REPORT

Nalunaq Gold Project

Environmental Impact Assessment 2023

Submitted to:

Nalunaq A/S
c/o Nuna Advokater ApS
Qullierfik 2.6
3900 Nuuk
Greenland

Submitted by:

WSP Golder
WSP House, 70 Chancery Lane, London, WC2A 1AF,
UK

+44 0 20 7423 0940

21467213.600/A.2

17 March 2023

Distribution List

Nalunaq A/S - 1 copy (pdf)

WSP Golder - 1 copy

Table of Contents

TABLES

Figures

APPENDICES

APPENDIX I
Preliminary Environmental Management System

APPENDIX II
Environmental Monitoring Plan

Appendices listed below are contained within additional PDF:

Appendix III Water Management Plan Technical Background Report [17 March 2023] Golder 2023a.

Appendix IV Seepage Assessment Technical Background Report [20 Jan 2021] Golder 2021c.

Appendix V DTSF_Design Criteria_20Nov2020

Appendix VI Hydrological and Hydrogeological Study Technical Background Report [27 Jan 2021] Golder 2021e.

Appendix VII Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure [1 Feb 2021] Golder 2021f.

Appendix VIII Tailings Waste Characterisation Review. [5 July 2021] Golder 2021g.

Appendix IX Tailings Storage Facility Options Analysis [7 March 2022] Golder 2022a.

Appendix X Failure Mode and Effects Analysis for Nalunaq Mine [15 March 2022] Golder 2022b.

Appendix XI Nalunaq Gold Mine, Greenland - Uranium Concentrations - Technical Memo [25th March 2022] Golder 2022c.

Appendix XII Nalunaq Gold Mine, Greenland: Preliminary Static and Kinetic Testing Results From 2022 Tailings Analysis Programme [15 June 2022] Golder 2022d.

Appendix XIII Nalunaq Gold Mine Flood Risk Assessment (Updated) [8 April 2022] Golder 2022e.

Appendix XIV Nalunaq Gold Mine Surface Water Infrastructure Design [8 April 2022] Golder 2022f.

Appendix XV Nalunaq Gold Mine, Greenland, Preliminary Closure Plan. 21467213.C04.3.A.0 [30 March 2022] Golder 2022g.

Appendix XVI Mine Inflow Assessment - Groundwater and Surface Water [12 Jan 2021] Golder 2021a.

Appendix XVII Tailings Disposal Options. Technical Background Report Nalunaq [9 October 2020] Golder 2020.

Appendix XVIII Geochemical Testing Results from 2022 Tailings Analysis [03 October 2022].

Appendix XIX An Investigation into the Environmental Characterization of Tailings from the Nalunaq Mine. [30 March 2021] SGS 2021.

Appendix XX Water Resources in Nalunaq Valley Desktop study [November 2019] Asiaq 2019.

Appendix XXI DTSF Potential Failure Modes [17 March 2023], WSP 2023a and DTSF Flood Assessment [17 March 2023], WSP 2023b

List of Abbreviations:

CPR	Competent Person Report
DCE	Danish Centre for Environment and Energy
DTS	Dry Tailings Storage
DTSF	Dry Tailings Stacking Facility
EAMRA	Environmental Agency for Mineral Resources Activities
EIA	Environmental Impact Assessment
LOM	Life-Of-Mine
MLSA	Mutual Logistic Support Agreement
MRA	Mineral Resources Authority
ROM	Run-of-Mine
SIA	Social Impact Assessment
SRK	SRK Exploration Services Ltd.
TEU	Twenty-foot-equivalent units
ToR	Terms of Reference
tpa	Tonnes per annum

1.0 NON-TECHNICAL SUMMARY AND CONCLUSIONS

The Nalunaq Gold Project is located in South Greenland (latitude 60°21' N, longitude 44°50' W), about 32 km northeast of Nanortalik, Greenland's 10th largest town with a population of approximately 1,350. The mine lies to the west of the permanent icecap in the municipality of Kujalleq, in Kirkespirdalen, a broad glacial valley situated about 8 km from the tidal, ice-free Saqqaa Fjord.

Nalunaq A/S ("the Company") is currently developing the Nalunaq Gold Project ("the Project") in South Greenland. The Nalunaq gold mine opened for the first time in 2004, following the discovery of visible gold in an outcropping quartz vein 12 years earlier. The mine operated until 2013, after which it was closed and decommissioned in 2014.

As part of developing the Nalunaq Gold Project, the Greenland Authorities require an Environmental Impact Assessment (''EIA'') to be prepared in accordance with guidelines published by the Greenland Mineral Resources Authority (''MRA''). This report is the required EIA and the supporting documents to this EIA are contained within Appendices I to XVII.

Based on the current mine concept estimate, the Company plans to operate the mine for approximately 5 years from the date it reaches commercial production, which is anticipated to be in 2024/ 2025. It is possible that the operation period may be extended if more gold is found.

The mine itself will continue to be underground. A process plant will be established adjacent to the mine. The processing facility building will consist of the following main systems: crushing (including dust collection system), grinding, gravity recovery, flotation, tailings thickening and tailings filtering and a gold room, used for smelting the gravity concentrate into doré. The major process area will be surrounded by containment where relevant.

The process plant building will be constructed on an engineered platform (a foundation) in the Kirkespir valley in an area previously utilized by past operators and where the local environment had thus already been modified. The foundation of the plant will be built above the 1:1000-year event flood line. The process plant building will be strategically located between the Dry Tailings Storage Facility (DTSF) A mill feed stockpiles will also be located on the south/west area of the process plant's pad. Roads will be located on both sides of the process plant to provide access to both sides of the building. The process plant will have a capacity to treat approximately 100,000 tonnes of feed material per year. Tailings (waste rock) from the plant will be placed in the DTSF which is designed to keep non-contact surface water out. The DTSF is designed with dams and an engineered pad to minimise seepage of contact water to the underground and the surroundings.

Water used in the processing plant will be recirculated and water from the mine and precipitation falling directly on the DTSF will drain through a basin large enough to allow particles to settle. The basin will have a single point outlet to the river which can be closed if an accidental pollution should happen. The flow of water will be monitored at the outlet and frequent samples of the water will be taken to monitor that the level of pollutants does not exceed the allowed values.

The new temporary Camp Facilities ("Camp") for field activities will be established near the Saqqaa Fjord, 7 km from the mine and the processing plant. The existing port facility will be used to service the mine during construction and during operation. A diesel driven power plant will be established near the camp and at the processing plant adjacent to the mine. The total power capacity will be 2 x 2000 kW.

The new temporary Camp, consisting of dormitories, a kitchen and lunchroom, a laundry unit, a mud room and a change room, as well as a recreation building and an administration office, will be capable of hosting 100 persons. The camp will include a sewage system connected to a sewage plant with outfall of the treated water to the fjord. Water for household use will be taken from wells established near the camp and water for the processing plant will likewise be extracted from wells in the valley near the mine. Sewage from the mine site and the processing plant will be collected in a holding tank from where it will be trucked to the sewage plant near the main camp.

Solid waste from the camp will be incinerated and hazardous waste like batteries, electronics, chemicals etc. will be shipped abroad for destruction.

After closure of the mine everything will be removed and either stored underground in the mine and sealed off or transported out of the area. The mining area will be cleaned up and any buildings and machinery removed. The DTSF will be sealed off to prevent access to the material and to prevent water from flowing into the DTSF.

In this EIA all possible environmental impacts during construction, during the operation phase and after closure of the mine have been assessed and evaluated for risk and consequences for the environment. Mitigative measures will be implemented where necessary in order to reduce environmental impact.

The most severe risk to the environment is associated with transport and handling of fuel, oil and chemicals. Great care will be taken to avoid accidents and an emergency team which can respond to accidental spill will be established.

Environmental monitoring was conducted at the former Nalunaq gold mine site from 2004 to 2019. The results of the monitoring documented the impact from the mining to the local environment. Already at the first environmental monitoring in 2004, moderate pollution from the mine was documented with elevated concentrations of a few pollutants in lichens. The pollution was associated with the mining activities primarily as a result of dust spreading by wind from rock crushing, waste rock and ore stockpiles, but also as a result of driving on the gravel road. In the new project, great care will be taken to reduce dust generation both from the road and from the mine and processing plant.

Upon decommissioning of the mine in 2013, the dust pollution decreased even further and in 2017, four years after mine closure, the levels of elements measured in lichens were at or close to background levels.

In the freshwater and seawater system, only slight impact was documented in the Kirkespir River and near the port facility in the fjord. The river was impacted by drainage from ore and waste rock, and from 2009-2013 by diluted mine wastewater flowing out of the mine potentially containing pollutants from the processing facility. All levels were back to normal background values in 2017 four years after closure of the mine.

With regard to the previous mining operation the Danish Centre for Environment and Energy (DCE) assessed that the current environmental impact from the former mining activities to the environment at Nalunaq is insignificant and that no further actions are needed to reduce the environmental impact. It is noted that the proposed operation differs from the historic operation hence will present differing risk to the environment. These risks have been assessed in the context of the current environmental conditions and regulatory context. .

2.0 INTRODUCTION

2.1 The Nalunaq Project

Nalunaq A/S ("the Company") is currently developing its Nalunaq Gold Project ("the Project") in South Greenland. The Nalunaq gold mine opened for the first time in 2004, following the discovery of visible gold in an outcropping quartz vein 12 years earlier. The mine operated until 2013, after which it was closed and decommissioned in 2014.

The historical Nalunaq gold mine operated under Crew Gold Corporation ("Crew") from 2004 to 2009 when Run-of-Mine ("ROM") material was mined and shipped offshore for processing to extract gold. Subsequently, Angel Mining PLC ("Angel Mining") operated a small underground gold processing facility at Nalunaq from 2009 to 2013 and produced gold doré on the site.

As part of developing the Nalunaq Gold Project, the Greenland Authorities require an Environmental Impact Assessment (''EIA'') to be prepared in accordance with guidelines published by the Greenland Mineral Resources Authority (''MRA''). This report is the required EIA and the supporting documents to this EIA are contained within Appendices I to XVII.

The current EIA guidelines (from 2015) also state that potential environmental impacts of a mining project should be identified and evaluated in a scoping report during the exploration phase. Accordingly, a scoping report outlining the Terms of Reference (''ToR'') for the EIA and identifying the major environmental focus points to be addressed in the EIA was prepared in 2020 and approved by the Greenlandic authorities in early 2021 (Orbicon-WSP, 2021).

It is envisaged that the project will be in production during 2024/ 2025. It is not possible to produce a more detailed timeline currently due to disclosure restrictions in place connected to AEX Gold Inc., the parent company of Nalunaq A/S, being listed on the AIM Market in the UK.

Table 1: Overall timing of the Project

Phase	Timing	Activities
Construction and predevelopment	1 year	Repair of roads. 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 elements to Plant and equipment from/ to the Project site.
Operations	5 years	Once operations commence, the Mine and Plant will gradually be developed until steady state operation is achieved. Mined areas will progressively be back filled. Waste rock generated from the underground excavations that is not suited for construction, road maintenance or the DTSF, will remain underground and be deposited in mined excavations as unconsolidated waste rock backfill.
Closure and decommissioning	1 year	Buildings, plant and utilities will be removed. Last mined area will be rehabilitated and sealed off. Waste rock from the mine temporarily used for roads, dams etc. during the operation phase will be returned to the mine where it will be deposited.
Post-closure	5 year	Yearly inspections of site to assess condition of DSTF cover, stability and potential risk of erosion in the DSTF.

Based on the current Inferred Resources, the Company plans to operate the mine for approximately 5 years from the date it reaches commercial production (Table 1). Through underground development, drilling and the sequencing of mining operations, the Company estimates that based on historical development at Nalunaq the Life-of-Mine ("LOM") could be extended.

There is also an Exploration Target which includes those areas in which the Main Vein is interpreted to extend, but that contain insufficient sampling to define a Mineral Resource and are some distance from the current infrastructure. This estimate is based on historic surface diamond drilling and channel sampling, and surface samples from 2015, 2016, 2019, 2020 and 2021 that demonstrate the continuity of the Main Vein. As detailed in the competent persons report (CPR) in Part VI, SRK Exploration Services Ltd. (SRK 2020) estimates an Exploration Target of between 200,000 oz. to 2.0 Moz. of gold contained within 2.5 to 10.0 million tonnes, grading between 2.4 to 6.0 g/t Au.

However, for the purpose of the EIA, the LOM is considered to cover a period of 5 years, after which the closure plan for the mine will be undertaken according to a plan to be agreed under Section 43 of the Mineral Resources Act as required by Greenlandic law. The overall closure and reclamation goal are to return the mine site and affected areas to viable and self-sustained ecosystems.

In order to achieve this, the following core closure principles will be followed:

- *Physical Stability* – All project components that remain after closure will be physically stable to wildlife and vegetation;
- *No Long-Term Active Care* – Any project component that remains after closure will not require long-term active care and maintenance.

Further details of mine closure are presented as Appendix XV (Closure Plan).

2.2 Project Setting

The Nalunaq Gold Project is located in South Greenland at latitude 60°21' N and longitude 44°50' W about 32 km northeast of Nanortalik, Greenland's 10th largest town with a population of approximately 1,350 (Figure 1).

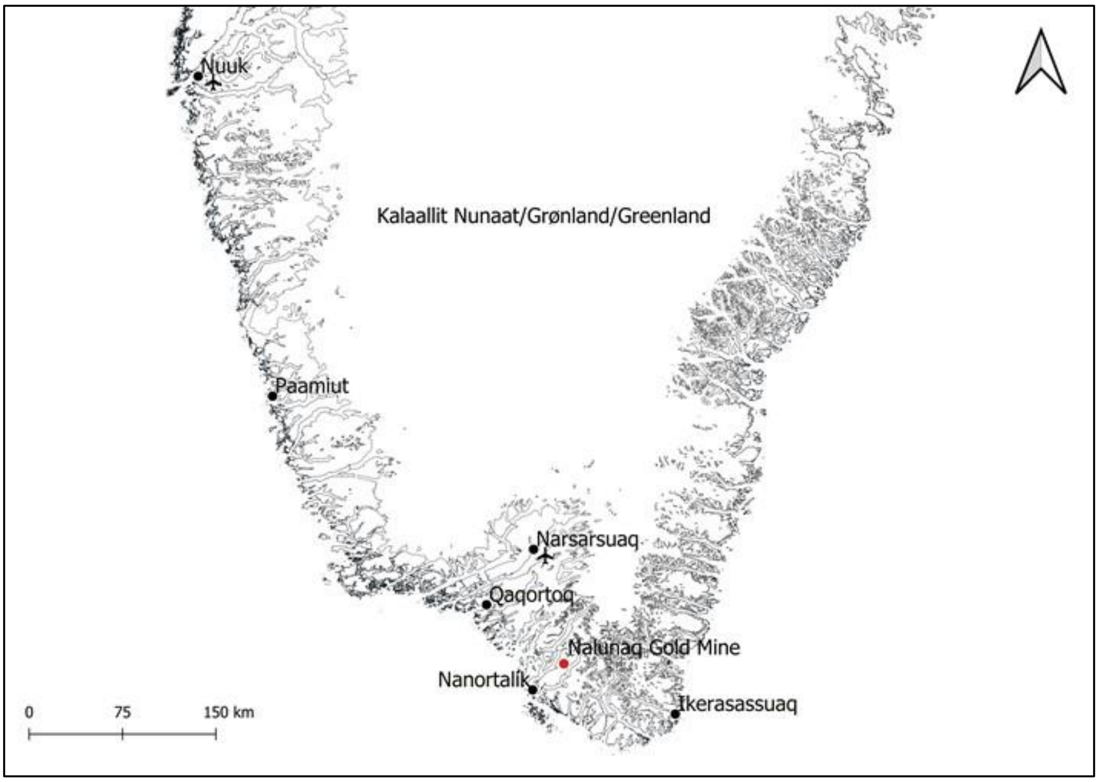


Figure 1: Location of the Nalunaq Gold Project in South Greenland

The mine lies to the west of the permanent icecap in the municipality of Kujalleq, in Kirkespirdalen, a broad glacial valley situated about 8 km from the tidal, ice-free Saqqaa Fjord.

The site benefits from access to ice-free deep-water fjords and is served by the Narsarsuaq international airport 100 km to the north, with regular connections to Copenhagen and Reykjavik.

2.3 Description of the Mine Company

The Nalunaq license is held by Nalunaq A/S, a 100 % owned Greenlandic subsidiary of AEX Gold Inc., a public company listed on the Toronto Venture Stock Exchange and on the AIM Stock Exchange in London. The Company is engaged in the identification, acquisition, exploration and development of gold properties in Greenland.

The Nalunaq Gold Project is a past-producing underground gold mine located in South Greenland. The mine was first operated under Crew from 2004 to 2009, and then by Angel Mining from 2009 to 2013, until the mine closed and decommissioned in 2014.

Nalunaq A/S saw an opportunity to acquire a past producing high-grade gold asset with significant exploration potential and benefitting from extensive infrastructures that remain in place, including an underground processing plant, underground mine workings, a mine access road and a jetty.

The mine is located within Exploitation license 2003/05, while some of the facilities are located in the adjacent exploration license 2006/10. Both are 100% owned by Nalunaq A/S. Nalunaq hosts an Inferred Mineral Resource of 251 koz of gold in 422,770 tonnes at a grade of 18.5 g/t Au as described by the latest Competent Person Report (''CPR'') from SRK (2020).

Additionally, the above Inferred Mineral Resource is supplemented by an underground Tailings Resource, also covered in the CPR, representing 48,220 tonnes of slurry at a grade of 4 g/t, for a total of 6,200 ounces of gold.

3.0 ADMINISTRATIVE AND LEGISLATIVE FRAMEWORK

3.1 Introduction

Greenland is part of the Kingdom of Denmark. Autonomous local governance was introduced to Greenland in 1979 followed in 2009 by a new Act of Greenland Self Government, which states that Greenland can take over the administration of mineral resources. In 2010, Naalakkersuisut (the Government of Greenland) took over mineral resource administration from Denmark, including the administration of environmental issues in relation to mine projects.

The Environmental Agency for Mineral Resource Activities (EAMRA) is the administrative authority for environmental matters relating to mineral resources activities, including protection of the environment and nature, environmental liability and environmental impact assessments. EAMRA is an agency under the Ministry of Science and Environment.

In addition to the requirements relating to the preparation of its EIA, the Project will also comply with all other applicable Greenlandic and Danish legislation, including conventions to which Greenland is a signatory.

The Mineral License and Safety Authority (MLSA) is the administrative authority for license issues and is the authority for safety matters, including supervision and inspections. Together EAMRA and MLSA form the Mineral Resource Authority in Greenland.

With regard to Environmental issues EAMRA has, according to the Mineral Resources Act, to make a decision based on assessments and proposals for decisions from one or more scientific and independent environmental institutions. Therefore they are presently cooperating closely with **DCE/Danish Center for Environment and Energy** and with the **Greenland Institute of Natural Resources** (GN), Pinngortitaleriffik.

3.2 Greenlandic Legislation

Greenland took over the responsibility for regulation and management of the mineral sector, when the *Mineral Resource Act* came into force on 1 January 2010 (*Greenland Parliament Act* no. 7 - 7 December 2009).

The Mineral Resource Act including later amendments ("the Act") is the backbone of the legislative regulation of the minerals sector, regulating all matters concerning mineral resource activities, including environmental issues and nature protection.

3.3 The Mineral Resource Act

The Act stipulates the conditions which need to be met in order to conduct mining activities in Greenland. Initially, a licensee must apply for and obtain an exploitation license for the area, which can be granted pursuant to Section 29 of the *Minerals Resource Act* upon submission to the authorities of the following documents:

1) An application with key information on the proposed mining project;

2) An Environmental Impact Assessment; and

3) A Social Impact Assessment.

An Environmental Impact Assessment should have regard to:

- § 53 - Planning and selection of all activities and construction must take place in a manner to cause the least possible pollution, disturbance or other environmental impacts;
- § 52 - The best available techniques must be used, including fewer polluting facilities, machinery, equipment, processes and technologies should be applied;
- § 56 - Impairment or negative impacts on the climate must be avoided; and

- § 60 - Impairment of nature and the habitats of species in designated national and international nature conservation areas and species must be avoided.

When an exploitation licence is granted, the licensee needs to submit an exploitation plan for approval by the Greenland government (Section 19 of the Act), which includes submission of a closure plan (Section 43). Provided Section 19 and 43 approvals are granted, all specific constructions, processes, vehicles etc. must be individually approved under Section 86 of the Act.

In addition to the requirements relating to the preparation of its EIA, the Project must also comply with all other applicable Greenlandic and Danish legislation, including conventions to which Greenland is a signatory.

3.4 Marine Environment Act for Greenland - Inatsisartutlov nr. 15 af 8. juni 2017 om beskyttelse af havmiljøet

Greenland and Denmark adopted legislation in both countries in 2017, which established shared responsibility for the marine environment, with Greenland responsible for the sea area up to 3 NM from land and Denmark responsible for the sea area between 3 NM and 200 NM.

The Marine Environment Act for Greenland is relevant for the part of the Nalunaq Gold mine project which involves discharge of pollutants to the sea and the transport of goods and persons out to 3 NM from land which in practice covers all transport and discharges to the fiord whereas the Danish part of the law is in force outside the 3 NM zone.

Both countries legislation covers ship traffic and other activities which may cause pollution to the sea. The legislation makes it possible for the authorities to regulate or prohibit import and export of especially harmful substances. Generally, the legislation prohibits any kind of dumping of harmful substances including sewage, waste etc. and prescribes precautionary and polluter pays principles for any harm done to the marine environment.

More information about the Marine Environment Act in Greenland can be found at: http:// lovgivning.gl and information about the Marine Environment Act covering Greenland waters outside the 3 NM zone can be found at https://www.elov.dk/havmiljoloven/

3.5 International Obligations

Greenland has ratified and is member of several conventions and organizations regarding nature and biodiversity, either as a direct member or through its membership of the commonwealth of Denmark and the Faroe Islands. Of particular relevance to the Project are the following:

- **The Convention on Biological Diversity** (CBD) - on the conservation of biological diversity, sustainable use of its components and fair and equitable sharing of benefits arising from genetic resources. The CBD guides national strategies and policies and implements themes such as sustainable use and precautionary principles. Its application to the Project will be through the implementation of national laws and regulations, in particular the *Mineral Resource Act.*

- **The Ramsar Convention** - on the protection of wetlands of international importance; None of the Greenland Ramsar Sites are situated in the proximity of the assessment area. Nearest Ramsar area is area id 21 located offshore from Nunarsuit 200 km NNW of Kirkespirdalen, see chapter 6.14 for further details on protected areas in vicinity of Kirkespirdalen.

- **International Union for Conservation of Nature** (IUCN) - an international organization dedicated to natural resource conservation. IUCN publishes a "Red List" compiling information from a network of conservation organizations to rate which species are most endangered.

- UNESCO's **World Heritage Convention** - a global instrument for the protection of sites of cultural and natural heritage. In 2017, Kujataa which represent five examples of Norse and Greenlandic farming culture in South Greenland was admitted onto UNESCO's World Heritage List.
- The **Convention on Environmental Impact Assessment in a Transboundary Context** (informally called the Espoo Convention) - sets out the obligations of states to carry out an environmental impact assessment of certain activities at an early stage of planning. It also lays down the general obligation of states to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.

3.6 Maritime Regulations

Maritime regulations in Greenland comprise the equivalent Danish regulations which have been supplemented with specific regulations for navigation in Arctic regions. In addition, regulations and codes administered by the IMO (International Maritime Organization), together with international conventions adopted by Denmark, apply in Greenland.

All carriers must comply with Greenlandic and IMO regulations. This includes the global requirement for all vessels that operate outside Emission Control Areas (ECAs) to use a maximum sulfur content of 0.5% from 1st January 2020 ("IMO 2020" rule).

Several international conventions focus on offshore environmental issues. These include:

- **The CANDEN** Canada-Denmark (Greenland) agreement on the cooperation in combating against pollution incidents at sea.
- **The International Convention for the Prevention of Pollution from Ships** (MARPOL) which was developed with an objective to minimize oil and air pollution of the oceans and seas.
- **The International Convention for the Control and Management of Ships' Ballast Water and Sediments** (Ballast Water Management Convention or BWM Convention) which requires signatory flag states to ensure that ships flagged by them comply with standards and procedures for the management and control of ships' ballast water and sediments. (The BMW convention was also accepted by Greenland in November 2020).
- **The International Convention on Oil Pollution Preparedness, Response and Co-operation** (OPRA) which is an international maritime convention establishing measures for dealing with marine oil pollution incidents in the North-East Atlantic and has developed plans to phase out toxic substances and bio-accumulating substances in the marine environment.
- Greenland is following the International Maritime Organization (IMO) regulation on Heavy Fuel Oil (HFO) in arctic marine areas that will enter into force June 2024.
- Greenland has adopted "Inatsisartutlov nr. 15 af 8. juni 2017 om beskyttelse af havmiljøet" = Act of protection of the marine environment: **Regelsæt database (lovgivning.gl)**

As a result of the special navigational conditions pertaining to Greenland waters, a safety package relating specifically to Greenland topics has been issued by the Danish Maritime Authorities. The safety package includes the following orders and recommendations relevant for the Project:

- Danish Maritime Authority Order no. 1697 of 11. December 2015: "Order on technical regulation on safety of navigation in Greenland territorial waters"; and

- The International Code for Ships Operating in Polar Waters (Polar Code) is an international regime adopted by the International Maritime Organization (IMO) which entered into force on 1 January 2017. The Polar Code sets out regulations for shipping in Arctic and Antarctic regions, principally related to ice navigation, ships design and training.

A special agreement has been entered between the MLSA and the Danish Maritime Authority regarding “Guideline on investigation of navigational safety issues in connection with mineral exploitation Projects in Greenland as basis for navigation in the operations phase”. The guideline specifies the contents of a navigational safety investigation to be carried out prior to starting the exploitation activities.

4.0 THE EIA PROCESS IN GREENLAND

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 for a proposed project will only be granted once the project's EIA has been accepted by the Government of Greenland (GoG).

4.1 The purpose of the Environmental Impact Assessment

The aim of a project's EIA is to identify, predict and communicate the potential environmental impacts of the planned mining project in all of 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 in the project design.

4.2 Greenlandic Procedure for preparing an EIA for Mineral Exploitation

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 quantifying potential sources of contamination;
- Discharges and emissions to the environment, including air and water emissions; and
- The approved Terms of Reference for the EIA.

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

4.3 Environmental Baseline Sampling

EAMRA normally requires that environmental baseline sampling are carried out for two or three years in order to provide a thorough characterization of the mining area's natural content of elements such as heavy metals. These samples usually include lichens, plants, soil, seaweed, mussels, freshwater fish, marine fish, water and sediment from rivers, lakes and the fjord, following a protocol developed by Danish Centre for Environment and Energy - DCE. In addition to sampling around the mining area, samples must also be collected from a reference area further away.

However, in connection with the monitoring plan agreed upon closure of the mine in 2013, most samples have already in advance been collected and analyzed on a regular basis by DCE until 2019. Therefore, there is already a thorough and up to date characterization of natural elements in the area around the mine and from a reference station. However, a few additional environmental studies have been carried out, including:

- Measurement of the water flow in Kirkespir River throughout a year;
- Nalunaq Gold Mine, Greenland: Preliminary Static and Kinetic Testing Results From 2022 Tailings Analysis Programme dated 15 June 2022 (Golder 2022d);
- The establishment of a weather station that measures temperature, wind speed and direction, among other things; and
- Measurement of soil temperature at different depths in the area where the tailings deposition is planned.

4.4 Assessment and Project Areas

In relation to this EIA report, an “Assessment Area” has been defined which constitutes the area in which the environment can potentially be affected by the mining project. The EIA also defines a "Project Area", which is the area within the Assessment Area where buildings and roads are constructed, and direct impacts as soil disturbance and habitat loss may occur (Figure 2).

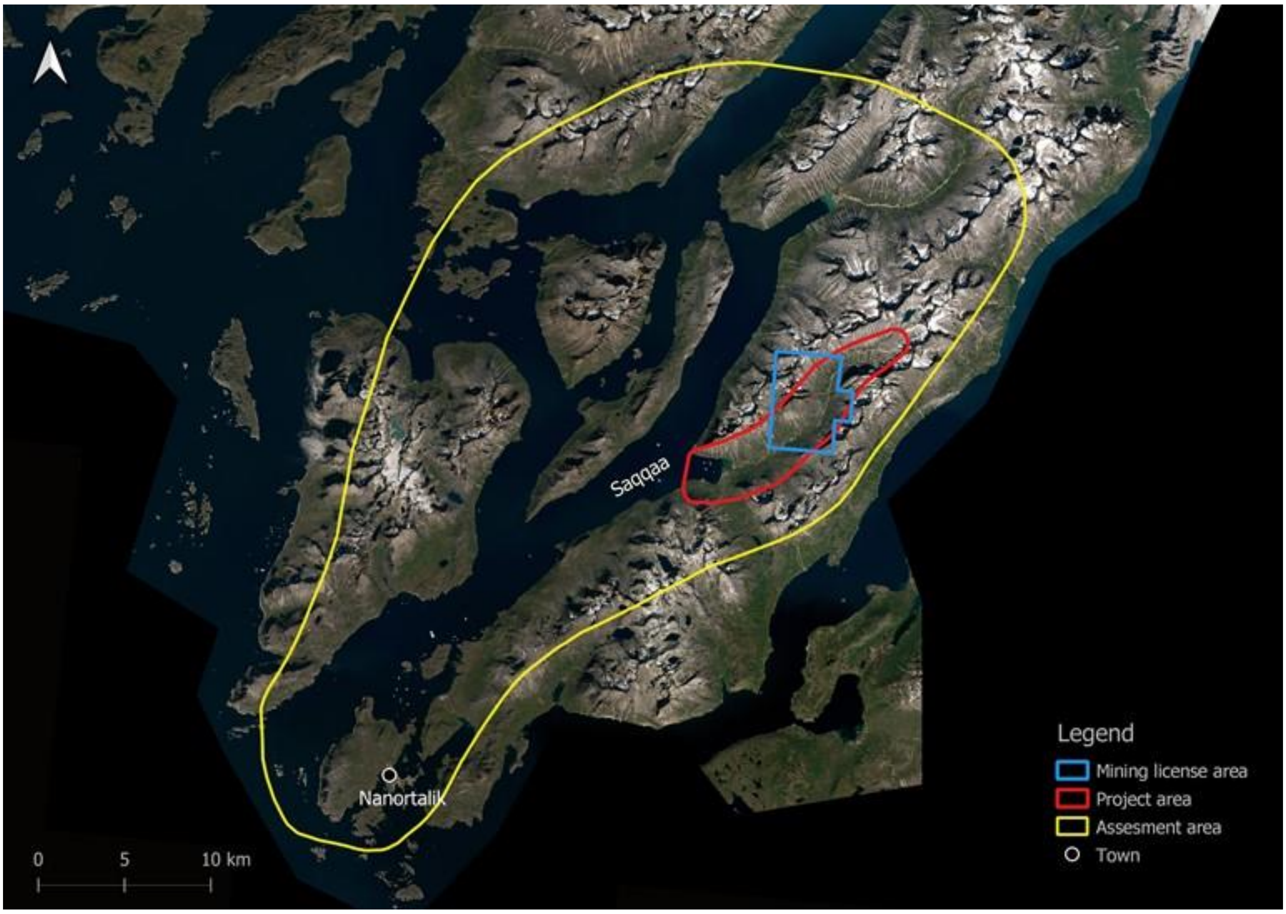


Figure 2: Assessment Area (yellow), Project Area (orange) and Mining License Area (blue).

5.0 PROJECT DESCRIPTION

5.1 Introduction

The Nalunaq Gold Project, being developed by Nalunaq A/S ("the Company"), is located in South Greenland at latitude 60°21' N and longitude 44°50' W. The project mine site is located about 32 km northeast of Nanortalik, Greenland's 10th largest town, which has a population of approximately 1,350 persons. The mine lies in Kirkespirdalen which is a broad glacial valley to the west of the permanent icecap in the municipality of Kujalleq approximately 8 km from the tidal, ice-free, Saqqaa fjord.

The Nalunaq gold mine opened for the first time in 2004, following the discovery of visible gold in an outcropping quartz vein 12 years earlier. The mine operated until 2013, after which it was closed and decommissioned in 2014.

5.2 Mineral Resources

The Nalunaq Gold Project is reported to have, as of 2020, an Inferred Mineral Resource of 250,970 oz. (422,770 tonnes at 18.5 g/t Au), covering only the area in and around the existing mine area and remaining stopes. The Inferred Mineral Resource estimate combines 233,080 oz. of gold in the mine area (396,080 tonnes at 18.3 g/t) and an additional 17,890 oz. of material in the remaining stopes left by the previous operator (26,690 tonnes at 20.8 g/t) as shown in Table 2.

Table 2: Mineral Resources at the Nalunaq Mine

Zone	Classification	Tonnes (t)	Grade (g/t Au)	Contained Gold (oz)
Mine Area	Inferred	396,080	18.3	233,080
Remaining Stopes	Inferred	26,690	20.8	17,890
Total Inferred		422,770	18.5	250,970

The identified Inferred Resource surrounds the historically mined areas around three blocks:

a) The Mountain Block;

b) The Target Block; and

c) The South Block.

In 2020, after the drilling season, a fourth block was identified, adjacent and parallel to South Block, which is known as the Valley Block. The presence of this fourth block was confirmed during the 2021 drilling programme as well as indications of a potential fifth block to the south known as the Welcome Block.

The tailings from previous operations will not be re-handled or recovered without being subject to a supplementary EIA and a subsequent application and approval procedure by the authorities. The possibility of rehandling tailings from previous operations was identified as a potential Mineral Resource in an independent Technical Report on the Nalunaq Gold Project from 2016 (SRK, 2016) and a Competent Person's Report on the Assets of AEX Gold, South Greenland report from 2020 (SRK, 2020), but is not currently being considered as an option at this stage of the project. The Inferred Resource is supplemented by an Exploration Target estimated to be between 200,000 oz. and 2.0 Moz. (2.5 to 10 million tonnes at 2.4 to 6.0 g/t Au).

5.3 Nalunaq Geological Setting and Vein Material Description

The Nalunaq gold mine is situated in the basement rocks of southern Greenland. According to Dominy *et al.* (2006) Nalunaq is situated within the Ketilidian Mobile Belt, which is related to the accretion of a Palaeoproterozoic continental margin against the Archaean Core of southern Greenland. Dominy *et al.* (2006) report that the site lies in the Psammite Zone, a supracrustal succession of psammites with pelites and interstratified mafic volcanic rocks. Gold mineralisation at Nalunaq is hosted by a meta-volcanic unit composed of basaltic pillow lavas and pyroclastics intruded by dolerite sills. The volcanic rocks are reported (Dominy *et al.*, 2006) to be metamorphosed to amphibolites and the area is intruded by late- and post-tectonic granitoid plutons. It is also reported by Dominy *et al.* (2006) that at Nalunaq granitoid rocks surround three sides of the meta-volcanic mass hosting the vein mineralisation.

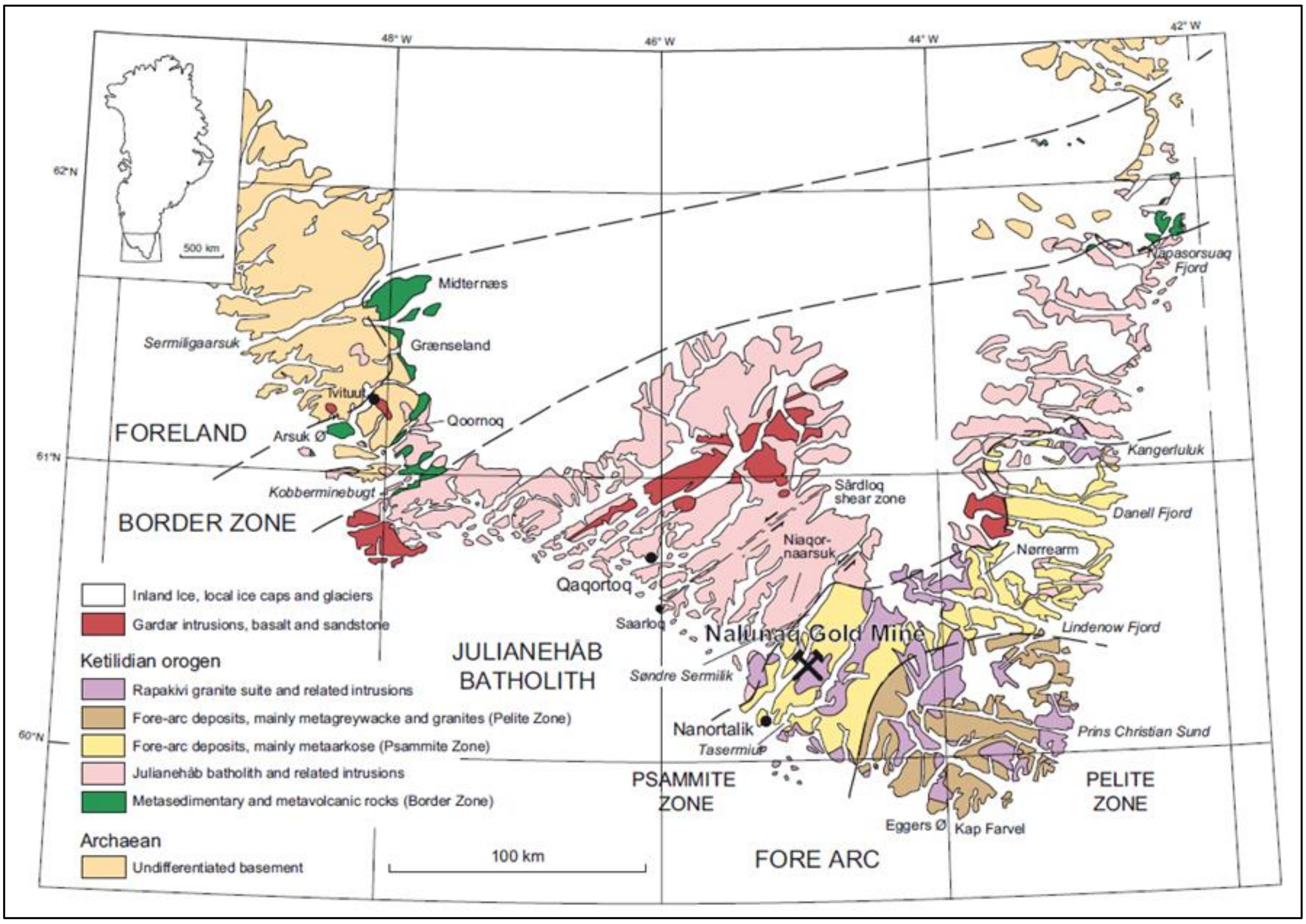


Figure 3: Geological Map of Southern Greenland with the location of the Nalunaq Mine (from Secher et al., 2008)

On the Nanortalik peninsula metabasic rocks have been found in three areas, including Nalunaq. These three areas have been interpreted, by Petersen *et al.* (1997) as separate parts of the Nanortalik Nappe where tholeiitic basalt flows and doleritic sills have been thrust over metasediments and intruded by later granites and several generations of late aplite and pegmatite dykes. The local geology consists mainly of fine-grained amphibolites and coarse-grained dolerite. The stratigraphy has been assigned into the structural footwall ("FW") and structural hanging wall ("HW") with respect to the main mineralised vein (Nalunaq Main Vein, "MV"). Between the granite of the deep footwall and the amphibolite and dolerite of the shallow footwall, silicified and pyrite-impregnated siltstones with intercalations of graphitic beds and altered fine-grained siltstones are present. The gold mineralised quartz vein is located at or close to the contact of fine-grained amphibolite and coarse-grained dolerite.

Nalunaq is a high-grade narrow vein gold deposit hosted in a package of metabasic rocks including metadolerites and fine grained amphibolites (Kvaerner, 2002). The Nalunaq Main Vein is exposed on two faces of Nalunaq Mountain (Figure 4). The vein is subparallel to the foliation and to the regional thrust/ shear planes, occurring about 100 m above the thrust-base (Petersen *et al*., 1997). On a local scale, the vein occurs along the contact between a medium grained metadolerite and fine-grained amphibolite in the footwall. The ore horizon is a calc-silicate zone with a discontinuous central filling of sheeted quartz veins often made up of slightly off-set flat quartz lenses which onlap laterally to yield swelling ore shoots connected to others by quartz-calc-silicate seams. Intensive calc-silicate altered amphibolites occur in discrete bands elsewhere in the series, particularly below the Main Vein, and may represent internal shear zones with enhanced fluid flow (Petersen *et al*., 1997).

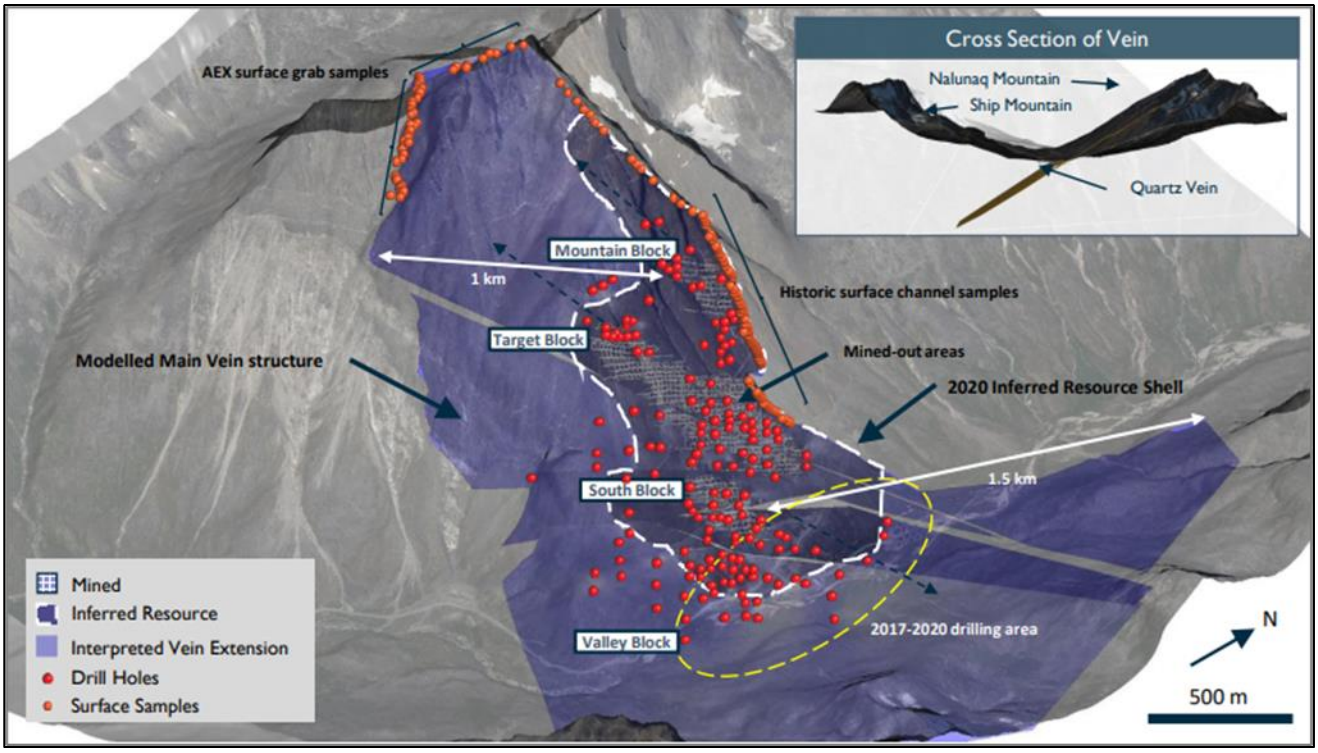


Figure 4: Nalunaq Mountain from the Southeast (AEX, 2020)

The mineralogy and composition of the waste rock and both flotation and gravity tailings samples reflects their geological origin. The concentration of most constituents is low and the only identified potential contaminant of concern (PCOC) based on trace element composition is Arsenic with an average concentration 149 mg/kg (median 98 mg/kg) with the tailings' samples showing a net buffering capacity and low sulphide content ranging from <0.04% sulphide sulphur in the flotation tailings to a maximum of 0.36% in gravity tailings (Golder, 2021g; Tailings Waste Characterisation Review, 5 July 2021. Report ref: 21467213.500.A.0). The tailings samples are generally considered inert with respect to sulphide content and neutralisation potential based on European Union's classification of inert extractive waste (European Commission, 2009). The highest concentration of PCOCs exist within the ore which will enter the process stream and end up in tailings or shipped offsite as gravity concentrate.

An analysis of the uranium content of the ore and waste rock has been undertaken (Golder, 2022c; Nalunaq Gold Mine, Greenland - Uranium Concentrations - Technical Memo, 25 March 2022. Report ref: 21467213.C04.4.B.0) to compare with the statutory limit of 100 ppm as set out in Greenlandic legislation (Greenlandic Parliament Act of December 1, 2021, on a Ban on Preliminary Investigation, Exploration and

Exploitation of Uranium, etc). Recent testing has been carried out on samples of tailings, which are processed from Nalunaq ore using both gravity and flotation extraction methods. The Uranium concentrations reported in flotation tailings samples range from 0.12 mg/kg to 0.65 mg/kg, with a mean concentration of 0.44 mg/kg. For gravity tailings samples, uranium concentration range between 0.15 mg/kg to 0.87 mg/kg, with a mean concentration of 0.52 mg/kg. These concentrations are considerably less that the statutory limit of 100 ppm (100 mg/kg). The detailed assessment is included in Appendix XI.

5.4 Project Timeframe and Phasing

The overall project plan, proposed by Nalunaq A/S, for exploiting the resource is split into three main phases which are outlined in Table 3.

Table 3: Project Timeframe and Phasing

Phase	Timing	Planned Activities
Construction and predevelopment	1 year	Repair of roads and new access to the orebody via a new portal and the extraction of a bulk sample to assist in final Resource definition and mining planning. 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 elements to Plant and equipment from/ to the Project site.
Operations	5 years (likely to extend as new resources are found)	Once operations commence, the Mine and Plant will gradually be extended until steady state operation is achieved. Mined areas will progressively be back filled. Waste rock generated from the underground excavations that is not used for construction, road maintenance or the DTSF will remain underground deposited in mined excavations as unconsolidated waste rock backfill.
Closure and decommissioning	1 year	Buildings, plant and utilities will be removed, and the last mined area will be rehabilitated.
Post-closure		A preliminary Closure Plan containing a conceptual Monitoring Plan is available in Appendix XV. In summary, Nalunaq will develop and implement an Environmental Monitoring Program (EMP) as part of an Environmental Management Plan in accordance with the Greenlandic guidelines to monitor the potential impact of the mining operation for 5 years following closure. The monitoring program will focus on physical monitoring of meteorology, groundwater, surface water and air (dust). The results of the monitoring programme will be submitted in an annual monitoring report to regulatory authorities for review.

5.5 Project Facilities

The facilities required to bring the project into operation include the following:

- Camp facilities;
- Power generation;
- Fuel storage facilities;
- Helipad, jetty and beach landing area;
- Underground development before mining operation;

- Process plant;
- Dry Tailings Storage Facility (DTSF); and
- Access roads.

The above facilities will be constructed during the 12-month construction phase. The workforce during construction is expected to be between 80 and 100 workers.

An overview of the Project Area is shown in Figure 5 and the Project Layout is shown in Figure 6.

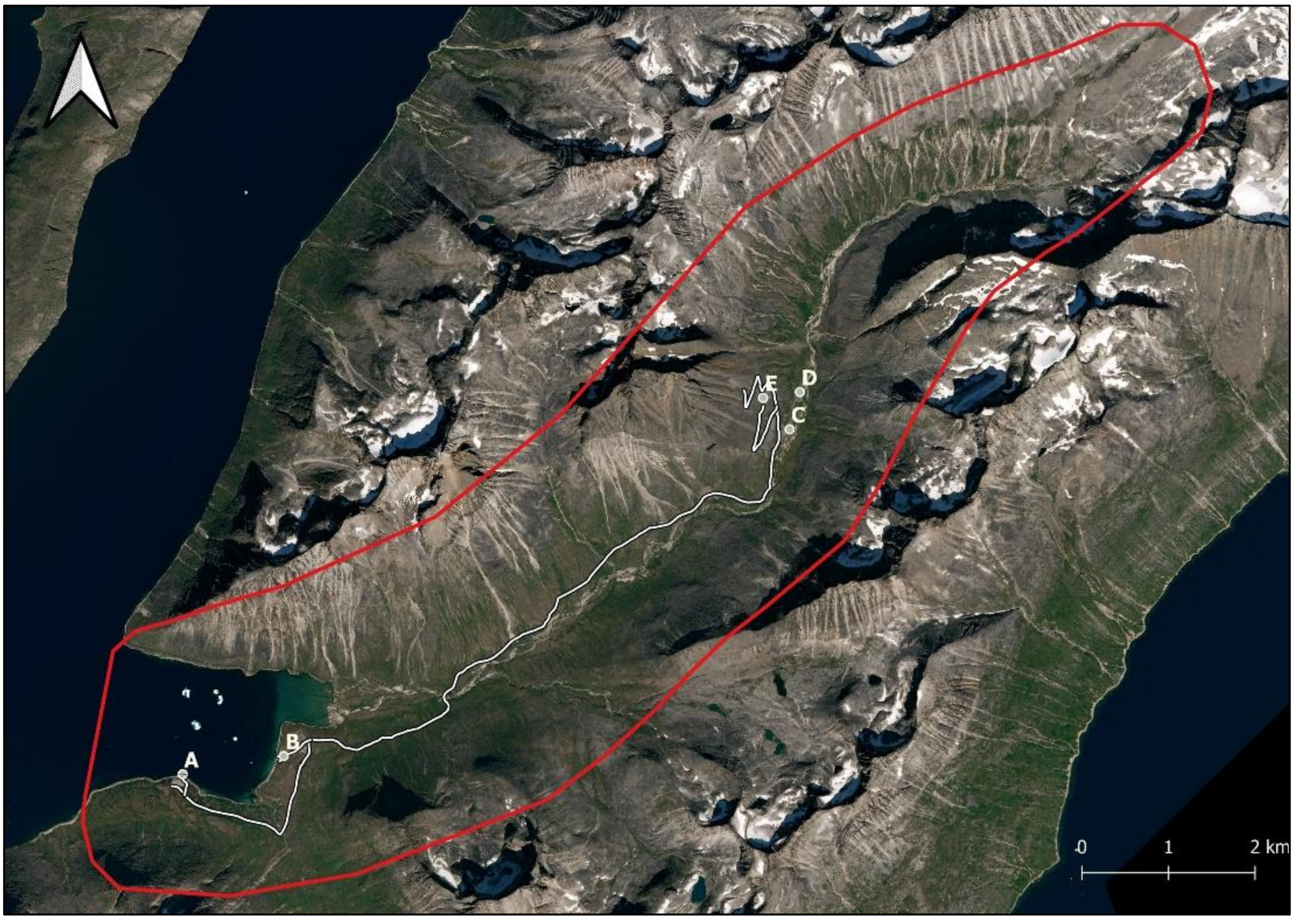


Figure 5: Overview of the Project Area

(A: Jetty; B: Camp; C: Process plant; D: Tailing storage; E: The mine. The road between the jetty and the mine is shown with a white line.)

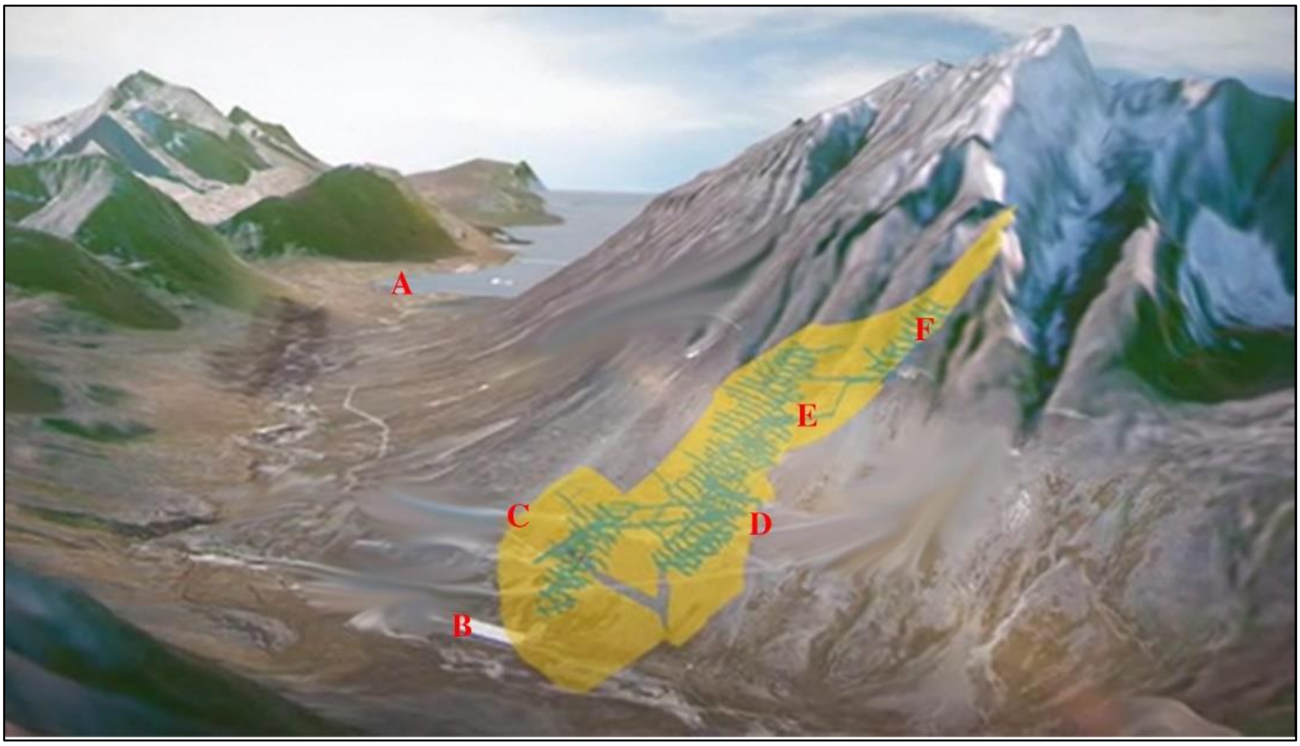


Figure 6: Project Layout

(A: Camp; B: Process Plant; C: South Block, 300 Portal and Valley Block; D: 350 Portal; E: 400 Portal; F: 600 Portal.)

5.6 Construction Phase

5.6.1 Introduction

The construction of the different facilities required to return the mine to operations will be carried out in a number of discrete tasks which are described in the following sections.

5.6.2 Establishment of Permanent Camp Facilities

The temporary Camp Facility for field activities was approved by the MLSA in November 2020 and was established near the Saqqaa Fjord. The temporary Exploration/Construction Camp was moved into position during the latter part of the 2020 field season and will be expanded in capacity to support construction activities while the permanent Camp is being built.

The new Camp, consisting of dormitories, a kitchen and canteen, a laundry, a mud room and a changing room, as well as a recreation building and an administration office and will be capable of hosting 100 persons. The Camp will be supported by other facilities, such as a sewage treatment plant, potable water treatment plant, fire protection system, freshwater pumps located in the fjord, incinerator and diesel generators. The Camp Complex has been designed with the assistance of health and safety professionals to enable operation under pandemic conditions, such as COVID-19. The camp will be constructed in accordance with the Greenlandic Building code. The location and layout of the facilities is shown in Figure 7 and Figure 8 and the detailed layout of the Camp Complex is shown in Figure 9.

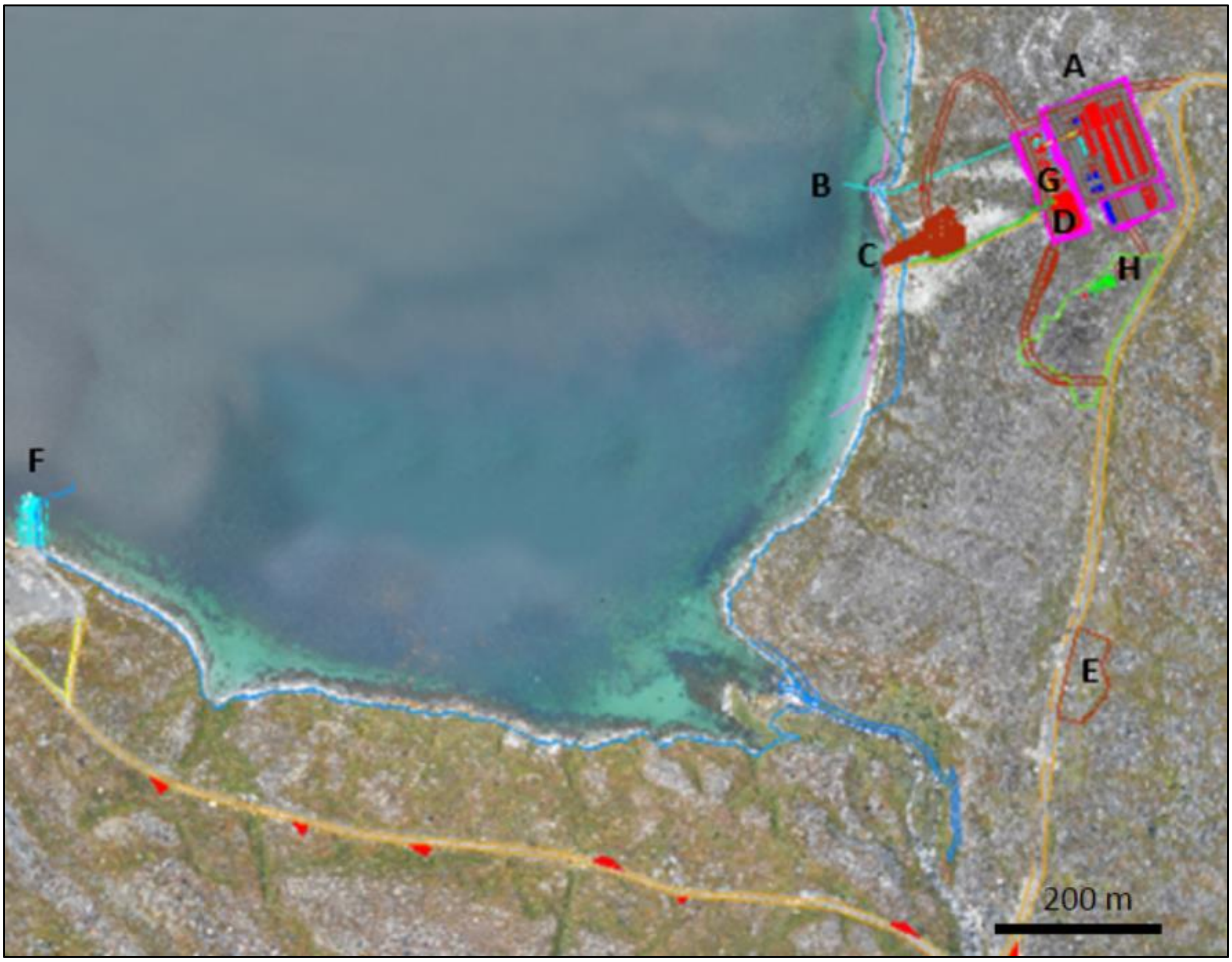


Figure 7: Location and Layout of Camp Facilities

(A: Camp Facility; B: Fjord Pumps; C: Beach Landing; D: Fuel Storage Area; E: Exploration / Construction Camp; F: Jetty; G: Camp Power Generation; H: Camp Helipad.)

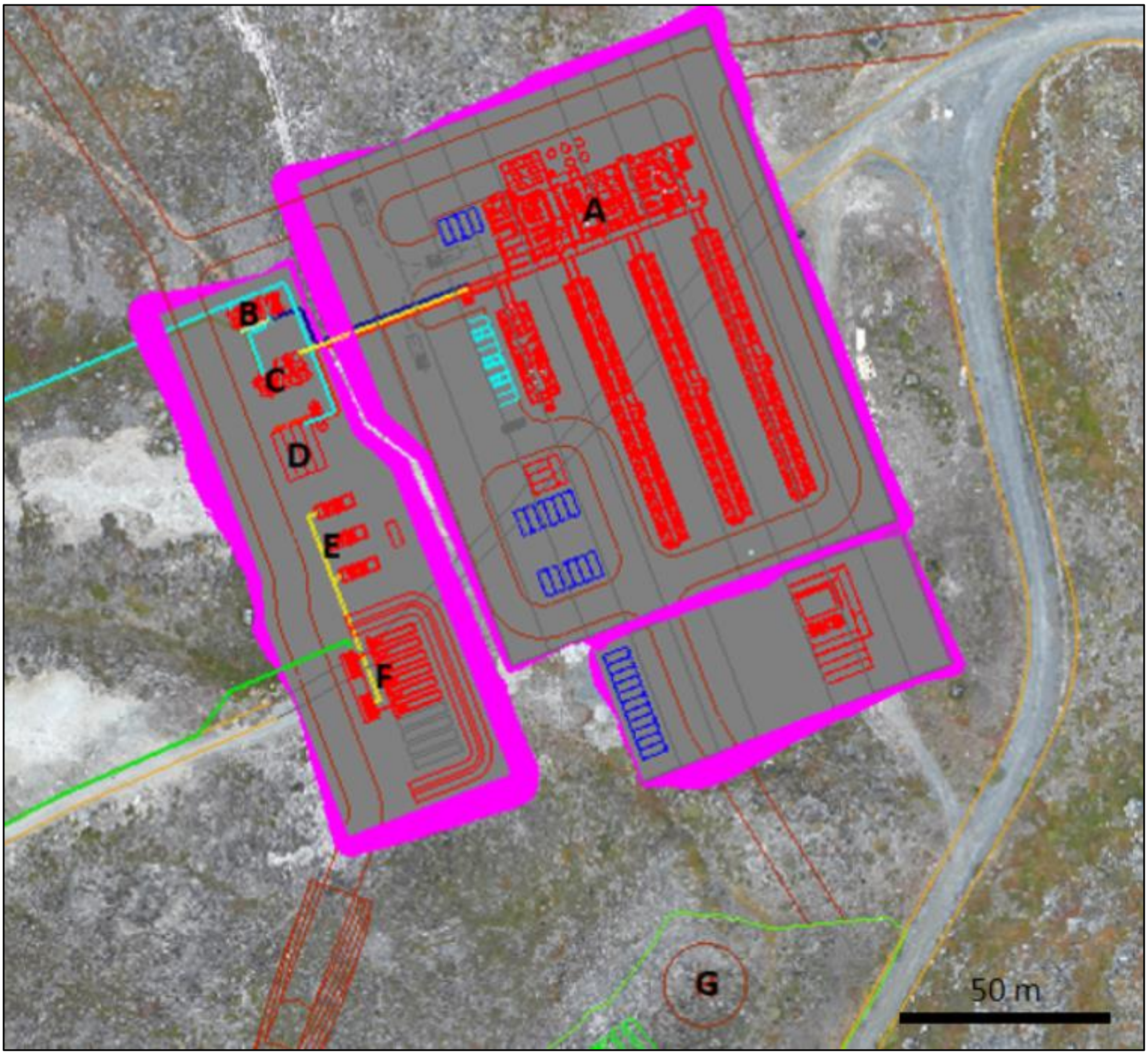


Figure 8: Layout of Main Camp Facilities

(A: Camp Facility; B: Potable Water Treatment; C: Sewage Treatment; D: Fire Water Tanks; E: Camp Power Generation; F: Fuel Storage Area; G: Camp Helipad)

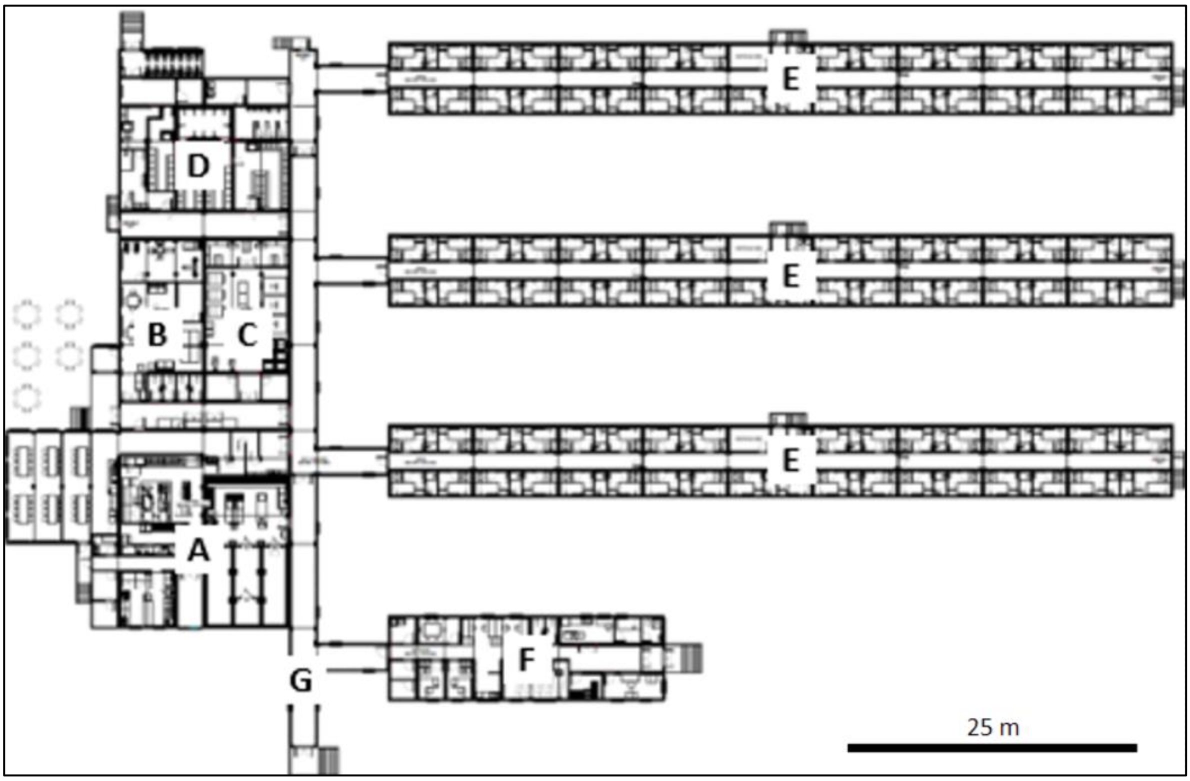


Figure 9: Detailed Layout of Camp Complex

(A: Kitchen; B: Recreation Room; C: Laundry. D: Changing Room; E: Dormitories; F: Administration Building; G: Arctic Corridors)

5.6.3 Power Generation

Electrical power to power the project facilities will initially be supplied by diesel generating sets, although AEX is currently in discussions to utilise green energy, including a small hydro plant. Two separate power plants will be established on site, one near the Camp and another near the mine and processing facility. At the Camp, a power generation facility with a peak power demand of approximately 500kW will be installed, whereas for the process plant and the mine the power generation facility will be designed for a peak power of approximately 2,000kW.

All electrical installations, including electrical production and distribution facilities, power cables and electrical machinery will be designed, constructed, and maintained in accordance with Greenlandic laws, regulations, provisions and guidelines and comply with all requirements. Approvals will be required from the Greenland Electrical Authority.

5.6.4 Fuel Storage and Management

The main fuel storage facility will consist of a 414 m^3 of storage capacity, located near the Camp. This will include 6 tanks of 69 m^3 capacity each. The tanks will be of the double wall type and will be installed inside secondary containment consisting of a High-Density Polyethylene (HDPE) membrane surrounded by rock fill berms.

Fuel is expected to be dispatched from the main storage area to the mine area by a 25 m^3 capacity fuel truck. At the mine site, two 30 m^3 double wall tanks will be located near the process facility, servicing the process plant and the mine.

Fuel will be delivered to Nalunaq by fuel barges in the Saqqaa fjord, which will pump fuel towards the main fuel facility. The Company will establish a fuel supply scheme whereby fuel consumed in a week will be replenished by barging fuel tankers of 60 m^3 capacity between the site and Nanortalik using a local operator at a frequency of 1 or 2 tankers per week.

The fuel storage and management will comply with the executive order No. 9 dated 6th of March on flammable liquids, part of the approval of the activity plan pursuant to section 86 of the Mineral Resources Act.

5.6.5 Helipads and Beach Landing

For ease of access to site during regular operations and for emergency use, a helipad will be constructed to be located at the Camp and the existing historic pad near the mine and process facility will be upgraded so as to be fit for operation.

The shipping of material in and out of Nalunaq will be supported by upgrading the historical barge beach landing area near the Camp. The beach landing area will also be used to support operations. The jetty, constructed in the early 2000s, may be used occasionally to support other logistical requirements.

5.6.6 Construction of Process Plant and Auxiliary Infrastructure

The process flowsheet was established and selected based on various key historical data and supported by various metallurgical test work program in the Project's Feasibility Study (Kvaerner E&C, 2002) and updated by the Company in 2020 by optimizing flotation test work. The latter provided important key findings pertaining to the performance of a flotation process versus a typical cyanide leaching recovery process.

The processing facilities will comprise the following main systems:

- Crushing;
- Dust collection;
- Grinding;
- Gravity recovery;
- Flotation;
- Tailings thickening;
- Tailings filtering; and
- Gold room (used for smelting the gravity concentrate into doré).

The major process area will be surrounded by containment where appropriate.

The process plant building will be constructed on an engineered platform in the Kirkespirdalen in an area previously utilized by past operators and effectively considered as a brownfield site. The engineered platform will be built above the 1:1000-year event flood contour. The process plant building will be located between the Dry Stack Tailings Storage Facility (DTSF) (see Section 5.6.7) to its north and the new 235 level Portal to its south. A mill feed will also be located on the south/west area of the process plant's pad. Roads will be located on both sides of the process plant to provide access to both sides of the building. The process plant will have capacity to treat approximately 100,000 tonnes of feed material per year. The general layout of the process plant is shown in Figure 10.

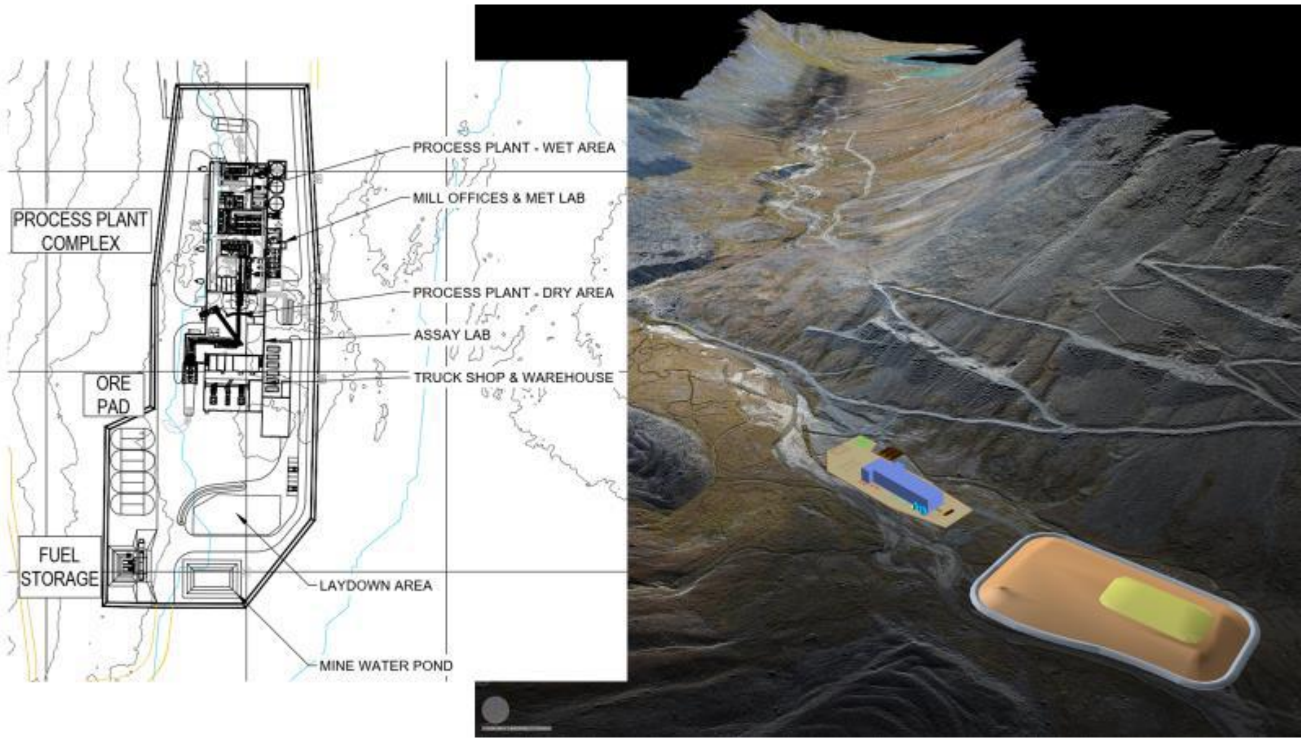


Figure 10: General Layout of Process Plant

The building will consist of insulated prefabricated sandwich panels for the walls and the roof system, using non-combustible material. The building will be installed on top of prefabricated concrete foundations. In the middle of the building a separation wall will divide the crushing and stockpiling area to the rest of the process area. The perimeter of the process plant building will house the control room, metallurgical lab, reagents storage, workshops, material storage, electrical room, process water tanks, clean water tanks and fire water tanks. The other buildings such as the offices, the warehouse and the assay lab will be of a modular type.

Raw water supply for the process plant requirements will be provided by 2 to 4 shallow groundwater wells that will be located close to the process plant area. The average water requirements are approximately 3 m^3/hour. A fire protection system will be included in the process plant building and will be comprise of fire hose stations.

Material will be fed to the primary crusher on the south side of the building and filtered tailings will be stockpiled in day piles to the north side, before being trucked to tailings disposal facility (see Section 5.6.7). The smelting facility will produce doré from the gravity concentrate and the flotation concentrate will be filtered, bagged and exported for additional refining.

The process plant and the underground mine will be supported by auxiliary infrastructures such as a maintenance shop, offices, warehouse, assay lab, fuel storage facility and power generation as illustrated in Figure 11.

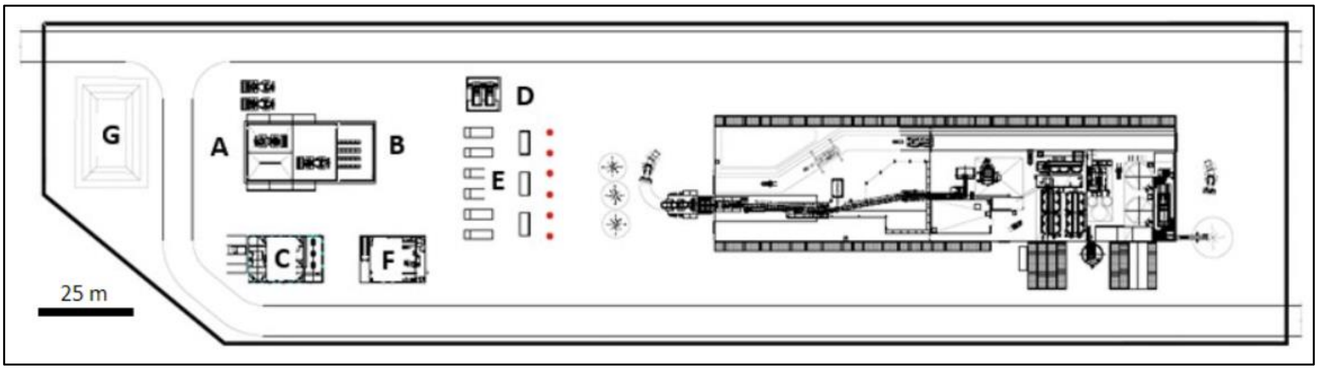


Figure 11: Auxiliary Infrastructure to Support the Processing Facilities

(A: Maintenance Shop; B: Warehouse; C: Offices; D: Fuel Storage; E: Power Generation; F: Assay Lab; G: Holding Pond.)

5.6.7 Establishment of Dry Stack Tailings Storage Facility

A key element of the Project will be the implementation of a process waste disposal facility, commonly known as tailings storage facility (TSF). Various tailings disposal technologies were investigated by Golder (Golder 2020) which ultimately culminated in the selection of a DTSF for the Project after an options analysis (see Section 5.9). The location of the DTSF was based on an assessment of the suitability of a number of alternative locations as set out in Golder (2022a; Tailings Storage Facility Options Analysis – Technical Memo, 7 March 2022. Report ref: 21467213.C04.1.B.0). This report is presented in Appendix IX.

The DTSF was designed to be an unlined and uncapped facility located on top of an engineered platform, above the 1:1000-year flood event line and protected by an outer berm from the maximum flood event, as shown in Figure 12.

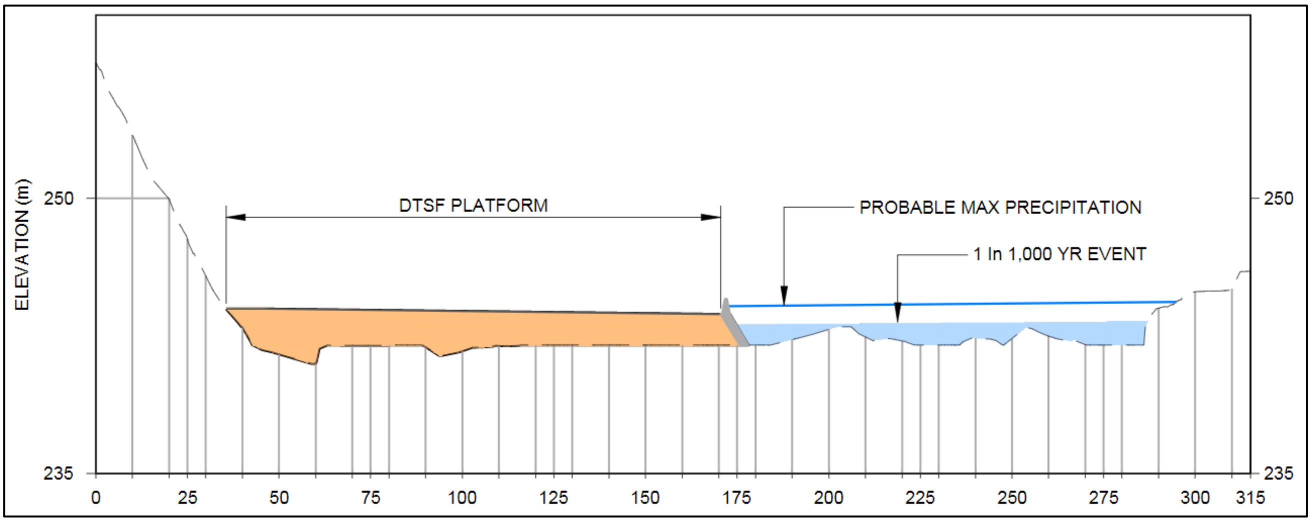


Figure 12: Typical Section through the DTSF Showing Elevations Relative to a 1 in 1,000-year Flood Event

The flood protection platform will be constructed in two stages. The first stage will be constructed to provide tailings storage capacity for the first two years of operation and the platform footprint will be expanded to provide a further 3 years capacity. The full storage capacity of the DTSF will be capable of holding the tailings generated during the entire Life of Mine (LOM). The concept of the phased development of the facility is shown in Figure 13.

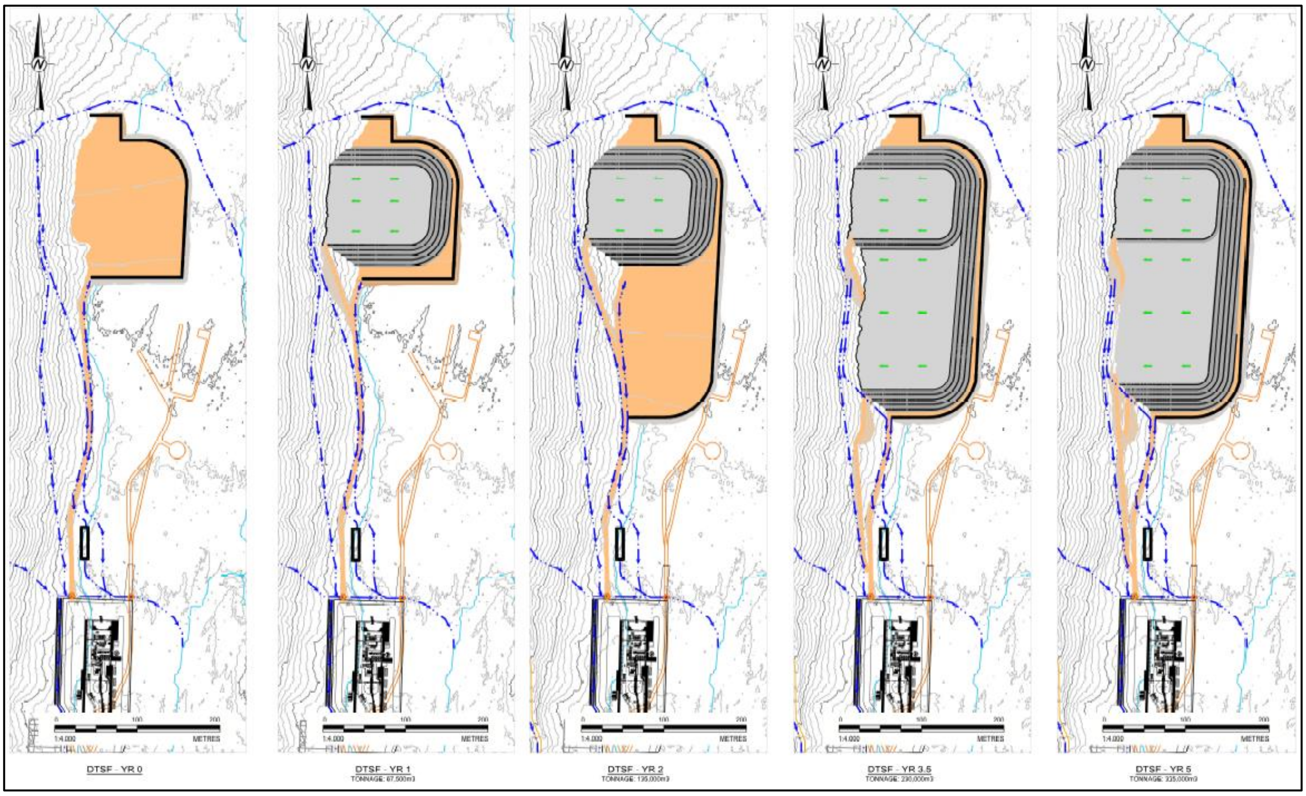


Figure 13: Conceptual Evolution of the DTSF Over the LOM (Golder, 2020)

Geotechnical test work was undertaken on representative tailings samples to establish a design criterion for the DTSF, as included in Golder (2021d; Tailings Storage Facility Design Report, 20 January 2021. Report ref: 20136781.619.A.1). The outer slopes of the DTSF will be protected against erosion by riprap armouring comprising rockfill and transition/filter layers (Golder, 2021d; Tailings Storage Facility Design Report, 20 January 2021. Report ref: 20136781.619.A.1). Site preparation for the DTSF will include clearing and grubbing, construction of access roads and salvaging topsoil for future reclamation use. After topsoil stripping, unsuitable materials within the footprint of the DTSF will be removed prior to construction of the DTSF platform.

As the DTSF is an unlined facility with no low permeability lining/capping system on the flanks or top that would inhibit oxygen ingress the facility will not become anoxic and will be free draining both internally and on the surface. It is noted that there is a potential for ice lenses to develop within the DTSF if rainfall is allowed to pond or snow left on the surface are subsequently covered with tailings material. This risk will be mitigated through maintenance of drainage and removing snow from the surface prior to tailings placement. A figure showing the relationship of the DTSF with the groundwater environment is presented in Figure 14.

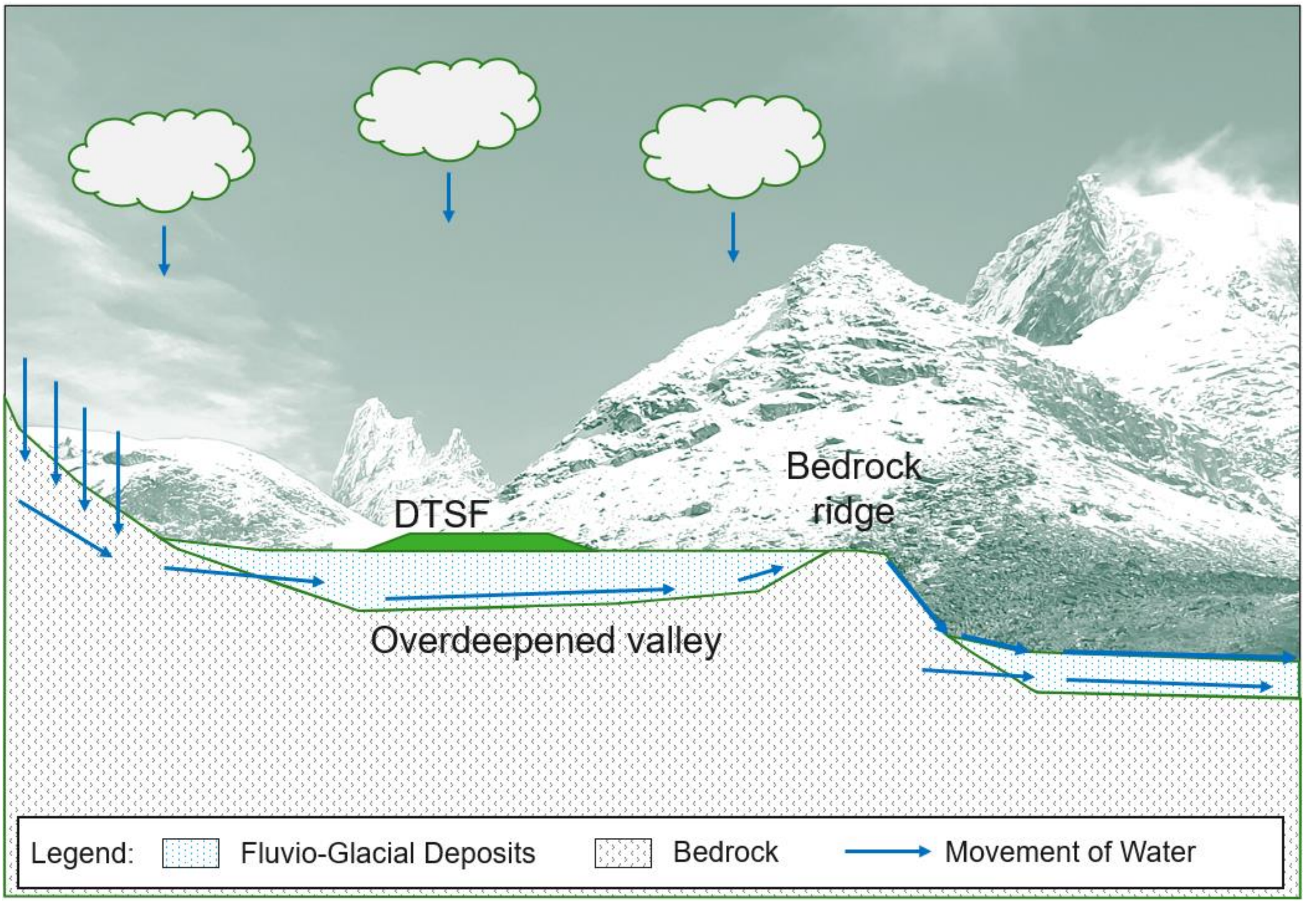


Figure 14: Conceptual drawing showing the relationship of the DTSF with the groundwater environment

Access roads will be developed during pre-deposition works to allow access to the DTSF platform and for access at the final elevation. The access roads will typically include a gravel surface placed onto graded, ripped and compacted subgrade and the upper road surface will be profiled to prevent ponding of surface water and to allow runoff and drainage.

Surface water from the hillside to the west of the DTSF and process plant will be intercepted by series of diversion channels and drains. This non-contact water will then be discharged to the Kirkespir river. All surface water from DTSF and the process plant area will be collected in a sediment pond (see Section 5.7.8) for controlled discharge to the Kirkespir river. Full details of the surface water assessment and management are described in the technical background reports on hydrology (Golder, 2023a; Water Management Plan Technical Background Report, 17 March 2023. Report ref: 20136781.611.A.3; and Golder, 2021e; Hydrological and Hydrogeological Study Technical Background Report, 27 January 2021. Report ref: 20136781.613.A.0).

Tailings samples were generated in 2020 and 2021 for geochemical testing at SGS Lakefield in Ontario, Canada. Rock core samples representative of areas of the mine were subjected to gravity and flotation processing. It is noted that the Project intends to move forward with flotation processing methodology for the mine planning, however, sometimes discharge of gravity tailings to the Dry Tailings Stack Facility (DTSF) may be required due to operational constraints. Therefore, both flotation and gravity tailings were tested using static and kinetic test methods.

The static testing results received including chemical composition and acid base accounting indicate that on the basis of assessment against NP and NAG pH all samples are likely to be Non Acid Forming (NAF). The NNP indicates that for some flotation and gravity samples the acid generation potential is uncertain. Humidity cell testing was recommended to assess the drainage chemistry of the dry stack filtered tailings. Bottle roll testing was recommended on the basis of the site setting, as the test method is suitable for assessing solute release rates from tailings that end up in an aqueous setting subject to mechanical abrasion (such as tailings in a stream).

Humidity cell results to week 25 show that pH values in the cells are neutral to alkaline and the samples are not acid generating. Some common CoPCs are identified between both the HCT and Intermittent Bottle Roll Tests, including aluminium, arsenic, cobalt, copper, magnesium, nickel, and phosphorus. Concentrations decrease and stabilise in the humidity cells over the testing period, with fewer metals exceeding limits by week 25 (only aluminium, arsenic, cobalt, and mercury (one sample only)).

Further detail of the geochemical testing is provided in Section 5.11.3.

5.6.8 Shipping During Construction

The majority of equipment to be delivered to the site during construction will be transported by vessels and barges to the beach landing. Approximately 19,000 m^3 of bulk cargo and 8,000 m^3 of containerized cargo will be delivered to the site. Depending on the shipment size and cargo consolidation methodology in Greenland, approximately 250 to 300 Twenty-foot Equivalent Units (TEU) will be sent to Nalunaq during the construction period. The strategy behind the logistics of these operations will be to consolidate cargo from international suppliers and to optimize shipments to Greenland, where cargo would then be barged to site. It is estimated that approximately 50-75 trips of barges from Nanortalik or Qaqortoq will be carried out to bring the cargo to site. The Company is also considering chartering vessels directly to Nalunaq to avoid multiple re-handling of cargo and overcrowding of local ports. A detailed logistics plan will be developed prior to the start of construction.

5.6.9 Access Roads

The project benefits from an existing gravel road running from the jetty to the mine area. The road was repaired in 2019 and maintenance work will be ongoing during the construction and the operations. The Kirkespir river bridge was upgraded in 2021 and is considered to be sufficient for planned operations.

5.7 Operation Phase/Production Phase

5.7.1 Introduction and General Overview

Nalunaq A/S is planning an initial underground development programme followed by a five-year production period. Mining is expected to ramp up to 100,000 tonnes of mill feed per annum. Two products will be produced for export:

- Gravity concentration doré; and
- Gold flotation concentrate.

In the planned production profile, recovery of the gold is first by gravity concentration followed by additional recovery by flotation. The production plan from the underground development program and the mining operations thereafter is summarized in Table 4. At closure and post-closure, the volumes represented in Table 4 will be 0 for all materials in accordance with the cessation of mining and processing activities.

Table 4: Production Plan for the Project

Production Plan	Total	Average	Year 1	Year 2	Year 3	Year 4	Year 5**
Waste Rock (tonnes)	750,000	122,000	50,000	140,000	140,000	140,000	140,000
Mined Production (tonnes)	540,000	100,000	30,000*	100,000	100,000	100,000	100,000
Gold Grade (g/t)	-	14	14	14	14	14	14

Production Plan	Total	Average	Year 1	Year 2	Year 3	Year 4	Year 5**
Mill Production (tonnes)	500,000	100,000	100,000	100,000	100,000	100,000	100,000
Gold Grade (g/t)	-	13	11	14	14	14	14
Contained Gold (koz)	214.6	43	34.6	45.0	45.0	45.0	45.0
Dore Gold Recovery	-	68%	68%	68%	68%	68%	68%
Dore Gold (koz)	145.9	29	23.5	30.6	30.6	30.6	30.6
Concentrate Recovery	-	75%	75%	75%	75%	75%	75%
Concentrate Gold (koz)	51.5	10	8.3	10.8	10.8	10.8	10.8
Tailings (tonnes)	485,000	97,000	97,000	97,000	97,000	97,000	97,000

* Material suitable for mill feed will be stockpiled during the underground exploration development program

** Production plan to be extended if further resources are found

5.7.2 Exploration Activities Prior to Mining Operations

The Nalunaq Gold mine will be reactivated through an exploration development programme, which will then be succeeded by a ramp up of the mining activities. The aim of the programme is to expand the mineral resource. The exploration development will take place in the Valley Block from a new mine portal at level 235 and will consist of a tunnel through waste rock to access the mineralized structure, from which exploration development on the vein will be initiated. The intended development length and tonnage as provided by the conceptual design stage is provided in Table 5.

The mineralized material will be stockpiled at site until permits for commencement of processing have been obtained, while the waste rock, which is assessed as non-acid generating (Golder, 2021g; Tailings Waste Characterisation Review, 5 July 2021. Report ref: 21467213.500.A.0) will be placed in the mine, the external waste rock dump or used to build and maintain mine infrastructure.

Initially, 40,000 tonnes of material will be stockpiled for processing during the exploration phase, prior to the commencement of processing. The material will be generated from the exploration development activities (tunnels) excavated along the mineralized structure. The stockpile will be located directly adjacent to the processing plant. Once processing has commenced the stockpile will be drawn down when there is capacity at the mill due to unplanned production shortfalls from the mine. Additional material may be added to the stockpile (up to the total stockpile capacity of 40,000 tonnes) when the mine is operational, but the mill is unavailable. Final drawdown of the stockpile will occur prior to closure.

Table 5: Lengths and Quantities Relating to the Underground Exploration Programme

Description	Total
Access/Infrastructure Tunnel Length	500 m
On-Vein Tunnel Length	1,800 m
Total Tunnel Length	2,300 m
Waste Rock Tonnage	50,000 t
Mill Feed* Tonnage	40,000 t
Total Tonnage	90,000 t

* Material suitable for mill feed will be stockpiled during the underground exploration development program

The company will continue its exploration activities in the Target Block and other high-grade domains through underground and surface drilling programs, which will provide the information to support a possible re-initiation of mining activities in those areas. If further exploration leads to revaluation of the amount of mineralized material, Nalunaq will prepare a supplementary EIA application.

5.7.3 Mining Activities

The mining activities will be centred around the promising Valley Block, which will be accessed through the new mine portal at level 235. The overall mining and processing site layout is shown in Figure 15.

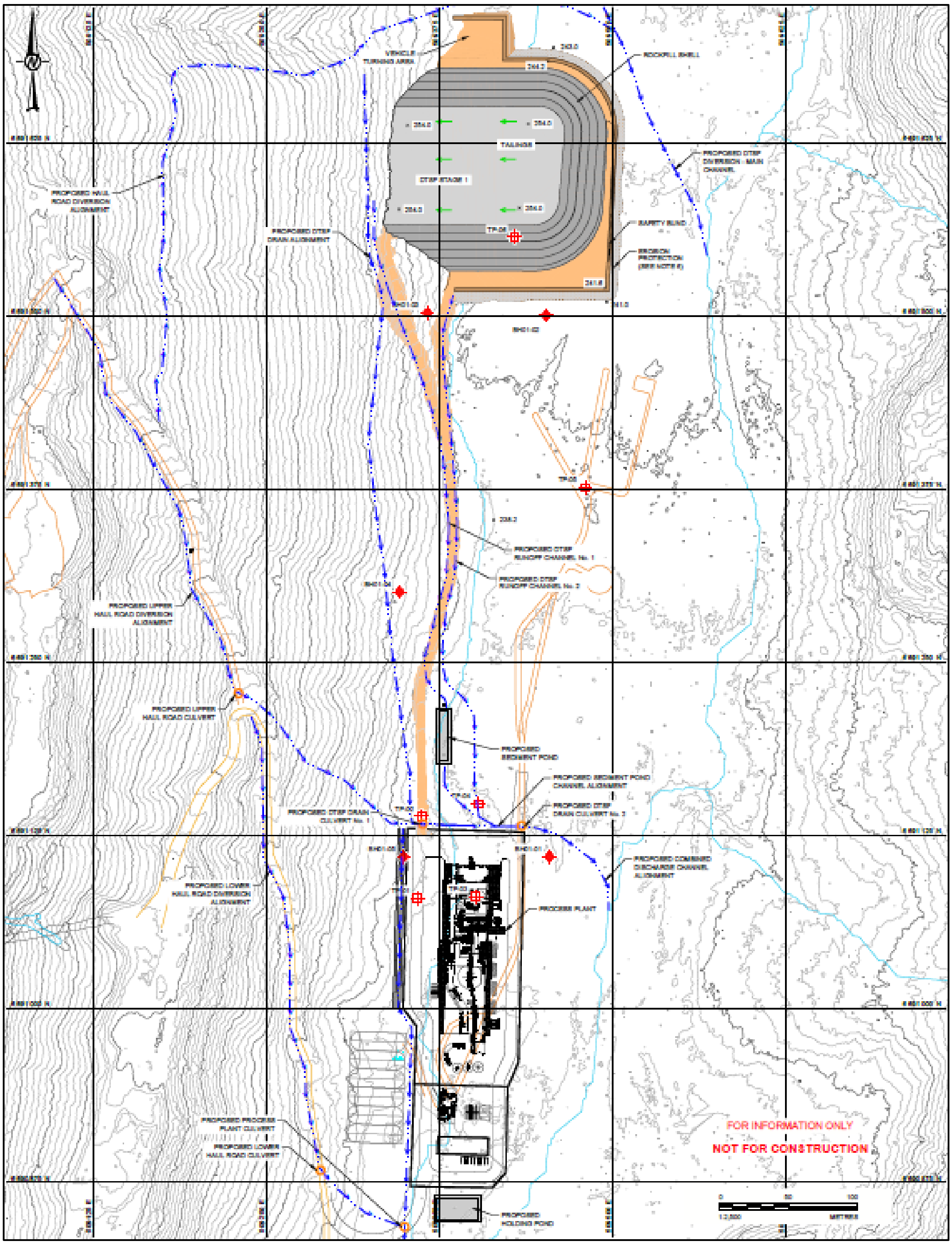


Figure 15: Schematic Showing Mine Layout

In the current plan for the LOM, the mine is expected to be in operation 24 hours per day, seven days per week and 365 days per year. It is expected that on average 300 tonnes of material will be mined underground inside the Nalunaq Mountain every day. Blasting will occur at the end of each shift once the mine is cleared. Material mined in the Valley Block will be brought to surface by the underground mining truck fleet to the dedicated pads. Material generated by the future mining operations from the Target Block and Mountain Block will be trucked out of the level 300 portal by the underground mining truck fleet and stockpiled outside the entrance at Portal 300 before being re-handled by surface support equipment and hauled down to the dedicated pads at the processing plant. Development and mining at the Target Block could start as early as year three.

The underground mining fleet is expected to consist of jumbo drills, long-haul-dump machines (LHDs), underground haulage trucks, production and exploration drills as well as other service vehicles. All vehicles are currently planned to be diesel powered and the company is exploring the possibility of integrating battery powered equipment in the future as technology evolves.

Waste rock will be used, in so far as is possible, as construction material, rock fill material and for maintenance during the Operational Phase of the project.

5.7.4 Use and Storage of Explosives

Explosives management will be according to the Greenlandic Executive order no. 16 of 16th of July 2007 concerning explosives. It has been suggested that explosives will be stored above ground at the location indicated on the site layout drawing below (Figure 16). Should this location not be acceptable, another location will be agreed in writing with the Greenlandic Authorities.

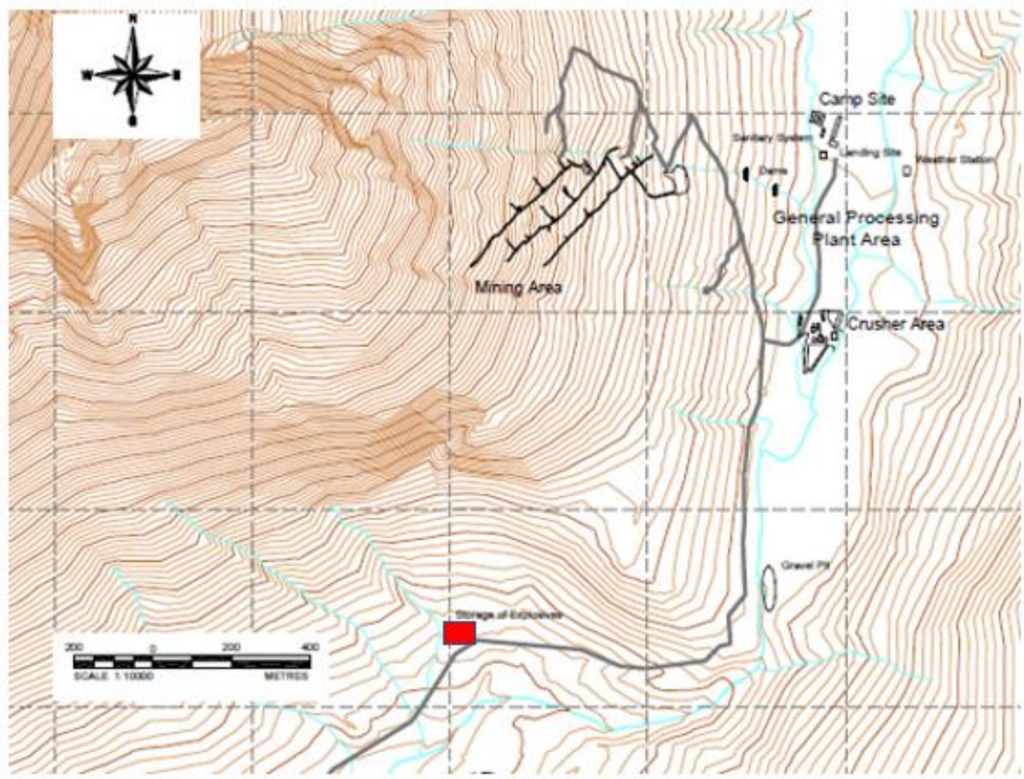


Figure 16: Position of explosives store (red rectangle)

Two types of explosive are currently being considered**:**

- Packaged emulsion; and
- Bulk emulsion.

The estimated quantity of explosives required for the exploration program is 150,000 kg, and the estimated yearly consumption of explosives is 400,000 kg, regardless of type of explosive selected.

Emulsion (either packaged or bulk) will be used for blasting activities. The nitrogen contained in emulsion is surrounded by a film of oil which minimizes contact with external water sources. Emulsion was selected for use in the project specifically due to its low capacity to introduce nitrogen into the water system. All explosives will be managed to maintain not only security but so as to mitigate the risk of pollution of water resources.

Any spill of emulsion in bulk will be contained and cleaned up by using non-flammable take-up material such as bentonite. Any material relating to spill clean-up will be disposed of in accordance with Greenland government guidance (Government of Greenland, 2000).

Details of the likely explosive systems are provided in Table 6

Table 6: Likely explosives to be used

Name	Type	Environmental aspects
Subtek Velcro	Bulk emulsion explosive; Ammonium nitrate emulsion (>60%) also containing distillates, thiourea, water (10-30%), urea, vegetable oils and other non-hazardous components.	Highly water resistant, which minimises nitrate leaching and reduces environmental impact. Ammonium nitrate is a plant nutrient that can stimulate algal and week growth in surface waters. It must therefore be kept out of waterways.
Cordtex N - Pentrit (PETN, pentaerythritol tetranitrate)	Flexible detonating cord, containing explosives. The cord consists of a PETN core, covered by a fibre fabric, covered by PVC.	Product is insoluble in water and therefore is considered to have minimal environmental impact.
Eurodyn 2000	Nitroglycol based, high strength, detonator sensitive explosive. Contains ammonium nitrate and ethylene dinitrate	Highly water resistant, which minimises leaching and reduces environmental impact. Does not contain any aromatic nitro compounds (DNT and TNT) which are considered to be carcinogenic.
Poladyn	Nitroester dynamite explosive	Highly water resistant, which minimises nitrate leaching and reduces environmental impact.
Exel Lead-in Line	Flexible tubing for initiating blasts	N/A
Exel LP	Non electric detonators with yellow Exel signal tube, with base charge inside aluminium shell	Base charge is sealed within waterproof shell

Destruction of explosives, explosive articles, blasting and igniting agents will be by burning or blasting in accordance with the Greenlandic Explosive Act no. 16 of 16 July 2007 on explosives.

5.7.5 Processing Activities

The ore will be processed in the processing facility, which will consist of the following extraction circuits: crushing, grinding, gravity recovery, flotation, thickening, and tailings filtering with disposal to the DTSF. There will also be a gravity concentrate smelting facility.

Stockpile systems will be used to blend various run of mine feed material to ensure the consistency of sulphides to the flotation process. It is expected that the majority of gold is recovered in the gravity concentration circuit with the remainder recovered using flotation methods, downstream of the gravity concentrator circuit (Halyard 2021).

It is expected that flotation tailings will be the predominant waste stream into the DTSF. However, due to operational requirements it may be required to discharge gravity tailings at isolated times and therefore both gravity and flotation tailings have been subjected to geochemical test work to support the assessment of seepage from the DSTF.

The following section regarding process activities is largely taken from Halyard (2022) with details regarding the plant reagents used and environmental impact of these from the technical note 2962-NT-004 by Soutex Inc..2021.

Material will be fed to a processing facility at a rate of approximately 100,000 tonnes per year. The processing facility will consist of the following processes:

- Crushing;
- Grinding;
- Gravity flotation;
- Thickening;
- Filtering tailings; and
- Gravity concentrate smelting.

A system for mixing the various types of rock material when feeding the crushing and grinding process from the stockpiles will be used to secure a steady input of sulphides to the flotation process needed to bind the reagents. The processing will take place inside a building equipped with a dust suppression system. Captured dust will be recirculated into the processing plant.

The process flow is developed around the high propensity of the gold at Nalunaq to be recovered in a gravity concentration circuit, calculated to be in the order of 65-75%. An additional 20 to 25% of the gold in the remaining slurry will be recovered by the flotation circuit downstream of the gravity concentration circuit. The process relies on the flotation behaviour of the auriferous pyrite minerals, by using reagents to separate these from the non-sulphide gangue. Using this technique, pyritic elements are concentrated to the top of a flotation cell and collected through an overflow launder, while other materials remain in suspension and are supplied to the tailings stream.

A block diagram of the process flow is presented in Figure 17 and reagents used within mineral processing are listed and described in Table 7 .

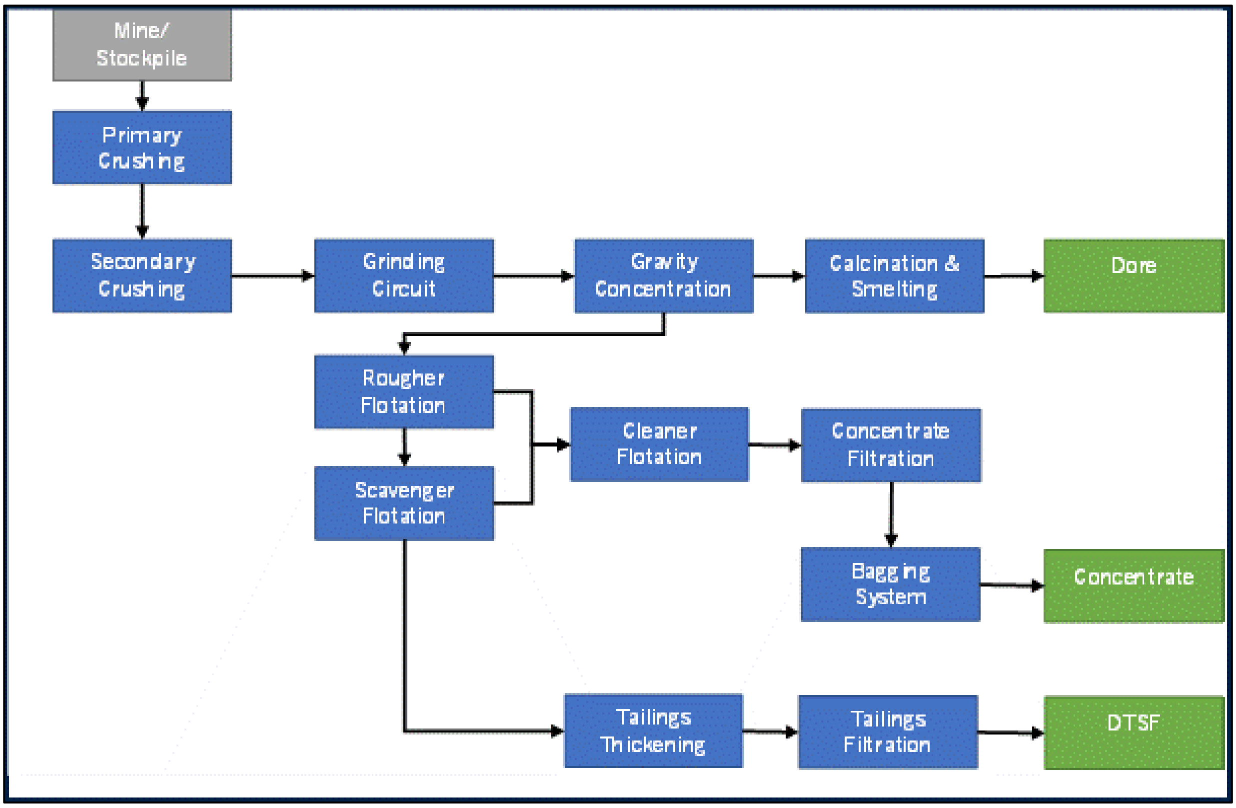


Figure 17: Block Diagram of the Processing Flowsheet

The processing steps are as follows:

Crushing – The crushing plant will process approximately 285 t/day. Ore is crushed in stages and transferred to the screen feed conveyor which is equipped with a magnet and tramp metal detector, passed through vibrating screens and further crushed to finally pass an aperture of 15mm. Ore is then conveyed to the indoor crushed ore stockpile. Dust collected is also discharged to the stockpile feed conveyor. Crushed ore from the stockpile is then conveyed to the ball mill feed chute.

Grinding and Gravity – Ball mill media is added to the ball mill to grind the crushed ore to a product size where 80% of the material passes 75 μm. Oversize material is returned to the ball mill via the ball mill conveyor. Screen undersize (-2 mm) is fed to one of two centrifugal gravity concentrators and the gravity concentrate then discharge periodically to a concentrate storage hopper, which in turn feeds to a hydrocyclone classifier. Hydrocyclone overflow is then supplied to the flotation circuit whilst the underflow is returned to the ball mill feed chute.

Grinding is performed at neutral pH and therefore the grinding media must resist oxidation. The recommended grinding media are Hi Chrome balls from Magotteaux or low oxidation balls from MolyCop.

Hydrocyclone overflow is supplied to the rougher conditioning tank (part of the flotation circuit) where PAX and A208 collectors are added. The role of the collectors is explained below. The flotation circuit consists of a rougher, scavenger and three cleaner stages.

Hydrocyclone overflow is supplied toThe rougher conditioning tank (6.5 m^3 capacity) where PAX and A208 collectors are added.

Flotation is a physico-chemical separation process that utilizes the difference in surface properties of the valuable minerals (at Nalunaq these are pyrite, arsenopyrite, precious metals) and the unwanted gangue minerals and is based on the surface properties and on the hydrophobicity and hydrophilicity properties of the mineral phases and takes place in a flotation cell. To facilitate the separation, chemical reagents can be used to condition the surfaces of the particles or to modify their properties to promote a selective flotation. Chemical reagents are of three categories: collectors, modifiers and frothers.

The principle of mineral flotation requires that the solid particles are suspended by stirring in water in a cell after wet grinding has freed the valuable mineral species from the gangue minerals. The pulp (the solid-water mixture) is conditioned with a chemical reagent called a collector. The role of the collector is to make the surface of the valuable minerals hydrophobic, to provide a greater affinity for the gas phase (the air bubble) than for the liquid phase. The collector reagent sticks mainly to the surface of valuable minerals and then follows the concentrate. Minimal amounts remain in the tailings.

After being conditioned with reagents, some particles become hydrophobic (not wettable), while others remain hydrophilic. The air bubbles bind the hydrophobic particles, lifting them to the surface of the water and forming a stable foam which is removed (concentrate). The hydrophilic particles remain inside the pulp and are removed (tailings).

MIBC frother is also added to the rougher's first cell, and the tailings from the rougher stage feed a bank of scavenger cells. The tailings from the scavenger stage feed the tailing thickener. The rougher and scavenger concentrates are then combined and enter the first cleaner via a cleaner conditioning tank. PAX and A208 collectors are also added to the first cleaner conditioning tank. Tailings are circulated through a series of three cleaner cells. Concentrate from the third cleaner cell is expected to contain 3-4% arsenic.

The flocculant FLOPAM FO4140 is added to the tailings thickener to increase the slurry density from 30% solid to 55% solid by causing suspended solids to agglomerate to form larger particles which can then be more easily removed from the solution.

Dewatering of the concentrate is undertaken on the final flotation concentrate when it is approximately 45% solids. The concentrate is pumped to the concentrate filter feed tank and pressure filtered to a moisture content of approximately 9%. The filter cake is then discharged into a hopper with screw conveyor and fed into bulk bags for transport.

Scavenger flotation tailings are thickened to 55-60% solids in a 5.5m diameter thickener. The thickened tailings are then fed to a pressure filter to produce a filter cake with a moisture content of less than 15%. The filter cake is transported to the Dry Tailings Stacking Facility (DTSF) by truck. Filtrate from the tailings thickener is recirculated back to the tailings thickener and overflow water from the tailings thickener is used as process water within the process plant.

The gravity concentrate received from the gravity concentrators will be processed in the gold room. The concentrate will be pumped to a magnetic separator to remove iron particles. Magnetic particles are placed in a separator bin and non-magnetic particles are separated into concentrate streams and tails using a shaking gravity table. Tails are returned to the flotation circuit and the concentrate collected for filtering and calcining prior to smelting within the diesel fired smelting furnace and poured into doré.

Doré produced on site will be stored in a vault in the gold room and flown offsite to a refinery to increase gold purity to 99.99%. The flotation concentrate bags will be stored on site and regularly barged off-site to Nanortalik or Qaqortoq, from where they will be shipped out of Greenland to a refinery.

Process water, including the water from the thickening dewatering process, is continually recycled within the process and is added from a process water tank of 156 m^3 capacity. Make-up water, provided from wells adjacent to the process plant, is added in proportion to the amount of water lost from the process through being entrained within the concentrates and tailings filter cakes. The process plant also has a combined clean / fire water tank of 320 m^3 capacity. The clean water tank feed consists of filtered process water and fresh water and is used for reagent preparation, within the gravity concentrator and for the washing of tailings and concentrates, and in the event of a fire.

Table 7: Reagents used in mineral processing

Chemical / Reagent	Stage of Process	How supplied	Environmental Aspects
PAX – Potassium Amyl Xanthate PAX	Collector of sulphides	Delivered in solid form, in clearly identified containers. A 10% w/w solution will be prepared in site and added to the flotation pulp at a dosage of 70 g/t. Annual consumption is 7.3 t/yr and daily consumption of 20 kg/d	Stored in a dry, weatherproof, covered storage area with impermeable floor. Handling and preparation of the reagent will be carried out in a dedicated tank. The tank will be installed in a contained area that provides a facility for the safe disposal of the solution in case of any accidental spillage. The handling area will be well ventilated for health and safety by a fan system during reagent preparation.
Sodium diethyldithiophosphate (A-208)	Collector Used for flotation of fine particles of gold	Delivered in solution, in clearly identified containers. A dosing pump is used to pump the solution directly into the container. Added undiluted to flotation pulp at dosage of 35 g/t Annual consumption is 3.6 t/yr and daily consumption is 10 kg/d.	Handling is limited to transportation from storage area to the addition location. Handling of reagent will be done in tank dedicated for that purpose. The tank will be installed in a contained area that provides a facility for the safe disposal of the solution in case of any accidental spillage.
Methyl-Isobutyl-Carbinol (MIBC)	Frother	Delivered in liquid form, in clearly identified containers. A dosing pump is used to pump the solution directly into the container. Added undiluted to the pulp at a dosage of 45 g/t. Annual consumption is 4.5 t/y and daily consumption is 12 kg/d	Handling is limited to transportation from storage area to the addition location. Hand will be in a contained area that provides a facility for the safe disposal of the solution in case of any accidental spillage.
FLOPAM FO4140 Based on polyacrylamide copolymers	Flocculation	Dry, granular powder. Annual consumption is 2.6 t/y and daily consumption is 7 kg/d	FLOPAM is a non-toxic, plant-based flocculant widely used in the water treatment industry.

The plant design is such that an expansion to 150,000 tonnes per year could occur with the addition of minimal critical equipment (for instance, a second ball mill) within the same plant footprint. The mine plan is based on 300 tonnes per day, however, if further exploration results in a sufficiently large mineral resource, it may justify installation of additional mill capacity. This would require a supplementary EIA application.

All chemicals and reagents associated with mineral processing will be handled according to industry best practice and safe storage and handling measures employed. Only a very minor amount of reagent will end up in the tailings and as the tailings are filtered and the water recovered to the process, the quantity ending up in the environment is minimal. It is not common practice for base metal mines to treat their process water. The following comments are made more specifically regarding the reagents to be used at Nalunaq:

- MIBC frother is a volatile, easily degradable, alcohol-based reagent used in small quantities and at a low concentration in the flotation process.
- Xanthates and Dithiophosphates collectors are toxic to fish when at a defined concentration. However, these are added in small quantities during the flotation stage and strongly adhere to the hydrophobic sulphides, thus being removed with the concentrate that is sent off site for further processing. Therefore a low concentration of reagents is found in the water discharged to the tailings site.
- FLOPAM is used in water treatment plants and does not present any risk to the environment at the added concentrations.

The surface of the DTSF will be smoothed and graded to allow water to runoff. During winter, the placement area will be regularly cleared to prevent build-up of snow and ice. In summer during rainy periods or if “off-spec” tailings are generated by the plant (i.e., the water content is too high), the tailings will be managed by storing until they can be reprocessed (Golder, 2021d; Tailings Storage Facility Design Report, 20 January 2021. Report ref: 20136781.619.A.1).

Poisonous fumes from the calcination oven and furnace are captured by a wet scrubber.

5.7.5.1 Summary of Toxicity testing

Historic toxicity testing was carried out and reported in the 2002 feasibility study (Kvaerner 2002). The metallurgical processing using cyanidation and depositional environment chosen for toxicity species (marine) are both not applicable for the current project, and therefore these results have not been reported.

SGS Canada (SGS 2021) carried out acute lethality testing on rainbow trout and Daphnia magna using flotation and gravity tailings process water at full strength and dilutions of the effluent (50%, 25%, 12.5% and 6.25%). The gravity tailings process water reported 100% survival rates and non-lethal designations for both species. The flotation tailings process was non-lethal with a 100% survival rate for rainbow trout and nearly 100% survival for Daphnid species (single anomalous mortality at 12.5% flotation tailings process water).

5.7.6 Chemicals / Reagents on site

In addition to the reagents and chemicals used in mineral processing, the chemicals and reagents used on the site are:

- cooling fluids
- oils including: engine oil, transmission oil, hydraulic oil
- Fuels consisting of: jet fuel, gasoline, diesel
- Fuel additives: Adblue
- Paints and stains

- Glue
- eco friendly washing detergent and soap

Measures taken to protect the environment during the life of the project are detailed in 9.5 below, 10.5 below, 11.5 below and 12.0 below.

5.7.7 Operational Workforce

The operational workforce is expected to be approximately 90 persons on site at any one time. A summary of the required workforce at the different mining facilities is presented in Table 8.

Table 8: Workforce Requirements for Different Operations

Facility or Job Function	Number of Positions
Mining	66
Processing	42
Camp	28
Shop, warehouse and machine operators	18
Administration	6
Safety, security, health. environment and quality	9
General and administrative Services	9
Total	178

5.7.8 Shipping During Operations

During operations, a much smaller amount of cargo is expected relative to the Construction Phase. Most of the cargo will consist of consumables for the mining and processing operations. It is expected that the cargo will be consolidated in South Greenland and barged into and out of the site on a regular basis. Gold concentrate from the flotation plant will also be handled by barges and shipped off site. It is expected that on an annual basis, approximately 3,000 tonnes of gold flotation concentrate will be barged off-site to a consolidation point in South Greenland, from which point the concentrate will be exported for further processing.

It is estimated that approximately one barge a week will service the project during operations for concentrate shipment. According to marine traffic information, the Saqqaa fjord is currently rarely visited by vessels. It is expected that the increase in number of vessels and operations resulting from the project will be very limited.

5.7.9 Water Management Strategy and Water Balance

The conceptual site water balance is summarised in Figure 18 (Golder, 2023a; Water Management Plan Technical Background Report, 17 March 2023. Report ref: 20136781.611.A.3). Figure 18 represents a conceptual water balance for the operational phase of the Project (years 1 to 5). The following sections summarise the main components of the water management strategy.

Key processes for operational water management are as follows:

- Make-up water for the Process Plant (3.14 m^3/hr) is pumped from Supply Wells;
- Bleed water from the Process Plant will be recirculated within the Plant at a rate of 1.34 m^3/hr. Water will be consumed at a rate of 0.49 m^3/hr (i.e. production of the concentrate);

- Water required for other operational uses will also be pumped from the Supply Wells (10 m^3/hr);
- Tailings (low water content) from the Process Plant will be trucked to the DTSF with a water equivalent rate of 2.63 m^3/hr;
- Runoff from the DTSF is collected in a constructed drain, before being diverted to a settling basin ("Sediment Pond"); and
- Treated water from the Sediment Pond is discharged to the environment.

Additionally, some key processes involving water from the underground mine are as follows:

- Groundwater inflow to the underground mine is pumped from the 235 Level portal to a holding pond ("Holding Pond") at a rate of 15 m^3/hr, to be temporarily stored for drilling in the underground mine;
- Water from the Holding Pond will be pumped to the underground operations for drilling use. Note that, for planning purposes, it has been assumed that the Holding Pond will be constructed within the proximity of the Process Plant (i.e. within the open environment) rather than underground; and
- Excess groundwater inflows into the underground mine will bypass the Holding Pond, and will be discharged to the environment via a weir (i.e. to facilitate monitoring).

Inflows to the water management system include:

- Rainfall and snowmelt falling directly into the Sediment Pond, DTSF and Holding Pond;
- Pumped groundwater inflow to the Holding Pond;
- Freshwater pumped from the Supply Wells to the Process Plant; and
- Freshwater pumped from the Supply Wells to satisfy demands related to other mine operational uses (such as dust suppression), as well as equipment uses.

Outflows from the water management system include:

- Evaporation from the exposed water surfaces in the Sediment Pond, DTSF and Holding Pond; and,
- Releases to the environment from the Sediment Pond and Underground Mine.

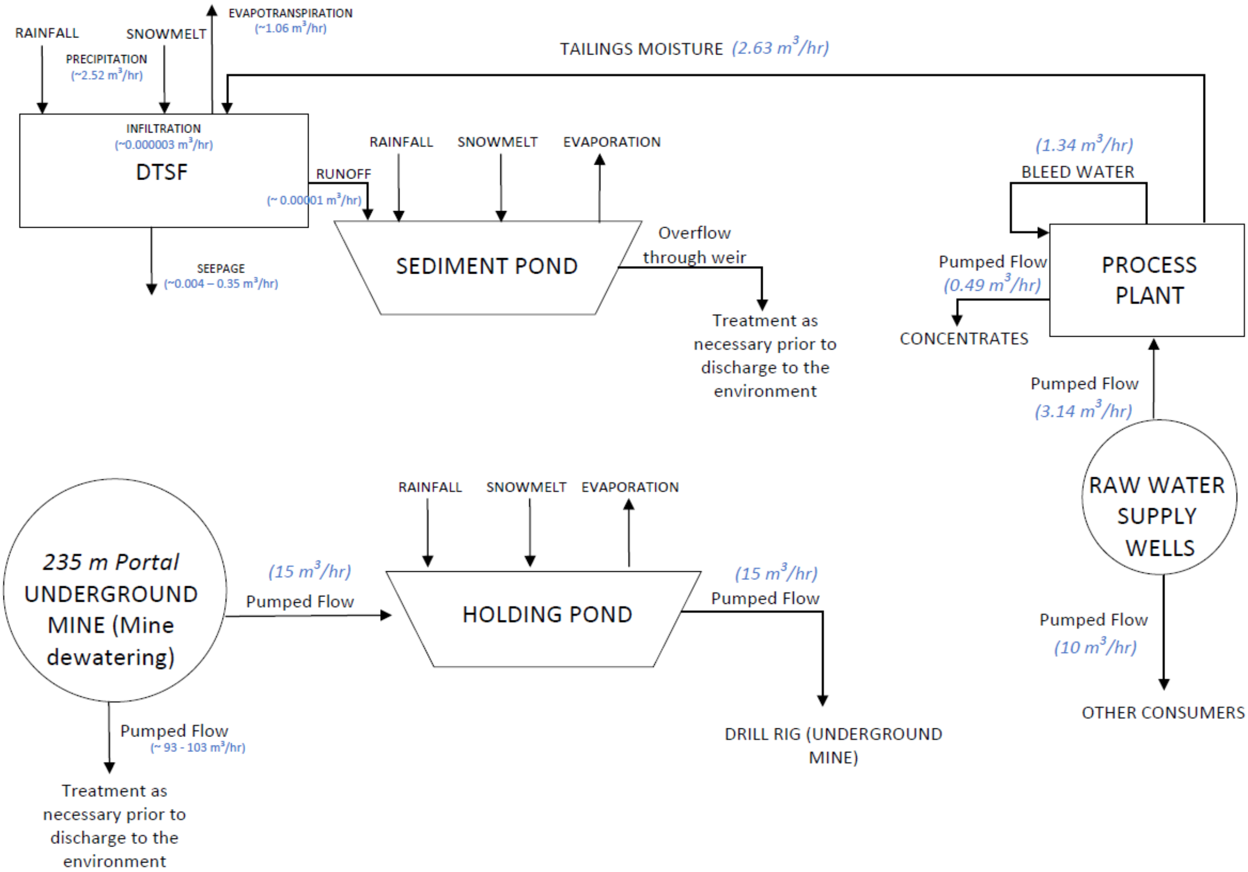


Figure 18: Block Diagram Summarising Site Water Balance (from Golder, 2023a)

5.7.10 Mine Water Storage

As mentioned previously, the operation of a settling basin ("Sediment Pond") and a holding pond ("Holding Pond") has been considered as part of the water management approach.

The purpose of the **Sediment Pond** will be to remove fines from the DTSF runoff during the 99.9th percentile daily rainfall conditions (i.e. a net inflow due to rainfall of 36 m^3/hr). The pond will also be sized to temporarily store runoff reporting from the DTSF resulting from a 1-in-2 year storm event (combined rainfall and snowmelt).

Only runoff reporting from the top of the DTSF (as opposed to the slopes and DTSF platform) will report to the Sediment Pond. Settling of runoff generated from the slopes of the DTSF will not be required, as it is not anticipated that fine particles would be mobilised from the slopes. However, due to the constant movement of haul trucks on the top surface of the DTSF, some mobilisation of particles is anticipated on the DTSF top surface. The runoff from the slopes of the DTSF will therefore be collected in a toe drain (without treatment) and be discharged to the Kirkespir River.

The **Holding Pond** will receive water pumped from the underground mine at a rate of 15 m^3/hr (i.e. equivalent to the anticipated demand for underground drilling), which will be temporarily stored for 24 hours. Water from this pond will then be supplied to the Drill Rig (located in the underground mine). The pumped quantity of 15 m^3/hr is for operational uses and is a proportion of the total groundwater inflows predicted to report to the underground mine, the balance of which will discharge to the environment. Predicted groundwater inflows to the underground mine are presented in Golder (2021a; Mine Inflow Assessment - Groundwater and Surface Water, 12 January 2021. Report ref: 20136781.618.A.0).

Details of the Sediment Pond and Holding Pond designs are provided in Golder (2022f; Nalunaq Gold Mine Surface Water Infrastructure Design, 8 April 2022. Report ref: 21467213.C04.6.B.0).

5.7.11 Mine Water Control and Discharge

5.7.11.1 Pumping Requirements

During the operational phase, pumps will be required to transfer water between facilities. The maximum pumping requirements for each facility are presented below:

- An average groundwater inflow rate of 15 m^3/hr will be required to report to the Holding Pond from the underground mine (i.e. to satisfy drilling requirements), therefore a pump with 15 m^3/hr capacity is required;
- Similarly, a 15 m^3/hr pump will be required to pump water from the Holding Pond to the underground mine Drill Rig;
- The Process Plant will require water to be pumped from the Supply Wells at a rate of 3.14 m^3/hr; and
- A pump with 10 m^3/hr capacity is required to transfer water from the Supply Wells to the operational mine for ancillary operational uses.

5.7.11.2 Discharges to the Environment

Water will be discharged to the environment from the underground mine and the Sediment Pond.

- Water from the underground mine will be discharged to the environment via a gravity-controlled weir outlet. However, water will only be discharged following testing in accordance with the Environmental Monitoring Plan (Appendix II) and if the agreed discharge criteria are met; and
- Water from the Sediment Pond will be released to the environment via gravity flow, through a weir system. However, it will only be discharged once the water level in the pond reaches the height of the weir invert. This will allow the water within the sediment pond to achieve the intended retention time before passively being discharged to the environment.
- The discharge from the DTSF to the sediment pond will comprise surface water runoff only it is anticipated that any contaminants can be controlled through sedimentation.
- There will be no discharge from the process plant to the environment and process fluid will be reused within the processing circuit. Any residual concentrations of chemicals arising from process plant in the tailings will be *de minimis*.
- Any water discharged from the mine that is not recirculated back for use in the mine will be tested prior to discharge and treated if necessary to settle any suspended solids, and if necessary, passed via an interceptor to remove any residual hydrocarbons.

5.7.11.3 Flow and Water Quality Monitoring

A comprehensive flow and water quality monitoring system is will be implemented to improve certainty in hydrological and hydrogeological predictions, and to more fully understand the water environment within which the mine will be operating. Flow monitoring should be undertaken:

- As part of the underground dewatering system; and
- As part of the Process Plant circuit.

As noted previously, climate data from the Narsarsuaq Station was used in lieu of site-specific precipitation data. In addition, evaporation was calculated using the Thornthwaite (1984) method, which resulted in very high rates of evaporation during the summer. For this reason, a hydrometric station should be set up to monitor (i) rainfall (ii) snowfall and (iii) pan evaporation.

5.7.12 Considerations for Maintenance

A comprehensive water management and maintenance regime will be required to ensure the long-term integrity of the system throughout the life of mine (and beyond). As a minimum however:

- Water distribution systems will need to be monitored and maintained to prevent freezing or ice-build up in the systems;
- The Sediment Pond and Holding Pond need to be inspected and cleaned regularly to prevent build-up of sediment within the ponds, and to retain the required operating capacity throughout the life of mine; and
- During operations, as well as closure, any channels that collect runoff from the DTSF would need to be inspected and cleaned regularly to prevent build-up of sediment in the channels.

5.7.13 Extreme Event Planning

Considerations for extreme event planning include the following:

- High inflows to the Sediment Pond due to rainfall and/or snowmelt events that exceed the design capacity of the system;
- Sediment-laden outflows from the Sediment Pond due to rainfall and/or snowmelt events that exceed the design capacity of the system; and

Flooding of the mine site facilities due to significant rainfall and/or snowmelt events that may result in the inundation of the Sediment and/or Holding Pond.

5.7.14 Water Ingress to the Mine

Groundwater inflows to the Nalunaq Mine have been calculated for the purpose of informing water management requirements. These have been calculated by month as follows for South, Target and Mountain Blocks, and for Valley Block, respectively.

Table 9: Calculated Groundwater Inflows to Nalunaq Mine

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
South, Target and Mountain Blocks												
Assumed 5%ile Inflow (m^3/hour)	6	14	4	174	176	78	79	88	100	78	65	12
Assumed 50%ile Inflow (m^3/hour)	6	14	4	159	161	52	53	59	67	52	43	12
Assumed Minimum (95%ile) Inflow (m^3/hour)	6	14	4	144	145	26	26	29	33	26	22	12
Valley Block												
Assumed 5%ile Inflow (m^3/hour)	108	109	107	112	112	116	116	117	118	116	114	108
Assumed 50%ile Inflow (m^3/hour)	108	109	107	110	111	113	113	114	114	113	112	108

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed Minimum (95%ile) Inflow (m^3/hour)	108	109	107	109	109	110	110	110	111	110	109	108

On the restart of operations, a number of monitoring points will be established in the mine and that v-notch weirs are used to monitor the inflows to allow a refinement of these estimate and to establish the magnitude of seasonal variation and the response of the mine to rainstorm events based on the recommendations

5.7.15 Potable Water

Potable water will be produced by a potable water treatment plant located at the Camp. The potable water treatment plant will be supplied by saltwater from the fjord through floating pumps. The potable water treatment plant will also produce an effluent from the reverse osmosis separation to be discharged to the fjord. The process creates approximately 40% water and 60% brine, which means that the return flow of brine to the fjord will be roughly 35 m^3/day. The brine will have an average salinity of 57 ppt with the same temperature as the intake water. The brine will be diluted into the fjord water as the plume descends into deeper parts of the fjord. The volume of brine to be discharged is too small to generate any significant effect on marine flora and fauna.

The water treatment plant will be a containerized potable water treatment plant that will produce 25 m^3/day of potable water. Treated water will conform to the European Union Directive 98/83/EC on the quality of water intended for human consumption.

5.7.16 Sewage Management

Domestic sewage or sanitary wastewater from the accommodation unit will be treated in the sewage treatment plant and subsequently discharged to the fjord. Sewage generated at the mine and process plant will be handled by a vacuum truck which will transport the sewage to the sewage treatment plant.

The plant will treat an average daily flow of 22 m^3/day. The plant comprises a membrane bioreactor treatment technology which is a combination of an activated sludge with membrane filtration. The process is automated, requiring no operator for day-to-day operation. The plant will be containerized, completely pre-assembled and pre-tested. A holding tank will be established upstream of the treatment plant to allow maintenance and repair of the treatment plant without allowing untreated sewage to be discharged to the environment.

As the quality of the treated effluent water will meet EU requirements for wastewater discharges to the marine environment it is not anticipated that the discharge of treated sewage will have any negative effect on the water quality of the fjord.

Slurry from the treatment plant will be collected in closed containers and disposed of to the camp incinerator.

5.7.17 Dust Management

Water will be used as the primary method of dust management when natural dust suppression is not occurring. The method of natural dust suppression will be dependent on the seasonality. During the wetter months the precipitation will result in natural suppression. The USEPA AP42 guidance (Compilation of Air Emissions Factors (5th edition); 1995) states that applying water can result in up to a 74% efficiency in controlling fine particulates (PM_{10}). Water for dust suppression is included in the 10 m^3/hour of water for operational and equipment demands detailed in Section 5.7.8. Most of this water will be sourced from raw water wells located near the process plant pad.

Dust will mostly be generated from three main areas:

- Access Road: dust along the road will mainly be generated during the summer season; a water truck will, as required, spread water along the road during the summer months to suppress dust generation.
- Process Plant: the main source of dust at the process plant is the crushing area. The primary and secondary crushers, as well as the crushed material stacking and reclaim conveyors, are all located inside an enclosed building. A dust collector with draw points at the primary and secondary crushers and the main transfer points along the crushed material conveying system will be covered by a piping network connected to a centralized bag house. Dust particles will be recovered from the dust collector bagging system and reintroduced into the grinding circuit.
- DTSF: In the winter, dust will not be an issue as the tailings stack and newly added layers will freeze rapidly, thereby inhibiting the movement of fine particles. In the summer, during dry periods, water will, when necessary, be sprayed over the stack to limit wind erosion. The build-up of the rock fill on the edges of the DTSF will also help in mitigation of dust generation.
- Stockpiles: There will be some stockpiling of material but stockpile size and duration will be minimised as far as practicable and water spraying will be undertaken where possible during prolonged dry periods.

5.7.18 Waste Rock Management

Waste rock generated (Table 10) during the exploration program and as a result of the mining activities will be used for the construction and the maintenance of the various facilities. Waste rock is defined as being low-grade rock that will be mined but is not of sufficient value to warrant processing. Excess waste rock will be kept underground, in the mine or disposed to the external waste rock dump adjacent to the 300-level portal (Figure 19).

Table 10: Estimation of Waste Rock Generation During the LOM

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Tonnage (t)						
Underground Waste Rock	50,000	140,000	140,000	140,000	140,000	140,000
Portal Overburden Excavation	70,000	-	-	-	-	-
Stripping and Borrow Pits	239,000	-	-	-	-	-
Total Waste Rock/Overburden Generated	359,000	140,000	140,000	140,000	140,000	140,000
Waste Rock Stored Underground	-	140,000	140,000	140,000	140,000	140,000
Process Plant Backfill	99,000	-	-	-	-	-
DTSF Backfill	260,000	-	-	-	-	-
Total Waste Rock/Overburden Consumed	359,000	140,000	140,000	140,000	140,000	140,000
Tailings	-	97,000	97,000	97,000	97,000	97,000

Toxicity tests show that the process water is designated as non-lethal. Any concerns regarding the toxicity of the process water and its potential impact to the recipient surface water receptors should thus also be negated. In addition, the potential toxicity of leachate from the tailings were investigated and its non-lethal characteristics were verified.

In addition, it is noted that environmental monitoring undertaken by DCE following the previous closure of the mine in 2013 demonstrated that there was no significant detrimental impact to the environment following closure (Bach & Olsen, 2020). The similarity between the historically mined areas and future additional mining prospect as well as present mine waste and the future mine waste have been investigated and no major change of composition are to be expected in the future (SRK, 2021).

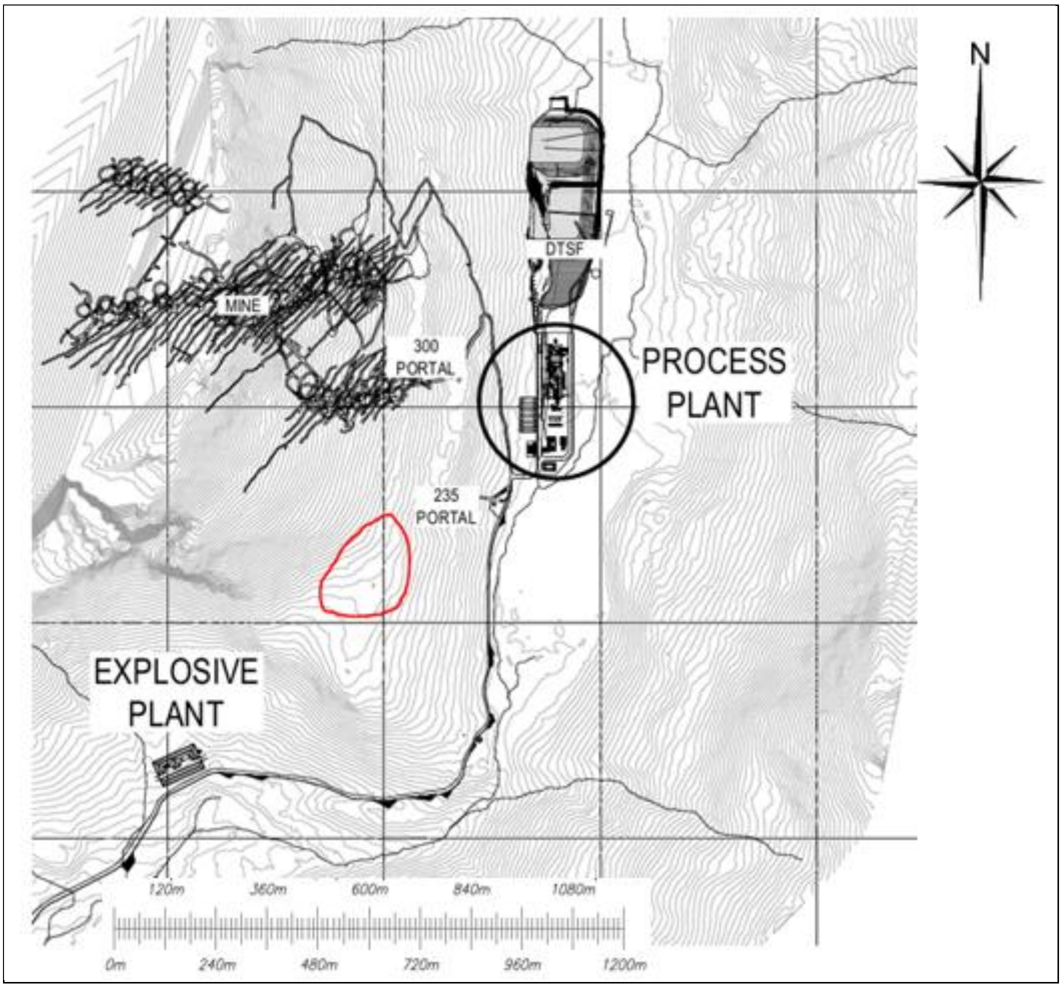


Figure 19: Plan View of Indicative Area of Potential Waste Rock Stockpiling (area enclosed by red line)

5.7.19 Solid Waste Management

Waste will be handled in accordance with all relevant regulations, including the statutory order nr. 3 of 7th January 2021 from The Government of Greenland about waste (Selvstyrets bekendtgørelse nr. 3 af 7. januar 2021 om affald). In general, hazardous waste will be shipped to Europe or North America and handled in compliance with the appropriate regulations in such jurisdictions, including any applicable trans-frontier waste shipment regulations. Hazardous waste will be registered and traced according to the guidelines established by accepted international regulations.

Accumulators, batteries, electronic devices, glass, etc. will be stored in temporary containers and periodically returned with supply ships for further disposal according to regulations and after mutual agreement.

The incinerator will not be used to dispose of hydrocarbon, plastic or wood waste. All hydrocarbon waste will be collected and stored and returned with supply ships for disposal at a suitable off-site facility. Plastic and wood waste will if it cannot be reused on site be sent where practicable to appropriate off-site recycling facilities, either domestically or outside of Greenland.

The incinerator will be used to treat selected waste streams with the exceptions being hazardous waste, hydrocarbon waste and recyclables. The incinerator will be containerized, complete with its own diesel fired generator and will be able to treat 250 kg/day of domestic waste. The emissions from the incinerator will conform to the European Union Directive 2010/75/EU on industrial emissions.

5.8 Closure and Rehabilitation Phase

A closure plan has been prepared as required by The Mineral Resources Act. The Act specifies the requirement for a Closure Plan, a plan for steps to be taken on cessation of activities, which must be prepared and approved by the Government of Greenland before exploitation begins. A preliminary closure plan is presented at Appendix XV.

The overall closure goal is to return the Project Area to a viable and wherever practicable, self-sustained ecosystem compatible with a healthy environment and human activity.

In order to achieve this, the following core closure principles will be adopted:

- **Physical Stability**: project components remaining after closure will be physically stable for humans and wildlife;
- **Chemical Stability** (the DTSF being the major focal point);
- **No Long-Term Active Care** is anticipated; any project component that remains after closure will not require long-term active care and maintenance; and,
- **Post-closure monitoring**: managed via a monitoring plan agreed with the authorities. Towards the end of the life of the Project, post closure objectives will be refined to accommodate the site conditions prevailing at the time.

It follows from the principles for mine closure that:

- All mining related artifacts will be removed, and inert material will be disposed of.
- Mine entries will be suitably secured to prevent accidental trespass.
- Roads no longer required will be reclaimed via progressive ripping, scarifying and landscaping to encourage revegetation.
- Any culverts that could act as hydraulic conduits at closure will be removed.
- All infrastructure relating to the electrical power supply system will be dismantled and removed.
- All fuel transit areas remaining will be equipped with spill kits until full decommissioning of the fuel storage areas is undertaken in accordance with a suitable method statement to be protective of the environment.

Infrastructure

The jetty, the beach landing area and the road connecting the port and the DTSF may be left intact to facilitate future inspections and monitoring activities (if agreed with the Greenland authorities). In relation to water management, the following will be implemented as a minimum:

- Water distribution systems will need to be monitored and maintained to prevent freezing or ice-build up in the systems.
- The sediment ponds need to be inspected and cleaned regularly to prevent build-up of sediment within the ponds.
- During closure, any channels that collect seepage and runoff from the DTSF would need to be inspected and cleaned regularly to prevent build-up of sediment in the channels.

The design of the water management systems on closure will be updated as the closure plan is updated prior to closure.

Dry Stack Storage Facility

With regard to the DTSF the design which is presented in Golder, 2021a includes consideration of the need to mitigate risks to the environment during decommissioning and closure of the facility including:

- The facility will be constructed above the 1:1000 flood level to mitigate the risk of inundation by surface water flooding.
- The construction of berms to divert upslope runoff into collection channels and away from the DTSF.
- Riprap will be placed upon a geofabric filter material, between toe and crest of embankment to a minimum height of 300 mm above the design flood level.
- Compaction of material to reduce risk of slope failure and dust emissions.

The stability of the DTSF slopes has been considered in the design, together with the need for erosion protection during operations and throughout closure. This includes a cover and transition/filter layers being placed along the outside slopes so that it quickly establishes a stable surface to minimise the potential for wind and water erosion, promote long-term stability and allow an appropriate after use that requires minimal maintenance. Final heights of the DTSF will be confirmed during detailed design and as the construction and operations plans are updated during the mine life, in consultation with the Greenland authorities.

Concurrent reclamation of the outer slopes of the DTSF will begin during operations and as much as practicable the outer slopes will be reclaimed with rock fill to complement the natural stable landform terrain. The top of the tailings surface will be graded to direct all runoff from the surface of the facility and into perimeter water management structures.

During the post operational period intensive input will be required to achieve the final surface topography commensurate with the agreed after use and to ensure its long-term integrity. This could include the following:

- Progressive ripping, scarifying and landscaping of any stockpile areas to be reinstated to conditions prior to construction;
- Placement of any cover layer as considered appropriate. The depth and grading of the material comprising such a cover will depend on the geotechnical characteristics of the final tailings layers; and,
- Independent post closure auditing.

In accordance with industry practice, data on tailings deposition, geotechnical and geochemical properties, hydrology and meteorology will be collected throughout the deposition period to ensure that an appropriate closure strategy is adopted. This information will be used to update and finalise the closure plan, building on the preliminary closure plan that is presented at Appendix XV.

Monitoring

Nalunaq will develop and implement an Environmental Monitoring Program (EMP) as part of an Environmental Management System in accordance with the Greenlandic guidelines to monitor the potential impact of the mining operation following closure and the effectiveness of implemented mitigation measures. The EMP will include the construction, operation, closure and post-closure phases of the project to identify any variances from predictions that occur and whether such variances require action, including any additional mitigation measures.

The monitoring program will focus on physical monitoring of meteorology, groundwater, surface water and air (dust) and will be consistent with those elements undertaken as part of the historical program summarised in Bach 2020. The results of the monitoring programme will be submitted in an annual monitoring report to regulatory authorities for review. It is not envisaged that monitoring of biota will be undertaken as part of this programme.

An annual inspection of the site will also be undertaken to assess the condition of the DSTF cover, stability and potential risk of erosion.

It is envisaged that the monitoring programme would be undertaken by Nalunaq for a period of 5 years post closure.

Implementation

The draft closure plan is based on the current mine configuration and production rates and that the mining operations will cease after 5 years of operation, at which stage mine closure activities will commence. Temporary suspension and possibly premature closure may be required if the operations are no longer viable due to a change in Project economics or other difficulties.

If the closure is temporary, various actions will include:

- The monitoring and maintenance of water distribution systems to prevent freezing or ice-build up within the system;
- The regular inspection and cleaning of the sediment ponds to prevent build-up of sediment within the ponds;
- The regular cleaning and inspection of any channels that collect seepage and runoff from the DTSF to prevent build-up of sediment in the channels.

Regular inspection of the site and hill slopes above will also be required to ensure that rockfall, debris flow or avalanche does not create a hazard that may damage the site during temporary closure or upon re-start of operations. Should operations recommence, then the site should be inspected for fallen rock that may be dislodged during storms. Regular inspections of the DTSF should also be undertaken during temporary closure and prior to re-commencement of operations to ensure that the DTSF has remained stable and that no flood damage has occurred.

A conceptual Monitoring Plan and a preliminary Closure Plan are included in Appendices II and XV respectively.

5.9 Analysis of Alternatives

5.9.1 Introduction

The following sections describe the main alternatives considered for the project and how the preferred options were identified.

5.9.2 Alternatives for Tailings Management

The advantages and disadvantages of the different options for the tailings disposal options for the Nalunaq mine has been assessed. The analysis has been undertaken using a multi account system where a simple scoring system was adopted to evaluate the preferred option to be developed.

5.9.2.1 Underground Slurry Tailings Disposal

The main advantages of underground slurry tailings disposal (not cemented) are the following:

- Low visual impact;
- Low environmental impact on surface water, although potential impacts on ground water may pose challenges; and
- There may be cost advantages to this option (lower capital expenditure [“CAPEX”]) but has not been developed to a point at which this can be confirmed.

The main disadvantages of this option are the following:

- Management of the contact (make-up) water pumped underground with the tailings will pose challenges, especially should the water quality be adversely impacted by the reagents used in the processing or the chemistry of the tailings. Return water will have to be collected and pumped back to the surface for re-use.
- Challenges with placement of the tailings and management of make-up water underground, especially with regards to tailings deposition in previously mined stopes situated at a higher elevation than one of the levels that will be mined as part of the project. Water-tight bulkheads will be required to retain water and tailings and these could be expensive to design and install.
- A survey of the underground space available for disposal together with a projection of future space to be created by ore extraction will be needed to ensure sufficient volume for Life of Mine disposal of tailings will be available.
- The required bulkheads to ensure tailings and tailings water containment would require maintenance with personnel and equipment required to work in direct contact with a potentially unstable structure. The risk to personnel directly involved in the maintenance of the structures and operating personnel in lower areas of the mine could be significant without a realistic prospect of the risk diminishing with time. Failure of any part of the system could lead to fatalities underground.
- An underground Rock Mechanics detailed assessment will be required to ensure no discontinuities exist in the rock mass surrounding previously mined out areas that could lead to uncontrolled migration of tailings into current working areas or other sectors of the underground workings.

5.9.2.2 Underground Paste Tailings Backfill

The main advantages of underground paste tailings backfill (cemented) are the following:

- Low visual impact.
- Low environmental impact on surface water, although potential impacts on ground water may pose challenges (e.g. metal leaching).
- Thickened or paste tailings disposal for underground backfill often with the addition of cement (e.g., 3% by weight) has been used successfully for stope support for a number of decades and is therefore considered proven technology.

- Paste tailings disposal is therefore deemed to be a much safer option for underground disposal, as the risk of uncontrolled migration is significantly reduced if not eliminated.
- This backfill system (if cemented paste is used) however also represents an attractive opportunity in that pillar mining may be possible once the cemented backfill has reached sufficient strength to provide stope support.

The main disadvantages of this option are the following:

- Thickening of tailings to create paste generally has a high capex for mechanical equipment, requiring thickeners, filters, cement addition (if cemented backfill is used), positive displacement pumps and high-pressure pipelines. Operating expense ("OPEX") for power consumption and cement addition is also high.
- Management of the contact (make-up) water pumped underground with the paste may pose challenges, especially should the water quality be adversely impacted by the reagents used in the processing or the chemistry of the tailings. The volume of water in the paste is however much reduced when compared with slurry tailings.
- Challenges with paste deposition and management of bleed water underground, especially with regards to tailings deposition in previously mined stopes situated at a higher elevation than one of the levels that will be mined as part of the project. This is less of a risk than for hydraulic backfill as the risk is removed within a few hours after the initial cement set.

5.9.2.3 On Surface Slurry Tailings Disposal

On surface slurry tailings disposal was the third tailings disposal option discussed.

The main advantages of this option are the following:

- Moderate cost;
- Proven technology, with similar facilities being operated successfully in similar climates (Northern Europe, Canada etc).
- Relatively easy to develop using a phased approach, thereby reducing initial CAPEX;
- Ease of pumping tailings to the facility and return water back to the Processing Plant; and
- Easier monitoring of the facility should be possible, when compared to the underground disposal options, although monitoring during the winter months will also pose challenges.

The main disadvantages of this option are the following:

- Relatively large size (when compared to the alternatives) and associated high visual impact;
- Permitting of surface tailings storage facilities is expected to be more difficult than other options given the current climate influenced by recent tailings dam failures;
- Exposure to the environment and close proximity to potential erosive forces including snow avalanches and the river. This may also pose operating challenges during the cold winter months;
- Potentially higher maintenance requirements than alternatives, especially following closure due to long term degradation; and
- Higher risk profile (including potential for environmental contamination due to pipe burst or failure of the facility) than some of the alternatives (e.g. underground cemented paste backfill or on surface dry stacking).

5.9.2.4 On Surface Filter cake (Dry Stack) Tailings Disposal

The fourth option considered was on surface filter cake (dry stack) tailings disposal.

The main advantages of this option are the following:

- Medium visual impact when compared to alternatives for on surface tailings disposal;
- Proven technology, with similar facilities being operated successfully in similar climates (Northern Europe, Canada etc.);
- Reduced size and footprint when compared to alternatives for on surface tailings disposal;
- Reduced seepage from the facility when compared to on-surface slurry tailings disposal;
- Lower risk profile than for on-surface slurry tailings disposal;
- Relatively easy to develop using a phased approach, thereby reducing initial CAPEX;
- Reduced water volumes to be pumped back to the Processing Plant;
- Permitting considered more likely to be successful; and
- Easier monitoring of the facility should be possible, when compared to the underground disposal options, although monitoring during the winter months is expected to pose challenges.

The main disadvantages of this option are the following:

- Higher initial CAPEX due to the costs associated with the Filter Plant;
- Exposure to the environment and close proximity to potential erosive forces including snow avalanches and the river. This may also pose operating challenges during the cold winter months;
- Potentially higher maintenance requirements than (underground) alternatives, especially following closure due to long term degradation. These challenges however are significantly lower than those for a slurry tailing facility on surface;
- Management of the contact water to be pumped back to the Plant during the winter months may pose challenges, although the volume will be less than for on surface slurry tailings disposal; and
- Challenges with filter cake transportation and placement expected during the cold winter months.

5.9.2.5 Marine Tailings Deposition.

Marine tailings deposition was the final tailings deposition option considered.

The main environmental impacts of marine tailings disposal are the loss of benthic habitat on the footprint area where tailings are deposited at the bottom of the fjord, the impact on the diversity and abundance of species and the risk associated with the bioaccumulation of heavy metals in the food chain.

When considering international best practice guidelines e.g. the EU BREF[1] document on mine waste disposal, marine disposal is usually only considered as an option when the waste is deemed to be inert and space is not available for tailings deposition on land (e.g. in the case of the Hustadmarmor Calcium Carbonate Mine in Norway, used as an example in the BREF).

[1] EU BREF = European Union Best Available Techniques reference documents

The World Bank's IFC issued sectoral EHS Guideline in 2007 stating that marine tailings disposal may be considered only in the absence of a socially and environmentally sound land-based alternative and based on an independent scientific assessment for mining. If this option is considered further, a detailed feasibility study and Environmental and Social Impact Assessment (ESIA) will be undertaken, including consideration of all tailings management alternatives, and only progress the option if it is shown that the discharge is not likely to have significant adverse effects on marine and coastal resources or on local communities. Any decision taken should further comply with international agreements such as the United Nations Convention on the Law of the Sea (UNCLOS), 1982.

Of the tailings deposition options considered, marine (or sub-aqueous) tailings deposition is probably the most controversial, primarily due to historical examples and the unknown long-term potential environmental impacts. In addition, due to the unbounded nature of the deposition, any remediation of the tailings should it ever become necessary would be impractical, difficult and extremely costly.

5.9.3 Options for Location of the DTSF

Seven potential areas (numbered 1 to 7) have been identified and are presented in Figure 20. Descriptions of Areas 1 to 7 are outlined below. Area 1 (Figure 20) was found to have a fatal flaw due to its presence on an archaeological site (SRK, 2002) and has not been considered further.

5.9.3.1 Area 1

Area 1 is located on a broad flat alluvial outwash fan area near the beach landing area. The identified site occupies an archaeological site which is considered a fatal flaw and the site is therefore not considered further.

5.9.3.2 Area 2

Area 2 is in the upper part of the Kirkespirdalen, to the north-east of the Repeater Station. This area is situated adjacent to Area 3 but lies within the middle of the valley floor within an area of braided streams. The area is underlain by alluvial deposits of sand and gravel (Golder, 2021f; Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure, 1 February 2021. Report ref: 20136781.615.A1).

5.9.3.3 Area 3

Area 3 is situated in the upper part of the Kirkespirdalen, to the north-east of the Repeater Station. The site is accessed via existing gravel roads and lies against the talus slope on the west side of the valley.

Subsurface conditions were investigated by the installation of 5 boreholes and 6 trial pits. The valley floor is underlain by alluvial deposits comprising cobbles and boulders with sand and gravel (alluvium) overlying glacial till and bedrock (Golder, 2021f; Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure, 1 February 2021. Report ref: 20136781.615.A1).

5.9.3.4 Area 4

Area 4 is located on the southeast side of the valley approximately 1. km – 2 km downstream of the proposed process plant location. The topography of the site is undulating and encompasses several piles of talus near the middle of the valley. The hillsides are steep with exposed rock and there are talus slopes on the southeast side. The ground surface consists of large boulders up to several metres in size, partially covered with grass, shrubs and moss. Above the site several very large, steep talus slopes are present. Weathered bedrock is exposed at higher elevations. Small ravines are present across the site, feeding drainage into the creek.

Subsurface conditions encountered in Borehole 01-06, advanced to 27.4 m below ground level (mbgl), indicated that subsurface conditions consisted of a layer of talus, overlying a cohesionless fluvial deposit and a sand and gravel glacial till deposit (Golder, 2021f; Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure, 1 February 2021. Report ref: 20136781.615.A1). Within the cased borehole, the water level was recorded at 0.35 mbgl, 30 minutes after the completion of drilling.

5.9.3.5 Area 5

Area 5 is located between a stream and the mountain on the northeast side of the valley. The topography of the site is relatively flat where it is in the middle of the valley and becomes undulating where it is adjacent to the hillside. The existing road passes through the site. The hillside becomes steep to very steep on the northwest side of the site and is covered with talus. Large ravines drop towards the site on the northwest side. The site is partially covered with grass, shrubs and moss within the valley, becoming sparse approaching the hillside and at higher elevations.

Subsurface conditions were investigated by the installation of 3 boreholes; subsoils were found to consist of talus or a cohesionless fluvial deposit overlying silty sand (Golder, 2021f; Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure, 1 February 2021. Report ref: 20136781.615.A1). The water level in a monitoring well was measured at 0.9 mbgl in September 2001.

5.9.3.6 Area 6

Area 6 is located at a within the valley of the Arpatsivîp stream. A site investigation has not been carried out; however, it is considered likely that the Quaternary cover is likely to consist predominantly of talus. The area is greenfield and has not been subject to disturbance by historic mining operations.

5.9.3.7 Area 7

Area 7 is situated 2.3 km to the northeast of the fjord on the southeast side of Kirkespirdalen Creek. It is approximately 5 km southwest of the proposed processing plant area and within a kilometer of the existing road bridge. Topography consists of a low-lying flood plain, formed by seasonal flooding of the Kirkespir river. The site varies from relatively flat to gently undulating and with slopes increasing towards the hillside on the southeastern side. A ravine is located immediately to the southwest of the site, and this connects to the creek further to the west. An archaeological site is approximately 2km further downstream of the site.

Soils at the site consist of a thin cover of topsoil overlying sand and gravel, with boulders, cobbles gravel and sand over silty sand (Golder, 2021f; Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure, 1 February 2021. Report ref: 20136781.615.A1). Water level within the drilled holes was approximately at the level of the water in the Creek.

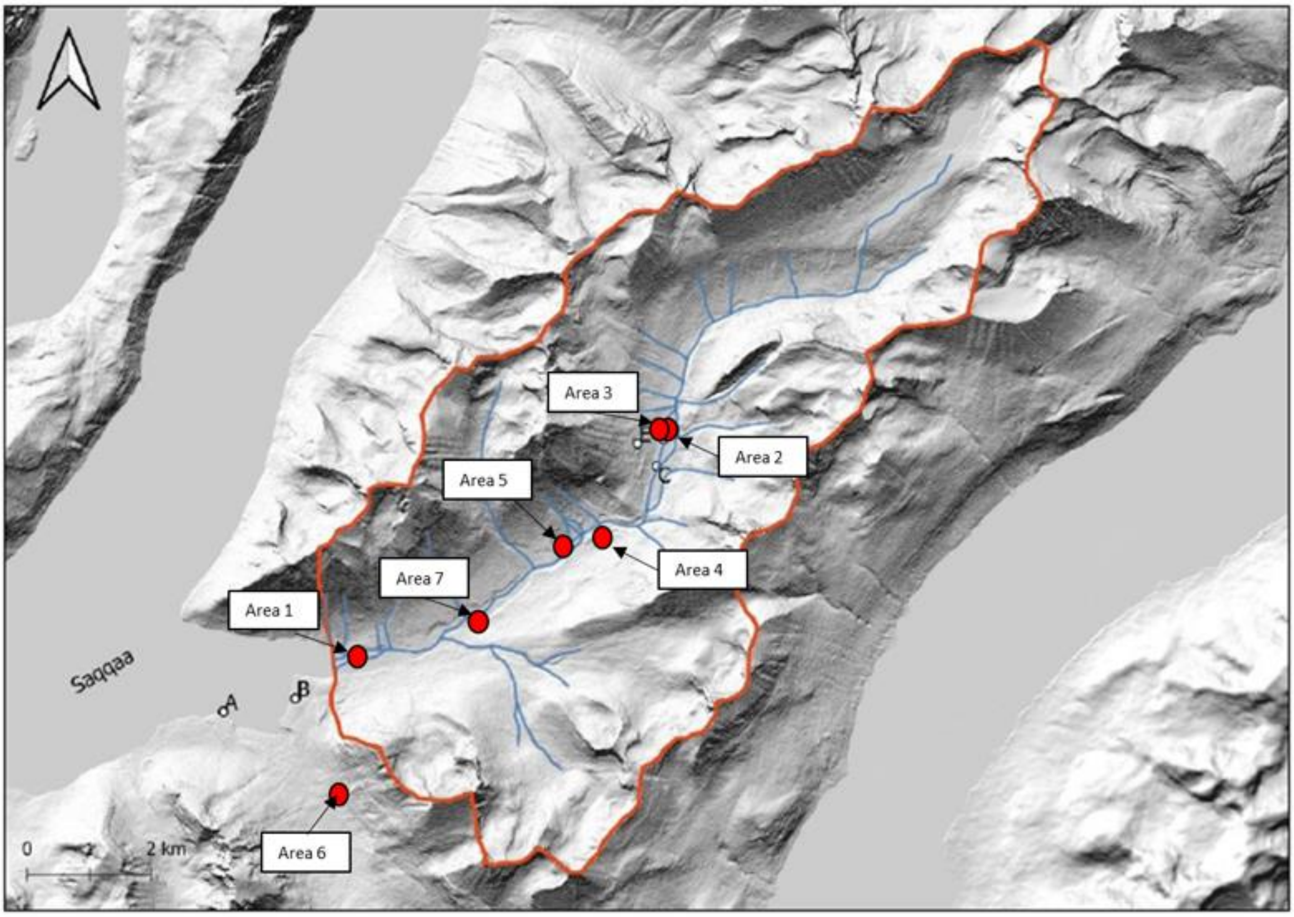


Figure 20 Approximate Locations of Potential DTSF Sites

A comparison of the sites was undertaken using a simple scoring system to take into account a number of variables (Golder 2022a; Tailings Storage Facility Options Analysis – Technical Memo, 7 March 2022. Report ref: 21467213.C04.1.B.0) at construction, operation and closure of the Project. On the basis of the scored assessment, Area 3 (presented in Figure 21) is the preferred location for the DTSF. Area 2 offers an alternative option, but this scored less favourably due to the location within the braided channel of the Kirkespir river with no buttressing from the hillside.

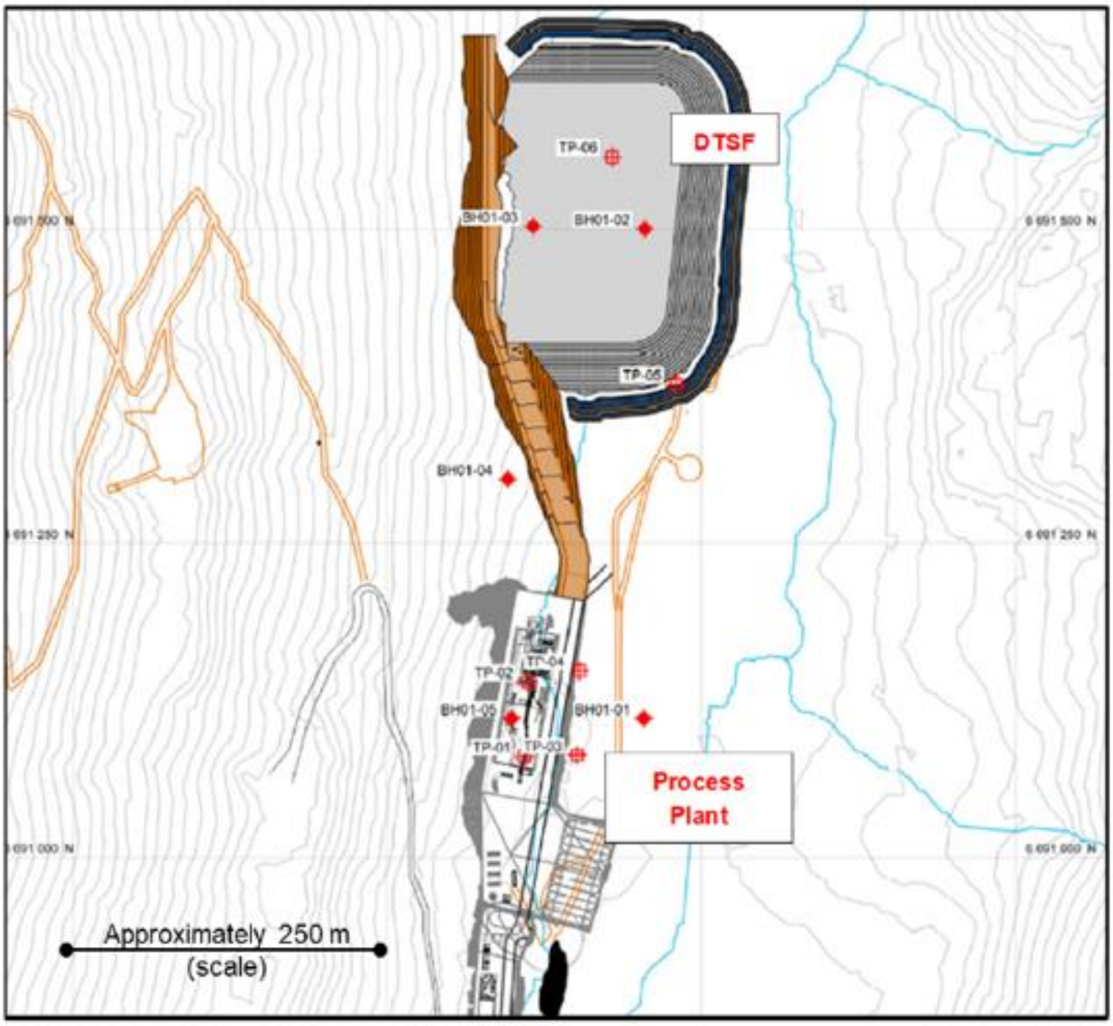


Figure 21: Area 3 Proposed TSF and Process Plant Layout and Investigation Locations (Updated based on Golder 2022a)

5.9.4 Processing of Minerals in Greenland

Gold recovery will initially occur via a gravity concentration circuit, producing doré that will be dispatched offsite for further refining. Addition recovery of gold from the remaining slurry will be by the flotations circuit and the resultant concentrate will be shipped offsite for further processing.

In order to produce doré onsite from the flotation concentrate, a cyanide leaching circuit would need to be implemented, which would have potential increased environmental risk implications in terms of importing, storing and usage of the chemical. Furthermore, cyanidation of the flotation concentrate has not been tested sufficiently to support the decision to implement this option. Refining the flotation concentrate by export to large smelting facilities outside Greenland remains environmentally and economically the preferred option.

5.9.5 Considerations Concerning Renewable Power

The project proponent, Nalunaq A/S, has the development objective to apply as much renewable power resources as possible in the mining project. The use of renewable power sources such as wind and solar have been considered by the project and a hydro power option is also being reviewed. A scoping study has been completed which assessed the possible use of wind and solar power sources (NIRAS, 2020). The assessment illustrated the potential of wind and solar at Nalunaq at a conceptual level.

The initial calculations indicate that a suitable location with adequate mean wind speed of 6.5 m/s is available at the mine site. A 100 kW wind turbine suitable for the harsh condition has been suggested, which will produce around 337 MWh of electricity per year. A number of such turbines can likely be installed at the site, depending on further optimization of wind turbine capacity relative to demand.

Four possible locations for PV solar panels have been investigated and the skyline based on the local topography has been created, showing significant shadows from the mountains. By combining this data with the best available weather data an annual production of a solar installation of 100 kWp is found to be 84MWh (camp) or 91 MWh (mine). A PV location 2 km from the camp site would yield 87 MWh due to less shading but would require a transmission line.

The study concluded that renewable energy could make a contribution and substitute for fuel consumed by the diesel consumed by the generators. The complete power supply system, be it wind, solar or hydro power, would be supplementary to full capacity diesel generators for power generation, and with sufficient redundancy to ensure that critical demands are always serviced.

For the current project design and a LOM of 5 years, renewable power sources are considered not technically or financially viable and also not considered as *available* technologies as defined in the explanatory notes to Section 52 of the Mineral Resources Act. If extending the LOM becomes viable sometime in the future, the proponent will consider re-evaluating the options for use of renewable power sources.

5.10 Failure Mode and Effects Analyses

A Failure Mode and Effects Analyses has been carried out for all stages of the project (Golder, 2022b; Failure Mode and Effects Analysis for Nalunaq Mine, 15 March 2022. Report ref: 21467213.C04.2.A.1). The highest value of Risk Probability Number (RPN) calculated is 45. The RPN provides a tool for prioritising additional actions and or implementing or updating current process controls (e.g., ongoing monitoring). The RPN should be used in the prioritisation of risks, and addressing these, rather than identifying risks as ‘high’, ‘medium’ etc. By this methodology, areas that represent an elevated risk to the environment have been identified as follows:

- Avalanche hazard, affecting all areas of the site throughout construction and operation of the mine. The highest value of RPN (45) was avalanche affecting the mine portal / underground workings due to failure on the southern and eastern sides of Nalunaq mountain, with the potential risk to workers and equipment. Avalanche risk was also high at the DTSF and mine camp (RPN of 40 at both sites). Mitigation will be included in an Avalanche Management Plan (AMP), which will outline key observations, data evaluation and protection measures.
- The accidental spillage of hydrocarbons may occur at various positions on the site, at all stages through the LoM, from refuelling, transit and storage. Where spillage occurs in the vicinity of the jetty or beach there is the potential for the hydrocarbons to impact a wider area. Refuelling will be carried out within fully contained areas and that appropriate spill kits are available.
- Upon closure, the highest potential for environmental impact arises from mine drainage and the decommissioning or removal of hydrocarbon storage tanks and related equipment. The potential for contamination from mine drainage will be mitigated by an environmental monitoring programme for the site as set out in an Environmental Management System. Previous monitoring has demonstrated that no significant detrimental impacts from the historical mining have been identified. Geochemical testing carried out to date has demonstrated that materials can be classed as inert with respect to ARD potential, and there is a low concentration of the only identified PCOC. Closure planning will be undertaken as an integrated process and monitoring during site operations together with the results of scheduled kinetic testing (Golder 2022d; Nalunaq Gold Mine, Greenland: Preliminary Static Testing Results From 2022 Tailings Analysis Programme, 5 April 2022. Report ref: 21457213.C04.4.B.0) will further inform the closure

plan. Decommissioning of fuel storage should be undertaken in accordance with a suitable method statement to be protective of the environment.

A separate analysis of the potential failure modes of the DTSF has been completed (WSP 2023a) which identifies the following potential failure modes that could lead to the release of tailings into the river valley:

- A sidewall of the DTSF could become unstable due to weakness of the DTSF foundation, inadequate compaction of the tailings or an elevated phreatic surface reducing its shear strength.
- A large seismic event could lead to liquefaction of the DTSF foundation resulting in an instability of the DTSF sidewall or liquefaction of saturated tailings resulting in an instability of the DTSF.
- Internal erosion of the platform or the perimeter of the DTSF could occur due to construction material incompatibility, an elevated phreatic surface in the tailings resulting in high hydraulic gradients against the platform fill, or construction defect (e.g., poor compaction, use of out-of-specification construction materials, gaps in the core filter).
- Overtopping of the perimeter of the top surface of the DTSF could occur due to significant precipitation and/or snow melt combined with plugging of the hillside drainage system, locally insufficient crest elevation due to delayed raising of the DTSF wall during operations, a flood event exceeding the design IDF that cannot be passed by the drainage system, Blockage of drainage system due to the build-up of snow and ice, blockage by debris from a rock fall or avalanche or incorrect placement of tailings close to the inlet of the drainage system.
- The design of the DTSF has taken into account seismic loading conditions, which may result in failure of the foundation and or slopes, and the calculated factor of safety exceed the values outlined in the design criteria under seismic loading conditions.

The most significant risks to the project arise from natural hazards such as rockfall, avalanche, debris flow and flooding / high rainfall. Much of the risk from these hazards is mitigated by careful site selection, but ongoing monitoring and management of these hazards will be required throughout the LoM to ensure the safe functioning of the site with no detriment to the environment.

5.11 Summary of Geochemical Test Work

The table below provides a summary of completed geochemical test work for the Nalunaq project. There is no ongoing geochemistry testing, the tailings geochemical programme has been concluded.

Table 11: Summary of Geochemical Test Work

Testing Category	Testing Type	Ore	Tailings	Waste Rock
Static	Acid Base Accounting	*	~	*
	NAG pH		~	
	Trace Element Analysis	^	* ~	"
	Whole Rock Analysis		~	
	Mineralogy		* ~	
	Short Term Leach Testing		* ~	
	Sequential Extraction		~	
Kinetic	Humidity Cell Testing		<	

Testing Category	Testing Type	Ore	Tailings	Waste Rock
	Bottle Roll Testing		<	
Toxicity Testing	Toxicity Testing		* ~	
Source	* Kvaerner, Nalunaq Gold Project Feasibility Study, July 2002			
	^ SRK Exploration. Memorandum: Nalunaq Vein Material Characterisation. 18 May 2021			
	" SRK Exploration. Memorandum: Nalunaq Waste Rock Characterisation. 15 January 2021			
	~ SGS Canada Inc. An Investigation into The Environmental Characterisation of Tailings from the Nalunaq Mine, prepared for Nalunaq A/S Project 17909-04. March 30 2021			
	< SGS Canada Inc. An Investigation into The Environmental Characterisation of Tailings Samples from the Nalunaq Mine, prepared for Nalunaq A/S Project 17909-06. February 6 2023			
	Blank cells indicate no geochemical test work available			

5.11.1 Ore

The Nalunaq project is a low sulphidation quartz vein gold deposit. The ‘Main Vein’ is a 0.5 – 2 m thick quartz vein which is located along a contact between fine-grained meta-volcanics in the footwall and meta-dolerites in the hanging wall. Gold is mainly present as the native form, occasionally as a gold-bismuth alloy (maldonite, Au_2 Bi) and associated with native bismuth (SGS 2021).

Historic geochemical test work (Kvaerner, 2002) reported neutralisation potential ratios (NPR = neutralisation potential/acid potential) of 2.9 – 3.4 for waste rock and ore materials, indicating significant buffering capacity and therefore acid generation is not expected to occur.

5.11.2 Waste Rock

The host rock materials, which will be extracted as waste during the exploitation of the Nalunaq project, are comprised of meta-basalts, meta-gabbro, and aplite dykes. Historic acid base accounting (Kvaerner 2002) reports that acid generation is not expected to occur due to sufficient buffering capacity in the waste rock.

5.11.3 Gravity and Flotation Tailings

Results of short-term leaching tests on processed gravity and flotation tailings for eight CoPCs were used as a source term for a previous seepage assessment (Golder, 2021c). Zinc and cadmium concentrations were taken as 50% of the method detection limit in these source terms as a conservative assumption. These 2021 source terms are compared here with the minimum, maximum, and average results of the Week 10 and Week 25 HCT tests as humidity cell leachates are considered more representative of longer-term seepage quality.

The maximum Week 10 concentrations in the HCT tests for the CoPCs are generally lower than the Golder (2021c) source term values previously used for all COPCs except arsenic in the flotation tailings and cadmium in the gravity tailings (Table 12). Although the maximum concentration for arsenic (0.0835 mg/L) in the Week 10 flotation HCT exceeds the Golder (2021c) source term concentration of 0.0646 mg/L, the average arsenic value across the four samples analysed is less than the concentration used in the Golder (2021c) source term. Similarly, the maximum concentration for cadmium (0.00003 mg/L) in the week 10 gravity HCT exceeds the Golder (2021c) source term concentration of 0.000015 mg/L but the average concentration is less.

All Week 25 concentrations are lower than the Golder (2021c) source terms values previously used. Zinc concentrations in humidity cell leachates are at the limit of detection as a conservative assumption but are lower than the Golder (2021) source term.

Table 12: Humidity Cell Testing Source term comparison (from Golder 2022d).

		Units	As	Cd	Co	Cr	Cu	Fe	Ni	Zn
Gravity Tailings Source Term		mg/L	0.154	0.000015	0.00115	0.00908	0.0064	0.909	0.0037	0.01
Gravity Tailings HCT (Week 10)	Maximum	mg/L	0.0188	***0.00003***	0.000312	0.00048	0.0008	0.035	0.0019	0.002
	Average	mg/L	0.0103	0.0000145	0.00018475	0.000355	0.000475	0.02725	0.001175	0.002
	Minimum	mg/L	0.006	0.000006	0.000118	0.00025	0.0003	0.019	0.0007	0.002
Gravity Tailings HCT (Week 25)	Maximum	mg/L	0.0263	0.00001	0.000239	0.00063	0.0006	0.034	0.0011	0.002
	Average	mg/L	0.012	0.000012	0.000144	0.0003875	0.000475	0.02675	0.0007	0.002
	Minimum	mg/L	0.0053	0.000012	0.000071	0.00015	0.0004	0.014	0.0003	0.002
Flotation Tailings Source Term		mg/L	0.0646	0.000015	0.0014	0.00726	0.0053	1.13	0.0035	0.01
Flotation Tailings HCT (Week 10)	Maximum	mg/L	***0.0835***	0.000008	0.000115	0.00067	0.0005	0.095	0.0008	0.002
	Average	mg/L	0.0533	0.0000065	0.000072	0.0004725	0.0004	0.042	0.0006	0.002
	Minimum	mg/L	0.0115	0.000005	0.000049	0.00034	0.0003	0.011	0.0003	0.002
Flotation Tailings HCT (Week 25)	Maximum	mg/L	0.0456	0.000005	0.000072	0.00045	0.0004	0.075	0.0002	0.002
	Average	mg/L	0.028475	0.000005	3.78E-05	0.000345	0.00035	0.03275	0.00015	0.002
	Minimum	mg/L	0.0074	0.000005	0.000025	0.00023	0.0003	0.012	0.0001	0.002

NOTE: Measurements at the limit of detection are at value. Values in ***bold & italics*** *exceed the Golder 2021c source term concentration.*

The metal leaching and acid rock drainage potential of the Nalunaq flotation and gravity tailings have been assessed through static and kinetic testing. Final humidity cell results (up to Week 35) show that the pH values are neutral to alkaline with the metal concentrations stabilising. Some common CoPCs are identified between both the HCT and Intermittent Bottle Roll Tests (WSP-Golder, 2022), including aluminium, arsenic, cobalt, copper, nickel, and phosphorus. Sulphate and manganese also initially exceed limits in the HCT tests before decreasing in concentration. Fewer metals exceed limits over time, with only aluminium, arsenic, cobalt (Gr_5 only), and nickel (Gr_5 only) exceeding limits at Week 35.

Flotation samples are elevated in phosphorus and aluminium in both the HCT and Intermittent Bottle Roll Tests when compared to gravity samples. Arsenic, as with the static testing, is consistently elevated in both the HCT and Intermittent Bottle Roll Tests.

The historic processing during previous operations used cyanidation to extract gold from the tailings. Cyanide is not proposed for the reopening of the Nalunaq mine. In the study, Nalunaq tailings were found to be dominated by SiO_2, with Al_2O_3 as a major component, although CaO and total Fe_2O_3 were more dominant than Al_2O_3. Total cyanide detected within washed and unwashed samples was similar at 26 mg/kg and 18 mg/kg respectively, which is well below the regulatory guideline of 50 mg/l weak acid dissociable cyanide used as a regulatory guideline in the United States and Australia.

5.11.4 Quantity and Quality of Seepage

The anticipated seepage characteristics from the DTSF including rates of flow and chemistry are summarised in (Golder 2021c, Appendix IV).

An assessment has not been undertaken of quality or quantity for the sedimentation pond.

6.0 EXISTING ENVIRONMENT

6.1 Topography

The Nalunaq gold mine is located in South Greenland c. 40 km Northeast of Nanortalik and eight km from the coast of Saqqaa Fjord in the Kirkespir Valley.

The Nalunaq Mountain, which hosts the gold deposit, is located in a wide glacial valley reaching into the Saqqaa Fjord about eight km from the mine site. The terrain is a glacial valley with mountain peaks reaching 1,200-1,600 m above sea level. A river (Kirkespir River) runs through the valley, fed by mountain streams of melting snow, and runs to the fjord.

Most of the valley floor is relatively lush with a delta area near the fjord containing dwarf-scrub heath, fens, marshes and patches of grassland. Further upstream fens and willow shrubs are found scattered along the river. Above the waterfall six km from the coast, the valley floor is mainly covered by marshes and patches of grassland. The slopes of the mountains contain only sparse fell-field vegetation.

6.2 Geology

The geology of Greenland is dominated by crystalline rocks of the Precambrian Shield. The crystalline rocks of the Nuuk/Qeqertarsuatsiaat area comprise some of the oldest bedrock in Greenland which covers most of western Greenland.

The geology of SW Greenland is dominated by the Ketilidian Mobile Belt, which forms a Paleoproterozoic continental accretion to the Achaean core of south Greenland. The Qaqortoq granite forms a Cordillera-type marginal batholith complex to the north, whereas the south is composed of flat-lying migmatitic metasediments termed the Psammite Zone.

The Nalunaq project lies within the ‘Psammite Zone’ in South Greenland that hosts the so called Nanortalik Gold Belt. This zone is part of the Ketilidian Mobile Belt which evolved between 1,850 Ma to 1,725 Ma during subduction of an oceanic plate under the southern margin of the Archaean North Atlantic Craton.

The gold mineralisation at Nalunaq is hosted in a package of metabasic rocks including metadolerites and fine-grained amphibolites and is often spatially related to the contact between these (Angel Mining 2009).

6.3 Climate

The Greenlandic climate is arctic with cool summers and very cold winters. Mean temperatures do not exceed 10°C in the warmest summer months. In the southern part of the country and the innermost parts of the long fjords, the temperature can, however, rise to more than 20°C in June, July or August.

Nanortalik which is located approximately 35 km southwest of the Site has an annual average rainfall of 900 mm/yr. Based on a hydrological model (Golder, 2021e; Hydrological and Hydrogeological Study Technical Background Report, 27 January 2021. Report ref: 20136781.613.A.0), the mean precipitation at the mine site is 602 mm/year. The yearly precipitation of 1800 mm/yr. stated in ToR originates from a worldwide model describing precipitation, temperature etc. based on hindcast modelling. These model data from https://climatecharts.net/ are based on a model with a resolution of 0.50 x 0.50 (90 x 90km). The hindcast modelled data from ToR should not be taken as an indicator of the precipitation at Nalunaq in Kirkespirdalen.

Asiaq undertook an assessment in 2019 to review water resource availability in the Nalunaq river valley. The report identified that several local short-term precipitation datasets were available, however due to varying data gaps, the assessment used a predictive model to establish a monthly precipitation record for low flow modelling purposes.

A number of precipitation datasets and supporting regional (and site-based) studies have been identified, including regional climate models, precipitation data sets for sites across southern Greenland, published EIA reports for surrounding sites, and earlier operator (Angel Mining) reports. The most complete long-term precipitation dataset identified was at Narsarsuaq where between 1973 and 2003 annual total precipitation averaged 601.8 mm/yr. Anecdotal information has been provided by GINR that indicates that the annual precipitation on site may be as high as 900 mm/yr, or a 50% increase in the recorded precipitation per year at Narsarsuaq. For conservatism, the hydrological analysis for the Project has been undertaken using the higher precipitation rate of 900 mm/yr (50% increase in design rainfall) (Golder 2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0; and Golder 2022f; Nalunaq Gold Mine Surface Water Infrastructure Design, 8 April 2022. Report ref: 21467213.C04.6.B.0).

Based on existing data, the specific mean annual precipitation at the Nalunaq mine site was estimated to 602 mm/year (see Table 13 and Figure 22). Onsite monitoring is ongoing at Nalunaq to collect reliable verification of the precipitation values using during the design.

The climate at Nalunaq tends to show an average annual temperature just above 1°C, with July the warmest month at 10°C and February the coldest at -9°C. Daily maxima and minima may be considerably higher or lower than this respectively.

The two dominant wind directions are north and south each representing around 20 to 25% of the time. This is due to the funneling effect of the north-south orientated Kirkespir Valley. Calm conditions occur around 20% of the time. A mountain valley phenomenon, whereby differential warming of air masses causes winds to blow down the valley sides, may give rise to strong gusts, possibly originating from all directions. A windrose presenting 50 m wind data for 2 years from the Nanortalik station, is presented in Figure 23 and displays a north-easterly prevailing wind direction with lower frequency higher wind speed events from the east and north-west.

The dominant persistent local wind system is the katabatic system generated by the Greenland icecap, in which the density difference between cold, dense air at the top of the icecap and the warmer, lighter air at sea level drives a downward flow of air through the fjords. The temperature of this air will increase as it descends to sea level because of the greater pressure there under the Foehn effect. If the incoming air has warmed to the temperature of the air already present, then minimal outflow occurs. However, if the air coming off the icecap is still cooler and denser than that over the fjord, strong outflows can develop (Angel Mining 2009).

Table 13: Average Monthly Precipitation at Narsarsuaq Station (Golder 2022e).

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Precipitation (mm)	44.0	37.7	35.6	45.6	35.8	57.4	58.2	64.6	73.8	57.6	47.6	43.9	601.8
Rainfall (mm)	3.2	7.5	2.4	33.5	35.0	57.4	58.2	64.6	73.1	50.4	16.2	6.4	407.8
Snowfall (mm)*	40.7	30.3	33.3	12.2	0.8	0.0	0.0	0.0	0.6	7.2	31.4	37.5	194.0

** As water equivalent.*

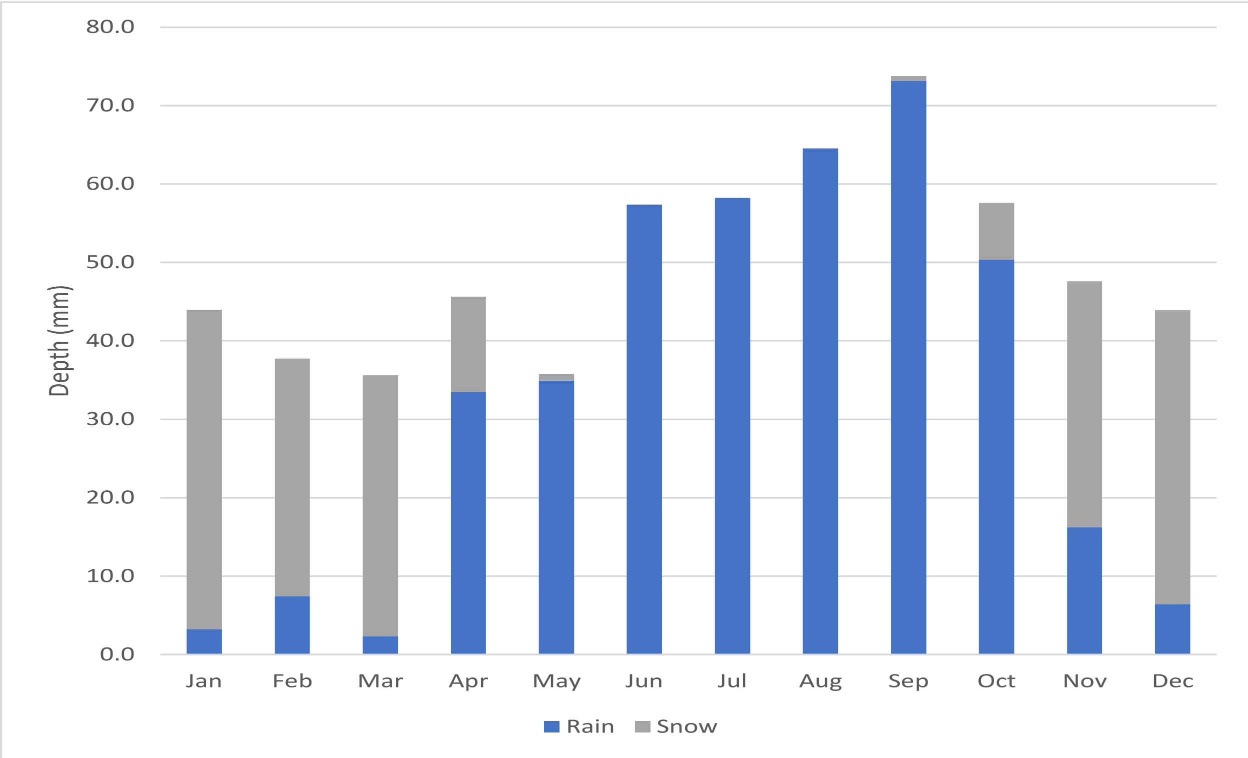


Figure 22: Average Monthly Rainfall and Snowfall at Narsarsuaq Station (Golder 2022e).

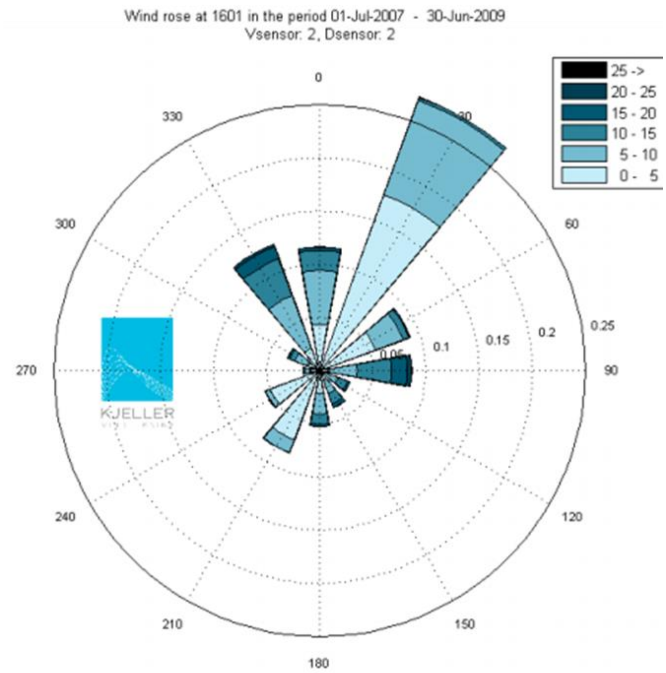


Figure 23: Windrose from Nanortalik period from July 2007 to end of June 2009

6.4 Predicted Climate Change

An assessment by Danmarks Meteorologiske Institut (DMI) in their report entitled *Videnskabelig rapport 15-04 (1/6) - Fremtidige klimaforandringer i Grønland: Kujalleq Kommune* dated 2016 concluded that Greenland will have a warmer climate in the future with generally more precipitation and extreme weather events, with a reduction in sea ice volume.

Greenland can thus expect more precipitation especially in winter with summer precipitation levels mostly unchanged but with a tendency towards heavier rains. The temperature in the country will rise; in particular, significantly milder winters are expected as sea ice spread is reduced, leading to an extended vegetation growing season. With warmer summers, after Greenlandic conditions, there may be more and longer-lasting heat waves. Significant changes in storm strength or frequency are not expected. Future changes in wind conditions in Greenland are generally worse determined than the conditions for temperature and precipitation. However, as sea ice spread decreases, even unchanged wind conditions will be experienced significantly differently. Finally, due to the complex conditions of land elevation and response to mass loss from the Ice Sheet, no significant sea level rise is expected around Greenland, so the coastal consequences are not expected to have any major significance. For Kirkspirdalen this means higher flow in the river especially during winter time, but less snow melt will reduce peak flow during spring.

As part of the Flood Risk Assessment (Golder 2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0)) for the Project, an analysis has been undertaken to establish the potential impacts of climate change upon the flooding regime, and therefore the level of protection offered to the DTSF and Processing Plant facilities over time. The analysis considered the DMI 2016 projected increase in rainfall. The FRA has assessed a conservative potential impact of a 20% increase in rainfall in the 1% Annual Exceedance Probability (1 in 100) design case, i.e., reflecting summer in 2100 under a worst-case climate scenario. The results and outputs of the climate change analysis (i.e., depth and velocity mapping) are presented in the Flood Risk Assessment (Appendix XIII).

The design of the mining facilities including the DTSF has been undertaken taking into consideration the results of the Flood Risk Assessment (Appendix XIII) such that all tailings deposition will take place on an engineered platform above the 1:1000 year return period flood event level and the DTSF is designed on the basis of providing environmental security from erosion and flooding during the mine life and post closure.

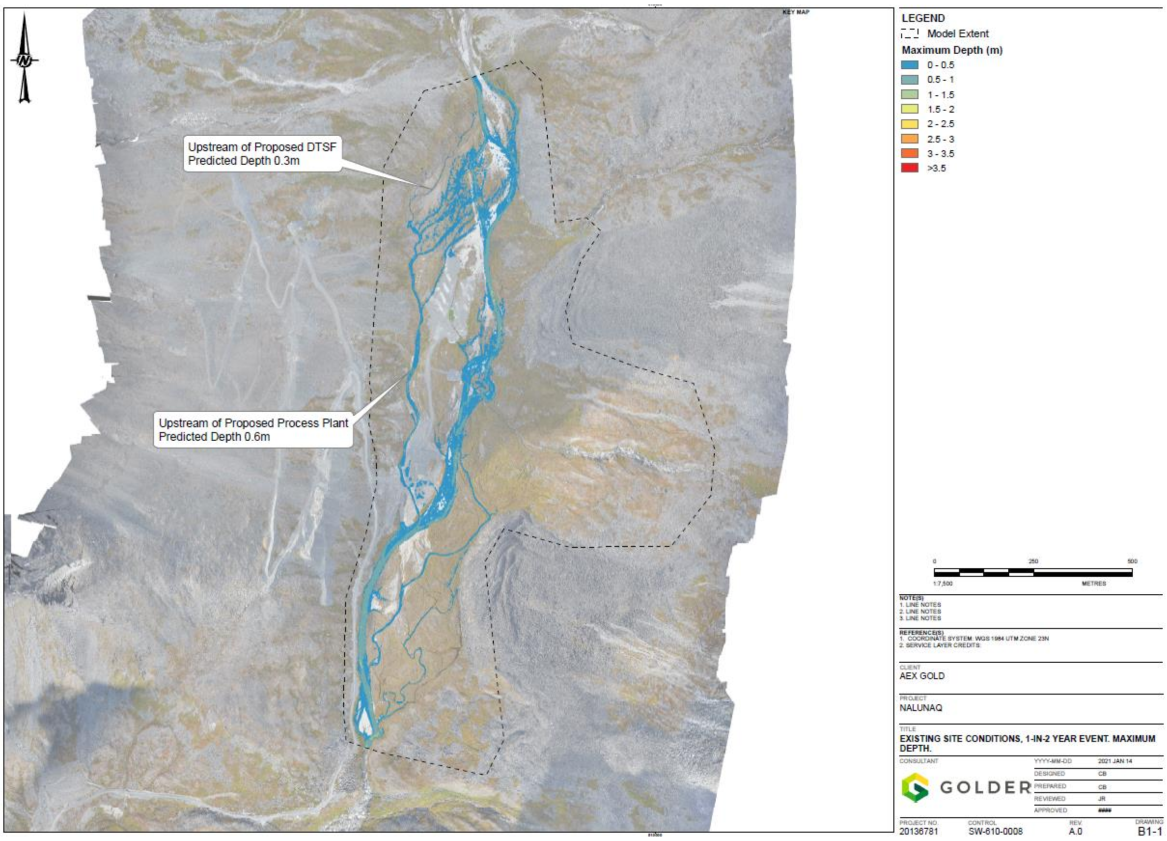


Figure 24: Maximum Flooding Depth 1-in-2 year event (from Golder, 2022e)

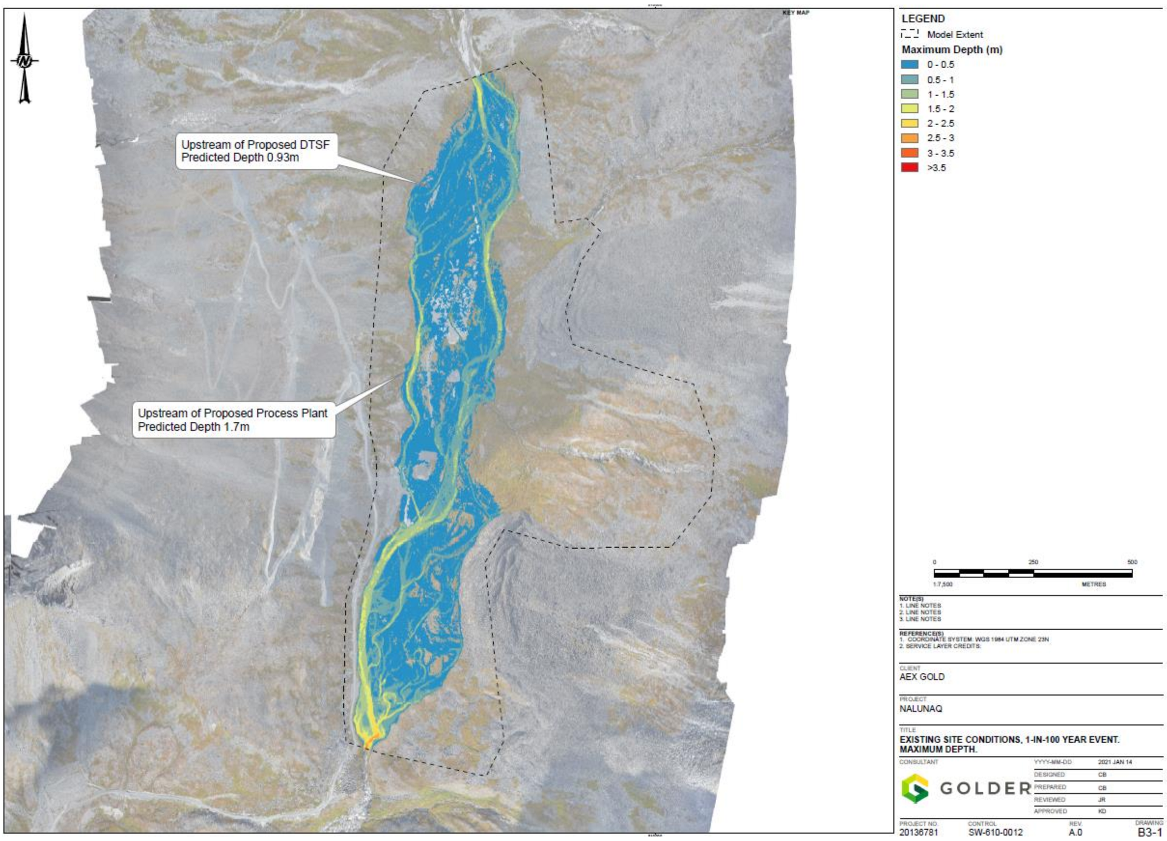


Figure 25: Maximum Flooding Depth 1-in-100 year event (from Golder, 2022e)

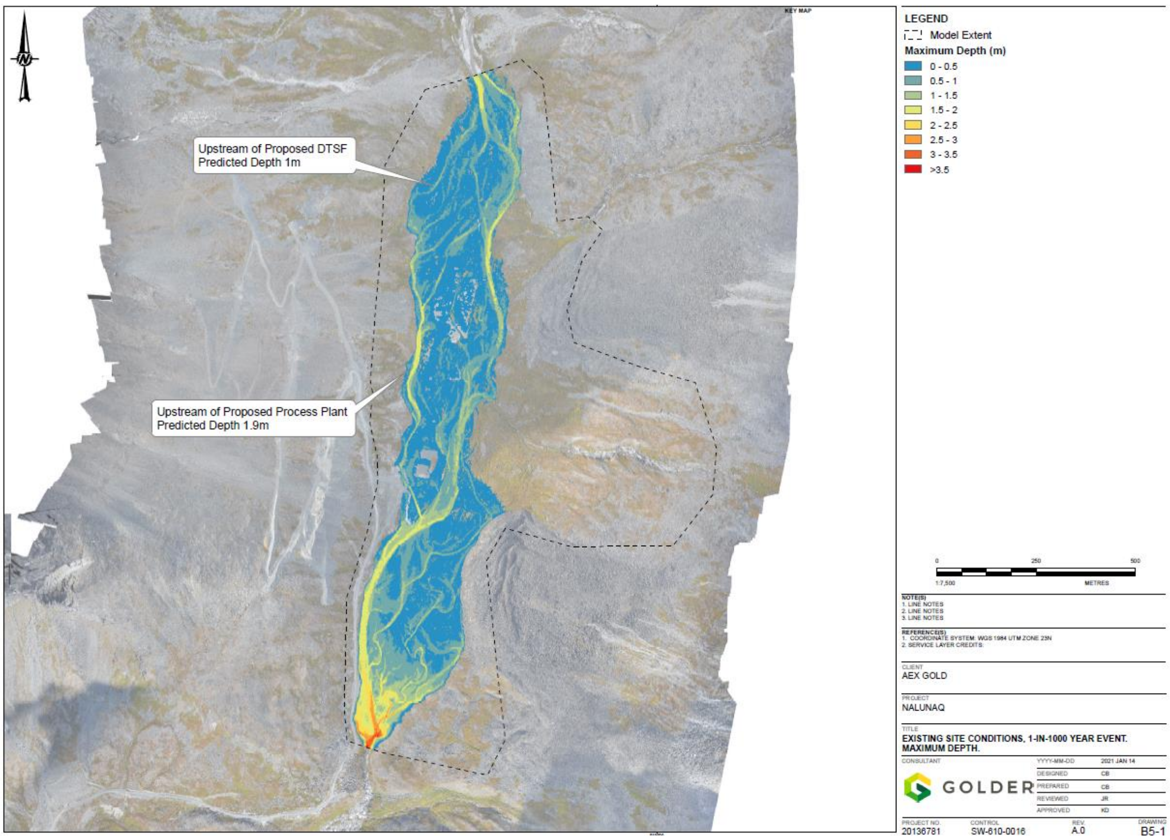


Figure 26: Maximum Flooding Depth 1-in-1000 year event (from Golder, 2022e)

6.5 Air Quality

The air quality in Greenland is generally among the best in the world due to the country's geographical position to the high north.

The most important sources of atmospheric pollutants are Europe and North America, through the long-range transport of gases in the upper atmosphere and their subsequent deposition with precipitation. No data is available for deposition rates at Nalunaq, but river water quality and the abundance of mosses and lichens (Bach & Olsen 2020) suggest that acid rain deposition is not an issue.

Outdoor air pollution is a mix of chemicals, particulate matter, and biological materials that react with each other to form tiny hazardous particles. It contributes to breathing problems, chronic diseases, increased hospitalization, and premature mortality.

The concentration of particulate matter (PM) is a key air quality indicator since it is the most common air pollutant that affects short term and long-term health. Two sizes of particulate matter are used to analyze air quality; fine particles with a diameter of less than 2.5 µm or PM2.5 and coarse particles with a diameter of less than 10 µm or PM_{10}. $PM_{2.5}$ particles are more concerning because their small size allows them to travel deeper into the cardiopulmonary system.

The World Health Organization's air quality guidelines recommend that the annual mean concentrations of $PM_{2.5}$ should not exceed 10 µg/m^3 and 20 µg/m^3 for PM_{10}.

Prior to the startup of operations, the remoteness of the site, its physical identity and the almost total lack of roads or any activity in the wider area would have meant that dust occurrence in the area would be very limited as the only dust sources would be natural.

The air quality assessment part of the EIA comprises (1) a greenhouse gases emissions estimate, and (2) a brief discussion of potential black carbon emissions. These assessments are based on estimated consumption data provided by Nalunaq A/S.

The potential pollution from dust generated from transport to and from the mine area and during the handling and storage of the heavy mineral concentrate will be discussed and assessed in chapters 9.2.1 and 10.2.1.

6.6 Baseline Data on Metals and Pollutants

An environmental monitoring program was conducted at the former Nalunaq gold mine site from 2009 to 2019 (Bach & Olsen 2020).

Previous monitoring reporting had described slight increased levels of the elements As, Cr, Co and Cu in the terrestrial environment, primarily as a result of dust spreading by wind from the waste rock and former ore stockpiles, but also as a result from driving on the gravel road.

Afterwards, the levels have shown decreasing trends, and with the closure of the mine in 2013, it was expected that the element concentrations in the environment would decrease even further. A small increase in dust dispersal during remediation and restoration of the landscape in 2013/2014 was anticipated and correspondingly observed in the 2014 monitoring (Bach et al. 2015).

Since 2015 until 2019, exploration activities have taken place in the area during the field seasons, including drilling, driving, establishment of working tents and re-establishment of roads, but no significant environmental effects were detected (Bach & Olsen 2020).

The analyses conducted in 2019 did not give rise to any environmental concern concerning cyanide that was used in the gold extraction process in the previous mining activities (Bach & Olsen 2020).

Results of the 2019 monitoring on specific water parameters and elements are summarized in Table 14 and Table 15 respectively.

Table 14: Water parameters measured in freshwater at three sample stations. Values are mean of a period of approximately 5 minutes.

		Station 2 Upstream	Station 3 Downstream	Station 4 Kirkespir River
Temperature	ºC	5.7	8.6	9.2
pH		7.2	7.1	6.9
Salinity	PSU	0.008	0.02	0.01
Specific conductivity	µS/cm	19.2	37.4	24.8
Total suspended solids*	Ppt	0.01	0.02	0.01
Oxygen saturation	%	100	100	98.8

Table 15: Selected elements measured in unfiltered and filtered (<0.45 µm) in freshwater upstream the mine, from sampling Station 2 that was representing background values in Bach & Olsen (2020), (in

µg/l). Values for Greenland Water Quality Criteria (GWQC) for filtered water for mining activities (MRA, 2015) are also shown. <dl: below detection limit.

	As	Au	Cd	Co	Cr	Cu	Fe	Hg	Ni	Pb	Se	Zn
Detection limit 2019	0.045	0.002	0.001	0.001	0.025	0.008	0.113	0.003	0.013	0.002	0.006	0.08
GWQC	4		0.1			2	300	0.05	5	1		10
Unfiltered	1.09	<dl	0.001	0.007	0.077	0.094	1.79	<dl	<dl	<dl	0.032	0.544
Filtered	1.03	<dl	0.002	0.005	0.071	0.095	0.981	<dl	<dl	<dl	0.044	0.526

6.7 Fresh Water Resources

The largest river in the Project Area is Kirkespir River/Quingârssûp River that runs through the entire valley and has its outlet in Saqqaa Fjord c. 500 metres northeast of the new mining camp (Figure 27).

Kirkespir River flows approximately 15 km along the bottom of the main valley from its source at the main valley's only lake (0.3 km^2) found at 747 meter above sea level to its mouth at the fjord. Tributaries from a few smaller side valleys feed water to the main river along its course (Asiaq 2019). The river has an estimated catchment area of 95 km^2 (Kvaerner E&C 2002, (Golder 2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0)).

A study of the water resources of the Kirkespirdalen is presented in a report prepared by Asiaq (2019), provided in Appendix XX, which includes analysis of potential freshwater resources and catchment areas.

In 2020 Golder carried out a detailed Hydrological and Hydrogeological Study to quantify the water resource at the Nalunaq mine site with a view to establish the project's design parameters (Golder, 2021e; Hydrological and Hydrogeological Study Technical Background Report, 27 January 2021. Report ref: 20136781.613.A.0).

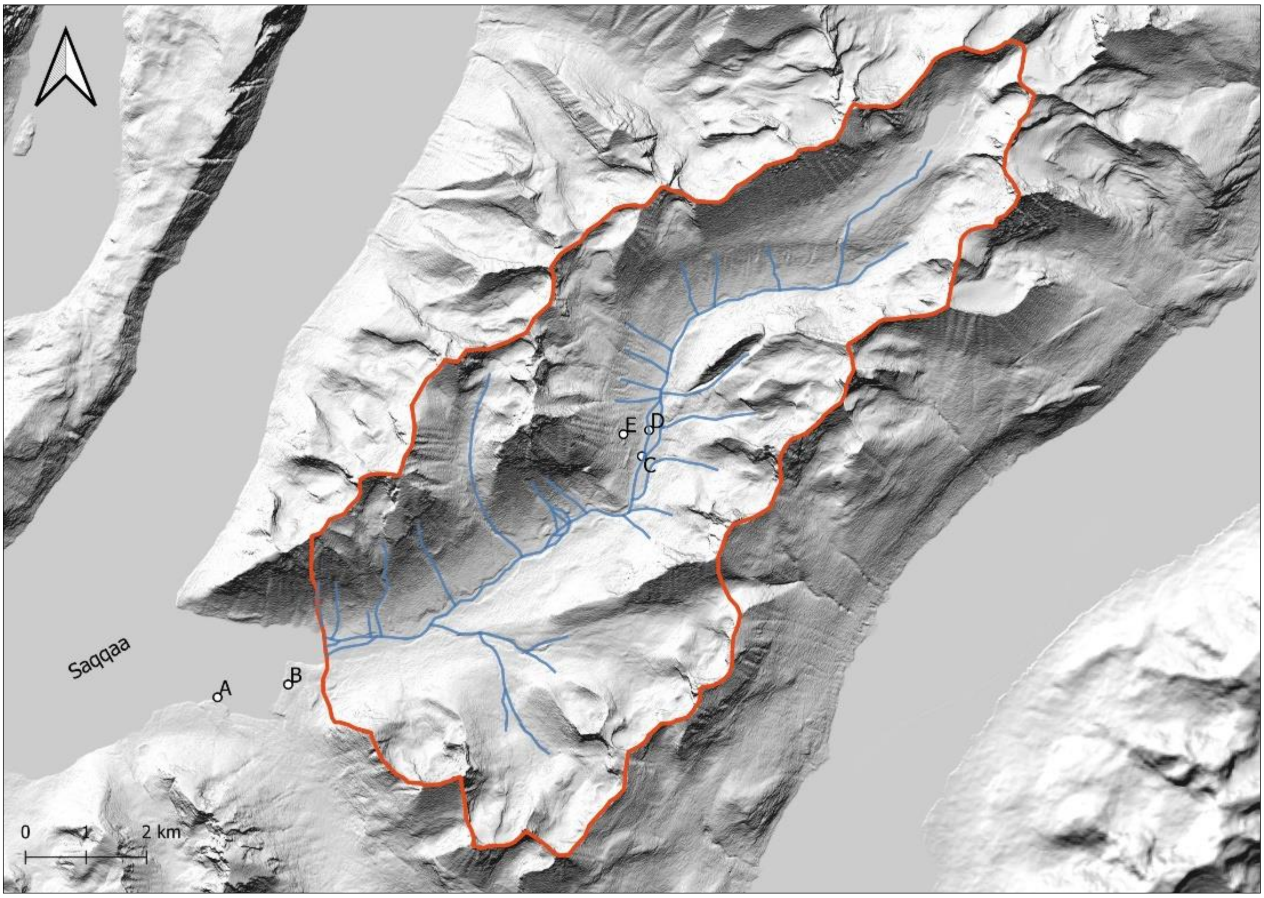


Figure 27: Nalunaq Valley Watershed. Catchment defined with orange border and stream network with blue lines. A: Jetty, B: Camp, C: Process plant, D: Tailing storage, E: The mine.

6.8 Marine Waters (sea ice)

Saqqaa Fjord

The Saqqaa Fjord is physically comparable to many coastal fjords in Greenland. It varies between 2.5 and 4 km wide and is about 45 km long, covering an area of some 160km^2. The average depth of the fjord is about 140 m.

The fjord is subject to strong winds, which originate in the open ocean or from the katabatic system associated with the Greenland ice-cap. In general, winds are strongest in the winter and are strongly directional, north and south, blowing up or down the fjord.

Sea Ice

The seas off South and West Greenland, north to 65-67° N, are ice-free throughout the year. This open-water-area (Åbenvandsområdet) is primarily caused by the relatively warm north or northwest flowing West Greenland Current. In the fjords of South Greenland, the ice situation is different. Here three types of sea ice occur:

- Short-lived fast ice may occur in the inner part of the fjord during winter. This type of ice cover is extremely variable both within each winter period and between winters. In recent years, fast ice has mostly been limited to the heads of fjords, with the remaining parts of the fjords otherwise ice-free during winter;
- Icebergs and growlers originating from glaciers are common all year.

Multi-year sea ice / drift ice (Storis), flowing with the East Greenland Current, moves southwards along the east coast of Greenland, turns westwards at Cape Farewell and then northward along the south-west coast of

Greenland. In some years, wind and waves cause “Storis” to fill up the mouths of the larger fjords of South Greenland during spring.

In normal years the drift ice occurs in South Greenland from January to July but there can be considerable variation from this norm (Bertelsen et al. 1990). The drift ice will then fill up the mouths of the larger fjords during March or April. The outer fjord, Qoornoq, is normally filled up with drift ice so that the entrances to Saqqaa Fjord and Sermersuup Saqqaa Fjord are closed. However, navigation to and from Nanortalik is in most cases not difficult.

The distribution of the drift ice is highly dependent of wind direction and speed, and the winds can also drive larger icebergs up the fjord as far as the mouth of Kirkespir River.

Tidal flows within the fjord are strongly diurnal and relatively large with a tidal range of about 3.6 m (Angel Mining 2009). However, the sea is usually ice free so that year-round shipment of supplies and consumables will be possible.

6.9 Terrestrial Vegetation

The vegetation in the Project Area is dominated by terrestrial habitats and plant species that are common and widespread in South Greenland (Orbicon 2019).

The presence and distribution of native vegetation in south Greenland is in general determined by temperature and precipitation, both of which follow oceanic-inland/continental and altitude gradients.

Such natural gradients are obvious when moving inland from the outlet of the Kirkespir River through the valley or moving from lower lying fens along the river to higher altitudes in the mountains. Also, yearly changes in the length of snow cover, water supply, temperature, soil type and wind exposure may further limit or influence the distribution of plant communities. In the outer fjord area, vegetation growth is also influenced by cold currents, drift ice, salt spray and wind.

In general, dense birch and willow scrubs are common below 200 m altitude, especially on south-facing exposures at the head of the fjord and inland.

The following major vegetation types were found in the Project Area in August 2019 (Orbicon 2019).

Dwarf-scrub Heath.

The dominant vegetation type in the Project Area is dwarf-shrub heath made up mainly by Northern Willow *Salix glauca*, Glandular Birch *Betula glandulosa*, Bog Bilberry *Vaccinium uliginosum* and Crowberry *Empetrum hermaphroditum*. The heathland is generally relatively dry but also contains humid patches with grasses and herbs, especially in the upper valley (Figure 28).

Near the coast the heathland also includes areas with a character of fell-fields, i.e. wind-swept sand and gravel plains with only few plants, including Sea Mayweed *Tripleurospermum maritimum* and different species of lichens. The mining camp, the camp itself and the nearest surroundings being almost completely without vegetation, is situated in this type of heathland.

Figure 28: Most of the vegetation in the project area consists of dwarf-scrub heath

Stream Surrounding and Gorges.

A species rich flora is found along the small streams that run through the dry heathland. Such streams are often temporary, as they may originate from snow beds along the foothills of the mountains along the valley. Many of the same species of dwarf scrubs that are also growing in the heathland, are growing along such streams. The vegetation is often quite lush with many species of grasses, sedges and flowering plants.

Figure 29: The outlet of Kirkespir River to the Saqqaa Fjord.

Fens are found on sites with high groundwater level or where surface water is accumulated on rocky ground. They are found throughout the Assessment and Project area, as part of the predominating heathland or near the riverbeds, including Kirkespir River, especially in the lower valley. Patches with fen are also found near the jetty (Figure 29)

Fens and bogs also cover parts of the coastal plains east of the outlet of Kirkespir River and the riverbanks between the old, abandoned mining camp and the location of the new one. These plant communities are dominated by grasses, sedges, cotton-grasses and different species of *Sphagnum* mosses.

Rocks and Boulder Fields

This habitat consists of bare rocks, mountain slopes and boulder fields with only little or no vegetation at all – the lichens being the most dominating element. The habitat type can be found at the mountain slopes throughout most of the valley (Figure 30).

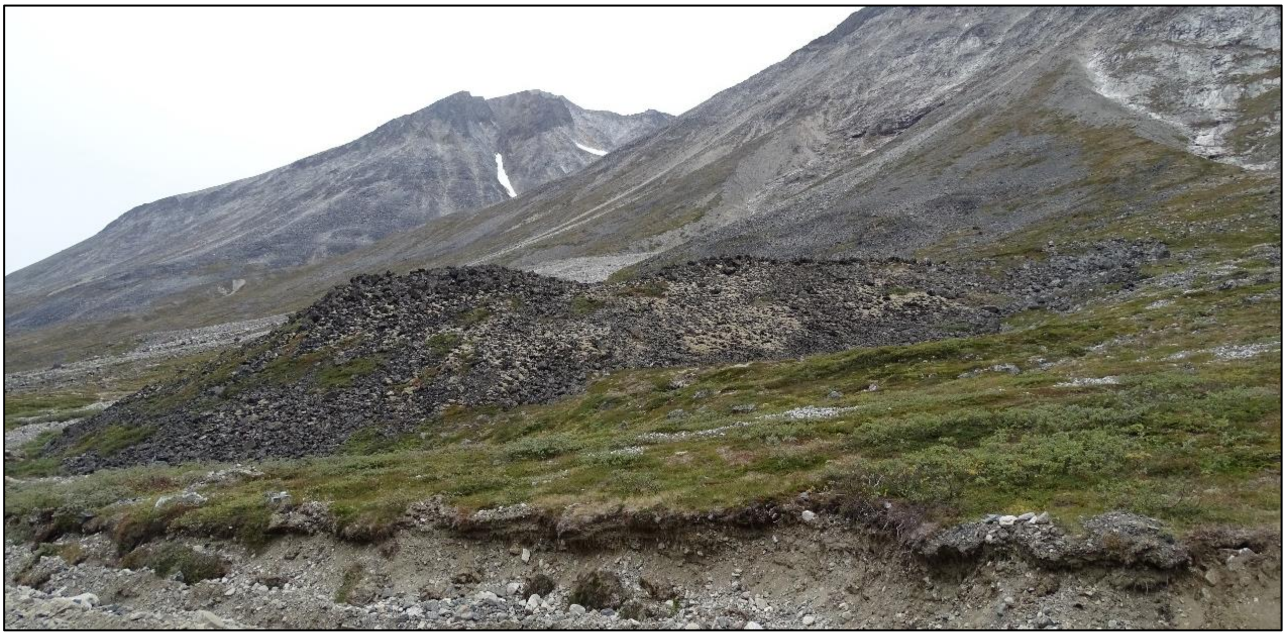


Figure 30: Boulder Field with very limited vegetation near the gravel road between the new and old mining camps.

Vegetation – Conclusions

The general plant communities in the Kirkespir Valley appear typical for those found throughout the Nanortalik region and South Greenland in general, though floral identification to species level has not been undertaken. No plant communities known to be rare, threatened or endangered in Greenland have been found in the Project Area (Orbicon 2019). Any future expansion of the Project footprint would require additional botanical and habitat surveys in order to inform biodiversity loss/gain calculations.

In addition, there is a small community of the Small-White Orchid *Leucorchis albida*, which is the commonest Greenland orchid, in the Upper Valley outside the Project Area (Angel Mining 2009).

The birch forests near Nanortalik have been identified as sites with a high diversity in plant species (Christensen *et al*. 2016).

Fungi and Lichens

Although not systematically searched for, a few species of fungi and lichens was observed in the Project Area, including Arctic Bolete *Leccinum rotundifoliae*. However, it is certain that more species occur. A great variety of lichens occur in the area. Crinkled Snow Lichen *Flavocetraria nivalis* and Reindeer Lichen *Cladonia arbuscala* among others are abundant.

6.10 Terrestrial fauna (mammals and birds)

Mammals

The mammal fauna in South Greenland consists almost entirely of marine species. However, a few terrestrial species of mammals occur in or near the Assessment area.

Based on existing information about the distribution of terrestrial mammals in Greenland. Arctic Fox *Alopex lagopus* and Arctic Hare *Lepus arcticus* are expected to be common and widely distributed in the Assessment Area. Polar Bears *Ursus maritimus* are regular visitors to the Kujalleq municipality, where bears or their footprints are seen most often during April and May. At this time of the year the Polar bears are transported to the district with the multi-year sea ice / drift ice (Glahder 2001).

Muskox *Ovibos moshatus* was introduced in the Assessment area in 2014, as 19 Muskox were taken from Ivittuut and translocated farther south to Nanortalik. Observations in 2017 and 2018 also included calves, but the population is still low and off limits for hunting (https://natur.gl/arter/moskusokse/?lang=en, Christensen et al. 2016). A few animals are also occurring in the Project Area (Orbicon 2019).

No sites of major importance for terrestrial mammals have been identified within the Assessment Area, and there is no knowledge of species of mammals that are rare or threatened in the area, as all naturally occurring species are relatively common throughout southern Greenland.

Birds

The terrestrial and freshwater bird fauna in South Greenland is relatively poor in species compared to arctic regions in other parts of Greenland, Canada, Alaska and Russia (Meltofte 1985, Alerstam *et al.* 1986). For instance, only five species of passerine birds are widespread and common in this part of Greenland.

Based on existing knowledge of birds' distribution in Greenland, at least 25 species of birds are expected to breed, feed or roost in or near the project area. Additionally, part of the sea off South Greenland is of importance to wintering sea birds (Boertmann *et al*. 2004).

The land-living birds in the Kirkespir Valley mainly include species that are generally common and widespread in southern Greenland. There are no species that are rare or threatened and there are no migratory species that are particular to the area or specially protected breeding birds.

The terrestrial bird fauna includes common species of passerines as Northern Wheatear *Oenanthe*, Common Redpoll *Carduelis flammea*, Lapland Bunting *Calcarius lapponicus* and Snow Bunting *Plectrophenax nivalis*. Also, Raven *Corvus corax* and Rock Ptarmigan *Lagopus mutus* are common.

Peregrine Falcon *Falco peregrinus* and White-tailed Eagle *Haliaetus albicilla*, the latter being redlisted in Greenland in 2018 as Vulnerable have been observed in the Project Area (**https://natur.gl/raadgivning/roedliste/1-roedliste/**).

There are no indications of breeding White-tailed Eagles in the Project Area, but it is known that the coastline between Sisimiut and Nanortalik holds the highest concentration of breeding White-tailed Eagles in Greenland (Kampp & Wille 1990).

The Gyrfalcon *Falco rusticolus* occurs throughout Greenland, but the species is not common anywhere. Gyrfalcons nest on ledges on steep cliff sides and primarily feed on large birds such as gulls. The population in South Greenland is mainly sedentary. The size of the Greenland breeding population is estimated to c. 500 pairs. Due to the small population size, Gyrfalcon is evaluated as “Near Threatened” in the regional red list over threatened animals and plants in Greenland (Boertmann & Bay 2018). No breeding sites of this falcon are known from the Kirkespir Valley, but it is possible that the species is an irregular visitor in the area.

6.11 Freshwater Fauna (fish)

There are only two species of freshwater fish in South Greenland: Three-spined stickleback and the Arctic char *Salvelinus alpinus*. Salmon *Salmo salar* is sometimes found in South Greenland fjords but is only breeding in a single river close to Nuuk, where it is considered a saltwater species.

The Arctic char is a habitat generalist found in streams, at sea and in all habitats of oligotrophic lakes throughout Greenland. Arctic char life histories are very variable, both within and between localities. The Arctic char population in Greenland rivers typically consists of resident fish (non-anadromous) and anadromous fish that migrate to the sea during summer when they have reached a certain age.

In winter, most of the Greenland’s rivers are covered by thick ice and the water flow is very restricted. This time of the year, the char spends in the deepest parts of the rivers.

In the Kirkespir Valley, the species is present in both anadromous (migratory and seagoing) and nonanadromous (freshwater resident) forms. The migratory form enters the fjord in May-June and returns to spawn in September (Angel Mining 2009).

In 1988 the Kirkespir River held an Arctic char population of about 5,000 migrating chars and an unknown number of resident chars (Boje 1989) and is likely that the population today is of a similar size. The Arctic char is evaluated as “Least Concern” in the regional red list over threatened animals and plants in Greenland (Boertmann & Bay 2018).

Three-spined stickleback *Gasterosteus aculeatus* is common in West and East Greenland and is known from many locations below 72ºN. It occurs in the marine coastal zone, in brackish waters (e.g. large deltas), in rivers and streams with slow currents and in the littoral zone of lakes. However, sticklebacks spawn only in freshwater and can form migrating coastal populations or stationary populations in streams and lakes.

There are no recordings of Three-spined stickleback from the Project Area, but it is likely to occur in the area. The species is evaluated as “Least Concern” in the regional red list over threatened animals and plants in Greenland (Boertmann & Bay 2018).

6.12 Marine Flora and Fauna

The marine environment of the Assessment Area includes the tidal, ice-free Saqqaa Fjord that joins the Søndre Sermilik Fjord, which together with Tasermiut Fjord form two deep 60-80 km NE trending fjords that extend from the ocean of the Davis Strait (in the southwest) to the Greenland ice cap (in the northeast).

<u>Seaweed</u> *Laminaria sp.*

There are different brown seaweed species, which are found commonly in Greenland waters. Seaweed growing below the tidal zone is often gathered by locals for personal consumption, and seaweed is also sold locally in

Nanortalik during winter (Glahder 2001). However, as seaweed are found commonly in most waters, it is unlikely that locals should seek to the Project Area specifically to collect seaweed.

The most common seaweed in the marine environment is brown seaweed (*Fucus vesiculosus*) that is abundant in Saqqaa Fjord, where samples have been collected as part of the 14 years of environmental monitoring of the former mining industry (Bach & Olsen 2020).

Marine Mammals

At least c. 11 species of whales and seals are potentially present off the coast of South Greenland and may potentially also occur in or near the Assessment area (Glahder 2001, Rosing-Asvid 2010a).

<u>Harbour Seal</u> *Phoca vitulina*

The main distribution in Greenland of this non-abundant species is the West coast south of Sisimiut (67°N). Harbour seals are rare in the Kujalleq municipality. They are encountered on the islands Nordlige Kitsissut and in the mouth of Tasermiut Fjord West of Tasiusaq (Glahder 2001, Rosing-Asvid 2010b). The species is redlisted as Critical Endangered in Greenland (Figure 31).

<u>Ringed seal</u> *Phoca hispida*

In Greenland the Ringed Seal is widely distributed, but few in number along the southwestern coastline and in North Greenland. Ringed Seals are found in low numbers throughout the municipality. They are hunted at the heads of the fjords of Tasermiut and Sdr. Sermilik where they should be rather numerous. The species is also hunted southeast of Nanortalik and in Uunartoq Fjord (Glahder 2001).

<u>Harp seal</u> *Phagophilus groenlandicus*

The Harp seal is a common summer visitor to Greenland from May onwards from the breeding grounds at Newfoundland. Harp seal is the most common seal species in the Kujalleq municipality and is in general hunted everywhere in the Nanortalik district both off the coast and in the fjords. Yet, some places have been pointed out as important hunting grounds, including Saqqaa Fjord (Figure 31).

<u>Bearded seal</u> *Erignatus barbatus*

Bearded seal is distributed sparsely along the coast of Greenland and in the drift ice. Bearded seal should be common in the Nanortalik district (Glahder 2001).

<u>Hooded seal</u> *Cystophora cristata*

In Greenland, the Hooded Seal is missing only in the North. The total population of the Hooded seal is probably increasing. The most important hunting grounds are situated on offshore islands far from the Assessment area (Glahder 2001).

<u>Other marine mammal species.</u> The Mink Whale *Balaenoptera acutorostrata* is found in West and East Greenland along the coast, in fjords and bay areas up to about 72°N. Mink whales should be numerous around Cape Farewell (Glahder 2001).

Sperm Whale *Physetermacrocephalus* is not a common species in the Nanortalik district but may still occur near the Assessment Area. Glahder (2001) describes rare sightings of White Whales Delphinapterus leucas and Nar Whales *Monodon monoceros* in the Nanortalik district. Humpback whales *Megaptera novaeangliae* are becoming more common in the Nanortalik district and are observed in many of the fjords (Glahder 2001).

A pod of Harbor Porpoises *Phocoena phocoena* was observed on several occasions in the fjord near the mining camp in August 2019 (Orbicon 2019).

Marine Birds

Saqqaa Fjord supports a variety of fauna with sea birds such as wintering Brünnich's guillemots *Uria lomvia*, Common eiders *Somateria mollisima* and Long-tailed ducks *Clangula hyemalis*. Also, Mallard *Anas platyrhynchos*, Lesser Black-backed Gull *Larus fuscus*, Iceland Gull *Larus glaucoides*, Glaucous Gull *Larus hyperboreus*, Black-legged Kittiwake *Rissa tridactyla* is seen in the fjord.

The following species of huntable seabirds are likely to occur in or near the Assessment Area (Glahder 2001).

<u>Eider</u> *Somateria mollissima*

In Greenland the Eider breeds along most of the west coast, and it is more scarce on the East coast to 77°N. Eiders from North and West Greenland and birds from high arctic East Canada migrate to wintering grounds in the open water areas in West Greenland, probably including the Assessment area, north to Aasiaat (69°N), and in East Greenland north to 74°N; many winters around Iceland (Boertmann 1994). In the Nanortalik district Eiders are known to breed at the islands of Nordlige Kitsissut which is more than 30 km from the Project Area. There are hunting grounds of some importance in the Assessment Area (Figure 27).

<u>Brünnich's Guillemot</u> *Uria lomvia*

The species is by far the most common and widespread auk in Greenland. The majority breeds in large colonies in the central part of the west coast, but small colonies are found along most of the coast. The Brünnich's Guillemot has declined significantly in numbers in recent decades. A survey in 2004 found no colonies in the Assessment Area (Boertmann 2004). High numbers of Brünnich's Guillemots are wintering in Southwest Greenland. Most of the wintering guillemots stay offshore or near the outer coasts and mouths of fjords, where they feed on small fish. However, guillemots also regularly occur in the fjords between October and April (Mosbech *et al.* 2004). Here, as elsewhere in Greenland, the wintering guillemots are hunted intensively. Hunting grounds also include Saqqaa Fjord in the Assessment Area (Glahder 2001), Figure 31.

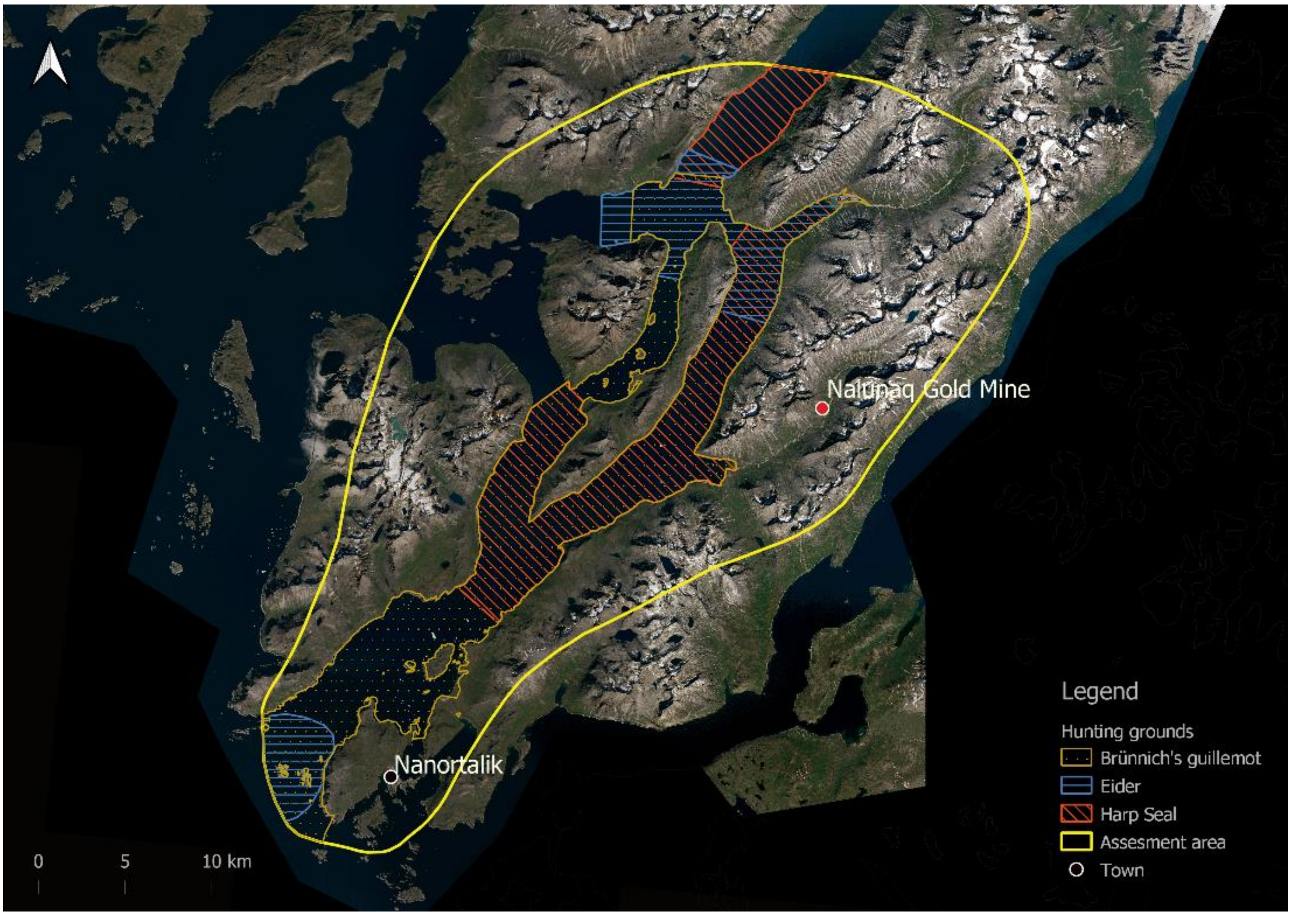


Figure 31: Hunting grounds for Harp Seal, Eider and Brûnnich's Guillemot in the Assessment area (based on Glahder 2001).

Fish

The following saltwater species that are utilized in the fjords of South Greenland, are likely to occur in the marine parts of the Assessment Area (Glahder 2001, Bugge Jensen & Christensen 2003).

<u>The Atlantic cod</u> *Gadus morhua* is common and widespread in Greenland waters, north to Qeqertarsuup Tunua. It occurs down to about 600 m and is found both close to the bottom and pelagic. Atlantic cod is common in fjords in South Greenland.

<u>The lumpsucker</u> *Cyclopterus lumpus* is a common and widespread species that spends most of the year in deep offshore waters. In the late winter the mature part of the stock migrates to shallow water to spawn, and it is then common along the coasts of the fjords in South Greenland.

<u>The Greenland cod</u> or uvak *Gadus ogac* occurs along the coasts and fjords north to Upernavik and is likely to be common in the fjords of the Assessment Area.

<u>The Spotted wolffish</u> *Anarhichas minor* has a wide distribution along the west and east coasts of Greenland but has decreased in abundance in recent years and the population is likely to be very small. It is mainly found in fjords with hard bottom substrates.

<u>Greenland halibut</u> *Reinhardtius hippoglossoides* is distributed along the entire West coast and on the East coast to Ittoqqortoormiit (72°N). The most important fishing grounds in the Kujalleq Municipality are situated around Aappilattoq. In the rest of the district, halibuts are small and few in numbers. The catching possibilities in the northern part of Saqqaa Fjord is uncertain.

Atlantic halibut *Hippoglossus hippoglossus has a* distribution almost identical to that of the Greenland halibut. Today only few and rather small Atlantic halibut are caught in the Kujalleq Municipality.

The capelin *Mallotus villosus* is widespread along Greenland's coasts. It is an ecological key species because of its role as an important food resource for larger fish, seabirds and marine mammals. It is also exploited both commercially and for subsistence fishery. It is likely to occur in the Assessment Area, although no exact data is available.

Redfish *Sebastes spp*. Are confined to deep waters offshore, but are also found in deep fjords, where they occur at 150 – 600m. It is likely to be common in the deeper parts of the fjords in the Assessment Area, although no exact data is available.

The Atlantic salmon *Salmo salar* occurs along Greenland's coast from August to about November, when on foraging migration from the American and European continents. Small numbers may also enter the fjords around Nanortalik. Salmon have been caught in the bay outside the Kirkespir River,

Snow crab *Chionoecetes opilio* is distributed along the West coast of Greenland. Important fishing grounds for crabs in the Nanortalik district have been identified in Tasermiut Fjord and in Saqqaa Fjord, with good quality crabs in the central and northern part of the fjord, and in the Kirkespir bay.

Deep sea prawn *Pandalus borealis* occurs throughout the North Atlantic. In Greenland waters, deep-sea shrimp are found in waters 100 – 600 m deep, mainly offshore, on the slopes of banks but also in the deep fjords. It is likely to be widespread in the deeper parts of the Saqqaa Fjord.

Benthos

South Greenland is poorly studied in terms of benthos, and consequently the knowledge is still relatively limited.

A single benthic survey has been conducted in the fjords of Saqqaa and Uunarto. The study was designed to test for environmental impacts of the previous gold mining in Kirkespirdalen (Glahder et al. 2005). The benthic samples were collected between 200 and 300 m depth in sediment dominated by fine particles.

As is typically found in the deeper parts of Greenland fjords, the benthic fauna was dominated by polychaetes (80% of all specimens). The 5 most abundant species (all polychaetes) found in two fjords near Nanortalik were also common in the Nuuk fjord system, at several stations in Northwest Greenland and in Holsteinsborgdybet, indicating that several species of polychaetes are abundant along the entire west coast of Greenland.

Blue mussel *Mytilus edulis* is a very common mussel in the fjords in the Assessment Area where large numbers are attached to underwater cliffs. Numerous samples of blue mussels have been collected in Saqqaa Fjord as part of the 14 years of environmental monitoring of the former mining industry (Bach & Olsen 2020).

6.13 Threatened Species

The plant communities in the Kirkespir Valley are typical for those found throughout the Nanortalik region and South Greenland in general.

No species known to be rare, threatened or endangered in Greenland have been recorded in the Project Area. However, four species of birds and one mammal species are listed as “Vulnerable” or “Near threatened” in the regional red list of threatened animals and plants in Greenland (Boertmann & Bay 2018) can at least potentially occur in the Assessment Area. Information on these species is summarized in Table 16.

Table 16: Red-listed Birds and Mammals that can potentially occur in the Project Area (Boertmann & Bay 2018).

Species	Status in project area	Main habitat	Greenland red-list status	Importance of Project Area to population
Gyrfalcon	Possible irregular visitor	Inland, coast	Near threatened	Low
White-tailed Eagle	Potential breeding territory	Coastal, inland	Vulnerable	Low-medium
Black-legged Kittiwake	Possible visitor in Saqqaa Fjord	Offshore, coastal, fjords	Vulnerable	Low
Brünnich’s Guillemot	Possible visitor in Saqqaa Fjord	Coastal, offshore, fjords	Vulnerable	Low
Hooded Seal	Possible visitor in Saqqaa Fjord	Coastal, offshore, fjords	Vulnerable	Low
Harbour Seal	Very rare and irregular visitor	Coastal, offshore, fjords	Critically endangered	Very low

6.14 Protected Areas

Greenland is a signee of the Ramsar Convention on projection of wetlands and their biodiversity and has designated 11 areas to be included in the list of Wetlands of International Importance (Ramsar Sites) (Egevang & Boertmann 2001). None of the Greenland Ramsar Sites is situated in the proximity of the assessment area (Figure 32).

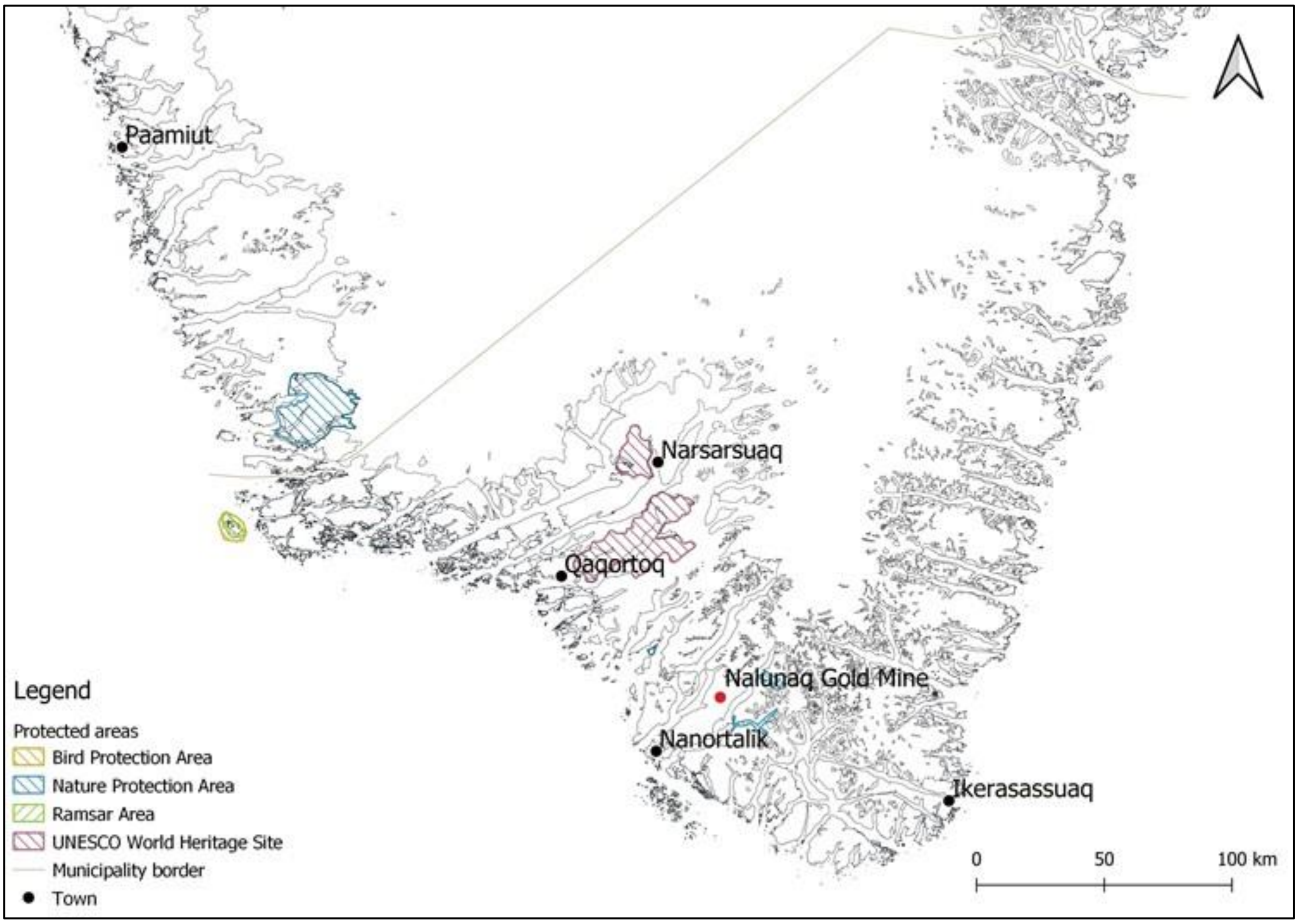


Figure 32: Protected Areas in South Greenland.

A number of nature reserves, and a single national park (the Northeast Greenland National Park), have been designated according to the Greenland nature protection law. This includes a number of sites protected according to national and local regulations. None of these protected areas is located in or close to the Assessment Area.

In addition, part of the island of Uunartoq which is located about 50 km Southwest of Erik Aapplaartup Nunaa peninsula is laid out as a protected area with the aim of protecting the island's unique hot springs, as well as its natural and cultural-historical values.

There are no major seabird breeding colonies or Important Bird Areas near the Assessment Area. The nearest Important Bird Area is the archipelago Kitsissut Avalliit (Ydre Kitsissut located 50 km south-southwest of Ivittur, 70 km west of the settlement Qassimiut and more than 100 km from the Project Area.

Kitsissut Avalliit holds a high diversity of breeding seabirds, including Common Guillemot *Uria aalge* and Razorbill *Alca torda* (Heath & Evans 2000).

A shipbased survey of seabird breeding colonies and 77 seal habitats in Southeast Greenland between Prins Christian Sund and Tasiilaq, including 11 sites between

Nanortalik and Prins Christian Sund, reported no significant seabird breeding colonies or sites of significant importance to seals near Nanortalik (Boertmann & Rosing-Asvid 2014).

6.15 Socio and Economic Setting

Local Use

The Nalunaq Gold Project lies within the area of the Municipality of Kujalleq, and Nanortalik is the nearest town. Nanortalik is the tenth largest town in Greenland and is also its most southerly, being located about 100 km north of Uummannarsuaq (Cape Farewell), the southern tip of Greenland.

There are a number of smaller settlements in the Nanortalik area, of which the more important are Aappilattoq, Narsaq Kujalleq (Narsarmijit), Tasiusaq, Ammassivik, and Alluitsup Paa, together with others with less than 20 inhabitants each.

The primary occupations in Nanortalik are fishing, service and administration. The district around Nanortalik is home to 2,200 people distributed between the town itself, five settlements and several sheep holding stations.

Nanortalik has little productive trade. There are no factories and no largescale fishing activities. Fishing from smaller boats, crab fishing, seal and seabird hunting and tourism provide most of the locally produced revenue. The main harbour is home to a few small fishing boats, and there is a marina type harbour in the old town which provides moorings for a number of private craft which are used for transport, fishing hunting and recreation purposes. Shops are limited but comprise two large and several smaller supermarkets, domestic and electrical goods, clothing and smaller general shops and cafes.

Nanortalik is served by scheduled helicopter services through Air Greenland which use the Nanortalik Heliport. The services currently link Nanortalik with the towns of Qaqortoq, Narsaq, Alliutsup paa and the international airport at Narsarsuaq.

The main employment in the town is provided by public sector in administration of the Municipality and Government services and in publicly owned companies. At present, tourism to the area forms a minor and irregular but still significant part of Nanortalik 's economic life, and cruise ships sometimes of quite large size, visit Nanortalik on a regular basis.

Land use in the Municipality of Kujalleq is unique in Greenland in that quite extensive rearing of sheep is achieved together with some cattle and reindeer husbandry. It is also possible to grow vegetables and produce grass silage as animal feed.

Gathering of mussels, seaweed, sea urchins, berries, herbs etc. is still a supplement to the daily household in many families in Nanortalik (Glahder 2001).

There are only few major hunting or fishing interests in or near the Project area. However, the Kirkespir Valley is to some extent used by local people from Nanortalik and surrounding settlements for gathering of berries and fungi for private households. Some hunting are being carried out in the Saqqaa Fjord, and a few local fishermen also put up their nets in the fjord.

A previous study (Glahder 2001) has shown that the most important natural resources in terms of local use in the vicinity of the Nalunaq project site are: the Arctic char populations living in the three rivers running to the Saqqaa Fjord and in the two fjord areas (i.e. Kirkespir Bay and Kangikitsoq) which are protected until 2003 from pound net fishing; the Snow crab population in the Saqqaa Fjord, possibly with a reasonable size and with a good quality; the spawning Capelin populations in the two bay areas of Kirkespir and Kangikitsoq rivers; flocks of Eiders and Brünnich's guillemots wintering in Saqqaa and adjacent fjords.

However, none of the above-mentioned species or their populations in the Saqqaa area seems to be unique to the Nanortalik district. The Arctic char population in the Kirkespir River and Bay is probably and potentially the most vulnerable animal population in the Saqqaa area because of its proximity to the Nalunaq Gold Project site (Glahder 2001)

Based on experiences from the previous operations it is expected that the Nalunaq Project will be a considerable major employer that will contribute to the Greenlandic and local economy.

6.16 Archaeological and Cultural Heritage

The Kujalleq Municipality and the Nanortalik area are known for the Norse settlements, but there is also evidence that Inuit have used the area intensively for the last several thousands of years (Figure 29). There are registered traces of Thule people in numerous places. The Norse settlement pattern in this part of 'Østerbygden' is different from elsewhere in Greenland because the exposed coastal areas have been utilized, not just the more sheltered valleys of the inner fjords, which are usually preferred.

A number of early investigations have been carried out in the valley (Greenland Museum, 1988). The ruin complexes in Kirkespirdalen (conservation reference numbers 60V2-II-566 and 567) were found and first described by Erik Holtved in 1932, who made a sketchy registration of the area north of the main stream. Ove Bak, a teacher, visited the area in 1968. He discovered a new ruin group, south of the stream. Finally, in 1981, Knud Krogh visited the area because of a plan to extend the local sheep farmers' grazing areas.

A walk-over survey of the project area was undertaken by the Qaqortup Katersugaasivia (Qaqortoq Museum), under the auspices of the Kalaallit Nunaata Katersugaasivia, the Greenlandic National Museum, in 1988 (Berglund & Elling 1988).

In the Kvaerner Feasibility Study of 2002 (Kvaerner E & C 2002), the archeological sites were identified and taken into account in the preliminary design of the infrastructures. No further investigation of the ruins has been carried out and no disturbance of the ruins has occurred due to the previous Nalunaq operations (Angel Mining 2009).On the area of the flat plain within about 0.6 km of the shore of the fjord a total of 24 ruins are found in a southern and a northern grouping (Figure 34). The ruins are of Norse origin and there was no evidence of Inuit or Greenlandic remains. A smaller group of Inuit ruins were located on the North side of the bay, some 500 m from the delta (high tide level). Since these were outside the concession area, and will not be disturbed, they have not been considered further.

The ruins are all very decayed and difficult to identify by the casual observer (Figure 35). However, they still represent a complex of residential and commercial sites with all the 'functions' characteristic of a self-sufficient Norse settlement. Whilst it is not possible to date the settlement without further investigations, it is likely the area was active in the period 1000-1500 CE.

A further investigation undertaken in 1997 (Greenland National Museum, 1997) resulted in the further identification of archaeological relics (Conservation reference numbers 0V2-0II-037 and 0V2-0II-573) in the fjord delta area to the west of the Norse settlements and further relics (Conservation numbers 60V2-0II-038 and 60V2-0II-039) within the Kirkespir valley.

Conservation reference number 60V2-0II-038 consists of a rounded structure believed to be approximately 250 years old. It may be connected with the identified reindeer hunting camp (conservation reference number 60V2-0II-039) of a similar age, located above the waterfall (Figure 36).

In case of project changes that can affect new areas, it will be discussed with Greenland National Museum, if sites of archaeological interest potentially can be affected by the exploration activities, and if specific mitigation measures are considered necessary.

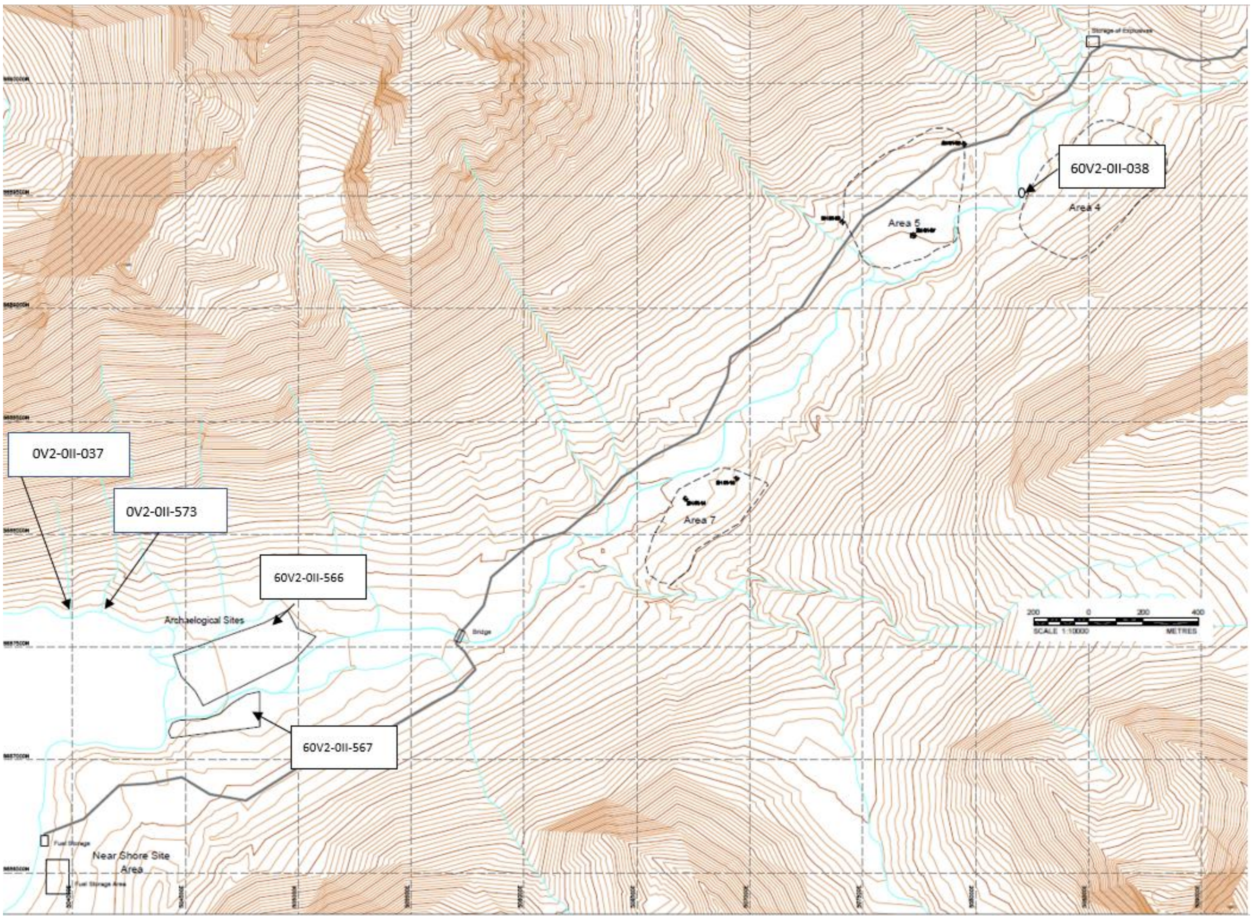


Figure 33: Location of Archaeological Sites relative to Site Layout

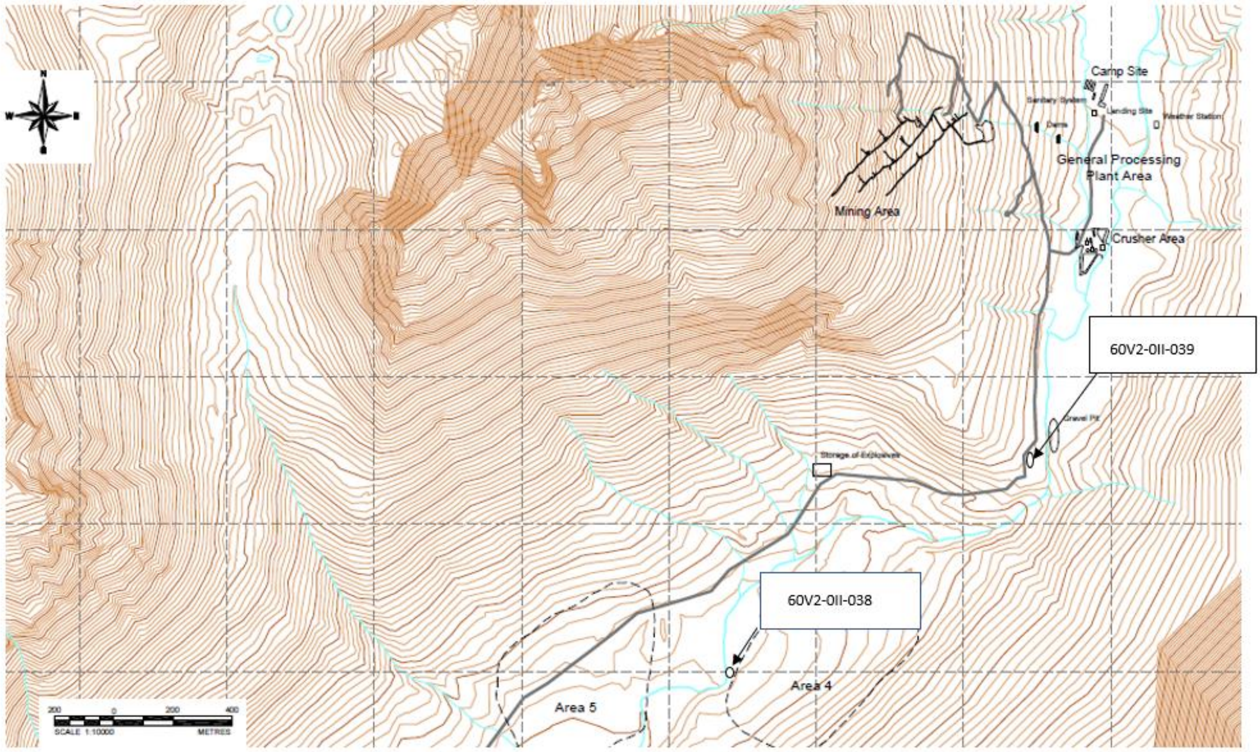


Figure 34: Location of Archaeological Sites relative to Site Layout

Figure 35: Decayed Remains of Ruins of Norse origin in the project area.

Figure 36: Hunting Shelter – Conservation number 60V2-0II-039

7.0 PREVIOUS MINING ACTIVITY

7.1 Mine Operation

Information about the previous mining activities and environmental lessons learnt is taken from Bach & Olsen (2020). The gold deposit at Nalunaq was discovered in 1992 The data gathered on the gold mineralisation in Kirkespir Valley led to many finds of other gold occurrences in the region, and now the area is regarded as a major gold province. The opening of the mine in 2004 was a milestone for Greenland, being the first gold mine and the first new mine to be developed in the country for over 30 years. In April 2003, the mining company Crew Gold Corporation was granted a license to exploit the gold deposit at Nalunaq. The license covered an area 22.21 km² around the mine site.

Phase 1 2004 to 2009: Shipment of ore abroad for further processing

The mine officially opened August 2004. No processing was carried out on site during their tenure, instead broken ore was shipped to Spain and later Newfoundland for processing. The mining included coarse rock crushing on site and stockpiling of ore at the pier area before shipment of the ore. Rising oil prices and shipping costs however made the economics progressively more difficult and the mine closed with the last shipment of ore in March 2009. In total, 8 tonnes of gold was produced during this period (Bach. & Olsen 2020)

Phase 2 2009 – 2014: On site gravity processing and Carbon-in-Pulp (CiP) leaching which included the use of cyanide.

In July 2009, Crew concluded the sale of Nalunaq Gold Mine to Angus and Ross plc (later Angel Mining plc). A new EIA was handed in November 2009 and described the full production of doré in Nalunaq. Ore processing was aimed to be carried out using a combination of gravity processing and Carbon-in-Pulp (CiP) leaching which included the use of cyanide. All process tailings were to be backfilled underground in the previously mined out areas. While acid-generating waste rock was to be deposited underground, nonacid-generating waste rock was to be deposited on the mountain slope at the 300 m and 600 m portal to a maximum of 20,000 tonnes per year. Most of the mining work from 2009 and until the actual production included excavation of a production chamber inside the mine. After initial testing of the gravity separation process, this method was discarded as the actual amount of gold was of a smaller size than what could be recovered by gravity. Angel Mining had the first pour of gold in May 2011. In total 10.5 tonnes of gold were produced (Bach & Olsen 2020)

7.2 Environmental Lessons Learnt

Environmental monitoring was conducted at the former Nalunaq gold mine site from 2004 to 2019 and reported in (Bach & Olsen 2020). The results of the monitoring documented the impact from the mining to the local environment. Already at the first environmental monitoring in 2004, moderate pollution from the mine was documented with elevated concentrations of a few metals (As, Co, Cr and Cu) in lichens. The pollution was associated with the mining activities primarily as a result of dust spreading by wind from rock crushing, waste rock and ore stockpiles, but also as a result of driving on the gravel road. In particular three areas were found affected: I) The pier, where stockpiles of ore was placed before ship loading, II) The camp where processing of ore including crushing took place and the mining area where waste rock was deposited on the mountain slope. III) Down the valley, where waste rock stockpiles were placed. As a result, recommendations were given to minimise the dust pollution. The levels of dust dispersal had their maximum in 2007/2008.

After the restructuring of the mine production in 2009, the pollution decreased. This was a result of the processing of ore (including crushing) taking place underground, and that stockpiles of ore and crushed waste rock were removed from the terrestrial environment. The dust dispersal could then primarily be related to driving on the gravel road.

Upon decommissioning of the mine in 2013, the dust pollution decreased even further and in 2017, four years after mine closure, the levels of elements measured in lichens were at or close to background levels.

In the freshwater system, only slight impact was documented in the Kirkespir River. The river was impacted by drainage from ore and waste rock, and from 2009-2013 by diluted mine wastewater flowing out of the mine potentially containing cyanide residues and elevated levels of elements. Water samples taken at the waterfall station showed no elevated concentrations of elements when compared to Greenland Water Quality Criteria (GWQC) guidelines. The Arctic chars at the site were shown, however, to accumulate some elements, and in particular Cadmium was found at consistently slightly elevated concentrations. It was assessed that the concentrations were too low to cause any harm to the fish or the freshwater system. All measured concentrations in the livers of Arctic char were found at the level of the background concentrations in 2017, four years after mine closure.

Concerning cyanide, no water samples collected in Kirkespir River had documented cyanide concentrations above instrument detection limits. Cyanide is and was not at any time considered to pose any risk to the biota including the Arctic char or to the surrounding environment. The marine environment was monitored by analysing mussels, seaweed and livers from sculpin fish. An impact to the marine environment could be the result of increased element concentrations carried to the marine environment by Kirkespir River and/or activities related to dust dispersal from stockpiling at the pier area and ship loading of ore in 2004-2009. While the mussels showed no elevated element concentrations, sculpin livers and in particular seaweed samples had slightly elevated or elevated element concentrations. In particular, Copper concentrations were found to be elevated in seaweed during 2010-2013. It was primarily the stations around the Kirkespir River mouth that were impacted. Therefore, it was assessed that the marine impact was related to accumulation of elements most likely originating from the mine wastewater brought to the marine environment by the river.

Four years after mining, in 2017, the element concentrations in seaweed and particular Copper were still slightly elevated. The concentrations are, however, assessed to pose no risk to the biota and it is likely that the concentrations will decrease with time. Overall, DCE assesses the current environmental impact from the former mining activities to the environment at Nalunaq as insignificant and that no further actions are needed to reduce the environmental impact.

Consequently, DCE considers the Nalunaq gold mine to serve as an example of how adequate environmental requirements together with detailed environmental monitoring and regulation can result in a mine operation in Greenland with minimum environmental impact.

7.3 Management of Historic Mine Residues

There is an area of historic tailings deposition within the mine contained behind a bulkhead in the Target Block. In addition, there is an area of waste rock deposited in the vicinity of the 300 level portal.

With regard to the tailings the confining bulkhead will be monitored during operations and entry to the tailings area will be restricted to prevent accidental disturbance, The existing waste rock area has been demonstrated through post closure monitoring to present no significant risk to the environment however its ongoing impact will be monitored through the sites Environmental Monitoring Plan.

8.0 IMPACT ASSESSMENT METHODOLOGY

8.1 Introduction

The Environmental Impact Assessment (EIA) has been undertaken in compliance with the Terms of Reference (ToR) for this project (Orbicon-WSP 2021). The ToR identified the key environmental issues to be investigated and assessed in the EIA report, as well as the environmental studies required to compile the required data (see Chapter 4.3).

8.2 Impact Assessment Methodology and Structure

Consistent with the *Guidelines for preparing an Environmental Impact Assessment (EIA) report for mineral exploitation in Greenland* (Mineral Resources Authority, 2015) and in order to best present the environmental data and the assessment of potential environmental impacts, this report has been structured to consider Project impacts associated with each of the environmental factors set out below:

- Physical Environment.
- Atmospheric Setting.
- Living Environment.
- Local Use.
- Archaeology and cultural heritage

For each of the environmental factors, the assessment has considered <u>disturbance</u> aspects and <u>pollution</u>. The assessment has been structured to consider (if relevant):

- Existing environment.
- Potential impacts (including cumulative).
- Assessment of impacts.
- Mitigation.
- Predicted outcomes.

8.3 Assessing the Impact Significance

The assessment of the predicted outcomes considers, for each potential impact, the spatial scale of the impact, the duration of the impact and the significance of the impact.

<u>Spatial scale</u>

The spatial scale classes used in this EIA are listed in Table 17.

Table 17: Spatial Scale Classes used when assessing Potential Impacts.

Spatial Scale	Status
Project Area	Direct disturbance by the Project, i.e. confined to the mining activities, the infrastructure and the very close vicinity of the Project
Assessment Area	Project area and surrounding area – see Figure 4-1
Regional	From 10 to 100 km from the activity
National	Greater than 100 km.

Duration (reversibility)

Duration means the time horizon for the impact. Duration also incorporates the degree of reversibility of the impact, i.e., to what extent the impact is reversible, ranging from completely reversible to irreversible (Table 18) defines the classes used in this EIA.

Table 18: Duration Classes used in the EIA.

Duration of Impact	Status
Short Term	The impact will last for a short period without any irreversible effects
Medium Term	The impact will last for a period of months or years but without permanent effects or irreversible effects
Life of Mine	The impact will last for the life of the Project
Long Term	The impact will potentially go beyond the life of the Project

Significance of the impact

Significance describes how severe the impact is. Table 19 defines the classes applied in the EIA.

Table 19: Significance used in the EIA.

Significance	When concerning pollution	When concerning disturbance
Very Low	Very small/brief elevation of non-toxic contaminants in local air/terrestrial /freshwater/marine environments	Decline/displacement of a few (non-key) animal and plant species and/or loss of habitat in part of the Project area.
Low	Small elevation of non-toxic contaminants in local air/ terrestrial/freshwater/ marine environments	Decline/displacement of a few key animal (such as Red-listed) and/or plant species and/or significant loss of habitat in Project area.
Medium	Some elevation (above baseline, national or international guidelines) of contaminants, including toxic substances, in local or regional air /terrestrial/ freshwater/marine environments	Decline/displacement of key animal and/or plant species and/or loss of habitat in Assessment area (i.e., also outside Project area).
High	Significant elevation of contaminants, including toxic substances, (above baseline, national or international guidelines) in local and regional air/terrestrial/freshwater/ marine environments	Decline/displacement of key animal and/or plant species and/or loss of habitat at Regional or National level.

9.0 IMPACT AND MITIGATION IN THE CONSTRUCTION PHASE

Environmental risk assessments are presented in chapter 12.

9.1 Physical Environment

The potential impacts from the Construction Phase of the Project on the physical environment have been identified as:

- Landscape alterations and visual impact.
- Erosion.
- Increased noise.
- Light emissions.

9.1.1 Landscape Alterations and Visual Impact

Visual impact on the landscape is an unavoidable part of a mining project and cannot be eliminated by mitigation measures. In the Construction Phase the most significant alterations will be visual impacts from machines and vehicles working in the landscape, visual impacts from temporary working areas and construction sites and vessels bringing personnel and equipment to and from the port facility.

In addition, constructing the foundations for the tank farm, ore stockpiles, processing facility, tailings storage facility, camp and other buildings and maintenance of the road connecting the camp complex and the mine area may require some re-profiling of the landscape.

Overall, the project will cause insignificant but long-term landscape alterations within the Project area.

Construction activities associated to some of the Project's components, for example the camp and port facilities will be visible from the fjord but will not be visible from Nanortalik or any other Greenlandic town or settlement.

As all activities are taking place in a sparsely populated large-scale landscape, the visual impact and impact from landscape alterations is assessed to be low in the Construction Phase of the project.

<u>Mitigation</u>

As activities in the Construction Phase is almost exclusively restricted to areas already affected by previous mining activities, no specific mitigation measures to minimize visual impact or landscape alterations in the Construction Phase is considered necessary.

9.1.2 Erosion

In this context erosion is defined as transport of soil, sand and gravel by the forces of water, ice or wind.

Generally, erosion is not expected to be an issue in the Construction Phase of the Project, as most construction works will take place in areas with consolidated rock. There are very limited clay or soils in the Project area as a result of the local geology and recent glaciation, and the impact due to erosion is assessed to be low in the Construction Phase of the project.

<u>Mitigation</u>

To minimize the risk of erosion and sediment transport associated with the development of the foundations the tailings storage facility beams will be constructed to divert the runoff from Nalunaq Mountain into collection channels which will be constructed in sequence with the expansion of the tailings facility over time. Other activities during the Project's operations are not expected to cause significant erosion. By taking erosion into account when constructing the DTSF, activities during the Project's operations are not expected to cause significant erosion.

9.1.3 Noise

During the construction phase significant noise will be generated by mobile equipment used in connection with excavations and construction of foundations for the camp and related facilities near the Saqqaa Fjord, as well as the processing plant, ore pads and a Dry Tailings Storage Facility in the Kirkespir Valley. Activities during the construction phase of the Project will result in an increase in the ambient noise level near several project facilities, in particular the processing plant and along the haul road.

Overall, the noise footprint for the Project's construction and operation phases will be small, short term and limited to the Kirkespir Valley and the inner part of the Saqqaa Fjord.

No blasting is expected to take place outside of the mine. Grading will take place in all key project areas to prepare level surfaces for various purposes.

Ship traffic associated with the construction will increase noise levels in the town of Nanortalik and may increase noise in the marine environment. However, due to low vessel speed and the distance from the Port to Nanortalik, the average noise from vessel movements will be below the 35 dB(A) Danish guideline for night-time noise in residential areas.

Overall, the noise impact during construction is expected to be low.

Mitigation

As the noise impact during the Construction Phase is expected to be low, short term and within legal requirements, no specific mitigation measures to reduce impact from noise is expected to be necessary.

Light emissions

Construction activities will take place day and night year-round. In periods of darkness, the construction areas will be illuminated. The consequences of such "ecological light pollution" where artificial light alters the natural light regimes in ecosystems are generally not well known.

The serious consequences of light in otherwise dark areas, such as the attraction of migratory birds and the risk of collisions with tall-lighted structures are well described; however, since artificial light will mainly be required during the winter months when almost no bird migration takes place, this is not expected to be a significant impact.

As all construction activities are taken place in a sparsely populated large-scale landscape, the impact from light emissions in the Construction Phase is assessed as low.

Mitigation

As the impact from light emissions during construction will be low, no specific mitigation measures will be necessary in the Construction Phase.

9.2 Air Quality

Baseline levels of dust and gaseous emissions have not been monitored in the Project area but since only very small and widely scattered settlements are present in South Greenland and the nearest town (Nanortalik) and settlement (Tasiusaq) is more than 33 and 18 km's away respectively, they are assumed to be very low.

- During the Construction Phase, the Project will generate dust which has the potential to result in increased annoyance and loss of amenity to local human receptors and potential impacts on sensitive vegetation.

- During the Construction Phase, the Project will generate gaseous air emissions primarily from exhaust emissions (oxides of nitrogen, oxides of sulphur, black carbon and polycyclic aromatic hydrocarbons (PAH)) which have the potential to reduce air quality.
- Construction of the Project will produce greenhouse gas (GHG) emissions from the combustion of diesel in mobile and stationary equipment. GHG contribute to unnatural global warming.

9.2.1 Dust

Dust from earlier mining activity 2004 to 2009 is described in Bach & Olsen (2020): "The terrestrial environment was impacted by a moderate pollution of the elements arsenic (As), cobalt (Co), chromium (Cr) and copper (Cu) dispersed as a result of dust spreading by wind from crushing of ore, waste rock and ore stockpiles, but also as a result from driving on the gravel road. Recommendations were given to minimise the dust pollution. After the restructuring of the mine production in 2009, the pollution decreased. This was a result of the processing of ore, including crushing, being placed inside the mountain, and that stockpiles of ore and crushed waste rock were removed from the terrestrial environment. The dust dispersal was then primarily related to traffic on the gravel road. Upon decommissioning of the mine in 2013, the dust pollution decreased even further and in 2017, four years after mine closure, the levels of elements measured in lichens were at or close to background levels."

It has been found that deposited dust does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), from the source of dust and it is commonly accepted that the greatest impacts will occur within 100 m of the source, with the potential for travel up to the 400 m. Deposited dust from roads usually occurs up to 50 m from the road.

As the nearest settlement is located approximately 18 km from the Site and there are no settlements within the 400 m dust deposition area there will be no dust impacts on the local community. There is the potential for dust deposition from construction to impact on tundra vegetation via the coating of leaves with dust. Dust deposited on vegetation might also have an impact on mammals and birds that feed on the affected vegetation such as Arctic Hare and Ptarmigan.

In the construction phase, potential dust generating sources include the following:

- Construction of foundations.
- Road grading,
- Material loading,
- Hauling of waste rock to build foundations and ore pads outside Nalunaq Mountain and pads near the processing plant
- Travelling on unpaved roads
- Wind erosion from exposed areas.

Due to the very limited area likely to be impacted by the dust (<400 m), the emissions have not been quantified as the majority of the dust will deposit within the Site boundary or very close, resulting in very limited off- Site impacts. Experience from other mines suggest that dust mobilised by mine trucks when hauling material on the un-sealed haul roads will most likely be the main dust source. However, since the speed of the mine trucks will be low and within the mine speed limit, the amount of dust generated during haulage is expected to be low. Furthermore, as the haul roads will be constructed from locally sourced gravel the composition of the dust particles will be similar to the road construction material.

Emissions from construction activities will be limited to the one-year construction period. Since the impact of dust is expected to be mainly limited to a narrow area along haul roads and around the mine area (where there are no settlements and which birds and animals will most likely avoid) and the dust management procedures in the EMP will be adhered to, the overall significance is assessed to be very low.

Mitigation

The procedures to manage dust impacts will be outlined in in the Environmental Management System (EMS). Dust management during the limited duration construction period will include water spraying during dry periods, visual inspections of dust levels and adherence with the site speed limit to limit the resuspension of dust.

9.2.2 Gaseous Emissions

During the Construction Phase, diesel powered mobile equipment and stationary power generation will produce gaseous emissions which include oxides of nitrogen and oxides of Sulphur. Black carbon and polycyclic aromatic hydrocarbons (PAH) are also produced if incomplete combustion of diesel fuel takes place. This will increase air emissions in the Project area during construction.

The very low background levels of gaseous emissions in the Project area and the relatively small number of diesel combustion sources emissions from Nox and Sox implies that it is unlikely that the Greenlandic (or EU or Canadian) ambient air quality assessment limit criteria will be exceeded. By limiting the amount of fuel combusted and by use Best Available Technology (BAT) equipment as much as possible, the air emissions generated by the Project are assessed to be very low.

The mobile equipment and diesel generators will be composed of used and new units and will be serviced according to the manufacturer's guidelines. Incomplete combustion of diesel fuel is therefore unlikely to take place except for very shorts periods of time. The potential impact of black carbon and PAHs from the Project has therefore been assessed as very low.

Mitigation

As the gas emissions during the Construction Phase is expected to be low and in compliance with legal requirements, due to use of as much as possible of BAT throughout the Construction Phase, no specific mitigation measures to reduce emissions in the Construction Phase is expected to be necessary.

9.2.3 Greenhouse Gas Emissions

Construction of the Project will result in increased greenhouse gas emissions which may contribute to climate change. The combustion of diesel produces emission of various greenhouse gases (GHG); including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). However, since CO_2 emissions in the context of the project are expected to contribute with 99% of the total GHG emissions, only the contribution of CO_2 has been included in the following.

The emissions sources considered for this assessment are 1) Mobile combustion: including emissions due to diesel combustion in mobile sources, 2) Stationary combustion: including emissions generated due to fuel consumption for power generation. The total annual site diesel fuel requirement in the Construction Phase is estimated to 2,54 million liters.

Using an emission factor for Diesel Fuel Arctic (DFA) of 72.00 kg CO_2-emissions/GJ, a heating value of 43.5 GJ/tonnes and a density of 0.8 kg/l, a total of 6,400 tonnes CO_2 emissions per year is estimated for the land activities.

The annual CO_2 emissions from energy production in Greenland were 523,963 tonnes in 2015 (Grønlands Statistic 2019). In the Construction Phase, the main sources are: 1) Mining equipment, 2) Construction of the processing plant, 3) Construction of the camp and associated facilities and 4) Mobile equipment.

In total, the Construction Phase will increase Greenland's yearly greenhouse gas emissions by 1,2 % per year.

Due to the very limited shipping activity, the annual CO_2 emissions from shipping to and from the mine site in the Construction Phase has not been calculated for the vessels that will be used for the shipping. It is expected that the vessels that will bring oil and supplies to the project will be the same that are already servicing towns along the Greenland coasts, such as Royal Arctic Line. The additional emissions from entering the project port will therefore be small.

The annual emissions from flight have not been calculated, as it is expected that only very little transport to and from the mine area will be by air.

Shipping to the mine will occur year around, as the Saqqaa fjord is free of ice, and the project is carried out far away from the icecap. Against this background, the climate impact from Black Carbon due to shipping to the project is assessed to be very low.

Mitigation

As the greenhouse gas emissions during the Construction Phase are expected to be low, based on BAT in Greenland and in compliance with legal requirements, no additional mitigation measures to reduce emissions in the Construction Phase is expected to be necessary.

9.3 Water Environment

Rainwater and water from melting snow from Nalunaq Mountain in spring will be diverted away from the DTSF pad to avoid contact and potential enrichment in metals and other pollutants from the tailings. This will be done by constructing collection channels in sequence with the expansion of the DTSF pad. The non-contact water is directed towards the Kirkespir River.

The Hydrological and Hydrogeological Study by Golder (2021e; Hydrological and Hydrogeological Study Technical Background Report, 27 January 2021. Report ref: 20136781.613.A.0) has established that infrastructure in the Nalunaq Valley need to be elevated above the 1:1000 year event, thereby considerably reducing the risk of flooding for the DTSF and process plant areas. Additionally, protection against the probable maximum precipitation have also been planned. Diversion of incident water from various infrastructure will take place mainly on the Nalunaq Mountain to keep runoff water from contacting the DTSF.

Process water, mine water and drainage from the lined DTSF will pass through a sedimentation basin before being discharged to the river via a weir and a single sampling point where frequent samples will be taken and analysed for content of heavy metals.

Sewage from the camp and mine facility will be collected and treated in a sewage treatment plant before being discharged to the fjord. A holding tank will be installed upstream of the sewage treatment plant allowing shorter stops for maintenance and repair of the treatment plant. Slurry from the treatment plant will be burnt in the incinerator facility.

The impact on the water environment and freshwater quality etc. due to hydrological changes is considered low in the Construction Phase of the project.

Accidental spill of oil, diesel fuel and chemicals from the processing plant pose a significant risk to the water environment as probability and consequences are high without mitigation, see also section 9.5.

Mitigation

Oil absorbents and floating barriers will be stored at relevant sites on land.

The sedimentation basin through which water from the process plant, the DTSF and the mine is handled can be closed off and will have a capacity large enough to hold the water back until accidental spill has been cleaned up and removed.

Training in handling oil and chemical spill will be conducted regularly. Special refueling stations designed to prevent oil spill from entering the water environment will be established.

Some of the mitigation actions have already been assessed and implemented through the design of the infrastructures and according to the flood risk assessment by Golder (2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0)).

9.4 Living Environment

In the Construction Phase, potential impacts on the living environment include:

- Disturbance of animals due to noise and visual impacts, for example from machines, vehicles, working personnel and underwater noise from shipping to and from the Project Area;
- Temporary or permanent habitat loss due to the footprint from construction of infrastructure or establishment of working areas and construction sites.

9.4.1 Disturbance

During the Construction Phase, equipment and building materials will have to be transported from the harbor area and the camp to the mine area. This is likely to result in an increased disturbance along the road between the new main camp and the mine area.

Noise from mobile and stationary equipment, which can be heard at a significant distance, has the potential of startling mammals and birds. Also, visual disturbances from personnel, machinery, vehicles, buildings and other project structures might cause mammals and birds to avoid utilising habitat in and near the mine area, roads and camps. This includes all phases of the project.

Outside the areas where construction activities are taken place, noise and visual disturbance will cause only localized disturbance. To minimize disturbance in these areas, the movement of staff members will be restricted outside the construction and mining areas.

The Red-listed White-tailed Eagle or Peregrine Falcon may breed high on cliff faces and are not likely to be affected by Project activities in the Construction Phase. Since few birds and mammals will be directly affected by the mining activities and because very large areas of similar habitat are widespread in the region, the disturbance impact of terrestrial mammals and birds is assessed as low.

Most of the cargo during the Construction Phase will be delivered by vessels and barges. It is estimated that approximately 50-75 trips of barges from Nanortalik or Qaqortoq will be carried out to bring the cargo to site during the Construction Phase.

Significant disturbance of seabirds will not occur, as no known important foraging, wintering or moulting areas for seabirds will be affected by shipping in the Construction Phase. Also, there will be no impact due to disturbance on benthos or marine vegetation.

Marine mammals occurring close to the Project area or in the marine waters between Nanortalik or Qaqortoq and the mining site can potentially be disturbed by shipping to and from the Project port. Underwater noise from ships can have undesired effects on marine mammals (and other organisms), and if the noise spectrum overlaps with the hearing sensitivity of a marine mammal, it can impact communication, navigation and change behaviour.

Artic Char populations were analysed following decommissioning of the mine in 2013, cadmium was found at consistently slightly elevated concentrations. It was assessed that the concentrations were too low to cause any harm to the fish or the freshwater system. All measured concentrations in the livers of Arctic char were found at the level of the background concentrations in 2017, four years after mine closure.

Only few species and individuals of marine mammals are expected to be present along the shipping route. Given the very limited number of operations and the extent of comparable marine habitat in the surroundings, the impact on marine mammals due to underwater noise is assessed to be low.

Mitigation

Given that only few species and individuals of marine and terrestrial mammals are expected to be present in the area and along the shipping route, no specific mitigation measures are needed for the Construction Phase.

9.4.2 Habitat Loss

Construction of the Project may potentially modify hydrological processes and freshwater habitats, as a smaller river is expected to be redirected as a mitigation measure, as described under the project description. However, as habitat loss and disturbance of freshwater fauna and flora mainly is associated with the Operational Phase, this will be assessed in the next chapter.

The Camp Facilities will be located near the fjord. Under Angel Mining, it was located outside of the Mine Area, where Nalunaq A/S is planning to build its process plant and DTSF. The area in which the new Camp Facilities will be placed is already influenced by previous operations, notably the beach landing, the jetty, the fuel storage area and the current exploration camp.

With respect to the processing facilities, Nalunaq A/S intends to locate the crushing, grinding, gravity, flotation, thickening, tailings filtering and a gravity concentrate smelting facility where the old workshop was located, under a building.

The loss of vegetation and terrestrial habitat due to construction of infrastructure or establishment of working areas and construction sites will be long term but will only affect small areas and low numbers of terrestrial birds and mammals.

There are no nature protection interests in these areas, and the additional footprint resulting from the new mine project is expected to be very limited. Overall, the impact on flora and fauna due to habitat loss is assessed to be low.

Mitigation

Given the minimal additional footprint from the mining activities and that no particular nature protecting interests are present in the respective areas, no specific mitigation measures to minimize habitat loss in the Construction Phase is needed.

9.5 Contamination of Environment

Project activities in the Construction Phase can potentially cause direct contamination of terrestrial, freshwater or marine habitats as a result of accidents in connection with transport, storage and handling of hazardous materials such as fuel and chemicals.

The most serious contamination of habitats would result from a hydrocarbon spill. Contamination of the surface soil and vegetation by oil or other hazardous materials potentially poses a risk to animals, plants and their habitats, as hydrocarbons can have toxic effects.

The likelihood of a major spill occurring on land during construction work is low. During construction, only small spills are more likely to occur, and the effects will be localized and comparatively easy to remediate. However, although the effects of an oil spill on land are likely to be small, the consequences for the vegetation can be long lasting, stretching into decades. This is because oil is toxic to plants and Arctic flora has very slow growth rates. Because spills on land typically affect small areas only, it will normally be easy to prevent terrestrial mammals and birds from being exposed to the spills.

The environmental impacts of fuel and chemical spills on land are assessed to be confined to the Project Area (local scale). The potential loss or depletion of terrestrial habitat due to contamination is considered low.

On land. the areas of the highest spill probability are at the mine and camp sites when mobile equipment (mine trucks, excavators, etc.) are refuelled. The causes can be human failures, malfunctions of valves, rupture of hoses, etc. The consequences are generally low, as the quantities of spilled oil in such an event are usually smaller.

Accidents in connection with transport, storage and handling of building materials such as fuel, grease, paint and chemicals can potentially cause contamination of nearby freshwater bodies. Contamination of lakes and rivers by oil or other hazardous materials from Project activities could potentially pose a risk to animals, plants and their habitats. Hydrocarbons, such as jet fuel and Arctic diesel, can have toxic effects. Since most oil spills are usually small the impact will mostly be small. The impact will potentially be worst in summer when running melting and rainwater can disperse a spill.

During construction, approximately 2,54 million liters diesel fuel will arrive to the port site each year in tankers. An unloading accident or a major shipping accident, such as a tanker collision or grounding could give rise to major spills of oil in the marine environment. Due to tidal currents in the fjords, oil leaked to the marine environment may be transported over long distances quickly. Other hazardous materials such as grease, paints and chemicals will also be shipped to the project port but in much smaller quantities.

Potential impacts of marine oil spills include marine and shoreline fouling. The consequences to the marine life, including birds, may be significant. Most spills are likely to result from routine operations in connection with loading, discharging and bunkering. However, the ships that will call in at the mine port will not be bunkering, and only diesel will be unloaded. If diesel is spilled in the port, the amount will typically be small and localized. The impact on marine life will also be local and the diesel can be removed using the oil spill combat equipment available near the port.

An accident at sea leading to a spill of heavy fuel oil will be serious and could potentially have major negative consequences for the environment, especially for the area’s seabirds. However, the risk for a significant spill of heavy fuel oil during shipping is assessed as very small, as all ships will comply with national and international regulations.

Due to the limited fuel storage the likelihood of a major accidental oil spill occurring on land or into local freshwater resources or the marine environment is low.

Mitigation

The water quality in the Project Area must, also in the Construction Phase, be continuously monitored, and it will therefore be immediately detected, if the water contains pollutants. However, the risk of pollution is very low, as no activities in the Construction Phase will generate heavy metals or other pollutants. Therefore, no specific mitigation measures are expected to be applied for the Construction Phase.

Sewage from all buildings will be treated in the sewage treatment plant before the effluent is discharged to the sea. Overall, the sewage treatment plant has a very stringent effluent guideline, and the discharge of water from the project to the sea is assessed to have negligible impact on marine life in nearest surroundings. To reduce the risk of operational spills of fuel and other hazardous materials in the sea and in the port, the following mitigating measures must be implemented:

- Follow recommendations in Navigational Safety Survey including comply with the International Maritime Organization (IMO) Polar Code;
- Proper procedures for loading and unloading ships must be in place;
- Properly dimensioned equipment for combating operational spills must be available, including containment booms available for berthed ships;
- Oil spill kits on site.

There must be contingency plans and procedures, for detecting and combating operational spills in place, including procedures for operational spills in sea ice. Regular training must take place to ensure readiness for emergency response to an incident of this nature. Planning must include winter and summer response procedures and training.

All ships must comply with national and international laws, regulations and agreements, including the IMO Polar Code for navigation and shipping in arctic waters and also, the requirements on having and using a certified pilot or crewmember onboard which has documented and approved experience and qualifications in controlling the ship and navigating in the Greenland territorial sea and continental shelf area.

To reduce the risk of operational spills of fuel on land and into freshwater bodies the following mitigating measures must be implemented:

- Low speed limits to reduce the risk of traffic accidents involving fuel tankers and avoid road transport when weather conditions are difficult (slippery roads);
- Strict procedures for handling of oil and equipment to minimize risk of oil spill;
- Training in handling oil and chemical spill; and,
- Fuelling stations shall be situated so spill of fuel cannot enter the water environment.

The procedures to prevent spill of oil and contamination with other pollutants must be outlined in more details in the Environmental Management System (EMS) that will be prepared before construction works commence at site.

It must include commitments and management measures that the mining company will implement to ensure the project risks, including oil spills, are managed to an acceptable level. The procedures in the Construction Phase will be the same as in the Operational Phase.

9.6 Introduction of Invasive Non-indigenous Species with Ballast Water

Vessels berthing at the Project port during the Construction Phase of the project will discharge ballast water before loading cargo. The ballast water can contain non-indigenous species that could potentially establish themselves in Greenland waters. Such species can potentially become a threat to indigenous species and local ecosystems.

The BWM Convention aims to prevent the potentially devastating effects of spreading harmful aquatic organisms carried by ships' ballast water. The BWM requires all ships to implement a Ballast Water and Sediments Management Plan. All ships are required to carry out ballast water management procedures to a given standard. To minimize a potential introduction of non-indigenous species, the mine company require all skips that berth at the port to follow the regulations of the BWM Convention. Provided that vessels arriving at the jetty follow BWM regulations, the risk of introducing invasive non-indigenous species with ballast water is very low.

Mitigation

Provided that the Project port follows the BWM regulations, no additional mitigation measures are necessary.

9.7 Land Use and Cultural Heritage

For safety 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 during the Construction Phase. However, there is only limited traditional use of natural resources in the land area in Kirkespir Valley. Except for the Project port area, the marine area off the project area will remain open for subsistence fishing, harvest and recreational use.

Construction works and mining activities can potentially disturb heritage sites. To localise sites in the Project area, Qaqortoq Museum surveyed the area in 1988 and discovered several important findings in the area.

However, none of the described ruin complexes have been affected by the earlier mining activities in the area (Angel Mining 2009). As the footprint of the Nalunaq Gold Project will not include new areas of potential archaeological interest, no impact on cultural heritage is expected during the Construction Phase of the project.

Mitigation

Whenever possible and relevant, 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.

10.0 IMPACT AND MITIGATION OF OPERATIONAL PHASE

Environmental risk assessments are presented in chapter 12.

10.1 Physical Environment

The existing topography, geology and climate in the Nalunaq area is described in Chapter 6. In this chapter potential impacts to the physical environment during the Operational Phase is discussed and assessed.

The potential impacts from the Operational Phase of the Project on the physical environment have been identified as:

- Landscape alterations and visual impact
- Erosion
- Increased noise
- Light emissions
- Risk of pollution

10.1.1 Landscape Alterations and Visual Impact

In the Operational Phase maintenance of the road connecting the camp complex and the mine area and the haul roads for transporting waste rock to expand the foundation for the dry tailings deposition and for hauling ore between the ore pads outside Nalunaq Mountain and the pads near the processing plant, will probably require some additional re-profiling of the landscape.

Some of the mine facilities including the tank farm, camp and jetty will be visible from the Saqqaa Fjord. However, as the nearest settlement - Tasiusa – is 18 km away in another fjord-system, the landscape alterations will not be visible from Greenlandic towns or settlements.

Mitigation

As visual impacts due to landscape alterations is not visible from Greenlandic towns or settlements, no mitigation measures are expected to be required.

10.1.2 Erosion

There are limited gravel and soils in the Project area as a result of the local geology but a number of operational activities in the Kirkespir Valley have the potential to lead to erosion. These comprise the construction and maintenance of foundations for the dry tailings storage facility.

Mitigation

To minimize the risk of erosion and sediment transport associated with the development and maintenance of the foundations the tailings storage facility beams will be constructed to divert the runoff from Nalunaq Mountain into collection channels which will be constructed in sequence with the expansion of the tailings facility over time. Other activities during the Project's operations are not expected to cause significant erosion. By taking erosion into account when constructing the DTSF activities during the Project's operations are not expected to cause significant erosion (Golder 2020).

10.1.3 Noise

Activities during the operations phase of the Project will result in an increase in the ambient noise level during the daytime and nighttime near several Project facilities, in particular the processing plant and along the haul road.

Overall, the noise footprint for the Project's operation phase will be small and limited to the Kirkespir Valley and the inner part of the Saqqaa Fjord.

Mitigation

As the impact from noise is limited to the Kirkespir Valley and the inner parts of the Saqqa Fjord, no specific mitigation measures are expected to be required.

10.1.4 Light Emissions

Operational activities resulting in light emissions will take place day and night, year-round at the mine and processing plants. In periods of darkness, many areas will be illuminated. The consequences of such "ecological light pollution" where artificial light alters the natural light regimes in ecosystems are generally not well known.

The serious consequences of light in otherwise dark areas, such as the attraction of migratory birds and the risk of collisions with tall-lighted structures are well described; however, since artificial light will mainly be required during the winter months when almost no bird migration takes place, this is not expected to be a significant impact of Project activities.

Mitigation

As there are only little consequences of light emissions during the operational phase, no particular mitigation measures are expected.

10.2 Atmospheric Setting

Baseline air quality levels in the Project area have not been monitored but are assumed to be very low due to areas remote geographical position (Chapter 7.4) with the nearest town (Nanortalik) about 34 km away and the closest settlement (Tasiusaq) 18 km away.

The Project's potential impacts to the ambient atmosphere in the Operational Phase are:

i) During operation, the project will generate dust which has the potential to result in reduced air quality.

ii) During operation, the Project will generate gaseous air emissions (oxides of nitrogen, oxides of sulphur, black carbon and polycyclic aromatic hydrocarbons (PAH)) which have the potential to reduce air quality.

iii) During operation, the Project will produce greenhouse gas (GHG) emissions from the combustion of diesel in mobile equipment and at the Power station which contribute to global warming.

10.2.1 Dust

In the Project's operations phase the following sources of dust are anticipated:

- Handling of ore and waste rock through the process plant,
- Mine Ventilation Adit;
- Stockpiles of ore and waste rock outside the Nalunaq Mountain,
- The DTSF and
- Vehicle movements on haul roads.

As discussed in Section 9.2.1, dust does not generally travel beyond 400 m (IAQM, Appendix 2, 2016), from the source of dust and it is commonly accepted that the greatest impacts will occur within 100 m of the source, with the potential for travel up to the 400 m. Deposited dust from roads usually occurs up to 50 m from the road. Due to the very limited area likely to be impacted by the dust, the emissions have not been quantified as the majority of the dust will deposit within the Site boundary or very close resulting in very limited off-Site impacts.

Dust deposition from mining operations can have an impact on tundra vegetation via the coating of leaves with dust. Dust deposited on vegetation might also have an impact on mammals and birds that feed on the affected vegetation such as arctic hare and ptarmigan. However, the area likely to be impacted will be mainly within the Site and already modified habitat due to legacy mining in the area.

Geochemical analysis undertaken for waste rock, tailings (Golder, 2021g; Tailings Waste Characterisation Review, 5 July 2021. Report ref: 21467213.500.A.0)), vein material that the mineralogy and composition of the waste rock and tailings samples reflects their geological origin. The concentration of most elements is low and the only identified problematic element is Arsenic with a concentration of 844 ug/kg in the vein material, but only 84 ug/kg in the waste rock. Golder 2021 h has reported that the average concentration of Arsenic in the test tailing produced using the separation methods, to be 149 μg/kg which is a low concentration, and the tailings can be classified as inert based guidance from e.g., the EU commission 2009. Based on the results of the geochemical analysis, the limited area of impact and the already modified habitat, an assessment of the composition of the deposit dust is not required.

Material handling/ Process Plant: Sources of dust relating to material handling/ processing plant are the primary and secondary crushers, as well as the crushed material stacking and reclaim conveyors. These are all inherently mitigated in the project design as they will all located inside an enclosed building. A dust collector with draw points at the primary and secondary crushers and the main transfer points along the crushed material conveying system will be covered by a piping network connected to a centralized bag house filter. Dust particles will be recovered from the dust collector bagging system and reintroduced into the grinding circuit, minimising dust emissions from the process.

Ventilation: There is the potential for dust emissions from the mine ventilation however this is considered unlikely to be significant due to the need to control dust for safe operations and measures will be in place within the mine to suppress dust generation.

Stockpiles: There will be some stockpiling of ore and waste rock and the main stockpiles will be located adjacent to the processing plant. Due to the limited distance that the dust disperses the dust will likely deposit within the Site boundary and not result in off-Site impacts. Stockpile size and duration will be minimised as far as practicable and will be wetted where possible during prolonged dry periods.

DTSF: In the winter, dust will be naturally managed as the tailings stack and newly added layers will freeze rapidly, thereby inhibiting the movement of fine particles. In the summer, dust will be controlled by rainfall on the DTSF. During dry periods in the summer, water will be sprayed over the stack to limit wind erosion, and the build-up of the rock fill on the edges of the DTSF will also help in mitigation of dust generation.

Access/ haul roads: Dust along the roads will mainly be generated during the summer season with the potential impacts localised to the roads. To minimise the potential impacts, the site speed limit will be adhered to, and a water truck will regularly spray along the road during dry periods.

Since the impact of dust is expected to be mainly limited to a narrow area along the access road and around the ore and waste rock deposits (already modified habitat), the driving distances will be short and the dust management procedures in the EMP will be adhered to, the overall significance is assessed to be very low.

Due to the very low distances that dust disperses and since the speed of traffic along the access road will be low and within the site speed limit, consequently it is expected that the impact of dust will also be low. Furthermore, since the roads will be constructed from locally sourced gravel the composition of the dust particles will be similar to the road construction material.

Mitigation

Potential dust generating activities relating to processing will be managed and mitigated through the design of the processing plant. This includes the process occurring inside a building and dust extraction with bag- house filtering. Taking those circuits out of the mine will allow Nalunaq A/S a better grade control of material fed to the mill, and ultimately optimize plant performance and operation scalability.

The procedures to manage dust impacts will be outlined in in the Environmental Management System (EMS). Dust management during the operational period will include minimising stockpile size and duration as far as practicable, wetting of stockpiles, roads and the DTSF as required during dry periods to inhibit particle mobilisation and will be wetted where possible during prolonged dry periods. Regular visual inspections of dust levels will be undertaken, and the site speed limit will be adhered to which will minimise the resuspension of dust.

10.2.2 Gaseous Emissions

During the operational phase, diesel powered mobile equipment and stationary power generation will produce gaseous emissions which include oxides of nitrogen and oxides of sulphur. Black carbon and polycyclic aromatic hydrocarbons (PAH) are also produced if incomplete combustion of diesel fuel takes place. This will increase air emissions in the Project area.

The very low background levels of gaseous emissions at Nalunaq and the relatively small number of diesel combustion sources emitting NOx and SOx implies that it is unlikely that the Greenlandic (or EU or Canadian) ambient air quality assessment limit criteria will be exceeded. By limiting the amount of fuel combusted as much as practical possible and by use Best Available Technology (BAT) equipment the air emissions generated by the Project are assessed to be very low.

The mining fleet and diesel generator will consist of new and used equipment and will be serviced according to the manufacturer's guidelines. When possible, the equipment will be state-of-the-art equipment (BAT). Incomplete combustion of diesel fuel is therefore unlikely to take place except for very shorts periods of time. The potential impact of black carbon and PAHs from the Project has therefore been assessed as negligible.

Mitigation

As the gas emissions during the Operational Phase is expected to be low and in compliance with legal requirements throughout the Operational Phase, no specific mitigation measures to reduce emissions in the Operational Phase is expected to be required.

10.2.3 Greenhouse Gas Emissions

Operation of the Project will result in increased greenhouse gas emissions which may contribute to climate change. The combustion of diesel produces emission of various greenhouse gases (GHG); including carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). However, since CO_2 emissions in the context of the Nalunaq project are expected to contribute with 99% of the total GHG emissions only the contribution of CO_2 has been included in the following.

The emissions sources considered for this assessment are 1) Mobile combustion, including emissions due to diesel combustion in mobile sources and 2) Stationary combustion: including emissions generated due to fuel consumption for power generation.

The total annual site diesel fuel requirement during operation is estimated to 5.46 million litres.

Using an emission factor for Diesel Fuel Arctic (DFA) of 72.00 kg CO2-emissions/GJ, a heating value of 43.5 GJ/tonnes and a density of 0.8 kg/l, a total of 13,700 tonnes CO2 emissions per year is estimated.

The annual CO_2 emissions from energy production in Greenland were 523,963 tonnes in 2015 (Grønlands Statistic 2019). The activities associated with the Operational Phase of the Nalunaq project will then increase Greenland's CO_2 emissions by 2.6 %.

Only the concentrate will be barged out from site to Nanortalik. Due to the very limited shipping activity, the annual CO_2 emissions from shipping to and from the mine site in the Operational Phase have not been calculated for the vessels that will be used for the shipping. It is expected that the vessels that will bring oil and supplies to the project will be the same that are already servicing towns along the Greenland coasts, such as Royal Arctic Line. The additional emissions from entering the project port will therefore be small.

The annual emissions from flights have not been calculated, as it is expected that only very little transport to and from the mine area will be by air.

Shipping to the mine will occur year around as the Saqqaa fjord is free of ice, and the project is carried out far away from the icecap. Against this background, the climate impact from Black Carbon due to shipping to the project is assessed to be negligible.

Mitigation

As the greenhouse gas emissions during the Operational Phase is expected to be low, and in compliance with legal requirements, no additional mitigation measures to reduce emissions in the Operational Phase is expected to be necessary.

10.3 Water Environment

The project has been carefully designed to avoid direct discharge of polluted water into the freshwater environment. All water from the DTSF, the mine and the process plant will be led through a sediment pond and will subsequently be discharged to the Kirkespir River.

Groundwater Concentrations

Golder carried out a seepage assessment of the DTSF (Golder 2021c; Seepage Assessment Technical Background Report, 20 January 2021. Report ref: 20136781.608.A.3). Groundwater concentrations were calculated using the leachate source terms and the groundwater flow under the DTSF, the downgradient concentrations are calculated based on the Domenico equation (ASTM, 2002) for contaminant transport that accounts for retardation, advection, dispersion and diffusion. Multiple conceptual scenarios for the DTSF design were assessed (Golder, 2021c), below is a summary of the results for the go-forward case, which is an unlined, uncapped facility on a 1.8 m platform.

The results of the calculations for the gravity tailings source term for a monitoring point in groundwater 800 m downgradient are summarised in Table 20. The results of the calculations, for the flotation tailings source term, for a monitoring point in groundwater 800 m downgradient are summarised in Table 21.

None of the calculated receptor concentrations exceed the relevant water quality criteria which are taken from the Government of Greenland Mineral Resources Authority (GMRA) guidance of preparing environmental impact assessments (EIA) for mining operations (GMRA, 2015), with the exception of cobalt which is taken from groundwater threshold value guidelines used in Finland (European Commission (EC), 2009).

Table 20: Calculated concentrations in groundwater 800 m downgradient of the DTSF using the gravity tailings source term

PARAMETER	UNITS	Arsenic	Cobalt	Nickel	Iron	Zinc	Copper	Cadmium	Chromium
Gravity tailings concentration	mg/l	*0.154*	*0.00115*	*0.0037*	*0.909*	*0.01*	*0.0064*	*0.000015*	*0.00908*
Water target concentration	mg/l	*0.004*	*0.002*	*0.005*	*0.3*	*0.01*	*0.002*	*0.0001*	*0.003*
No liner, no cap (DTSF on platform 1.8 m above current surface	mg/l	0.002	0.00001	0.00005	0.011	0.0001	0.00008	1.89×10^{-7}	0.00011

Table 21: Calculated concentrations in groundwater 800 m downgradient of the DTSF using the flotation tailings source term

PARAMETER	UNITS	Arsenic	Cobalt	Nickel	Iron	Zinc	Copper	Cadmium	Chromium
Flotation tailings concentration	mg/l	*0.0646*	*0.0014*	*0.0035*	*1.13*	*0.01*	*0.0053*	*0.000015*	*0.00726*
Water target concentration	mg/l	*0.004*	*0.002*	*0.005*	*0.3*	*0.01*	*0.002*	*0.0001*	*0.003*
No liner, no cap (DTSF on platform 1.8 m above current surface	mg/l	0.001	0.00002	0.00004	0.014	0.0001	0.00007	1.90×10^{-7}	0.00009

Surface Water Concentrations

On the basis that the groundwater plume discharges into the Kirkespir River the concentrations of the PCOCs will be further diluted. A dilution factor may be calculated from the ratio of groundwater discharge to the river compared with the flow in the river.

Based on the limited flow monitoring data available it is estimated that the low flow in the river is approximately 3 m^3/s immediately upstream of the Waterfall Station. This is derived from flow monitoring undertaken during May to August 1998, from which it was calculated that the average flow at monitoring station 1 (Figure 37) immediately upstream of the Waterfall Station was 3.29 m^3/s (SRK, 2002). This value is conservatively reduced to 3 m^3/s to account for uncertainty in the dataset due to the limited monitoring period.

The groundwater discharge (Q_{gw}) into the river, sourced from the DTSF, is calculated using Darcy's Law as follows:

$$Q_{gw} = K\ i\ A$$

Where: K is the hydraulic conductivity of the aquifer (m/s), i is the hydraulic gradient (m/m); and A is the area (m^2) of the aquifer that contributes flow to the river.

The area (A) is calculated from the mixed depth of the plume, calculated to be 10 m, and the width of the source zone (assumed to be 150 m) plus an allowance for the lateral spread of the plume, calculated to be approximately 26.67 m in each direction. This result is in a maximum plume width of approximately 203 m. The resulting area is thus 2030 m^2. Based on a hydraulic conductivity (K) of 2.45 x 10^{-4} m/s (Golder, 2021) and a hydraulic gradient of 0.01 the discharge is calculated as approximately 0.005 m^3/s.

Using the calculated groundwater discharge of 0.005 m^3/s and a low flow of 3 m^3/s in the river a dilution factor of approximately 602 is calculated. Using this dilution factor the diluted concentrations in the Kirkespir River have been calculated and the results are presented based on the gravity tailings source term in Table 22 and for the flotation tailings source term in Table 23.

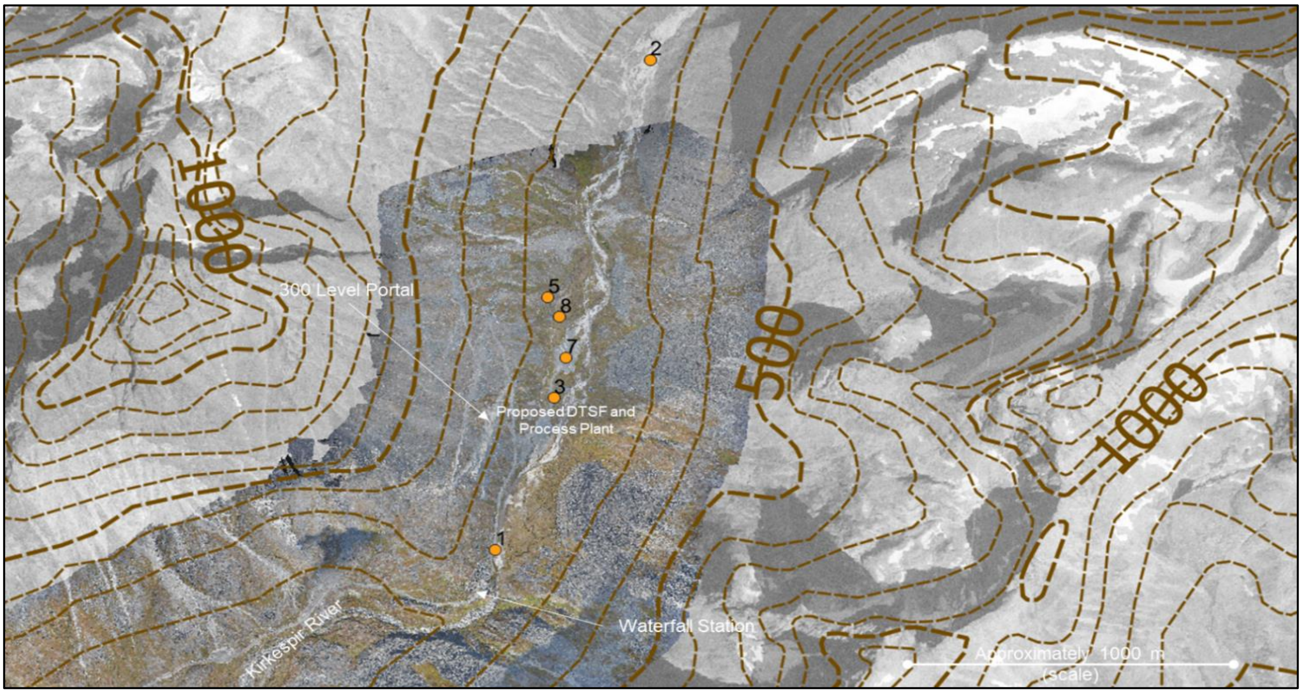


Figure 37: Approximate location of surface water flow monitoring stations (orange dots) reported in SRK, 2002.

Table 22: Calculated concentrations in the Kirkespir River at the Waterfall Monitoring Station downgradient of the DTSF using the gravity tailings source term

PARAMETER	UNITS	Arsenic	Cobalt	Nickel	Iron	Zinc	Copper	Cadmium	Chromium
Gravity tailings concentration	mg/l	*0.154*	*0.00115*	*0.0037*	*0.909*	*0.01*	*0.0064*	*0.000015*	*0.00908*
Water target concentration	mg/l	*0.004*	*0.002*	*0.005*	*0.3*	*0.01*	*0.002*	*0.0001*	*0.003*
No liner, no cap (DTSF on platform 1.8 m above current surface	mg/l	3.23×10^{-6}	2.41×10^{-8}	7.76×10^{-8}	1.91×10^{-5}	2.09×10^{-7}	1.34×10^{-7}	3.13×10^{-10}	1.89×10^{-7}

Table 23: Calculated concentrations in the Kirkespir River at the Waterfall Monitoring Station downgradient of the DTSF using the flotation tailings source term

PARAMETER	UNITS	Arsenic	Cobalt	Nickel	Iron	Zinc	Copper	Cadmium	Chromium
Flotation tailings concentration	mg/l	*0.0646*	*0.0014*	*0.0035*	*1.13*	*0.01*	*0.0053*	*0.000015*	*0.00726*
Water target concentration	mg/l	*0.004*	*0.002*	*0.005*	*0.3*	*0.01*	*0.002*	*0.0001*	*0.003*
No liner, no cap (DTSF on platform 1.8 m above current surface	mg/l	1.36×10^{-6}	2.94×10^{-8}	7.35×10^{-8}	2.37×10^{-5}	2.10×10^{-7}	1.11×10^{-7}	3.13×10^{-10}	1.51×10^{-7}

Mitigation

Discharge water from the sediment pond is treated before discharge to the environment.

As all effluents will comply with Greenlandic guidelines, no additional mitigations measures are required.

The ongoing monitoring of the concentration of metals in the Kirkespir River during the Operational Phase of the mine will immediately detect if the water contains significantly elevated concentration of heavy metals or other pollutants

10.4 Living Environment

In the Operational Phase, potential impacts on the living environment include:

- Disturbance of animals due to noise and visual impacts, for example from machines, vehicles, working personnel and under underwater noise from shipping to and from the project area; As the new processing facility will be constructed at the valley floor near the mine, some extra transport to and from the camp and the mining area is expected, compared to the Angel Mining project, mostly involving personnel transportation. This is likely to result, also in the Operational Phase, in an increased disturbance along the road between the new main camp and the mine area.
- Temporary or permanent habitat loss due to the footprint from construction of infrastructure or establishment of working areas and construction sites.

10.4.1 Disturbance

During the Operational Phase, equipment and personnel will have to be transported from the harbor area and the camp to the mine area. This is likely to result in some disturbance along the road between the new main camp and the mine area.

Noise from mobile and stationary equipment, which can be heard at a significant distance, has the potential of startling mammals and birds. Also, visual disturbances from personnel, machinery, vehicles, buildings and other project structures might cause mammals and birds to avoid utilising habitat in and near the mine area, roads and camps. This includes also the operational phase of the project.

Outside the areas where operation activities are taken place, noise and visual disturbance will cause only localized disturbance. To minimize disturbance in these areas, the movement of staff members will be restricted outside the mining areas.

However, since few birds and mammals will be directly affected by the mining activities and because very large areas of similar habitat are widespread in the region, the disturbance impact of terrestrial mammals and birds during operation is assessed as low.Disturbance of seabirds will be very limited, as there is no known important foraging, wintering or moulting areas for seabirds in the assessment area.

Only few species and individuals of marine mammals are expected to be present along the shipping route. Given the very limited number of operations and the extent of comparable marine habitat in the surroundings, the impact on marine mammals due to underwater noise is assessed to be low.

Artic Char populations were analysed following decommissioning of the mine in 2013, cadmium was found at consistently slightly elevated concentrations. It was assessed that the concentrations were too low to cause any harm to the fish or the freshwater system. All measured concentrations in the livers of Arctic char were found at the level of the background concentrations in 2017, four years after mine closure.

Mitigation

Given that only few species and individuals of marine and terrestrial mammals are expected to be present in the area and along the shipping route, no specific mitigation measures are needed for the Operational Phase.

10.4.2 Habitat Loss

The Project may potentially modify hydrological processes and freshwater habitats, as a smaller river is expected to be redirected as a mitigation measure. However, given the extent of freshwater habitats, including the Kirkespir River, in the assessment area, the actual importance of this intervention is assessed to be low.

The area in which the new Camp Facilities will be placed is already influenced by previous operations, notably the beach landing, the jetty, the fuel storage area and the current exploration camp.

Nalunaq A/S intends to locate the crushing, grinding, gravity, flotation, thickening, tailings filtering, and a gravity concentrate smelting facility where the old workshop was located, under a building.

During the Operational Phase the additional footprint on habitats will be very low. All major project elements are (in the Construction Phase) placed in areas with footprints from previous operations and with no nature protection interests. Overall, the impact on flora and fauna due to habitat loss is assessed to be low.

Mitigation

Given the minimal additional footprint from the mining activities and that no particular nature protecting interests are present in the respective areas, no specific mitigation measures to minimize habitat loss in the Operational Phase is needed.

10.5 Contamination of Environment

Project activities in the Operational Phase can potentially cause direct contamination of terrestrial, freshwater or marine habitats as a result of accidents in connection with transport, storage and handling of hazardous materials such as fuel and chemicals.

The most serious contamination of habitats would result from a hydrocarbon spill. Contamination of the surface soil and vegetation by oil or other hazardous materials potentially poses a risk to animals, plants and their habitats, as hydrocarbons can have toxic effects.

The likelihood of a major spill occurring on land during construction work is low. During construction, only small spills are more likely to occur, and the effects will be localized and comparatively easy to remediate. However, although the effects of an oil spill on land are likely to be small, the consequences for the vegetation can be long lasting, stretching into decades. This is because oil is toxic to plants and Arctic flora has very slow growth rates. Because spills on land typically affect small areas only, it will normally be easy to prevent terrestrial mammals and birds from being exposed to the spills.

The environmental impacts of fuel and chemical spills on land are assessed to be confined to the Project Area (local scale). The potential loss or depletion of terrestrial habitat due to contamination is considered low.

Accidents in connection with transport, storage and handling of building materials such as fuel, grease, paint and chemicals during operation can potentially cause contamination of nearby freshwater bodies. Contamination of freshwater habitats by oil or other hazardous materials from Project activities could potentially pose a risk to animals, plants and their habitats. Hydrocarbons, such as jet fuel and Arctic diesel, can have toxic effects. Since most oil spills are usually small the impact will mostly be small. The impact will potentially be worst in summer when running melting and rainwater can disperse a spill.

During operation approximately 5,46 million liters diesel fuel will arrive to the port site each year in tankers. An unloading accident or a major shipping accident, such as a tanker collision or grounding could give rise to major spills of oil in the marine environment. Due to tidal currents in the fjords, oil leaked to the marine environment may be transported over long distances quickly. Other hazardous materials such as grease, paints and chemicals will also be shipped to the project port but in much smaller quantities.

Potential impacts of marine oil spills include marine and shoreline fouling. The consequences to the marine life, including birds, may be significant.

Most spills are likely to result from routine operations in connection with loading, discharging and bunkering. If diesel is spilled in the port, the amount will typically be small and localized. The impact on marine life will also be local and the diesel can be removed using the oil spill combat equipment available near the port.

An accident at sea leading to a spill of heavy fuel oil will be serious and could potentially have major negative consequences for the environment, especially for the area’s seabirds. However, the risk for a significant spill of heavy fuel oil during shipping is assessed as very small, as all ships will comply with national and international laws and regulations.

The risk of seepage from DTSF to the environment is specifically addressed (Section 12).

Drainage including runoff from the area of the processing plant and mill stockpile will be captured as part of the process plant footprint drainage system and utilised within the process feed.

As described in the Project Description, waste rock will be used as construction material, rock fill material and for maintenance during the Operational Phase of the project.

Past geochemical test work at Nalunaq, which supported the assessment in the past project feasibility study (Kvaerner E&C 2002) and environmental monitoring program from 2004 to 2019 have demonstrated that the waste rock and ore material do not exhibit acid generation characteristics or behavior.

The waste rock and ore material characterization in the new Valley Block follows the same geological settings as the historically mined blocks, as evidenced by SGS (2021) and SRK (2021). Therefore, using waste rock material as construction material and rockfill material is considered acceptable.

Mitigation

The ongoing monitoring of the concentration of metals in the Kirkespir River during the Operational Phase of the mine will immediately detect if the water contains significantly elevated concentration of heavy metals or other pollutants.

If the concentrations are approaching the Greenlandic or European Guideline limits, mitigation measures will be implemented. Measures will include increasing the capacity of the sediment pond and actively removing metals from the wastewater before the water is discharged to the Kirkespir River.

Sewage from all buildings will be treated in the sewage treatment plant before the effluent is discharged to the sea. Overall, the sewage treatment plant has a very stringent effluent guideline, the discharge of water from the project to the sea is assessed to have negligible impact on marine life in nearest surroundings.

To reduce the risk of operational spills of fuel and other hazardous materials in the sea and in the port, the following mitigating measures must be implemented:

- Follow recommendations in Navigational Safety Survey including comply with the International Maritime Organization (IMO) Polar Code;
- Proper procedures for loading and unloading ships must be in place;

- Properly dimensioned equipment for combating operational spills must be available, including containment booms available for berthed ships; and
- Oil spill kits on site.

Regular training must take place to ensure readiness for emergency response to an incident of this nature. Planning will include winter and summer response procedures and training.

All ships must comply with national and international laws, regulations and agreements, including the IMO Polar Code for navigation and shipping in arctic waters and also, the requirements on having and using a certified pilot or crewmember onboard which has documented and approved experience and qualifications in controlling the ship and navigating in the Greenland territorial sea and continental shelf area.

The procedures to prevent oil spills and other contamination must be outlined in detail in the Environmental Management System (EMS) that must be prepared before construction works commence at site. It must include commitments and management measures that the mining company will implement to ensure the project risks, including oil spills, are managed to an acceptable level. The procedures in the Operational Phase must be the same as in the Construction Phase.

10.6 Introduction of Invasive Non-indigenous Species with Ballast Water

Vessels berthing at the Project port during the Construction Phase of the project 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.

The BWM Convention aims to prevent the potentially devastating effects of spreading harmful aquatic organisms carried by ships' ballast water. The BWM requires all ships to implement a Ballast Water and Sediments Management Plan. All ships are required to carry out ballast water management procedures to a given standard. To minimize a potential introduction of non-indigenous species, the mine company require all skips that berth at the port to follow the regulations of the BWM Convention.

Provided the relative limited number of vessels that call in at the Project ports follow the BWM regulations, the risk of introducing invasive non-indigenous species with ballast water during the Construction Phase is very low.

<u>Mitigation</u>

Provided that the Project port follows the BWM regulations, no additional mitigation measures are necessary.

10.7 Land Use and Cultural Heritage

For safety 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 during the Operational Phase. The effect of these restrictions will be low, as there is only limited traditional use of natural resources in the land area in Kirkespir Valley. Except for the Project port area, the marine area off the project area will remain open for subsistence fishing, harvest and recreational use.Mining activities can potentially disturb heritage sites. To localise sites in the Project area, Qaqortoq Museum surveyed the area in 1988 and discovered several important findings in the area. However, none of the described ruin complexes have been affected by the earlier mining activities in the area (Angel Mining 2009). As the footprint of the Nalunaq Gold Project will not include new areas of potential archaeological interest, no impact on cultural heritage is expected during the Operational Phase of the project.

<u>Mitigation</u>

As no impacts on cultural heritage is expected during operation, no specific mitigation measures are required.

11.0 IMPACT AND MITIGATION AFTER CLOSURE

Environmental risk assessments are presented in Chapter 12.

11.1 Physical Environment

The existing topography, geology and climate in the Nalunaq area is described in Chapter 6. In this chapter potential impacts to the physical environment after closure is discussed and assessed.

The potential impacts after closure of the Project on the physical environment have been identified as:

- Lasting landscape alterations and visual impact
- Erosion of DTSF, the road and other surfaces exposed as a part of the mining activity
- Risk of pollution

11.1.1 Landscape Alterations and Visual Impact

After closure, vegetation will slowly cover some of the surfaces exposed during the mining activity, erosion will slowly degrade the road and other surfaces. Experience from abandoned mining sites like the Blyklippen in Mestersvig and abandoned American bases from WW II shows that recovery takes more than 80 years.

Mitigation

All mining related artifacts will be removed, and inert material will be disposed of in the mine before sealing off the mine entrances.

11.1.2 Erosion

There are limited gravel and soils in the Project area as a result of the local geology but a number of operational activities in the Kirkespir Valley have the potential to lead to long term erosion after closure.

Mitigation

To minimize the risk of erosion and sediment transport associated with the foundations and the tailings storage facility, these elements will be protected with large stones before the mine is closed.

11.2 Air Quality

11.2.1 Dust

Results of the monitoring of dust borne contamination after closure of the previous mining activities shows that the level of pollutants returns to normal background levels after a couple of years (Bach & Olsen 2020). No need for mitigation is foreseen.

11.3 Water Environment

Results of the monitoring of water borne contamination after closure of the previous mining activities shows that the level of pollutants returns to normal background levels after a couple of years (Bach & Olsen 2020).

Mitigation

The DTSF will be protected against erosion before the mining area is closed off. Regular visits to the area in the years to follow will allow for an inspection of the integrity of the DTSF.

11.4 Habitat Loss

The additional footprint after closure on habitats will be very low. All major project elements are (in the Construction Phase) placed in areas with footprints from previous operations and with no nature protection interests. Overall, the impact on flora and fauna due to habitat loss is assessed to be low and slowly vanishing during decades after closure.

Mitigation

Given the minimal additional footprint from the mining activities and that no particular nature protecting interests are present in the respective areas, no specific mitigation measures to minimize habitat loss after closure is needed.

11.5 Contamination of Environment

Results of the monitoring of water and airborne contamination after closure of the previous mining activities shows that the level of pollutants returns to normal background levels after a couple of years (Bach & Olsen 2020)

Mitigation

Similar monitoring after closure of this project shall be carried out. Any signs of after closure increase in levels of contaminants shall be investigated and mitigative action taken.

11.6 Land Use and Cultural Heritage

As hiking and hunting will attract people to the valley after closure of the mine, great care should be taken to eliminate danger to the public.

Mitigation

Seal off the entrances to the underground mine, remove all buildings and machinery. Cover the DTSF with a layer of stones to avoid public access to the tailing.

11.7 Cumulative Impacts, Construction, Operation and Closure

The assessment had been based upon the Greenland EIA Guidelines (MRA, 2015) which state that '*Cumulative impacts of existing and expected future already planned projects that could influence the conclusions of the EIA* (must be assessed) and furthermore, '*an evaluation of the impacts caused by the activities in combination with other industrial operators in the region and in combination with other human activities in the area (e.g. fishing and hunting, should be undertaken).*

Consideration of *'other industrial operators'* within the Project area of influence is focussed primarily on the previous mining activities at the Project site. The gold deposit at Nalunaq was discovered in 1992 and the mine was opened in 2004. The license covered an area 22.21 km^2 around the mine site. Between 2004 and 2009 no processing was carried out on site, instead broken ore was shipped to Spain and later Newfoundland for processing. The mining included coarse rock crushing on site and stockpiling of ore at the pier area before shipment of the ore.

Between 2009 and 2014 ore processing was carried out using a combination of gravity processing and Carbon-in-Pulp (CiP) leaching which included the use of cyanide. The Project site was decommissioned in 2013. Between 2013 and 2022 the mining activity at the Project site is likely to have been low to negligible. Given this time lag between the only other '*industrial operation'* and the Project recommencement the potential for cumulative effects would focus on any legacy residual impacts from mining activity rather than physical (land take/disturbance) impacts. Residual mining impacts to the environment are likely to be focussed on bioaccumulation issues regarding flora and fauna at the Project site.

Environmental monitoring at the former Nalunaq gold mine site was undertaken between 2004 and 2019. Some evidence of bioaccumulation in lichens was recorded in terms of elevated metals e.g. As, Co, Cr and Cu. This was generally attributed to mining activities primarily as a result of dust spreading by wind from rock crushing, waste rock and ore stockpiles.

Upon decommissioning of the mine in 2013, the dust pollution decreased even further and in 2017, four years after mine closure, the levels of elements measured in lichens were at or close to background levels.

Aquatic habitat (notably the Kirkespir River) has exhibited evidence of anthropogenic impacts. Artic Char were analysed and cadmium was found at consistently slightly elevated concentrations. It was assessed that the concentrations were too low to cause any harm to the fish or the freshwater system. All measured concentrations in the livers of Arctic char were found at the level of the background concentrations in 2017, four years after mine closure.

As residual impacts from the previous Mining operation appear to now be deemed non-significant the main focus for potential cumulative impact focusses on the existing hunting and fishing that occurs in and around the Project site.

There are few major hunting or fishing interests in or near the Project area. However, the Kirkespir Valley is to some extent used by local people from Nanortalik and surrounding settlements for gathering of berries and fungi for private households. Some hunting is being carried out in the Saqqaa Fjord, and a few local fishermen net the fjord.

A previous study (Glahder, 2001) has shown that the most important natural resources in terms of local use in the vicinity of the Nalunaq project site are: the Arctic char populations living in the three rivers running to the Saqqaa Fjord and in the two fjord areas (i.e. Kirkespir Bay and Kangikitsoq) which are protected until 2003 from pound net fishing; the Snow crab population in the Saqqaa Fjord, possibly with a reasonable size and with a good quality; the spawning Capelin populations in the two bay areas of Kirkespir and Kangikitsoq rivers; flocks of Eiders and Brünnich's guillemots wintering in Saqqaa and adjacent fjords. Measures taken to minimise cumulative impacts will be documented in the EMP (Appendix I) and will include:

- Noise level control including blasting and plant and machinery movements; and,
- Mine staff will not hunt or fish during the construction, operation and closure of the mine.

Given the adoption of these measures, cumulative impacts during construction, operation and closure of the Mine are considered to be low / very low at the Project area scale.

12.0 ENVIRONMENTAL RISK ASSESSMENT

This chapter summarizes and assesses the major potential risks associated with mining (onshore and offshore) in all project phases. Risks related to legacy mining are considered in the previous section under cumulative impacts.

The major risks are assessed to be:

- Spill of oil from tanks and leak of chemicals used for the flotation and other mine processes;
- Contamination of land areas and freshwater with oil;
- Contamination of the sea due to a shipping accident;
- Risk of seepage from DTSF to the environment;
- Catastrophic Collapse of the DTSF, and
- The dispersal of heavy metals to the environment as seepage through the fluvio-glacial deposit; Potential flood risk to the proposed mine infrastructure.

The following paragraphs summarizes the potential impact (without mitigation), probability and risk and describes appropriate mitigation measures.

12.1 Spill of Oil from Tanks and Leak of Reagents from Flotation and other Operational Process

The total annual site diesel fuel requirement in the Construction and Operational Phases is estimated to 2.54 and 5.46 million liters respectively.

The fuel will be stored in fuel storage tanks of the double-wall type located in a containment area with a geomembrane liner and berms, as described under the Project Description.

As described under the Project Description (Section 5.7.6), the process facility will require the use of key reagents for metallurgical performance, in the form of collectors, frothers and flocculation. As presented in the Technical Note by Soutex (Soutex 2021), the flotation reagents mostly follow the precious minerals in the flotation concentrate, with a very low quantity ending up in the tailing facility. It should be noted that the residual concentration will be low and subject to microbial degradation such that there will be no ongoing risk to the water environment.

The concentration of reagents in the effluent will be low (Soutex 2021), and the direct microbial oxidation of these organic compounds allows a detoxification (Soutex 2021) of the process water to an acceptable level.

<u>Probability</u>

The probability of spills of reagents in the process plant is low. The probability of pollution due to fuel storage tank rupture and leaks is also considered very low.

<u>Mitigation</u>

The reagents will be stored in containers surrounded by a spill holding capacity. The mixed reagents will be located in containment areas in the process plant, so to limit the release of the reagents to the environment in case of spills. Fuel will be stored in double wall tanks, inside an HDPE lined area surrounded by berms.

<u>Assessment</u>

The risk of oil spill from tanks or leak of chemicals from the flotation process is assessed to be low (Table 24)

Table 24: Risk Assessment Summary: Spill of oil from tanks and leak of reagents.* For details, see above.

	Construction	Operation	Closure	Post-closure
Duration	Medium term	Medium term	Short Term	Long
Significance of Impact	Medium	Medium	Medium	None
Probability	Low/very low	Low/very low	Low/very low	None
Mitigation*	Safe storage	Safe storage	Safe storage	None
Risk	Low	Low	Low	None

12.2 Contamination of Land Areas and Freshwater with Oil

During the operational phase, diesel fuel will be supplied by means of a fuel barge from the Greenlandic fuel distribution company every 3 months.

Additionally, to circumvent the infrequent servicing of the fuel barge to South Greenland, 60m^3 tankers will be barged between Nanortalik and Nalunaq on a weekly basis, which is expected to be approximately 1-2 times a week. A local barge service provider will transport the tankers between the beach landing site at Nalunaq and the main fuel storage area in Nanortalik. The fuel barge will pump diesel fuel to the main fuel storage area at the Camp Facility through a floating pipeline.

Tankers barged between Nalunaq and Nanortalik will be trucked from the beach landing area to the main fuel storage are at the Camp Facility where fuel will be transferred. All fuel storage tanks are of the double-wall type and will be located in a containment area with a geomembrane liner and berms. The containment area will be able to contain 110% of the volume of a tank of 69m^3, for a containment volume of 76m^3.

The diesel fuel storage will consist of 6 tanks of 69m^3 each, for a total storage capacity 414 m^3). Smaller fuel storage tanks (2 tanks of 30m^3) are also located in the mine area and will be lined with a geomembrane and protected by a berm for spill prevention the same way as it is done for the main fuel storage facility. A 25m^3 fuel tanker will transport diesel from the fuel storage area to the storage tanks at the mine area. Fuelling of mobile equipment will take place at both locations.

Most spills on land are much smaller than a shipping accident. However, although the effects of an oil spill on land will likely be smaller and more localised, the consequences for the vegetation can be long lasting, stretching into decades. This is because oil is toxic to plants and Arctic flora has very slow growth rates. As terrestrial spills likely only will affect relatively small areas, it will be relatively easy to prevent terrestrial mammals from being exposed to the spills. It is also unlikely that terrestrial bird populations will be significantly impacted. Spills into freshwater ecosystems can cause an impact on diversity and abundance of invertebrates, plants and fish. The impact will potentially be worst in summer when running melting and rainwater can disperse a spill.

<u>Probability</u>

The likelihood of spills of oil products when transporting and refueling oil on land is larger than for example major shipping accidents, but the volume of oil spills is usually much smaller.

Mitigation

To further reduce the risk and consequences of operational spills of fuel on land and into freshwater bodies the following mitigating measures must be implemented:

- Impose strict speed limits to reduce the likelihood of traffic accidents involving the fuel tanker and avoid road transport when weather conditions are difficult (slippery roads); and
- Introduce strict procedures for handling of oil and equipment to minimize any oil spill impact.

Assessment of oil spills on land and in freshwater

The areas of the highest spill probability are probably at the mine site when mobile equipment (mine trucks, excavators, etc.) are refuelled. The causes can be human failures, malfunctions of valves, rupture of hoses, etc. The consequences are usually much lower that oil spill at sea or port, as the quantities of spilled oil in such an event are usually smaller.

Due to the limited fuel storage capacity, the likelihood of a major accidental oil spill occurring on land or into local freshwater resources is assessed to be low (Table 25).

Table 25: Risk Assessment Summary: Contamination of land areas and freshwater with oil. * For details, see above.

	Construction	Operation	Closure	Post-closure
Duration	Medium term	Medium term	Short Term	Long
Significance of Impact	Medium	Medium	Medium	None
Probability	Low/very low	Low/very low	Low/very low	None
Mitigation*	Safe storage	Safe storage	Safe storage	None
Risk	Low	Low	Low	None

12.3 Contamination of the Sea due to a Shipping Accident

During the Construction, Operational and Closure Phases ships will arrive to the mine port with diesel fuel, supplies and spare parts. A major shipping accident in the fjords such as a tanker collision or grounding or an unloading accident, could give rise to major spills of oil. Other hazardous materials such as grease, paints and chemicals will also be shipped to the project port but in much smaller quantities.

Due to tidal currents in the South Greenland fjords, leakages of any form to the marine environment will be transported over long distances quickly, and the narrow fjords will make shoreline contamination very likely. Impacts must be considered as potentially causing both marine and shoreline fouling.

The consequences of such spill to the marine life, including birds may be significant. In particular birds are extremely vulnerable to oil. Most fatalities are usually due to oiling of the plumage, but many birds often also die from intoxication. Marine mammals are generally less sensitive to oiling.

No sea bird colonies are located near the shipping routes to the Nalunaq port but quite large numbers of sea duck (eiders) and probably also many auks winter in the fjords and are vulnerable to oil spills.

Most of the fjords close to Nalunaq have rocky shorelines and the intertidal organisms found here are commonly exposed to the scouring effects of sea ice. As wave action can clean away spill residue, wave-exposed shores are less sensitive to oil spills. However, sheltered rocky shores will be in contact with spills for longer, and effects on the invertebrate fauna can potentially affect the ecological balance of the shore.

Probability

Shipping though the fjords to and from the project port has some potential risks. These risks are, however, not different from other shipping routes in Arctic coastal areas, including routes to several Greenlandic towns and settlements. If all maritime regulations including the recommendations in the Navigational Safety Survey and the International Maritime Organization (IMO) Polar Code are followed, the likelihood of a full-scale accident happening is deemed to be very low.

Mitigation

To further reduce the risk and consequences of accidents and operational spills of fuel and other hazardous materials in the sea and in the port the following mitigating measures must be implemented:

- Proper procedures for loading and unloading ships must be in place;
- Properly dimensioned equipment for combating operational spills must be available, including containment booms available for berthed ships;
- It is also essential to have contingency plans and procedures for detecting and combating operational spills in place, including procedures for operational spills in sea ice; and
- Regular training must take place to ensure readiness for emergency responses. Planning must include winter and summer response procedures and training.

Assessment of risk of marine oil spills

An accident at sea leading to a spill of oil will be serious and could potentially have major negative consequences for the environment, especially for the area's seabirds. Most spills result from routine operations in connection with loading, discharging and bunkering. The ships that will call in at the Nalunaq port will not be bunkering and only diesel will be unloaded. If diesel is spilled in the port the amount will typically be small and localized. The impact on marine life will also be local and the diesel can be removed using the oil spill combat equipment available at the Port.

If all maritime regulations are followed, proper oil spill combat equipment is in place at the port and staffs is well-trained in response procedures during summer and winter, the likelihood of a significant oil spill occurring during shipping or unloading is very low.

Table 26: Risk Assessment Summary: Contamination of the sea due to shipping accident. *For details, see above.

	Construction	Operation	Closure	Post-closure
Duration	Medium term	Medium term	Short Term	Long
Significance of Impact	High	High	Low	None
Probability	Very low	Very low	Very low	None
Mitigation*	Procedures	Procedures	Procedures	None
Risk	Low	Low	Low	None

12.4 Risk of Seepage from DTSF to the Environment

In the Seepage Assessment (Golder 2021c; Seepage Assessment Technical Background Report, 20 January 2021. Report ref: 20136781.608.A.3), providing support for the water and tailings management at the Nalunaq Gold mine, an assessment of seepage from the Dry Stack Tailings Storage Facility (DTSF) has been carried out to inform the engineering design. The assessment was based on a review of geochemical data available for the Project (SGS, 2020) and existing meteorological data. The risk assessment is made for a DTSF without a liner.

The assessment evaluated the impact on water quality from the DTSF under different design scenarios and leachate quality source terms.

It was concluded from the results that the downgradient contaminant concentrations of the Potential Contaminants of Concern (PCOC) in groundwater without any low permeability measures constructed at the base of the facility are well within the limits of the guidelines in Greenland.

When integrating the results of the groundwater concentrations 800 m downgradient into the surface water system of the Kirkespir Valley, the worst-case scenario (i.e. low flow in the Kirkespir River) shows that the contaminant concentrations at the historical Waterfall monitoring point are significantly lower than the Greenlandic guidelines and would be compliant with the past historical environmental monitoring program (Golder 2021c; Seepage Assessment Technical Background Report, 20 January 2021. Report ref: 20136781.608.A.3). As such, no mitigations are required for the seepage water out of the DTSF.

Probability

The probability of seepage of contaminants from the DTSF to the environment to a level that exceeds the level of the Greenlandic guidelines is very low.

Mitigation

The design of the DTSF, on top of an engineered platform, above the 1:1000 year flood event line and protected by an outer berm from the maximum flood event, as presented in the Project Description, no additional mitigation measures are required.

Assessment of risk of seepage from DTSF to the environment

With the chosen design and placement of the DTSF, the risk of seepage to the environment is assessed to be very low.

Table 27: Risk Assessment Summary: Risk of seepage from DSTF to the Environment.* For details, see above.

	Construction	Operation	Closure	Post-closure
Duration	Medium term	Medium term	Short Term	Long
Significance of Impact	Medium	Medium	Medium	Medium
Probability	Low/very low	Low/very low	Low/very low	Low
Mitigation*	DTSF design	DTSF design	DTSF design	DTSF design
Risk	Low	Low	Low	Low

12.5 Catastrophic collapse of the DTSF

WSP have carried out a qualitative impact assessment of the credible potential failure modes of the DTSF (WSP 2023b, Appendix XXI). The qualitative analysis focuses on the consequences of a failure due to the erosion of the DTSF perimeter by surface runoff, including both heavy rainfall (pluvial runoff) and extreme river flow (fluvial flooding). This has been selected as it is expected to represent the "worst-case scenario" for the Kirkespir River valley (and downstream fjord) with approximately 100,000 m3 of tailings being released (WSP 2023b).

Sunny Day Scenario – triggered by heavy rainfall, where it has been assumed that the background hydrological conditions within the Kirkespir River is the Mean Annual Discharge (MAD).

The majority of the released volume will deposit within the river floodplain, obstructing the river main channel. Projecting the volume of material expected to be lost from the DTSF in light of a failure (i.e. 100,000 m3) into the river channel (using LiDAR) it is expected that the sludge plume will extend a distance of approximately 80m from the breached wall, causing an almost full blockage of the Kirkespir River valley.

Depending on the extent of the obstructed area two (2) scenarios can be identified:

- Assuming a "less worst case" and more likely scenario, tailings will partially obstruct the river channel and floodplain: this could lead to a limited amount of water accumulating upstream of the obstruction. The scenario could result with the river eroding the eastern portion of the tailings outflow, where the tailings have a reduced thickness, and transporting the material downstream.
- Assuming a "worst case" scenario and less likely, tailings will completely obstruct the river channel and floodplain: this could lead to a large volume of water accumulating upstream of the tailings obstruction, which would act like a dam. Water could keep accumulating upstream of this "dam" until the erosive processes create a breach into the obstruction, or the "dam" is overtopped.

In both circumstances, the rate at which the deposited tailings material in the river will be mobilised in the flow, and therefore transported downstream, will depend on the river regime.

The typical flow velocity is in the order of 2 m/s in the Mean Annual Discharge (MAD) event. Any blockage in the river will reduce the available flow area and increase the energy (and hence velocity) of the flow, progressively mobilising the material and washing it downstream. Under typical "sunny day" flow conditions however, flow conditions are relatively shallow and low energy. It is therefore expected that the tailings will settle out along the length of the river valley within a relatively short distance of the failed DTSF. Fines will also discolour the river flow and this will create a visible plume into the fjord.

It is noted that toxicity testing has been carried out to establish the potential toxicity of the tailings material (SGS 2021) to the natural environment. It is understood that the study concluded that, whilst there will be a short-term reduction in dissolved oxygen and increased turbidity, the tailings is not toxic to existing aquatic habitat.

Consequently, whilst there will be a significant visual impact, the net environmental harm is expected to be short-term and reversible.

Figure 38 : Projected tailings outflow area – Sunny day scenario

Rainy Day Scenario – triggered by high energy flow conditions, where flow in the Kirkespir River is the Probable Maximum Flood (PMF).

For the Rainy Day Scenario it has been assumed that the Probable Maximum Flood (PMF) is occurring within the Kirkespir River, triggering the failure of the DTSF.

Key results for the Updated DTSF Flood Risk Assessment (Golder 2022) during a Probable Maximum Flood are a maximum flood depth of 3.0 m and a maximum flow velocity of 4.0 m/s for the proposed “updated” DTSF facility layout.

The high velocities and water depths would instantaneously erode the tailings outflow volume which, therefore, would not deposit within the floodplain. Tailings would be transported in the form of sediment load till the river outlet and into the fjord.

As noted above, the geochemical analysis has indicated that the tailings is not toxic to aquatic life. There will however be a short-term increase in turbidity and Total Suspended Solids (TSS), and a reduction in dissolved oxygen. The Kirkespir River flow will be visibly discoloured, and there will be a visible plume into the fjord. In light of the finite volume of the released material, it is expected that the tailings will disperse relatively rapidly into the fjord with limited material retained as deposited sediment in the Kirkespir River valley.

12.6 The Dispersal of Heavy Metals or Suspended Particles to the Environment as Seepage through a Fluvio-glacial Deposit

The risk of heavy metal contamination via infiltration through fluvio-glacial deposits has been recognised as an environmental risk. In order to quantify this risk, studies have been undertaken to evaluate the likelihood of occurrence together with the magnitude of effect. Specifically, within the Seepage Assessment (Golder 2021c; Seepage Assessment Technical Background Report, 20 January 2021. Report ref: 20136781.608.A.3) an assessment of seepage risk from the Dry Stack Tailings Storage Facility (DTSF) has been carried out to inform the engineering design. The assessment was based on a review of geochemical data available for the Project (SGS, 2020) and existing meteorological data. The assessment evaluated the impact on water quality from the DTSF under different design scenarios and leachate quality source terms e.g. presence of heavy metals.

It was concluded from the results that the downgradient contaminant concentrations of the Potential Contaminants of Concern (PCOC) in groundwater without any low permeability measures constructed at the base of the facility are well within the limits of the guidelines in Greenland. Suspended particles were considered to be highly unlikely to pass through the glacial tills as these would act as a natural filtration system.

When integrating the results of the groundwater concentrations 800 m downgradient into the surface water system of the Kirkespir Valley, the worst-case scenario (i.e. low flow in the Kirkespir River) shows that the contaminant concentrations at the historical Waterfall monitoring point are significantly lower than the Greenlandic guidelines and would be compliant with the past historical environmental monitoring program (Golder 2021c; Seepage Assessment Technical Background Report, 20 January 2021. Report ref: 20136781.608.A.3). As such, no mitigations are required concerning heavy metal contamination via infiltration through fluvio-glacial deposits. This evaluation is focussed on the DTSF as risks outside of this facility concerning heavy metal contamination are considered negligible.

<u>Probability</u>

The probability of heavy metal contamination via infiltration through fluvio-glacial deposits from the DTSF to the environment to a level that exceeds the level of the Greenlandic guidelines is very low.

<u>Mitigation</u>

The design of the DTSF, on top of an engineered platform, above the 1:1000 year flood event line and protected by an outer berm from the maximum flood event, as presented in the Project Description, no additional mitigation measures are required.

Table 28: Risk Assessment Summary: The dispersal of heavy metals to the environment as seepage through a fluvio-glacial deposit

	Construction	Operation	Closure	Post-closure
Duration	Medium term	Medium term	Short Term	Long
Significance of Impact	Medium	Medium	Medium	Medium
Probability	Low/very low	Low/very low	Low/very low	Low
Mitigation*	DTSF design	DTSF design	DTSF design	DTSF design
Risk	Low	Low	Low	Low

12.7 Potential Flood Risk to the Proposed Mine Infrastructure

Golder (2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0)) carried out a flood risk assessment (FRA) for the Nalunaq Gold mine. The assessment considered both existing site conditions as well as developed site conditions, accounting for various proposed layouts for the proposed Dry tailings Stack Facility and the Process Plant under various ground surface conditions.

Based on this assessment, the following key conclusions were made:

- The entire Valley bottom is at risk of flooding, even under high-frequency (low return period) events for both existing site conditions and developed site conditions.
- A maximum flood depth of 2,7 – 3,1 m and a maximum flow velocity of 3,8 – 4,5 m/s can be expected for the two assessed DTSF alternatives (Golder 2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0). Localized velocities as high as 6,0 – 7,8 m/s can be expected at the toe of the facility, if the now disused camp platform is not regraded.

Key results for the Process Plant during a Probable Maximum Flood are as follows:

- A maximum flood depth of 1.9 - 2.0 and a maximum flow velocity of 1,4 – 2,7 m/s can be expected for the two assessed Process Plant alternatives (Golder 2022e; Nalunaq Gold Mine Flood Risk Assessment (Updated), 8 April 2022. Report ref: 21467213.C04.5.B.0). Localized velocities as high as 10.3-14.3 m/s can be expected at the toe of the facility, if the now disused camp platform is not regraded.

<u>Probability</u>

The probability of flood risk to the proposed mine infrastructure is summarized in Table 29, indicated as The Annual Exceedance Probability (AEP) that refers to the probability of a flood event occurring in any given year.

Table 29: Annual Maximum Daily Rainfall plus Snowmelt Depths at Narsarsuaq Station. The Annual Exceedance Probability (AEP) is referring to the probability of a flood event occurring in any given year.

Return Period (Years)	Annual Exceedance Probability (%) (1)	Rainfall plus Snowmelt Depth (mm)
2	50	42.4
5	20	59.0
10	10	70.1
25	4	84.3
50	2	95.9
100	1	106.6
200	0.5	116.5
500	0.2	131.1
1,000	0.1	142.5

NOTES: (1) The Annual Exceedance Probability (AEP) refers to the probability of a flood event occurring in any given year.

Mitigation

- Regrade the historical camp area to the natural level;
- Design the DTSF and process plant facilities on an engineered rockfill platform above the 1:1000 flood event, with a freeboard of 300 mm;
- Implement a rockfill berm on the perimeter of the platform to protect against the probable maximum flood event; and
- Continuous monitoring at the Kirkespir River, as well as the highlighted tributary reporting to the river.

Assessment of flood risk to the proposed mine infrastructure

For all mine infrastructures, including the design of the DTSF, the risk of flooding of mine infrastructure is assessed to be very low.

Table 30: Risk Assessment Summary: Potential flood risk of mine infrastructure.* For details, see above

	Construction	Operation	Closure	Post-closure
Duration	Medium term	Medium term	Short Term	Long
Significance of Impact	High	High	High	High
Probability	Low/very low	Low/very low	Low/very low	Low
Mitigation*	Design	Design	Design	Design
Risk	Very low	Very low	Very low	Low

13.0 REFERENCES

1) AEX 2020 - https://www.aexgold.com/projects/nalunaq/

2) Alerstam, T., Hjort, C., Högstedt, G., Jönsson, P.E., Karslson, J. & Larsson, B. 1986. Spring migration of birds across Greenland Inlandice. Meddelelser om Grønland, Bioscience 21. 38pp.

3) Angel Mining 2009: Nalunaq Gold Mine. Revised Environmental Assessment.

4) ASIAQ 2019. Water resource in Nalunaq Valley Desktop study. Asiaq Report 2019-17, version 2, November 2019

5) ASTM, 2002. Standard guide for risk-based corrective action applied at petroleum release sites. ASTM E 173995.

6) Bach, L. & Olsen, L. 2020. Environmental monitoring at the Nalunaq Gold Mine, South Greenland, 2019. Technical note from Aarhus University, DCE – Danish Centre for Envi-ronment and Energy, 19 pp.

7) Bach, L., Asmund, G. & Jia, Y. 2015. Nalunaq Environmental Monitoring 2014. Monitoring note from DCE – Danish Centre for Environment and Energy.

8) Berglund, M. A. J. & Elling, H. 1988. Mapping of archaeological interests in relation to the gold exploration in the vicinity of Saqqaa Fjord. Unpublished report of the Kalaallit Nunaata Katersugaasivia (Greenlandic National Museum). November 1988.

9) Bertelsen, C., Mortensen, I. H. & Mortensen, E. (eds.) 1990. Kalaallit Nunaat Greenland Atlas. – Greenland Home Rule, Pilersuiffik: 127 pp.

10) Boertmann 1994. An annotated checklist to the birds of Greenland. Meddelelser om Grønland. Bioscience

11) Boertmann, D. & Bay, C. 2018. Grønlands Rødliste 2018 – Fortegnelse over grønlandske dyr og planters trusselstatus. – Aarhus Universitet, Nationalt Center for Energi og Miljø (DCE) og Grønlands Naturinstitut.

12) Boertmann, D. & Rosing-Asvid, A. 2014. Seabirds and seals in Southeast Greenland. Re-sults from a survey in July 2014. Aarhus University, DCE – Danish Centre for Environment and Energy, 42 pp. Scientific Report from DCE – Danish Centre for Environment and Ener-gy No. 117. http://dce2.au.dk/pub/SR117.pdf

13) Boertmann, D. 2004. Seabird colonies and moulting harlequin ducks in South Greenland. Results of a survey in July 2003. National Environmental Research Institute, Denmark34 pp. – Research Notes from NERI No. 191.

14) Boertmann, D., Lyngs, P., Merkel, F.R. and Mosbeck, A. 2004. The significance of Southwest Greenland as winter quarters for seabirds. Bird Conservation International 14:87–112.

15) Boje, J. 1989. Fjeldørredundersøgelser ved Itillersuaq, Nanortalik 1988 (Arctic char study at Itillersuaq, Nanortalik 1988; Summary in English). – Grønlands Miljøundersøgelser: 36 pp.

16) Bugge Jensen, D. and Christensen, K. D. 2003. The Biodiversity of Greenland – a country study. Technical Report No 55, Pinngortitalerifik, Grønlands Naturinstitut. 210 pp.

17) Christensen, T., Aastrup, P., Boye, T., Boertmann, D., Hedeholm, R., Johansen, K.L., Mer-kel, F., Rosing-Asvid, A., Bay, C., Blicher, M., Clausen, D.S., Ugarte, F., Arendt, K., Bur-meister, A., Topp-Jørgensen, E., Retzel, A, Hammeken, N., Falk, K., Frederiksen, M., Bjer-rum, M. & Mosbech, A. 2016. Biologiske interesseområder i Vest- og Sydøstgrønland. Kort-lægning af vigtige biologiske områder. Aarhus Universitet, DCE – Nationalt Center for Miljø og Energi, 210 s. - Teknisk rapport fra DCE – Nationalt Center for Miljø og Energi nr. 89. http://dce2.au.dk/pub/TR89.pdf

18) Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

19) DMI 2016: Videnskabelig rapport 15-04 (1/6) Fremtidige klimaforandringer i Grønland: Kujalleq Kommune.

20) Dominy, S C, Sides, E J, Platten, I M and Dahl, O, 2006. Estimation and exploitation in an underground narrow vein gold operation – Nalunaq Mine, Greenland, in Proceedings Sixth International Mining Geology Conference 2006, pp 29-44 (The Australasian Institute of Mining and Metallurgy: Melbourne).

21) Egevang, C. & Boertmann, D. 2001. The Greenland Ramsar sites, a status report. National Environmental Research Institute, Denmark. Technical Report No. 346, 96 pp.

22) European Commission, 2009. Commission Decision of 30 April 2009 completing the definition of inert waste in implementation of Article 22(1)(f) of Directive 2006/21/EC of the European Parliament and the Council concerning the management of waste from extractive industries (notified under document number C(2009) 3012), (2009/359/EC).

23) Glahder, C. M. 2001. Natural resources in the Nanortalik district. An interview study on fishing, hunting and tourism in the area around the Nalunaq gold project. National Environmental Research Institute, Technical Report No. 384: 81 pp.

24) Glahder, C. M., Asmund, G., Josefson, A., Burmeister, A. D. & Jespersen, M. 2005. Nalunaq environmental baseline study 1998-2001. NERI Technical Report No. 562., National Environmental Research Institute, Roskilde, Denmark. November 2005.

25) Global Facility for Disaster Reduction and Recovery (GFDRR) Innovation Lab, 2020. Global assessment report atlas online maps (https://www.geonode-gfdrrlab.org/layers/hazard:gar17pga2475; https://www.geonode-gfdrrlab.org/layers/hazard:gar17pga975) (Last accessed December 2020)

26) Golder 2020. Tailings Disposal Options. Technical Background Report Nalunaq. [9 October 2020]

27) Golder 2021a - Mine Inflow Assessment - Groundwater and Surface Water [12 Jan 2021]

28) Golder 2021c. Seepage Assessment Technical Background Report [20 Jan 2021]

29) Golder 2021d. Tailings Storage Facility Design Report. [20 January 2021]

30) Golder 2021e. Hydrological and Hydrogeological Study Technical Background Report [27 Jan 2021]

31) Golder 2021f. Nalunaq Gold Mine, Greenland Preliminary Geotechnical Report - Mine Surface Infrastructure [1 Feb 2021]

32) Golder 2021g. Tailings Waste Characterisation Review. [5 July 2021]

33) Golder 2022a. Tailings Storage Facility Options Analysis [7 March 2022]

34) Golder 2022b. Failure Mode and Effects Analysis for Nalunaq Mine [15 March 2022]

35) Golder 2022c. Nalunaq Gold Mine, Greenland - Uranium Concentrations - Technical Memo [25th March 2022]

36) Golder 2022d. Nalunaq Gold Mine, Greenland: Preliminary Static and Kinetic Testing Results From 2022 Tailings Analysis Programme [15 June 2022]

37) Golder 2022e - Nalunaq Gold Mine Flood Risk Assessment (Updated) [8 April 2022]

38) Golder 2022f - Nalunaq Gold Mine Surface Water Infrastructure Design [8 April 2022]

39) Golder 2022g. Nalunaq Gold Mine, Greenland, Preliminary Closure Plan Submitted by Golder Associates Ltd, WSP House. 21467213.C04.3.A.0 [30 March 2022]

40) Golder 2023a. Water Management Plan Technical Background Report [17 March 2023]

41) Government of Greenland, 2000. Rules for field work and reporting regarding mineral resources (excluding hydrocarbons) in Greenland. Government of Greenland Bureau of Minerals and Petroleum document reference no.69.03.20+01, dated November 2000.

42) Greenland National Museum, 1997. Report on archaeological Interests in Kirkespirdalen, May 1997.

43) Greenland Museum 1988. Mapping of archaeological interests in research with gold exploration in the Saqqaa Fjord, Nanortalik Municipality

44) Gronlands Statistic 2019. https://bank.stat.gl/pxweb/en/Greenland/Greenland__EN/

45) Halyard, 2022. Internal feasibility study report. Report dated 28 February 2022, prepared for AEX Gold.

46) Heath, M.F. & Evans, M.I. (eds.) 2000. Important Bird Areas in Europe: Priority sites for conservation. 1: Northern Europa: Greenland Pp. 197-204. Cambridge, U.K.: Birdlife International (Birdlife Conservation Series No. 8).

47) IAQM 2016. Guidance on the Assessment of Mineral Dust Impacts for Planning, Appendix 2

48) Kampp, K. and Wille, F. 1990. The white-tailed eagle population in Greenland. Dansk Ornithologisk Forenings Tidsskrift.

49) Kvaerner E & C 2002. Nalunaq Gold Project Feasibility Study. C37922.

50) Meltofte, H. 1985. Populations and breeding schedules of waders, Charadrii, in high arctic Greenland. Meddelelser om Grønland, Bioscience 16: 44 pp.

51) Mineral Resources Authority (Government of Greenland) 2015. Guidelines for preparing an Environmental Impact Assessment (EIA) report for mineral exploitation in Greenland.

52) Mosbech, A., Boertmann, D., Olsen, B.Ø., Olsvig, S., von Platen, F., Buch, E., hansen, K.Q., Rash, M., Nielsen, N., Møller, H.S., Potter, S., Andreasen, C., Berglund, J. & Myrup, M. 2004. Environmental Oil Spill Sensivity Atlas for South Greenland Coastal Zone. National Environmental Research Institute, Denmark. 341 pp. - NERI Technical Report No. 493.

53) NIRAS 2020. Nalunaq Gold Project - Potential Wind and Solar Resources, August 2020, - Report from NIRAS Denmark A/S.

54) Orbicon 2019. Nalunaq Goldmine. Description of natural conditions 2019. Site description report to Nalunaq A/S.

55) Orbicon-WSP 2021. Nalunaq Gold Project. Scoping and Terms of Reference for the Environmental Impact Assessment for the Nalunaq Project. ToR prepared for Nalunaq A/S.

56) Petersen J. S., Kaltoft K. and Schlatter D. M. The Nanortalik Gold District in South Greenland. In Papunen H. 2007. Minral Deposits: Research and Exploration - Where Do They Meet? 4th Biennial SGA Meeting. Rotterdam: Balkema. 285 - 288.

57) Rosing-Asvid A. 2010b. Catch history and status of the harbour seal (Phoca vitulina) in Greenland. NAMMCO Sci. Publ. 8:161-174.

58) Rosing-Asvid, A. 2010a. Grønlands sæler. Ilinniusiorfik Undervisningsmiddelforlag. 144 pp.

59) Secher K., Stendal H. and Stensgaard B. M., 2008. The Nalunaq Gold Mine. GEUS Geology and Ore. 11-12.

60) SGS 2021. The Environmental characterization of Tailings from the Nalunaq Mine, Prepared by SGS for Nalunaq A/S. Dated 30 March 2021

61) SGS, 2020. Appendix Data Tables 17909-04. Excel workbook supplied by SGS to AEX dated 18 December 2020.

62) SGS, 2023. An Investigation into The Environmental Characterisation of Tailings Samples from the Nalunaq Mine, prepared for Nalunaq A/S Project 17909-06. Dated 06 February 2023.

63) Soutex 2021. Process Plant Reagents Utilization. Nalunaq Technical Background Report.

64) SRK 2002. Nalunaq Gold Project Environmental Impact Assessment. Report ref: U1787/001PRIV_NAL_REP

65) SRK Explorations Services Ltd, 2016. Independent Technical Report on Nalunaq Gold Project, South Greenland

66) SRK Exploration Services Ltd, 2020. A Competent Person's Report on the Assets of AEX Gold, South Greenland

67) SRK 2021a. Memorandum: Nalunaq Waste Rock Characterisation. Dated 15 January 2021

68) SRK 2021b. Memorandum: Nalunaq Vein Material Characterisation. Dated 18 May 2021

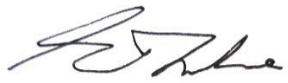
69) USEPA 1995. AP42 Compilation of Air Emissions Factors (5th edition)

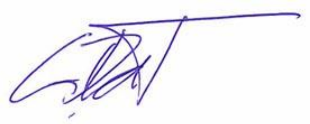
70) WSP 2023a. Potential Failure Modes Analysis for the Nalunaq Mine DTSF. Technical Memorandum. Dated 17 March 2023.

71) WSP 2023b. DTSF Qualitative Flood Risk Assessment. Technical Memorandum. Dated 17 March 2023.

Signature Page

WSP Golder





Susan Digges La Touche
Assiciate Hydrogeologist

Gareth Digges La Touche
Technical Director Minewater

Date: 17 March 2023

SDLT/GDLT

Company Registered in England No. 01383511
At WSP House, 70 Chancery Lane, London, WC2A 1AF
VAT No. 905054942

APPENDIX I

Preliminary Environmental Management System

Introduction

The Environmental Management System (EMS) for a mine project describes how the mining company intends to manage the environmental issues identified in the EIA. The EMS also identifies who is responsible for each commitment.

The Nalunaq A/S Management System

The Nalunaq Environmental Management System (EMS) will be prepared before construction works commence at site. It will include commitments and management measures that the mining company will implement to ensure the project risks are managed to an acceptable level.

The EMS outlines the management objectives under each environmental aspect identified in the EIA, the potential impacts to the environment, mitigation measures for each impact, the responsibility for each commitment as well as the applicable Construction, Operational or Closure Phase for which management is required. The commitments outlined in the EMS aim to provide a basis for which environmental performance and compliance can be measured throughout the Project.

The EMS and work procedures will be continuously reviewed, updated and improved based on the results of the monitoring program over the life of the mine. Environmental management commitments detailed in the EMS will be included in relevant contract documents and technical specifications prepared for the Project. All the mine company's employees, contractors and other personnel employed on the Project will be made aware of the EMS through the site induction process. In all Project phases, compliance with environmental management measures will be regularly monitored, any non-compliances addressed, and improvement actions will be implemented.

The Preliminary EMS presented below is a framework which consists of the following key elements:

- 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.
- A definition of the roles, responsibilities and authority to implement the management program.

The Preliminary EMS is tabulated in spreadsheets below, which are laid out with the following divisions:

- Project activity – the activity associated with the mining project which has been identified to pose a potential impact or risk to the environment.
- Environmental impact – description of the negative impact of the activity (such as pollution or disturbance of natural environment);
- Action – the mitigating measure or actions identified to prevent or minimize the adverse environmental impact; and
- Responsibility – party/ies responsible for ensuring the action, measure, or principle is done.

Initial responsibility for meeting some of the management commitments in the tables will be transferred to the mine company's contractors. Nalunaq A/S will commit the contractors to meeting the relevant management responsibilities. This will be done by developing a code of responsible environmental practice that will be included in tender documents and contracts. Nalunaq A/S will fully recognize that it is not absolved from those management responsibilities. Ultimate responsibility for meeting all commitments in this section lies with the mine company. In most cases the person (or persons) assigned responsibility for a certain commitment is seen as the driver of the requirement. This will typically be the General Manager and/or the company Environmental Supervisor.

Some of the environmental commitments include a whole range of linked actions and will therefore be combined into specific plans:

- Plan for safe handling of oil, which describes the company's procedure for safe handling of oil in the port, when filling in the camp and in the mining area, etc. A proposal for such a plan will be prepared by the mining company before project start and presented to the authorities.
- Contingency plan for handling oil spill in the sea, on land and in fresh water. This plan describes the workflows for combating different types of oil spills, both in summer and winter. The plan also describes the combat equipment that must be present in the harbour as well as the equipment that should be available in case of land or freshwater spillage. A proposal for the plan will be prepared by the mining company before the start of the project and submitted to the authorities.

Nalunaq's Environmental Management System

Before the start of operations, Nalunaq A/S will finalise and implement an Environmental Management System (EMS) consistent with the industry's best practice. The purpose is to formalize procedures for managing and reducing environmental impacts from the Nalunaq Gold Project. The EMS will assist the company to maintain compliance with Greenland's environmental regulations, lower environmental impacts, reduce risks, develop indicators of impact and improve environmental performance.

The EMS will ensure that the environmental obligations associated with the Nalunaq Gold Project are adequately managed in a manner that is planned, controlled, monitored, recorded and audited. Environmental incidents will be reported, investigated, analysed and documented. Information gathered from the incident investigations will be analysed to monitor trends and to develop prevention programs, which include corrective and preventative actions taken to eliminate the causes of incidents. All employees, contractors and sub-contractors will be required to adhere to the EMS and the non-conformance and corrective action system in place at the project site.

Preliminary Environmental Management System for the Nalunaq Gold Project

No	Project Activity	Environmental Impact	Action	Responsibility
1	Construction activities could cause erosion	Loss of soil, sand and gravel by the forces of water	Take erosion into account when selecting construction methods and routing of the alignments	General Manager / Environmental Manager
2	Haulage generate dust	Potential pollution of land and water	Plan construction works and mining activities to minimize dust generation	General Manager / Environmental Manager
3	Mobile equipment and stationary power generation produces gaseous emissions	Increased air emissions	Limit the amount of fuel combusted as much as practical possible and use BAT equipment	General Manager / Environmental Manager
4	Mobile equipment and stationary power generation generate greenhouse gasses	Climate change	Limit amount of fuel combusted as much as practical possible	General Manager / Environmental Manager
5	Re-profiling to accommodate buildings and mining activities	Loss of terrestrial habitat	Minimize the area to be disturbed by planning infrastructure to have as small a footprint as possible	General Manager / Environmental Manager
6	Noise and visual disturbances from personnel and machinery	Disturbance of terrestrial mammals and birds	Restrict the movement of staff members outside the construction and mining areas	General Manager / Environmental Manager
7	Construction of beams and diversion channels	Disturbance of freshwater organisms	Minimise the disturbance of the water and restore natural hydrology as quickly as practically possible	General Manager / Environmental Manager
8	Accidents can lead to spill of oil and hazardous materials	Pollution of marine environment	Ensure that all arriving skips follow recommendations in Navigational Safety Survey. Ensure that the plan for safe handling of oil is followed. Ensure that contingency plan is well known to the responsible, that combat equipment is available and that efficient combat readiness is trained summer and winter	General Manager / Environmental Manager
9	Accidents can lead to spill of oil and hazardous materials	Pollution of land areas and freshwater habitats	Ensure that contingency plan and equipment is available, and use is trained	General Manager / Environmental Manager
10	Discharge of ballast water in Greenlandic waters	Introduction of invasive alien species with ballast water	Ensure that arriving skips regulations of the International Convention for the Control and	General Manager /

No	Project Activity	Environmental Impact	Action	Responsibility
			Management of Ships' ballast water and Sediments	Environmental Manager
11	Construction works	Disturbance of heritage sites	Contact staff members of the Greenland National Museum and Archives	General Manager / Environmental Manager
12	Construction works require that the plant cover is removed	Because of low temperatures and short growing season, it will take very long for the vegetation to recover.	Limit area where natural vegetation is disturbed	General Manager / Environmental Manager
13	Implementation of Monitoring plan	-	Ensure that all activities included in the Monitoring program are carried out as agreed with the Greenlandic authorities and that the data are used in the environmental management	General Manager / Environmental Manager

APPENDIX II

Environmental Monitoring Plan

Introduction
Nalunaq A/S will develop and implement an Environmental Monitoring Plan (EMP) in accordance with the Greenlandic guidelines to monitor the predicted residual effects of the Nalunaq Gold Project and the effectiveness of implemented mitigation measures. The EMP will encompass all phases of the project (construction, operation, closure and post-closure) and identify any variances from predictions that occur and whether such variances require action, including any additional mitigation measures.

Content of Environmental Monitoring Program

The Nalunaq EMP will be a best practice approach comprising sampling of water, air, and soil from numerous locations in and around the mine site. The monitoring program will be in line with the historical program (Bach & Olsen 2020), and the results will be submitted to regulatory authorities for review.

The monitoring program will comprise the following key-elements:

- Freshwater monitoring
- Dust monitoring
- Hydrology Monitoring
- Meteorological Monitoring

The EMP will be developed and updated throughout the mine life.

Conceptual Monitoring Program

Prior to project operations, a more detailed study design will be developed for each of the EMP's elements. This will be done in cooperation with the Greenland authorities.

Below are descriptions of the proposed approach for each element of the EMP. In addition to the studies outlined below, supplementary studies may be conducted for specific, well-defined objectives and are not expected to continue throughout the program.

<u>Freshwater Monitoring</u>
The purpose of this monitoring activity is to trace if the mining activities lead to the release of unwanted elements into the environment. The monitoring activities comprise the collection and analyses of water from the tailings run-off, and water from Kirkespir River collected at stations above and below the discharge point of tailings water.

All the samples will be analysed for a number of elements including heavy metals and the results are compared to the values of previous monitoring by EAMRA to determine if there is a change as a result of new mine activities. The sampling frequency and reporting requirements will be defined in cooperation with the Greenlandic authorities.

Dust monitoring

Dust dispersal and deposition on vegetation along roads will be monitored to determine if this is a significant problem that require dust control activities (such as spraying of water on the roads during summer). Dust samples must also be analysed for metal content.

The monitoring activities, sampling frequency and reporting requirements will be defined in cooperation with the Greenlandic authorities.

Hydrology Monitoring

The monitoring of water flow in the Kirkespir River will be continued at the established station to monitor seasonal and annual flow patterns.

Meteorological Monitoring

Collection of meteorological data will continue at the established weather station.

The Meteorological Monitoring reporting will include a summary of the measured parameters, including temperature, precipitation and wind.

Framework for the monitoring parameters and sampling locations

The table below shows a framework for the monitoring parameters and sampling locations proposed.

Conceptual Monitoring Program.

Monitoring aspect	Sites/activities to be monitored	Parameter to be monitored	Frequency	Duration	Assessment criteria	Reporting
Outlet and run-off from the tailings storage facility	Tailings storage facility outlet and Kirkespir River	Metals	To be defined in cooperation with EAMRA	Operational phase	To be defined in cooperation with EAMRA	Monthly
Dust deposition on vegetation	To be defined in cooperation with EAMRA	Amount of dust on leaves and metal content in dust	To be defined in cooperation with EAMRA	Construction, operational and closure phases	To be defined in cooperation with EAMRA	Annual Monitoring Report
Hydrology	Kirkespir River	Water flow	Continual	Life of mine	To be defined in cooperation with EAMRA	Annual Monitoring Report
Local climate	Weather station at Main camp	Temperature, precipitation, wind speed and direction	Continual	Life of mine	-	Annual Monitoring Report

Signature Page

Golder Associates (UK) Ltd

Susan Digges La Touche
Assiciate Hydrogeologist

Gareth Digges La Touche
Technical Director Minewater

SDLT/GDLT

WSP GOLDER

golder.com