizes landuse without making the heaps higher than the natural hights in the surrounding area.

#### *Rehabilitation/restoration*

When closing down mining operations the legislated remediation/rehabilitation of old industrial sites measures have primarily been focused on health and safety. In accordance to our land use guidelines LKAB in addition also strive to implement remediation improving



habitat structures to enhance biodiversity. LKAB try to either emanate surrounding areas with high natural values or add on new structures. Thereby benefits are created for the environment and in some cases also social values to old industrial sites.

During 2017 this process has been implemented to one of the old tailing ponds in our MalMBERGET site for example by adding landscape design, adding micro habitats for insect populations and planted forest vegetation typical for this region.

#### *Offset/compensation*

Since 2015, in accordance to LKABs landuse guidelines, when starting up new mines or increasing our landuse for industrial use LKAB compensate for remaining impact after avoiding, minimizing and in some cases restoring measures have been taken. To mention some examples LKAB has fully compensated for our greenfield mine in Mertainen, based on the so called habitate-hectare method.

The land affected by mining constitutes 1200 ha of which about 460 hectares of this have been categorized as direct impact zones – areas that will be logged and landfilled. 230 hectares is categorized as medium impact zones and 410 hectares as low impact zones. Both medium and low impact areas are, in various degrees, indirectly affected by mostly noise and dust from ongoing activity.

The compensation program is a combination of 1) enhanced protection status from all exploitation - foremost from logging, for 50 years to 2600 ha of land situated close to the mining site, and 2) conservation measures that will be implemented to create and raise existing values.

The protection of a rather large area also benefits the reindeer herding. All the conservation measures was consulted with and approved by the samii village.

The number of conservation measures that can improve the habitat condition and species richness in these types of forest habitats in northern Sweden are limited. Besides free development, LKAB has defined four different management measures.

1. Increasing the amount of dead wood in about 60 hectares of woodland. Dead wood is often scarce in human impacted areas due to selective cutting. The measure aims to improve the amount of available substrates for plant and animal species. The trees have been collected primarily from Mertainen with the hope of also moving species into the compensation area.
2. Mire haymaking is an example of historical land use practices that used to be a common part of living-conditions in the northern parts of Sweden. The measure could improve species diversity in selected wetlands in Kuosajänkkä, and LKAB will follow up how species diversity is affected.



3. To restore natural water flows and improve wetland conditions affected by human activity, wetland restoration will be made by filling ditches and tramlines with peat and moss.
4. Fires - just as dead wood - are a rare commodity in today's forestry, and through nature conservational burning (controlled burning), fire dependent plants and insects will be favoured.

The results from the habitate-hectares calculations show a balance between losses and gains. For Mertainen a total of ca 450 'habitat-hectares' were lost, and in the compensation area a total of ca 460 'habitat-hectares' were gained, thus leaving the area with net gain.

Although the compensation was mandatory since endangered species were affected, "no net loss" is not mandatory according to Swedish law. Therefore, LKAB chose to have a higher ambition.

In addition to this compensation project LKAB has compensated for some smaller areas such as quarries and waste rock deposits. This mainly by moving logged wood from the affected site to improve biodiversity in nearby areas.

### ***Challenges***

In order to make compensatory measures, access to the appropriate land is required and necessary. It may be difficult to agree with the relevant authorities about what kind of measures and areas that are appropriate. There can also be legal and practical difficulties in obtaining the necessary agreement and acquire the appropriate land.

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## **Land use, biodiversity and compensation measures at Boliden**

Boliden operates mines and smelters. Our core competence is within exploration, mining, smelting and metals recycling. Boliden has approximately 5500 employees with headoffice in Sweden. The environmental commitment is based on the company values, and driven by the need to reduce environmental impact. We strive to maximize the environmental benefit in relation to the resources invested.

The Boliden Environmental policy emphasize that our environmental commitments includes that:

- We shall operate in a manner that minimizes the impact from active and closed operations on the surrounding communities
- We work actively to preserve, and where not possible, to compensate for lost biodiversity, and to manage our land and forests in a responsible way

### **Ecological compensation**

Boliden's ambition is that expansions of existing operations or new operations should not entail a significant net loss of biodiversity when natural land is used at regional or national level, even if local values can be affected. The work is based on the four steps of the so-called mitigation hierarchy; avoid, minimize, restore and compensate damage. Ecological compensation requirements are found in Chapter 16 of the Environmental Code, for example, when an activity involves an intrusion into natural values. The requirement for compensation is based on the extent of the land used and the area's natural values / sensitivity.

In conjunction with the ongoing expansion of the tailings pond at the Aitik mine in Gällivare municipality, Boliden will claim land with high natural values that are of importance to different species linked to nature forests. In January 2013 the company therefore started an investigation into the possibilities for compensating for the natural values deemed to be affected or disappeared, as requested by the authorities during the trial process.

The work resulted in a compensation investigation aimed at identifying suitable areas, describing and motivating relevant compensatory measures that weigh up on the one hand, the losses of natural environments of general interest that will occur and, secondly, the impact on redlisted species that are expected to occur in connection with the expansion of the tailings pond. The planned expansion means that about 170 hectares of forests with natural forest character disappear and that several species of animal and plant species are expected to have a reduced living space.

In the permit process under the Environmental Code, two proposals were submitted for compensation areas which the court considered to be reasonable. The judgment stated a condition that compensation should be made at least including 250 ha, with a delegation for the county administrative board to approve the design and measures reported in a compensation plan.

Selection criteria for the chosen compensation area have been closeness to the

impact area, proximity to existing nature conservation areas, so that natural values are strengthened in a landscape perspective, and that the area has high natural values and natural forest qualities with restoration potential to enable successful compensation.

The final compensation at the Aitik mine was about 840 hectares, of which forest land approximately 520 ha in two subdivisions. Felling of the area of influence and implementation of measures such as relocation of deadwood, demolition, creation of deadwood, burning, favoring bird life, etc. was launched in the summer of 2017. The compensation will continue until year 2022 with active measures and thereafter at least 10 years of follow up.

#### **Other examples on land use, biodiversity and compensation measures**

Boliden also works actively with affected parties in particular the samiis to maintain good relation and have a good dialogue to be able to find the best solutions to minimize the impact on important areas for reindeer herding when planning for expansions as well as during operation.

Boliden is an active part in research and development projects in cooperation with reindeer herders and universities. As an example there is one project ongoing with GPS tracking of reindeers to be able to evaluate their patterns of movement in connection to ongoing operations, as well as a project related to planting of lichens to increase the reestablishment in areas where Boliden has been active.

In recent years, a number of studies and plans with an ecological orientation have been developed. An example of completed ecological remediation is the measures that were carried out in the process with reclamation of the old mine in Kedträsk. Where the purpose was to implement complementary measures to the technical reclamation to promote biodiversity and accelerate lichens establishment in the area. The target images for the area were that dry and sandy areas of the existing moraine and sand heap would develop into a sparsely lichens rich plot of open sandy areas on the steepest parts. For other parts of the area, the target image was a barrels mixed forest with elements of aspen and seal. Educated water areas on the former industrial area have the goal of becoming a good birdlife area. Measures such as spreading of lichens, planting of aspen and measures for accelerating vegetation development in the water area have been implemented.

Examples are also available where Boliden reviews working methods to hold consultations and create a public dialogue for the development of final plans for the restoration of an old open pit and tailings pond in Boliden. The purpose includes increasing participation and creating commitment to ultimately create added value at the final restoration of the site.

Another example of measures to compensate for land use is the monitoring of a bird lake in a nearby Natura 2000 area to Boliden's mine in Kevitsa, Finland. The business has also placed 200 bird nests in the area and a few nests for eagles. Both compensatory measures have worked well and are maintained and checked regularly.

**Challenges**

Implementing measures with ecological overtones in order to, among other things increase the biological diversity sees as an opportunity to restore and to bring values to a previously affected area. In these areas, access to land is not a problem as the company largely owns the land and is responsible. However, it is important to take into account that, in particular after closing a sulphide ore mine, it is important to secure a technique for the so-called technical closure, thereby minimizing the environmental impact of the completed operation, which complies with international and European legislation. Technical implementation is thus an important prerequisite that must be ensured. Compensation measures in such an area can only be established as a second step and it must be ensured that they will not challenge the purpose of the technical solutions for mine closure.

In order to make compensatory measures, access to the appropriate land is required and necessary. Access to suitable land, which in many cases are owned by other actors is seen as a challenge and a risk when working with ecological compensation, as well as the ability to prepare the compensation area long-term protection. A risk of introducing sharper legislation about this is that it can be complicated and take a very long time to find good solutions. A soft regulation enables cost-effective and reasonable solutions tailored to the specific conditions, where it should primarily be compensation for land with high or very high values that should be covered.

## Land use, biodiversity and nature enhancement and restoration management at Nordkalk

### *Mitigation hierarchy*

#### Avoidance

Limestone used for limekiln production have very high and specific quality demand. This means you need to find very specific clean limestone with particular hardness so it can get burned in kiln without falling apart when CO<sub>2</sub> is leaving the stone during burning process. Limestone is so called “land-owned” mineral, meaning drilling and investigation of limestone only can be done on land that is owned or with another land-owners permit. This typical limestone only exists on Gotland in whole Baltic Sea. Due to this a lack of “alternatives” often appears when it comes to avoidance but Nordkalk have always avoided opening limestone quarries in big wetland or by causing harm to such wetlands during quarrying processes. On Gotland nature inventories are conducted in and around mining sites along geology investigations very early in permit processes. This is important to be able to make an avoidance more possible in an early stage. But it has also its limitation due to the learning process that high quality limestone and high nature value seems to quite often come along.

#### Minimization

Impact on areas with high natural values are minimized when planning the infrastructure around a quarry. Many examples can be made for e.g. making conveyor belts going around smaller wetlands, making avoidance of hot spot areas of red list species if possible and when passing wetlands creating solutions where the natural water flow can pass under roads or constructions by using semi permeable gravel and using culvert making fish and small water animals to pass under roads without problems. On Gotland Nordkalk have successful experience of how to sediment quarry water and clean it even more over wetlands before pumping to downstream creek enhancing the trout fish. Improvements have also been done by creating new mating areas in creek and to yearly investigate and evaluate and learn more how to step-wise improve fish life with the quarry water as a very clean and positive resource rather than a problem for downstream ecosystem.

#### Rehabilitation/restoration

All limestone quarries have to propose detailed recultivation plans. Limestone quarries have shown to have great possibilities to create high biodiversity. Nordkalk have therefor started to develop this kind of ecological restoration with higher focus on how to create the natural systems for insects, plants, water and land animals and birds to move in and create ecological systems with a big total biodiversity. The limestone industry in whole Europe are working very actively with this in the organization IMA Europe (Industrial Mineral Europe) and co-operate with biologist's from several limestone areas in Europe to strengthen the ecological restoration possibilities for limestone quarries.

#### Offset/compensation/Protection and Conservation of specific species

Nordkalk have earlier decades several times done big offsets of nature land of very high nature values including big wetland areas. These areas have all been developed to Natura 2000-areas of Swedish government. During 2015 even more land planned for a new limestone quarry on north of Gotland was decided to be prioritized for Natura 2000-areas instead of becoming a future quarry. During 2016 Nordkalk got an environmental decision from the higher court to develop a specific protection and conservation programme for two butterfly species protected by EU:s Habitat Directive that existed on planned quarry land. A positive and fruitful cooperation with local environmental authorities have done the programme well-functioning and successful and it has developed very well according to and in line with the intentions with the court decision. This programme participated in an award at IMA during 2016 and is presented on next page.



**Biodiversity**  
Candidate 8

## Apollo and Large Blue butterfly project

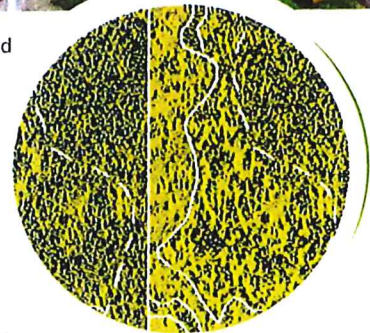


In connection with Nordkalk's latest limestone quarry permit application for a new quarry area on Gotland the EIA study found two rare butterflies, the Apollo (*Parnassius apollo*) and Large Blue (*Maculinea arion*), at the planned quarry.

Nordkalk developed a special protection and conservation program aiming to increase the natural areas for the two rare butterfly species at a suitable overgrown nature area close to the quarry. A detailed plan how to trim bushes and trees to create the right

habitat conditions for the butterflies and their host plants and host ants was developed with help from experienced ecological experts.

This project is the first of its kind in Swedish Mining Industry regulating protection and conservation measures according to the Habitats Directive (Council Directive 92/43/EEC) by a Swedish Environmental Court decision. The court decision stated that such an approach was considered to comply with the Habitats Directive's overall aim of biological diversity and restoration work.



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## Nature and biodiversity management at Cementa

Cementa has an ambition to find solutions where nature and biodiversity at all sites may coexist with operations necessary to supply Swedish markets with sustainable building materials in the long term.

Our Biodiversity management plans are continual and long-term processes, applied throughout operational phases and in post operational restoration.

Limestone extraction for cement production requires long term planning, both to secure mineral supply, but also to design operations in a way that minimize biodiversity impacts and allow time for targeted biodiversity goals to yield results.

Swedish environmental legislation require in-depth studies of the natural environment, and design of operational activities that minimize impacts on important species and habitats in order to gain a planning permission for extraction.

Restoration plans are developed in connection with quarry permit applications with an ambition to create favourable conditions for biodiversity and recreational values. These ambitions are outlined in the Heidelberg Cement group policy on restoration, and exceed government requirements for environmental performance.

## Redirecting a stream and ecological restoration at Skövde

In Skövde, an ambitious restoration plan has been adopted which promotes biodiversity management and creation of recreational areas. This will be implemented through creation of the unique habitats typical for this region, which simultaneously provide a pleasant recreational space. The last permit application for Skövde involved redirection of a watercourse. Rather than redirecting water through a ditch or canal, as is common practice, the company constructed a new streambed with natural structures providing good conditions for biodiversity. The works were supervised by an ecologist and resulted in a stream that is naturally integrated into the landscape.

## Building knowledge, protected species responsibility and pike factory in Slite

Biodiversity management in Slite pose a challenge, as the quarry is located in an area of high biodiversity value. It has therefore been a priority for Cementa to develop a body of knowledge on the habitats, an undertaking employing top-national experts on the species involved. A potential extension of the quarry has been designed to minimize harm to biodiversity values.

One of the largest populations of Eastern Pasque Flower in Europe can be found in the vicinity of the quarry. Both EU and Swedish legislation protect the species. For the past ten years Cementa has collaborated with Umeå University to conduct research and build knowledge on the species' ecology, reproduction and conservation efforts to benefit the population. The cement plant in Slite takes on responsibility for the species, where all employees are briefed on the species protection. This work is a continuous effort and not only carried out in relation to a quarry permit application, although the information would be useful in such an instance.

Wetlands have recently been created in connection to a nearby harbour, to create spawning grounds for Northern Pike. Local residents call the place "the pike factory". This is a voluntary commitment with no relation to permit conditions.

## Continuous communication and biodiversity management in Degerhamn

At Degerhamn Cementa keeps a continuous dialogue with nature preservation groups and carry out activities to enhance biodiversity within the quarry as well as on surrounding land. Activities have involved habitat creation for birds such as Barred

Warbler and Sand Martins, and creation of ephemeral ponds on the alvar meadows. A pleasant footpath with a wind shelter, fireplace, interpretation boards and a viewpoint have also been constructed.

### **Social responsibility**

Cementa works continuously to achieve social responsibility. The company is keen to carry an open dialogue with local residents and other interest groups, especially in Slite and Degerhamn where the company constitute a substantial presence.

Rights of indigenous groups are not an issue in the parts of the country where Cementa base their operations.