

DCE/GINR – Review of ‘Majoqqap Qaava. Environmental Impact Assessment, Greenland Anorthosite Mining’

Comments and recommendations

Scientific note from DCE – Danish Centre for Environment and Energy and Pinngortitaleriffik, Greenland Institute of Natural Resources.

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Data sheet

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Title: DCE/GINR – Review of 'Majoqqap Qaava. Environmental Impact Assessment, Greenland Anorthosite Mining'

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1 Introduction and background

By e-mail of 22 October 2024, the Environmental Agency for Mineral Resource Activities (EAMRA) has requested the Danish Centre for Environment and Energy (DCE) and Greenland Institute of Natural Resources (GINR) to review the summary report “Majoqqap Qaava. Environmental Impact Assessment, Greenland Anorthosite Mining” (in the following referred to as the EIA draft [1]), including its supporting documents (Annex 1-6 and Background reports I to XI to the EIA report).

The EIA draft has been prepared by NIRAS Greenland A/S for Greenland Anorthosite Mining (the company) and is the fifth revision of the EIA draft dated October 2024. DCE/GINR’s comments and recommendations for the previous versions of the EIA draft are listed in [2-5].

The focus of DCE/GINR’s review and technical assessment has been to verify that the description of all relevant environmental aspects of the project complies with 1) the conditions specified in the “EIA Scope and Terms of Reference’ for the Majoqqap Qaava, Anorthosite Project” (ToR) as prepared by NIRAS for Greenland Anorthosite Mining and 2) “Guidelines for preparing an Environmental Impact Assessment (EIA) report for mineral exploitation in Greenland, 2015” (referred to as EIA Guidelines hereafter). Fulfilment of the EIA Guidelines entails that all aspects of the project are based on international environmental standards and the principles of Best Available Technology (BAT) and Best Environmental Practice (BEP).

As stated in the EIA Guidelines, the aims of the EIA are:

- *“To estimate and describe the nature and the environment as well as the possible environmental impacts of the proposed project.*
- *To provide a basis for the consideration of the proposed project for Naalakkersuisut (the Government of Greenland).*
- *To provide a basis for public participation in the decision-making process.*
- *To give the authorities all information necessary to determine the conditions of permission and approval of a proposed project”.*

In DCE/GINR’s review, special attention has been given to verify that the aims of the EIA Guidelines have been adequately addressed and that the presented conclusions of the summary EIA draft are supported by clear and unambiguous references to the relevant background documents. This review does not include an evaluation of chapter 3 on ‘Regulatory framework’ and the technical aspects of Background report V on Land tailings deposit.

In conclusion, DCE/GINR find that the EIA draft includes a sufficient description of the main issues mentioned in the ToR and provides an easy-to-read compilation of the main conclusions of the background documents. DCE/GINR assess that the EIA draft complies with the requirements of the EIA Guidelines and provides an adequate and correct basis for public participation in the decision-making process.

However, some parts of the EIA draft's conclusions are based on either theoretical assumptions, ad-hoc field observations or desktop and modelling studies. These conclusions are inherently associated with data uncertainty with respect to the quantification of potential environmental impacts, projects risks and mitigation strategies. While the conclusions presented in the EIA draft are assessed to be adequate for the purpose of describing the anticipated environmental impacts of the project, DCE/GINR recommend that special attention and follow-up actions are made to provide sufficient empirical field data to verify some of these assumptions. Chapter 2 lists topics where DCE/GINR recommend additional monitoring and field verification during the construction, operations and closure phase of the project to reduce uncertainty and inform future mitigation.

2 General comments and recommendations

DCE/GINR recommend that special attention and follow-up actions are made to document the following list of topics.

2.1 Tailings storage facility (TSF)

The company has described two alternatives for the long-term storage of tailings in either a dry deposit (TSF Dry) or in a lake (TSF Wet). DCE/GINR assess that the EIA draft [ref 1] describes the risks of the two alternatives to an adequate level of detail for the public consultation process and for decision makers assessment. DCE/GINR assess that deposition of tailings occupy one of the largest potential environmental risks from the mining project. DCE/GINR recommend that special attention is given to finding the tailings deposition methodology that minimizes this potential environmental risk in both the operational and post-closure phases of the project.

For the TSF Dry, DCE/GINR recommend that attention is targeted the construction of the facility and the water management/drainage from the TSF Dry. During active mining and post closure, it is recommended that the stability of the TSF Dry is monitored and that a closure plan for the TSF Dry is enforced. For the TSF Wet, DCE/GINR recommend that attention should be targeted monitoring of the deposition of tailings in the tailings lake (Lake 2).

2.2 Additional studies of birds

DCE/GINR note that the baseline studies of birds are based on ad hoc data rather than systematic surveys during critical periods e.g., breeding season. In the latest version of the EIA draft, DCE/GINR note that a new bird survey has been added to be completed during the construction phase. DCE/GINR assess that such a survey may involve uncertainties due to activities on the site, and that it cannot serve as a true baseline. Despite this, the survey may well document occurrences that are not known and described in the EIA. DCE/GINR recommend that a specific plan for the survey of birds is submitted for approval as soon as possible. DCE/GINR recommend the surveys are conducted as soon as possible and before larger construction activities disturb the surveys. DCE/GINR recommend that the accuracy of the ad hoc assessment of project disturbances on birds are re-evaluated based results of the new survey.

2.3 Environmental impacts from dust emissions

For the assessments of potential dust emissions and dust dispersal related to the Majoqqap Qaava project, estimates are based on calculations of project work tasks Emission Factors (EF) following equations developed for U. S. Environmental Protection Agency Office of Air Quality Planning and Standards Emission Factor and Inventory Group (USEPA).

The environmental impacts of the calculated potential dust emissions from the described project activities are described using a parameterization of the impact area. The detail level of the presented parameterization is based on a

partly pragmatic approached based on the expected dispersed dust size fractions, an evaluation of the project area topography and measurement of the overall wind regime in the project area.

DCE/GINR recommend that the predicted dust dispersion distances, magnitude of predicted deposition within affected areas and overall environmental impacts are verified by field measurements and long-term monitoring at representative locations over time during construction, operation and closure of the mine project. This will verify if dust concentrations and dust deposition levels comply with the Environmental Air Quality Criteria for mining activities in Greenland (see EIA Guidelines, Appendix 3) at the boundary of predefined buffer zones around the identified sources of dust emissions.

2.4 Annual precipitation range and water flow in the project area

Long-term site specific measurements of the total annual precipitation (rain, snow etc.) do not exist at the Majoqqap Qaava project area. Instead, long term climate data from Nuuk area was used in lieu of site-specific precipitation data. The accuracy of the annual precipitation range is important for assessment of the flooding risk, short- and long-term stability of the TSF Dry or TSF Wet, surface water management, seepage rates through TSF Dry, surface erosion of tailings etc.

As stated in the EIA, onsite monitoring is ongoing at Majoqqap Qaava to collect reliable verification of the water flow in the freshwater system and the precipitation values to be used for the design of the project. DCE/GINR recommend that both water flow and precipitation measurements is continued throughout the life of the mine, including special attention to document also winter precipitation (snow and sleet). DCE/GINR recommend that the accuracy of the flooding risk assessment and other water flow and precipitation affected risk factors are re-evaluated after continuous precipitation measuring for some years to assess whether updates to the project design are needed as a result of the measured annual mean versus the assumed annual mean.

3 List of references and previous notes on Majoqqap Qaava EIA versions

[1] NIRAS Greenland A/S. 2024. Majoqqap Qaava. Environmental Impact Assessment, Greenland Anorthosite Mining. October 2024.

[2] Bach, L and Raundrup, K. 2024. DCE/GINR comments and recommendations to 'EIA Report'. Majoqqap Qaava. Greenland Anorthosite Mining, License 2019-162. Aarhus University, DCE - Danish Centre for Environment and Energy, 27 s. - Scientific note, August 2024

[3] Bach, L, Jørgensen, C.J., Fritt-Rasmussen, J and Raundrup, K. 2024. DCE/GINR comments and recommendations to 'EIA Report'. Majoqqap Qaava. Greenland Anorthosite Mining, License 2019-162. Aarhus University, DCE - Danish Centre for Environment and Energy, 119 s. - Scientific note, May 2024

[4] Bach, L, Jørgensen, C.J., Fritt-Rasmussen, J and Raundrup, K. 2023. DCE/GINR comments and recommendations to 'EIA White Book'. Majoqqap Qaava. Greenland Anorthosite Mining, License 2019-162. Aarhus University, DCE - Danish Centre for Environment and Energy, 76 s. - Scientific briefing no. 2023

[5] Bach, L, Jørgensen, CJ, Fritt-Rasmussen, J, Boertmann, D, Raundrup, K. 2023. DCE/GINR - Review of 'Greenland Anorthosite Mining, Majoqqap Qaava project. Environmental Impact Assessment (version 12 April 2023)' for the license 2019-162. Aarhus University, DCE - Danish Centre for Environment and Energy, 2023 21 August.