ORBICON

Bluejay Mining Plc

Dundas Ilmenite Project

Environmental Impact Assessment
Non-technical summary

Draft

February 2020

Bluejay Mining Plc

ENVIRONMENTAL IMPACT ASSESSMENT

Client	Bluejay Mining Plc. 7-9 Swallow Street London W1B 4DE UK
Consultant	Orbicon A/S Linnés Allé 2 2630 Taastrup
Project number	362170314
Project manager	Morten Christensen
Author	Flemming Pagh Jensen
QA	Morten Christensen
Revisions no.	03
Approved by	Søren Hinge-Christensen
Date	07-02-2020

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1. NON-TECHNICAL SUMMARY AND CONCLUSIONS

1.1. Project overview

Dundas Titanium A/S proposes to develop the Dundas Ilmenite Project (the Project), which will extract ilmenite concentrate with high (3.45%) titanium dioxide content from the black mineral sand deposits found along the coastline of Steensby Land in North-west Greenland (Figure 1). Ilmenite is important for producing pigments, whiting and polishing abrasives while titanium metal is used extensively to produce durable, high-strength, lightweight metal alloys.

Dundas Titanium A/S is based in Greenland and holds 100% of the Project. Dundas Titanium is owned by Bluejay Mining Plc which is listed on the London Stock Ex-change AIM market

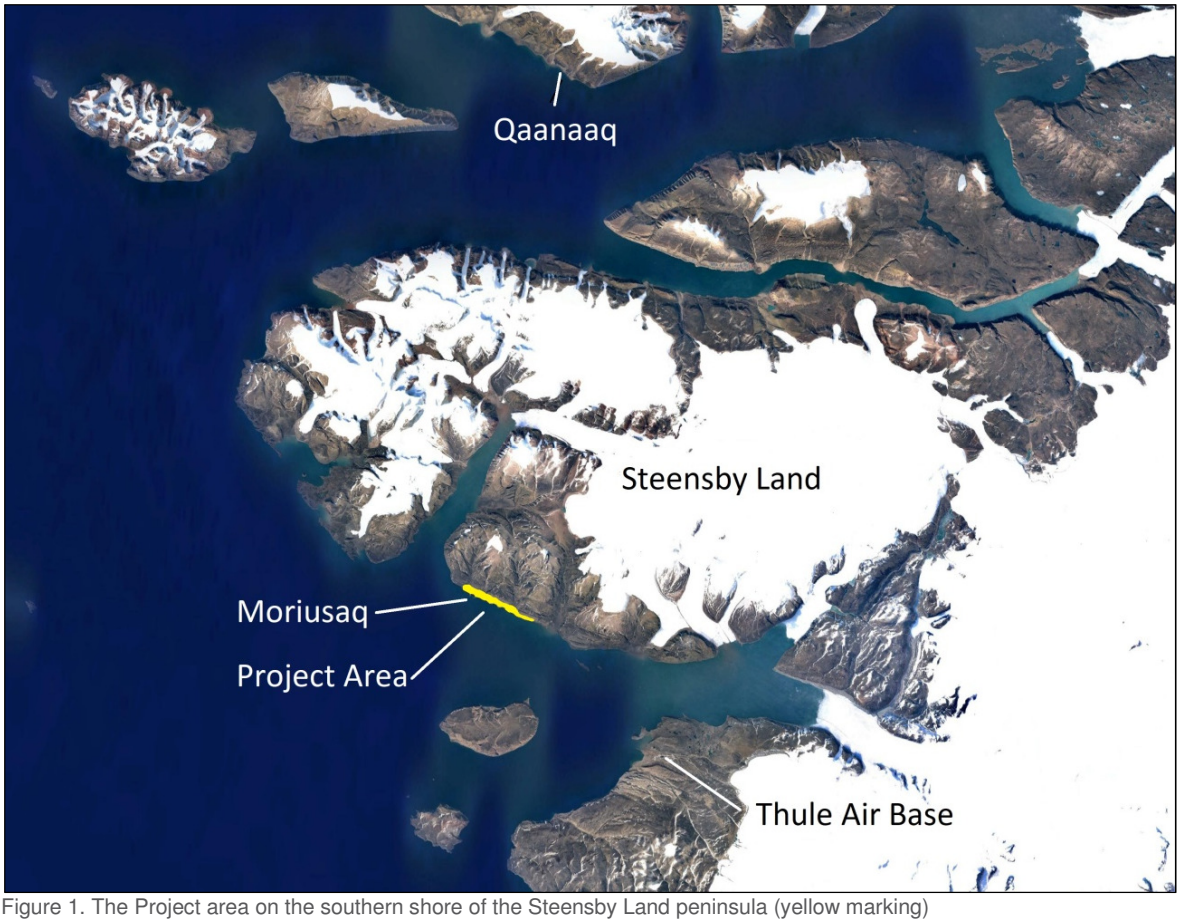

Figure 1. The Project area on the southern shore of the Steensby Land peninsula (yellow marking)

1.2. The Local Population[1]

Qaanaaq is the closest town to the proposed mine (Figure 1). By boat the distance is 135 km. Qaanaaq has around 640 inhabitants. Hunting and whaling are the traditional trades and mainly include seals, narwhales, walruses and sea birds. Less important are white whales. Occasional hunting of caribou and musk oxen also take place.

During winter and spring traditional subsistence harvest of walrus mainly takes place to the northwest of Qaanaaq and around Saunders Island and previously also near Moriusaq. Smaller seals are mostly hunted in the fjords close to Qaanaaq. Traditional subsistence harvest of narwhales mainly takes place in Inglefield Bredning east of Qaanaaq where large numbers concentrate during summer. Subsistence harvesting of birds mainly include Brünnich's guillemot, little auk and eider duck. These birds are only present in the Qaanaaq area during summer.

In recent years halibut fishing has become the most important income for the around 100 hunters/fishermen that live in Qaanaaq. The halibut fishing mainly takes place during winter and east of Qaanaaq.

The settlement Moriusaq on the southern shore of the Steensby Land peninsula (Figure 1) was established in the 1960ies but abandoned in 2010. Around 20 buildings are still left, and a few are occasionally used briefly by the owners, most people from Qaanaaq.

Thule Air Base is a United States Air Force base located c. 40 km to the south-east of the Project site. The airbase is not part of any municipality of Greenland, but an enclave within Greenland, outside of its jurisdiction.

1.3. The mining project

The Project involves the mining and processing of black heavy mineral sand from the coastal plains and beaches on 12 km of the south coast of Steensby Land to produce ilmenite concentrate. The estimated mine life is 10 years. Each year the black sand resource will be mined in specific blocks to an average depth of 4.6 m. Mining will start west of Moriusaq and generally develop from west to east and will include the resource below Moriusaq. After 10 year an 8 km^2 area has been mined.

The sand material will first be transported to a plant close to the mine area for removal of over- and undersize material as well as sand material consisting mainly of light minerals (which cannot be used).

[1] The *Social Impact Assessment* (SIA) prepared by NIRAS (2019) deals with the impacts from the project on the local populations

The heavy sand concentrate will then be transported by trucks to a magnetic plant next to the main camp. This plant separates the highly magnetic ilmenite product from non-magnetic trash sand material to produce ilmenite concentrate, which will be loaded onto ships for transport to customers. No chemical will be used in the processing.

The mining rate will be 7.4 million tonnes per annum, at which rate the Project is expected to produce approximately 440,000 tonnes of ilmenite product per year. All oversized material (rocks and gravel) and light sand material removed during the processing is hauled back to the mine void where it is backfilled. This represents c. 90% of the mined material. The undersize silt fraction and saltwater used to melt and wash the material in the first plant is mixed and pumped directly to the sea and discharged at 10 m depth.

The ilmenite product will be shipped out by ice class C1 40,000 DWT bulk carriers. Due to the ice conditions shipping will only be possible from mid-July to end of October. During this period all available ilmenite products will be exported. All products produced between the closure of a shipping window and the opening of the next will be stored on site.

Main components of the Project

A permanent main camp will be built app. 2.5 km southeast of Moriusaq with accommodation for 175 staff (Figure 2).

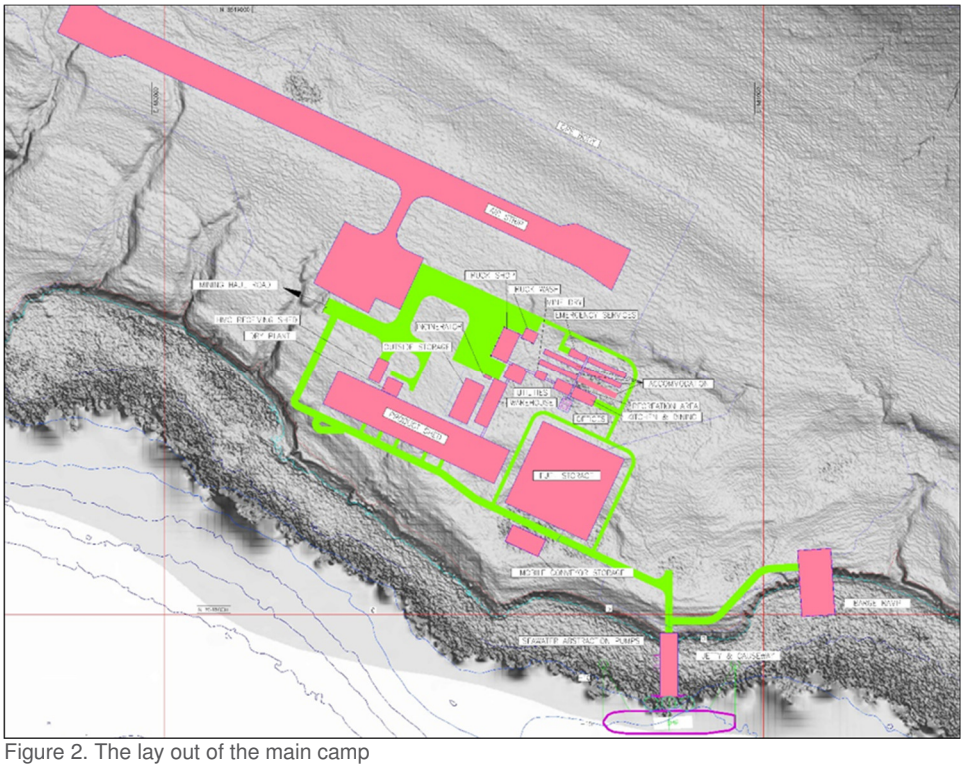

Figure 2. The lay out of the main camp

The main camp will also include service buildings, the magnetic separation plant, storage building, jetty with a ship-loading facility, fuel tank farm and general services such as power and water supply. An airstrip to facilitate the year-round movement of personnel and consumables will be built near the main camp.

A smaller moveable camp will be located near the area that is mined. This camp includes the plant where most of the waste material is removed, will be moved every 2-3 years and have four locations during the 10 years mine life (Figure 3). The mobile camp also includes modular offices, a lunchroom and washrooms to support activities in the mining area.

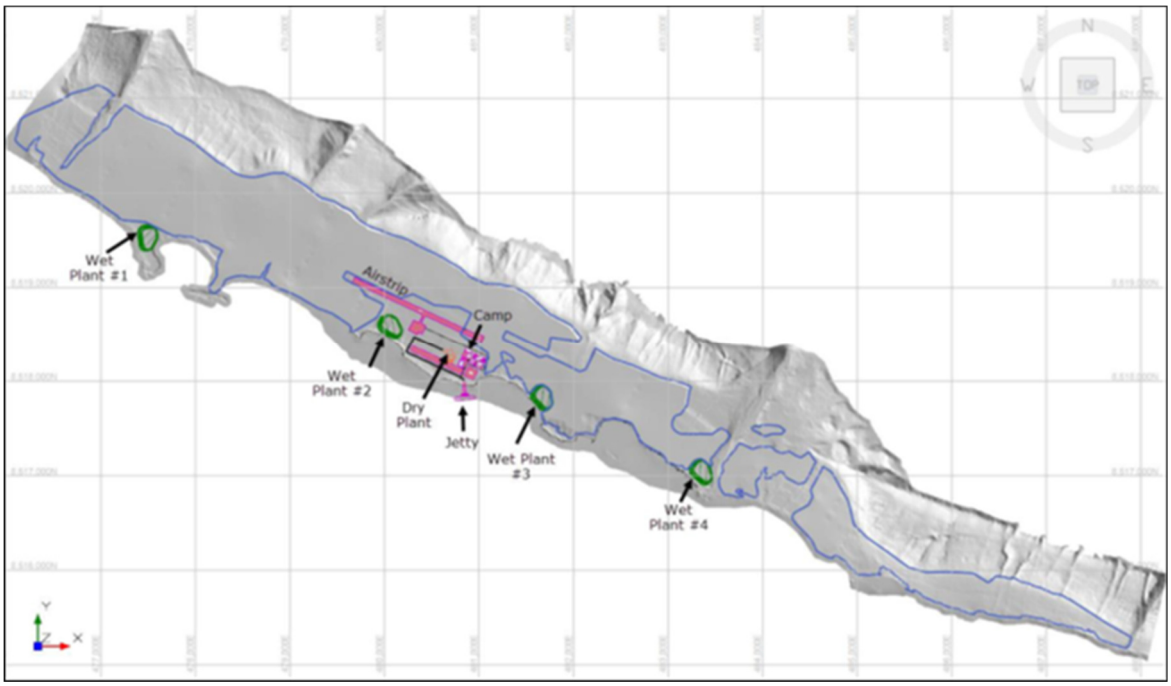

Figure 3. Mine layout with the four locations of the moveable wet plant and the setting of the permanent dry processing facility at the main camp. The blue lines indicate the areas to be mined.

Project phases

The construction phase will take 2 years. During this phase buildings will be erected, and the plants and port will be constructed. The Operation phase is estimated to 10 years. Closure and decommissioning will take 1 year during which time buildings, plants and utilities will be removed and the last mine area will be rehabilitated.

Project Element	Details	Description
Mining rate		7.4 million tonnes per year
Plant feed rate		965 tons per hour
Mine method		Open pit
Construction phase		2 years
Operating phase		10 years
Decommissioning		1 years
Plant operation calendar		12 months - 24/7 operation
Products	Ilmenite product	440,000 tonnes per year
Supporting infrastructure	Diesel power plant	59 mega watts
Size of Project elements	Total footprint (at 10 years)	8.5 km^2
	Mine pits	8 km^2
Water use	Seawater requirements	1,046 m^3/h
Excess water	Discharge of excess seawater to the fjord	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	Airport	Dundas Ilmenite Airport
Employees	Construction	270
	Operation	175

Table 1. Project summary

Alternatives considered

Several alternatives for all or part of the Project have been considered during the course of Project design:

Alternative	Details	Consideration
Not proceeding with the Project	This is an alternative if it is considered that the environmental consequences of the project are too large. Not proceeding with the Project would mean any environmental (and social impacts and benefits) would not occur.	Based on the ability to appropriately manage the potential environmental impacts, Dundas Titanium will proceed with the project.
Port location	Two alternative locations were considered. Option 1 is located at Moriusaq while Option 2 is located 3.5 km to the south east of the town	Option two was chosen because this would require the shortest jetty causeway to reach the required water depth reducing material handling (and costs)
Deposition of undersize silt fraction	Two alternatives were examined in detail: • On land deposition (and discharge of excess process water to the sea)	Discharge to the sea was chosen because it would mean least construction work (minimising disturbance and CO_2 emissions) and no risk of dust generation. Analyses of the excess water showed little

	• Discharge of slurry consisting of silt and process water to the sea. In addition to a discharge point at 10 meters water depth, it was considered to discharge the material at 35 m.	risk of contaminating sea water and modelling showed the increase in sedimentation and turbidity of the sea water to be local causing limited impact on marine life. Discharge at 10 m water depth was preferred because modelling showed that the sedimentation would be limited to a smaller area with less impact on marine life (albeit with a thicker layer) that with the discharge at 35 m

Table 2. Project alternatives considered.

1.4. Regulatory Framework

Inatsisartut Act no. 7 of 7 December 2009 (the Mineral Resources Act) requires that mining companies prepare an Environmental Impact Assessment (EIA) in connection with the development of any proposed mineral project. The Act also stipulates that an exploitation license will only be granted once the project's EIA has been accepted by the Government of Greenland.

The aim of a project's EIA is to identify, predict and communicate the potential environmental impacts of the planned mining project in all its phases - construction, operations, closure and post-closure. The assessment should also identify mitigation measures designed to eliminate or minimize negative environmental effects, and such measures, should as far as possible, be incorporated into project design.

This EIA has been prepared in accordance with the *Guidelines for preparing an Environmental Impact Assessment (EIA) report for mineral exploitations in Greenland* (Mineral Resources Authority, 2015), (the Guidelines). The Guidelines identify the requirements for impact assessments relating to:

- Environmental baseline studies, including background concentrations and variations, vegetation and fauna, and local use and knowledge;
- Project related environmental studies, including studies of flora and fauna and quantifying potential sources of contamination such as water discharged to the sea;
- Discharges and emissions to the environment, including air and water emissions.

The Guidelines also specify the requirements for environmental closure and monitoring plans.

This impact assessment was undertaken in compliance with the Terms of Reference (ToR) for this project (Orbicon 2017) and an addendum (Orbicon 2018). Following public consultations, the ToR was approved by the Greenland authorities in 2017 and 2018.

1.5. The structure of this EIA

This EIA has been structured to consider Project impacts associated with each of the headlines set out below:

- Physical environment
- Atmospheric setting
- Living environment

For each headline the assessment considers first the existing status today, s, then the identified potential impacts (disturbance and/or pollution), followed by an assessment of impacts, suggested mitigation (when relevant) and predicted outcomes with mitigation in place.

1.6. Physical environment

The landscape of the south-western part Steensby Land peninsula is dominated by broad, up to 2 km wide, coastal plains which stretch along more than 30 km of the coastline. Further inland ice capped mountains raise to over 1,000m. Several small, low islands are located 3-5 km off the coast.

The climate is dry and cold, with mean summer temperatures around 4-5°C and winter mean temperatures around -25°C. Precipitation is also very low, about 217 mm, most of it falling as snow.

The ilmenite sand in the Project area are derived from a high titanium basalt source further inland, which has been mechanical weathered to create heavy mineral sand deposits along the coast.

A study in 2019 of potential contamination of the Project area following the crash of a US bomber close to Thule Air Base in 1968, showed that this was not the case and that the plutonium concentrations are at the same level as elsewhere in the northern hemisphere.

1.6.1 Potential impacts

The potential impacts on the physical environment have been identified as:

Landscape alterations and visual impact
Constructing the airstrip, causeway to the jetty, foundations and haul roads will require the extraction of large amounts of fill material (gravel and rocks). Mining the black sand will also cause significant landscape alterations. The large buildings in the main camp will be widely visible from the fjord. All this can have aesthetic impact for the life of the mine. Following the decommissioning of buildings and machines and the shading and grading of platforms for building the visual impact for bypasses on the fjord is assessed to be Low.

Erosion
Some construction activities could cause erosion, in particular loss of soil, sand and gravel by the forces of water. By taking erosion into account when selecting construction methods and routing of the alignments the risk of erosion has been assessed to be Very low.

Light emissions
In dark periods the construction areas will be illuminated. Such “Ecological light pollution” can distract wildlife, in particular migrating birds “. Since artificial light will mainly be required during winter when almost no bird migration takes place, this is not expected to be a significant impact.

1.7. Atmospheric setting

Baseline levels of dust and gaseous emissions have not been monitored but are assumed to be very low.

1.7.1 Potential impacts

The potential impacts have been identified as:

Dust dispersal
Excavation and in particular haulage generate dust, which can impact vegetation and animals that feed on the affected vegetation. Since the speed restrictions of mine trucks will be enforced dust generated during haulage is expected to be low and limited to a narrow area along haul roads and the around mine area. The overall significance has been assessed to be Very low.

Gaseous emissions
Mobile equipment and stationary power generation will produce gaseous emissions, including NOx and SOx and increase air emissions. By limiting the amount of fuel combusted as much as practical possible and new, state-of-the-art equipment (Best Available Technique (BAT) equipment, the impact of gaseous emissions is assessed to be Very low.

Greenhouse gas emissions
Mobile equipment and stationary power generation also generate greenhouse gasses which lead to climate change. It is estimated that the land activities will produce 85,700 tons CO_2 emissions per year and increasing Greenland's CO_2 emissions by 16.4%. The export of the concentrate with ship and the flight to the project will bring the total CO_2 emissions up to 91,788 tons of CO2. (17.5% increase in Greenland's emissions).
The amount of fuel combusted should be limited as much as practical possible.

1.8. Living environment

The Project area is in the high arctic with sub-freezing mean annual temperatures. Frozen conditions are usually found from September through May, with snowmelt occurring predominantly in June and July. From late May to September shallow water flow takes place in the active layer above the permafrost from higher elevations toward the coastline.

High arctic dwarf-shrub heath and along the coast also fens and bogs cover most of the Project area. Generally, the plant communities consist of few species most of which are common and widespread in Northwest Greenland. Only rather few land birds and mammals occur.

The sea off the Project area is covered by thick sea ice much of the year. On average the ice start to break up in May-June and the sea is free of ice from late June to late October but there are large annual variations. Seawater movements are dominated by tidal currents with the flow direction generally parallel to the coastline for both ebb and flood.

During summer streams, rivers and glaciers discharge freshwater to the fjord which sometimes forms a brackish surface layer. From May-June to September-October glacial rives discharge large amounts of fine material into the sea. In summer the turbidity of the fjord water is often high due to the sediment load from these rivers.

The sea between NW Greenland and Elsmere Island in Canada is named the North Water Polynya (NOW). A polynya is an area of persistent thin sea ice or open water where thick sea ice would be expected during winter. Although the NOW often has 95 % ice cover in January, the ice is mobile and criss-crossed by open leads permitting marine mammals to remain during winter.

The NOW evolves from a small area in winter, to a large area of ice-free water in June and ultimately in summer ceases to exist as a distinct ice-bounded region. Exceptionally for Arctic areas, phytoplankton biomass and primary productivity in the NOW starts in April and is high throughout the ice-free period. The high primary production results in a diverse zooplankton community which provides food for large numbers of

fish, marine mammals and sea birds. The NOW is the largest polynya in the Northern Hemisphere and one of the most biologically productive marine areas in the Arctic.

In summer, NOW supports some of the largest concentrations of seabirds anywhere in the Arctic. The NOW also supports large numbers of ice-associated seals and whales including considerable numbers of narwhale, white whale (beluga) and walrus.

1.8.1 Potential impacts

The potential impacts from the Project on the living environment have been identified as:

Disturbance of terrestrial vegetation
Re-profiling to accommodate buildings and mining activities will remove the vegetation from a large area (c. 8km^2). In the high arctic climate with very short growing season it will take decades maybe even longer before the vegetation is restored. To minimize this impact infrastructure and mining activities should be planned to have as small a footprint as possible.

At the local level the disturbance (loss) of vegetation is significant but in a larger regional context the loss is minor because the plants occurring in the disturbed area are common and widespread in very large parts of Northwest Greenland. For this reason, the disturbance of terrestrial vegetation and loss of terrestrial habitat has been assessed as Medium.

Disturbance of terrestrial mammals and birds
Noise and visual disturbances from personnel and machinery will cause birds and mammals to avoid the active mine areas. To minimize this disturbance the movement of staff members should be restricted outside the construction and mining areas.
The loss of plant cover (and the changes to the hydrological regime in the active mining blocks - see below) will exclude birds and mammals from utilizing this habitat until the plant cover is restored.

Since only very few birds and mammals are associated with the disturbed habitats (none of which are threatened) and because very large areas of similar undisturbed habitat are widespread in the region, the disturbance impact of terrestrial mammals and birds has been assessed as Low.

Disturbance of freshwater fauna and flora
Construction and operation of the Project will modify hydrological processes, potentially affecting freshwater habitat. This includes diverting water runoff from entering the mining area and camp facilities. This will have large scale impact on the freshwater ecosystems within the mined block.

To mitigate this impact the disturbance of freshwater should be minimized as much as possible and the natural hydrology should be restored as quickly as practically possible. Since undisturbed areas with similar freshwater habitat are widespread in the region, and the disturbance will be temporary only, the impact has been assessed as Low.

Disturbance of benthic flora and fauna

The discharge of silt material to the sea will lead to enhanced concentrations of fine particulate matter in the water and sedimentation on the sea floor near the outlet. The oscillating tidal current will disperse the material along the coastline and result in particularly high sedimentation on both sides of the discharge point. In a nine km long and one km wide zone along the coast high mortality among benthos organisms is expected. In a bigger area stretching 20 km along the coast and 1-1.5 km offshore decreased numbers and possibly lower biomass are expected. Re-colonization is expected to start within one year and after 4 years all the major benthic macrofauna phyla will probably be present. However, a full recovery of the age variation of mussels will take many decades.

Since the impact zones are limited to the Assessment area the overall impact is assessed to be long term with Medium significance.

Disturbance of seabirds

Disturbance of seabirds mainly concerns the area's seabird colonies on islands off the Project area's coast and Saunders Island (Figure 4) where visits by staff members and shipping could disturb the birds.

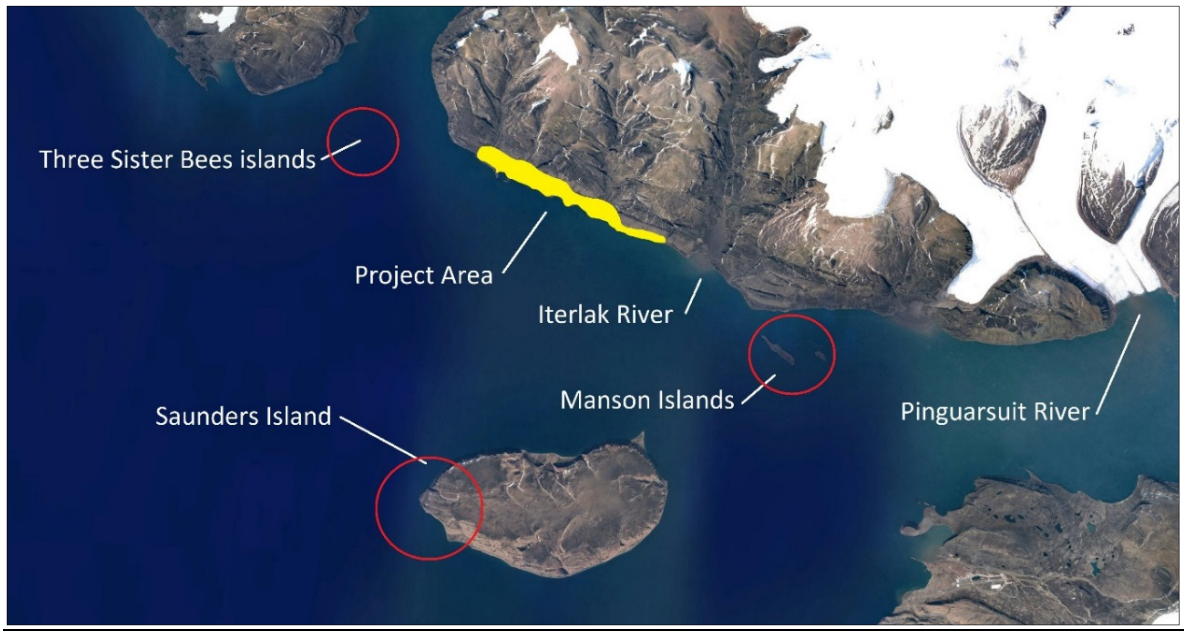

Figure 4. Important seabird colonies near the Project area

To avoid disturbance of breeding birds on Three Sister Bees and Manson Islands (Figure 4) project staff must not visit these islands from 1th May until 1th September. To avoid disturbing the seabirds on Saunders Island vessels to the Project port should maintain a minimum of 5 km distance to this island. With these mitigations in place disturbance of the area's seabird colonies has been assessed as Very low.

Disturbance of marine mammals
The following potential disturbance impacts are identified:

- Noise and visual disturbance from project activities on land and from ships;
- Loss of feeding areas for walrus (mussels); and
- Underwater noise from shipping.

Hunting is also a significant potential disturbance. In recent years hunting of marine mammals off the project area has ended. This is because the hunters in Qaanaaq that previously shot mainly walrus in this area has given up this type of hunting because the distance by boast is too long. But this can change in the future.

Existing data and surveys carried out in connection with this project found that large numbers of walruses migrate along the south coast of Steensby Land in May-June and large pods of white whale often migrate close to the coasts of the Project area in September – October.

Noise and visual disturbance from Project activities on land and from ships
This is mainly a potential problem in relation to walruses which gather at mussel banks off the easternmost end of the Project area. This area will be mined in Year 10. If data collected during the project's environmental monitoring suggest that the animals might be disturbed by noise or the presence of people and machines near the shore, the working schedule must be change so that work in this area only takes place where there are no walruses (during summer).

With the walruses' present distribution in Wolstenholme Fjord noise and visual disturbance from the planned project activities are assessed as low. However, because of the uncertainties associated with potential walrus hunting in the fjord in the future, and because changes in the fjords ice conditions in the coming years may cause walruses to prefer haul-outs closer to the Project area disturbance is conservatively assessed to Medium.

Loss of feeding opportunities for walruses.
The sedimentation of discharged silt on the sea floor will cause significant mortality among benthic organisms in a small area around the outlet pipe.

The closest mussel bank with high numbers of the mussels preferred by walrus is 5 km from the nearest discharge point. Due to the distance the mussels in this area are unlikely to be harmed by the projects discharge of silt to the sea.

Underwater noise from shipping
Shipping generates underwater noise which can disturb marine mammals. White whale and narwhale are of particular concern. None of these whales have permanent population in the fjords off the Project areas but pass on migration in spring and autumn.

Underwater noise from ships increase with the ships speed. But if the ships slow down the time it disturbs is longer. Studies have shown, that a good compromise for ships of the type that will arrive to the Project port, is to reduce the speed to 8 knots. To minimise disturbance of marine mammals (in particular whales) all skips calling at the project port must therefore reduce the speed to 8 knots when entering the NOW (that is the last 150 km before the port). With this mitigating measure in place disturbance from shipping underwater noise is assessed as Low.

Contamination of fjord due to discharge of excess water
Discharge of water from mining operations to ocean can potentially pollute the marine environment. Two streams of excess water will be pumped to the sea:

- Saltwater used in the mobile concentrator plant; and
- Sewage from the camps.

Water used in the mobile plant will be mixed with under-sized silt material and disposed of in the sea via pipeline. No chemical additives will be used in the process. Tests have shown that heavy sand from some parts of the planned mine area contain high natural concentrations of the heavy metals copper, barium and zinc. When the material is washed with saltwater in the concentrator plant that can cause the concentrations of these metals in the discharged water to exceed the Greenland guideline limits in the sea outside the mixing zone.

To avoid this, ongoing monitoring of the concentration of metals in the discharged water will take place. If the concentration of heavy metals approaches the guideline limits extraction of sand for the area with high heavy metal contain will be stopped (or alternatively the metals will be removed from the discharged water). Sewage from all buildings will be treated in the sewage treatment plant before the effluent is discharged to the sea. Overall, the discharge of water from the project to the sea is assessed to potentially have Medium impact on marine life.

Contamination of fjord due to tanker accidents or oil spills when unloading

A major unloading or shipping accident such as a tanker collision or grounding could give rise to major spills of oil to the fjord. Shipping to and from the Project is not different from other shipping routes in Arctic coastal areas, including routes to other Greenlandic towns and settlements. If all maritime regulations are followed, proper oil spill combat equipment is in place at the port, and the staff is well-trained in response procedures during summer and winter, the likelihood of a significant oil spill is assessed as Very low.

Contamination of land areas due to oil spills

Accidents can lead to spill of oil and hazardous materials on land and into freshwater. Oil is toxic to plants and the consequences of an oil spill on land can be long lasting because the Arctic flora has very slow growth rates. Spills that seep into freshwater can cause an impact on freshwater ecology. The areas of the highest spill probability are at the mine site when mobile equipment is refuelled. Due to the limited fuel storage, the likelihood of a major accidental oil spill occurring on land or into local freshwater resources are assessed as Low.

Introduction of invasive non-indigenous species

Vessels berthing at the Project port will discharge ballast water before loading cargo. The ballast water can contain non-indigenous species that could potentially establish themselves in Greenland waters. When introduced in new areas, these species could thrive and become a threat to indigenous species and the local ecosystem. To minimize a potential introduction of non-indigenous species, the regulations of the International Convention for the Control and Management of Ships' ballast water and Sediments should be followed.

1.9. Local Use

For security reasons hiking on the mine roads, in the mine area and in a zone around the various Project facilities will not be permitted for the public. The effect of these restrictions will be low, as there has been no or only very limited traditional use of natural resources in the land area around Moriusaq since it was abandoned in 2010. Except for the Project port area, the marine area off the project area will remain open for subsistence harvest and recreational use.

1.10. Archaeology

Construction works and mining activities can disturb heritage sites. To localise sites in the Project area, Greenland National Museum & Archives surveyed the area in 2018 and discovered several important findings along the coast. Whenever possible, these archaeological sites will be fenced off to avoid machinery from accidentally damage the ruins. In other cases, the museum will be asked to excavate and, if necessary, recover objects before project activities commence.

1.11. Environmental Management Plan

The Environmental Management Plans describes how the mining company intends to manage the environmental issues identified in the EIA and who is responsible for each commitment. The Plan includes a management program that specifies the activities to be performed in order to minimize disturbance of the natural environment and prevent or minimize all forms of pollution, and a definition of the roles, responsibilities and authority to implement the management program.

1.12. Closure plan

Principles for mine closure are summarized in the conceptual closure plan (in the back of this EIA). These principles are summarised by the following points:

- All buildings, major structures and equipment must be dismantled and removed;
- Foundations should be removed where possible, or covered by natural materials to blend into the natural surroundings;
- The haul roads must be reclaimed;
- Any culverts are removed; and
- The mine port is left as constructed (if agreed with the authorities).

1.13. Monitoring Plan

An Environmental Monitoring Program will be implemented in accordance with the Greenlandic guidelines to monitor residual effects of the Project and the effectiveness of implemented mitigation measures. The plan comprises of the following key-elements:

- Air Quality and Dust Monitoring;
- Sea and Freshwater Monitoring;
- Soil and Terrestrial Biota Monitoring;
- Tailings Facility Monitoring; and
- Meteorological Monitoring.

The EIA report includes a framework for the monitoring plan, including proposed parameters. The conceptual monitoring plan also suggests a sampling frequency for each parameter and proposes monitoring durations. Where relevant the programme includes control sites, where no expected Project impacts are likely to be experienced. The EMP will be developed and updated throughout the mine life.

1.14. Conclusions

The environmental issues identified in this EIA concerns the potential disturbance of animals and plants and the potential pollution of the environment.

With the proposed mitigations in place the impact of all identified issues is assessed as Low or Medium. In the case of accidents with significant impact on the environment, as highly unlikely to take place.

1.15. Summary of environmental impacts assessed

Table 3. Summary of environmental impacts assessed

Potential impact	Project phase	Activities	Mitigation	Significance with mitigations
Aesthetic impact	Construction Operations Closure	1. Construction works will require large amounts of material. 2. Mining the resource will extract large amount of material 3. Mine facilities will be visible from the fjord	1. Plan the extraction of material to blend as far as practical with the surrounding landscape	Low
Loss of soil, sand and gravel by the forces of water	Construction Operations	1. Preparation of construction sites 2. Construction of roads 3. Redirection of water courses from mining area	1. Take erosion into account when selecting construction methods and routing of the alignments	Very low
"Ecological light pollution"	Construction Operations	1. Lights from construction and mining activities at night	1. No action required since problem is negligible	Negligible
Potential pollution of land and water	Construction Operations Closure	1. Surface mining, material handling and in particular hauling generates dust	1. Plan construction works and mining activities to minimize dust generation including speed limits for mine trucks	Very low
Increased air emissions	Construction Operations Closure	1. Mobile equipment and stationary power generation produces gaseous emissions	1. Limit the amount of fuel combusted as much as practical possible and use new, Best Avail-	Very Low

			able Technology (BAT) equipment and service it according to the manufacturer's guidelines.	
Climate change	Construction Operations Closure	1. Combustion of diesel produces emission of greenhouse gases	1. Keep fuel consumption as low as practical possible	-
Disturbance of terrestrial vegetation	Construction Operations	1. Loss of vegetation where buildings and facilities are constructed 2. Removal of vegetation in mining area	1. Minimize the area to be disturbed by planning infrastructure to have as small a footprint as possible. 2. Initiate the restoration of vegetation as soon as mining activities in an area are completed	Medium
Disturbance of land mammals and birds	Construction Operations Closure	1. Noise and visual disturbance from mining activities	1. Restrict the movement of staff members outside the construction and mining areas	Low
Disturbance of freshwater fauna and flora	Construction Operations	1. Hydrological changes to direct water runoff away from mining area and facilities	1. Minimize the disturbance of the water and restore natural hydrology as quickly as practically possible	Low
Disturbance of benthic flora and fauna	Operations	1. Discharge of silt material to seafloor	1. To be defined if unexpected accumulations are recorded	Medium
Disturbance of seabirds	Construction Operations Closure	1. People could visit seabird colonies on small islands off the coast 2. Shipping could pass close to seabird colonies on Saunders island	1. Ban access for staff during the birds breeding season 2. Shipping route at least 5 km from colonies on Saunders Island	Very low

Disturbance of marine mammals	Construction Operations Closure	1. Noise and visual activities close to shore 2. Loss of food resource due to discharge of silt to the seafloor 3. Underwater noise from shipping	1. Plan mining operations so that work close to the shore only takes place during summer 2. Change discharge strategy if loss of food resource becomes unacceptably large 3. Reduce speed of vessels through NOW to 8 knobs	Medium Low
Contamination of fjord due to discharge of excess water	Construction Operations Closure	1. Discharge of process water to fjord 2. Discharge of sewage from camps	1. Ongoing monitoring of the concentration of metals in the discharged water will take place. If the concentration of heavy metals approaches the guideline limits extraction of sand for the area with high heavy metal contain will be stopped (or alternatively the metals will be removed from the discharged water 2. No action required since water is cleaned in sewage plant	Medium
Pollution of marine environment	Construction Operations Closure	1. Tanker accident 2. Unloading accident leading to oil spill	1. Follow recommendations in *Navigational Safety Inspection* report 2. Proper procedures, equipment, plans and training to combat spills	Very low
Contamination of land and freshwater ecosystems	Construction Operations	1. Oil spill on land and in freshwater	1. Impose strict speed limits to reduce risk of traffic accidents 2. Introduce strict procedures for handling of oil	Low
Introduction of invasive non-indigenous species	Construction Operations Closure	1. Vessels arriving to the Project ports needs to discharge ballast water before loading	1. Carry out ballast water management in compliance with international convention before discharging	Unlikely

Restrictions in local use	Construction Operations Closure	1. For security reasons access to the Project area will not be permitted for the public (but offshore hunting can still take place)	1. Minimize restrictions in access to project area as much as practically possible	-
Disturbance of cultural heritage sites	Construction Operations	1. Mining activities could damage cultural heritage sites	1. Request Greenland museum to identify and – if needed- recover cultural heritage sites that could be damaged by mining activities	-

2. REFERENCES

Orbicon. 2017. Scoping and Terms of Reference for the Environmental Impact Assessment for the Pituffik Titanium Project. 44 pages.

Orbicon 2018. Addendum to Terms of Reference for EIA. 8 pp.