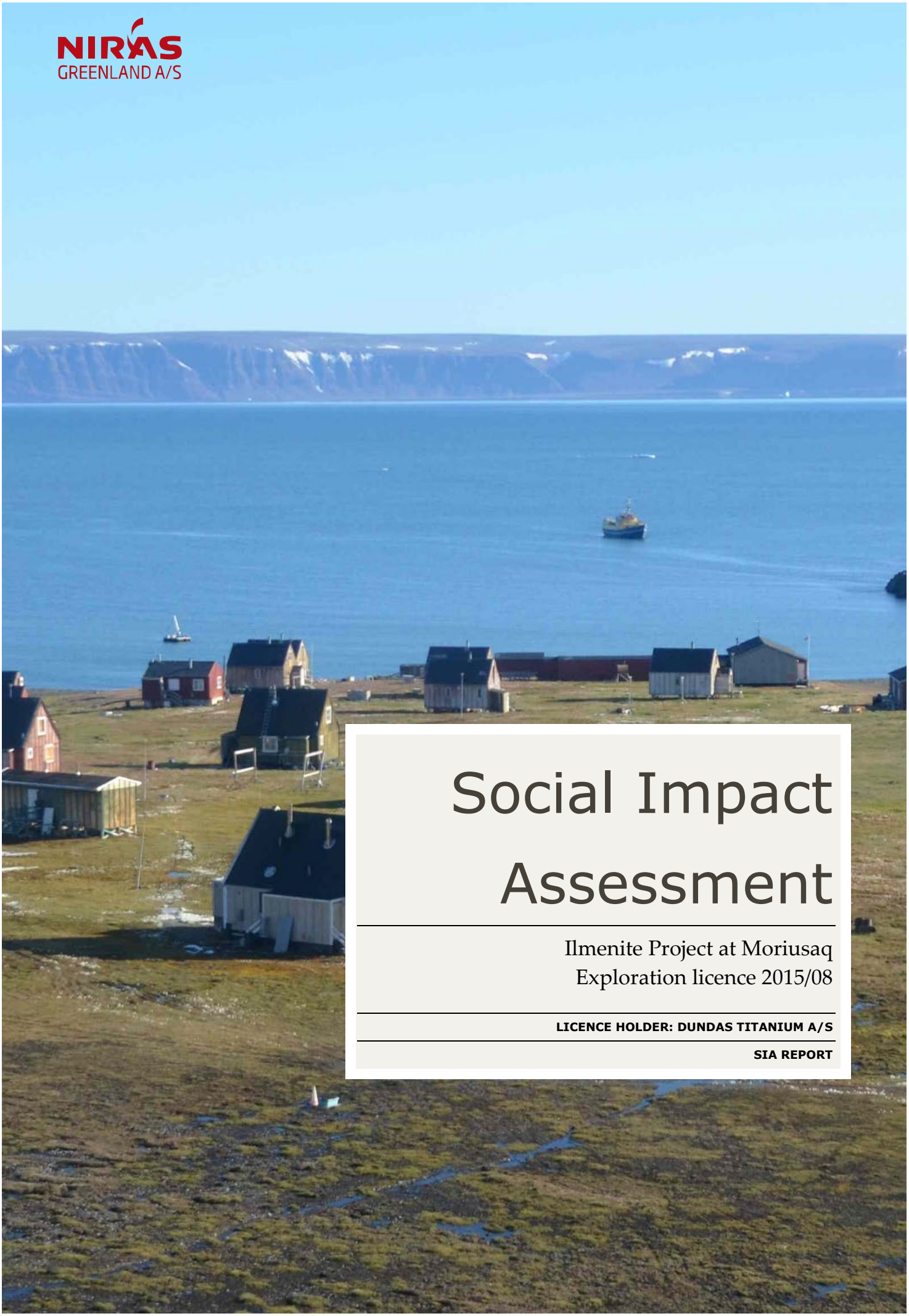
NIRAS GREENLAND A/S



Social Impact Assessment

Ilmenite Project at Moriusaq
Exploration licence 2015/08

LICENCE HOLDER: DUNDAS TITANIUM A/S

SIA REPORT

Contents

1 Non-technical Summary

This is the non-technical summary of the Social Impact Assessment (SIA) for the Ilmenite Project near Moriusaq, North-West Greenland.

The aim of the Ilmenite Project is to extract ilmenite from onshore beaches of 'black sand' deposit on the South coast of Steensby Land peninsula in Northern Greenland. Ilmenite is a titanium-iron oxide mineral ($FeTiO_3$) that is mined and processed for its titanium. Titanium dioxide (TiO_2) is an important commodity used as pigments in paint, plastics, enamels, paper and cosmetics and in the making of different metal alloys.

The project is owned by Dundas Titanium A/S, a company registered in Greenland. Dundas Titanium A/S owns 100 % of the current exploration license (number 2015/08) and has been responsible for all the exploration work at the site carried out over the last three years. Dundas Titanium is 100 % owned by Bluejay Mining plc.

A separate Environmental Impact Assessment (EIA) has been developed for the project.

The non-technical summary describes the project, the SIA methodology and process and the result of the impact analysis.

1.1 Overview of social impacts for Greenland

The project will have four overall positive impacts on the Greenlandic society:

- It will **create job opportunities** for Greenlanders, with up to 270 employees during the construction phase and approximately 175 employees in the operation phase.
- It will give **training and skill upgrading opportunities to Greenlandic workers and students** and give opportunities to build experience in the mining sector.
- It will **create opportunities for Greenlandic companies** to provide goods and services to the project.
- It will **generate a public revenue** through the payment of royalties, corporate taxes and income taxes. The gross public revenue is expected to accumulate to at least DKK 592 million during a ten-year operation period.

The SIA process has, however, also identified some negative social impacts from the project. These include:

- The project will lead to **restricted access to the license area.** Parts of the area is currently being used for limited recreational activities and overnight stays during travel in the area.
- The project will impact the **level of pressure on public services** such as transport, telecommunication, police and health services.
- There are **risks of accidents** and risks of negative impacts on employees related to working on a mining project.

The negative social impacts from the project are relatively small, and can to a large extend be mitigated. The mining and processing of ilmenite are simple processes, and many positions at the project can therefore be given to people with no formal education.

The closest town to the project is Qaanaaq. Qaanaaq has one of the highest unemployment rates in Greenland and a relatively large share of the population has limited education. The project can potentially have a positive impact on employment opportunities and therefore as a result upgrade skills at a local level.

1.2 Overview of the project

The Ilmenite Project is a mining project, with an expected extraction of 440,000 tonnes of ilmenite annually.

Ilmenite is found in the 'black sand' deposit that covers the license area. The black sand is located at the surface, and there is therefore no underground mining involved in extracting the sand.

The license area covers an area which is approximately 30 km long and 2 km wide. The area is located in the Municipality of Avannaata, around 80 km South of Qaanaaq. The abandoned former settlement Moriusaq is located within the license area, as illustrated in Figure 1.1 and Figure 1.2. In the current mining scenario, the total area that is expected to be mined is 8.5 km^2. The area to be mined only includes onshore mining in the area north of Iterlak.

The mining and beneficiation process will consist of four overall processes:

1. **Mining:** The black sand will be mined by automated mining machines (so-called 'continuous surface miners') that 'harvest' the black sand through cuts by rotating cutter-heads. No drilling or blasting will be needed.
2. **Wet gravity processing at the wet plant:** At the wet plant the sand will be separated into two fractions through a two-step gravity separation, one fraction with 'heavy minerals' (app. 10 % of the mined volume) and one fraction with 'light minerals' (app. 90 % of the mined volume). The gravity separation is a simple washing process in which the black sand is basically washed in gravity separators. The water used for the washing will be normal seawater. No chemicals, crushing or liberation of the minerals are needed in the process. The 'light minerals' will be transported back to the earlier mine cuttings where it will be backfilled. The 'heavy mineral concentrate' (consisting of approximately 88 % ilmenite) will be transported to the dry plant.
3. **Dry magnetic processing at the dry plant:** The 'heavy mineral' fraction material from the wet plant will be dried and all moisture will be removed. When the material is completely dry, it will be sent through a magnetic seperation by different magnets in the dry plant. The heavy minerals will be refined into a clean 'premium ilmenite product', a 'standard ilmenite product' and a fraction that is rejected (consisting of magnetite, amphiboles and pyroxene).
4. **Shipping and storage:** The ilmenite products will be stored in a large storage facility at the mining site. During the ice-free shipping window (June-October) the material will be shipped by bulk-carriers to an international, all year round open water storage location or directly to customers.

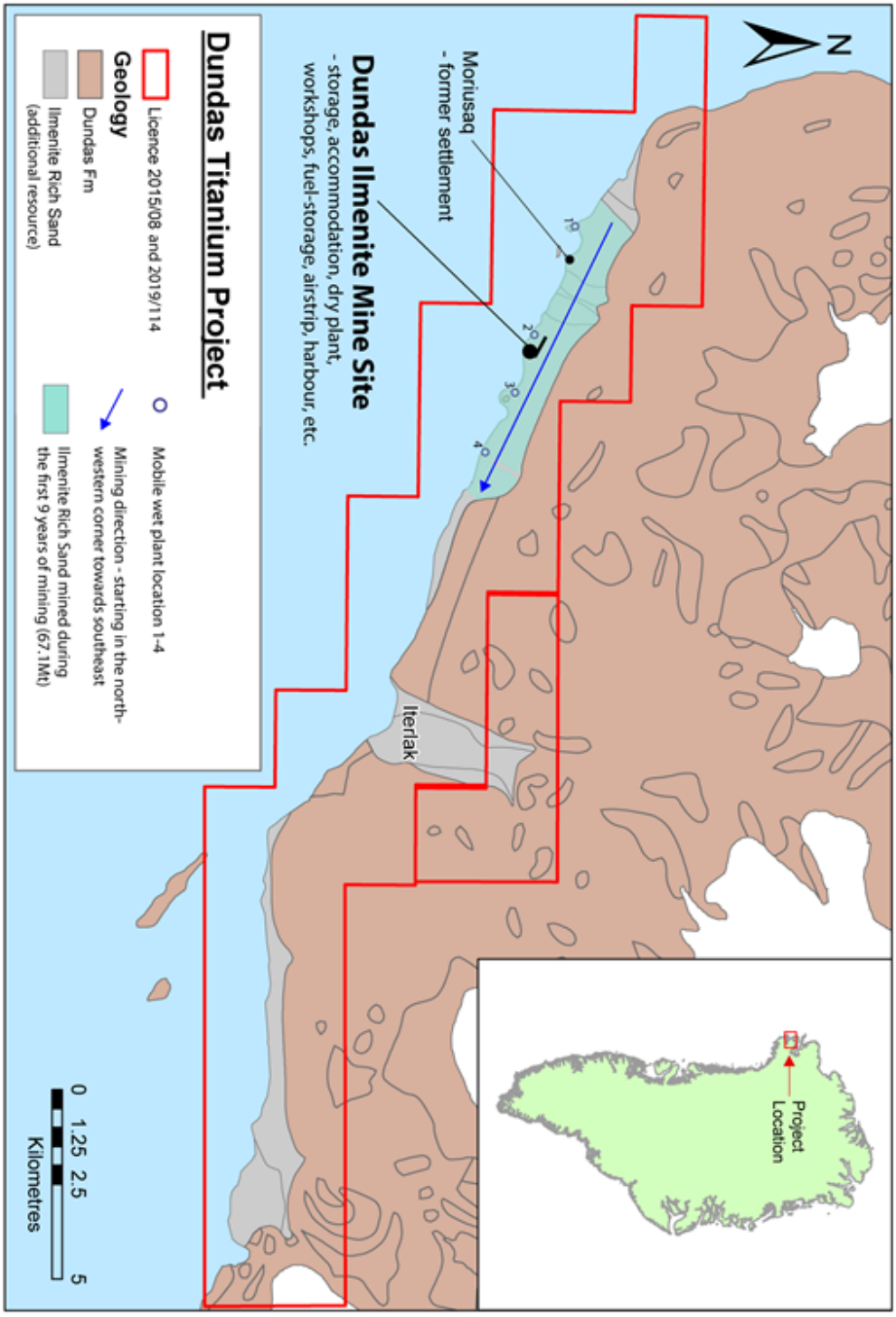


Figure 1.1: Extent of the exploration license hold by Dundas Titanium A/S. Only the onshore raised beaches from the north-western corner, west of Moriusaq (top-right corner of the onshore license area) to the Iterlak river delta are considered in the current mining scenario. The red outline shows the extent of the Bluejay exploration licenses.

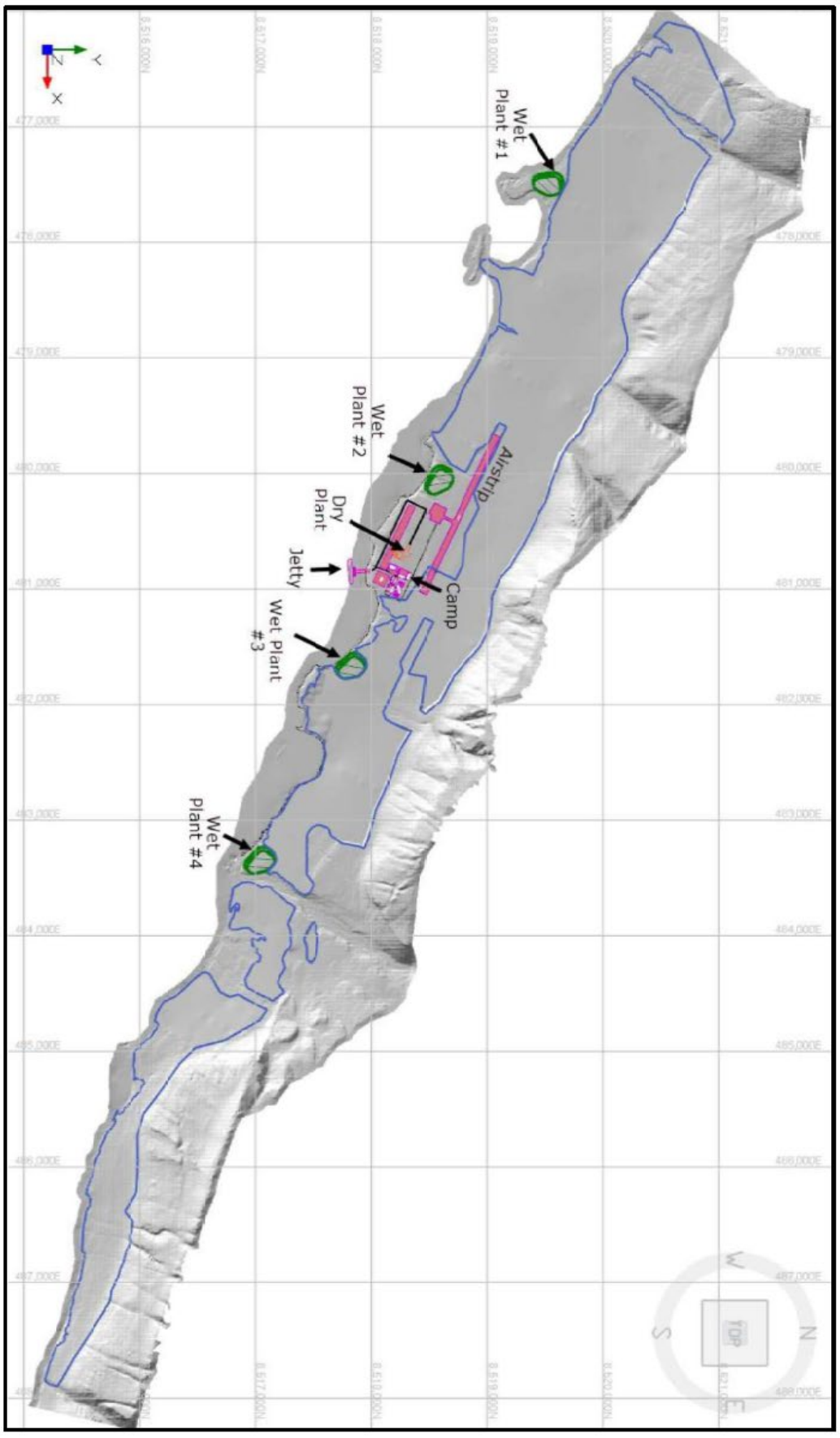


Figure 1.2: Map of planned infrastructure at Ilmenite Project. The blue line indicates areas that will be mined during the current planned mine-life. Mining will be initiated in the north-western (top right) corner of the area and will progress towards South. The green areas indicate the locations of the wet plant during the life of the mine. Purple areas outline other infrastructure at the mine-site (airstrip, camp/accommodation, dry plant, jetty/port/shipping facilities)

The wet plant will move three times during the mine life. The locations of the wet plants are based on the orebody and grade distribution and a target maximum haulage distance of 1 km. The wet plant moves are as follows:

Wet Plant Location #1: Year 1 to Year 4 Q1;Wet Plant Location #2: Year 4 Q1 to Year 6 Q4;Wet Plant Location #3: Year 6 Q4 to Year 8 Q3; Wet Plant Location #4: Year 8 Q3 onwards.

The project is expected to employ up to 270 employees (peak period) during construction and around 175 employees when in production. Approximately 120 people will be at the site at any time during production due to rotations with six weeks on-site and three weeks home.

On average it is expected that the share of unskilled workers will be approximately 50 % of the total work force during operation. Skilled workers will fill approximately 40 % of the positions, while academics will constitute the last 10 %.

The mining site is expected to be in operation all year around. It is planned that employees will work in rotations of six weeks on-site, and three weeks off site. Employees will be transported directly to the site by chartered flights from a central hub in Greenland.

Besides the continuous surface miners, the wet plant, the dry plant and the concentrate storage, the following infrastructure will be built on-site: A small port, a ship-loading facility, an airstrip, power and water supply, accommodation, office, medical and safety facilities and workshop facilities.

The black sand located under the abandoned settlement Moriusaq will be mined, which means that the buildings will be removed. The cemetery area will not be mined.

Because of safety aspects (e.g. heavy machinery operations), access to the mine area and mine site will be restricted and monitored. Dundas Titanium A/S is considering allowing people to travel through the area to stay in a guest house/room at the site, either in the accommodation camp, or in one or two renovated houses from Moriusaq.

Dundas Titanium A/S will establish a grievance mechanism, ensuring that the local population can always contact the company and that these inquiries are handled and responded to.

Key figures of the project are shown in Table 1.1 and Table 1.2 at the next page

Table 1.1: Key figures for the Ilmenite Project

Project element	Details	Description
Products	Ilmenite product	440,000 tonnes per annum
Mining rate		7.4 million tonnes per year
Plant feed rate		965 tons per hour (average over life of mine)
Mine method		Open pit
Construction phase		2 years
Operating phase		10 years
Decommissioning/closing		1 year
Plant operation calendar		12 months - 24/7 operation (average of 7906 hours per calendar year)
Supporting infrastructure	Diesel power plant	59 mega watts
Size of Project elements	Total footprint (at 10 yrs.)	8.5 km^2
Size of Project elements	Mine pits	8 km^2
Water use	Fresh water requirements	1,046 m^3/h sea water
Excess water	Discharge of excess water to the sea	913 m^3/h
Waste volume	Material returned to mine void	6.6 million tonnes per year
Product Transport	Handy-Max vessel 40,000 DWT	11 ships per year
Employee Transport	Airstrip	Airport at the mine site
Employees	Construction	Up to 270
Employees	Operation	175

Table 1.2: Key financial figures for the Ilmenite Project. Based Pre-Feasibility Study, June 2019

Element	Details	Description
CapEx	The estimated capital expenditure (CapEx) inclusive of mining, processing, storage of dried finished product and a near shore direct ship loading facility	245 US$M
OpEx	Based on total 440,000 tonnes ilmenite per annum and an estimated operating cost of 112.81$ per tonne	496 US$M in 10 years operation phase
Payback Period	Based on a 32.8% internal rate of return (IRR) on base case and 34% IRR on upside case, post tax	3 years

1.2.1 The Ilmenite Project – a possible Large-Scale Project

This aim of the Large Scale Project Act is according to Section 1 to promote investments in Greenland, and to prevent and restrict unintended negative impacts in terms of macroeconomics and the competitiveness of the business community, including disproportionate increases in general levels of wages and costs as a result of the possible construction activities in e.g. the mineral resource industry in Greenland. The Large Scale Project Act therefore only applies to the construction phase of mining projects, which fulfil the requirements listed below and as they are stipulated in Section 6 of the Large-Scale Project Act:

a. The project's capital costs exceed DKK 1 billion

b. One of the following two conditions:

- The project's need for labour for performance of construction activities exceeds the qualified, not otherwise employed and available workforce in Greenland,
  or
- The project's requirements for technical and financial capacity exceeds the capacity of Greenlandic enterprises in a technical or financial sense.

As it is shown in Table 1.2 the project's capital cost is estimated to be around 1,7 billion DKK (245 US$M) and is therefore above the threshold of 1 billion DKK stipulated in Section 6 (1), no. 1 of the Large-Scale Project Act. The Project therefore fulfils this criterion for being considered as a large scale project.

Secondly, as shown in the employment section of the SIA report (see Section 5.2), it is foreseen that Greenland will lack several skilled and qualified construction workers in the coming years due to general construction activities including the new airports in Nuuk, Ilulissat and Qaqortoq. The report demonstrates that the project's need for labour for performance of the project's construction activities exceeds the qualified, not otherwise employed and available workforce in Greenland. Hence, the Project is during its construction phase assessed to fulfil the requirements of Section 6(1), no. 2 of the Large Scale Project Act.

Thirdly, Section 5.4 of the SIA Report also demonstrates that the project's technical and financial capacity exceed the capacity of Greenlandic enterprises in a technical or financial sense.

To sum up the Project can therefore be considered a large-scale construction project pursuant to Section 6 of the Large-Scale Project Act.

1.3 SIA methodology and process

The purpose of a Social Impact Assessment (SIA) is to identify potential socio-economic impacts from a project, both positive and negative.

The Social Impact Assessment and related engagement process for the Ilmenite Project has been developed in accordance with the '*Guidelines on the process and preparation of the SIA report for mineral projects 2016*' developed by the Government of Greenland.

The SIA has been developed by NIRAS Greenland A/S. NIRAS Greenland is an independent consultant to Dundas Titanium A/S.

The SIA process consists of five overall steps:

1. **Scoping phase and development of Terms of Reference:** The aim of the scoping phase and the terms of reference is to identify the social areas that can be affected by the project. The scoping phase resulted in the document 'Terms of Reference' (ToR), which was published for public consultation. Following the public consultation, the ToR was updated and approved by the authorities. This SIA is built on the ToR.
2. **Development of socio-economic baseline:** The socio-economic baseline describes key figures of the community that can be impacted by the project.

The baseline is used in the analysis of potential impacts, and can also be used for monitoring of the project.

3. **Stakeholder consultation:** A key part of the SIA process is to inform and engage stakeholders in the project.
4. **Analysis of social impacts and identification of mitigation measures:** Based on the project description, the socio-economic baseline and the stakeholder consultation, the severity and likelihood of the impacts are analysed. Furthermore, mitigation measures that can minimise negative impacts and maximise positive impacts are identified and described. The results of the assessment are shown in this SIA report.
5. **Development of benefit and impact plan:** The benefit and impact plan provides input to the IBA negotiation to take place between the government, the municipality and the mining company.

For each potential impact it is assessed which geographic area the project could impact:

- Local impact: Impacts that might be seen in Qaanaaq, Siorapaluk, Qeqartat and Savissivik
- Regional impact: Impacts that might be seen in the Municipality of Avannaata
- National impact: Impacts that might be seen in Greenland

For the above mentioned local towns and villages it is assessed whether they will be particularly affected by the activities of the Ilmenite Project.

Furthermore, it has been assessed whether the identified impacts occur in the project's construction phase, during operation or in the closure phase.

All potential impacts are assessed to be either negative or positive, and the severity risk/change of the impact is qualified based on the likelihood of the impact to happen (improbable, possible or probable) and the severity of the impact if it occurs (insignificant, minor, moderate or significant), as illustrated in Table 1.3.

Table 1.3: Impact assessment codes

		Severity of impact							
		Negative				**Positive**			
Likenlihood of impact		**Significant** *High impact with large influence*	**Moderate** *Effects are felt and influence som stakeholders*	**Minor** *Effects are observed*	**Insignifi-cant** *Little to no effect if impact occurs*	**Insignifi-cant** *Little to no effect if impact occurs*	**Minor** *Effects are observed*	**Moderate** *Effects are felt and influence som stakeholders*	**Significant** *High impact with large influence*
	Improbable *Impact is unlikely to occur*								
	Possible *Impact will likely occur*	High impact	Medium impact	Low impact	Insignificant impact	Insignificant impact	Low impact	Medium impact	High impact
	Probable *Impact is expected to occur*								

1.4 Assessment of social impacts

As part of the SIA process, a list of issues have been analysed with focus on how the project can potentially impact these issues.

The issues are divided in five categories:

- Employment (section 1.4.1)
- Education and training (section 1.4.2)
- Greenlandic enterprises (section 1.4.3)
- Public revenue (section 1.4.4)
- Other socio-economic and sustainability matters (section 1.4.5)

An overview of the results of the impact assessment is shown in Table 1.4. A brief description of each impact is given in the following sections. For the potential negative impacts, mitigation measures that can minimise these impacts have been identified. Similarly, for positive impacts, measures have been identified that can maximise these impacts. Proposed mitigation measures are listed in section 1.5.

Table 1.4: Overview of impact assessment

Issue	Impact in construction phase	Impact in operation phase	Impact in closure phase
Employment			
Potential impact 1: Direct engagement of Greenlandic workers	**Positive – medium impact** Likelihood: Possible Severity: Moderate	**Positive – medium impact** Likelihood: Possible Severity: Moderate	**Negative – medium impact** Likelihood: Possible Severity: Moderate
Potential impact 2: Creation of indirect and induced job opportunities	**Positive – medium impact** Likelihood: Possible Severity: Moderate	**Positive – medium impact** Likelihood: Possible Severity: Moderate	**Negative – medium impact** Likelihood: Possible Severity: Moderate
Potential impact 3: Cumulative impacts related to job market	**Negative – low impact** Likelihood: Possible Severity: Minor	**Negative – low impact** Likelihood: Possible Severity: Minor	**Not relevant**
Potential impact 4: Occupational health and safety on-site	**Negative – medium impact** Likelihood: Unlikely Severity: Significant	**Negative – medium impact** Likelihood: Unlikely Severity: Significant	**Negative – medium impact** Likelihood: Unlikely Severity: Significant
Potential impact 5: Labour conditions and health of employees	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor
Education and training			
Potential impact 6: Development of competencies	**Positive – low impact** Likelihood: Possible Severity: Minor	**Positive – high impact** Likelihood: Likely Severity: Moderate	**Positive – insignificant impact** Likelihood: Unlikely Severity: Minor

Greenlandic enterprises			
Potential impact 7: Business opportunities for Greenlandic businesses	**Positive - medium impact** Likelihood: Possible Severity: Moderate	**Positive - medium impact** Likelihood: possible Severity: Moderate	**Negative – medium impact** Likelihood: Possible Severity: Moderate
Public revenue			
Potential impact 8: Royalties and taxes	**Positive - medium impact** Likelihood: Likely Severity: Minor	**Positive – high impact** Likelihood: Likely Severity: Moderate	**Positive – low impact** Likelihood: Likely Severity: Insignificant
Other socio economic and sustainability matters			
Potential impact 9: Pressure on public sector, infrastructure and services	**Negative– low impact** Likelihood: Possible Severity: Minor	**Negative – low impact** Likelihood: Possible Severity: Minor	**Not relevant**
Potential impact 10: Public health	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Not relevant**
Potential impact 11: Cumulative impacts (not related to job market)	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Not relevant**
Potential impact 12: Recreational / local use of project area and cultural heritage	**Negative – medium impact** Likelihood: Likely Severity: Minor	**Negative – medium impact** Likelihood: Likely Severity: Minor	**Not relevant**
Potential impact 13: Resettlement/livelihood compensation	**Not relevant**	**Not relevant**	**Not relevant**
Potential impact 14: Vulnerable groups	**Negative– insignificant impact** Likelihood: Unlikely Severity: Minor	**Negative – insignificant impact** Likelihood: Unlikely Severity: Minor	**Not relevant**

1.4.1 Employment

The project will create a number of new employment opportunities in the Municipality of Avannaata. The positions can potentially be filled by local employees, or international employees, if the Greenlandic workforce is unavailable.

During the construction phase up to 270 persons will be working at the project. Some of these will be working for contractors hired to construct the plant and accommodation on-site, and will therefore not be hired directly by Dundas Titanium A/S.

During the operation phase there will be approximately 175 people employed on the project, where 2/3 will be on-site at any time. Approximately 50 % of the positions can be filled by people with no formal education.

Potential impact 1: Direct engagement of Greenlandic workers
The impact of the direct employment during the construction phase and operation phase is assessed to be positive. The project will create up to 270 positions during the two-year construction phase, and approximately 175 positions in the operation phase. The more Greenlandic workers that are employed, the larger the positive impact.

Employees will be transported to the mining site from a central hub in Greenland, and the effects on employment will therefore not only be seen in Qaanaaq and the settlements. However, it will be beneficial to both the local society and the company if there is a specific focus on attracting workers from the local area.

When the mine closes, it is a potential negative impact if employees have no alternative place of employment. This risk must be assessed by the company and authorities in cooperation, once it is known when the project will close down. However, as many employees will have gained experience and skills in the mining sector, a sector that is expected to grow during the coming decades, it is expected that most employees will be able to find new employment when the mine eventually closes down.

Potential impact 2: Creation of indirect and induced job opportunities
The mining project can generate both indirect and induced jobs in Greenland:

- **Indirect jobs**: Jobs that are created as suppliers to the mine hire workers to meet the increased demand of their products and services
- **Induced jobs**: Jobs that occur due to an increased economic activity, as the increased income of workers directly and indirectly employed by Dundas Titanium A/S are used to purchase services and products in other sectors

During both the construction and operation phase it is expected that Greenlandic contractors and other companies can provide services to the project. During construction, contractors might for instance be hired for construction of infrastructure on-site and for assembly of the camp. Here, Greenlandic companies can compete with international contractors.

During operation small or medium scale companies, as well as Greenlandic transportation companies, may provide their services to the project. A very conservative estimate is that the project will create 35 indirect and induced jobs in the operation phase.

Potential impact 3: Cumulative impacts related to the job market
As the project will be among the largest employers in Greenland, it will compete with other mining projects and other sectors to attract Greenlandic workers. The development in other sectors can therefore impact the number of Greenlandic employees who can be attracted to work on the project.

In Greenland there is a lack of skilled workers and workers with experience from the mining sector, and the project will therefore compete with other projects to attract employees.

The project will compete with both other mining projects and other sectors for local employees, mainly in two areas of expertise:

- Skilled mineworkers who can be employed at other mining or exploration projects
- Unskilled and skilled workers who can work at the mine, but could also fill jobs in other sectors.

When demand for employees exceed supply, this will benefit employees, who will have more employment opportunities and as a result they can be offered higher salaries or better work conditions.

Shortage of labor may force owners of construction and mining projects to delay their projects if there is no workforce available. This puts pressure on the labor market, in a situation where the number of construction projects in Greenland is increasing.

The unemployment in the Thule area is however higher than in most of Greenland, and the project will create job possibilities in an area with only few job opportunities.

Potential impact 4: Occupational health and safety on site
There is a potential risk of accidents during the construction, operation and closing of the mine, mainly related to the operation of heavy machinery. The company will continuously work to minimise risks of accidents. However, in the unlikely event that a serious accident occurs this will have significant negative impact.

The long distance to large scale health facilities also make up a risk, in case of large accidents involving numerous employees.

The project therefore has a negative impact on the risk of occupational health and safety compared to a no-production alternative. The impact is negative in all phases of the mine life.

Potential impact 5: Labour conditions and health of employees
There is a risk of negative impacts on employees general health. Based on the isolation and location of the project there is a risk of contagious diseases spreading among employees. Furthermore, there is a risk of mental illnesses related to the lack of daylight and harsh weather conditions. However, if preventive health screenings prior to employment are established, combined with health and life style campaigns amongst workers, the risk is assessed to be insignificant.

The project is located in a very remote part of Greenland, and employees will not be able to leave the site during the six weeks on-site.

There is a risk of cultural differences between employees, as they are expected to come from different parts of Greenland and the world. This can lead to social conflicts. It is therefore important that there is a focus on intercultural understanding among the management on-site. Similarly, a zero tolerance to discrimination must be established.

It has been raised as a concern that the sand at the site could potentially be polluted, due to its proximity to the Thule Air Base and the crash site from the B-52 flight crash in 1968 (for more information see appendix 3: Social Baseline). This concern has been assessed in a number of studies, and there has not been

identified any risks in the Moriusaq area. A new study was carried out in relation to the Ilmenite project by the Technical University of Denmark in 2019[1] and the study finds no indication that there is a health risk related to working on the project.

1.4.2 Education and training

Greenlandic employees at the project will obtain new competencies and skills that can be used in other positions when the project is closed, or as a stepping stone to higher positions at the ilmenite mine or in other organisations or companies. The competencies will be obtained through both formal training and by gaining practical experience with mining and processing.

Potential impact 6: Development of competencies
To obtain the largest possible Greenlandic workforce, expected mismatches between the competencies of potential workers and the required skills at the project must be minimized. This will happen through training on-site and/or training of employees at for instance the Greenland School of Minerals & Petroleum or relevant courses in or outside Greenland.

The impact of training and education on employees is positive. The extent of the impact is dependent on the number of employees completing internal and external training programmes in relation to their work on the project, and the number of internships offered by the company.

1.4.3 Greenlandic enterprises

Potential impact 7: Business Opportunities for Greenlandic businesses
The project will contract companies to do work that they cannot do internally at a competitive price, or that they do not have the skills to do. A company can for instance choose to outsource shipping, transport of employees, engineering, construction, supply of food, catering, cleaning, provision of fuel, electricity work and many other goods and services.

At this stage, it is not decided which goods and services that will be part of the project organisation, and which goods and services that will be contracted to external suppliers.

Procurement and contract packages for infrastructure components, equipment, goods and services will be issued to Greenlandic bidders. Pre-qualified international bidders may be used in cases where Greenlandic enterprises are not technically or commercially competitive or during construction if a large-scale project licence is applied for and obtained.[2]

Greenlandic companies can potentially provide services within air transport, shipping, construction work, supply of arctic diesel, normal site and maintenance work, supply of traditional food and goods, catering, cleaning, administrative and other support services etc.

[1] Roos, Per (2019). Assessment of risk from plutonium isotopes in connection with the proposed onshore mining activities at Moriusaq, Thule, Northwest Greenland.
[2] In accordance with Government of Greenland (2009): Section 18 (2) of the Mineral Resources Act.

It is assessed that Greenlandic companies can support the project, and the impact is therefore positive. The extent is dependent on how many services the mining company outsources.

1.4.4 Public revenue

If the project materialises, it is expected to create a positive public gross revenue. Public revenue will be achieved through income taxes, corporate taxes and royalties.

Potential impact 8: Royalties and taxes
The impact of royalties and taxes on public revenue is expected to be positive.

During the operation phase, the project will generate income taxes and royalties. If the project is generating profits for Dundas Titanium A/S it will furthermore generate corporate taxes. In the pre-feasibility study (PFS) the tax and royalty payments have been calculated in different mining scenarios. With ten years of production, and the costs and income as assumed in the PFS, the total corporate tax and royalty payment is calculated to be a sum of DKK 346.6 million. If the lifetime of the project is extended, this figure will increase.

Income tax generation is dependent on the salaries of employees, and the nationality of employees. Based on the expected positions and salaries, the annual income tax generation from employees directly employed by the project will be between DKK 24.6 and 26.6 million.

During the phases of construction and closure employees will also pay income taxes.

1.4.5 Other socio-economic and sustainability matters

In addition to creating new job opportunities and generating public revenue, the project can also have an impact on other social issues in the local society.

Potential impact 9: Pressure on public sector, infrastructure and services
The project is located in a remote part of Greenland, where infrastructure and public services are limited. The project will impact the public services: Police will be responsible if something happens on site, telecommunication services in the area will have to be improved to service the project, and the Greenlandic health sector can be put under extra pressure. The overall assessment is that the project will lead to increased pressure on public services.

The project is not expected to have negative impacts at a local level, and it can potentially lead to positive indirect impacts to the population in Qaanaaq and the settlements, if for instance telecommunication services are improved.

Several stakeholders have pointed out that it would have a direct positive impact on Qaanaaq if the project used the airport in Qaanaaq as an entry point, instead of building its own airstrip. This is however not possible for the project. However, Dundas Titanium A/S is evaluating the possibilities of making a stop in Qaanaaq when en route for the mining site to pick-up/drop local employees

Potential impact 10: Public health
There are no people living near the project, and no communities will be impacted by potential health effects from the project, such as dust, noise or pollution.

With many employees, potentially 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.

Potential impact 11: Cumulative impacts (not related to job market)
Climate change is affecting the traditional livelihood in the Thule area, where weather and ice conditions are changing. This means that the timing of migrating animals are changing. Consequently, the best areas to go hunting are slowly changing. For instance, walrus hunting near Siorapaluk is no longer as good as it used to be. The Moriusaq area has only been used very little for hunting and fishing during the past years, but in a no-project scenario, Moriusaq could potentially change status, so it would be used for fishing or hunting again.

The project will lead to increased maritime traffic in the area. However, the change is relatively small. The local chairman of KNAPK (the Association of Fishers and Hunters in Greenland) does not expect that the project will impact the animals in the area, as these are already used to the noise from the Thule Air Base.

It must be noted that environmental impacts are not assessed in the SIA.

Due to the limited size of the project, the project is not assessed to have any major impact on the possibilities for living a traditional life for the population in Qaanaaq or the settlements, with regard to fishing and hunting.

Potential impact 12: Recreational/local use of project area and cultural heritage
The project area is located between Qaanaaq (80 km north) and Savissivik (120 km south). There is only very limited activity in the area.

When the project materialises, and the closed and abandoned settlement Moriusaq is removed, the mining company will provide opportunities to stay overnight at the project's facilities or in renovated moved houses from Moriusaq, or in new houses, and it will be possible to visit the Moriusaq cemetery. There will, however, be limited access to the parts of the license area where the company is working, and people who wish to dock within the license area will have to contact the mining company.

The Greenland National museum has identified nine sites falling under the provisions of the Heritage Act at the license area of the Ilmenite Project. These sites will either not be mined or they will be subject to a complete archaeological investigation by the museum.

Potential impact 13: Resettlement/livelihood compensation
No people live in the license area, and no hunters or fishermen make their livelihood - or significant parts of their livelihood - from hunting or fishing in the project area.

Consequently, nobody will be resettled due to the project and nobody will receive livelihood compensation.

Potential impact 14: Vulnerable groups
Vulnerability is often linked to factors such as poor health, abuse, lack of education and unemployment.

As the project is not located in an inhabited area, it will not directly influence a local population. Due to this, the project will not directly impact any vulnerable groups.

Indirect negative impacts can occur with regard to children in vulnerable families, if the most functional adult in the household is employed on the project, and is therefore not present in the household during the time she/he is working on the project.

Similarly, it has been indicated that the project can have indirect negative impacts on vulnerable people in small, local communities, if the project succeeds in hiring several employees from the relatively small communities.

1.5 Overview of proposed measures (mitigation or enhancement)

Mitigation measures have been identified throughout the SIA process. Mitigation measures are measures that can enhance positive impacts of the project or measures that can minimise negative impacts.

Mitigation measures can be initiated by the company or the authorities.

Table 1.5: Overview of proposed mitigation measures

Issue	Proposed mitigation measures
Employment	
Potential impact 1: Direct engagement of Greenlandic workers	• Focus should be on creating an attractive work place for recruitment and retention of local workforce. This includes that Dundas Titanium A/S must address cultural, gender, competences and geographical issues and incorporate findings into planning of the project (rotation scheme, transport arrangements and working conditions at camp). • The project should put emphasis on creating and maintaining Greenlandic culture at the site, including managers who speak Greenlandic and provision of local food at the site. • There should be adequate access to internet and phone connections for employees to be able to keep in touch with their families. • It is suggested that local workers can be offered shorter term positions. For instance, the local unemployment is higher in the autumn, when there are no fishing and hunting activities, and thus this time of year would be a good opportunity for a short-term position. • To target the search for local applicants, it is necessary to ensure strong cooperation between public jobcentres (Majoriaq), educational institutions, job consultants in the towns and settlements and the mining company, to target the search for applicants. • Detailed job description and requirements for all categories of job during operation phase should be made publicly available to community, municipality, unions and technical schools. Job descriptions and qualification requirements are to be developed and distributed to all relevant stakeholders. • In order to progressively replace foreign labourers with local labourers, it is necessary to do an active on-site training of local employees, so that they can advance to higher level positions. • Stakeholders are advising that the company starts to work on engaging Greenlandic employees as early as possible, preferably during the exploration and construction phases. • It is suggested that the mining company makes visual advertisements (for instance short videos) describing what it is like to work at the mine. Potential employees can then watch the video on the company homepage, in order to get an insight into the daily tasks of, for instance, a shift operator. This will give a much better impression of the work compared to a written job advertisement.
Potential impact 2: Creation of indirect and induced job opportunities	• The creation of indirect jobs in Greenland is dependent on how much of the supplies to the mine that are supplied locally. A focus on hiring Greenlandic contractors and buying products produced in Greenland (when possible) will lead to a relatively higher indirect job creation. • When possible, procurement and contract packages for goods and services should be prepared in a way that makes it possible for Greenlandic companies to bid on the contract, to see if they can provide a competitive bid. • When possible and competitive, activities related to transportation of goods and staff should be outsourced to local companies.

	• Close dialogue to local transportation providers should be established to discuss local opportunities and challenges (Air Greenland and Royal Arctic Line). • Close dialogue with Tele-POST to clarify and establish the necessary communication services for the project. • When outsourcing services (potentially carpentry, engineering, electricity work, IT services, cleaning, catering, laundry and similar), Greenlandic companies should be invited to bid on the contract. • When outsourcing larger service contracts, it can be set as a requirement that some goods/services are purchased in Greenland. • Local hunters could provide local meat to the camp. • A forum can be established with the local business council, regional and/or national authorities and GE (Greenland Business Association) to discuss potential tender processes, with the purpose of ensuring that also Greenlandic companies are targeted.
Potential impact 3: Cumulative impacts related to job market	• There should be a focus on employing people who are currently outside the labour market. This should happen in a cooperation between authorities, educational institutions and the company. • There should be a focus on providing targeted training to potential unskilled employees, so they can fill the open positions and obtain documented qualifications for work on other future mining projects.
Potential impact 4: Occupational health and safety on site	• Occupational Health Risk Assessments must be carried out and updated continuously. The assessment must be used to develop, implement and monitor a health and safety management plan that all staff at the site must adhere to. • Training programmes for all staff on H&S and emergency response at the mine site, training programmes must be carried out in Greenlandic, English and potentially other languages for people not fluent in one of the two languages. • Establishment of a health and safety committee with joint participation of management and workers, where workers help to monitor and advise on H&S programs at the mine site. • Pre-notification of operations and traffic of vessels to relevant authorities. • Contractual requirements on H&S to contractors regarding safety measures, response time, etc., in order to minimise risk of accidents, appropriate and timely response in case of accidents, emergency evacuation etc. • Procedures for on-site handling of accidents, and clear procedures for emergency evacuations must be agreed with relevant authorities.
Potential impact 5: Labour conditions and health of employees	• An organised health screening process prior to employment. The health screening can also screen for contagious diseases that could spread to other employees at the mine. • Dust and noise control on machinery, e.g. water sprays and noise inhibitors. • Provision of personal dust protective equipment and noise protective equipment (e.g. dust masks, ear defenders, helmet). • Monitoring of potential plutonium pollution or pollution from the Thule Air Base. • Introductory sessions for all workers should include a section on intercultural understanding. • International workers should be given an overview on Greenlandic culture as part of their introduction programme.

	• It should be ensured that the camp accommodates the cultural needs of the different nationalities living at the camp. • Established anti-bullying and anti-harassment policies in place, and procedures if employees are bullied or harassed.
Potential impact 6: Development of competencies	• A Training Needs Assessment can be undertaken in cooperation with local authorities to ensure that the training opportunities provided benefit both Dundas Titanium A/S and the local business life, also for service-related and managerial positions. • Pre-employment and on-the-job training programmes for the operation phase must be developed as early as possible, and preferably during the construction phase. • Pre-employment and on-the-job training programmes should be developed in cooperation with local authorities, educational institutions and labour market organisations. • A continuous dialogue with educational institutions (especially the mining school) on how internships and training programs can be carried out in cooperation with the institutions must be initiated. It is suggested that a quarterly meeting between the mining school and the project is planned throughout the project's construction phase, to ensure that the school is aware of the future demand for skills. • There must be a focus on continuously upgrading of employees at all levels, in order to retain and develop employees. • The company must offer apprenticeships within different fields of work, e.g. processing, management etc.
Education and training	
Potential impact 6: Development of competencies	• A Training Needs Assessment can be undertaken in cooperation with local authorities to ensure that the training opportunities provided benefit both Dundas Titanium A/S and the local business life, also for service-related and managerial positions. • Pre-employment and on-the-job training programmes for the operation phase must be developed as early as possible, and preferably during the construction phase. • Pre-employment and on-the-job training programmes should be developed in cooperation with local authorities, educational institutions and labour market organisations • A continuous dialogue with educational institutions (especially the mining school) on how internships and training programs can be carried out in cooperation with the institutions must be initiated. It is suggested that a quarterly meeting between the mining school and the project is planned throughout the project's construction phase, to ensure that the school is aware of the future demand for skills. • There must be a focus on continuously upgrading of employees at all levels, in order to retain and develop employees. • The company must offer apprenticeships within different fields of work, e.g. processing, management etc.
Greenlandic enterprises	
Potential impact 7: Business opportunities for Greenlandic businesses	• When possible, procurement and contract packages for goods and services should be prepared and issued to the pre-qualified and approved bidders in Greenland as well as overseas. • Activities related to the transportation of goods and staff can be outsourced. Where possible and competitive, local businesses can provide these services (Air Greenland and Royal Arctic Line).

	• Servicing of the camp will be tendered. Such services include catering services, cleaning, laundry and similar tasks. There will be a number of local services provided for the mine such as carpenters, engineers, electricians and IT services. • Close dialogue with local transportation providers will be established to discuss local opportunities and challenges (Air Greenland, Royal Arctic Line). • Close dialogue with local fuel providers (as Polaroil) will be established to discuss local opportunities and challenges. Special attention will be given to the type of fuel and opportunities of transport of fuel to the location. • Close dialogue with KNAPK in order to organise provision of local food to the camp. • Establishment of a forum with business council. This forum will be used before and during the tender process to provide information and clarification of the tenders.
Public revenue	
Potential impact 8: Royalties and taxes	No mitigation measures are listed for this impact.
Other socio economic and sustainability matters	
Potential impact 9: Pressure on public sector, infrastructure and services	• Dialogue between Dundas Titanium A/S and the relevant authorities is necessary to clarify the procedure for establishing an airstrip on site and the routes that can be used to access the airstrip. • A Health and Safety Management Plan must be developed in close cooperation with the authorities, including a procedure for use of external public health care services. • Establish contact with local health service and authorities and prepare contingency plans in cooperation. • Develop a plan and an approach in collaboration with the Police covering aspects of customs and the role of the Police on site.
Potential impact 10: Public health	No mitigation measures are listed for this impact.
Potential impact 11: Cumulative impacts (not related to job market)	No mitigation measures are listed for this impact.
Potential impact 12: Recreational/local use of project area and cultural heritage	• People travelling in the area should be able to dock their boats, and have the opportunity to stay in the area for rest. • If possible, it would be a benefit for locals if they could buy fuel and basic goods at the site. • It should be easy to find a phone number for the person at the camp, whom locals should contact when they are in the area.
Potential impact 13: Resettlement/livelihood compensation	No mitigation measures are listed for this impact.

Potential impact 14: Vulnerable groups	• The project, in corporation with the authorities, should have focus on identifying and assisting people with little or no formal skills to realise the opportunities for working at the project, and assist in the application and potential training. • Job adds should be made easily accessible for people with little education and who are not currently working. For instance, it is suggested that job ads are printed and made available at Majoriaq in Qaanaaq and service houses in the settlements. It is also suggested that the mining company make a small video in plain language explaining how it is to work at the mine. In this way people with limited knowledge of the mining sector can get an understanding of what the job includes. • The project should not offer salaries that are much higher than what skilled workers can earn in the local communities.

2 List of abbreviations

DKK	Danish Krone
DWT	Deadweight tonnes
EIA	Environmental Impact Assessment
$FeTiO_3$	Titanium-iron oxide mineral
H&S	Health and Safety
HMC	Heavy Mineral Concentrate
IBA	Impact and Benefit Agreement
IFC	International Finance Corporation
Mining school	Greenland School of Minerals & Petroleum
OHS	Occupational Health and Safety
RAL	Royal Arctic Line
SIA	Social Impact Assessment
TiO_2	Titanium Dioxide
ToR	Terms of Reference

3 Introduction

This report presents the Social Impact Assessment (SIA) for the Ilmenite Project. The report is prepared by NIRAS Greenland A/S, an independent consultant company, on behalf of Dundas Titanium A/S. It has mainly been drafted for fulfilling section 76 of the Mineral Resources Act and secondary for fulling Section 9 of the Large-Scale Project Act. Both of these sections dictate that before either of the licences can be granted a SIA report needs to be submitted and approved by the Government.

Due to the fact that it's a mineral resource project the SIA report covers all phases in the life of mine (construction, operation and closure), while the Large-Scale Project Act will only potentially apply to the construction phase of the project.

Dundas Titanium A/S is applying for an exploitation license to develop the Ilmenite Project located 80 km South of Qaanaaq in the Municipality of Avannaata. The license area is approximately 30 km long and up to 2 km wide, and includes the closed and abandoned settlement Moriusaq.

The primary aim of the project is to extract and export ilmenite. It is expected that the mine can operate for at least ten years, and employ approximately 175 people during the operation phase.

An Environmental Impact Assessment (EIA) has been carried out in parallel to this SIA.

3.1 Objective of the SIA

The SIA report and the SIA process has been carried out according to the 2016 guidelines prepared by the Government of Greenland: *Guidelines on the process and preparation of the SIA report for mineral projects* (the guidelines) and the requirements in the Mineral Resource Act, especially Section 18 (1), Section 18 (2) Section 18 (3) in part 5 and part 18a.

The guidelines identify the main objectives of a SIA process for a mineral project to:

- provide an impartial description of what Greenland, the communities affected and individuals will gain from the project;
- inform and involve relevant and affected individuals and stakeholders early in the process via ongoing dialogue and specific procedures;
- provide a detailed description of the social pre-project baseline situation, which is to form the basis for planning, mitigation initiatives and future monitoring;
- provide an assessment for identification of both positive and negative impacts at local and national levels;
- optimise positive impacts and mitigate negative impacts throughout the project lifetime and thus ensure sustainable development;
- involve affected towns, settlements, communities and individuals that may be directly or indirectly impacted throughout the project by utilising and respecting local knowledge, experience, culture and values;
- develop a Benefit and Impact plan.

An integrated aspect of the SIA is to highlight the project's potential impacts on the following essential issues in the Greenlandic context:

- The use of Greenlandic labour.
- Skill enhancement of Greenlanders through training and education.

- Use of Greenlandic enterprises.
- Processing of minerals in Greenland.

3.1.1 The SIA process

This SIA analyses the potential impacts of the Ilmenite Project, if the project is materialised as anticipated in the project description presented in the pre-feasibility study of the project.

A SIA Terms of Reference (ToR) document for the project was approved following a public consultation in 2017. This draft SIA is developed in accordance with the ToR. A final version of the SIA will be carried out following a public consultation of the SIA and EIA for the project.

In the EIA a full analysis of the potential environmental impacts from the project is presented. The EIA and SIA can be read together to understand the combined impacts of the project.

Furthermore, the SIA Report is also prepared for the benefit of giving Dundas Titanium A/S the opportunity for applying for a Large-Scale Project License pursuant to Section 16 of the Large-Scale Project Act. The SIA process therefore also includes an assessment whether Ilmenite Project during construction fulfils the criteria for being considered a large-scale project as the criteria are stipulated in Section 6 (1), No. 2 and No. 3 of the Large-Scale Project Act:

- *»The project's need for labour for performance of construction activities exceeds the qualified, not otherwise employed and available workforce in Greenland«* cf. Section 6 (1), No 2 of the Large-Scale Project Act
- *»The project's requirements for technical and financial capacity exceed the capacity of Greenlandic enterprises in a technical or financial sense.«* cf. Section 6 (1), No 3 of the Large-Scale Project Act

3.2 Geographic scope

The social impacts of the project are described for three geographic levels:

- Local area: Qaanaaq, Savissivik, Siorapaluk and Qeqartat
- Regional area: Municipality of Avannaata
- National area: All of Greenland

Potential impacts are all assessed at the three geographical levels. However, some impacts are assessed to only impact the local area, e.g. reduced access to fishing and hunting areas, while for others it is only possible to evaluate the impact at national level, e.g. increased tax revenue. For each potential impact it is described which geographical areas that can be affected, and the analysis is then carried out for the relevant geographical areas.

The baseline analysis is primarily focusing on the local area. Due to the limited size of the project, the potential impacts on current social indicators are expected to be most significant in Qaanaaq and the settlements.

3.3 Responsible authorities

3.3.1 Authorities in the mineral resource area

Two authorities are responsible for administration of the mineral resources area in Greenland:

- The Ministry of Mineral Resources (MMR)
- The Environmental Agency for Mineral Resources Activities (EAMRA)

The Ministry of Mineral Resources and the underlying Mineral Licence and Safety Authority (MLSA) are responsible for licence administration, technical and geological matters. Furthermore, the Ministry is responsible for the SIA and Impact Benefit Agreements (IBA) for mineral resource companies including mining projects' use of Greenlandic enterprises and Greenlandic labour.

The Environmental Agency for Mineral Resources Activities (EAMRA) is the administrative body responsible for environmental aspects, including the EIA.

3.3.2 Authority in relation to constructing large-scale projects

The appropriate authority for processing an application for obtaining a licence for constructing a project pursuant to the provisions stipulated in The Large-Scale Projects Act is:

- The Ministry of Industry

4 Project Description

4.1 Overview of project

The purpose of the Ilmenite Project is to extract ilmenite from the onshore raised and active dry beaches of the 'black sand' deposit on the south coast of Steensby Land peninsula in Northern Greenland.

The black sand is located on the surface of the raised and active dry beaches, and the project therefore does not include underground mining.

The black sand at the Ilmenite Project consists of a large proportion of the titanium-iron-oxide mineral named ilmenite. Ilmenite is a titanium-iron oxide mineral (FeTiO3) that is mined and processed for its titanium. Titanium dioxide (TiO2) is an important commodity used as pigments in paint, plastics, enamels, paper and cosmetics and in the making of different metal alloys.

The ilmenite-bearing black sand is also sometimes referred to as 'heavy mineral sands' due to the mineral ilmenite being a dense (heavy) mineral. There are no harmful toxic heavy metals or radioactive isotopes present in these beach sand deposits.

Table 4.1: Key figures for the Project

Project element	Details	Description
Products	Ilmenite product	440,000 tonnes per annum
Mining rate		7.4 million tonnes per year
Plant feed rate		965 tons per hour (average over life of mine)
Mine method		Open pit
Construction phase		2 years
Operating phase		10 years
Decommissioning/closing		1 year
Plant operation calendar		12 months - 24/7 operation (average of 7906 hours per calendar year)
Supporting infrastructure	Diesel power plant	59 mega watts
Size of Project elements	Total footprint (at 10 yrs.)	8.5 km^2
Size of Project elements	Mine pits	8 km^2
Water use	Fresh water requirements	1,046 m^3/h sea water
Excess water	Discharge of excess water to the sea	913 m^3/h
Waste volume	Material returned to mine void	6.6 million tonnes per year
Product Transport	Handy-Max vessel 40,000 DWT	11 ships per year
Employee Transport	Airstrip	Airport at the mine site
Employees	Construction	Up to 270
Employees	Operation	175

Table 4.2: Key financial figures for the Project. Based Pre-Feasibility Study, June 2019

Element	Details	Description
CapEx	The estimated capital expenditure (CapEx) inclusive of mining, processing, storage of dried finished product and a near shore direct ship loading facility	245 US$M
OpEx	Based on total 440,000 tonnes ilmenite per annum and an estimated operating cost of 112.81$ per tonne	496 US$M in 10 years operation phase
Payback Period	Based on a 32.8% IRR on base case and 34% IRR on upside case, post tax	3 years

The project has a current indicated and inferred resource for the raised beaches and active dry beaches west and east of Moriusaq of 101 million tonnes at 7.1 % ilmenite in-situ.

A Pre-Feasibility Study shows that the Ilmenite Project is economically feasibly and the key financial figures are inserted in Table 4.2.

4.1.1 Capex above the threshold in the Large-Scale Project Act

As it is shown in Table 4.2 the project's capital cost (245 US$M) is estimated to be above the threshold of 1 billion DKK stipulated in Section 6 (1) No. 1 of the Large-Scale Project Act.

4.2 Project location

The license area is located in the Municipality of Avannaata, around 80 km south of Qaanaaq. The abandoned former settlement Moriusaq is located within the license area.

The exploration license covers an area which is approximately 30 km long and 2 km wide, as illustrated on the map below. Only onshore mining is considered in the current mining scenario.

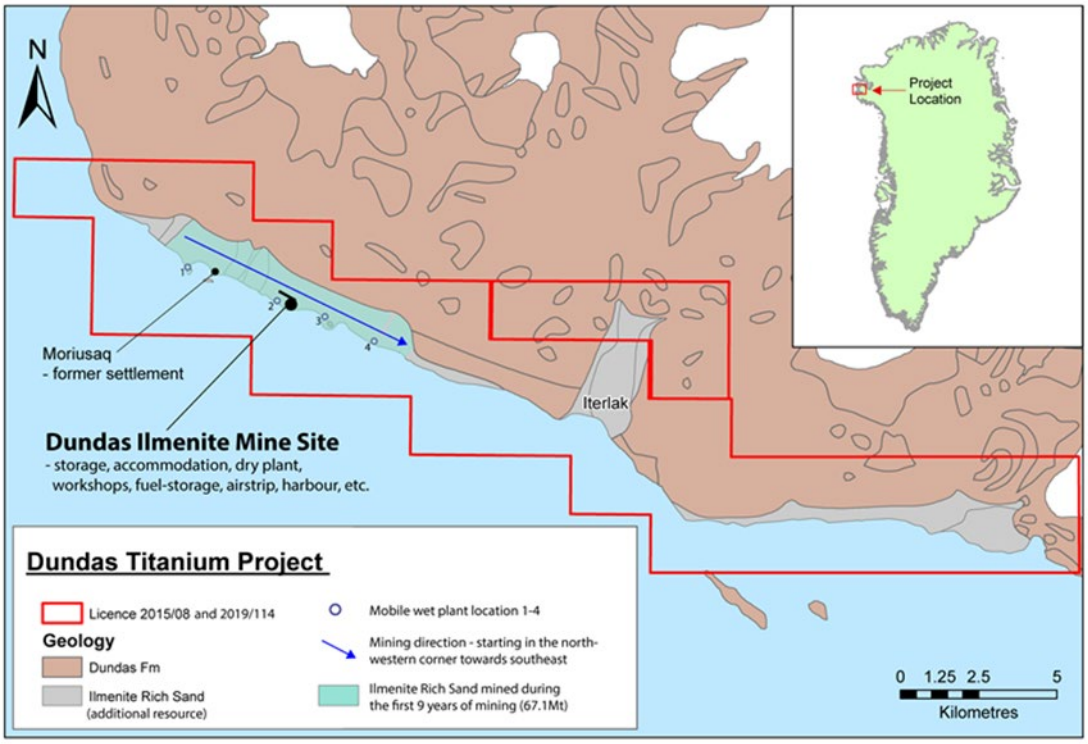


Figure 4.1: Extent of the exploration license that cover the Dundas Titanium Project. Only the onshore raised beaches from the northwestern corner, west of Moriusaq (top-right corner of the onshore license area) to the Iterlak river delta are considered in the current mining scenario. The red outline shows the extent of the Bluejay exploration licenses.

4.3 Planned mining operations

The mining operation will take place on the raised beaches (containing black sand with ilmenite accumulations over widths of more than 1 km) and active dry beaches (the area seaward of the frontal dunes).

The construction period is expected to be around 18 months, starting from the shipping window opens in the summer. The feasibility study has identified a ten-year mining operation, however, it is expected that additional resources in the area should be capable of supporting a mining operation for more than 10 years.

The activities during the three project phases are described in Table 4.3.

Table 4.3: Activities during construction, operation and closure phase. Source: EIA for Ilmenite Project

Phase	Timing	Activities
Construction	18 months	A temporary landing pad will initially be used for beaching barges. The port will subsequently be constructed. Packaged equipment will arrive on site and be installed by specialist construction workers. Buildings will be erected to provide protection against weather events. There will be continuous deliveries of plant and equipment from the port to the mine and plant.
Operation	10 years	Once operations commence the mine and plant will gradually ramp up operations until steady state operation is achieved. Mined areas will progressively be rehabilitated.
Closure and decommissioning	1 year	Buildings, plant and utilities will be removed. Last mine area will be rehabilitated

Key infrastructure on the project will be onshore automated continuous surface miners, a wet plant, a dry plant, a small port, a ship-loading facility, an airstrip, concentrate storage, and general utilities such as power and water supply.

Beside the mining and processing facilities, accommodation, office, medical & safety and workshop facilities will be built as part of the infrastructure at the mine.

A map of the planned infrastructure is seen in Figure 4.2.

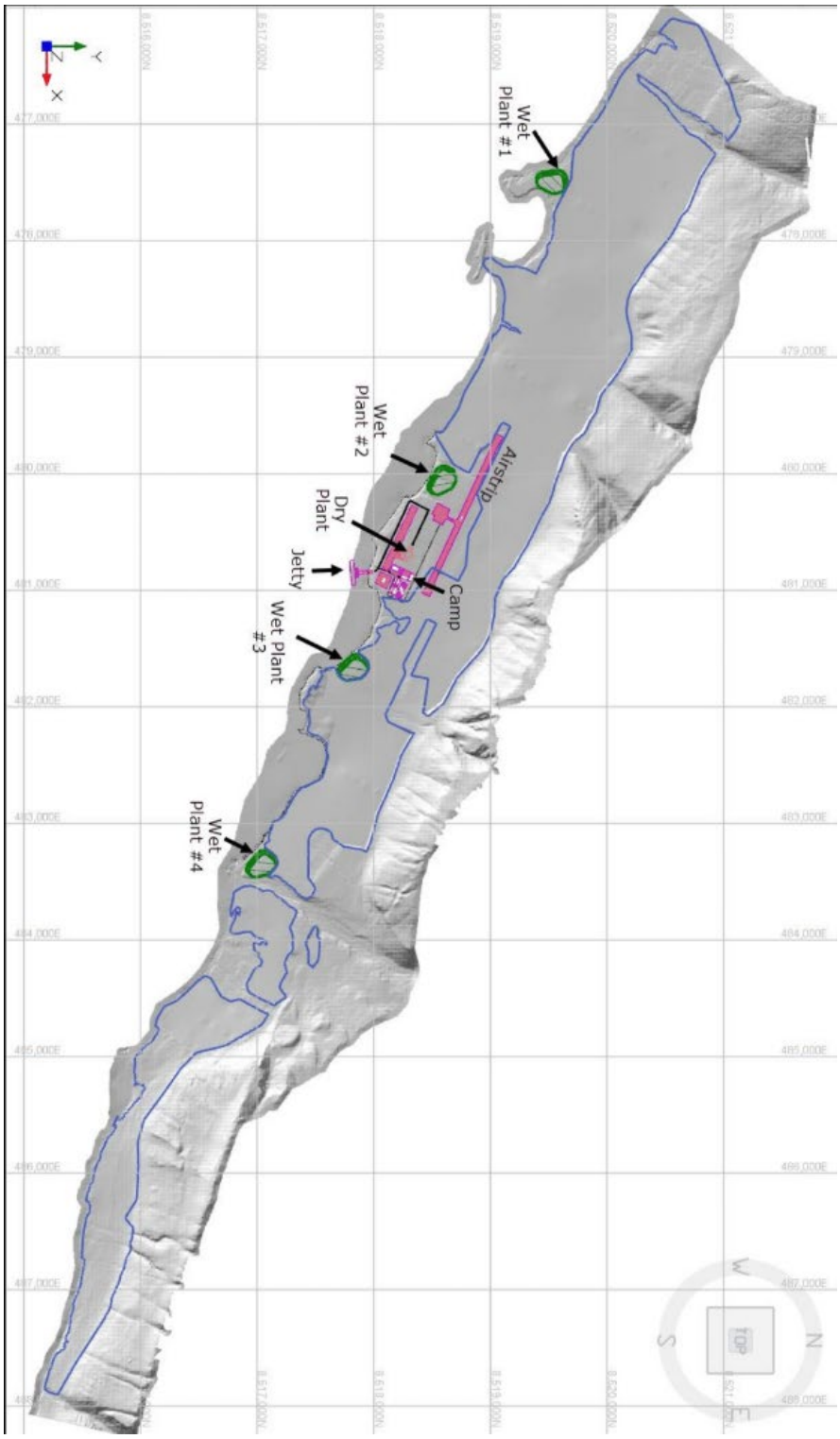


Figure 4.2: Map of planned infrastructure at Ilmenite Project. The blue line indicates areas that will be mined during the current planned mine-life. Mining will be initiated in the north-western (top right) corner of the area and will progress towards Southwest (bottom left corner). The green outlined areas indicate the various locations of the wet plant during the life of the mine. Purple outlined areas outline other infrastructure at the mine-site (airstrip, camp/accommodation, dry plant, jetty/port/shipping facilities)

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The mining and beneficiation process carried out in the project will consist of four overall processes: Mining, wet gravity processing, dry magnetic processing, and finally, storage and shipping. Each process is described below.

4.3.1 Mining

- Where present, the top-most part of the raised-beaches with organic plant-material, the so-called top-soil, will be stripped off and deposited for later remediation work when the ilmenite has been mined from the black sand and the mining voids have been back-filled with sand rejected by the wet gravity seperation.
- The black sand will be mined by automated mining machines (so-called 'continuous surface miners') that 'harvest' the black sand through cuts by rotating cutter-heads. No drilling or blasting will be needed.
- Mined black sand will be loaded on mining trucks that will transport the sand to the wet gravity processing plant.

4.3.2 Process at the wet plant

- Before entering the wet plant the mined material will be screened to remove oversize material and the material will be heated in a rotary kiln for de-icing.
- The wet plant, screens and rotary kiln will be mobile so that they can be moved to new positions (relocation every 2-3 years) and follow the operational area for the continuous surface miners.
- At the wet plant the mined screen sand will be separated into two fractions through a two-step gravity separation: One fraction with 'heavy minerals' (app. 10 % of the mined volume) and one fraction with 'light minerals' (app. 90 % of the mined volume). The gravity separation is a simple washing process in which the black sand basically is washed in gravity separators. The water used for the washing will be normal seawater. No chemicals, crushing or liberation of the minerals are needed in the process.
- The sea-water used in the gravity separation will be pumped back to the sea after use. The returned sea-water will be pumped to deep water (at approximately 10 m water depth) and discharge areas will be selected according to areas that already have muddy bottom-conditions. The returned sea-water contains no added chemicals.
- Following beneficiation, the 'light minerals' will be transported back to the earlier mine cuttings where it will be backfilled together with the oversize screened material. At the very end, the backfilled cuttings will be covered with the earlier removed organic-bearing top-soil material. There is expected to be no discernible impact to the original environment after the final layer of topsoil is replaced and the area remediated back to its natural state.
- After beneficiation at the wet plant, the 'heavy mineral concentrate' (consisting of approximately 88 % ilmenite with the remaining 12 % being composed mainly of magnetite and other heavy minerals) will be transported to the dry plant.

4.3.3 Process at the dry plant

- Before entering the dry plant, the 'heavy mineral' fraction material from the wet plant will be dried and all moisture will be removed.
- The dry plant is a fixed plant that is located close to the established storage and port facilities.

- By the use of magnetic seperation by different magnets in the dry plant, the heavy minerals will be refined into >99 % clean 'premium ilmenite product', a 'standard ilmenite product' and a rejected non-valuable heavy mineral fraction (magnetite, amphiboles and pyroxene)

4.3.4 Shipping and storage

- The ilmenite products will be stored in a large storage facility at the mining site.
- The project will establish storage facility for 327,000 tons ilmenite. This capacity is based on the annual production of 440,000 tons ilmenite per annum. The 327,000 tons capacity takes into account stock movements throughout the year and accounts for storage for production outside the shipping window.
- During the ice-free shipping window (June-October) the material will be shipped by bulk-carriers to an international, all year round open storage location or directly to customers. A rock-filled steel piled berth and ship-loading facilities will be part of the infrastructure. The ships will only operate in ice-free conditions (sailable conditions by ice-class 1A bulk-carriers without ice-breaker assistance). Therefore, there will be no need for icebreaking in the area due to the Ilmenite Project.
- With the planned production, the shipping will include approximately 10-12 return trips with vessels of the type 40,000 DWT Supramax or similar. Additionally, approximately four ships will supply the operation with fuel and other supplies during the shipping window.
- The ilmenite products from the project will be sold on long-term agreements to the international market.

4.4 Employment

The project is expected to employ up to 270 employees during construction and around 175 employess during operation. Approximately 120 people will be on-site at any time.

On average it is expected that the share of unskilled workers will constitute approximately 50 % of all workers during operation, skilled workers will fill approximately 40 % of the positions, while academics will constitute the last 10 %.

The mining site is expected to be in operation all year around. It is planned that employees will work in rotations of six weeks on-site, and three weeks off-site. Employees will be transported directly to the site by chartered flights from a central hub in Greenland. An airstrip will be built on the site as part of the infrastructure.

Greenlandic employees will be preferred if their skills and experiences are sufficient. The goal is to employ as high a share of Greenlandic employees as possible. To obtain a high degree of Greenlandic involvement, Dundas Titanium A/S will offer on-the-job and continued training for workers. The company will also actively work with the Greenland School of Minerals & Petroleum ('Råstofskolen') to develop training programmes and internships for students from the school. Furthermore, Greenlandic and local contractors will, when possible, competitive and feasible, be preferred and used to support and supply the operation.

4.5 Local use and access to the project area

Moriusaq is located on the routes between Savissivik and Qaanaaq, and between Qaanaaq and Pituffik. The transport is related to either hunters passing from and to Savissivik and Qaanaaq or related to social and family gatherings as there are several family ties between the inhabitants of Savissivik and Qaanaaq. Today Moriusaq has therefore been used for overnight stays for people transferring from one location to another. Only limited hunting and fishing activities take place in the license area.

Because of safety aspects (e.g. heavy machinery operations), access to the mine area and mine site will be restricted and monitored. Restrictions on access to the area will be based on a work place assessment, which will be drafted by a special competent person or company. Dundas Titanium A/S is considering allowing people to travel through the area to stay in a guest house/room at the site, either in the accommodation camp, or in one or two renovated houses from Moriusaq.

The black sand located under Moriusaq will be mined, which means that the buildings will be removed. The cemetery area at Moriusaq will not be mined.

Dundas Titanium A/S will establish a grievance mechanism, ensuring that the local population can always contact the company, and that these inquiries are handled and responded to.

5 Potential social impacts

The expected social impacts related to the construction, operation and closing of the project are described in this chapter. In the scoping phase the topics relevant to assess were defined to be the topics listed in Table 5.1.

Table 5.1:Potential impacts to be assessed in the SIA, according to Terms of Reference

**Point OHS and labour conditions were described as one impact in the TOR, however, to assess the impacts it has been decided to split this into two categories.*
*** The possibility of further processing in Greenland, is not assessed as an impact, but described in a separate section (section 8)*

Impact category	Detailed impact	Section
1. Direct employment of Greenlandic workers	Engagement of Greenlandic workers	5.2.1
	Indirect and induced job effects	5.2.2
	Cumulative impacts (related to jobs)	5.2.3
	Occupational health and safety and risk of accidents*	5.2.4
	Labour conditions and health of employees*	5.2.5
2. Education and training	Development of competences	5.3.1
3. Use of Greenlandic enterprises	Business opportunities for Greenlandic Enterprises	5.4.1
4. Processing of minerals	Extra jobs**	8
	Increased public revenue**	8
5. Public revenue	Personal income tax	5.6
	Corporate tax/Royalty	5.6
6. Other socio-economic and sustainability matters	Pressure on the public sector, infrastructure and services	5.7.1
	Public health	5.7.2
	Cumulative impacts (except impacts on job market)	5.7.3
	Recreational/local use of the project area and cultural heritage	5.7.4
	Resettlement/livelihood compensation	5.7.5
	Vulnerable groups	5.7.6

All topics are assessed to be either negative or positive, and the severity risk/change of the impact is qualified based on the likelihood of the impact to happen (improbable, possible or probable) and the severity of the impact if it occurs (insignificant, minor, moderate or significant), as illustrated in Table 5.2: Impact assessment codes

Table 5.2: Impact assessment codes

		Severity of impact							
		Negative				**Positive**			
		Significant *High impact with large influence*	**Moderate** *Effects are felt and influence som stakeholders*	**Minor** *Effects are observed*	**Insignifi-cant** *Little to no effect if impact occurs*	**Insignifi-cant** *Little to no effect if impact occurs*	**Minor** *Effects are observed*	**Moderate** *Effects are felt and influence som stakeholders*	**Significant** *High impact with large influence*
Likenlihood of impact	**Improbable** *Impact is unlikely to occur*								
	Possible *Impact will likely occur*	High impact	Medium impact	Low impact	Insignificant impact	Insignificant impact	Low impact	Medium impact	High impact
	Probable *Impact is expected to occur*								

5.1 Result of assessment

All potential issues are assessed for the construction phase (year 1 and 2), the operation phase (minimum year 3-12) and the closure phase (after year 12). The assessment is based on the project design as presented by Dundas Titanium A/S.

Following the assessment, further initiatives (mitigation measures) that can be taken to increase the positive impacts and minimise the negative impacts, are listed. The initiatives can be initiated by either the mining company or the public sector.

Table 5.3 illustrates the result of the assessments. In the following sections the reasoning behind the assessment is described in detail.

Table 5.3: Overview of assessment after implementation of mitigation measures

Chapt.	Issue	Source of potential impacts	Construction phase	Operation phase	Closure/ rehabilitation phase
Direct employment of Greenlandic workers					
5.2.1	Engagement of Greenlandic workers	• The project will generate up to 270 positions during the construction phase and approximately 175 positions in the operation phase. • When the project closes, the job opportunities at the project will disappear. • It is the aim of the company to employ as high a share of Greenlandic workers as possible during all phases of the project. However it is expected that it will be challenging to find people who are interested in, and qualified for, all positions at the project.	Positive - medium impact	Positive - medium impact	Negative- medium impact
5.2.2.	Indirect and induced job effects	• The project will create indirect jobs in Greenland, when Greenlandic suppliers to the mine hire more employees to meet the increased demand for their products and/or services. • The project can create indirect jobs due to the increase in the income of workers, which then leads to an increase in the economic sectors where the income is spent.	Positive - medium impact	Positive - medium impact	Negative - medium impact
5.2.3	Cumulative impacts (related to jobs)	• At national level there is a record-low unemployment rate, and a number of new projects in both the construction and mining sector are expected in the coming years. This leads to increased competition for workers, where domestic supply of workers cannot meet the demand. Compared to other planned projects, the Ilmenite Project is relatively small, and a relatively high share of the planned positions will be for unskilled workers. • At a local level, there is a concern that if some of the people with the best skills start to work at the project, they will no longer be fulfilling the positions (formal and informal) they currently have in the local communities.	Negative - low impact	Negative - low impact	Not relevant

Chapt.	Issue	Source of potential impacts	Construction phase	Operation phase	Closure/ rehabilitation phase
5.2.4	Occupational health and safety and risk of accidents	• The project will live up to international best practise in terms of OHS risk assessments and management. However, there still is a risk of accidents during all phases of the project. The likelihood of severe accidents is low, but if an accident happens, the impact can be significant.	Negative - medium impact	Negative - medium impact	Negative - medium impact
5.2.5	Labour conditions and health of employees	• Labour conditions (salaries, facilities while on site, holidays, etc.) will follow national legislation, agreements with the unions, and international best practice. • The lack of daylight and harsh weather conditions can potentially have a negative impact on the health of some employees. • Potential health risks related to the projects proximity to the Thule Air Base, and the crash site of the B-52 flight that crashed in 1968, has been investigated, and no risks have been identified.	Negative - insignificant impact	Negative - insignificant impact	Negative - insignificant impact
Education and training of workers					
5.3.1	Development of competencies	• The project can inspire more people in the local area to apply for education and training opportunities within the mining sector. • Employees will receive on-site training and potentially external training, giving them improved formal skills • The project will offer internships and education programmes in cooperation with for instance the mining school.	Positive - low impact	Positive - high impact	Positive - insignificant impact
Use of Greenlandic enterprises					
5.4.1	Business opportunities for Greenlandic enterprises	• Greenlandic companies can benefit from the project by selling products and services to the project. • Greenland companies can potentially provide services within assembly and construction, short term craftsman services, transportation of staff, goods and ilmenite as well as services such as food supply, catering and cleaning	Positive - medium impact	Positive - medium impact	Negative - medium impact
Public revenue					
5.5.1	Royalties and taxes	• The project will generate public revenue through royalties (2.5 % of sales price when ilmenite products are sold), corporate taxes (30 % of surplus) • Employees on the project will pay income taxes on the income earned from working at the project (35 % for international staff and 42-44 % after a deduction for domestic employees).	Positive - medium impact	Positive - high impact	Positive - Insignificant impact

Chapt.	Issue	Source of potential impacts	Construction phase	Operation phase	Closure/ rehabilitation phase
Other socio-economic and sustainability matters					
5.6.1	Pressure on the public sector, infrastructure and services	• The project will potentially lead to more assignments for Greenland Police and the health sector, including search and rescue. • The project is expected to increase the need for freight transportation to the area, which can have positive impacts at local level. • The project will mean that the telecommunication capacity in the area will have to be expanded, which might have positive impacts for the local population.	Negative - low impact	Negative - low impact	Not relevant
5.6.2	Public health	• There is no people living near the project, and no communities will be impacted by potential health effects from the project (dust, noise or other pollution). • Due to the many employees, potentially from different countries and cultures, living full time at the mining 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.	Negative - insignificant impact	Negative- insignificant impact	Not relevant
5.6.3	Cumulative impacts (except impacts on job market)	• Climate change is affecting the traditional livelihood in the Thule area, for instance the ice conditions are changing. Moriusaq has only been used very little for hunting and fishing during the past years, but it has been indicated, that if the project is not materialising, the area could potentially become a fishing or hunting area again in the future. • The project will lead to increased maritime traffic in the area. However, the change is relatively small.	Negative - insignificant impact	Negative - insignificant impact	Not relevant
5.6.4	Recreational/local use of the project area and cultural heritage	• The Greenland National museum has identified nine sites falling under the provisions of the Heritage Act at the license area of the Ilmenite Project. The mining company will therefore either not mine the sites, or - if mining the area is considered unavoidable - these sites will be subject to a complete archaeological investigation by the museum. • Moriusaq is used for overnight stays, when people travel between Savissivik and Qaanaaq and when hunters from Qaanaaq travel to south of Pituffik for muskox hunting. • The area has traditionally been a good hunting area, but only very limited fishing activities and narwhale hunting has taken place in the past decade. Some polar bear hunting is possible in the area. • When the project materialise and Moriusaq is removed, the mining company will provide opportunities to stay overnight at the project's facilities. There will, however, be limited access to the area, as it is a working area.	Negative - medium impact	Negative - medium impact	Not relevant
5.6.5	Resettlement/ livelihood compensation	• No resettlement will take place. • The area is not used for hunting by professional hunters, and no livelihood is made from use of the area. • Some of the buildings in Moriusaq are privately owned and used as summer houses/for overnight stays. The mining company is in progress with buying the houses from the current owners.	Not relevant	Not relevant	Not relevant

5.6.6	Vulnerable groups	• The project can give job opportunities to local people with little formal education who are currently unemployed, making these people less vulnerable than they are today. • Indirect negative impacts can occur with regard to children in vulnerable families, if the most functional adult in the household is employed on the project, and therefore is not present in the household during the time she/he is working on the project. • If the project succeeds in hiring several employees from the relatively small communities, and if these employees play important roles in the community, it has been indicated that the project can have negative impacts on the communities.	Negative - low impact	Negative - low impact	Not relevant

5.2 Employment opportunities

The project will create new employment opportunities in the municipality of Avannaata. The positions can potentially be filled by local, regional and national Greenlandic employees, or alternatively international employees, if no Greenlandic workers are available[3]. The project's employment opportunities lead to five potential impacts:

- Direct engagement of Greenlandic workers (section 5.2.1)
- Indirect and induced job effects (section 5.2.2)
- Cumulative impacts related to jobs (section 5.2.3)
- Occupational health and safety and risk of accidents (section 5.2.4)
- Labour conditions and health of employees (section 5.2.5)

The pre-feasibility study has identified the positions that will be available during the construction and operation phase, respectively. During the construction phase up to 270 people (peak-period) will be working at the project, whereas it is expected that there will be 175 people employed on the project during the operation phase, where 120 persons will be on-site at any time because of rotation (six weeks on-site, three weeks home). The expected job functions are described below.

Construction phase

The construction phase is expected to last approximately 18 months on-site, starting from around June, when the shipping window opens. During the construction period up to 270 people (peak period during construction) will be working on the project, some only on short term assignments.

The following jobs must be filled in the construction phase:

- Construction manager
- Construction supervisors
- Land Surveyors
- Quantity surveyors
- Boilermakers
- Welders
- Fitters
- Electricians
- Instrument technicians
- General labourers
- Carpenters
- Cement/Concrete workers
- Mobile equipment operators
- Crane operators
- Insulation workers
- Painters
- HVAC technicians
- Tugboat operators
- Dredge operators
- Bricklayers/Masons
- Site planners

For some of the jobs a contractor may be hired to carry out a part of the full construction.

[3] Section 18 (1) of the MRA: "However, to the extent necessary for the activities, the licensee may use foreign labour if labour with similar qualifications does not exist or is not available in Greenland." Government of Greenland (2009)

Operation phase

Table 5.4 gives a detailed breakdown of positions at the project during the operation phase. The table provides the total number of workers. It is expected that 2/3 of the employees will be at the site at any time.

Table 5.4: Expected number of employees, by position and professional level

Position	Required education/training	Number of positions
Mining		
Mine manager	High level professional/academic	1
Mining shift supervisor	Skilled supervisors	3
Shift operators	Unskilled	60
Maintenance supervisor	Skilled supervisors	2
Shift maintainers	Skilled artisans	9
Mine planning engineer	High level professional/academic	1
Mining engineer	High level professional/academic	1
Mine surveyor	Skilled artisans	2
Mine geologist	High level professional/academic	2
Mining pit technician	Unskilled	2
Processing		
Plant manager	High level professional/academic	1
Metallurgist	High level professional/academic	1
Lab chemist	Skilled artisans	3
Process/laboratory technician	Skilled artisans	3
Shift coordinator	Skilled supervisors	3
Wet concentrator plant control room operator	Skilled artisans	3
Plant Operator	Unskilled	3
Shift Maintainer	Skilled artisans	3
ROM Stockpile/outstations operator	Unskilled	3
Engineering		
Engineering manager	High level professional/academic	1
Electrical supervisor	Skilled supervisors	1
Programmable logic controller/instrument technician	Skilled artisans	3
Electrician	Skilled artisans	3
Maintenance planner	Skilled supervisors	1
Mechanical supervisor	Skilled supervisors	1
Mechanical fitter	Skilled artisans	6

Sewage treatment plant/wet concentrator plant/incinerator/diesel operator	Skilled artisans	2
Power plant/boiler operator	Skilled artisans	3
Fuel storage/dispensing operator	Skilled artisans	3
Administration		
Greenland general manager	High level professional/academic	1
Administration manager	High level professional/academic	1
Chefs	Skilled supervisors	3
Kitchen staff	Unskilled	6
Waiting/service staff	Unskilled	6
Accommodation supervisor	Skilled supervisors	3
Cleaning staff	Unskilled	6
Harbour master	Skilled supervisors	1
Warehouse officer	Unskilled	2
Shiploader/product handling/storage operators	Unskilled	6
IT/communication technicians	Skilled artisans	2
Safety, security health, environment and quality		
Safety, security, health, environment and quality manager	High level professional/academic	1
Medical/health support	High level professional/academic	1
Safety/training officer	Skilled artisans	2
Environmental officer	Skilled artisans	2
Medical Officers/nurses	Skilled artisans	2
Off-site employees		
Off-site commercial manager	High level professional/academic	1
Human resources supervisor	Skilled supervisors	1
Payroll supervisor	Unskilled	1
Management accountant	Skilled supervisors	1
Accounts received/payable	Unskilled	1
Cost accountant	Skilled supervisors	1
Logistics supervisor	Skilled supervisors	1
Purchasing officer	Unskilled	1
Shipping coordinator	Unskilled	1

Work on the project will be in rotations with six weeks on-site and three weeks off site. Operations will take place all year around.

The new employment opportunities will impact the Greenland society both through direct and indirect employment opportunities, as described in the following sections.

5.2.1 Direct Engagement of Greenlandic workers

Dundas Titanium A/S has stated that they will aim to attract as high a number of local and Greenlandic employees as possible, based on the availability of qualified and available workers.

The Greenlandic legislation states that a company can only employ foreign workers if labour with similar qualifications does not exist or is not available in Greenland. If foreign blue-collar workers (unskilled and certified blue-collar workers) are to be hired, the mining company must send a request to the municipality, and describe the vacancy which they have not been able to fill, and the municipality will have to approve that the company can hire a foreign worker (Regulation no 27 of 30 October 1992 and later amendments).

It has been raised during the stakeholder engagement activities that it might be difficult to fill all available position with Greenlandic workers. This is amongst others due to the skill gap between unemployed people and the needed skills to work at a mining site. Furthermore, the remote location of the project and the increased competition to hire workers for both mining and construction projects across Greenland can impact the possibility of hiring Greenlandic workers.

The Greenland Economic Council describes the Greenlandic job market in their 2018 annual report: "*There is a large shortage of labor within both specialized and unskilled job functions, and the need for recruiting foreign labor is large and growing"*. The report furthermore finds that the geographic labour mobility is relatively low, and workers will not necessarily move to another part of the country for jobs: *"The figures do not show strong signs of internal mobility in the country. There are only slight signs of relocation from cities with many jobseekers to cities with better job opportunities"*[4]*.* This is also seen in the fishing industry, where several fish factories experience a need for more workers, and their only available option is to hire foreign workers. Similarly, it might prove difficult for Dundas Titanium A/S to attract workers from other parts of the country to work at the project.

At a national level the unemployment level was between 6-8 % in 2017, and on average there were 1,858 unemployed people during 2017[5]. Of the unemployed people, approximately 85 % had no formal education higher than lower secondary school (see section 6.2 in appendix 3 Social baseline).

In Qaanaaq the unemployment rate has decreased significantly during the past five years, yet the unemployment rate in the local area is amongst the highest in Greenland, with an average of 12.9 % of the population between 18 and 65 being formally unemployed in 2017 (equal to 39 people). These numbers, however, cover large seasonal differences, where for instance the fishing industry employs relatively many residents during winter. The fish factory in Qaanaaq has 20

[4] Economic Council of Greenland (2018). Economy of Greenland 2018.
[5] Statistics Greenland (2020).

employees during the season for fishing Greenland Halibut (6-7 months a year), while only five or less people work at the factory during summer and autumn.

There are 82 professional hunters in Qaanaaq (including settlements) and 160 people with a license to do recreational hunting and fishing[6]. Recreational hunting and fishing is therefore very important to many families in the region. This also means that a large share of the population will go hunting in the relevant season. An employer in Qaanaaq informs that his employees are given time off when the narwhale season starts. This requires some flexibility from the employers, as the narwhales passing depends on the ice, and therefore does not happen at the same time every year.

As described in the social baseline, the level of documented skills in the labour force is relatively low and as shown in the figure below, the unemployment rates (%) among skilled construction workers and unskilled workers are relatively low.

Table 5.5: Unemployment rate in % based on education Source: Statistics Greenland

Year	Workers who completed public school	Workers with a vocational education in engineering, production or construction
2016	11,6	2,6
2017	11	2,4
2018	9,3	2

With ongoing and forthcoming construction activities in Greenland in general such as construction of airports, the low unemployment rate among construction workers and unskilled workers are not assessed to change in the next 2-3 years.

However, for the benefit of securing as many employees from the nearby communities in North-West Greenland, it will therefore be necessary that some potential employees receive targeted training towards the positions they are going to fill. Initiatives to upgrade technical skills of people in Qaanaaq has already been initiated by the mining school in the spring of 2019, where they are offering a targeted training programme to become a certified machine operator to 12 people living in Qaanaaq. The programme is carried out in cooperation with, amongst others, Majoriaq Qaanaaq and Dundas Titanium A/S, and it is being financed by PKU.

Barriers to attracting Greenlandic workers

Based on the experience with employing and retaining Greenlandic employees during the field work in the project's exploration phase, experience from similar projects as well as inputs provided during the stakeholder engagement activities, a number of barriers to attract local employees have been identified:

- The gap between required skills and available skills will be a barrier to employing local workers.
- The relatively remote location in Greenland will make the project less attractive compared to other Greenlandic mining projects, located closer to larger towns. See also section 5.2.3 on cumulative impacts.
- The retention level for employees who are not experienced with working at mines is expected to be relatively low, due to difficulties to adapt to the

[6] Numbers informed by the municipal office in Qaanaaq

working conditions. During the exploration phase Dundas Titanium A/S has also experienced that some employees have only stayed at the project for a very short period of time.
- The long rotations (periods on site) can make it difficult to attract employees.
- The potential lack of flexibility at a large mining operation, compared to the traditional lifestyle at local level, can be a barrier. For instance, narwhale hunting and fishing can be important priorities for potential local workers.

Initiatives/mitigation measures to attract and retain Greenlandic workers
- Focus should be on creating an attractive working place for recruitment and retention of local workforce. This includes that Dundas Titanium A/S must address cultural, gender, competences and geographical issues and incorporate findings into planning of the project (rotation scheme, transport arrangements and working conditions at camp).
- The project should put emphasis on creating and maintaining Greenlandic culture at the site, including managers who speak Greenlandic and provision of local food at the site.
- There should be adequate access to internet and phone connections, for employees to be able to keep in touch with their families.
- It is suggested that local workers can be offered shorter term positions. For instance, the local unemployment is higher in the autumn, when there are no fishing and hunting activities, and thus this time of year would be a good opportunity for a short-term position.
- To target the search for local applicants, it is necessary to ensure strong cooperation between public jobcentres (Majoriaq), educational institutions, job consultants in the towns and settlements and the mining company, to target the search for applicants.
- Detailed job description and requirements for all categories of jobs during operation phase should be made publicly available to community, municipality, unions and technical schools. Job descriptions and qualification requirements are to be developed and distributed to all relevant stakeholders. Before any foreign blue-collar workers (unskilled and certified skilled workers) can obtain a work permit it is required by law to publish the job descriptions on suli.gl cf. Act No. 27 of 30 October 1992 on the regulation of the influx of labour in Greenland (incl. later amendments).
- In order to progressively replace foreign labourers with local labourers, it is necessary to do an active on-site training of local employees in order for them to advance to higher level positions.
- Stakeholders are advising the company to start work on engaging Greenlandic employees as early as possible, preferably during the exploration and construction phases.
- It is suggested that the mining company makes visual advertisements (for instance short videos) describing what it is like to work at the mine. Potential employees can then watch the video on the company homepage, to get an insight into the daily tasks of, for instance, a shift operator. This will give a much better impression of the work compared to a written job advertisement.

Assessment

The impact of the direct employment during the construction and operation phase is assessed to be positive with a low impact and positive with a medium impact during the operation phase**.**

During **construction** it is assessed that Greenland will not be able fulfil the project's need of relevant and qualified labour during the next 2-3 years. It is

therefore assessed that the project will have to hire foreign workers. The need for foreigners will only be intensified due to the very short construction season in North-West Greenland, during which the unemployment among construction workers and unskilled workers are even lower than the annual average rate, which appears in Table 5.5.

It is therefore assessed that the Ilmenite Project during construction fulfils the requirement for being consider a large-scale project pursuant to Section 6 (1), no. 2 of the Large-Scale Project Act.

Employees will be transported to the mining site, and the effects on local employment will therefore not only benefit at a local level. However, it will be beneficial to both the local society and the company, if there is a specific focus on attracting workers from the local area.

When the mine closes, it is a potential negative impact if employees have no alternative place of employment. This will lead to an increase in unemployment and a decrease in overall income. However, as many employees will have gained experience and skills in the mining sector, a sector that is expected to grow during the coming decades, it is expected that most employees will be able to find new employment when the mine closes.

Table 5.6: Impact Assessment Direct employment of Greenlandic workers

Impact Assessment Direct employment of Greenlandic workers		
Short description: The project is expected to create up to 270 jobs in the construction phase and 175 jobs in the operation phase. The aim of Dundas Titanium is that as high a share as possible of these positions will be filled by Greenlandic employees. The share of Greenlandic employees is dependent on the match between qualified and available Greenlandic candidates and the needed position on site. For some positions, job training programmes will be organised in order to match available candidates with the needed skills to fill the position. In the current project description, it is assumed that the operation phase will last ten years, but it is expected that there is material to extend the lifetime of the mine beyond ten years. However, when the mine will be closing down, this will have a potential negative impact, if employees have no alternative place of employment.		
Baseline status that will be impacted: The unemployment rate in Greenland was 6.8 % and for Qaanaaq 12.9 % in 2017. Both figures has decreased significantly during the past five years. In the past years, two mines have started operating in Greenland, and the mining school has informed that the graduates from the school have found employment relatively fast following graduation. There are therefore no unemployed people with specific mining skills. For avoiding an increase in wages for construction workers in Greenland and a possible "Dutch disease"[7] the project will most likely have to hire foreign construction workers.		
Geographical impact: The project can impact the employment at local, regional and national level. As the number of employment opportunities are relatively limited, the largest impact are expected to be seen at local and regional level, where the opportunities for both unskilled and skilled positions will increase. If the project materialises, it will be one of the largest employers in the municipality of Avannaata.		
Who will be impacted?: The people who will be employed on the project will experience an increased income if they are currently unemployed. This will impact the family income. If people who are currently unemployed gets employed on the project, this will lead to increased tax income to the government of Greenland, and at the same time, the people will no longer receive unemployment payments.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Positive – medium impact	**Positive – medium impact**	**Negative - medium impact**
Likelihood: Possible *Severity: Moderate*	*Likelihood: Possible* *Severity: Moderate*	*Likelihood: Possible* *Severity: Moderate*

[7] ScienceDirect 2019: Dutch Disease – an overview ScienceDirect Topics https://www.sciencedirect.com/topics/social-sciences/dutch-disease.

5.2.2 Indirect and induced job effects

The mining project can potentially generate both indirect and induced jobs in Greenland:

- **Indirect jobs**: Jobs created when suppliers to the mine hire workers to meet the increased demand of their product/service.
- **Induced jobs**: Jobs that occur due to the increased overall economic activity, as the increased income of workers are used to purchase services and products in other sectors.

Indirect jobs can be created across Greenland, depending on which companies that are contracted to provide goods and services to the project. The potential to contract local businesses is assessed and a plan for contracting the businesses is described in section 5.4 on Greenlandic Enterprises.

Induced jobs can be seen in all sectors. If the number of unemployed people decreases, the overall personal income in Greenland increases. The increased income can be used on both domestic and foreign goods and services, depending on the purchasing behaviour and preferences of the wage-earner. This can potentially result in a "Dutch disease" (see footnote 7) in Greenland and for avoiding its possible detrimental effect on the Greenland economy, it might be necessary to import foreign workers.

In order to access the combined impact of the indirect and induced job creation that the project can generate, a so called 'job multiplier' is used. The job multiplier describes how many additional jobs are expected to be created, based on the direct employment at a project. Several empirical analyses have been carried out post implementation of mining projects to determine the job multiplier.

Statistics Greenland has developed an input-output model based on the Greenlandic economy in 2013[8]. The analysis finds that when the supply from the mining sector increases by DKK 1 million, it will lead to an indirect increase in overall employment of 0.6 person.

A recent study analysing the job multipliers of mining projects in Northern Sweden finds that the job multiplier is 0.85 when addressing only nearby mining municipalities[9]. This means that if 10 direct jobs are created in the mining sector an additional 8.5 jobs are created in the rest of the municipality. The study, however, does not find a significant job multiplier when looking at a broader geographical scope, where no mining industry is established. Experiences from Canada and Alaska has found multiplier effects for employment of 0.6 to 1.2 in the mining sector.

However, as Greenland has limited domestic production of the goods necessary to run a mine, a significant share of these goods will therefore have to be imported. The multiplier factor is therefore expected to be lower in Greenland.

By using a conservative job multiplier of 0.2[10] the indirect and induced job creation from employing 175 people is 35 people in Greenland.

[8] Statistics Greenland (2017): Input-output tabel for 2013.
[9] Moritz et al. (2017): The local employment impacts of mining: an econometric analysis of job multipliers in northern Sweden
[10] Same multiplier as used in the SIA for Ironbark Zinc project

Barriers to obtaining induced and indirect jobs

- It can be seen as easier and/or cheaper to hire large, international, companies to provide goods and service packages that include numerous services. If such large service contracts are tendered, it is unlikely that Greenlandic companies will be technically and commercially competitive, leading to a low indirect job creation.
- The location of the mine will be a barrier for small companies from outside the local area to provide services to the mine.

Initiatives to obtain and increase the indirect and induced job effects:

- The creation of indirect jobs in Greenland is dependent on how much of the supplies to the mine that are sourced locally. A tender procedure will be established so it can be assessed when Greenland enterprises will be commercial and technical competitive. The more competitive Greenland enterprises are, the more indirect job creation is expected.
- When possible, procurement and contract packages for goods and services should be prepared in a way that makes it possible for Greenlandic companies to bid on the contract.
- When possible and competitive, activities related to transportation of goods and staff should be outsourced to local companies.
- Close dialogue to local transportation providers should be established to discuss local opportunities and challenges (Air Greenland and Royal Arctic Line).
- Close dialogue with Tele-POST to clarify and establish the necessary communication services for the project.
- When outsourcing services (potentially carpentry, engineering, electricity work, IT services, cleaning, catering, laundry and similar), Greenlandic companies should be invited to bid on the contract.
- When outsourcing larger service contracts, it can be set as a requirement that some goods/services are purchased in Greenland.
- Local hunters could supply local meat to the camp.
- A forum can be established with the local business council, regional and national authorities and GE (Greenland Business Association) to discuss potential tender processes, with the purpose of ensuring that also Greenlandic companies are targeted.

Assessment

During the construction phase it is expected that most of the construction materials will be purchased from outside Greenland. It is, however, expected that some Greenlandic services and potentially contractors will be used to assemble the plant and provide services at the camp during construction.

During operation there are possibilities for small or medium scale companies, as well as Greenlandic transportation companies, to provide services to the project. At the closure phase, the companies that have serviced the operation, will no longer have to provide the service, and the impact on induced and indirect jobs will therefore be negative.

The project is expected to increase personal income in Greenland, which will again increase demand for services and goods. This income of employees are expected to support the creation of induced jobs.

Table 5.7: Impact Assessment Induced and indirect jobs in Greenland

Creation of indirect and induced jobs in Greenland		
Short description: Besides the direct employment opportunities that will be created due to the project, the project can create indirect and induced jobs.		
Baseline status that will be impacted: In Qaanaaq there are two private carpenters (Kim Petersen and Kim Fritze) and one water and sanitation company (Morten Jepsen). The Qaqortoq based Qaqortoq Contractors are contracted to build the breakwater structure in Qaanaaq (2018-2020), and therefore also work in the area.		
Geographical impact: The project can impact the indirect and induced employment at local, regional and national level. The impact is dependent on which companies are subcontracted and the hometown of employees. It is expected that the project can increase employment and overall income in Qaanaaq, and therefore potentially lead to induced job creation in Qaanaaq. Indirect job creation will not be geographically limited to local or regional level, as it is expected that potential contracts with Greenlandic companies can be companies from all over Greenland.		
Who will be impacted? Companies that will provide services to the mine will potentially have to hire more employees. Local businesses and service providers in Qaanaaq might potentially experience increased demand for goods and services and overall income in Qaanaaq increases.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Positive – medium impact	**Positive – medium impact**	**Negative – medium impact**
Likelihood: Possible *Severity: minor*	*Likelihood: Possible* *Severity: moderate*	*Likelihood: possible* *Severity: Moderate*

5.2.3 Cumulative impacts (related to jobs)

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project or activity when added to other existing, planned and/or reasonable anticipated future ones[11]. For the ilmenite Project, and mining projects in Greenland in general, the recruitment of local staff can lead to cumulative impacts.

If the Ilmenite Project materialises, the project will have to compete with other mining projects and sectors for local employees. This includes two areas of expertise:

- Skilled mineworkers who can be employed at other mining or exploration projects.
- Unskilled and skilled workers who can work at the mine, but could also fill jobs in other sectors.

[11] IFC (2013): Good practise handbook: Cumulative Impact Assessment and Management - Guidance for the Private Sector in Emerging Markets

In the 2018 annual report from the Economic Council of Greenland, the council writes that: "*There is a large shortage of labor within both specialized and unskilled job functions, and the need for recruiting foreign labor is large and growing. In the current situation, therefore, unemployment has reached its structural level and further lasting reduction in unemployment will require structural improvements in the labor market*.[12]"

For both the mining and construction sector the number of jobs is expected to increase in the coming years, leading to a shortage of workers and a related increased competition for workers. This can potentially result in a "Dutch disease" (see footnote 7) in Greenland and for avoiding its possible detrimental effect on the Greenland economy, it might be necessary to hire foreign workers.

Mining sector

As of today's date there are two operating mines in Greenland

- Greenland Ruby Aappaluttoq (Qeqertarsuatsiaat), approximately 37 employees.
- Anorthosite (Naajat) project operated by Hudson Resources Inc., approximately 34 employees.

Furthermore, exploitation licences have been granted to the Ironbark Zinc project located in the far North-Eastern part of Greenland, and the large scale Isua Iron Ore project north-east of Nuuk. The large scale Kvanefjeld project and the Tanbreez project in Southern Greenland are both planning to submit their applications for a mining license in the near future.

The mining school has informed that graduates from the school have all found employment within a short time after graduation, indicating that there already is a demand for graduates.

With more mining projects starting to operate in Greenland, the sector will experience an increase in number of job opportunities. This can lead to a situation, where demand for employees exceeds the supply and consequently, a larger share of the employees in the sector will be foreign. At the same time, increased competition for the potential local employees, can lead to higher salaries, and a higher turnover of staff. For avoiding a resource boom effect on the Greenland economy it might be necessary to import foreign construction workers.

The Ilmenite Project is a 'simple project' in terms of mining technology. This means that there will be a relatively high share of positions for unskilled workers. These workers can obtain practical experience at the project, and be better qualified for potential future mining projects in Greenland. This constitutes a positive cumulative effect, if the sector grows in the future.

Cumulative impacts on other sectors (building and construction)

The unemployment in Greenland is currently low, especially when looking at people with a vocational training. Furthermore, a number of large scale infrastructure projects are planned to take place within the coming years, this includes the construction of larger airports in Nuuk and Ilulissat and the construction of a new airport in Qaqortoq.

Several stakeholders point towards the fact that scarcity of skilled workers will mean that the labour market will be under substantial pressure, both leading to a

[12] Economic Council of Greenland (2018). Economy of Greenland 2018.

high influx of foreign workers, and also that the potential salaries and conditions that can be offered by larger companies will make it difficult for small employers and employees located outside the major cities to attract and retain workers.

This also means that the general economic growth and activity in Greenland will make it more difficult to attract Greenlandic workers to the Ilmenite Project.

At a local level, the project might also impact the overall skill level of the people who work in Qaanaaq and the settlements, if the people with the most skills in the communities start to work at the project and stop working in the local community.

Initiatives to improve positive cumulative impacts and decrease negative cumulative impacts

- There should be a focus on employing people who are currently outside the labour market. This should happen in a cooperation between authorities, educational institutions and the company.
- There should be a focus on providing targeted training to unskilled employees, so they can fill the open positions and obtain documented qualifications for work on other future mining projects.

Assessment

The impact is assessed to be negative as increased competition for local workers can lead to a relatively higher share of international workers, given the limited size of the domestic workforce and the currently low unemployment.

However, the number of jobs on the Ilmenite Project is relatively low, so the cumulative impacts of the project will – all other things being equal - be relatively small.

Table 5.8: Impact Assessment Cumulative impacts on the job market

Cumulative impacts on the job market		
Short description: In Greenland there is a lack of skilled workers and workers with experience from the mining sector. The project will increase the number of job positions, and the project will therefore compete with other projects for employees.		
Baseline status that will be impacted: The annual average unemployment rate in 2017 was 6.8 % in Greenland and 12.9 % in Qaanaaq. At a national level, the highest unemployment rate is for people who have finished primary school, but have no other education (11 %). For people who have taken targeted supplementary courses, the average unemployment rate was 0.9 %, and for people with a vocational education within engineering, manufacturing and construction the unemployment rate was 2.2 %. There are significant seasonal variations in the unemployment rate.		
Geographical scope: The impact will be seen at a national level.		
Who will be impacted: When the demand for employees exceeds supply, this will benefit employees, who will have more choices for potential employment and can be offered higher salaries or better work conditions. On the other hand, owners of construction and mining projects can potentially be forced to delay their projects, if there is no available workforce. This furthermore puts a high pressure on the labour market, when the number of construction projects are increasing. Use of foreign workers might benefit the general economy because the incoming foreign workers will prevent a shortage of construction workers and thereby prevent the Greenland economy for developing a "Dutch disease" (see footnote 7).		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Negative – low impact	Negative – low impact	Not relevant
Likelihood: Possible *Severity: Minor*	*Likelihood: Possible* *Severity: Minor*	*Not relevant*

5.2.4 Occupational health and safety and risk of accidents

The mining company will provide health and safety related training to all of its supervisors and workers. Occupational health and safety manuals and guidelines will be developed to the highest standards. All employees will continually undergo basic first-aid and safety managements courses and introductions. Health and safety assessments will be conducted daily and rehearsals will be conducted regularly. Selected employees will be offered relevant advanced courses e.g. in safety & health managements, healthy social & healthy psychological work environment, medical treatment& advanced first-aid[13] and courses towards

[13] Imarsiornermik Ilinniarfik (2018)https://maritim.gl/da/Kurser/Sygdomsbehandler-medicinkiste-B)

ensuring proper balance between work and private life. Other relevant advanced courses will also be considered.

A 'Health & Safety Organization' will be established. This organization will be responsible both for daily and general tasks related to health and safety at work. The members of the 'Health & Safety Organization' will be representatives of the employer, one or more health and safety representative and appointed work managers/representatives of specific functions. For specific functions in the operation at the ilmenite mine (e.g. mining, processing, storage, kitchen, workshops, etc.) specific Health & Safety Groups will be established.

Bluejay Mining PLC and its subsidiary Dundas Titanium A/S already operates under the highest standards for health and safety. Emergency Response Plans and contingency scenario training have been created and rehearsed for all active exploration camps and fields programs currently ongoing within Bluejay Mining PLC and its subsidiaries for the 2019 operational fields seasons.

Currently Bluejay Mining are revising the "BlueJay Mining PLC Occupational Health and Safety Manual" which is designed and tailored towards the current operational sites including Dundas Titanium A/S, which operates the Ilmenite Project[14]. This will be reassessed continuously during the lifespan of the entire operation to ensure that it is always improved and optimized – and to ensure that it is taking into account all conditions, functions and operations in the Ilmenite Project.

Dundas Titanium A/S' occupational health and safety (OHS) activities will include development of OHS policy, management system and practices. These policies have, however, not been developed at this stage of the project development.

The OHS policies will be built on national Greenlandic legislation and international best practise. ILO conventions describe the required work conditions for all workers. Furthermore, the national OHS legislation sets out special regulation related to the extraction industry. Relevant OHS legislation is described in appendix 2: Administrative and legal framework.

The risk for accidents is generally higher in the mining sector compared to other sectors, due to the work including heavy machinery. There is a potential risk of accidents during the construction, operation and closing phases of the mine, and the mining company must continuously work to minimise risks of accidents.

[14] The following documents have put in place in regards to the health and safety culture at Bluejay Mining PLC and its subsidiaries and can be seen on request:

- Bluejay Mining PLC Field Instructions and Standards Manual 2019
- Bluejay Mining PLC Dundas Titanium A/S ERP loading operation 2019
- Bluejay Mining PLC Dundas Titanium A/S ERP Moriusaq Ilmenite Project 2019
- The emergency response plans are for Bluejay Mining PLC subsidiary Dundas Titanium A/S Dundas Ilmenite Project for 2019 and a site specific emergency response plan at the Dundas Ilmenite Projects forthcoming loading and shipping operation

Health and safety management plan
A Health and Safety Management System (HSMS) will be established in line with international best practise. The HSMS is important to reduce risks of accidents. Key elements of a HSMS includes:

- Assessment of health and safety risks
- Development and implementation of health and safety controls and improvements
- Monitoring of health impacts and safety performance
- Corrective actions to address issues as they are identified
- Continuous review of procedures and plans to ensure continual improvement

The commitments outlined in the HSMS will provide a basis for Health and Safety Management Plans (HSMP). The HSMP will outline commitments and management measures for health and safety risks and feed into specific work procedures.

It will be ensured that all employees, contractors and sub-contractor adhere to the HSMS and work procedures.

Emergency management
A Site Emergency Response Plan will be developed, covering all potential safety, health and environmental emergency situations and the management of such situations. The development of the Emergency Response Plan and related procedures will use risk and probability analysis tools, and will include necessary contingency and required resources to adequately manage an emergency situation.

Initiatives to ensure good occupational health and reduce risks of accidents
OHS at the site must live up to the legal requirements in Greenland and international conventions. To further reduce the risk for accidents and obtain health and safety performance that aim towards zero harm, the following initiatives have been identified:

- Occupational Health Risk Assessments must be carried out and updated continuously. The assessment must be used to develop, implement and monitor a health and safety management plan that all staff at the site must adhere to.
- Training programmes for all staff on H&S and emergency response at the mine site, training programmes must be carried out in Greenlandic, English and potentially other languages for people not fluent in one of the two languages.
- Establishment of a health and safety committee with joint participation of management and workers, where workers help to monitor and advise on H&S programs at the mine site.
- Pre-notification of operations and traffic of vessels to relevant authorities.
- Contractual requirements on H&S to contractors regarding safety measures, response time, etc., in order to minimise risk of accidents, appropriate and timely response in case of accidents, emergency evacuation etc.
- Procedures for on-site handling of accidents, and clear procedures for emergency evacuations must be agreed with relevant authorities.

Assessment

There is a potential risk of accidents during the construction, operation and closing phases of the mine, mainly related to the operation of heavy machinery. The company must continuously work to minimise risks of accidents. However, in the unlikely event that a serious accident occurs this will have significant negative impact.

The long distance to large scale health facilities also makes up a risk, in case of large accidents involving numerous employees.

The project therefore has a negative impact on the risk of occupational health and safety compared to a no-production alternative. The impact is negative in all phases of the mine life.

Table 5.9: Impact Assessment Occupational health and safety

Occupational health and safety and risk of accidents		
Short description of impact: A mining operation is a workplace with occupational health and safety risks, due to the type of work with heavy machinery. It is therefore important that all employees have the adequate qualifications to operate the machinery that they are operating and that all employees receive safety training. At the same time, plans must continuously be developed to reduce the risk of accidents, and emergency management plans should at all times be updated, in case of accidents.		
Baseline status that will be impacted: None. There is currently no operation and production in the area.		
Geographical scope: Local. However, in case of larger accidents the project can impact the emergency response and hospitals at regional and/or national level.		
Who will be impacted?: Employees		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Negative – medium impact	Negative – medium impact	Negative – medium impact
Likelihood: Unlikely *Severity: Significant*	*Likelihood: Unlikely* *Severity: Significant*	*Likelihood: Unlikely* *Severity: Significant*

5.2.5 Labour conditions and health of employees

Labour conditions and employment terms

The labour market in Greenland is dominated by agreements between the labour unions and the employers' organisation. The labour force are largely organised and represented by SIK (Greenland workers union). Private employers are organised by GE and NUSUKA (Greenland employers' organisations).

There is currently no union agreement regarding work in the mining sector, but SIK informs that there is ongoing work to establish an agreement targeting the mining sector. The collective agreement on Construction workers, plumbing and heating 2019-2023 between Greenland Business Association (GE) and SIK will most likely apply during the construction phase The conditions for international workers must be the same as those for national workers.

The project will live up to national legislation and international guidelines regarding labour conditions.

Employment terms if Dundas Titanium A/S applies for a Large-Scale Licence

If Dundas Titanium A/S decides to apply for a large scale project licence, Dundas Titanium must ensure that foreign workers have terms of renumeration and employment and working conditions that are acceptable, objectively and fairly justified cf. Section 10a , No. 1 of the Large-Scale Project Act. In addition, Dundas Titanium must also ensure that during procurement, call for tenders and awarding or concluding construction agreement that the contracting parties comply with Section 10a, No. 1 of the Large-Scale Project Act cf. Section 10a of the Large-Scale Project Act.

Furthermore, foreign workers will earn vacation in accordance with provision in the Large-Project and not pursuant to The Greenland Parliament Act No. 10 of 12 November 2001 on Vacation.

Another aspect is that the licensee pursuant to the Large-Scale Project Act also has to ensure that the foreign workers leave Greenland, when they are no longer employed on the large-scale construction project.

Special conditions working and living at the mining site

As the employees will be living on site for six weeks at a time, the accommodation area will provide private bedrooms and access to recreational activities. The project is located in a very remote part of Greenland, and employees will not be able to leave the site during the six week on site.

There is a risk of cultural differences between employees, as they are expected to come from different parts of Greenland and the world. This can lead to social conflicts. It is therefore important that there is a focus on intercultural understanding among the management on site. Similarly, a zero tolerance to discrimination must be established.

It is expected that the mine will operate in at least two languages, Greenlandic and English. In this regard it is important that managers are aware that the inuit language in the Thule region is a different dialect compared to the rest of Greenland, and that the northern dialect can be used as a working language on site.

Recreational activities such as hunting and fishing is illegal without a license, and employees will therefore not be able to go hunting or fishing.

Concern of pollution at the mine area

There has been a concern that the sand at the site could potentially be polluted, due to its proximity to the Thule Air Base and the crash site from the B-52 flight crash in 1968 (for more information see appendix 3: Social Baseline).

This concern has been assessed in a number of studies, and no risks have been identified in the Moriusaq area. A new study was carried out in relation to the Ilmenite project by the Technical University of Denmark in 2019[15] (the study is attached to the EIA as an appendix). The study finds no indication of a health risk related to working on the project, and concludes that: "*Based on the results and*

[15] Roos, Per (2019): Assessment of risk from plutonium isotopes in connection with the proposed onshore mining activities at Moriusaq, Thule, Northwest Greenland

on previous findings in the area, there are no relevant needs to perform extensive monitoring during the proposed activities."

Initiatives/mitigation measures to minimise potential negative impacts on employees health

- An organised health screening process prior to employment. The health screening should also screen for contagious diseases that could spread to other employees at the mine.
- Dust and noise control on machinery, e.g. water sprays and noise inhibitors.
- Provision of personal dust protective equipment and noise protective equipment (e.g. dust masks, ear defenders, helmet).
- Monitoring of potential plutonium pollution or pollution from the Thule Air Base.

Initiatives/mitigation measures to reduce the risk of social conflicts on site

- Introductory sessions for all workers should include a section on intercultural understanding.
- International workers should be given an overview on Greenlandic culture as part of their introduction programme.
- It should be ensured that the camp accommodates the cultural needs of the different nationalities living at the camp.
- Established anti-bullying and anti-harassment policies in place, and procedures if employees are bullied or harassed

Assessment

Based on the isolation and location of the project and the related risks of contagious diseases spreading among employees, or mental illnesses related to the lack of daylight and harsh weather conditions, there is a risk of negative impacts on employees' general health. However, if preventive health screenings prior to employment, combined with health and life style campaigns amongst workers, are established, the risk is assessed to be insignificant.

Table 5.10: Impact Assessment Labour conditions and health of employees

Labour conditions and health of employees		
Short description of impact: The project will live up to Greenlandic legislation and international conventions on conditions and salaries. Working at a mine site can impact the health of employees, if the right protective equipment is not used. Furthermore, the location and remoteness of the project can impact mental health, if not taken into account.		
Baseline status that will be impacted: A study assessing the risk from plutonium isotopes has been carried out by the Technical University of Denmark, and the study finds no health related risks related to plutonium from working at the project[16].		
Geographical scope: Only relevant at the mine site. For the risk of contagious diseases that spread from employees to their families in their home community see section on public health.		
Who will be impacted?: Employees working at the mine site		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**

[16] Roos, Per (2019). *Assessment of risk from plutonium isotopes in connection with the proposed onshore mining activities at Moriusaq, Thule, Northwest Greenland.* Technical University of Denmark

Negative – insignificant impact *Likelihood: Unlikely* *Severity: Minor*	Negative – insignificant impact *Likelihood: Unlikely* *Severity: Minor*	Negative – insignificant impact *Likelihood: Unlikely* *Severity: Minor*

5.3 Education and training of Greenlandic workers

5.3.1 Development of competencies in the Greenlandic workforce

Greenlandic employees at the project will obtain new competencies and skills that can be used in other positions when the project is closed, or as a stepping stone to higher positions at the ilmenite mine or in other organisations/companies.

To obtain the largest possible Greenlandic workforce, expected mismatches between the competencies of potential workers and the required skills at the project must be removed. This will happen through training at the site and/or training of employees at the mining school or relevant courses in or outside Greenland.

The number of students completing vocational education, mid-range training and higher education has been increasing during the past decade, increasing the number of potential Greenlandic employees with formal skills.

Furthermore, the exploration for potential mines and the construction of the Aappaluttog Ruby Mine by Greenland Ruby A/S and The White Mountain (Qaqortorsuaq) Anorthosite Mine by Hudson Resources Inc. projects have led to an increase in 'available' national competences, even though the number of projects and possibilities for building competences in the sector are still limited.

A large share of the people who do not have formal education, still have informal skills that can be very useful in the workplace. For instance, hunters and fishermen, who are used to working in the climate and darkness in the region and who understand the environment, can become valuable workers.

In 2019 the Greenland School of Minerals & Petroleum, Dundas Titanium A/S and Majoriaq Qaanaaq carried out a machine operator course for 12 unskilled citizens in Qaanaaq. 30 people participated in the information course, and 26 people applied for the course. Course participants first have to take a driving license, thereafter they will receive one week of theoretical education in Qaanaaq and two weeks of practical training in Sisimiut. The course is financed by PKU, and students receive a salary while taking the course. The aim is to prepare the students for positions at for instance the Ilmenite Project[17].

The project will also offer jobs within other fields of expertise than extraction and processing of the black sand. For instance servicing of the camp (preparation of meals, cleaning, etc.), administration and shipping. Students and graduates from INULI in Southern Greenland and the Maritime Centre in Greenland (Imarsiornermik Ilinniarfik) will be relevant interns and employees within these fields.

[17]The mining schools information about the course is available at: https://www.kti.gl/da/om/Nyheder/kti-raastofskolen-maskinfoererkursus-i-qaanaaq

Initiatives to obtain and potentially increase skill upgrading of the Greenlandic workforce

- A Training Needs Assessment can be undertaken in cooperation with local authorities to ensure that the training opportunities provided benefit both Dundas Titanium A/S and the local business life, also for service-related and managerial positions.
- Pre-employment and on-the-job training programmes for the operation phase must be developed as early as possible, and preferably during the construction phase.
- Pre-employment and on-the-job training programmes should be developed in cooperation with local authorities, educational institutions and labour market organisations
- A continuous dialogue with educational institutions (especially the mining school) on how internships and training programs can be carried out in cooperation with the institutions must be initiated. It is suggested that a quarterly meeting between the mining school and the project is planned throughout the project's construction phase, to ensure that the school is aware of the future demand for skills.
- There must be a focus on continuously upgrading employees at all levels, in order to retain and develop employees.
- The company must offer apprenticeships within different fields of work, e.g. processing, management etc.

Assessment

The impact from training and education of employees and potential employees is positive. The extent of the impact is dependent on how many people complete internal and external training programmes in relation to their work on the project, and the number of internships offered by the company.

The impact is assessed to be positive during construction and operation. This is most significant during operation, where a higher share of Greenlandic employees are expected to be working at the mine, and where employees can gain experience over several years of work. The impacts are also assessed to be positive, but with little significance during the closure phase.

Table 5.11: Impact Assessment Development of competencies in the Greenlandic workforce

Development of competencies in the Greenlandic workforce		
Short description of impacts: Education and training of employees will lead to an increased number of formal skills in the mining sector among the project employees.		
Baseline status that will be impacted: Vocational education and training is provided by Tech College Greenland (KTI), which offers educations in Sisimiut and Nuuk. The Mining School is part of KTI, and is based in Sisimiut. There is a relatively small number of Greenlandic people with significant experience from the mining sector.		
Geographical scope: The impact will be seen in the locations where employees are living. It is expected that the impact will mainly be seen at local and regional level, as most Greenlandic employees are expected to be living in the Municipality of Avannaata.		
Who will be impacted?: Employees who gain experience (and potential training) while working at the mine.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**

Positive – low impact	Positive – high impact	Positive – insignificant impact
Likelihood: Possible *Severity: Minor*	*Likelihood: Likely* *Severity: Moderate*	*Likelihood: Unlikely* *Severity: Minor*

5.4 Greenlandic enterprises

5.4.1 Business opportunities for Greenlandic enterprises

The project will contract companies to do work that they cannot do internally at a competitive price, or that they do not have the skills to do. A company can for instance choose to outsource shipping, transport of employees, engineering, construction, supply of food, catering, cleaning, provision of fuel, electricity work and many other goods and services.

At this stage, it is not clear which goods and services will be organised within the project organisation, and which goods and services will be contracted to an external supplier.

In compliance with Section 18 (2) of the Mineral Resources Act procurement and contract package for infrastructure components, equipment, goods and services will be issued to Greenlandic bidders. Pre-qualified international bidders may be used if Greenland enterprises are not technically or commercially competitive.

Much of the necessary specialised goods and equipment for a mining operation cannot be produced in Greenland, and therefore it will be imported to Greenland.

The infrastructure facilities, including the dry as well as the wet processing plants, which Dundas Titanium A/S will install at the mine site (See Section 4.3.2. and Section 4.3.2 above) are in a technical sense very complicated facilities. Due to the fact that both the ruby mine at Aappaluttoq and Hudson Greenland's mine at Naajat/Qaqortorsuaq have bought their processing facilities abroad from non-Greenlandic enterprises, it is assessed that Greenland Enterprises will not be able to construct the dry and the wet processing plants independently of foreign companies. However, for the benefit of ensuring that both plants fulfil the technical requirements, which will be set by MLSA, Dundas Titanium A/S will encourage the foreign contractors to engage in a partnership with a local company, which can give technical guidance to the contractor in relation to fulfilling the requirements set by the mineral resource authority. Most likely, the technical requirements set by the MLSA will state that most technical installations need to be CE marked or approved by the Greenland Electricity Authority.

Furthermore, to construct the wet and the dry processing plants, which are some of the most expensive parts of the project facilities, requires a large financial capacity. Based on that numbers of construction companies in Greenland, which have a total payroll above 10M DKK (see Table 5.12) are around 20, it is assessed that the required financial capacity for constructing infrastructure facilities including the wet and dry processing plants could be a challenge for Greenlandic construction companies. The processing plants are not the only sophisticated components in the infrastructure in the operation; conveyor systems, haul-transport systems, ship-loading facilities, very large storage-facilities and module-based systems for accommodation, workshops and offices are all specialized facilities.

Table 5.12: Greenlandic Construction companies with a total payroll above 10M DKK

Source: Statistics Greenland

Greenlandic Construction companies with a total payroll above 10M DKK		
2015	**2016**	**2017**
18	19	22

Based on the above and on that the total CAPEX for the Ilmenite Project is on almost 1,700M DKK, it is assessed that the Ilmenite Project during construction fulfils the requirement for being considered a large-scale project pursuant to Section 6 (1), no. 3 of the Large-Scale Project Act.

However, in Greenland there are companies and operators who can provide services to the operation of the mine. For instance, there are Greenlandic companies who can provide services within air transport, shipping, construction work, supply of arctic diesel, normal site and maintenance work, supply of traditional food and goods, catering, cleaning, administrative and other support services etc.

In Qaanaaq there are only a small number of private businesses. This includes the fish factory with up to 20 employees in the high season, two carpenters and one plumbing company with 1-5 employees and a small hotel. 82 people in Qaanaaq and the settlements are professional hunters. It is therefore not possible for companies in Qaanaaq to tender for large service contracts that require many employees and a lot of equipment. Due to the proximity to the project, it could still be beneficial for the project to hire short-term contractors from Qaanaaq for maintenance work that cannot be done by full time employees.

Royal Arctic Line, Air Greenland, KNI Engros and Polaroil all service Qaanaaq and the settlements. The logistics of servicing the project should therefore be possible for these companies.

Transportation of ilmenite, equipment and personnel
The ilmenite products will be stored on site, and shipped from the site to a location with smelter facilities. The end-location of this is not known, as the buyers of the ilmenite products are not known at this stage of the project's development.

Personnel is expected to be flying directly to the site by chartered flights from a hub in Greenland. Most likely there will be one weekly flight from the hub to the site, for shifting of personnel.

Initiatives to increase the involvement of Greenlandic enterprises:

- For the benefit of securing documentation in accordance with Section 18 (2) of the Mineral Resource Act, procurement and contract packages for goods and services should be prepared and issued to the pre-qualified and approved bidders in Greenland as well as overseas.
- Activities related to the transportation of goods and staff can be outsourced. Where possible and competitive, local businesses can provide these services (Air Greenland and Royal Arctic Line).
- Servicing of the camp will be tendered. Such services include catering services, cleaning, laundry and similar tasks. There will be a number of local services provided for the mine such as carpenters, engineers, electricians and IT services.
- Close dialogue with local transportation providers will be established to discuss local opportunities and challenges (Air Greenland, Royal Arctic Line).
- Close dialogue with local fuel providers (such as Polaroil) will be established to discuss local opportunities and challenges. Special attention will be given to the type of fuel and opportunities for transportation of fuel to the location.
- Close dialogue with KNAPK in order to organise provision of local food to the camp.

- Establishment of a forum with business council. This forum will be used before and during the tender process to provide information and clarification of the tenders.
- Establishing a tender procedure as method for documenting when Greenland enterprises are technically and commercially non-competitive.
- The ability to respect and fulfil the conditions described in this SIA will be an important criteria for the pre-qualification of the companies.

Assessment
The project's impact on Greenlandic businesses is assessed to be positive. The extend of outsourcing is not known at this stage of the project development. It is however expected that Greenlandic companies will bid for contracts for services and work during both the construction and operation phases.

During operation it is possible for small or medium scale companies, as well as Greenlandic transportation companies, to provide services to the project.
In the closure phase, the companies that have serviced the operation, will no longer have to provide the service, and the impact on induced and indirect jobs will therefore be negative.

Table 5.13: Impact Assessment Business opportunities for Greenlandic enterprises

Greenlandic enterprises		
Short description of impact: The mining project will need to supply equipment and services to operate the mine. Greenlandic companies will have a possibility to provide these goods and services		
Baseline status that will be impacted: In Qaanaaq there are two private carpenter companies and one plumbing company with 1-5 employee. 82 people in Qaanaaq and the settlements are professional hunters. Royal Arctic Line, Air Greenland, KNI Engros and Polaroil all service Qaanaaq and the settlements. The logistics of servicing the project should therefore be possible for these companies.		
Geographical scope: National: The project can supply equipment, works and services from Greenlandic companies across Greenland.		
Who will be impacted?: The companies who are awarded contracts to service the project.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Positive – medium impact	Positive – medium impact	Negative – medium impact
Likelihood: Possible *Severity: Moderate*	*Likelihood: possible* *Severity: Moderate*	*Likelihood: Possible* *Severity: Moderate*

5.5 Public revenue

5.5.1 Royalties and taxes

If the project materialises, it is expected to create a positive public gross revenue. Public revenue will be achieved through income taxes, corporate taxes and royalties.

Corporate taxes and royalties
Dundas Titanium A/S will pay 2.5 % in royalties. This means that 2.5 % of the sales price of the ilmenite will be paid to Greenland at the time of export.

The corporate tax rate is 30 %. Corporate tax is paid from the company profits. Royalties are subtracted from the corporate tax payments

Table 5.14: Calculated public revenues with a ten year and 15 year operation phase. Total amounts. Applied exchange rate: USD1 = DKK 6.65

Source: Pre-feasibility study.

Income stream	Calculated amount, 10 years of operation	Calculated amount, 15 years of operation
Royalties	DKK 153.5 million	DKK 254.7 million
Corporate taxes	DKK 193.1 million	DKK 333.0 million

The expected payment of taxes and royalties are calculated in the company's pre-feasibility study and based on the best estimates for costs and sales prices available at this stage[18].

Income taxes

In the pre-feasibility study, the expected positions and related salaries are listed for the operation phase.

The tax rate for national employees is between 42 % and 44 % dependent on the municipality and an annual personal tax deduction of DKK 58,000. In the municipality of Avannaata the income tax rate is 44 %[19]. International employees pay 35 % tax on all income.[20]

As described in section 5.2.1, the aim of Dundas Titanium A/S is to employ as high a share of Greenlandic workers as possible.

In Table 5.15 income taxes are calculated for three scenarios, dependent on the composition of the employees on national and international workers. The scenario with 100 % international employees is seen as unrealistic, but is included to calculate the potential lowest income tax generation. The calculations are based on the positions and salaries that are included as costs in the pre-feasibility study.

Table 5.15: Income tax generation with three scenarios of combination between Greenlandic and international workers. Calculation is based on costs related to salaries in the pre-feasibility study for the project.

Scenario	Annual income tax during operation
100 % international employees	DKK 24.6 million/year
50 % Greenlandic employees and 50 % international employees	DKK 25.6 million/year
100 % Greenlandic employees	DKK 26.6 million/year

[18] During the construction phase no ilmenite is currently planned to be mined and exported. Therefore, no royalties are paid during this phase. Similarly, Dundas Titanium does not expect any revenue streams during construction and thus no corporate tax is expected paid during the construction phase. However, public revenues in the form of corporate taxes could be generated from the companies contracted to contribute to the construction phase.

[19] Tax Agency of Greenland (2017): Https://aka.gl//~/media/Skattestyrelsen/Meddelelser%20fra%202008/Nr%20110%20Udskrivningspcter%202018.pdf

[20] However, unlike Greenlandic employees international employees do not have any options to make standard deductions in their taxable income.

The income tax generated during the construction phase is difficult to estimate at this stage of planning. The number of people taking part in the construction work depends on several factors and in particular on the detailed planning of the mining infrastructure as well as the construction work itself. Another important factor is the weather and climate conditions: Outside construction work on-site is likely not possible for more than 4-5 months per year[21]. Yet another factor determining the number of people engaged in the construction work is the character of the construction: Assembling modular infrastructure on-site is less labour-intensive than full construction on-site. Finally, the different stages of the construction require a varying number of workers.

Most of the components assembled in the construction process are tendered out. Consequently, the income tax generated during construction also depends on the proposals and specific solutions suggested by sub-contractors, their work-estimates and pricing.

If modular infrastructure is assembled on-site, the generated income tax will also depend on the proportion of modular components manufactured in Greenland against the proportion of components imported to Greenland. The extend of local production of modular components typically depends on the country-of-origin of sub-contractors. If the sub-contractors are based outside Greenland, they are more likely to use their overseas production sites for the manufacture of components.

In the pre-feasibility study, it is estimated that up to 270 people can be engaged during the construction phase. It must be noted that this estimate is the maximum number of people working during the most busy part of the construction phase and it is to be regarded as the highest peak employment during the construction phase. The average number of workers involved in the construction phase over time will be considerable lower. As mentioned previously, the number of people working on the construction of the mining infrastructure will vary according to seasonal weather conditions, stages in construction, character of construction, etc.

Because of the above outlined complexities and uncertainties only a rough preliminary estimate of the income tax generated during the construction phase is provided. In the following, an average tax revenue per employee similar to the estimated tax revenue per employee during the operation phase forms the basis of the rough and very preliminary estimated range of income tax generated during construction. Furthermore, it is assumed that an average of 135 persons per month are engaged in the construction - both on-site and off-site. Under these assumptions, the estimated income tax from 135 persons is approximately 1.7 million DKK per month.

Assuming 405 man-months of construction in Greenland per year, which is a low estimate representing 3 months of construction on-site for 135 workers per year, the income tax would be 10.2 million DKK over two years. Similarly, assuming 1,620 man-months of construction in Greenland per year, which is a high estimate

[21] The work-period for the construction phase (4-5 months per year) is different from the production phase (12 months per year). Construction work can be carried out 4-5 months of the year. The climate is too harsh for outside construction work the remaining part year and before infrastructure have been established it will not be possible to operate all year. Also, the character of the outside construction work and the outside production work (under the mine production) is completely different. Almost all of the outside work during the production phase will happen from shelter workplaces in machinery. During the construction phase the working conditions are completely different and the workers will be directly exposed to the harsh climate at Dundas.

representing 12 months of construction in Greenland for 135 workers per year, the estimated income tax is 40.8 million DKK over two years.

It is important to notice, that the provided rough and very preliminary range of income tax generated during the construction phase estimated between 10.2 million and 40.8 million DKK over two years is associated with a high degree of uncertainty at this stage of planning.

Mitigation measures
The company will each year disclose the total of income to the Greenlandic treasury generated from paid income taxes. No mitigation measures are listed for this impact, as taxes and royalties will be generated according to current legislation.

Assessment
The project will generate public revenue through taxes and royalties.

During the operation phase, where the ilmenite product is being sold and the project is generating a profit, the impact on public revenue is assessed to be positive and significant.

During construction and closure phases employees will pay income taxes. The impact is assessed to be positive with medium impact in the construction phase, and positive with low impact in the closure phase.

Table 5.16: Impact Assessment Public revenue

Public revenue		
Short description of impact: The project will generate public revenue in terms of royalties, corporate taxes and income taxes.		
Baseline status that will be impacted: Without the project, the calculated public revenues will not be generated		
Geographical scope: National level. For Greenlandic workers, part of the income taxes will be paid at municipal level.		
Who will be impacted?: Public revenues are used to provide public services, and therefore the public revenues will benefit the people of Greenland.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Positive – medium impact	Positive – high impact	Positive – low impact
Likelihood: Likely *Severity: Minor*	*Likelihood: Likely* *Severity: Moderate*	*Likelihood: Likely* *Severity: Insignificant*

5.6 Other socio-economic and sustainability matters

5.6.1 Pressure on the public sector, infrastructure and services

The project is located in an isolated part of Greenland, the closest town being Qaanaaq 80 km North of the license area.

Even though Moriusaq is located at the site, there is no existing infrastructure besides an old helipad in the license area.

Generally, there is a large pressure on the public services in Greenland, and especially in the Municipality of Avannaata Kommunia. The public services includes, amongst other things, health service, public administration, public institutions (schools, childcare and elderly care etc.), public housing and provision of social benefits.

The public sector is under pressure due to a decrease in public income and at the same time an increase in public expenditure following an increased demand of services. The pressure is expected to increase in the future due to the demographic profile of Greenland where a larger share of the population will be dependent on public services.

The following infrastructure and services can be impacted by the project:

- Flight services
- Freight services
- Telecommunication
- Supervision authorities (OHS inspection, environmental inspection etc.)
- Police
- Greenland custom services and Danish Immigration services
- Health services
- Power and water supply

Each point is described below.

Flight services

There is an airport in Qaanaaq and also helicopter connections to the settlements and Thule airbase. Air Greenland has one weekly flight to Qaanaaq from Ilulissat.

This section demonstrates, describes and assess the direct and indirect impacts of the project on the flight service and the related social conditions in the area. It also describes the interaction between the conditions, mutual impact between the conditions and cumulative effects of impacts on the conditions.

The project is expected to charter flights (flights chartered by Dundas Titanium A/S besides scheduled regular flights available for the public). These chartered flights will transport employees to the mining site via the airstrip that will be established at the mine. These flights will fly from and to a central transport hub in Greenland. The hub could for instance be in Kangerlussuaq or Ilulissat. Ilulissat will be suitable when the runway is extended in 2023 so that it can be used for international flights. Consequently, as most of the flights related to the project will be by chartered flights, regular scheduled flights to the region and Qaanaaq which are available for the public will not be affected by the transport of employees to/from the mine. Dundas Titanium A/S might consider including Qaanaaq in the routes of the chartered flights to/from the mining site in order to transport local

workforce from the region. An alternative or supplement to this solution might be to transport local employees by boat to/from Qaanaaq. The specific routes will be planned in cooperation with the relevant authorities and take into account the specific regulations around the Thule Air Base.

During the production phase of the project approximately 120 employees will be on the site at any time. It is expected that employees will work and stay on the site for six weeks at a time. If employees are replaced on a weekly basis, this means that approximately 20 people will arrive to the site per week, and approximately 20 people will leave weekly. This means that one Dash-8 flight (or similar size airplane) will be needed per week. As outlined above, the employees are expected to arrive directly to the mining site on chartered flights. Some of these employees will be living in Qaanaaq or the settlements and will therefore not be flying out of the region.

During the construction phase of the project the workers will likewise primarily be transported by chartered flights. Consequently, this will not affect the capacity of the scheduled regular flights available for the public. In the top peak period of the construction phase in the mid-summer it is estimated that up to 270 workers will be on site. This maximum of 270 workers is unlikely during the first year of construction when accommodation and infrastructure is not yet established for the peak period. Also, it is worth noticing that the number of workers during the peak period is a high estimate which most likely will decrease when detailed planning is done. Outside the peak period, but still outside the winter period, there will be estimated up to 100 workers on site during construction. During the winter period this will fall to between 0 to 25 workers on site. The rotation of workers during the construction phase is anticipated to be much longer than under the production phase – it will be like an exploration phase were workers often will be on site for 2 to 5-6 months before returning home. Consequently, in the start-up of the construction phase it is anticipated that approximately a maximum of 10 flights with a Dash-8 are needed monthly. When workers return a similar number of flights will be needed but over a longer period of time, probably 2-6 months.

The flights chartered during the construction period will make use of Qaanaaq Airport until the airstrip at the mining site is established and approved by the authorities. Transport between Qaanaaq and the construction site at Moriusaq will most likely be by helicopters chartered by Dundas Titanium A/S. Transportation by boat will be considered and evaluated as an alternative to the helicopters. It will also be evaluated whether it is possible and feasible to transport larger groups of workers from other parts of Greenland by ship – potentially ships carrying material needed for the construction of the site.

Dundas Titanium A/S will consider whether non-used seats on the chartered flights to the mining site can be made publicly available in cooperation with the subcontractor that are providing the flights. It will also be considered whether Qaanaaq could be included in the flight-routes that are servicing the mining site. This would lead to an increase in the availability of flight seats for the public in North-West Greenland. Also, in case some employees need to be flown in on chartered flight from/to Nunavut and/or North-Eastern Canada this would potentially provide an opportunity for sustaining a route between North-West Greenland and North-East Canada. Ilmenite from the Project at Moriusaq will similarly look into whether it is possible to make the potentially non-used seats on this route available to the public.

As Dundas Titanium A/S will charter in flights for most of its need during both the construction and production phase – and since flights will happen to/from the airstrip established at the mine site there will be very limited pressure on commercial flights to the region and the flight services servicing the mine is not expected to have an negative impact on society.

On the contrary the project could lead to an additional capacity to/from North-West Greenland, because the non-used seats on the flights chartered by Dundas Titanium A/S might be made available to the public .

Several stakeholders have pointed out that it would have a positive impact on Qaanaaq if the project used the airport in Qaanaaq as an entry point, instead of building its own airstrip. For instance, this would lead to more weekly flights to and from Qaanaaq. Furthermore, the related infrastructure would create business opportunities in Qaanaaq (accommodation in Qaanaaq if flights are cancelled and potentially transport to/from Moriusaq). The mining company has designed the project with an airstrip on site to minimize costs, as there are regular delays in the current service to Qaanaaq. It is a substantial risk, that even though the employees arrive in Qaanaaq, weather will not permit the transfer to Moriusaq. However, it will be evaluated from a practical and economic point of view how transport of local employees can be undertaken most efficiently at various time of the year. This will also include an evaluation of making stops in Qaanaaq when en route to the mine site to pick-up or drop off local employees.

Freight services
Both Qaanaaq and the settlements are serviced twice a year by a cargo vessel from Royal Arctic Line (RAL). Furthermore, fuel is shipped to Qaanaaq and the settlements once a year.

During the exploration phase, RAL has also assisted the project with transportation of machinery and materials.

It has been raised as a concern from a stakeholder from Qaanaaq that the project might be given priority compared to smaller businesses in Qaanaaq. This concern has been raised, as RAL has informed that the first ship to arrive in Qaanaaq in the spring 2019 will depart Denmark two days prior to the planned departure date. The reason for the earlier departure, and longer travel time, is that the ship will have an extra stop on route in Moriusaq.

It is key to the project's cooperation with the local community that the project does not negatively impact services to the local community. RAL is, however, bound by contract to service Qaanaaq.

If the project uses RAL for transport of goods during the operation phase, it can potentially mean that the amount of goods to be transported to the area increases, and this can potentially have a positive impact on the local community, if the number of annual shipments increases.

Telecommunication
The telecommunication provider TELE Greenland A/S (TELE-POST) is responsible for providing telecommunications, IT and postal services to all of Greenland, including the towns, settlements and other users in Northern Greenland.

According to TELE-POST, the current telecommunication capacity in the area is limited and expensive[22].

This section gives a detailed description of the present telecommunication capacity, the direct and indirect impact of the project and the solutions Dundas Titanium A/S offer to improve the telecommunication capacity in the area.

Before Dundas Titanium A/S carried out the exploration there was no mobile phone or other telecommunication coverage in the area at Moriusaq.

During the exploration phase Dundas Titanium A/S has established a link to the public telecommunication infrastructure which is established at Pittuffik (at the Thule Air Base, 40-45 km east of Moriusaq). By doing this the company has established a mobile phone coverage at and in the vicinity of Moriusaq. Furthermore, a data link has been established by the company and the workers participating in the exploration phase have been given a regulated amount of data-traffic for personal use. The data-link was established through a connection (micro-wave link at 8-9 magabit per second up- and download) to the public telecommunication infrastructure which is established at Pituffik.

The telecommunication to towns, settlements and other users in North-West Greenland is, in its current setup, served by a satellite connection. In this setup, only a limited telecommunication capacity is available for all users in the region. It is therefore of greatest importance for Dundas Titanium A/S that the capacity to public in towns and settlements are not negatively impacted by the mining operation.

Multiple communication systems for both voice and data will be required for the Ilmenite Project. Internal data and voice traffic for on-site voice and data communication will be in a closed network (two-way radio, VHF radios and fibre optic local network) that will be established by the mine operation at the site. This internal network will not affect the regions telecommunication or capacity – but it will provide a safety/emergency option for communication e.g. when locals are travelling through the area. Only external telecommunication from site, both voice- (phone) and data-traffic, could potentially affect telecommunication capacity in the region.

In the construction phase it is anticipated that Dundas Titanium A/S would need data-traffic in the order of 2550 gigabyte (Gb) per month[23] in the period during the mid-summer (if is assumed to be 270 workers on-site; the peak of 270 workers is not likely in anytime during the first year of construction). Outside the peak period, but still outside the winter period will there be an estimated up to 100 workers on site during construction – this would amount around 937 Gb. During the winter period this will fall to between 10-240 Gb per month[24] during

[22] See letter Tele-Post (2019) Kapacitetsudfordringer i telekommunikationen ved øget aktivitet i Moriusaq' letter from Allan Lynge, Tele Greenland A/S dated 20-09-2019

[23] This estimate is based on the following. Dundas Titanium A/S was assigning a fixed user amount of 69 Gb to 884 man-days on site in 2019. This means that one man-day in data traffic was 80 Mb per day. Additional data was used for business-related data-communication. Consequently, to make sure to include this use also have the above data amount multiplied by 4. This means that data traffic was 320 Mb per day per person/workers on-site. Dundas Titanium will use a similar scheme for data use during the construction phase. Is a similar amount used in the construction phase will data use per month in the highest peak be around 2550 Gb (320Mb × 270 workers × 30 days).

[24] 10 Gb per month is here assumed to be the absolute maximum for data-transfer from various sensors on-site – without any workers on-site.

the construction period (assuming a maximum of 0 to 25 workers will be on-site in this period when the basic infrastructure, services and accommodation have been established on-site – so this is unlikely in the first year/first winter-period of construction).

During production phase is it anticipated that the Dundas Titanium A/S would need data-traffic in the order of 4,150 to 8,300 gigabit (Gb) per month[25].

It should be noted that both during the construction and production phase Dundas Titanium A/S will establish a scheme of individual and private use of data and voice traffic for all workers on-site[26.] On the basis of this scheme each worker on-site will receive a regulated amount of free data-traffic for private use.

In the production phase workers in the ilmenite mining operation will be working on-site for six weeks. With 120 workers on-site during the production phase at the ilmenite mine operation the weekly total of data provided to workers will be 120 Gb (480 Gb per month). Like in the Aappaluttoq Ruby Mine operation it will be possible for workers to buy additional data-packages[27].

It is key issue for the telecommunication services of the Ilmenite Project that the demand for services are mapped, and that a dialogue about the needs is established prior to the construction phase of the project. Dundas Titanium A/S have already initiated this dialogue with TELE-POST on this.

For external telecommunication, both voice- (phone) and data-traffic, Dundas Titanium A/S is considering several solutions and measures which will ensure that telecommunication in North-West Greenland is not affected negatively by the operation.

Three solutions and mitigating measures are considered. These three scenarios are described below.

1. If Dundas Titanium A/S is using the current setup for telecommunication in the region without any means of limiting threshold on use there is a risk that the capacity for towns and settlements in the region would be negatively affected. Dundas Titanium A/S will mitigate this in several ways.

[25] The estimated need of data traffic is based on the current use in the Aappaluttoq Ruby Mine (based on 2019 use) per month provided to Dundas Titanium in email correspondence. The average data use in the Aappaluttoq Ruby Mine is 830 Gb per month (including all; both voice and data traffic and both personal - and business-related traffic through the network established at Aappaluttoq Ruby Mine). There are 24 persons at the Aappaluttoq Ruby Mine. Dundas Titanium will have 120 persons on-site in its production phase. This means that Dundas Titanium A/S needs 4,150 Gb per month. In case that this amount is increased because of the more extensive processing carried out by Dundas Titanium A/S is the estimated need stated as being between 4,150 to (double-up) 8,300 Gb per month.

[26] Dundas Titanium has been informed that at the Aappaluttoq Ruby Mine a user-scheme is in made for private data and voice traffic. On the basis of this scheme each workers on-site get 1 Gb of free data-traffic for private use for each 3 weeks on siteDundas Titanium A/S have been informed that the data use at the Aappaluttoq Ruby Mine is 830 Gb per month. This number use covers all data traffic; both business-related and privately used data by workers. This results in a weekly data use of ca 208 Gb. Since there are 24 workers on-site and these are supplied freely with 1 Gb of free data for private use over a 3-week period (so 1.33 Gb per month) it means that ca 32 Gb out of the 830 Gb per month is given to the workers for free private use.

[27] The Aappaluttoq Ruby Mine informs that only a minority of the workers are buying larger additional amounts of data. Consequently, it is estimated that somewhere between 480 Gb and, triple that amount, 1440 Gb of data will be used by workers on-site per month. Dundas Titanium A/S is aware of the tax implication of providing a certain amount of free data-traffic/telecommunication to its user and will take this into account.

For voice-communication (mobile phone coverage) in the vicinity of the mining site (linking up to the mobile phone link that Dundas Titanium A/S is in control of on-site) technical measures will control the numbers and the use of data (there will be a threshold on the amount of traffic). For data-communication a similar a technical measure will (controlled by the link that Dundas Titanium A/S is establishing on-site to network off-site) establish an overall limit on the amount of external data-traffic that Dundas Titanium A/S is using. Also, larger data transfers from the site will be regulated and managed so that it is carried out during public low-peak periods (e.g. at nights). This will ensure that Dundas Titanium A/S is not affecting the public telecommunication capacity negatively. Furthermore, the user-scheme that is established for workers on-site for free data for private use while on-site will enable Dundas Titanium A/S to control the use of data by its workers both during the construction and production phases.

Furthermore, as part of an interim solution before an increase in satellite capacity to the region have been established by TELE-POST in 2023 (see description of solution 2 here below), Dundas Titanium A/S has been informed that a temporary ground-station/-antenna for satellite communication can be established at Moriusaq (at a commercial prize) e.g. in year 2021. This alternative telecommunication capacity would give Dundas Titanium A/S full service and a significant alternative capacity which will not affect the capacity in the rest of North-West Greenland.

2. As already mentioned Dundas Titanium A/S has been in contact with TELE-POST about the future telecommunication setup and capacity and according to Tele-Post the current telecommunication capacity in the area is limited and expensive.

   Tele-Post reports that they have through some time been looking at the future satellite-based telecommunication in order to be able to cover remote areas better - including North-West Greenland. Tele-Post expects to make a major investment in the satellite-based telecommunication solutions in the remote areas over the next 3 years. This should lead to a considerable increase in the capacity available in the North-West Greenland region in 2023[28] (see also footnote). This means that demands from Dundas Titanium A/S in a timely manner can be taken into account. This timeframe is well-fitted with the Ilmenite project. Dundas Titanium A/S intend to start its two-year construction phase when it receives an exploitation permit from the Government of Greenland. The construction phase will need two summer periods before a full production can be initiated.

   The demand for telecommunication during the construction phase is lesser than under production. Regulation is only needed during the summer peak-period in voice and data demand from the site. The data-communication will be regulated for workers on-site (e.g. by giving each worker on-site a limit on the amount of communication units and data). Data-use will be closely monitored and will be regulated so that it is not affecting telecommunication capacities in towns and settlements in North-West Greenland. Also, as outlined in 'Solution 1', there will be technical measures and alternative systems for telecommunication which can be

[28] Tele Greenland A/S News - 15/01/2020 Tele Greenland Bedre internet til satellitområder – see https://telepost.gl/da/nyheder/tele-greenland-bedre-internet-til-satellitomraader.

used to control the use of data-traffic as well as provide alternative means of telecommunication. This will ensure that the general telecommunication capacity in North-West Greenland is not affected by the project.

After two-years (two summer periods) of construction demand for telecommunication at the mining site will increase as the project enter the production phase. This will fit well with the improved telecommunication infrastructure and increased capacity in the region anticipated by Tele-Post Greenland in 2023 (see note 22). Furthermore, Tele-Post states that within this time-frame they can incorporate the needs of Dundas Titanium A/S in future solutions and increase the capacity.

It should be noted that Tele-Post points out, that Dundas Titanium A/S as a business, will be charged for the capacity-related expenses associated with the use of telecommunication. This means that the Ilmenite project will contribute to the development and increased capacity of future telecommunication in North-West Greenland.

3. In the unlikely event that Tele-Post Greenland is not increasing the telecommunication capacity as anticipated and outlined in the response to Dundas Titanium A/S the mining company will use alternative telecommunication systems ensuring that the telecommunication in the region will not be affected negatively.

   This mitigation could be established through independent systems for telecommunications e.g. by use of the new satellite systems which increasingly have been introduced to the market and which over the next years will provide viable systems for telecommunication via satellite connection (an alternative satellite systems to the one that currently are servicing North-West Greenland through TELE-POST).

   Telecommunication infrastructure in the arctic was reviewed by a report published by the Arctic Council in 2017[29] and the report states *"… the future for satellite-based connectivity in the Arctic looks potentially positive, as there are several companies seeking to deploy new constellations, including constellations of satellites that will provide expanded or nearly-complete coverage in the Arctic."*

   The report from the Arctic Council outlines several new satellite-based telecommunication systems planned in 2017 and expected to be operational by 2021-2022.

   In 2019 the Arctic Council came out with a new report that outlined both the available and emerging technologies and services for telecommunication[30]. One of the main findings of this report is: *"Over the next few years, existing and emerging connectivity technologies are*

[29] Arctic Council Secretariat, 2017: Arctic Council Task Force on Telecommunications Infrastructure in the Arctic, 2017, Telecommunications infrastructure in the Arctic: a circumpolar assessment. Arctic Council Task Force on Telecommunications Infrastructure in the Arctic (TFTIA). https://oaarchive.arctic-council.org/bitstream/handle/11374/1924/2017-04-28-ACSTelecomsREPORTWEB-2.pdf?sequence=1

[30] Arctic Council Secretariat 2019: Arctic Council Task Force on Improved Connectivity in the Arctic (2019). Improving Connectivity in the Arctic. https://oaarchive.arctic-council.org/bitstream/handle/11374/2369/SAOXFI205_2019_RUKA_06_TFICA_Report-3rd-Draft%206%20May.pdf?sequence=1&isAllowed=y

expected to become more widely available which, if successfully coordinated with industry, could improve service in the circumpolar regions."

The technologies and services described in the 2019 report the Arctic Council and found to be relevant for Dundas Titanium A/S are listed in a technical report made by Bluejay Mining plc[31].

Of the above described solutions 'Solution 2' is the preferred solution when it becomes available. Via 'Solution 2', Dundas Titanium A/S will support the expansion of the telecommunication infrastructure in North-West Greenland. During the construction phase it might be necessary to use 'Solution 1' until the planned expansion of the capacity in North-West Greenland has been established by TELE-POST. However, if a potential negative impact is foreseen or observed this will be mitigated through limitations of the use by Dundas Titanium A/S.

'Solution 3' involves alternative systems which by 2020-21 start to become commercially available. This means that these systems already can be considered used during the construction phase.

Concerning television broadcasting to a future mining site at Moriusaq TELE-POST informs Dundas Titanium A/S that it can deliver TV and radio channels to the mining site if a connection is made to Pituffik (radio chain/Minilink)[32]. In addition, if the mine wishes to receive foreign television and radio channels, a special satellite dish can be established locally for this purpose. The above setup are not affecting the telecommunication capacity in North-West Greenland.

In summary, the Ilmenite Project is expected to have a positive impact on the telecommunication setup and capacity in North-West Greenland. As already mentioned, TELE-POST is currently considering the future service of the region and the potential development of mining projects in the area impact these considerations positively. Dundas Titanium A/S is aware of the importance of securing telecommunication capacity available for the public, i.e. towns and settlements in North-West Greenland, and are considering several solutions in order to ensure that there will no negative impact on the telecommunication available to the public in the region. Overall, it is evaluated that the project will have a positive impact on the telecommunication available to the populations in the towns and settlements in the region.

Working Environment Authority

The working environment in Greenland is regulated by law issued by Danish authorities. The Working Environment Authority is the authority which contributes to the creation of safe and sound working conditions at workplaces. The authority has an office in Nuuk. The authority is responsible for inspections of companies and has the authority to penalise enterprises which do not comply with the working environment rules[33].

[31] Bluejay Mining Technical Report Telecommunication 2020
[32] TELE-POST has informed Dundas Titanium that the number of subscribers to broadcasting/television channels does not matter since it is broadcast. (the same signal is received by several users).
[33] https://at.gl/da

Greenland has its own working Environmental Act and the Working Environment Authority in Greenland administrates and exercises its authority according to this act.

Greenland has a Health and Safety at Work Act which applies to work on land and to a limited degree to aviation, navigation, and fishing. It does not apply to work offshore.

In the case of industrial accidents, poisoning, occupational diseases and other matters of importance to the working environment Dundas Titanium A/S will report to the Working Environment Authority[34]. Similarly, Dundas Titanium A/S will of course report to and respect all relevant authorities such as The Danish Maritime Authorities and The Danish Transport, Construction and Housing Authority.

The project will be among the largest work sites in Greenland, and the relevant authorities will have to carry out inspections on site.

Police

The Danish Police consists of the National Danish Police Service (Rigspolitiet) and 14 police districts, one of which is the Greenlandic district. The district is headed by a Chief Constable based in Nuuk under the Ministry of Justice.

The responsibilities of the police include: Protection of citizens from harm and danger, investigations, Search and Rescue operations and for pressing charges. If the Greenland police finds it necessary, they can call for assistance from other police districts in Greenland or Denmark.

The Greenland Police is furthermore responsible for the coordination of Search and Rescue (SAR) operations in Greenland.

The police act as a rescue authority in Greenland both on land and at sea and there is a potential risk of increased rescue activities in relation to the project. In addition, the police will have the role as the coordinator if any accident/incident occurs at the site such as fire.

On the other side, the project can have a positive impact on SAR in the area, as the project can take part in larger SAR operations.

There is a need to develop an emergency management plan in close cooperation with the authorities taking into consideration the location of the project.

Greenland custom service and Danish Immigration services

In relation to the Project, increased tasks for the custom service (i.e. Greenland Tax Agency) are expected in regard to the activities directly related to the project and customs control of the international workforce when travelling to and from Greenland. The international employees are, however, expected to enter the country via an international airport, and the number of international employees will be relatively limited compared to the influx of travellers.

Impacts on the immigration services might be different during construction compared to during production depending on whether Dundas Titanium A/S decides to apply for large-scale project licence or not.

During production and construction, if Dundas Titanium A/S does not decide to apply a large-scale project licence the municipality will have to process

[34] The Ministry of Employment (2012). The Greenland Working Environment Act §58. https://at.gl/regler/love/lov-om-arbejdsmiljoe-i-groenland-uk/#afs12

applications for obtaining permit for unskilled and certified blue collar workers submitted by Dundas Titanium A/S pursuant to the Greenland Parliament Act No. 27 of 30 October 1992 on the regulation of the influx of labour. This is assessed to generate an insignificant impact on the municipality incl. its labour offices (Majoriaq). Furthermore, it is also assessed that it will have an insignificant impact on the Danish Agency for International Recruitment and Integration (SIRI), which processes applications for work permits in Greenland for non-Nordic citizens, and which also subsequently issues the work permit.

However, if Dundas Titanium A/S chooses to apply for a large-scale project licence for the construction phase the Danish Agency for International Recruitment and Integration might be able to make a "bacth-approval" of foreign construction workers, which will be employed in a large-scale construction project in Greenland. This will most likely make the application procedure more efficient for the workers, Dundas Titanium A/S as well as increasing the efficiency of the processing the applications at the Danish Agency for International Recruitment and Integration (SIRI).

Health services

Greenland is divided into five health districts. Each region consists of a regional hospital which holds the overall responsibility of the health services in the region, In addition to the hospital there are several health-centres in each region. In Qaanaaq there is a health centre, and the closest regional hospital is in Ilulissat[35].

There will be dedicated health facilities at the mine site. A medical doctor will be on site at any time. However, if an employee needs treatment at a hospital, this will mean added pressure on the public health services.

Power and water supply

There is currently no power or water supply on site. The processing of the black sand requires large amounts of both heating and fresh water. Furthermore, power and water will be necessary for the camp.

In order to meet the demand for power and water from the project, power will be generated by diesel powered generators and water will be desalted seawater. The EIA analyses the expected environmental impacts of the power and water use.

Suggested initiatives and mitigation measures to decrease negative impacts and increase positive impacts

- Dialogue between Dundas Titanium A/S and the relevant authorities is necessary to clarify the procedure for establishing an airstrip on site and the routes that can be used to access the airstrip. Also, Dundas Titanium A/S will consider whether non-used seats on the chartered flights to the mining site can be made publicly available in cooperation with the subcontractor that are providing the flights.
- A Health and Safety Management Plan must be developed in close cooperation with the authorities, including a procedure for use of external public health care services.
- Establish contact with local health service and authorities and prepare contingency plans in cooperation.

[35] www.peqqik.dk

- Develop a plan and an approach in collaboration with the Police covering aspects of customs and the role of the Police on site

Assessment
The project is located in a remote part of Greenland, where infrastructure and public services are limited. The project will impact the public services: Police will be responsible if something happens on site, telecommunication services in the area will have to be improved to service the project, the Greenlandic health sector. The overall assessment is that the project will lead to increased pressure on public services.

The project is not expected to have negative impacts on the service level experienced at local level. The project can potentially also lead to positive indirect impacts to the population in Qaanaaq and the settlements, if and when for instance telecommunication services are improved.

Table 5.17: Impact assessment: Pressure on the public sector, infrastructure and services

Pressure on the public sector, infrastructure and services		
Short description of impact: The project is located in an isolated location, where there is currently no infrastructure. The mining company will therefore have to establish infrastructure on site themselves. This includes a port, an airstrip, water and electricity supply. Public services that can be impacted by a new mining project includes the health sector, the police, the working environment authorities and telecommunication access.		
Baseline status that will be impacted: There is currently one weekly flight to Qaanaaq from Ilulissat. There are two cargo ships and one fuel vessel servicing the settlements and Qaanaaq. The telecommunication services in the area is dependent on satellite services, and the current connections are not strong enough to handle the expected data use of the project. There is a health centre in Qaanaaq and a regional hospital in Ilulissat.		
Geographical scope: Local and national		
Who will be impacted?: National service providers, such as the health sector, police, search and rescue, customs services and working environment authorities can experience increased pressure on their services. Organisations delivering services to the local area (Qaanaaq and settlements) will potentially have to change the services. People living in the local area can be impacted if the level of services changes It is not expected that the local population will experience negative impacts on their access to public services or infrastructure services. .		
Impact by phase:		
Construction phase	**Operation phase**	**Closure phase**
Negative – low impact	Negative – low impact	Not relevant
Likelihood: Possible *Severity: Minor*	*Likelihood: Possible* *Severity: Minor*	*Not relevant*

5.6.2 Public health

There are no people living near the project, and no communities will be impacted by potential health effects from the project, such as dust, noise or pollution.

The negative impacts on health and quality of life of the community related to a mining operation are often related to interactions between the local community and the influx of staff. In other parts of the world mining has resulted in an increase in STDs and HIV/AIDS among the general population and sex workers (Desmond N, 2005; Campbell C, 1997). However, there are no settlements or towns near to the mine site, and only few people not working on the project are expected to visit the mine site.

With many employees, potentially 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.

Mitigation measures
No mitigation measures are listed for this impact.

Assessment
The impact is assessed to be negative, but insignificant, as the project is very unlikely to impact public health in Greenland.

Table 5.18: Impact Assessment Public health

Public health		
Short description of impact: There are no people living near the project, and no communities will be impacted by potential health effects from the project (dust, noise or other pollution). The largest potential risk for impacts on the public health derives from infections received by employees at the mine site and brought back to the home communities.		
Baseline status that will be impacted: The project is not expected to be able to impact the general health status in Greenland.		
Geographical scope: National		
Who will be impacted?: Potentially everybody		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Negative - insignificant impact	Negative – insignificant impact	Not relevant
Likelihood: Unlikely *Severity: Minor*	*Likelihood: Unlikely* *Severity: Minor*	*Not relevant*

5.6.3 Cumulative impacts (except impacts on the job market)

During the scoping phase two potential cumulative impacts were identified, which can impact the traditional use of natural resources, especially the opportunities to go hunting:

- Climate change is affecting the traditional livelihood in the Thule area, where weather and ice conditions are changing. This means that the timing of migrating animals are changing. Similarly, the best areas to go hunting are slowly changing. For instance, walrus hunting near Siorapaluk is no longer as good as it used to be. The Moriusaq area has only been used very little for hunting and fishing during the past years, but if the project is not materialising, the area could potentially become a fishing or hunting area again. It should be noted that the area which is expected to be mined covers an area of 8.5 km^2.
- The project will lead to increased maritime traffic in the area. However, the change is relatively small. The local KNAPK foreman does not expect that the project will impact the animals in the area, as these are already used to noise from the Thule air base.

It must be noted, that this assessment does not look at the environmental impacts of increased traffic of ships in the area. These impacts are analysed in the EIA.

Mitigation measures

No mitigation measures are listed for this impact.

Assessment
Due to the limited size of the project, the project is not assessed to have any major impact on the possibilities for living a traditional life for the population in Qaanaaq or the settlements, with regard to fishing and hunting.

If the mine is built and put into operation, land-based hunting will not be possible in parts of the area. Overall the impact is assessed to be negative with insignificant impact.

Table 5.19: Impact Assessment Cumulative impacts (not related to job market)

Cumulative impacts (not related to job market)		
Short description of impact: General changes in temperatures and ice conditions impact the traditional lifestyle with hunting in the Thule region. This could potentially change where and when hunters go hunting. The project will close off limited onshore areas which are equipped with heavy machinery operations and processing infrastructure. In these areas land-based hunting activities will be banned for safety reasons but hunting activities will not be banned in the parts of the license areas that are located at an appropriate distance from the areas affected by the mining and processing infrastructure. The project will increase the number of ships passing the area annually.		
Baseline status that will be impacted: Not relevant		
Geographical scope: Local		
Who will be impacted?: Fishermen and hunters who potentially would go hunting in the Moriusaq area		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Negative - insignificant impact	Negative - insignificant impact	Not relevant
Likelihood: Unlikely *Severity: Minor*	*Likelihood: Unlikely* *Severity: Minor*	*Not relevant*

5.6.4 Local use and local impacts incl. cultural heritage

The project area is located between the town Qaanaaq and the settlement Savissivik (respectively 80 km north and 120 km south-east of the Ilmenite Project area). There are only very limited activities by local citizens in the project area.

Public Consultation meetings
Article 87C of the Greenland Mineral Resources Act states: *"During the consultation period, the Government of Greenland must conduct public consultation meetings in towns and villages particularly affected by the activities. If the activities are geographically far away from towns and villages or located outside the municipal boundaries, the Government of Greenland will decide in which towns and villages public consultation meetings are to be held.".*[36]

Based on Article 87C quoted above, the impact described in this report and discussion with Ministry of Mineral Resources and Avannaata Kommunia, Dundas

[36] The Government of Greenland will convene the public consultation meetings at a minimum notice of 14 days (Article 87d of the Mineral Resources Act).

Titanium A/S suggests that public consultation meetings should be directed towards the public in Qaanaaq, Savissivik, Siorapaluk and Ilulissat.

Public consultation meetings will be held in Qaanaaq, Savissivik and Ilulissat.

A number of citizens from Siorapaluk is suggested to be offered transportation for participating in the public consultation meeting in Qaanaaq. However, if it is found to be too logistically and practically challenging to arrange a transportation offer for a number of citizens during the consultation period a later information meeting will be held in Siorapaluk by Dundas Titanium A/S.

An information meeting in Nuuk is also considered by Dundas Titanium A/S.

Information and involvement of citizens during the consultation period
In order to make sure that all local citizens are informed and given an opportunity to express their opinions and concerns Dundas Titanium A/S plan to distribute public information announcements or information flyers to the towns and settlements in the Qaanaaq region. Furthermore, the public released hearing material and the presentations that are presented at the public hearing meetings will be distributed digitally on USB memory sticks to local authorities/municipality offices in North-West Greenland. The flyers and public announcements will inform citizens in North-West Greenland that the material is available at the local authorities/municipality offices in North-West Greenland.

The public information announcements and flyers will contain an invitation to participate in the public hearing process, the address for the Dundas Titanium A/S website and an email address (faq@dundas.gl) that is dedicated to the hearing period. This will ensure that the entire public in the Qaanaaq region is fully informed about the project and the public consultation. Also, this informs the public about know how to get in contact with the company, and where to address questions and get more information.

Qaanaaq and Savissivik – public consultation meetings
The public consultation meeting in Qaanaaq and Savissivik will ensure that all local stakeholders and citizens which will be affected by the project are informed and given an opportunity to express their opinions and engage in a dialogue with the company and its advisors as well as the governmental institutions and politicians. The focus is on ensuring a broad involvement and debate about the project.

Qaanaaq is affected by the activities since the town is the largest in the region and since it is the main hub and center of local businesses and services, transport, logistics, education, authorities etc. in the region. The airport in Qaanaaq will be used as an alternative airport for the mining site and will also be used in the initial construction phase to transport workers (before an air strip have been constructed at the mining site). Services and local sub-contractors from Qaanaaq will also be involved in and affected by the project. Just as local labor force and educational initiatives in Qaanaaq will be invited to be part of the project. Furthermore, there are many family ties between the inhabitants of Qaanaaq and those in the smaller settlements in the region.

Savissivik is affected by the activities since the settlement is the nearest to the mining site. In the summer months local travelers and hunters are sailing between especially Savissivik and Qaanaaq where abandoned houses in Moriusaq are used for stopovers. The sailing is either related to social gatherings between Savissivik and Qaanaaq or to hunting in the region. Dundas Titanium A/S will arrange

alternative accommodation, selected services and safe anchoring for locals in the need of stopovers in Moriusaq and thereby mitigating this potential negative impacts. Still, Dundas Titanium A/S offers to contribute to public consultation meetings Savissivik which is the nearest settlement to project area and therefore local labor force and service contractors might be contributing to the project.

Siorapaluk – involvement of citizens

Based on the practical and logistical possibilities two options for informing citizens in Siorapaluk will be considered.

Option 1: If found logistically and practically possible during the consultation period (considering weather and availability of transport solutions and accommodation during the public consultation period) nine persons from Siorapaluk will be invited to represent the settlement at the public hearing meeting in Qaanaaq[37]. Under 'Option 1' the nine invited citizens will be transported to Qaanaaq and back to Siorapaluk.

Option 2: If found too logistically and practically challenging to transport citizens from Siorapaluk to Qaanaaq during the period of the public consultation and back again Dundas Titanium A/S will instead conduct information meetings in Siorapaluk later outside the consultation period. At this meeting the representatives from national and regional authorities are also invited to participate. The intention with the information meeting is to inform about the project and the job and business opportunities that are associated with the project.

The possibilities will be evaluated jointly at the start of the public consultation period by Dundas Titanium A/S and the Mineral Resource Authority. Based on this evaluation a decision will be taken about which option is appropriate and possible.

In case that Option 1 is found to be possible, Dundas Titanium A/S offers to transport nine persons from Siorapaluk to participate in the public hearing in Qaanaaq and to represent the settlement of Siorapaluk in this meeting. It is recommended that the nine invited persons representing the settlement are: Persons that constitute the elected and official board-members of the Siorapaluk settlement, representatives from the local business (e.g. the manager of the local Pilersuisoq/store), local hunters (e.g. through a local representation of the Fisherman and Hunters Association KNAPK), local education (e.g. the manager of the primary school Piitaaqqap Atuarfia in Siorapaluk), local authorities (e.g. manager of the local municipality office in Siorapaluk), local organizations (e.g. local representation of women's association).

The invited persons will be offered transportation by Dundas Titanium A/S between Siorapaluk and Qaanaaq on the day (or the day before) of the public meeting in Qaanaaq. This will ensure that the population of Siorapaluk is represented in the public meeting in Qaanaaq. This will enable them to engage with the company, its advisors, representatives from the authorities, as well as participating politicians. It should be noted, that although nine selected representatives from Siorapaluk is invited and transported to the public

[37] The nine persons will represent around 30% of the population (age above 17) in Siorapaluk. The total population in Siorapaluk is 42 persons with 12 persons of age below 17, 25 persons being between 17-64 and 5 persons being above age of 65. Grønlands Statisik – data July 2019: http://bank.stat.gl/pxweb/en/Greenland/Greenland__BE__BE01__BE0140/BEXSTM4.PX/table/tableViewLayout1/?rxid=1dbffa17-f05b-4f69-970d-74eedcf15a30

consultation meeting in Qaanaaq, the Social Impact Assessment does not find that Siorapaluk are particularly affected by the future mining operation carried out by Dundas Titanium A/S.

Ilulissat – public consultation meeting
Dundas Titanium A/S also proposes to hold a public consultation meeting in Ilulissat. Ilulissat is the local authority center for Avannaata Kommunia and a meeting in Ilulissat will be conducted as it would allow the regional authorities, general public and business stakeholder from the region to obtain knowledge about the project and contribute to the hearing process. Also, considering that Ilulissat might be a national hub for flights to/from the future mining site it is considered relevant to include a public consultation meeting in Ilulissat. Finally, the local authority will also be a party to the Impact Benefit Agreement, which subsequent to the public consultation period will be negotiated and concluded on the basis of the SIA Report and which establishes a basis for local public involvement throughout the life of mine.

Additional Public information meetings
Dundas Titanium A/S intent to supplement the local public consultation meetings in North-West Greenland with a public information meeting in Nuuk. Dundas Titanium A/S considers it important to conduct public information meetings in Nuuk to ensure that national stakeholders, non-government organization, larger research and higher educational institutions as well as governmental bodies and authorities will be informed about the project. Previously, Dundas Titanium A/S has held successful and mutually beneficial information meetings in Nuuk where a large number of stakeholders and individuals participated.

Sites of monumental or cultural importance
The Greenland National Museum, NKA, performed an archaeological survey relating to the activities of Dundas Titanium A/S in the Summer 2018[38].

The license area is located in the southern "Gateway to Greenland" area. This area is well noted for its tremendous importance in understanding of prehistoric migrations from Canada and Alaska into Greenland. The area contains archaeological evidence of Paleo-Eskimo and Inuit peoples in Greenland, as well as the Norse.

The NKA survey identified 89 sites/structures of contemporary, historic and prehistoric significance within the company's license area. Out of these, nine sites were categorised as falling under the provisions of the Heritage Act, and the survey concludes that if the project activities are of such a character where damaging the archaeological features is considered unavoidable, these sites will need to be subjected to a complete archaeological investigation.

The mining plan will take the archaeological study into consideration, and either avoid mining the sites of prehistoric significance that falls under the provisions of the heritage act, or make sure that the sites will undergo a complete archaeological investigation.

[38] Myrup, Mikkel (2018): *Moriusaq archaeological survey 2018*. The Greenland National Museum & Archives

Local use
At a meeting in 2017 local hunters from Qaanaaq said that they did not use the license area for hunting or fishing. This is partly due to the fact that the area is not far from Qaanaaq, and partly due to a fear that the animals are polluted by radioactive materials from the B-52 flight crash in 1968. In 2019 the local KNAPK-chairman has informed that the area is of interest in connection with polar bear hunting.

In Greenland, there is traditionally access to all locations. The houses in Moriusaq are never locked, so travellers and hunters can gain access to the houses if they choose to stay in Moriusaq. It could therefore be seen as a red flag to the local population, if they are prevented access to the license area. Several stakeholders at the same time point out that an exclusion would most likely not be respected, and that it could potentially lead to a conflict with the company's private property right on one hand and the traditional understanding that the nature belongs to everybody on the other hand.

Moriusaq has a natural safe port, which is used by travellers in case of bad weather.

From interviews with the local population and registrations of visitors during the exploration phase, it is estimated that less than 10 individuals/groups of people stop in the area during the summer season.

The mining company is planning to allow overnight stays in the camp area, where the travellers can also buy food in the cantina. Travellers will also have access to the cemetery. However, as the site is a working area with heavy machinery, access to part of the area can only be allowed for employees with proper training. The best potential set up for access to the area, including information on arrival, docking of boats, potential handling of dogs and sledges etc. will have to be discussed and developed in cooperation with the local population and local authorities.

It will not be possible to go hunting on land in the entire license area. Fishing and hunting at sea will still be possible.

Mitigation measures to limit negative impacts from reduced access to the area
- People travelling in the area should be able to dock their boats, and rest in the area.
- If possible, it would be a benefit for locals if they could buy fuel and basic goods at the site.
- It should be easy to find a phone number for the person at the camp, whom locals should contact when they are in the area.
- The company could make it possible to visit the project for groups that are interested, allowing the local population to understand the project and the processes that take place at site.

Assessment
The limited access to the license area is assessed to have a negative impact. The company is however planning on mitigating the negative impact by making it possible to stay overnight, and make it possible to access the cemetery.

It is key to the project's integration with the local community, that the population and Dundas Titanium A/S find a solution to the restricted access in cooperation with the population

Table 5.20: Impact Assessment Recreational/local use of the project area and cultural heritage

Recreational/local use of the project area and cultural heritage		
Short description of impact: When the project materialises and Moriusaq is removed, the mining company will provide opportunities to stay overnight at the project's facilities, and it will be possible to visit the Moriusaq cemetery. There will, however, be limited access to the license area, and people who wish to dock within the license area will have to contact the mining company. The Greenland National museum has identified nine sites falling under the provisions of the Heritage Act at the license area of the Ilmenite Project. These sites will either not be mined or they will be subject to a complete archaeological investigation by the museum.		
Baseline status that will be impacted: Moriusaq is today used for overnight stays by people travelling between Savissivik and Qaanaaq and by hunters from Qaanaaq travelling to south of Pituffik for muskox hunting. The area has traditionally been a good hunting area, but only very limited fishing and hunting has taken place in the past years. Some polar bear hunting is possible in the area. The Greenland National museum has identified nine sites falling under the provisions of the Heritage Act at the license area of the Ilmenite Project		
Geographical scope: Local		
Who will be impacted?: People travelling in the area, or who are connected to Moriusaq.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Negative – medium impact	Negative – medium impact	Not relevant
Likelihood: Likely *Severity: Minor*	*Likelihood: Likely* *Severity: Minor*	*Not relevant*

5.6.5 Livelihood compensation etc.

No people are living in the license area, and no hunters or fishermen make their livelihood - or significant parts of their livelihood - from hunting or fishing in the project area.

Consequently, nobody will be resettled due to the project and nobody will receive livelihood compensation.

Removal of Moriusaq

The former settlement Moriusaq is located within the license area. The last inhabitant left Moriusaq and settled in Qaanaaq in 2010. In the abandoned settlement there are 24 buildings and a cemetery. Some of the buildings are owned by former residents or their heirs, others by the government and a few houses are owned by other inhabitants in Qaanaaq or workers at the Thule Air Base.

It is the intention to mine the sand underneath Moriusaq and remove the buildings. However, the area around the cemetery will not be mined, and it will be possible to visit the cemetery when the mine is operating.

Dundas Titanium A/S has identified the owners and have bought some of the buildings, while negotiating with others regarding the price of the buildings.

Acquisition of the buildings will be based on the value of the buildings. If the owners and Dundas Titanium A/S cannot reach an agreement, expropriation can be a solution, but this will be done by the authorities.

Mitigation measures
No mitigation measures are listed for this impact.

Assessment
Nobody lives in or nearby the license area and nobody makes a livelihood from hunting, fishing or gathering in the area. There is therefore no impact.

Table 5.21: Impact Assessment Resettlement/livelihood compensation

Resettlement/livelihood compensation		
Short description of impact: Nobody lives in or nearby the license area and nobody makes a livelihood from hunting, fishing or gathering in the area. Due to this no resettlement or livelihood compensation is relevant. Some of the buildings in Moriusaq are privately owned and used as summerhouses/for overnight stays. The mining company is in the progress of buying the houses from the current owners.		
Baseline status that will be impacted: None. Nobody lives in or nearby the license area. Nobody makes a livelihood from hunting, fishing or gathering in the area.		
Geographical scope: Local		
Who will be impacted?: None		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Not relevant	Not relevant	Not relevant
Not relevant	*Not relevant*	*Not relevant*

5.6.6 Vulnerable groups

Vulnerability is often linked to factors such as poor health, abuse, lack of education and unemployment.

As the project is not located in an inhabited area, it will not directly influence a local population. Due to this, the project will not directly impact any vulnerable groups.

The number of vulnerable people in Qaanaaq and the settlements is relatively high compared to the rest of Greenland, and the number of vulnerable people in

Greenland is relatively high compared to Denmark and other Western European countries. Studies have found a high occurrence of households with alcohol problems, violence and abuse in the Thule area[39].

The project can potentially employ local people with no or little education, who are currently unemployed. This can improve the livelihood of these employees and their households.

The project can indirectly lead to negative impacts for vulnerable people, both at household and at community level. In the case where the most functional adult in the household is employed by the project, and therefore not present in the household during the time she/he is working on the project, this can have negative impact on the rest of the household including children.

Similarly, if the project succeeds in hiring several employees from the relatively small communities in the region, and if these employees play important roles in the community, this can have negative impacts on the communities.

Mitigation measures to reduce potential negative impacts on vulnerable people/households/communities

- The project, in corporation with the authorities, should have focus on identifying and assisting people with little or no formal skills to realise the opportunities for working at the project, and assist in the application and potential training.
- Job adds should be made easily accessible for people with little education and who are not currently working. These jobs will be posted on suli.gl. Also, it is suggested that job ads are printed and made available at Majoriaq in Qaanaaq and service houses in Qaanaaq and the settlements in the Qaanaaq region. It is also suggested that the mining company make a small video in plain language explaining how it is to work at the mine. The company is also considering making regular citizens days or 'come and meet a representative from the ilmenite mine' meetings in Qaanaaq & Ilulissat. Furthermore, the company is planning to be active in job fairs/educational fairs and programs – as well as building cooperation with educational institutions. In this way people with limited knowledge of the mining sector can get an understanding of the job.
- The project should not offer salaries that are much higher than what skilled workers can earn in the local communities.

Assessment
The project is not expected to have any direct impact on any vulnerable groups.

Indirect negative impacts can occur with regard to children in vulnerable families, if the most functional adult in the household is employed on the project, and therefore not present in the household during the time she/he is working on the project.

Similarly, it has been indicated that the project can have indirect negative impacts on vulnerable people in small, local communities, if the project succeeds in hiring several employees from the relatively small communities.

[39] For more detailed information see appendix 2: Social baseline

Table 5.22: Impact Assessment Vulnerable groups

Vulnerable groups		
Short description of impact: The project can give job opportunities to local people with little formal education who are currently unemployed, making these people less vulnerable than they are today. Indirect negative impacts can occur with regard to children in vulnerable families, if the most functional adult in the household is employed on the project, and therefore not present in the household during the time she/he is working on the project. If the project succeeds in hiring several employees from the relatively small communities, and if these employees play important roles in the community, this can have negative impacts on the communities.		
Baseline status that will be impacted: It is not clearly defined how many individuals and families are vulnerable in a way where the project can impact them negatively.		
Geographical scope: Local level		
Who will be impacted?: The project can improve the livelihood of people who are vulnerable due to unemployment and/or lack of education. Vulnerable people, who are not employed on the project, can be impacted if relatives that supports them are employed on the project and therefore no longer care for the vulnerable person.		
Impact by phase		
Construction phase	**Operation phase**	**Closure phase**
Negative – insignificant impact	Negative – insignificant impact	Not relevant
Likelihood: Unlikely *Severity: Minor*	*Likelihood: Unlikely* *Severity: Minor*	*Not relevant*

6 Benefit and Impact Plan

The draft Benefit and impact plan have been prepared using a logical framework approach according to international standards and Best Practice.

The purpose of the draft Benefit and impact plans is to consult the findings of the SIA with authorities and stakeholders. When developing the Impact Benefit Agreement (IBA), the Benefit and impact plan will be incorporated to the appendices of the IBA, including the feedback received during the consultations.

Stakeholders will be engaged according to the principles described in the TOR. The IBA will follow the standards and procedures formulated by The Ministry of Mineral Resources. Stakeholder engagement will be planned and carried out in cooperation with the relevant authorities in Greenland.

In the plan the main impacts from the project are listed, and for each impact the following is described:

- **Main goal:** Describes the goal for how the impact from the project should be.
- **Initiatives to achieve the goal (proposed mitigation):** Describes suggested initiatives/measures that can be taken to obtain the goal. The measures can be initiated by the mining company, authorities or civil society.
- **Risk and assumption:** Lists the main assumptions and risks that the goal cannot be obtained.
- **Verifiable indicators:** List indicators that can be used to measure the project's success in obtaining the goal

The draft benefit and impact plan is shown in Table 6.1.

Table 6.1: Benefit and impact plan

Description of the impact	Main goal(s)	Initiatives to achieve goal (proposed mitigation)	Risks and assumptions	Verifiable indicators
Employment of Greenlandic workers at the mine.	As many employees as possible should be local during the two years of construction, subject to availability, qualifications, experience and to the possibility of mobilising the local workforce. As many employees as possible should be local during the operation phase, subject to availability, qualifications, experience and to the possibility of mobilising the local workforce.	• Creating an attractive working place for recruitment and retention of local workers includes that Dundas Titanium A/S must address cultural, gender, and geographical issues and incorporate findings into planning of the project (rotation scheme, transport arrangements and working conditions at camp). • Detailed job description and requirements for all categories of job during operation phase made public available to community, municipality, unions and technical schools. The job adds must be targeted the local population and job descriptions and the job advertisement strategy must be developed in cooperation with relevant stakeholders. • It is suggested that the mining company makes visual advertisements (for instance short videos) describing what it is like to work at the mine. Potential employees can then watch the video on the company homepage, to get an insight into the daily tasks of, for instance, a shift operator. This will give a much better impression of the work compared to a written job advertisement • A recruitment campaign in Municipality of Avaannata must be carried out in cooperation with the municipality, job centres etc. • The project should put emphasis on creating and maintaining Greenlandic culture at the site, including managers who speak Greenlandic and provision of local food at the site. • It is suggested that local workers can be offered shorter term positions. For instance, the local unemployment is higher in the autumn, when there are no fishing and hunting activities, and thus this time	• Assumption: Local workforce is available and interested in working in the mine operations. • Risk: The gap between required skills and available skills will be a barrier for employing local workers. • Risk: The relatively remote location in Greenland will make the project less attractive compared to other Greenlandic mining projects, located closer to larger towns. • Risk: The long rotations (periods on site) can make it difficult to attract employees. • Risk: The lack of flexibility at a large mining operation, compared to the traditional lifestyle at local level will be a barrier for attracting employees from the local area	• Number of workforce from local area, from municipality of Avannaata and from Greenland. • Percentage of Greenlandic workforce per job category. • Number of applicants per job advertisement

Description of the impact	Main goal(s)	Initiatives to achieve goal (proposed mitigation)	Risks and assumptions	Verifiable indicators
		of year would be a good opportunity for a short-term position. • In order to progressively replace foreign labourers with local labourers, it is necessary to do an active on-site training of local employees, so that they can advance to higher level positions.		
Education, training and competence development among the Greenlandic workforce	As many people as possible should obtain practical skills and experience from work at a mine Students should be offered apprenticeship within different fields	• A Training Needs Assessment can be undertaken in cooperation with local authorities to ensure that the training opportunities provided benefit both Dundas Titanium A/S and the local business life, also for service-related and managerial positions. • Pre-employment and on-the-job training programmes for the operation phase must be developed as early as possible, and preferably during the construction phase. • Pre-employment and on-the-job training programmes should be developed in cooperation with local authorities, educational institutions and labour market organisations • A continues dialogue with educational institutions (especially the mining school) on how internships and training programs can be carried out in cooperation with the institutions must be initiated. It is suggested that a quarterly meeting between the mining school and the project is planned throughout the project's construction phase, to ensure that the school is aware of the future demand for skills. • There must be a focus on continuously upgrading of employees at all levels, in order to retain and develop employees.	• Assumption: Greenlandic employees employed at the project who can receive on-the-job training and build practical experiences • Assumption: Students available and interested in apprenticeships • Assumption: Staff motivated to invest time in training activities. • Assumption: Authorities and educational institutions has resources to go into cooperation with the company	• Number of on-the-job trainings conducted. • Number of trainee and apprenticeship per year. • Number of initiatives taken by authorities and organisations to improve qualifications of potential candidates. • Number of people enrolled in specific courses of relevance to the mining sector.

Description of the impact	Main goal(s)	Initiatives to achieve goal (proposed mitigation)	Risks and assumptions	Verifiable indicators
		• The company must offer apprenticeships within different fields of work, e.g. processing, management etc. • Reinsertion programs for workers must be prepared for mine closure. • Employment of dedicated, local based, Human Resource Manager to develop and follow up on recruitment, training and career development of staff.		
Engagement of Greenlandic companies in the project	• As many work and service contracts as possible granted to Greenlandic companies	• Local businesses engaged and informed about tender procedure and type of contracts available from the mine. • When possible, procurement and contract packages for goods and services should be prepared in a way that makes it possible for Greenlandic companies to bid on the contract, to see if they can provide a competitive bid. • When possible and competitive, activities related to transportation of goods and staff should be outsourced to local companies. • When outsourcing services (potentially carpentry, engineering, electricity work, IT services, cleaning, catering, laundry and similar), Greenlandic companies should be invited to bid on the contract. • When outsourcing larger service contracts, it can be set as a requirement / point given criteria that some goods/services are purchased in Greenland. • Local hunters could provide local meat for the camp. • A forum can be established with the local business council and GE to discuss potential tender processes, with the purpose of ensuring that also Greenlandic companies are targeted.	• Assumption: Local business has the necessary capacity to invest in service delivery. • Risk that Greenlandic companies aren't competitive compared to international companies. • Risk: The location of the mine can be a barrier for small companies from outside the local area to provide services to the mine	• Number of contracts awarded Greenlandic companies • Value of contracts awarded to Greenlandic companies (in USD and % of total contracted amount) • Number of local businesses involved in the tender processes.

Description of the impact	Main goal(s)	Initiatives to achieve goal (proposed mitigation)	Risks and assumptions	Verifiable indicators
Reduced access to the license area for the local populations	• Local population should experience restrictions as little as possible • Conflicts and mistrust between local population and mining company should be avoided	• People travelling in the area should be able to dock their boats, and have the opportunity to stay in the area for rest. • If possible, it would be a benefit for locals if they could buy fuel and basic goods at the site. • It should be easy to find a phone number for the person at the camp, whom locals should contact when they are in the area. • The company could make it possible to visit the project for groups that are interested, allowing the local population to understand the project and the processes that take place at site. • Employment of dedicated, local based, community contact point	• Risk: Local population does not accept the restricted access to the area, and will access the area without noticing the responsible at site. This can lead to serious accidents. It can also lead to mistrust from the company side, and in worst case lead to the mine management not allowing any access.	• Complaints received at grievance mechanism established by Dundas Titanium A/S regarding restricted access
Social conflicts at site	• Social conflicts at site avoided	• Introductory sessions for all workers should include a section on intercultural understanding. • International workers should be given an overview on Greenlandic culture as part of their introduction programme. • It should be ensured that the camp accommodates the cultural needs of the different nationalities living at the camp. • Established anti-bullying and anti-harassment policies in place, and procedures if employees are bullied or harassed		• Program and policies for avoiding social conflicts available
Risk of accidents at site	• High standard of OHS on the mine site and in related operations. • Accidents avoided at the mine site (zero-tolerance).	• Procedures for on-site handling of accidents, and clear procedures for emergency evacuations to be agreed with relevant authorities • Occupational Health Risk Assessments must be carried out and updated continuously. The assessment must be used to develop, implement and monitor a health	• Assumption: Local authorities has the necessary capacity and resources allocated for response.	• Number of staff trained • Number of accidents related to the mine operation. • Number of accidents at the mine site.

Description of the impact	Main goal(s)	Initiatives to achieve goal (proposed mitigation)	Risks and assumptions	Verifiable indicators
		and safety management plan that all staff at the site must adhere to. • Training programmes for all staff on H&S and emergency response at the mine site, training programmes must be carried out in Greenlandic, English and potentially other languages for people not fluent in one of the two languages. • Establishment of a health and safety committee with joint participation of management and workers, where workers help to monitor and advise on H&S programs at the mine site. • Pre-notification of operations and traffic of vessels to relevant authorities. • Contractual requirements on H&S to contractors regarding safety measures, response time, etc., in order to minimise risk of accidents, appropriate and timely response in case of accidents, emergency evacuation etc.		• Number of nearby accidents

7 Public participation

A number of stakeholder engagement activities have been carried out during the project exploration phase.

Engagement activities include:

- February 2017: Open information meeting in Qaanaaq, individual interviews focusing on baseline in Qaanaaq and Ilulissat.
- April-May 2017: Public consultation of Terms of Reference for the SIA and EIA for the project.
- October 2017: Meetings with stakeholders in Nuuk and Ilulissat.
- March/April 2019: Written information on final project description and invitation to provide inputs to the SIA to a broad range of stakeholders.

Furthermore, informal dialogue and information has been shared by the mining company to people travelling and staying overnight in the license area, during the field work seasons in 2016, 2017 and 2018.

The objective of the stakeholder engagement activities has been to inform and update stakeholders on the status of the project. Additionally, the stakeholders have been invited to ask questions, to propose initiatives which could increase the local involvement in the project, as well as raise their concerns related to the project.

Picture from information meeting in Qaanaaq, February 2017

7.1 Inputs and comments from stakeholders

7.1.1 February 2017

In February 2017 Dundas Titanium A/S held an open information meeting in Qaanaaq. At the meeting representatives from the company, the EIA Consultant (Orbicon) and the SIA consultant (NIRAS) participated.

At the meeting the interested residents in Qaanaaq were given information about the project, the planned activities for the field work in the summer of 2017, as well as the license process with focus on the EIA and SIA. During and after the presentations the public was able to raise questions and concerns. The meeting was held in Danish and translated into Greenlandic. 14 people participated in the meeting.

Further to the open meeting, eight semi-structured interviews with stakeholders were carried out, focusing on gathering baseline information on local conditions, including the use of the Moriusaq area. A key focus of the stay in Qaanaaq was to identify the owners of the houses in Moriusaq.

Table 7.1: Overview of inputs from stakeholder engagement in February 2017

Stakeholder category	Stakeholder	Date	Methodology	Key points raised	Other comments
Local residents/businesses	Residents in Qaanaaq	25 February 2017	Public information meeting	At the meeting three presentations were held, where participants could ask questions during and after the presentations. Presentations included: The project (Hans Jensen, Dundas Titanium A/S) The EIA process (Flemming Pagh, Orbicon) The SIA process (Camilla Christensen, NIRAS) Interpretor: Navarana Sørensen A number of questions related to the planned project, the field work etc. were asked and answered.	The meeting was announced on flyers at the municipality, community health centre and the supermarket. Furthermore, the meeting was announced on Facebook.
Public organisations	Majoriaq Qaanaaq (Johnny Jensen, principal)	23 February 2017	Semi structured interview	• A high percentage of the population in Qaanaaq and the settlements do not graduate primary school • Very difficult to find internships for students who are interested in starting a technical training programme • Positive if Dundas Titanium A/S can create training programmes/employment opportunities	
Municipality	Qaasuitsup municipality, Qaanaaq office (Arruttaq Qujaukitsoq– business consultant, responsible for the	24 February 2017	Semi structured interview	• There are app. 80 commercial hunters in Avanersuaq, 40-50 living in Qaanaaq and the remaining in the settlements • To his knowledge very limited activities around Moriusaq	

	mineral sector, business development, tourism and hunting/fishing)			• The area is lacking employment opportunities, the project should aim to use as high a degree of local employees and services as possible	
Local residents/businesses	Qaanaaq Carpentry and contractor (Kim Petersen, owner)	26 February 2017	Semi structured interview	• Critical towards the possible use of infrastructure and services from the Thule Airbase • Kim highlighted the importance of using the infrastructure in Qaanaaq (especially airport) • Kim highlighted the importance of Inglefield Breding not being impacted, which will have negative impacts on the wildlife and fishing in the area. Fishing provides the main income for many in Qaanaaq and Qeqartat.	The company is the largest contractor in Qaanaaq, with four full time employees.
Local residents/businesses	Commercial hunters and fishermen (Rasmus Avike, Avigiaq Petersen, Martin Uumaaq and Qillaq Danielsen)	28 February 2017	Semi structured interview	• Commercial hunters/fishermen from Qaanaaq/Savissivik do not use the area around Moriusaq for hunting/fishing • Climate change has a large influence of the livelihood of the hunters • Halibut and narwhale are sold to the fish factory. caribou/muskox /walrus/seals for own consumption and dog food.	
Local residents/businesses	House owner in Moriusaq (Juaanna Platou, priest in Qaanaaq + settlements)	26 February 2017	Semi structured interview	Owns two houses in Moriusaq, where she lived and worked as a teacher in 1996. Her and her family stayed overnight in the house in 2016.	
Local residents/businesses	House owner in Moriusaq (Regina Kristiansen, retired and her Danish speaking friend Kista Henson)	27 February 2017 & 01 March 2017	Semi structured interview	• Owns two houses in Moriusaq, one was used by a group of people on the way to and from Pittufik in the Summer of 2016	Regina was the second last resident in Moriusaq, now living in Qaanaaq. Regina helped identifying the owners of a number of houses in Moriusaq
Organisations	SIK, Qaanaaq department (Paulina Kleist, chairman)	28 February 2017	Semi structured interview	• Larger unemployment of SIP members in the winter compared to summer. • Foresee positive impacts if the project can generate employment to SIP members in Qaanaaq and the settlements	
Municipality	Mayor of Qaasuitsup Municipality, Ole Dorph	02 March 2017	Information on the project and activities carried out in Qaanaaq in February 2017		Ole recommends that the municipal business council (Hans Peter Lennert) is included as a key stakeholder.

7.1.2 **October 2017**

In October 2017 Dundas Titanium A/S, Orbicon and NIRAS invited stakeholders in Nuuk and Ilulissat to participate in three meetings/workshops. Participants and inputs related to the SIA process can be seen in Table 7.2.

Table 7.2: Overview of inputs from stakeholder engagement in February 2017

Stakeholder category	Stakeholder	Date	Methodology	Key points raised	Other comments
Public authorities	Representatives from The Environmental Agency for Mineral Resource Activities and the Ministry of Mineral Resources	24 October 2017	Meeting/workshop in Nuuk	Three-hour meeting/workshop with focus on the project design and the fieldwork carried out in 2017. Due to the limited number of participants questions and discussions were made in plenum. Q&A is not listed in this summary, as these were focused on the project description and process related questions	Invitations also sent to Ministry of Health; Ministry of industry, Labour, Trade and Energy; Ministry of Fisheries and Hunting; Greenland Institute of Natural Resources; The National Museum; KANUKOKA; Greenland Police and Arctic Command.
Civil Society and Businesses	Representatives from KNAPK, WWF, Transparency Greenland, Siemens (as a member of GE), EY accountants (as a member of GE), Kommune Kujalleq		Meeting/workshop, in Nuuk	Three-hour meeting/workshop with focus on the project design and the fieldwork carried out in 2017. Due to the limited number of participants questions and discussions were made in plenum. Q&A is not listed in this summary, as these were focused on the project description and process related questions. However the following comments were given by participants: • In the Citronen Fjord Project - where the shipping to some extent can be compared to this project - the shipping plans were not prepared and distributed for public consultation. It was clear that the approval of shipping 'felt between two chairs' (Danish and Greenlandic legislation). This was a highly critical aspect of that project, and the impact of shipping should be investigated as part of the environmental studies for the project. • There is a strong cultural identity in the project area, and ICC and its cooperation partners (Pikialasorsuaq commission) are key stakeholders in this aspect. ICC has recently prepared a report on land rights and land-interests across Inuit communities (Canada,	Invitations also sent to: Visit Greenland, KTI – School of minerals and petroleum, ARTEK, AVATAQ, IIC, Greenland Maritime Centre

			Alaska, Greenland). You should look at this report. • It is difficult for the municipalities to benefit from mining projects, and they are not involved in developing the projects. It is important to think about how the projects impact the municipalities, and if they impact the municipalities differently. It leads to tension if you feel that no one listens to your complaints. • No heavy fuel oil should be used on the project • The impacts from shipping should be examined to the highest possible degree, focusing on noise while sailing and noise when transhipping. • It will be difficult to attract local KNAPK members as potential employers, if they have professional hunting licences. The reason is that fulltime fishermen/hunters can only earn a minimum salary while keeping their licence. This is a problem in terms of attracting the local workforce, even though the operation and fishing periods of the year could match.	
Authorities, civil society and businesses	Representatives from Municipality of Qaasuitsup, Greenland Business Association, KJ Construction in Ilulissat	Meeting/workshop in Ilulissat	Two-hour meeting/workshop with focus on the project design and the fieldwork carried out in 2017. Due to the limited number of participants questions and discussions were made in plenum. Q&A is not listed in this summary, as these were focused on the project description and process related questions	Invitations also sent to: Police in Ilulissat, KNAPK, SIK

7.1.3 **Spring 2019**

In March and April 2019, a written information package was sent by email to project stakeholders. The email included a detailed non-technical project description, based on the project described in the pre-feasibility study. The project description was translated into Danish and Greenlandic. Stakeholders were encouraged to participate in a phone interview, where they could:

- Ask questions to the project description and the SIA process
- Describe their concerns related to the project
- Give inputs to how the local area/Greenland can benefit the most from the project

Minutes of interviews express the opinions of the stakeholders and all comments to the project, positive or negative, have been included. As the project description was the written project description gave an overview of the project as described in the pre-feasibility study, the information package was sent to a number of project stakeholders, who would not necessarily have inputs to above mentioned subjects. A number of stakeholders have not

replied to the email, and others have informed that they do not have comments to the project and/or SIA at this stage, or that there focus is on the potential environmental impacts. Stakeholders who have confirmed receipt of the material, but who have not given inputs to the three points mentioned above are not included in the overview of stakeholder inputs.

Table 7.3 shows which stakeholders that has been contacted with information on the project.

Table 7.3: List of stakeholders to whom a project description and invitation to participate in SIA interview has been sent.

Ministry of Nature, Environment and Research	GEUS	Transparency Greenland
Ministry of Housing and Infrastructure	The Police - Qaanaaq	ICC – Inuit Circumpolar Conference
Ministry of Education, Culture and Church	The Police - Nuuk	Vectrus (Thule Airbase)
Ministry of Fisheries, Hunting and Agriculture	Workers Union, SIK	Royal Artic Line
Ministry of Health	Greenland Business Association	Air Greenland
Ministry of Industry and Energy	Visit Greenland	Pikialasorsuaq Commission
Ministry of Mineral Resources and Labour	Greenland Business, Innovation Greenland	Arctic command
Environmental Agency for Mineral Ressource Activities	Organisations related to fishing and hunting	TelePost
Foreign Directorate	KNAPK	Kåre Hendriksen, ARTEK (DTU)
Amunicipality of Avannaata	KTI - School of mineral and petroleum	Kirsten Hastrup, University of Copenhagen
Amunicipality of Avannaata - business department	KTI - iron and steel educations	Demokraterne
Representatives from Savissivik	KTI - Building and construction educations	Inuit Ataqatigiit (IA)
Representatives from Siorapaluk & Qeqertat	Majoriaq (Qaanaaq)	Samarbejdspartiet
Rigsombudsmanden i Grønland	Greenland Maritime School	Siumut
Danish Maritime Authorities	Kim Petersen, local business	Partii Naleraq
The Greenland Nature Institute	Morten Jeosen, Local business	Nunatta Qitornai
National Museum	Kim Fritze, local business	
Working Environment Authority	AVATAQ	
	WWF	

Table 7.4 describes the key points raised by stakeholders in the interviews.

Table 7.4: Overview of inputs from stakeholder engagement in Spring 2019

Stakeholder category	Stakeholder	Date	Key points raised	Other comments
Organisations	Mineral School, Hans Hinrichsen	13. marts 2019	• Hans is positive towards the project. If it is realized, it is possible that it will be a "game-changer" in the Qaanaaq area, which is an area that suffers from lower social status than the majority of Greenland. • It can create a positive spiral if a larger part of the population is employed and as a result get a higher income. This extra income can then be used for investing in improvements of the employees' houses and this might then again create increased local employment. • It is important that apprentices are used on the project (there are now apprentices on Hudson and the ruby mine). • It is important that the mining company has continuous and close contact with the mining school, so that they can prepare prospective targeted courses that meet the future needs of the mining company. • On other projects there has been problems with retaining employees on site for long periods of time. Hans believes that it is an advantage with the 6 weeks on site/3 weeks at home rotation due to the fact that you have a fair amount of time at home and are able to live the traditional life with family and hunting. • In the spring of 2019, the mining school offers a course on machine operation for students in Qaanaaq. In April 2019, an information meeting was held in Qaanaaq with a representative from Dundas Titanium A/S. There is room for 12 students, and the mining school has received 26 letters of application. The theoretical part of the course will take place in Qaanaaq, but the practical part (three weeks) will take place at the mining school in Sisimiut. The expenses are covered by a PKU grant and the students will get all their expenses covered and will receive a salary during their education. The goal is to prepare the students for employment on the Ilmenite Project and/or the Alba project.	There is currently 14 students enrolled in the four-year long education to become a skilled mining worker. 10 first-year students and four second-year students. The education consists of two years of theory followed by two years of internship and, lastly, a test for completed apprenticeship. A series of shorter training sessions are also offered. There are 11 teachers/employees currently at the school. An addition to this, external teachers are used. The Greenland School of Minerals & Petroleum offer courses within the following: • Blasting technique • Rigging and Lifting • Crushing and sorting • Drill jumbo courses • Core drilling • Machine operating courses • Vibration measurement Blast planner with drone technology

Local residents/businesses	Qaanaaq Carpentry and contractor, Kim Petersen	13. March 2019	• It is a disadvantage that the mining company wants to build a runway in the license area. It would be a larger benefit for Qaanaaq if the airport in Qaanaaq was used. If the airport in Qaanaaq was used, it would both create revenue and jobs in the city, and in addition it would be easier to get employees from Qaanaaq to work on the project, if the company flew and/or sailed the workers to the site from Qaanaaq. • When the new airport in Ilulissat is established, the regularity in Qaanaaq will be improved. Today, a large share of the cancellations to/from Qaanaaq are caused by the short runway in Ilulissat, meaning the planes cannot be entirely filled up. Consequently, the planes cannot return to Ilulissat if they cannot land in Qaanaaq. Due to the requirements regarding alternative landing opportunities, the flights can also be cancelled if the weather is bad in Uppernavik, even if the weather is good in both Ilulissat and Qaanaaq. • Kim also estimates that it will be very expensive for the mining company to establish a runway on site. As an example, it cost almost DKK 100 million to build the airport in Qaanaaq. It must therefore make economic sense to fly to Qaanaaq and then from there use a helicopter and/or boat to Moriusaq. • It is important that requirements regarding employment of workers from Qaanaaq are made in the agreement with the mining company, as well as requirements regarding skill development must be made. • There must be access to the mining area for passersby. Citizens still must be able to get to land – it is an issue of culture, but also because Moriusaq functions as a place that provides overnight accommodation for travellers and also as a port of refuge in case of bad weather. • Kim is worried as he from the CBR register can see that Dundas Titanium A/S' parent company is registered on the Virgin Islands. It is very important that the company contributes to the Greenlandic society and pays the taxes that must be paid according to the law. Kim is in a defensive position towards the company, especially due the fact that it seems like the mining company during the exploration period has addressed Vectrus/Thule Air Base and not the local community. As an example, agreements regarding the secondment of employees from Vectrus has been made (without looking for Greenlandic workers first). This is not possible for other businesses and means that there are employees on the project that pay American taxes. To Kim's knowledge, no positions have been posted in Qaanaaq. Among other things, he is familiar with a person who has taken courses at the mining school and lives in Qaanaaq, and who has applied for a job without hearing back from the company.
Businesses	Royal Arctic Line	15. March 2019	• RAL, as a Greenlandic company, has a strong interest in being involved in the project. • RAL wishes to be heard and contacted regarding call for tenders within transportation in connection with the coming construction phase. RAL

			will of course respect the competition conditions that exist in the free market for transport projects, but gladly sees an opportunity for "last refusal". • Despite the fact that Moriusaq no longer belongs to RAL's license area, RAL has already in 2017/2018 proved that they during the exploration phase have been able to contribute with infrastructure and supplies to Blue Jay/Dundas Titanium A/S site in Moriusaq. • Therefore RAL is interested in bidding on freight services during the operational phase, perhaps with the setting up of a fixed regular service.	
Organisations	SIK, Jess G. Berthelsen	21. March 2019	• Overall, SIK is positive towards raw material projects and the Ilmenit Project. It is, however, very important that the authorities ensure that the working environment meet the legal requirements and that Greenland benefits from the project through taxes and royalties. • Today, there is already almost full employment for a number of professional groups in Greenland, e.g. electricians and carpenters. If people from professional groups that are already fully employed are hired by the mine, they will be missing somewhere else in Greenland. • There is a "double effect" with a project like this one: There must be attractive salary and working conditions to attract workers to the projects, but if the salary offered is too high, the employees will be missed on the coast. • There is a number of large construction projects in the pipeline in Greenland, including three airport projects which will lead to a bottle neck effect, and this will make it harder to attract Greenlandic labour to the Ilmenite Project. • It is positive that such a high proportion of the positions on the project are for unskilled and skilled workers, as this will make it easier to attract a large share of Greenlandic workers. • The project will be good for Qaanaaq, as the unemployment rate is higher in Qaanaaq than the national average. Thus, it will be positive if some of the unemployed workers are hired and their skills can be improved as a result thereof. • It is very important that there is a focus upon developing the skills of the possible Greenlandic workers, for instance in collaboration with the mining school. • It is suggested that it is considered to use different rotation systems for people that live in the local area and the rest of Greenland/abroad can be considered. • SIK cannot assess how many Greenlandic workers it will be possible to attract, as this depends on how competitive the conditions (salary and working environment) offered are in comparison with other projects (across several sectors). SIK hopes that unskilled ad skilled positions can be filled by locals, resulting in around 80 % Greenlandic workers.	SIK has at present no collective agreement for the mining sector, but work is being done to prepare a collective agreement, among others in collaboration with two ongoing raw material projects and GME. SIK plans to visit the project

Authorities	The Department for Fisheries and Agriculture (APNN)	22. March 2019	• APNN draws attention to the fact that there are bird colonies within the exploration license area, and that the existing restrictive zones must be respected. • APNN points out that the area is a reindeer area and that flying in the area must follow the prevailing rules, including the rule concerning the minimally permissible flying altitude. • It is stressed that fishing and hunting will not be permitted without a hunting license, fishing license or other licenses. • APNN draws attention to the fact that there is a concentration of walruses and a place of disembarkation for walruses in the area around Moriusaq, and disturbance of the walruses should be avoided. Furthermore, it is pointed out that the home rule administration's notice number 20 from 27th October 2006 about the protection of the walrus is under revision, and stricter rules concerning protection zones for places of disembarkation are expected. • The area is an important walrus hunting and sealing area. Therefore, the hunting periods must be respected. Sealing is allowed year-round from January 1st to December 31st cf. § 5, sub-section 4 in the home rule's notice number 16 from November 12th 2010 concerning protection and hunting of seals.	APNN has commented in writing. Questions have been answered directly to the Department by Orbicon and NIRAS; as questions and comments are primarily focused on the environmental area.
Expert	Kåre Hendriksen, Associate Professor, DTU	23. March 2019	• The mining company must acknowledge the large cultural differences between the traditional culture and the culture of the mining company. • It takes time and patience to build trust between the company and the local population, and it is important that it is possible to get in contact with the company, and that local contacts are made available for the locals. • To obtain a positive synergy, it is very important that the mine – and the leadership of the mine – understands the local culture; that they are open towards the local society, have a "everyone is welcome" attitude, and that great flexibility is shown regarding the relationship between employment and the traditional way of living. • The worst thing which the company can do regarding the local culture is to put up a fence along the border of the license area. • An important cultural understanding for leaders and the company is to understand that the locals at any means will avoid conflicts, and therefore, confrontations should not be made directly. • It is important that the company has focus on creating positive synergies with the local area. If not, the project will, at its best, not matter to the development of the area and, at its worst, be a hindrance to the development, e.g. by limiting hunting and fishing access. • It should be possible for hunters and travellers, who are in the area, to stay overnight at the project or in Moriusaq. Attention should be paid to the fact that larger groups may at times be travelling together.	Kåre's research area is focused on the relationship between infrastructure and business development. He has amongst other things expertise regarding outer districts and the settlements' economy and development opportunities. Over the past years he has especially focused his researched on Northern Greenland.

			• In addition to the possibility of staying overnight, it would create a positive relationship to the local society if passersby can buy fuel and other necessities at the mine (like at a depot). • To attract workers from Qaanaaq and the settlements, it is necessary that the company is flexible regarding employment (and not necessarily stands firm on the 6 week/3 week rotation), and that the traditional way of life is accepted. • To attract as many local workers as possible to the project, it would be a good idea to hire the locals in the fall (between September and February), and then hire the international workers during the other months of the year. That is to say that permanent employment not necessarily should be offered, but instead employment per "time" at the mine. • It would be positive if local building contractors could be used when possible, and as many goods as possible should also be bought through KNI. This, and the use of local transport infrastructure, can in addition to creating employment perhaps be the best support for the local society, as transport is limited and expensive. • It would create larger growth in the local area and greater cohesion in the region if the mining company used Qaanaaq airport to fly employees to and from the project area. A shorter 600 m runway could perhaps be constructed on site, which could be used for flying employees to and from Qaanaaq. It would mean stationing of a smaller fixed-wing aircraft in the district, which will also be able to fly to the three settlements. • Even though there are not many today who use the area for hunting and fishing, the tendency is turning. The fear that animals from the area are unsafe due to pollution from the B-52 flight is disappearing. Additionally, a displacement of the hunting areas is happening due to a change in the ice conditions. As a consequence, there are no longer as good opportunities for walrus hunting in Siorapaluk. Moriusaq is then the natural place to go instead. • It speaks in favour of re-establishing an actual settlement by Moriusaq in connection with the mine, with a school, shops etc., where the inhabitants can both work at the mine and go hunting and fishing. • Fishing has created large economic growth in Qaanaaq, and tourism is increasing. Kåre believes that the area is not "dependent" on the mine in order to become economically sustainable, as the district has other good potential. However, a mine with local jobs can contribute to reducing vulnerability towards fluctuations etc.	
Local residents/businesses	MBJ VVS ApS, Morten Bork Jepsen	3. April 2019	• It is an exciting project and there are different possibilities of employment. Morten is generally positive towards the project, but emphasizes that it is important that the mining company and the local community play "on the same team" and that the projected is not detrimental to the interests of Qaanaaq.	MBJ provides employment for five people in Qaanaaq.

			• It is important that the project does not influence the infrastructure in Qaanaaq negatively, and there should not be given preference to the project, e.g. in regards to freight. RAL has in 2019 announced that departure from Denmark is two days earlier, as there must be a stopover in Moriusaq on the way. This means that the mine negatively impacts the freight time, and freight arrangements must be made earlier than before. Additionally, it is important that the town has preference in terms of the space on the freight ships. It must be thoroughly considered, how RAL prioritizes. • It is important that the project does not attract the "good" workers away from Qaanaaq. • Information from the company during the exploration period has been missing, and this easily creates a feeling of not being informed, or even of being misled. It is important that the company is present in the city and provides information continuously. • Morten has heard that some of the hunters have not felt welcome in Moriusaq. However, he also understands that it is a working site and that you cannot just come and go. It is a fine balance, but the hunters must be allowed access. • As a businessman in Qaanaaq, it feels unfair that the mining company during the exploration phase has applied other rules than other businesses in the area. As an example, there is the collaboration with Vectrus, where workers from the company has been hired before the jobs had been posted in Greenland. • To retain employees, Morten lets his own employees go hunting during the season. It will be necessary for the mining company to take similar considerations, in order to retain local workers.	
Authorities	Business consultant in Qaanaaq, Arruttaq Qujaukitsoq	4. April 2019	• Arruttaq is generally positive towards the project. • There is a considerable interest for the project among the citizens of Qaanaaq. • The unemployment rate in the town is high, and therefore it is of strong interest to have a large worksite relatively close by.	Arruttaq Qujaukitsoq has contributed with baseline information regarding the employees at the fish factory, the number of leisure and business licenses in Qaanaaq as well as the settlements and tourism in the area.
Businesses	Qaqortoq Entreprenørforretning ApS (QEF), Lars Motzfeldt		• QEF is responsible for building the new breakwater in Qaanaaq and therefore has experience with larger construction work in Qaanaaq. • QEF's employees for the breakwater project have not been from Qaanaaq. • QEF would be interested in bidding on construction projects for the mining company. • There can only be built on the breakwater in the summer. The employees have all been approximately four months in Qaanaaq during the summer, without returning home during this period. The employees	QEF have 55 employees and primarily carry out construction work in Southern Greenland, but bids on projects all over Greenland. Employs primarily Greenlandic workers.

			have accepted this and Lars therefore also expects that many employees will be able to accept a rotation of six weeks on site, as it is suggested in the project description for the Ilmenit Project. • Lars's gut feeling concerning how many Greenlanders it is possible to hire during the construction phase of a mining project like the Ilmenit Project is approximately 10 %.
Businesses	TelePost, Allan Lynge TelePost, Allan Lynge	April 9th 2019 September 20.th 2019	• The current phone capacity in the area is very limited. Today, satellite links are pulled down in Qaanaaq and on Pittufik and radio links then go from there to the settlements. It is not an optimal solution and it is very expensive. To supply the license area during the exploration phase, the satellite connection at Thule Air Base has been used. • The current capacity can handle the current situation, but will not be able to handle a mine with 175 employees. • At other mining sites Tele-Post has "extended the radio link" to the mining site. Here, the mining company has paid for this service (construction and operation of the link) and then the employees and the company have been able to connect to the network. This is, however, not possible for this project as the signal is not strong enough to establish a radio link. Tele-Post therefore consider satellite-based solutions which currently are in use for the region and which will be increased in capacity and improved in the future • Tele-Post expects to make a major investment in the satellite-based telecommunication solutions in the remote areas over the next 1-2 years. This timeframe is well-fitted with the Ilmenite project and the need for increase in capacity when entering production. Furthermore, Tele-Post states that within this time-frame they can incorporate the needs of Dundas Titanium A/S in future solutions and increase the capacity • The project is an important part of Tele-Post's considerations regarding supply in the area in the future. It is important that a solution that benefits the whole area is found, and which at the minimum does not worsen the current supply. Tele-Post points out, that Dundas Titanium A/S as a business, will be charged for the capacity-related expenses associated with the use of telecommunication. This means that the Ilmenite project will contribute to the development and increased capacity of future telecommunication in North-West Greenland. • It is important that the current dialogue between Tele-Post and the mining company is continued in order to align expectations ,and to ensure a good solution will be found.
Civil society	KNAPK, local president in Qaanaaq, Mads Ole	11. April 2019	• Mads Ole has read the project description and has no concerns regarding the project, as long as the fishers and hunters have possibilities for staying overnight when travelling through the area in the case of bad weather conditions. Therefore, it is important that the area is not totally closed off. Moriusaq has a good mooring space even in the case of bad weather.

			• Mads Ole explains that hunting of polar bears has become more popular in the area, and the hunters can use Moriusaq as base. The same applies to walruses in the spring and narwhales in the fall. When the hunting season for musk oxen start, Moriusaq is used for overnight stays when travelling through this area. • It would be a big help if passersby can buy gasoline and petroleum at the mine. Today they travel far to get more fuel. • Mads Ole does not believe that the animals in the area will be disturbed by the project, as there is already a lot of noise and activity from Thule Air Base.	
Local residents/businesses	Board of Directors of the settlement, Savissivik, Mequ S. Hansen	12. April 2019	• Some of the settlement residents have expressed concern regarding whether the project can result in pollution. • There are still several unemployed people in Savissivik in the summer. It is suggested that the mining company also sends any job postings to the settlement so they can be printed and put up on the notice board. This way, the residents are made aware of the open positions.	The project description that has been forwarded in connection with the stakeholder involvement has been printed and hangs on the notice board in the settlement.
Authorities	Avannaata Municipality, The Administration for Business, Chief Executive Hans Peter Lennart	17. April 2019	• The municipality is mostly positive towards the project and the jobs that will be created in the municipality, if the project is completed. • It is important that focus is put upon attracting job seekers from the entire municipality, and not just from Qaanaaq. • It is positive that the project in addition can lead to education and improvement of the skills of the citizens of the municipality. It is a positive initiative from the Greenland School of Minerals & Petroleum that they now offer courses in Qaanaaq, and it would be interesting to make similar courses in other towns in the municipality. • Job seekers will typically contact their local Majoriaq to have development plans made [the Majoriaq centres function as the connecting link between education, labour market and the industry for job seekers and citizens that want to improve their skills]. It is therefore important that the Majoriaq in different towns are aware of the opportunities the Ilmenit Project offers. • It is positive that the mining company has established an office in Ilulissat and the municipality is very interested in collaborating with the company, in order for the municipality to benefit as much as possible from the project.	
Local residents/businesses	Kim Fritze, building contractor in Qaanaaq	8. May 2019	• Kim is generally positive towards the project, as he expects that it will have positive impacts on the local community. • Kim assesses that it will be very difficult to attract workers from Qaanaaq to work at the mining project. As an example, not many have been hired from Qaanaaq at Pittufik (Kim believes that no more than 2 from Qaanaaq have worked there at a time). Many have started, but have stopped again after a short period.	Kim has lived in Qaanaaq for the past 30 years. He has a building contractor business and generally employs local workers for the projects he solves.

	• The working culture in Qaanaaq is very different from the rest of Greenland, Denmark and Europe. People "live in the present" and take time off work unplanned, e.g. when there are whales and walruses. As an example, there are 100-110 annual appointments at the retirement home in Qaanaaq, because employees resign after a short period, and then come back and look for work again after a while. • People cannot be forced to work or stay in a job if they do not want to. • Another cultural problem is that there is a lot of jealousy between spouses. This means they will not let each work far away from home. As an example, Kim has had a project in Savissivik where one of his employees could not go because his wife would not let him, as she was afraid of infidelity. • Kim has adapted to the local circumstances by spending more time on projects than he would anywhere else. If his employees take time off or do not want to work long days, he adjusts the project accordingly. For larger projects he has also hired labor from outside of Qaanaaq/Greenland. • It is positive that an attempt is made to have a training course at the local mining school to educate the locals, so they are better qualified to apply for jobs at the mine. But even if they complete the course, it is not certain that they will want long employments. When the airport was built in Qaanaaq, the same was done. Even though approx. 12 people completed the training course, they did not help building the airport, as the long work days and long employments made them resign quickly. • It is positive that the mining company shows interest in the local community and it would be positive if they could support the different charitable projects in Qaanaaq, such as activities for children, playgrounds or internet cafes. • The project would be more beneficial for Qaanaaq, if people were flown to the project using the airport in Qaanaaq instead of flying directly to the mining site.

8 Analysis of alternative project proposals

Article 18(3) in the Mineral Resource Act states: *"A licence under section 16 may lay down the extent to which the licensee must process exploited mineral resources in Greenland. However, minerals may be processed outside Greenland if processing in Greenland would result in significantly higher costs or greater inconvenience".*

The following description will assess the considerations given to alternative processing options for the project. In order to understand the possible alternatives, supplemental information for the ilmenite and titanium slag market will be presented.

8.1 Summary of alternatives considered

The processes considered for the project to take place in Greenland focus on removing non-value fractions from the ilmenite in order to produce an ilmenite-concentrate. This is done in three steps:

1. Oversize fractions are removed during the first step of processing.
2. Removal of 'light' minerals (with a specific gravity <2.9 g/cm^3) by wet gravity separation. This produces a heavy mineral concentrate (HMC) which contains the ilmenite.
3. Dry magnetic separation is then used to separate the ilmenite concentrate from the highly magnetic and non-magnetic minerals in the HMC (ilmenite is medium magnetic).

The project design's end-products produced in Greenland are two products; 'Premium Ilmenite' and 'Standard ilmenite'.

Both 'premium ilmenite' and 'standard ilmenite' products are suitable for direct use as a feedstock material in manufacturing of both TiO_2-pigment and titanium slag[40] via the 'sulphate process' (see Figure 8.1). 'Premium ilmenite' is also suitable for manufacturing titanium slag via the "chloride process" due to the lower content of calcium-oxide (CaO) and magnesium-oxide (MgO) contents. Titanium slag is sold to manufacturers of TiO_2-pigment and producers of titanium tetrachloride for titanium metal. The chemical composition of the ilmenite determines if the slag produced is suitable for the sulphate process or the chloride process.

The alternative processing reviewed are:

- Alternative I: Dry magnetic separation outside of Greenland
- Alternative II: Smelting of ilmenite to produce titanium slag on-site in Greenland

The conclusions on these alternatives are summarized below figure 8.1. The full review of the alternatives can be found in section 8.3 and 8.4.

[40] Titanium slag is one of the main feedstock types for the TiO2 manufacturers. See also section 8.4.

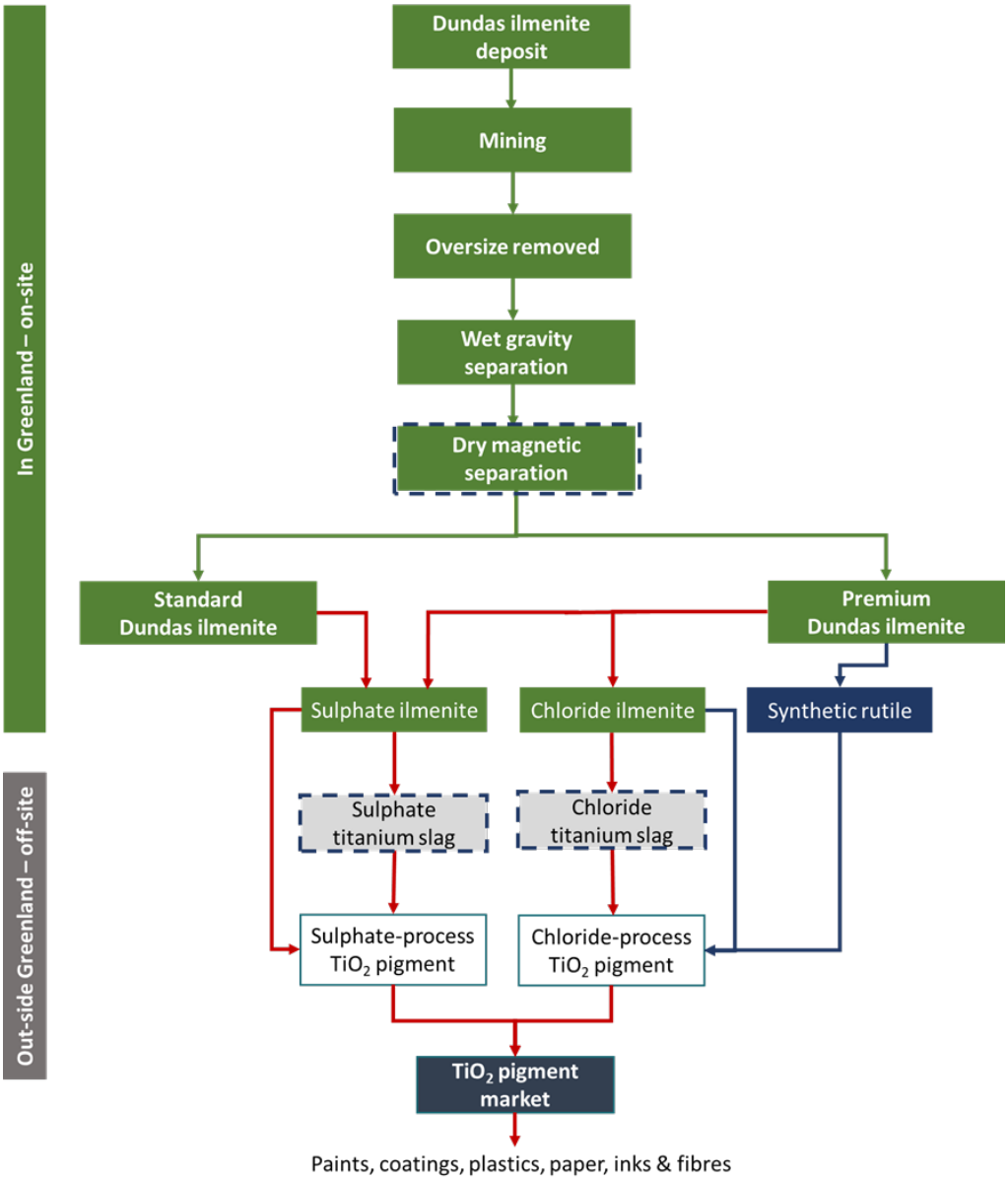

Figure 8.1: Flowchart of possible routes for ilmenite from ilmenite mine towards the production of TiO2 pigment. Over 90% of the TiO2 bearing minerals (ilmenite and rutile) extracted globally are consumed by the TiO2 pigment industry. All boxes and arrows in green indicate the processing or the products produced in Greenland. The red arrows indicate the possible options for the ilmenite products that are produced from the ilmenite mine. Blue lines indicate routes that are not possible as a result of the chemical composition of ilmenite from the mine. The chemical composition of the ilmenite determines which routes are possible. The blue-outlined dotted boxes are the processing options that were considered both within and outside of Greenland. 'Standard ilmenite' and 'Premium ilmenite' refers to the two ilmenite concentrate products that will be produced at the ilmenite mine and shipped to off-takers.

Alternative I - summary: Dry magnetic separation outside of Greenland
Dundas Titanium A/S considered the possibility of performing the dry magnetic separation process phase outside of Greenland. This would have resulted in the mine producing a heavy mineral concentrate on-site, rather than a standard or premium ilmenite product. After evaluating this scenario, it was determined that it was more beneficial from a cost and operational standpoint to produce an ilmenite concentrate. These considerations are described in section 8.3.

Alternative II - summary : Smelting of ilmenite to produce titanium slag on-site in Greenland
After it was decided that the dry magnetic separation phase would be performed in Greenland, smelting of ilmenite to produce titanium slag on-site in Greenland was also considered for the Ilmenite Project. Titanium slag would then be sold and exported to international markets outside Greenland to the manufactures of TiO_2 pigments.

To produce titanium slag from ilmenite, the ilmenite concentrate must be processed in an extremely energy intensive thermal metallurgical process. This process requires materials such as sub-bituminous coal (used as reductant), ammonium chloride and sulphuric acid (used for leaching), as well as energy and water. In some operations is it required to blend ilmenite with different chemical composition and characteristics from different sources to produce the most optimal, highest quality, titanium slag. As a result, a smelter operation in Greenland may also be required to import ilmenite from other sources world-wide in order to produce the highest valuable titanium product possible.

The technology required for smelting of ilmenite into a titanium slag is complex, and locations of such plants are primarily determined by the access to cheap and reliable electricity supply. A titanium-slag smelter is a very large industrial facility. Globally, smelter facilities used to produce titanium slag have been developed by a small number of individual operators, including some who use the product in their own vertically-integrated TiO_2 pigment production processes.

Extreme capital and operating expenses, lack of reliable, inexpensive power, a harsh, remote climate for metallurgical processing, a limited transportation window to bring materials in and out, proprietary technology, increased environmental footprint, increased emissions and discharges, and marketing limitations mean that it is not feasible to incorporate smelting into the project. The process and considerations behind this decision is further described in section 8.4.

8.2 Market for ilmenite products from the mine

In order to evaluate the different scenarios for alternative processing in or outside of Greenland, it is important to understand the demand and market for ilmenite as it affects the relevant alternatives to the suggested project.

Ilmenite ($FeTiO_3$) is a primary ore of titanium (TiO_2). Ilmenite is a commodity product, which means that the price is driven by supply and demand. Demand for ilmenite and other TiO_2 bearing materials primarily derives from the market for feedstock for pigment production. Approximately 90% of TiO_2 feedstocks are used in the manufacturing of TiO_2 pigment; an important white pigment used in paints and coatings, plastics, papers, inks and fibres. The remaining titanium feedstock is used in the production of titanium metal (6%) and a range of other products, such as the flux in welding rods (4%) .

Currently, more than 90% of the TiO_2 feedstocks use ilmenite or an upgraded ilmenite in the form of titanium slag or synthetic rutile. Titanium slag is a titanium material that are metallurgically upgraded so that it has a higher content of TiO_2 and a lower amount of iron than ilmenite alone. As a result, the review of alternative processing methods is focused on the primary market for ilmenite, which is the TiO_2 pigment manufacturing market and the titanium slag market.

TiO_2 pigment manufacturers use two methods to produce the pigments; either the sulphate process or the chloride process. The sulphate process for producing TiO_2 pigments currently accounts for around 55 % of the installed capacity, with the chloride process accounting for the remaining 45%. However, the share of the chloride process is growing as new facilities are built and older sulphate process plants are shut down.

Ilmenite's ideal chemical composition is $FeTiO_3$. Ilmenite typically contains between 45 and 60 % TiO_2 with most of the remainder being iron oxides. Ilmenite

from Moriusaq has a TiO_2 content of approximately 46 % with variable amounts of minor components such as magnesium, manganese, calcium or other trace-elements such as vanadium, chromium, etc.

Ilmenite with a TiO_2 content around 46 %, as for the ilmenite from the mine, could in principle be used directly in the sulphate process to produce TiO_2 pigment. However, higher TiO_2 content in the feedstock material is preferred by the manufactures of TiO_2 pigment as it is more feasible for the sulphate process, generate less waste and produce a better end-user product (minimum impurities at competitive prices). Worldwide only a single TiO_2 pigment producer has the capability to use natural ilmenite directly in the chloride process where higher TiO_2 feedstocks are preferred, usually with >85 % TiO_2.

Naturally occurring minerals with high TiO_2 content (>85 % TiO_2), such as rutile, are limited in availability so processes have been developed to increase the TiO_2 content of ilmenite by removing iron. The increase in TiO_2 content is achieved through a conversion (upgrade/beneficiation) of natural ilmenite through a high temperature metallurgy process in which a titanium-rich material that have a higher content of TiO_2 than the natural occurring ilmenite is produced. This material is referred to as 'titanium slag'.

The produced titanium slag can be focused on either the sulphate or the chloride process. Sulphate-process focused titanium slag cannot be used as a feedstock in the chloride process as it need ilmenite with low CaO/MgO. Approximately 85 % of the ilmenite from mine is suitable for chloride slag.

Consequently, three markets are identified forilmenite concentrate from the mine (see also Figure 8.1):

1. Direct use for the manufacture of TiO_2 pigment by the sulphate-process, and
2. Feed material to produce titanium slag by smelting which can be used as feedstock for TiO_2 pigment production by the sulphate-process, and
3. Feed material to produce titanium slag by smelting which can be used as feedstock for TiO_2 pigment production by chloride processes.

8.3 Alternative I: Dry magnetic separation outside of Greenland

During the project development it was considered to only perform gravity separation on site, shipping a heavy mineral concentrate (HMC) from Greenland to an international location for magnetic separation, before delivering an ilmenite concentrate to a producer of titanium slag that would then undertake the advanced processing (high temperature smelting of the ilmenite concentrate).

The magnetic separation of the HMC material could still be undertaken by Dundas Titanium A/S, only at an international location outside of Greenland. HMC material from Dundas Titanium A/S could also be sold directly to buyers, who then would have to undertake the ilmenite processing and titanium slag smelting themselves.

As explained above, the HMC must be dried following the gravity separation because magnetic separation is a dry process. The fuel usage for the drier, which would run on diesel, was initially believed to justify transporting of the HMC to an international location, e.g. Quebec in Canada, with less expensive energy sources (i.e. hydro power) required for drying. However, during the project development it

became clear that in order to store HMC material during periods without a shipping opportunity, it would still be necessary to dry the material to prevent freezing during the winter months. The evaluation showed that it would be technologically possible and operationally beneficial for Dundas Titanium A/S to perform the processing in Greenland as this significantly reduced the amount of material required to be shipped from Greenland. The additional processing of the HMC material into an ilmenite concentrates also allows for the production of higher value products (i.e. Premium/Standard Ilmenite vs HMC).

Conclusion: The cost estimates of the two scenarios illustrates that it was economically beneficial for the project to perform both the gravity separation and the magnetic separation to produce a dry ilmenite concentrate before storage in advance of shipping during the shipping window. Consequently, Dundas Titanium A/S has decided to produce an ilmenite concentrate - and not only a heavy mineral concentrate - on site in Greenland.

8.4 Alternative II: Smelting of ilmenite concentrate to produce titanium slag on-site in Greenland

This summary will assess the additional requirements necessary to refine the currently scoped ilmenite concentrate into titanium slag. Due to technological, operational, environmental, and economic considerations, Dundas Titanium A/S has determined titanium slag production is not feasible in the Ilmenite Project in Greenland and this option has been excluded from the proposed project.

Details of the evaluation have been presented in a technical report[41] developed by Bluejay Mining plc/Dundas Titanium A/S which is provided as a technical report to this the study.

Smelting of ilmenite yields titanium slag, which is traded at a higher price, but consumes nearly 2 tons of ilmenite per ton of titanium slag. The possible potential value added from this processing is outlined in Table 8.1. The potential added value amounts between US$ 264-379M depending on the applied trading price for titanium slag (US$ 657-721/tonne)[42].

[41] Bluejay Mining PLC (2019). Bluejay Mining Technical Report: Assessment of Titanium Slag production complex in Greenland within the Dundas Ilmenite Project. Page 17
[42] M = million; so, in this case US$ 264,000,000 to 379,000,000.

Table 8.1: Economic figures and estimate of possible value added to the Ilmenite Project by adding a titanium slag production complex to the project in Greenland. The abbreviation M = million.

	Unit	Estimate
Ilmenite price per ton[43],[44]	US$	$232
Tons of titanium slag per ton of ilmenite	Tons	0.45
Total tons of ilmenite per anno production (currently planned)	Tons	440,000
Tons of titanium slag per anno from current planned ilmenite production	Tons per anno	200,000
Titanium slag price per ton[45]	US$	$657–721
Estimated value of one ton of ilmenite upgraded to 0.45 tons titanium slag	US$	$295–324
Life of mine LOM (currently planned)	Years	9
Estimated total value of the currently planned ilmenite concentrate production at the currently planned life of mine (9 years)	US$	$919M
Estimated total value of the currently planned titanium slag production at the current planned life of mine (9 years)	US$	$1,183–1,298M
Possible value added to the project by titanium slag production	US$	**$264–379M**

The potential number of jobs added by the titanium slag production is estimated to be 150 employees and the potential annual income tax revenue estimated at US$ 3.4 per year[46]. The capital expenditure (CAPEX) and operating expenditure (OPEX) for the ilmenite concentrate processing facilities (as currently planned and outlined the developed pre-feasibility study for the project).

The estimated CAPEX and OPEX of the titanium slag processing complex is detailed by the Mining Company in 'Bluejay Mining plc Technical Report 2019 No. 01' (see note 27). This report presents technical aspects and considerations for a titanium slag processing complex built at the site in North-West Greenland. It furthermore presents estimates of the capital expenditure and operational expenditure that would be associated with such a facility. Also, none-technical aspects are assessed by the report, such as environmental, social, operational, market and business model perspectives of an operation in Greenland.

[43] Bluejay Mining PLC (2019). Summary of Pre-Feasibility Study for the Dundas Ilmenite Project. RNS Number: 5724D. https://polaris.brighterir.com/public/bluejay_mining/news/rns/story/wk5z7yw/export

[44] U. S. Geological Survey (2019). USGS National Minerals Information Center Annual Publications 2018.https://prd-wret.s3-us-west-2.amazonaws.com/assets/palladium/production/atoms/files/mcs-2019-timin.pdf For the 'Ilmenite, import, dollars per ton' over the period 2014-2018 is the minimum and maximum ilmenite price per ton between US$ 142 to 220; with an average of US$ 184. These prices reflect yearned average from different project. Although prices of titanium slag per ton for the period 2014-2018 is used in the table and in the calculation it is found most appropriate, although there are inconsistency in the pricing period/years, to use ilmenite price found by the pre-feasibility study done in 2019 by Bluejay Mining as this is the best currently estimated price of the material from the Dundas project.

[45] U. S. Geological Survey (2019). USGS National Minerals Information Center Annual Publications 2018 https://prd-wret.s3-us-west-2.amazonaws.com/assets/palladium/production/atoms/files/mcs-2019-timin.pdf. Based on this, the calculated price average per ton of titanium slag for the years 2014-2018 is between USD$ 657-721.

[46] Bluejay Mining PLC (2019). Bluejay Mining Technical Report: Assessment of Titanium Slag production complex in Greenland within the Dundas Ilmenite Project. Page 10

Table 8.2: Overview of capital (CAPEX) and operational (OPEX) expenditure associated with a ilmenite concentrate facility (currently planned) and a titanium slag processing complex (evaluated as an alternative proposal) in Greenland. The CAPEX and OPEX estimations for the titanium slag processing complex is detailed by the Company in 'Bluejay Mining plc Technical Report 2019-01 The CAPEX and OPEX for the ilmenite concentrate processing facility is from the pre-feasibility study developed for the planned mining and processing at the ilmenite mine by Bluejay Mining plc/Dundas Titanium A/S.

	Estimated CAPEX ($USD)	Estimated OPEX* ($USD)
Ilmenite concentrate processing facility in Greenland	$245M	$296M
Titanium slag production complex in Greenland (scenario of such complex in Greenland without considering an Arctic Factor on the costs; see also details in 'Bluejay Mining plc Technical Report 2019-01)	$972M**	$355.5M**
Titanium slag production complex in Greenland (scenario of such complex in Greenland with an Arctic Factor on the costs taken into account; see also details in 'Bluejay Mining plc Technical Report 2019-01)	$2,093M – $3,122M	$422.1 – $540.9M
Total cost to produce both ilmenite concentrate and titanium slag in Greenland (with an Arctic factor on cost taken into account)	$2,338 – 3,367M	$890.8 – $989.6M

*Operating cost over the life of mine (9 years).

** Without an Arctic Factor on the estimated CAPEX and OPEX.

Without the titanium slag production complex the current planned mine and processing of an ilmenite concentrate amounts a CAPEX of US$ 245M (converted to Danish kroner 1,7 billion DKK).

A titanium slag production complex in Greenland is estimated to amount an estimated CAPEX of US$ 972M. This is on its own nearly 4 times the CAPEX for the currently planned project. The estimated CAPEX of US$ 972M of the titanium slag production complex converted to Danish kroner would be around DKK 6.56 billion. It should be noted, that the US$ 972M is without the Arctic Factor. Applying an Arctic Factor the estimated CAPEX cost would be raised to US$ 2,093M to 3,122M (DKK 14.13 billion to DKK 21.1 billion).

Adding the titanium slag production complex to the currently planned project will, without considering the Arctic Factor on the titanium slag complex, raise the total CAPEX from US$ 245M to US$ 1,214M. This is a five-fold increase of the total capital expenditure for the project. If the Arctic Factor on capital expenditure is taken into account the total CAPEX for the project will between US$ 2.338 billion to US$ 3.367 billion; which would be equal to a ten- to fourteen-fold increase in the total CAPEX.

Consequently, as outlined in Table 8.1 as the possible value added to the project by titanium slag production only amounts $264-379M it would not be economically feasible adding the titanium slag production facility to the project in Greenland. The large capital and operating expenditures outweigh the possible value that could be added for this operation. Hence, titanium slag production at the mine is not economically feasible.

In addition, the estimated CAPEX and OPEX in Table 8.2 only highlights the financial ramifications of smelter construction. There is a number of environmental considerations as well as consideration on social aspects, market access, project financing, and timeline for a potential titanium slag production facility in Greenland which would be problematic, and which would further hinder the development of the project. These conditions and considerations are described in the above-mentioned technical report produced by Bluejay Mining.

Overall, to produce a titanium slag product in Greenland at the mine would not be economically, technically, operationally, and environmentally feasible, and will not be given further consideration by Dundas Titanium A/S. Details of this assessment are also included in the abovementioned technical report.

Although it has been demonstrated that it is not economically, technically, operationally, and environmentally feasible to produce a titanium slag product in Greenland estimates of tax revenue, jobs and other potential positive impacts are provided below.

It is estimated that 150 workers[47] would be needed for the furnace-smelter facility itself if a titanium-slag production had been found to be feasible. If an average tax revenue per employee similar to the estimate for the currently planned mining operation in the Ilmenite Project is assumed the annual income tax revenue for 150 employees is estimated to be 23M DKK (US$ 3.4M) per annum. The 150 workers in the smelter-furnace operation and the operation itself will need to be supported and services. It is estimated that 50 workers would be involved in this. This would bring the total workers up to approximately 200 in total for the smelter-furnace operation if it was found to be feasible at the mine. The total income tax revenue would accordingly be 30.1M DKK.

As the possible value added to the project by titanium slag production of $264-379M over a nine-year period and the cost of the CAPEX is between $2,093M–$3,122M and OPEX between $422.1 – $540.9M would this result in a large economic deficit. Consequently, would there not be any company tax revenue. This also illustrate a titanium slag production is not viable economically in the Ilmenite Project.

Of other positive impacts that could be considered if it had been found that a titanium slag production in the Ilmenite Project was feasible are for example: new jobs within the down-stream industrial value chain, new jobs with higher skills requirements, larger need for subcontracted services and goods, etc. It should be noted that the currently planned mining scenario already includes these positive impacts and that the current project will allow a natural-growth of the labour force in Greenland so that it in the future it is more likely that there will be a larger number of higher skilled workers. This also means that down-stream industry and

[47] Bluejay Mining PLC (2019). Bluejay Mining Technical Report: Assessment of Titanium Slag production complex in Greenland within the Dundas Ilmenite Project.

more advanced processing can be considered and found to be feasible in other more accessible parts of Greenland.

8.5 Conclusion on alternative project proposals

It is economically beneficial for the project to perform both the gravity separation and the magnetic separation to produce a dry ilmenite concentrate on site at the mine. To produce a titanium slag product at at the mine would not be economically, technically, operationally, and environmentally feasible, and will not be given further consideration by Dundas Titanium A/S.

9 Cumulative effects

Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned, and/or reasonable anticipated future ones[48].

The potential cumulative effects for the Ilmenite Project are described in chapter 5, with focus on respectively cumulative effects on the job market (section 5.2.3) and cumulative effects not related to the job market (section 5.6.3).

10 Baseline data summary

This chapter contains a baseline summary, focusing on describing baseline information applied in the impact assessment. A more comprehensive social baseline description is given in appendix 3.

Due to the limited project size, the project is assessed to mainly impact the local communities in the Thule region, wherefore this baseline summary is focusing on this area.

The Ilmenite Project is located in the Municipality of Avennaata, 80 km south of Qaanaaq. Qaanaaq is the most northern town of Greenland, and is in some physical and cultural regards very isolated from the rest of the country.

Population and income

The Municipality of Avannaata had a population of 10,584 people by January 1st 2018, and is the second most populated municipality in Greenland. The majority of the people live in the south of the municipality, with 4,563 people living in Ilulissat. 628 people live in Qaanaaq, 60 people in Savissivik, 42 people in Siorapaluk and 23 people in Qeqertat. The population of Qaanaaq has been decreasing during the past ten years[49]. Qaanaaq has a growing elderly population, and a large part of the population is younger than 15 years old.

Out of the 10,584 people living in the Municipality of Avannaata, 519 have been born outside of Greenland which is equivalent to approximately 5 %. The majority of the people born outside Greenland live in Ilulissat. In Qaanaaq, 24 residents have been born other places than Greenland. This is equivalent to approximately 3 % of Qaanaaq's population.

The local population in the Thule region is called Inughuit (the proud people) and the local cultural traditions such as drum dancing and kayaking play an important

[48] IFC (2017). *Good practise handbook: Cumulative Impact Assessment and Management - Guidance for the Private Sector in Emerging Markets*

[49] Qaanaaq is covering both Qaanaaq town and Savissiik, Siorapaluk and Qeqartat

role in the cultural life of the inhabitants. A large share of the population speaks the Inuktun language, which is different from Greenlandic. Greenlandic and Danish is also widely spoken.

Ilulissat, the main town of the municipality, is located more than 1,000 km to the south of Qaanaaq. Transportation to Qaanaaq is with a weekly plane from Ilulissat and there is supply of goods by boat twice a year.

The average household income in Qaanaaq town has been steadily increasing and was approximately DKK 300,000 in 2017. Households in the former Municipality of Qaasuitsup[50] have an income which is approximately DKK 50,000 lower than the average Greenlandic household. The average household income in Qaanaaq has not been increasing as much as the average Greenlandic income and the income in Municipality of Qaasuitsup.

Business environment
Qaanaaq has a limited number of privately owned businesses. Hunting and fishing are important trades, and there is a fish processing facility located in Qaanaaq. There are limited tourism activities in the area. The town has one small hotel and a few holiday houses, one plumber, one car repair workshop, one grocery store, two carpenters and one paint shop. The largest business in Qaanaaq is the fish processing facility owned by Inughuit Seafood A/S, which occupies 15-19 workers[51]. The number of employees at the fish processing factory is highest during winter. Hunting and fishing are important occupations for many of the inhabitants.

More than 50 % of the employed people in Qaanaaq work in the public sector, 16 % are employed within the fishing, hunting and agricultural sector and 15 % in the whole sale sector. Less than 5 % of the employed population in Qaanaaq work in the remaining nine sectors, and Qaanaaq currently neither has a mining and quarrying sector, nor a manufacturing sector.

Employment
The unemployment rate in Qaanaaq is higher than the unemployment rate for the whole country. Qaanaaq has one of the highest unemployment rates in Greenland[52]. It is important to note that the population in Qaanaaq is very small compared to Greenland and the statistics of the area are therefore volatile and more subject to errors. The unemployment rate is especially high amongst young women living in Qaanaaq. For women between 18-24 years, the unemployment rate is 33 %, which is approximately twice as high as for the rest of Greenland.

The unemployment rate in Qaanaaq has decreased from 2014 to 2017, but is relatively volatile, and lies approximately between 10 and 18 %, depending on the quarter of the year, due to the many seasonal jobs. Because of this, the unemployment is generally higher during winter than it is during the summer[53]. In 2017, the unemployment rate in Qaanaaq was the lowest during the third quarter of the year.

[50] The Municipality of Qaasuitsup was split in two municipalities on 1 January 2018: Municipality of Avannaata and Municipality of Qeqertalik
[51] Royal Greenland A/S (2019)
[52] Statistics Greenland (2020)
[53] Ministry of Finance and Taxes (2017)

The barter economy has a significant role in Qaanaaq, especially in the settlements. Hunting contributes substantially to the families' consumption of food. Furthermore, it gives the families an extra unregistered income from sales through informal channels.

Education

There are no high schools in the Municipality of Avannaata. Because of this, young people have to leave home in order to complete high school. The level of achieved education is lower in the Municipality of Avannaata compared to the country average.

The formal educational attainment of people living in Qaanaaq is lower than for the municipality. Qaanaaq has a Majoriaq, which offers vocational education and training. 79 % of the people living in Qaanaaq have not attained any education above lower secondary school. The nearest high school is in Aasiaat.

Health and social status

Qaanaaq town has a health care station, while the three settlements all have a nursing station. The most common cause of death in Qaanaaq is cancer and on average one suicide is seen annually.

In October 2018, Qaanaaq started a new voluntary initiative to help prevent suicides. The initiative is aimed at young people and will be run by young people between 14-22 years.

Qaanaaq is challenged with social problems, including high alcohol consumption, marihuana abuse, and sexual offences. Qaanaaq also struggles with a relatively high lack of housing. It is therefore normal that three generations live in two rooms[54]. It is estimated that approximately a quarter of all adults in the town of Qaanaaq are homeless and are forced to sleep at their friends' or family's place[55].

In 2017, 39 offences were reported in Qaanaaq. The most common offence was burglary with 17 cases. The second most common offence was violence with 12 cases. In 2017 there were also 7 sexual offences, where 3 concerned rape, 3 concerned sexual relationships with children under 15 years and 1 concerned an offence against public decency. Qaanaaq was also the scene of one homicide in 2017.

[54] Hendriksen & Hoffmann (2016)
[55] Sæhl, Kirk & Veihe (2018) and stakeholder interviews

11 Overview of appendices

11.1 Appendix 1: Methodology

In appendix 1 the SIA methodology and guidelines used for the project is presented.

11.2 Appendix 2: Legal and administrative framework

In appendix 2 the main Greenlandic regulation and guidelines impacting the project are presented. Furthermore, international conventions that are relevant for the project are listed.

11.3 Appendix 3: Baseline data and baseline description

In appendix 3 the full social baseline at local, regional and national level is presented. The appendix gives a more detailed baseline description that the baseline summary presented in the main report, and can provide inputs for later monitoring purposes.

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