

# Citronen Base Metal Project Non-Technical Summary

Licence 2007/02

Licensee  
Bedford (No. 3) Limited  
(a wholly owned subsidiary of  
Ironbark Zinc Limited)



## SOCIAL IMPACT ASSESSMENT

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Rev 8

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## Definitions and abbreviations

Wording or abbreviation	Explanation
<i>APP</i>	Local fishermen and hunting association
<i>AVATAQ</i>	Greenlandic nature and environment society
<i>Baseline Study</i>	The Baseline study describes the socio-economic and social conditions in the area(s) of the potentially affected by the project before the project is realised. The baseline is used to identify the expected impacts of the mining project.
<i>BAT</i>	Best Available Technique
<i>BIP</i>	Benefit and Impact Plan - A plan of the proposed initiatives to realise and optimise the benefits of the project and to minimise or mitigate the negative impacts. A draft Benefit and Impact Plan will be the starting point for negotiation of the Impact Benefit Agreement (IBA). A final Benefit and Impact Plan will be included in the IBA.
<i>DKK</i>	Danish Crowns
<i>DWT</i>	Dead Weight Tonnage - Deadweight tonnage is a measurement of the capacity in long tonnes of cargo, fuel, stores, passengers etc. of a vessel.
<i>EIA</i>	Environmental Impact Assessment
<i>FIFO</i>	Fly-In-Fly-Out basis
<i>GE</i>	Employer's Association of Greenland
<i>Greenlandic workforce</i>	Workforce from Greenland (workforce who lives permanently in Greenland)
<i>GWQG</i>	Greenland Water Quality Guidelines
<i>HIV/AIDS</i>	Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome
<i>HMS</i>	Heavy Media Separator
<i>HR</i>	Human Resources
<i>HSEC</i>	Health Safety Environment and Community
<i>IBA</i>	Impact and Benefit Agreement
<i>ICC</i>	Inuit Circumpolar Council
<i>ICMM</i>	International Council on Mining and Metals
<i>IFC</i>	International Finance Corporation
<i>ILO</i>	International Labour Organization
<i>Inuit</i>	Aboriginal/local people of Greenland
<i>IUCN</i>	International Union for Convention of Nature
<i>KANUKOKA</i>	Association of Greenland Municipalities
<i>KNAPK</i>	National fishermen and hunters' association

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LHD	Load Haul Dump
<i>Local workforce</i>	Workforce from Greenland
MARPOL	Marine Pollution – International Convention for the Prevention of Pollution from Ships 1973/1978
MMR	Ministry of Mineral Resources
MILT	Ministry of Industry, Labour and Trade
MMU	Mobile Mixing Unit
NUSUKA	Greenlandic Employer's Union
<i>Naalakkersuisut</i>	Greenland Government
OHS	Occupational Health and Safety
PAARISA	Centre of health prevention
PFA	Danish Pension Fund
RAL	Royal Arctic Line A/S
ROM	Run of Mine
SIA	Social Impact Assessment
SIK	Sulinermik Inuussutissarsiuqqart Kattuffiat – Employee's Union of Greenland
SISA	Employee's Pension Fund
SLiCA	Survey of Living Conditions in the Arctic
SOLAS	International Convention for the Safety of Life at Sea
STD	Sexual Transmitted Diseases
SU	Student Grant
TB	Tuberculosis
TEU	Twenty foot Equivalent Unit
ToR	Terms of Reference - The document which describes the expected focus and plan for the SIA process.
TPA	Tonnes per annum
UNESCO	United Nations Educational, Scientific and Cultural Organization
Q&A	Questions and Answers

## 1 NON-TECHNICAL EXECUTIVE SUMMARY

This is the non-technical executive summary of the Social Impact Assessment (SIA) for the Citronen Fjord Project, wholly owned by Ironbark Zinc Ltd. The Citronen Fjord Project is located in Peary Land within the North East Greenland National Park. Citronen Fjord is approximately 2,000km north-northeast from Nuuk and 940km from Qaanaaq, the nearest Greenlandic settlement.

A separate Environmental Impact Assessment (EIA) has been prepared.

## 1.1 Summary of Benefits for Greenland

Item	Value/ Benefit
	DKK (6.8 DKK : 1 USD)
Initial Capital Expenditure (CAPEX)	3.3 billion
Operating Expenditure	24 billion
Personal tax - construction	88 million
Personal tax - operation	1.9 billion
Corporate/Withholding tax – operation	2.0 – 2.7 billion
National Employment - construction	60 persons
National Employment - operation	235 persons by Year 5 423 persons by Year 7
Employment package	Salary, location allowance, travel allowance (variable %- home to Kangerlussuaq), training.
Education and training	Pre-employment and on-the-job training program for the required job categories during operation phase, in cooperation with local authorities, education institutions and construction contractor early in the detailed planning of the project.
	Underground mining training facilities established with education institutions.
	Apprenticeships.
Business and enterprise	Opportunity to bid for contract packages for supply of goods and services, including catering services, cleaning, laundry and similar tasks, provision of local food.
	Opportunity to bid for contract packages for transportation of goods and staff.
	Opportunities for contracts for local tradesmen such as carpenters, engineers, electricians etc
	Opportunities for contracts for IT and communication services.
	Potential opportunities for local fuel providers (as Polaroil). Special attention will be given to type of fuel and opportunities of transport of fuel to the location.
	Establishment of a forum with GA, Nusuka and the municipalities (business councils). This forum will be used before and during tendering process to provide information and clarification of the tenders.



## 2 OBJECTIVE OF SIA

The overall objective of the SIA was to identify and analyse the potential impacts of the proposed Project and to recommend initiatives to realise sustainable development opportunities as well as to mitigate the negative impacts. The SIA is based on a high degree of engagement of the stakeholders.

## 3 APPROACH AND METHOD

The Bureau of Minerals and Petroleum (BMP) SIA Guidelines of November 2009 were used as the reference to establish a minimum level of information, content, and general structure of the SIA. The SIA was based on a participatory approach, involving the stakeholders during the development of the SIA. The SIA identified the potential impacts from the Project on the valued socio-economic components. All relevant potential impacts were identified, with priority given to those identified as the biggest concerns by stakeholders and authorities. For the potential impacts identified, the SIA includes the evaluation of the impact (significance) and propose possible mitigations. The net impact after the application of the mitigation measures is further evaluated. Potential benefits are identified and where possible measures to maximise them are included.

## 4 IMPACT ANALYSIS METHOD

The impact assessment was based on an assessment of the positive and/or negative impacts from the project based on a set of social/socio-economic aspects with the use of an Impact Matrix. The impact on the social/socio-economic aspects (employment, business life, health, vulnerable groups, etc.) are assessed of the project (such as transport, provision of goods, operation of camp, mine site and processing plant etc).

For each combination of project activity and social/socio-economic aspect, both for the construction and the operation phases, the positive and negative impacts of the project have been predicted and its magnitude quantified as far as possible.

Mitigation measures have been identified for all negative impacts likely to occur, are adverse in nature and significant enough to require mitigation [medium and high-level (negative) impacts] in order to diminish or eliminate such impacts. Furthermore, mitigation measures that can lead to increased positive impacts have been identified.

## 5 LEGISLATION

The main legislation for the Project is *Act no. 7 of 7 December 2009 on Minerals and Resources (Act on Mineral Resources)*, which came into force on January 1, 2010.

## 6 DESCRIPTION OF THE PROJECT

The proposed Citronen Zinc project (the Project), includes the development, operation and ultimate reclamation of a zinc and lead mine at Citronen Fjord in Peary Land, Greenland. The Project will comprise mining three deposits (both open pit and underground) with an on-site processing facility to produce globally saleable mineral concentrates of zinc and lead. The concentrates will be shipped off-site to Iceland or another northern European port and subsequently to a third party smelter complex. As per the schedule, the project has two years of construction and an estimated mine life of at least 14 years. There is no existing infrastructure at the site and consequently all infrastructure and ancillary facilities need to be developed as part of the project.

A construction contractor will be used to provide construction services, equipment and personnel.

The proposed mining operation will occur at a rate of 3.3 million tonnes per annum at three deposits: initially two below surface and later an open pit. Approximately 40 million tonnes will be mined at an average grade of 5.4% zinc and lead.

The mined ore will be delivered by trucks to the processing plant. The ore will first pass through a two stage crushing process followed by Dense Media Separation (DMS), which acts as a pre-concentration step. The ore continues onward through a milling process before entering the flotation section of the plant, where the valuable zinc and lead concentrates are separated from the gangue (worthless) material. The flotation gangue is initially disposed of at the tailings storage facility (TSF), and later in the underground voids left by mining as backfill. After flotation the froth is cleaned and the concentrate dewatered through pressure filters to produce a concentrate cake. The globally saleable concentrate will be stored within a large concentrate dome before being shipped off site.

The project will consist of:

- Underground mine (room and pillar method)
- Open pit (drill and blast, load and haul)
- Processing plant (crushing and flotation)
- Waste dump
- Rejects dump
- Tailings storage facility
- Port site
- Fuel storage
- Concentrate storage
- Airstrip
- Accommodation camp

- Infrastructure (roads, warehouses, administration buildings)
- Power supply (heavy fuel power generators)
- Water supply (water will be supplied from Lake Platinova)
- Sewage treatment (liquid waste generated at the camp will be treated and discharged into the Fjord)
- Waste plant (solid waste generated will be treated in an incineration plant on site).

## **6.1 Secondary Processing**

It is a requirement under the Act on Mineral Resources that the potential for downstream processing is evaluated prior to a exploitation licence being granted.

Batemans Engineering Pty Ltd was commissioned by Ironbark to produce a report which examines the traditional zinc smelting technologies, and provides operating and capital costs for each of these options to allow the evaluation of downstream processing to be undertaken.

Please refer to the entire report for assumptions, exclusions and accuracy of the estimates. The report is made available from the Ironbark website. Alternatively a copy may be obtained by contacting Ironbark Zinc Limited.

Each of these processes will add significant capital cost to the project (doubling to tripling the capital cost of the project), and would duplicate capacity which is currently available worldwide, typically where power or transport synergies exist. These processes require large amounts of energy, either through electricity or coal, and specialised shipping would have to be constructed to bring these to Citronen.

Zinc concentrate prices are agreed, at arm's length, annually in negotiations between smelters and miners. All of Ironbark offtake agreements are at arm's length to ensure the highest prices possible will be obtained.

Given Citronen's remote location, lack of significant power generation facilities and transparent nature of the zinc market, it is not feasible to construct a secondary processing facility on site.

## **7 STUDY AREA**

The SIA covers the area directly impacted by the mining operations and ancillary facilities (port, airport, camp etc.) where the impacts and benefits of employment, business opportunities and developments directly and indirectly created by the Project are expected to be more noticeable.

As the Project is located in a remote area outside the border of the four municipalities the project's area of influence in terms of the SIA is Greenland as a whole. For the baseline study the information was processed and analysed at two levels: national and the four municipalities. All four municipalities were engaged on an equal basis.

The SIA covers the Project stages: construction (two years), operations (14 years) and closure (post operation).

## **8 DESCRIPTION OF SOCIAL BASELINE CONDITIONS**

### **8.1 Demographic profile**

The total population of Greenland is 56,483 (July 2013). Greenland's population primarily consists of Greenlanders, or Kalaallit, with roughly 11 percent comprised of Danes and other Europeans.

Greenland's spatial distribution is unequally inhabited with the population concentrated in few areas, primarily divided between the four municipalities, Qaasuitsup Kommunia, Qeqqata Kommunia, Kommuneqarfik Sermersooq, and Kommune Kujalleq. The Project lies outside of these municipalities, in the north east of the national park. There are no towns or settlements in the region of the National park and apart from the personnel at meteorological stations and the Danish Armed Forces surveillance unit no people live in the area.

### **8.2 Cultural Values and Natural Resources**

Generally in Greenland, traditional and cultural activities and customs are very important to the local communities, according to SLiCA, Survey of Living Conditions in the Arctic (Poppel, B. et al, 2004). Values include the preservation of traditional foods, hunting and fishing, the use of the the Greenlandic language, poetry and literature, or religious and spiritual beliefs Greenlandic people are very involved in the use of natural resources, either commercially, for additional income or recreationally.

### **8.3 Tourism**

The Greenlandic culture, amazing landscapes and wildlife are the main reasons for tourists to visit Greenland. In the national park, tourists only travel in the southern part of the park to discover landscapes and wildlife like walruses and polar bears. The region is also visited to investigate relics from former settlements along the coast (source:greenland.com).

### **8.4 Socio-Economic Aspects**

Greenland's economy is based on fishing and fish products. In addition, Greenland receives a block grant of some DKK 3.45 billion (2012) from Denmark, which is equivalent to approximately 40 percent of the public revenue.

The private sector in Greenland primarily consists of small enterprises such as retailers, builders, fishermen, hotel and catering, as well as repair services, apart from a few large national enterprises that are owned by the Self Government. These national companies employ most of the workforce (Skatte- og velfærdskommission, 2010). The private sector has the highest revenue with retail trade, whole sale and repair work, counting for almost half of the total turnover in Greenland (47.7 percent). In 2014, the mining industry counts for 0.3 percent (DKK 55 million).

The number of unemployed was on average 3,960 persons per month, equivalent to 13.0 percent of the potential workforce in the first quarter of 2014. In 2006, this number was 5.6 percent.

## **8.5 Education**

University education, vocational and commercial programs are free in Greenland (paid through the tax system). Students with a certain grade average from upper secondary school are admitted. Most students are eligible for financial support.

From 2006 to 2013, the number of graduates from formal post-primary education has increased by 64 percent. According to international standards Greenland has a high percentage of persons who have completed primary school and low percentage for secondary and tertiary education compared to other European countries.

## **8.6 Health care**

All health care treatment in Greenland is free, including medication and dental treatment, being financed through the tax system ([www.naalakkersuisut.gl](http://www.naalakkersuisut.gl) or [www.aka.gl](http://www.aka.gl)).

Greenlanders are increasingly abandoning the traditional Greenlandic lifestyle and foods and choosing to adopt a Western lifestyle, resulting in an increase in welfare based diseases such as diabetes, heart diseases, cardiovascular diseases and obesity since 1993. (Bjerregaard, P. and Aidt, E.C., 2010).

Tuberculosis (TB) has been recognised as a prevalent disease in Greenland. On average, 88 persons have contracted TB each year for the past five years. The majority of the cases have been reported in municipality of Sermersooq, especially Tasilliaq have had many cases since 2010 (Landslægeembedets årsberetning, 2011 & 2012).

## 9 POTENTIAL IMPACTS

The potential impacts of the Citronen Fjord Project during both the construction and operation phases, as well as for the closure of the project are assessed.

The assessment is based on the valued social and socio-economic components:

- economic aspects (employment, tax and revenues and business opportunities)
- education and training
- public service and plans
- social aspects
- health
- culture and natural values
- cumulative effects

This non-technical summary includes only the description of the medium and high level impacts.

### 9.1 Employment

The project is divided into the construction and the operation phases. The construction phase will require approximately 300 workers, both local and foreign, over a period of two years. Once construction is completed and operations have commenced, the number of employees per year will increase to approximately 470 per year for the first ten years of operation and thereafter the number of employees will decrease until the end of the Project. Approximately 290 people are expected to be on site at any time. The rosters are of two types - three week on/three week off rotation and six week on/three week off rotation.

The following types of jobs will be required for the Project:

- **General and administrative** - IT technical staff, Occupational health advisor, Safety advisor, Environment and community advisor, and Medical, Security/Emergency response.
- **Maintenance - Process and Mining** - Maintenance manager, Electrical engineer, Mechanical engineer, Boiler maker, and Process plant operations.
- **Stores and Logistics** - Warehouse and stores personnel, and Port personnel.
- **Camp** - Camp manager, Cooks, Kitchen hands, Cleaners, and Maintenance.
- **Off-site Management and Personnel** - Operations manager, Finance manager, Business analyst/accounts, HSEC manager, Occupational health coordinator, Safety coordinator, Environmental and communication

coordinator, Human resources manager, Recruitment advisor, HR advisor, Payroll, and Travel and accommodation staff.

- **Process Management and Operations** - Process manager, Plant metallurgist, Chemist/Environment monitor, Loader operator, Crushing operator, HMS and Grinding operator, Flotation and Filter plant operator, Plant sampling and laboratory assistant.
- **Mine Management** - Mining manager, Senior mining engineer, Mine planning, mining engineer, Senior geotechnical engineer, Geotechnical engineer, Geology manager, Geologist, and Surveyor.
- **Underground and Open Pit Labour** - Mining foreman, Shift boss, Jumbo operator, Long-hole operator, Boltec operator, LHD operator, Truck driver, Shotfirer, Service crew, Backfill operator, Explosives Facility/Magazine keeper, Grader operator (UG), Driller, Excavator operator, Dozer operator, Shotfirer and MMU operator.

The aim of the Project is to operate with a maximum of local workforce in all job categories. The share of the local workforce is aimed to reach a level of 20 percent during the construction phase if personnel with appropriate qualifications and experience can be recruited on competitive terms. This goal of local employment will increase to 50 percent by year 3 of the operation phase, and increase further to 90 percent by year 7 of operation.

A construction contractor will be chosen to complete the plant construction and hence foreign workers will account for the majority of workers in the initial construction phase. Foreign operators will be progressively replaced by local workers during the construction phase with support and guidance from Greenland government agencies. The licensee's early planning and training will be essential in order to achieve the local employment targets and attract the best candidates.

It has been recognised that barriers may exist in achieving the expected high share of local workforce. Some identified barriers are:

- The remote location of the project will make the location less attractive compared to other mining projects in Greenland;
- Lack of minimum qualifications/experience for the required positions;
- Competition with other mining and oil projects for qualified workers;
- Lack of access to communication (such as telephone and IT) to keep in touch with home, as Greenlanders have a very strong relationships with their family;
- Language barrier: it is expected that a basic level of English will be required (primarily for safety procedure communication).

Potentially, unemployed workers can benefit from the job opportunities created by the Citronen Fjord Project during the construction and operation phase. However, the most likely scenario is that the project will attract mainly workers already employed in other sectors and new graduates. Indirectly, this will create new opportunities for the unemployed workers throughout Greenland.

The impact of the direct employment during the operation phase is characterised as positive minor to major, and for construction phase negligible to minor. The Citronen Fjord Project does not require the employees to move close to the mine, and therefore the positive effects of local employment will not be geographically concentrated, but distributed around Greenland.

While the duration of the employment will cease with the completion of project, benefits related to employment, such as enhancement of qualifications and experience, pension and savings, etc. will last beyond the employment time.

### 9.2 Industry and Commerce

The remote location of the Project is the most important factor when considering using local businesses and the provision of goods. The majority of equipment and supplies will require to be shipped to site. It is imperative that materials and equipment transported during the shipping window arrive at the site according to the planned window sequences to enable all work to be completed on schedule.

The Project will require one main marshalling point close to the site to take advantage of the limited shipping window. This will be a location suited to the transfer of equipment and materials from normal ocean-going ships onto ice-classed vessels. This is most likely to be Akureyri in Iceland, or a similar location.

The majority of the process plant equipment and steelwork will come from overseas. Equipment for the mining activities such as dump trucks, excavators etc. are expected to be purchased directly from outside Greenland.

Other consumables to be purchased during the operation phase of the project are light vehicles and vehicles supplies, furniture and equipment for the camp, stationery, clothes and safety shoes, protective gear and equipment. Most of these articles are likely to be purchased from outside Greenland. Unfortunately, Greenland does not yet have the large scale fabrication yards and employment pool with appropriate skills in sufficient quantities to enable Citronen to be exclusively using local resources.

Ironbark will outsource activities related to transportation of goods and staff as well as servicing of the camp, including catering and cleaning. Where possible and competitive, local businesses will provide these services.



### 9.3 Employee Transportation

The planned transportation route for local employees will be from Kangerlussuaq directly to the Project. This flight will be paid for and organised by Ironbark. Ironbark will also provide a travel allowance that will notionally cover the cost of flights from the capitals cities of each municipality to Kangerlussuaq.

Employment package agreements (Employment terms and conditions, salary) will include this travel allowance (on top of their agreed salary).

Employees living outside Kangerlussuaq or a municipal capital city will be required to organise and pay for their own transport to these cities. Foreign employees will fly to site via Longyearbyen in Svalbard.

Local transportation companies as Air Greenland and other companies who operate in Greenland such as Air Iceland and Nordand air could provide the transport of staff.

There are opportunities related to the Project with regards to local provision of goods and services. However, it will be difficult (primarily due to transport issues to the remote location) and initiatives such as planning and corporation with local suppliers need to be in place. Based on the opportunities that exist, these are assessed to be positive negligible during construction and negligible to minor during operation.

### 9.4 Conflicts and synergies with other sectors

Potential conflicts and synergies with other sectors such as oil, minerals and construction have been identified especially with the completion of human resources. This impact is considered to be negative negligible during construction and minor during operation.

When Greenland has several mining projects in operation it is foreseen that synergies could occur within the mining sector, for example common education and training activities across the sector.

### 9.5 Salary boost

It is expected that there will be an increase in the economic activity due to the Project. This is as a result of salary increase for the local workers which will boost the economic activities through an increased demand for services and goods. As there is no local community near the Project, the impact of the salary boost will be spread all over Greenland and thus it will be difficult to accumulate and stimulate the local economic environment within a small community.

A salary boost and the opportunity for economic development is assessed to be positive negligible for both construction and operation phase.

## 9.6 Taxes and revenues

The main direct economic benefits from the Ironbark Citronen Zinc Project arrive from corporate taxes and income taxes from local and international employees whom will be liable to pay tax in Greenland according to the Greenland tax regulation (Act on income Taxes no. 12 of 2 November 2006).

As the Project generates income and corporate taxes this is assessed to have a positive major impact during the construction phase and a significant impact during operation.

The current exploration licence (2007/02) for the Citronen Fjord Project (Ironbark) does not include any royalties and thus royalties have not been included in the SIA.

## 9.7 Education and training

In Greenland, there is a general need and wish to improve and further develop the skills and competences of labour, in order to be prepared for potential future activities such as in the extraction industry.

Working on a mine site and a processing plant requires certain skills and education which are currently not 100 percent available in Greenland. It is anticipated that initially 80 percent of the workforce will be held by foreign employees. However once construction is finished and as the project progresses (training and education programs are completed), Ironbark aims to increase the local percentage of employment to 50 percent by year 3 and 90 percent by year 7.

It is considered that projects such as Citronen project will contribute to the general development of skills in Greenland. The impact from training and education is positive and has been assessed during construction as positive negligible to minor. During the operation phase the impact is assessed to be positive minor to major.

## 9.8 Existing infrastructure and Public Services

No infrastructure exists at the Project site, other than a temporary camp and a gravel airstrip. All required infrastructure will have to be established by Ironbark.

The planned air transportation route for local employees will be from Kangerlussuaq directly to Citronen. Transport of equipment and materials will primarily be on ships originating from outside Greenland. Greenlandic shipping company Royal Arctic Line was consulted regarding shipping options for the project. Although they do not have suitable ships for this type of transport they would be available for consultation and provide advice on shipping and routes for the project.

As the international workforce will be transported directly to the site from an airport outside Greenland, and as Ironbark will organise chartered transport from Kangerlussuaq to the site for local workforce, the pressure on the existing infrastructure and services are considered to be negative negligible.

Increases in some public services are expected due to the Project during the construction phase and operation phase. These are customs control (police), immigration authorities and health services. Emergency management at site will also require assistance from the police.

As there is a need for further consultation with police and other authorities, the pressure on the public services are considered to be negative major prior to mitigation measures.

The increased pressure on the health system is expected to be negative major for both construction and operation. There is the possibility that medical assistance may be required outside the expertise provided by site. The Greenland health service is already under pressure due to cost of infrastructure, the lack of sufficient personnel resources and a small Government budget. These concerns were raised by the health authorities during the stakeholder consultation.

### 9.9 Demography and Population

The Citronen Fjord Project is expected to employ up to 470 employees per year. During construction and the first years of the operation, the majority of the employees will be foreigners. During the operation phase an increasing number of local employees are expected.

A possible positive impact of the Citronen Fjord Project is an expected reduction in the negative net migration rates of Greenlanders, as a result of increased job and business opportunities. This positive impact will be obtained both if more people choose to stay in Greenland, and if Greenlanders who have earlier moved away from Greenland choose to return.

The impact on demography is assessed to be insignificant during the construction phase and positive negligible during the operation phase.

### 9.10 Social conflicts

The assessment of impacts of social conflict is based on experiences from other mining projects around the world. Identified risks are conflict between local and international employees and increased marginalisation of persons without skills to work in the mining sector.

The risk of social conflicts during construction is assessed to be negative minor to negligible. The risk of social conflicts during operation is assessed to be negative major to negligible as there is a risk of both social exclusion and conflict between local and international employees at site.

### 9.11 Vulnerable groups

No direct impact on any vulnerable groups is expected. However, indirect negative impacts may occur with regards to children in vulnerable families, should the most functional adult in the household be employed at the Project.

### 9.12 Criminality

During the hearing process of other proposed mining projects in Greenland, police have raised potential crime at the mining site as a concern, particularly violence and theft. The risk of criminality at the mining site is assessed to be negative major to minor during both the construction and operation phases.

### 9.13 Occupational health and risk of accidents

There is a potential risk of accidents during the construction, operation and closure of the mine, mainly related to the operation of heavy machinery, explosives, and processing. Adverse weather conditions can also lead to accidents during transportation of goods, staff and concentrate. Furthermore, the long distance to health facilities outside Project area is also a risk factor.

Even though the likelihood of accidents is low, the repercussions are very serious if anything is to happen to workers and transporters. Due to the number of workers involved and type of potential accidents involving explosives and heavy machinery the risks are significant.

Based on an overall assessment risks of accidents during construction and operation are therefore considered negative major to minor (after mitigation).

Working at a mine can have adverse effects on personal health, including illness from dust exposure, hearing issues, respiratory disease and mental health issues (due to the remote location of the Project).

Communicable diseases are also a risk due to many employees living in a small community.

### 9.14 Health - public health

A mining project's operations will have an impact on the health and quality of life of the employees and the public in general. These negative impacts are often related to interactions between the local community and the influx of staff.

Due to the remote location of the Project, where foreign employees are expected to fly to the site from outside Greenland, there will be no influence of foreign workers on towns and settlements.

With many employees from different countries and cultures living full time at the mine site for several weeks, the largest risk for impacts of the public health derives from infections received at the mine site and brought back to the home communities. A health screening for STD and HIV/AIDS will be required before employment. This impact is assessed to be negative negligible.

### 9.15 Cultural and Natural Values

An archaeological survey of the Project area (July 1994) noted a site with potential pre-historical significance. This site comprises three stones arranged in a row, and may have been placed by members of the Thule culture to support an “umiak” – an 8-10 metre long open boat used in summer to move people and possessions to seasonal hunting grounds (EIA 2014). Greenland’s National Museum recommends that these finds be registered and dated before any activity is undertaken in the area. The stones may also be a natural occurrence as the area is almost exclusively populated with stones as a result of recent glacial activity.

Based on the previous surveys the impacts of the project on ‘Sites of monumental or cultural importance’ during the construction phase are assessed to be negative major before mitigation as the registration is needed. After this registration the impact will be negligible. During operation the impact is assessed to be negligible.

Peary Land, including Citronen Fjord, is not used for fishing, hunting or other human activities by the Greenlandic population or people from other nations. This is due to the remoteness and the fact that sea ice covers the ocean around North Greenland most of the year. Accordingly it was decided that a local use study was not necessary due to the remote nature of the project and Peary Land has been un-inhabited for the last 600 years. Based on this the impact of the access to natural areas are considered to be not significant.

### 9.16 Cumulative impacts

The cumulative impacts recruitment of local staff for the Citronen Fjord project is assessed to be negative negligible as increased competition of local workers as other mining projects are established will lead to increased competition for local workers. This may result in more international workers and could lead to an increased number of negative social conflicts.

## 10 OVERVIEW OF IMPACTS

For each social and socio-economic component the impact has been assessed before and after mitigation for the construction phase, the operation phase, and where relevant the closing phase.

The result of the assessment is presented using the following colour codes indicating whether the impact is non-significant, negligible, minor, major or significant. The assessment is based on an evaluation of the likelihood of the impact taking place and the magnitude of the impact should it take place.

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		Positive Impact/ Benefit				← Magnitude →	Adverse Impact			
		Very High	High	Moderate	Low		Low	Moderate	High	Very High
Likelihood	Highly likely					Not significant				
	Probable	Significant	Major	Minor	Negligible		Negligible	Minor	Major	High
	Unlikely									
	Very unlikely									

Figure 10-1 risk assessment codes

An overview of the impact matrix, identifying areas with high, medium and low impacts before the mitigation measures are applied is presented on the following page.

Table 10-1 Overview of the impact matrix

Issue	Construction phase		Operation phase	
	Before mitigation	After mitigation	Before mitigation	After mitigation
<b>Economic impacts</b>				
Employment	Negligible	Minor	Minor	Major
Business life	Negligible	Negligible	Negligible	Minor
Conflict with other sectors: <i>Mineral sector</i>	Negligible	No mitigation required	Major	Minor
Conflict with other sectors: <i>Building and construction sector</i>	Negligible	No mitigation required	Major	Minor
Conflict with other sectors: <i>Fishing and hunting activities</i>	Not significant	No mitigation required	Not significant	No mitigation required
Salary boost	Negligible	No mitigation required	Negligible	No mitigation required
Taxes and revenue	Major	No mitigation required	Significant	No mitigation required
<b>Education and training</b>				
Education and training	Negligible	Minor	Minor	Major
<b>Public service and plans</b>				
Existing Infrastructure	Negligible	No mitigation required	Negligible	No mitigation required
Public services	Major	Minor	Major	Minor
<b>Social aspects</b>				
Demography and population	Not significant	No mitigation required	Minor	No mitigation required
Social conflicts	Minor	Negligible	Major	Negligible
Vulnerable groups	Negligible	No mitigation required	Negligible	No mitigation required
Potential criminality at the mining site	Major	Minor	Major	Minor
<b>Health aspects</b>				
Occupational Health and risk of accidents	Major	Minor	Major	Minor
Health of employees at the mine	Minor	Negligible	Minor	Negligible
Public health and quality of life	Negligible	No mitigation required	Negligible	No mitigation required
<b>Cultural and natural values</b>				
Sites of monumental or cultural importance	Major	Negligible	Negligible	No mitigation required
Access to natural areas	Not significant	No mitigation required	Not significant	No mitigation required
<b>Cumulative impacts</b>				
Cumulative impacts	Negligible	No mitigation required	Negligible	No mitigation required

## 11 PROPOSED MITIGATIONS

For all negative impacts that are major or significant in nature, mitigation measures have been identified. For positive impacts measures to optimise the benefits are proposed.

The proposed mitigation measures are presented in the following table.



**Overview of proposed measures (mitigation or enhancement)**

Issue	Proposed measures (mitigation or enhancement)
<b>Economic Impacts</b>	
1 Employment	<ul style="list-style-type: none"> <li>a) Prepare a description of the requirements for the different work and job categories for the construction and operation phase.</li> <li>b) Assistance in understanding requirements of the future workplace, such as health and safety issues etc., in cooperation with the local authorities.</li> <li>c) Develop a plan for recruitment of local employees. This plan should be developed together with the municipalities (Labour Market Offices) and should be developed before concluding the IBA.</li> <li>d) Ironbark to be physically present in Greenland including a Greenlandic speaking human resources person to support the development and implementation of recruitment plans .</li> <li>e) Develop a program to stimulate representation of local employees to be represented in all positions, including employment packages to make Citronen Fjord Project an attractive workplace for local workers.</li> <li>f) Undertake a gender sensitive workforce assessment, in order to ensure that both women and men will apply for the jobs during the operation phase.</li> <li>g) For retention of local workforce the camp area should offer communication services in order for the local employees to have reliable communication with family. Communication services will be determined by what is technically possible in such a remote location. In addition there should be Greenlandic food served at the camp.</li> <li>h) A travel allowance in Employment packages to provide assistance to travel from home to Kangerlussuaq and on to site.</li> <li>i) Consider transportation of staff via Iceland in order for potential workforce from the south east Greenland to be employed at the site as there are regular flights to Iceland from east Greenland and south Greenland.</li> <li>j) Clearly communicate a zero-tolerance towards alcohol and drugs for all potential employees.</li> <li>k) As education and training measures are key to ensure local employment this has been assessed separately in section 6.2 of this table</li> <li>l) On site education should be of international standards and if possible certified so that employees can use their skills on other mining projects.</li> </ul>
2 Business life	<ul style="list-style-type: none"> <li>a) Procurement and contract packages for goods and services will be prepared and issued to the pre-qualified and approved bidders in Greenland as well as overseas.</li> <li>b) Outsourcing of activities related to transportation of goods and staff. Where possible and competitive, local businesses will provide these services.</li> <li>c) Servicing of the camp will be tendered. Such services include catering services, cleaning, laundry and similar tasks. Arrangements can be done by the catering company with local fishers and hunters for the provision of fish</li> </ul>

	<p>and meat for traditional food. Moreover, there will be a number of services provided for the mine when contracting local tradesmen (carpenters, engineers, electricians etc.). Also, IT services could be requested during the operation and provided locally.</p> <p>d) Close dialogue with local transportation providers will be established to discuss local opportunities and challenges (Air Greenland, Royal Arctic Line).</p> <p>e) Close dialogue with local fuel providers (as Polaroil) will be established to discuss local opportunities and challenges. Special attention will be given to type of fuel and opportunities of transport of fuel to the location.</p> <p>f) Close dialogue with local communication service providers will be established to clarify if the need of Ironbark in connection with what Greenlandic telephone companies can provide</p> <p>g) Close dialogue with KNAPK in order to organise provision of local food to the camp.</p> <p>h) Establishment of a forum with GA, Nusuka and the municipalities (business councils). This forum will be used before and during tendering process to provide information and clarification of the tenders.</p>
<p><b>Education and training</b></p>	
<p>3 Skill upgrading</p>	<p>a) Undertake an assessment of training needs in cooperation with local authorities in Greenland.</p> <p>b) Develop a pre-employment and on-the-job training program for the required job categories during operation phase, in cooperation with local authorities, education institutions and construction contractor early in the detailed planning of the project.</p> <p>c) Discuss with educational institutions how to set-up training facilities for underground mining.</p> <p>d) Development of a dedicated training program for staff on specific duties, safety, etc.</p> <p>e) General training programs and on-the-job training for staff will be part of all employees' work profile.</p> <p>f) Cooperation with other mining companies in terms of offering training and apprentices.</p> <p>g) Focus on continuously up-grading of employees at all levels.</p> <p>h) Offer apprenticeships within different fields of work.</p>
<p><b>Public Service and Plans</b></p>	
<p>4 Public services</p>	<p>a) Develop a plan and an approach together with the Police covering aspects of customs and the role of the Police on site.</p> <p>b) Develop a Health and Safety Management Plan in close cooperation with the authorities, including procedure for use of external public health care services.</p> <p>c) Establish contact with local health service and work out cooperation between both parties.</p> <p>d) Pre-employment health screening and an annual check. The parameters to be included in the health check should be agreed with the health authorities.</p> <p>e) Establish contact with local health service and work out cooperation between both parties and other major local work places.</p>

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<b>Social Aspects</b>	
5 Social conflicts	<ul style="list-style-type: none"> <li>a) Establish introductory sessions for all workers on intercultural understanding and provide an overview on Greenlandic culture for international workers as part of their introduction process.</li> <li>b) Set up a program for intercultural understanding, to be provided to all of the workforce and contractors.</li> <li>c) It should be ensured that the camp accommodates the cultural needs of the different nationalities living at the camp.</li> </ul>
6 Potential criminality at the mining site	<ul style="list-style-type: none"> <li>a) Development of rules of behaviour and code of conduct/ethics, and include these in the introduction sessions for new employees.</li> <li>b) Ironbark should cooperate with the police of Greenland in the planning of the project.</li> <li>c) Having a zero-tolerance policy with regard to possession and use of alcohols, drugs and use of firearms.</li> </ul>
<b>Health Aspects</b>	
7 Occupational Health and risk of accidents	<ul style="list-style-type: none"> <li>a) Develop and implement health and safety management plan for staff in the mine site.</li> <li>b) Establish health and safety committee with joint participation of workers that help to monitor and advice health and safety programs on mine site.</li> <li>c) Training of all staff on safety and emergency response on the mine site.</li> <li>d) Contractual requirements to providers of transportation services (Air Greenland, charter boats for staff, etc.) regarding safety measures, response time, etc. in order to minimise risk of accidents, appropriate and timely response in case of accidents, emergency evacuation from mine site, etc.</li> <li>e) Pre-notification of operations and traffic of vessels to authorities.</li> <li>f) Develop emergency and contingency plans in coordination with Greenland Contingency Committee and other major local workplaces.</li> </ul>
8 Health of employees at the mine	<ul style="list-style-type: none"> <li>a) Dust and noise controls on machinery eg water sprays, noise inhibitors. Provision of personal dust and noise protective equipment eg ear plugs, dust masks.</li> <li>b) Health screening prior to employment to ensure that the workers do not have any Sexually Transmitted Disease (STD) or Tuberculosis (TB).</li> </ul>
<b>Cultural and natural values</b>	
9 Sites of monumental or cultural importance	<ul style="list-style-type: none"> <li>a) Contact the Greenlandic National Museum and Archive for them to further study and register the affected archaeological features.</li> </ul>

## 11.1 Public Participation

In 2014, the Greenland parliament, Inatsisartut, amended the Mineral Resource Act, which meant that new rules concerning public consultation came into force in July 2014. This means that mining companies, which start the SIA process after July 2014 will have to submit a project description for drafting the SIA report. The Project description will be subject for a public review, which last for at least 35 days – a so called “Pre-hearing” of the project. However, due to Ironbark commencing the SIA process before July 2014 the Citronen Base Metal Project has not been subject to the aforementioned “Pre-hearing” (see Section 5 and 9).

Based on the Guidelines from the BMP (2009) and local knowledge relevant stakeholders have been identified for the Citronen Zinc Project. Stakeholders were initially engaged in October 2010. Meetings between the stakeholders and Ironbark representatives were organised by Greenland Venture and held in person in Greenland and by phone. The objective of the stakeholder engagement was to identify parties with interests in the establishment of a mine at Citronen Fjord, and invite the stakeholders for their views on the mine. The four municipalities and KANUKOKA agreed that during the scoping phase there was no basis for holding public meetings because the mine is not located in a municipality.

The key issues raised during the stakeholder engagement in 2010 were possibilities for local employment, requests from stakeholders to be informed on the different kind of jobs and required qualifications, transportation opportunities, local business opportunities and a request for collaboration with education institutions.

Follow-up stakeholder engagement activities occurred between December 2013 and March 2014. The objectives of the stakeholder engagement activities were to update the stakeholders on the status of the project and to share the findings from the consultation with stakeholders in 2010. Additionally, the stakeholders were invited to propose initiatives which could increase the local involvement in the project (employment and business opportunities) in the light of the remote location of the project.

Before the phone interviews occurred, a detailed description of the project was distributed along with an invitation letter which clarified the objective of the interview and stated the questions to be answered during the call. The interviews were held either in Greenlandic or Danish (by preference of the stakeholders).

The key issues raised during the stakeholder engagement in 2014 were health issues, the requirement for a Greenlandic transportation hub, an increased share of local involvement in the construction phase, importance of providing Greenlandic food at the site, additional meetings with infrastructure authorities are needed, engagement with education institutions, more cooperation with the local stakeholders (municipalities, local representatives from GA, SIK etc), and a requirement for increased stakeholder engagement due to increased interest in activities.