PRELIMINARY ECONOMIC ASSESSMENT UPDATE FOR THE RÖNNBÄCKEN NICKEL PROJECT, SWEDEN

Prepared For

Nickel Mountain AB

Report Prepared by

srk consulting

SRK Consulting (Sweden) AB
UK31363-SE807

SRK Legal Entity:		SRK Consulting (Sweden) AB
SRK Address:		Box 95 931 21 Skellefteå Sweden.
Date:		February, 2022
Project Number:		UK31363-SE807
SRK Project Director:	Fiona Cessford	Corporate Consultant (ESG)
SRK Project Manager:	Ben Lepley	Consultant (ESG)
Client Legal Entity:		Nickel Mountain AB
Client Address:		Brahegatan 29 S- 114 37 Stockholm Sweden

Table of Contents

List of Tables

List of Figures

SRK Consulting (Sweden) AB
Box 95
931 21 Skelleftea
Sweden
E-mail: enquires@srk.se.com
URL: www.srk.com

PRELIMINARY ECONOMIC ASSESSMENT UPDATE FOR THE RÖNNBÄCKEN NICKEL PROJECT, SWEDEN

1 EXECUTIVE SUMMARY

1.1 Introduction

SRK Consulting (Sweden) AB ("SRK") was requested by Nickel Mountain AB ("Nickel Mountain", hereinafter also referred to as the "Company") to undertake a preliminary economic assessment ("PEA") on its Rönnbäcken nickel project ("Rönnbäcken", or the "Project") located in Sweden. Nickel Mountain is a 100%-owned subsidiary of Bluelake Mineral AB ("Bluelake").

SRK had previously completed a PEA for the Project in April 2011 that was subsequently updated in December 2011 on behalf of previous owners Nickel Mountain Resources AB and parent company IGE Nordic AB ("IGE"). Since 2011, there have been significant changes to the mining industry in terms of technological advances, commodity supply and demand, commodity selling prices and costs used for economic assessment but also the requirement of companies to incorporate environmental, social and governance ("ESG") thinking into all aspects of the Project.

As well as considering the sale of concentrate for smelting as envisaged in the previous PEA, the Company has the vision of producing material compatible with the battery manufacturing industry, either as a high-grade sulphide concentrate or as a refined sulphate product. Such products could be considered as a feed into battery manufacturing plants currently under construction in Europe or to the greater worldwide market for these types of product.

Following this PEA and subject to financial backing, the Company expects to commence a Prefeasibility Study ("PFS") alongside an environmental and social impact assessment ("ESIA") in 2022.

1.2 Location and Setting

The Project comprises three nickel-cobalt deposits, Rönnbäcksnäset, Vinberget and Sundsberget. It is located in the Storuman municipality of Västerbotten County in northern Sweden, approximately 35 km south-southeast of the town of Tärnaby, 110 km northwest of the town of Storuman and 300 km northwest of the city of Umeå.

The three deposits are contained within three approved and valid mining leases (exploitation concessions, Swedish: b*earbetningskoncession*). These are: Rönnbäcken K nr 1 (containing Vinberget), Rönnbäcken K nr 2 (containing Rönnbäcksnäset) and Rönnbäcken K nr 3 (containing Sundsberget), as shown on Figure 1-1. The nr 1 and 2 leases were approved in 2010 and are valid for 25 years (they currently expire 23 June 2035). The nr 3 lease was approved in 2012 and currently expires on 01 October 2037.

The Project is accessible by road and an airport is located close to Tärnaby (Hemavan-Tärnaby airport). The Project is located around Lake Gardiken; a man-made reservoir formed after the River Umeå (Swedish: *Umeälven*) was dammed for hydroelectric power. The Ajaure hydroelectric dam is located 12 km downstream of the Project. The Rönnbäcksnäset deposit is on an island of the same name within Lake Gardiken; Sundsberget and Vinberget are on the northern and southern shores of the lake, respectively.

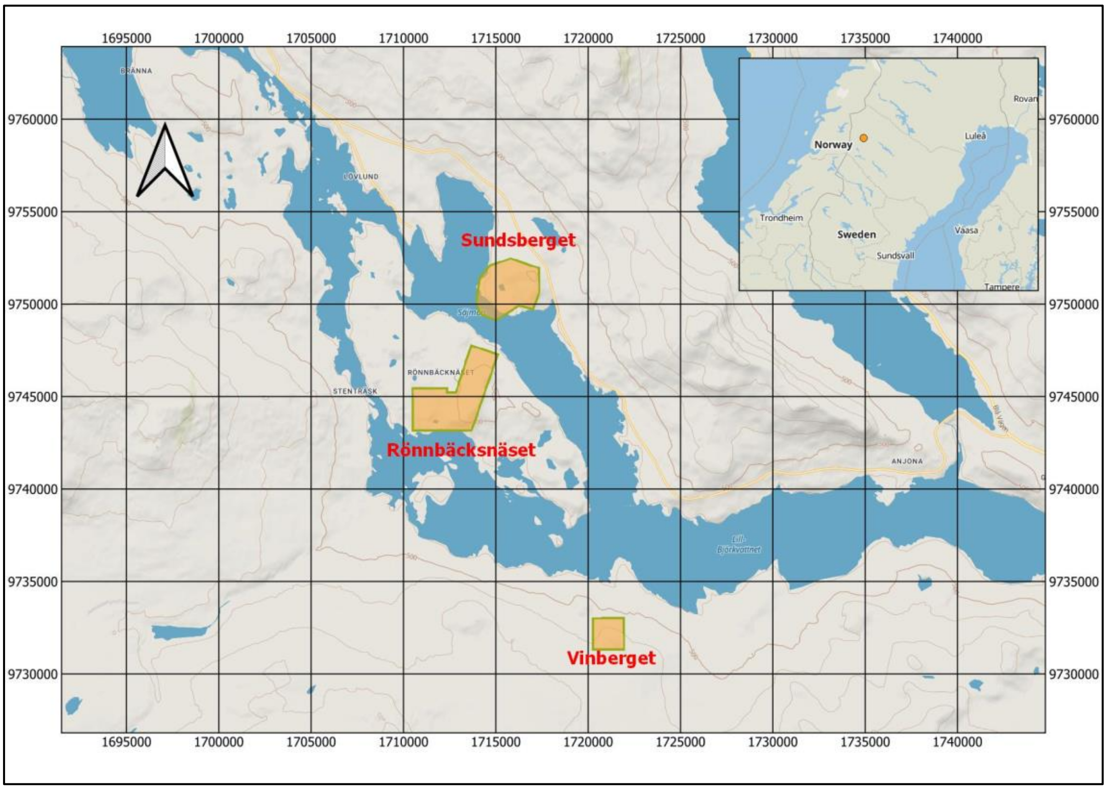

Figure 1-1: Rönnbäcken Project and exploitation concessions locations

1.3 Geology

The Project is located in the Swedish Caledonian mountains and is hosted by rocks which formed approximately 400 to 510 million years ago (“Ma”). The geology in the Rönnbäcken area is dominated by the Köli Nappe consisting of phyllite and felsic to mafic metavolcanics and nickel bearing ultramafic rocks. The ultramafic rocks occur as lenses of various sizes over the Project area together covering an area of roughly 15 km^2.

The nickel-sulphide mineralization which is the target of the proposed mining operation is hosted by serpentines, tectonically displaced from the mantle into the crust, and is considered to be of epigenetic origin and to have formed during the release of nickel from olivine through a process of alteration and serpentinization of the precursor dunite and peridotite rocks.

The Rönnbäcksnäset deposit comprises two separate serpentinized orebodies separated by between 80 m and 140 m of chloritic phyllite. The orebodies dip at approximately 45° west in the north and flatten out into a bowl-shaped geometry to a dip of roughly 30° north in the southwest. The deposit has a strike length of roughly 2.4 km and a width of up to 400 m at its widest point. The Vinberget deposit comprises a single homogeneous serpentenised tabular-shaped orebody (up to 350 m thick, 300 m wide and 700 m long) which dips steeply to the northeast and plunges to the northwest. The Sundsberget deposit consists of a single serpentinite body that strikes in a north-northeast to south-southwest orientation and dips at roughly 30° to the west northwest. The deposit extends for roughly 1.2 km along strike and is between 500 m and 600 m in width.

1.4 Mineral Resources

The most recent previous Mineral Resource estimate ("MRE") for the deposits was produced in August 2012. The updated Mineral Resource statement herein utilises the same 2012 block models, as no additional geological information has been collected since 2012, but has been updated to reflect the requirements of the Canadian Institute of Mining, Metallurgy, and Petroleum ("CIM") Definition Standards on Mineral Resources and Reserves (Canadian Institute of Mining, Metallurgy and Petroleum (CIM) 2014). These standards require the Mineral Resource to demonstrate '*reasonable prospects for eventual economic extraction'* ("RPEEE"). This was completed by completing an updated pit optimisation and cut-off grade analysis. Grades of total nickel ("Ni_T"), sulphidic nickel ("Ni_S"; namely, nickel bound in sulphide minerals), sulphidic cobalt ("Co_S") and total iron ("Fe_{Total}") were estimated into the models along with density for tonnage reporting.

The updated Mineral Resource statement produced by SRK as part of this PEA update is provided in Table 1-1. The statement is constrained to a conceptual open pit shell based on technical parameters along with metal selling prices described within the report.

Table 1-1: Rönnbäcken Mineral Resource Statement updated PEA 2022*

Deposit	Mineral Resource Category	Tonnes (Mt)	Ni_T (%)	Ni_S (%)	Co_S (%)	Fe_{total} (%)
Rönnbäcksnäset	Measured	-	-	-	-	-
	Indicated	270	0.18	0.10	0.003	5.5
	Measured + Indicated	**270**	**0.18**	**0.10**	**0.003**	**5.5**
	Inferred	10	0.17	0.09	0.004	5.1
Vinberget	Measured	30	0.19	0.13	0.006	5.2
	Indicated	20	0.18	0.14	0.006	5.1
	Measured + Indicated	**50**	**0.19**	**0.13**	**0.006**	**5.2**
	Inferred	10	0.18	0.14	0.007	5.2
Sundsberget	Measured	-	-	-	-	-
	Indicated	280	0.17	0.09	0.003	5.9
	Measured + Indicated	**280**	**0.17**	**0.09**	**0.003**	**5.9**
	Inferred	-	-	-	-	-
Total (Measured & Indicated)	**Measured**	**30**	**0.19**	**0.13**	**0.006**	**5.2**
	Indicated	**570**	**0.18**	**0.10**	**0.003**	**5.7**
	Measured + Indicated	**600**	**0.18**	**0.10**	**0.003**	**5.7**
Total (Inferred)	**Inferred**	**20**	**0.18**	**0.11**	**0.005**	**5.2**

**Notes:*
(1) The Effective date of the Mineral Resource Statement is 28 January 2022.
(2) The QP responsible, for the Mineral Resource, Dr Mike Armitage, has not visited site. Site visits were undertaken by Mr Johan Bradley (previously of SRK) in February 2011 and Mr Ben Lepley of SRK in September 2021. Technical work was undertaken by a team of consultants overseen by Dr Armitage.
(3) The Mineral Resource reported for Rönnbäcksnäset, Vinberget and Sundsberget deposits has been constrained within a Lerchs-Grossman pit shell defined by a marginal cut-off-grade of 0.05% Ni_S, a nickel metal price of USD 10/lb (USD 22,046/t), cobalt selling price of USD 26/lb and iron ore selling price of USD 1.47/dmtu; slope angles of 48º, 48º and 49° respectively; a mining recovery of 95%; a mining dilution of 2.5%; a base mining cost of USD 1.53/tonne mined and an incremental mine operating costs of USD 0.07/tonne/10 m below a reference RL; process operating costs of USD 6.00/tonne ore; G&A costs of USD 0.50/tonne ore and rehabilitation/closure cost of USD 0.17/tonne ore.
(4) The pit shell has been constrained to exploitation concession boundaries. No other factors were used to constrain the Mineral Resource such as environmental and social, permitting or land use.
(5) There is no guarantee that Inferred Mineral Resources will convert to a higher confidence category after future work is conducted.
(6) Mineral Resources are reported as undiluted and no mining recovery has been applied.
(7) Tonnages are reported in metric units and have been rounded to the nearest 10 Mt.

1.5 Mining

The mining at Rönnbäcken is envisaged to be completed using three separate open pit mines feeding a single processing plant in a central location. Multiple scenarios were tested including varying production rates and equipment choices. A pit optimisation study was completed to provide the schedule of material to feed the technical economic model. The schedule assumes mining 30 Mtpa of ore over a life of mine of 20 years.

The approach to costing the mining aspects of the Project is conceptual in nature, based on benchmark information and has an approximate ±50 % accuracy level. The granularity of overall capital and operating cost estimates are therefore insufficient to run sensitivities on fuel price for example. While this approach is considered by SRK to be suitable for a PEA level of study of the robustness of the mine, for future detailed studies, SRK recommends a first principles mining cost calculation based on a detailed haulage analysis for each mine.

The major engineering and maintenance of the large fleet is assumed to take place on site, and the infrastructure and labour complement required to achieve this is included in the estimate. It is recommended that further detailed studies investigate equipment maintenance contracts for major parts maintenance off-site, with only minimal maintenance required on site. This might reduce up-front capital cost but would increase operating cost. As part of the mining trade-off studies, options for electrification of mining fleet was investigated albeit at a high level.

1.6 Processing

Metallurgical testwork has demonstrated that a high-grade nickel concentrate with acceptable impurities can be produced at 80% nickel recovery albeit that a fine grind of 80% -50 µm is required. Magnetite production is feasible, but the particle size will be very fine compared to normal magnetite concentrates and iron recovery and concentrate grade and impurity levels require further testwork to confirm the metallurgical performance.

1.7 Infrastructure and Logistics

The site is located near to established national road (E12) and the rail infrastructure of the “Inland Railway Line” (Swedish: *Inlandsbanen*). The Project is between 140 km and 280 km from port infrastructure. The nearby town of Storuman already has a working inland logistics hub (“NLC Storuman”). The Swedish electricity market is well developed, provides low-cost power, with a high penetration of renewables generation, especially in the northern regions. The Project lies adjacent to the Ajaure hydroelectric power plant and high voltage transmission grid. Key to success will be the ability to permit the infrastructure areas and establishment of the dedicated project access road between the site and rail infrastructure. There is the opportunity to assess extending the railway to the site. Electrification of transportation systems and other decarbonising strategies will be investigated further in future studies.

1.8 Water Management

No site-specific data relating to the water environment has been collected to date. A high degree of uncertainty therefore surrounds water management requirements and the associated risks to the project at present. This applies especially to the risk of significant hydraulic connection between the proposed pits and Lake Gardiken. The potential costs for water management, particularly dewatering of the pits, are currently unknown, have not been included in the economic analysis and so these have potential to increase once this has been done.

1.9 Waste Management

SRK has completed a PEA level assessment identifying a series of in-lake and on-land slurry tailings storage options for the Project. A total of ten alternatives were modelled, in proximity to the proposed open pit locations. A number of feasible options were identified for consideration at future study stages; however, Option A was selected as the basis for PEA cost estimation. This site is located in close proximity to the Rönnbäcksnäset open pit, occupies minimal land space and ranked favourably as part of an multicriteria assessment of environmental and social criteria.

The proposed TMF concept consists of initial sub-aqueous tailings disposal in segregated area within an existing man-made reservoir. A series of rockfill dams will be constructed to prevent migration of tailings downstream. These will be designed to retain the tailings particles and act as a drain. The dams will include a filter zone on the tailings side for restricting the movement of fine particles with the groundwater flow. The tailings will ultimately be constructed above the level of the existing reservoir and will be contained by perimeter dykes around portions of the northern and southern flanks. Diversion channels will be designed, to divert clean runoff around the impoundment.

Preliminary testwork on acid rock drainage (“ARD”) potential in 2011 described the waste rock and tailings have a very low content of sulphur and a relatively high neutralization capacity. The worst-case sulphur concentrations are considered to be low or moderately high but high enough to be subjected to further evaluation according to Swedish Regulatory requirements. One of these, the ordinary schist has a high enough neutralization potential to be classified as “inert waste”. In order to be prepared for possible ARD problems, the other two waste rock types should be subject to further studies using kinetic tests.

The estimated project capital estimate for tailings management assumed by the PEA presented in this report is USD 45 M with the remaining sustaining capital and operating costs assumed to be split evenly across the project lifespan (USD 17 M per annum, equating to USD 334 M in total). These estimates include an allowance for EPCM and contingencies.

1.10 Environmental, Social and Governance (ESG)

The Project envisaged herein could potential supply locally-sourced, low-carbon intensity material for the burgeoning battery manufacturing industry in northern Europe; however, along with these potential opportunities, the Project also presents a number of potential risks to the environment and local communities in the area. Notably, the Project received exploitation concessions for the three deposits following a preliminary environmental and social impact assessment (“ESIA”; Swedish: *Miljökonsekvensbeskrivning*, “MKB”).

While SRK has not deemed any of the environmental, social and governance (“ESG”) risks and issues noted in this PEA to be of sufficient risk to impact on the reporting of Mineral Resources according to the RPEEE criteria, SRK is aware there is a vocal opposition - particularly regarding concerns attributed to the potential impact on the Sámi reindeer husbandry – and significant effort will be required to ensure all potential negative impacts are assessed, avoided, minimised and/or mitigated. SRK notes there are investigations ongoing by the State into the process of awarding exploitation concessions but currently the concessions are in place for the Project. However, prior to start-up of operations, additional environmental permits are required following completion and approval of the detailed ESIA (referred to as MKB2).

Notwithstanding the above, the Project is covered by active mining rights and has gained support from local government and the Swedish Geological Survey through the designation of the area as of national interest for mineral extraction.

The next stage in the environmental and social assessment will be a detailed ESIA (MKB2) that will be conducted alongside the PFS in addition to continued stakeholder engagement.

1.11 Capital and Operating Costs

Capital and operating costs have been estimated for the main economic drivers of the Project for the purpose of the PEA presented in this report. Three main scenarios were analysed based on electrification of vehicles:

- Scenario 1: current technology case assumes mining equipment is commercially available and will consist of a diesel-powered fleet. It assumes that in year 12, the mine would have developed sufficiently to implement a trolley assist type system and or other technology to enable the mining operating cost to be reduced by 20%.
- Scenario 2: optimistic case assumes that due to technological developments mining operating cost can be reduced by 20% from the start-up of operations.

- Scenario 3: fully electric case assumes mining equipment is fully electric from start-up of operations, associated with the lowest environmental impact.

A summary of the capital cost estimate over the life of mine (“LoM”) is presented in Table 1-2 for the three scenarios. SRK notes 100% of the capital for the plant and infrastructure, 80% of the mining capital and 12% of the tailings capital is required in the first two years (construction period) and the remaining is spread throughout the following 20 year operational period.

A summary of the operating cost estimate over the LoM is presented in Table 1-3 for the three scenarios.

Table 1-2: LoM capital cost estimate summary

Item	Unit	Scenario 1 LoM Cost	Scenario 2 LoM Cost	Scenario 3 LoM Cost
Mining	USD M	309	309	352
Processing plant	USD M	870	870	870
Infrastructure	USD M	232	232	232
Tailings	USD M	379	379	379
Total	**USD M**	**1,789**	**1,789**	**1,832**

Table 1-3: LoM operating cost estimate summary

Item	Scenario 1		Scenario 2		Scenario 3	
	Rate	LoM Cost (USD M)	Rate	LoM Cost (USD M)	Rate	LoM Cost (USD M)
Mining	1.68 USD/t	1,567	1.53 USD/t	1,429	1.53 USD/t	1,429
Processing	5.99 USD/t	3,514	5.99 USD/t	3,514	5.99 USD/t	3,514
Sub-total-		**5,082**	**-**	**4,944**	**-**	**4,944**
Royalty	0.2%	20	0.2%	20	0.2%	20
Carbon Tax	133 USD/t CO_2	131	113 USD/t CO_2	120	-	-
Closure	-	50	-	50	-	50
Total		**5,282**		**5,133**		**5,013**

1.12 Economic Analysis

The following commodity prices have been applied in the PEA as requested by the Company:

- Nickel: USD 10/lb (USD 22,046/t).
- Cobalt: USD 20/lb (USD 44,092/t).
- Iron: USD 1.13/dmtu (which results in USD 74.6/t for concentrate at 66% Fe).

SRK notes the nickel price applied is higher than the range of current (2022 Q1) consensus market forecasts that SRK subscribes to independently, and more in line with current spot prices (in excess of USD 24,000 t as at 10 February 2022).

The following smelter terms have been applied, based on SRK’s experience of similar projects:

- payabilities of 93.5% for Ni and 55% for Co;
- Ni concentrate treatment charge: USD 225/t concentrate;
- Ni refining charge: USD 1/lb Ni payable; and
- Co refining charge: USD 2.75/lb Co payable.

Freight cost assumptions are as follows:

- Ni concentrate: USD 85.1/t dry; and
- Fe concentrate: USD 31.1/t dry.

Cashflows presented below are presented post tax and pre finance. As advised by the Company, SRK has applied a corporate income tax of 20% on taxable profit. Depreciation has been modelled at 12.5% annually of the open balance. No opening book value (for depreciation purposes), working capital or value added tax ("VAT") movements have been considered in this assessment.

A royalty of 0.20% of net revenue has been allowed for. A carbon tax of USD 133/t carbon dioxide ("CO_2") has been applied to all direct (scope 1) emissions (diesel fuel for mining fleet). This is based on the standard 2021 rate of SEK 1,200/t CO_2 applicable to industries and individuals burning fossil fuels.

A base discount rate of 8% has been used for NPV determinations.

A summary of the cashflow analysis results from the PEA are provided in Table 1-4. Scenario 2 benefits over Scenario 1 from a lower unit operating cost. Scenario 3 has this same mining operating cost, but at a higher capital expenditure due to the cost of electric mining fleet over diesel fleet; however, the electric case benefits from the lack of carbon tax payments. This means that Scenario 3 results in the best Net Present Value ("NPV"), albeit at a slightly lower Internal Rate of Return ("IRR") than Scenario 2 due to the elevated project capital.

A sensitivity of NPV was undertaken, with the highest sensitivity shown with respect to nickel prices, where Scenario 1 and 2 return negative NPV if the Ni price drops below USD 19,000/t. SRK notes approximately 20 to 25% of the revenue is generated by the iron concentrate and this is deemed an essential part of the economic success of the Project with current thinking. SRK also notes 100% of the capital cost required for the plant and infrastructure, 80% of the mining capital and 12% of the tailings capital is required in the first 2 years (construction period) and the remaining is spread throughout the following 20 year operational period.

Table 1-4: PEA cashflow analysis results

Item	Unit	Scenario 1	Scenario 2	Scenario 3
Net Free Post-Tax Cashflow	(USD M)	2,176	2,295	2,356
Post-Tax NPV (8%)	(USD M)	465	538	547
Post-Tax IRR	(%)	13.5	14.5	14.4
Post-tax Payback Period	(Years)	6	6	6
Net Free Pre-Tax Cashflow	(USD M)	2,771	2,919	2,996
Pre-tax NPV (8%)	(USD M)	713	804	819
Pre-tax IRR	(%)	16.0	17.1	17.0

1.13 Interpretation and Conclusions

The Project is a high-tonnage, low-grade nickel-cobalt deposit amenable to mining through open pit mining from three separate deposits. It is envisaged that the processing plant flowsheet will include a three-staged comminution circuit followed by flotation to produce a nickel concentrate (with cobalt credits). In addition, magnetite will be recovered by magnetic concentration and sold as an iron ore by-product.

The current Project envisages road transport for concentrates to Storuman from where it is loaded on to trains for transport onwards towards ports on the east coast of Sweden. Currently the nickel-cobalt concentrate is expected to be sold to a third-party nickel smelter although a bioleaching plant may also be a viable route.

This PEA assessed a number of options for mining, processing, infrastructure, logistics and tailings management. The main economic scenarios tested were using current technology (diesel-powered vehicles), an optimistic operating cost scenario (where early electrification allows for a reduction in costs) and a fully-electrified scenario.

SRK expects the fully electric scenario would be preferable for the majority of stakeholders; however, the required technology assumed in this case is not currently available and is still in development. Given the likely timescale of environmental permitting in addition to detailed technical studies, SRK expects the required technology to be at a more advanced stage of development and therefore considers this a potentially viable solution. SRK notes the three scenarios in the TEM currently show similar economic results due to the relatively high cost of capital costs for all scenarios compared to the more variable operating costs. The impact of savings later in the mine life are also minimised by the effect of the discount rate. SRK also notes the Fe concentrate makes a significant contribution to Project revenue

1.14 Recommendations

The next stages for the Rönnbäcken Project are to initiate PFS alongside a detailed environmental and social impact assessment (MKB2). It is expected the PFS and ESIA studies will require approximately 18 months to complete including field studies, drilling, sampling, testwork, analysis and reporting. On completion, an application for an environmental permit will be submitted. Approval of environmental permits is a lengthy and complex process that cannot be predicted accurately at this stage.

2 INTRODUCTION

The Project comprises three nickel sulphide deposits: Rönnbäcksnäset, Vinberget and Sundsberget. It is located in the Storuman municipality of Västerbotten County in northern Sweden, approximately 35 km south-southeast of the town of Tärnaby and 300 km northwest of the city of Umeå. The Project is accessible by road and an airport is located close to Tärnaby (Hemavan-Tärnaby airport). The Project is located around Lake Gardiken; a man-made reservoir formed after the River Umeå (Swedish: *Umeälven*) was dammed for hydroelectric power. The Ajaure hydroelectric dam in located 12 km downstream of the Project. The Rönnbäcksnäset deposit is on an island of the same name within Lake Gardiken; Sundsberget and Vinberget are on the northern and southern shores of the lake, respectively.

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The Project is at a conceptual stage, but it is currently envisaged that it will comprise three open pit mines feeding a single processing operation producing both a nickel sulphide concentrate (including cobalt credits) and a magnetite concentrate through conventional flotation and magnetic separation.

2.1 Report Contributors

The work undertaken by SRK in compiling this report has been managed by Mr Ben Lepley (CGeol, MIMMM) and reviewed by Dr Mike Armitage (CGeol, CEng, MIMMM) and Mr Rick Skelton (CEng, MIMMM). Dr Armitage is the Qualified Person (“QP”), as defined in CIM Definition Standards, for the Mineral Resource statement. The details of the various contributing authors and their respective areas of technical responsibility are presented in Table 2-1. It should be noted that, although SRK takes responsibility for the economic analysis section of this report, the metal selling prices were provided by the Company.

As part of this work, SRK has undertaken site visits and made first-hand observations of the core, collection and core logging procedures employed and reviewed all the Project data available. The most recent site visit was undertaken by Mr Ben Lepley in September 2021. A previous visit was undertaken by former SRK employee and geologist Mr Johan Bradley in February 2011 as part of the 2011 PEA.

Table 2-1: Contributing authors and respective area of technical responsibility

Contributing Author	Area of technical responsibility	Sections of this report
Rick Skelton	Reviewer	15-19, 21-22* (review)
Mike Armitage	MRE QP	2-14 (review)
David Pattinson	Processing and metallurgy	13, 17, 21, 23, 24
Hanno Buys	Mining	16, 21, 22*, 23, 24
Michael Di Giovinazzo	Geotechnical assumptions	16.1, 23, 24
Colin Chapman	Infrastructure and logistics	18, 21, 23, 24
Murray McGregor and Hannah Wickham	Tailings management	18.1, 23, 24
Carl Williams	Acid rock drainage	18.2, 23, 24
James Bellin	Water Management	18.3, 23, 24
Fiona Cessford	ESG	20 (review)
Inge Moors	Technical economic model	22*
Ben Lepley	ESG, Project Manager	All sections

**Note: SRK takes responsibility for the economic analysis section but relied on metal selling prices provided by the Company.*

2.2 Reporting Standards

The Company is listed on the Nordic Growth Market Small-Medium Enterprise stock exchange ("NGM Nordic SME") based in Stockholm trading under the ticker 'BLUE'. The NGM Nordic SME does not have any requirements in terms of Mineral Resource or Mineral Reserve reporting standards. Notwithstanding this, the Mineral Resource is reported according to Canadian Institute of Mining, Metallurgy, and Petroleum ("CIM") Definition Standards on Mineral Resources and Reserves ("CIM Definition Standards"). These standards are internationally recognised and allow the reader to compare to similar projects. The definitions and requirements within the CIM Definition Standards are aligned with the Committee for Mineral Reserves International Reporting Standards ("CRIRSCO") reporting template and as such is an internationally recognised reporting standard comparable to other recognised international reporting codes such as the SAMREC code of South Africa and the JORC Code of Australia.

3 RELIANCE ON OTHER EXPERTS

SRK has authored the report and takes responsibility for the content. A number of sections are modified extracts from the 2011 PEA (SRK Consulting (Sweden) AB 2011) and the 2009 technical report entitled “Technical Report on the Preliminary Assessment of Rönnbäcken Nickel Project, Sweden” by Scott Wilson Roscoe Postle Associates Inc. (“Scott Wilson RPA”) on behalf of former owners IGE Nordic AB (Scott Wilson RPA 2009). The opinions and conclusions presented in the Scott Wilson RPA Report are based largely on information and technical reports provided to the authors by the previous operators and its consultants. The additional information reviewed in preparing this report has also largely been provided directly by the Company and its associated consultants, contractors and business partners.

Notwithstanding the above comment, SRK conducted face to face meetings with the consultants responsible for certain technical aspects of the Project as part of this PEA update. This included the exploration data capture undertaken by IGE staff, mining and infrastructure aspects undertaken by Rolf Ritzén of Ritzén Consult, preliminary environmental and social impact assessments (“ESIA”, Swedish: M*iljökonsekvensbeskrivning, “MKB”*) undertaken by Per Broman of Per B Consult and tailings management facility design undertaken by Tom Lundgren of Ambiental.

SRK has also confirmed that the Mineral Resource reported herein is within the exploitation concession boundaries and that the exploitation concessions as presented by the Company reflect the publicly available information at the Mining Inspectorate of Sweden. SRK has not, however, conducted any legal due diligence on the ownership of the exploitation concessions themselves.

The metal selling prices used for the pit optimisation and economic analysis were provided by Bluelake Mineral AB.

4 PROPERTY DESCRIPTION AND LOCATION

The following section outlines the location and property description of the Project. The section also presents the current and expected status of permitting for the project. Information summarised here is mainly extracted from the 2011 PEA (SRK Consulting (Sweden) AB 2011).

4.1 Property Description

The Project is a nickel-cobalt disseminated sulphide deposit hosted by ultra-mafic serpentenite bedrock. The Project is currently at an advanced exploration stage with significant exploration through geophysics, geochemistry, drilling and trial mining conducted to date. No mining has been conducted on the site to date with the exception of a small trial pit close to the Vinberget deposit developed by Boliden in the 1970s.

The Project is currently covered by three exploitation concessions covering a total area of 245 hectares (2.45 km^2) enclosed with areas of national interest for mineral development of 2030 hectares (20.3 km^2) and associated mining industrial area of 1280 hectares (12.8 km^2).

Following this PEA, the Company aims to conduct a PFS in addition to environmental and social impact assessment ("ESIA") starting in 2022.

4.2 Location

The Project is located 35 km by road south-southeast of Tärnaby, Storuman Municipality, Västerbotten County, as illustrated in Figure 4-1. The Project currently comprises three discrete deposits: Rönnbäcksnäset, Vinberget and Sundsberget. The Rönnbäcken K nr 1 exploitation concession covers the Vinberget deposit on the mainland south of Lake Gardiken. The Rönnbäcken K nr 2 exploitation concession is located on what now is an island, Rönnbäcksnäset, in Lake Gardiken and covers the Rönnbäcksnäset deposit. The island was created in 1963 when a hydroelectric power station was built and raised the water levels. The Rönnbäcken K nr 3 exploitation concession is located on the mainland northeast of Lake Gardiken and covers the Sundsberget deposit. The relative locations of the exploitation concessions are shown in Figure 4-2.

Figure 4-1: Rönnbäcken Project location

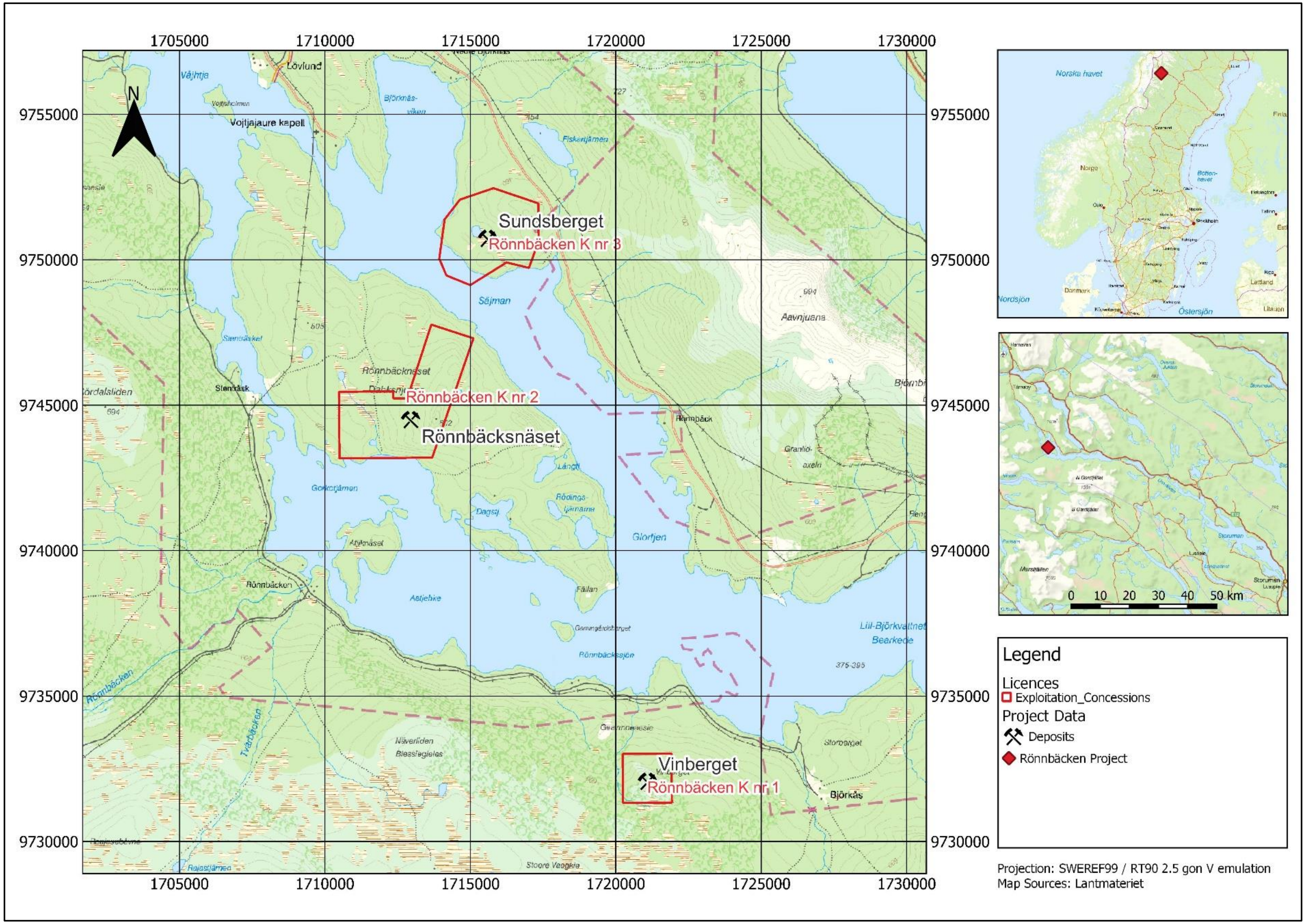

Figure 4-2: Rönnbäcken Project location and exploitation concession boundaries

4.3 Coordinate Systems

Unless otherwise specified, the coordinates used for the Project are in SWEREF99 (SWEREF99/RT90 2.5gonV; EPSG:3006). This system replaced the previously used RT90 coordinate system in Sweden in 2003.

Longitude/latitude coordinates for the Project are approximately 65° 31' 1.56"N, 15° 23' 20.04" E.

4.4 Permitting

Rules and regulations pertaining to mining exploration in Sweden are outlined in the latest (2006) 'Guide to Mineral Legislation and Regulations in Sweden' by the Geological Survey of Sweden (Swedish: *Svenska Geologiska Undersökning, "SGU"*[1]). The Mining Inspectorate of Sweden (Swedish: *Bergsstaten*) also provides clear directives, available from the Mining Inspectorate website[2], for conducting exploration. Another useful link that summarizes these laws and guidelines is 'A Guide to Mineral Legislation and Regulations in Sweden' published in 1995[3].

4.4.1 Sweden legislation

The key Swedish legislation relevant to the mining projects is outlined in Table 4-1. Sweden is a member of the European Union and as such is subject to the Directives and Regulations of the European Parliament and its Commission. European Directives must be transposed into member states legislation that often merely reference the text of the Directives. Key directives applicable to the project and details of their requirements are outlined in Table 4-2

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[1] SGU Website: www.sgu.se
[2] Bergstaten: www.bergsstaten.se
[3] Geonord Website: www.geonord.org/law/minlageng.html

Table 4-1: Legislation pertinent to mining projects

Law	Summary	Responsible Authorities
Minerals Act, *Minerallag* (1991:45) last amended 01 March 2021 (law 2021:120)	Applicable to the exploration and exploitation stages of mine development. The Minerals Act is administered by Mining Inspectorate with input from local government and the environmental courts.	Ministry of Economic Affairs (Swedish: *Näringsdepartementet RSN)* Chief Mining Inspector at the Mining Inspectorate *(Swedish: Bergstaten)*
Minerals Regulation, *Mineralförordning* (1992:285)	Instructions for use with the Minerals Act for guiding the proponent in the process of applying for exploration permits and exploitation concessions along with the requirements and obligations if approved.	
Environmental Code, *Miljöbalk* (1998:808) last amended 01 January 2021 (law 2020:1174)	Purpose of this Code is to promote sustainable development that will assure a healthy and sound environment for present and future generations. The procedure and requirements for environmental impact assessments, plans and planning documents should follow this Code. The applicant is obliged to consult Västerbotten County Administrative Board ("CAB", Swedish: *Länsstyrelsen*) or the local Environmental and Public Health Committee (Swedish: *Miljö- och folkhälsokommittén*) before submitting an application for an environmental permit and a public hearing is often held.	Ministry of the Environment (Swedish: *Miljödepartementet*); Environmental Protection Agency (Swedish: *Naturvårdsverket*); County (Västerbotten) CAB; Land and Environmental Court (Swedish: *Mark- och miljödomstolen*)
Environmental Assessment Regulation, *Miljöbedömningsförordning (2017:966)*	Instructions for use with the Environmental Code and Minerals Act with regard to ESIA. Specifically updates the requirement to undertake stakeholder engagement prior to awarding of exploitation concessions	
Reindeer Husbandry Act, *Rennäringslag* (1971:437) last amended 25 May 2018	Law relating to reindeer husbandry (Swedish: *Rennäring*) including the interaction with other land uses.	Ministry of Economic Affairs
Planning and Building Act, *Plan- och bygglag* (2010:900) last amended 02 August 2021 (law 2021:785)	Once the Land and Environmental Court has granted permission to begin operations, a construction permit is required by the local municipality. A construction permit normally takes between four and eight weeks to process and covers buildings and other facilities that need to be constructed in connection with the mining project.	Ministry of Finance (Swedish: *Finansdepartementet SPN BB*)

Table 4-2: Key EU Directives applicable to ESG in mining

Directive	Summary
EIA Directive	Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment. This was amended by Directive 2014/52/EU on 16 April 2014. Transposition of the Directive into national law was required by 16 May 2017. The developer may request the competent authority to say what should be covered by the EIA information to be provided by the developer (scoping). The developer must provide information on the environmental impact (report). The Environmental Authorities and the public (and affected Member States) must be informed and consulted, and the Competent Authority decides, taking into consideration the results of the consultations. The public must be informed of the decision and can challenge the decision before the courts.
Public Participation Directive	Directive 2003/35/EC of the European Parliament and of the Council of 26 May 2003 providing for public participation in respect of the drawing up of certain plans and programmes relating to the environment. It amends requirements relating to public participation and access to justice from Council Directives 85/337/EEC (assessment of the effects of certain public and private projects on the environment) and 96/61/EC (concerning integrated pollution prevention and control)
Habitats Directive	Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora. The Habitats Directive alongside the Birds Directive establishes the Natura 2000 Network across Europe. The network consists of protected areas across the continent and ensures the conservation of rare, threatened or endemic animal and plant species. Over 200 habitat types are targeted for conservation in their own right, and over 1,000 species.
Birds Directive	Council Directive 2009/147/EC on the conservation of wild birds – replaces Council Directive 79/409/EEC of 2 April 1979.
Water Framework Directive (WFD) Daughter directives: Environmental Quality Standards Directive (also referred to as the “Priority Substances Directive”); and Groundwater Directive	Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for community action in the field of water policy. The WFD pulls together a number different legacy pieces of legislation. The Directive requires the development of River Basin Management Plans (“RBMP”) for each river basin district. It requires surface waters be managed or improved to good ecological and chemical status, and that groundwater should not be polluted. Priority Substances: The Water Framework Directive provides for a list of Priority Substances (in Annex X). The Environmental Quality Standards (EQS) Directive, a daughter directive of the Water Framework Directive (officially named “Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy”) set the quality standards as required by Article 16(8) of the Water Framework Directive. The Groundwater Directive (Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration) is the other daughter directive of the Water Framework Directive. Annex II sets forth threshold values for groundwater pollutants and indicators of pollution and was amended by Directive 2014/80/EU of 20 June 2014.
Floods Directive	Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. The Directive requires governments to assess flood risk, to produce flood risk maps and instigate management plans.
Drinking Water Directive	Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption. The Directive sets minimum drinking water quality standards based on World Health Organisation (“WHO”) guidelines, measured at the tap.
Mine Waste Directive	Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries. (Note this directive also amends Directive 2004/35/EC – the Environmental Liability Directive.) Several decisions have also been published implementing the requirements of the Mine Waste Directive, including - 2009/337/EC on Criteria for the classification of waste facilities in accordance with Annex III - 2009/335/EC on Technical guidelines for the establishment of the financial guarantee - 2009/360/EC on technical requirements for waste classification - 2009/359/EC on Definition of inert waste in implementation of Article 22 - 2009/358/EC on the Harmonisation, the regular transmission of the information and the questionnaire referred to in Articles 22(1)(a) and 18. Mining Waste Facilities are those in which extractive wastes are stored for a time period (a time period is not applicable to higher risk facilities) and are required to apply for and maintain a permit. Material destined for such a facility must be adequately characterised prior to deposition.
Waste Framework Directive	Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives
Industrial Emissions Directive	Directive 2010/75/EU of the European Parliament and the Council on industrial emissions is the main EU instrument regulating pollutant emissions from industrial installations. The Directive requires Operators apply Best Available Techniques, including technology, management systems and emission limits decided at a European community level.

Directive	Summary
Ambient Air Quality Directive Daughter directive: Directive 2004/107/EC	Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe. Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.
Environmental Noise Directive	Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise.
Major Accidents (Seveso Directive III)	Directive 2012/18/EU of the European Parliament and of the Council of 4 July 2012 on the control of major-accident hazards involving dangerous substances.
Environmental Liability Directive	Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage. This applies to serious environmental damage to land, water and to species and habitats.
EU Emission Trading Scheme Directive	Directive 87/2002/EC of the European Parliament establishes a trading scheme for greenhouse gas emissions across the EU. The flagship carbon directive for the EU it was the first of its kind internationally. Phase IV began in January 2021.
Energy Efficiency Directive	Directive 2012/27/EU is an EU directive that mandates energy efficiency in the EU and includes energy efficiency targets, building renovation, energy efficiency obligation schemes, energy audits, promotion of energy efficiency in heating and cooling and other rights
REACH	Registration, evaluation and authorisation of chemicals. The Regulations require essentially all products coming into the EU to be registered and is the most comprehensive and wide-reaching supplier requirement ever constructed by the EU.
European Green Deal	A raft of legislation and guidance was produced and is in progress support the EU with its 'European Green Deal' as launched in 2019. This includes the following key items relevant to mining and battery metals: • EU taxonomy (Regulation (EU) 2020/852) - a classification system, establishing a list of environmentally sustainable economic activities. • Carbon Border Adjustment Mechanism ("CBAM" – not yet legislated – this will put a carbon price on imports of a targeted selection of products so that climate action in Europe does not lead to 'carbon leakage' where carbon-intensive production to moved to outside Europe. • Battery Minerals Regulation (not yet legislated) – aiming to modernise EU legislation on batteries in order to ensure the sustainability and competitiveness of EU battery value chains.

4.4.2 Swedish permitting summary

There are four types of permits necessary to develop a metal mine in Sweden from the exploration stage to the development and operational stage: exploration permits, exploitation (mining) concessions, environmental permits, and building permits. In addition to the permits, land designation must be approved for use of land for the requested purposes (such as tailings, waste rock, supporting infrastructure).

For the purpose of reporting a Mineral Resource and the PEA, the currently valid exploitation concessions provide the Company with exclusive mineral rights to the Project.

The permits are issued by the local authority, with main permitting stages for a mining operation in Sweden graphically illustrated in Figure 4-3.

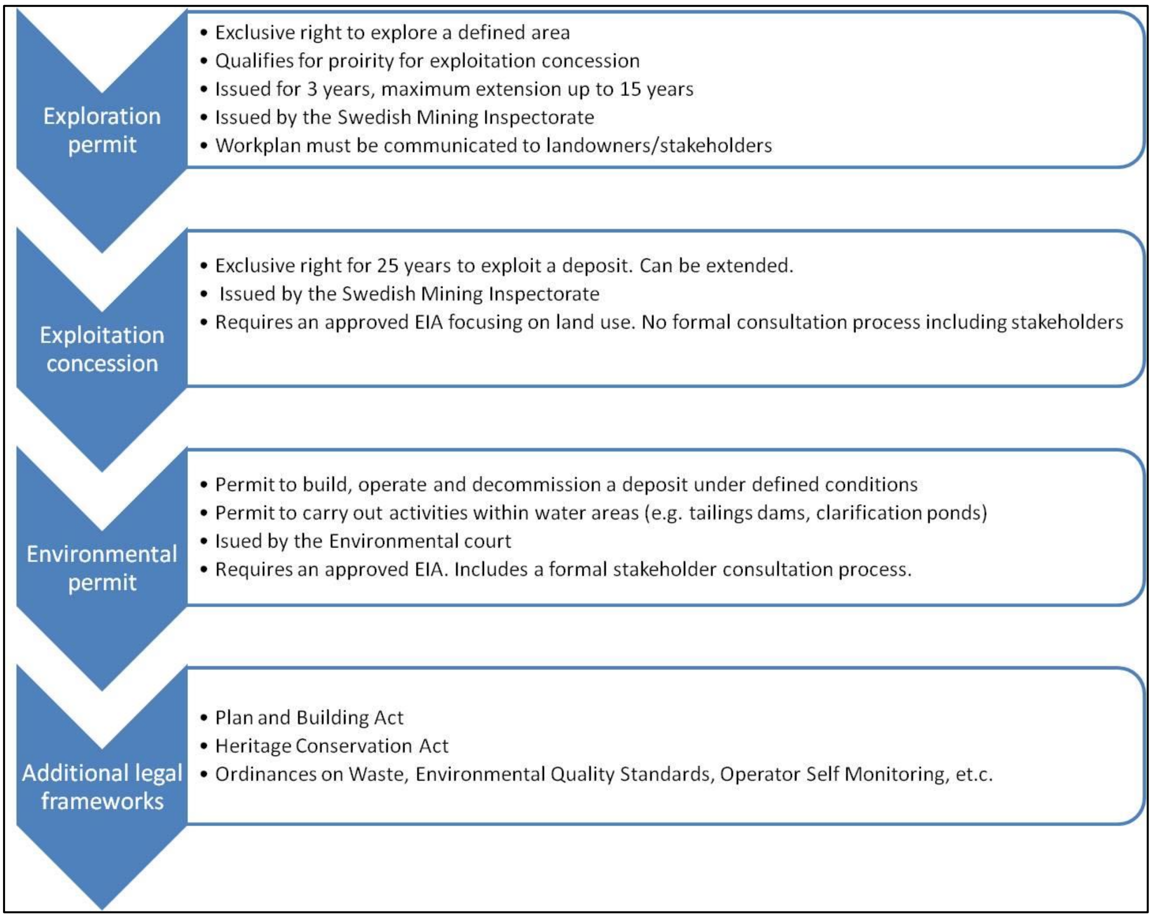


Figure 4-3: Swedish mine permitting process

Exploration Permits

Under the Minerals Act (1991, last amended 2021) exploration permits (Swedish: *undersökningstillstånd*) are issued by the Mining Inspectorate of Sweden (Swedish: *Bergsstaten*). An exploration permit allows the holder exclusive (no other parties permitted) access to land for exploration work that does not damage the environment or the land use. It does not entitle the holder to undertake exploration work in contravention of any environmental regulations that apply to the area. Applications for exemptions relating to environmental regulations are normally made to the CAB (Swedish: *Länsstyrelsen*). The exploration permit holder has the obligation to outline a work programme and gain permission from landholders prior to accessing the properties, and to provide compensation for any ground-disturbing work conducted.

Exploration permits are granted for a period of three years. They may be extended by application to 11 years and can be further extended to a maximum period of 15 years, but only in exceptional circumstances. According to Section 3 of the Minerals Act (1991, last amended 2021) a holder of an exploration permit may have priority in applying for an exploitation concession. A minimal financial assurance must be provided and guaranteed to provide for any damage and restoration. Should exploration terminate and the project not progress to mining, the exploration permit holder may have to provide a report to the Swedish Government (the "State") on the minerals explored and results.

Exploration Permits cannot be granted for land within a protected zone (National or International protection for environmental or cultural reasons) including a buffer of 1,000 m and including the following restrictions:

- must be more than 30 m from transport infrastructure such as roads and railways;
- must be more than 200 m from an inhabited building;
- cannot be on electrical infrastructure sites;
- must be more than 200 m from churches, assembly halls, hotels, hospitals or anywhere accommodating more than 50 people;
- must not be in areas of fortification;
- must not be in churchyards or burial grounds;
- must not be in certain specified mountain areas in Sweden; and
- must not be in National Parks.

Exploitation Concessions

Exploitation of a property for minerals requires an exploitation concession (Swedish: *Bearbetningskoncession*) under the Minerals Act (1991, last amended 2021), which is issued by the Mining Inspectorate. A pre-requisite for the granting of a concession is that Chapters 3 and 4 of the Environmental Code (1998:808, Swedish: *Miljöbalken*) relating to suitability of land use versus other interests (basic and special provisions respectively for the management of land and water) are complied with. Applications for a exploitation concession must be accompanied by a preliminary environmental and social impact assessment ("ESIA", Swedish: *miljökonsekvensbeskrivning 1,* or "*MKB1")* including an assessment on the impact on reindeer herding.

The applications are made to the Mining Inspectorate to be evaluated for approval by the local CAB. An exploitation concession is granted if there is a probability for economic exploitation of the deposit and if the site is considered appropriate from a mining and environmental point of view. Concessions are granted for a period of 25 years but if exploitation is ongoing the concession may roll-over without the need to submit additional applications.

The CAB has to complete the following before approving concessions:

- assess compatibility with Chapters 3 and 4 in the Environmental Code;
- decide if the environmental impact statement (MKB1) is acceptable;
- consult with and obtain opinion from local municipality (in this case Storuman);
- consult with and obtain opinion from local residents; and
- consult with and obtain opinion from local Sámi village (in this case Vapsten).

There is no requirement to legally survey the boundaries of exploitation concessions in Sweden; instead boundaries are assigned Swedish SWEREF99 (SWEREF99/RT90 2.5gonV) coordinates by the Mining Inspectorate on granting.

Environmental Permits

In addition to an exploitation concession, mining activities require an environmental permit (Swedish: *miljötillstånd*) under the Swedish Environmental Code. They are issued by the Land and Environmental Court (Swedish: *Mark- och* m*iljödomstolen*) and regulated by the Swedish Environmental Protection Agency (Swedish: *Naturvårdsverket*) in conjunction with the Västerbotten CAB (in the case of Rönnbäcken). The permit will define the conditions for the design, building, operation and closure of a mining installation. The permit application must be supported by a comprehensive ESIA (referred to as “MKB2”), which includes formal consultations with stakeholders. Decisions by the Environmental Court may (with leave to appeal) be appealed to the Environmental Court of Appeal and further to the Supreme Court.

The flowsheet of environmental permit approvals is provided in Figure 4-4; summarised from the SGU guidance along with the Environmental Code.

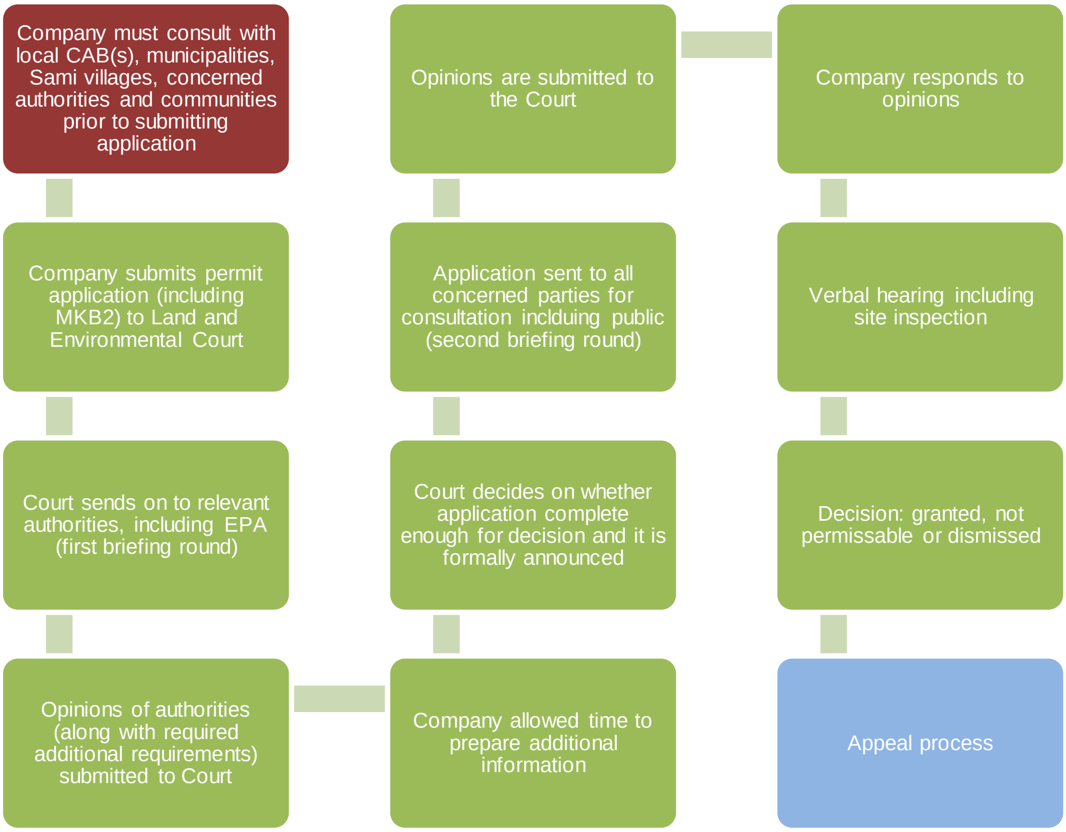


Figure 4-4: Sweden environmental permitting approvals flowsheet

Construction activities within water areas (such as tailings dam, clarification pond), requires special considerations in the application for an environmental permit. One such consideration is the right of disposition of the water, which the Company must have before the application is submitted. Right of disposition of the water is normally obtained by acquisition of the land where the water works will take place or through an easement granted either by the landowner or by an authority.

Building Permits

A building permit (Swedish: *byggnadstillstånd*) is also needed under the terms of the Planning and Building Act (2010:900; Swedish: *Plan- och bygglag*).

Land Designation

In addition to the above-mentioned permits, mining activities require an agreement with the landowner(s) or a decision by the Mining Inspectorate regarding designation of land above ground to be used for the activities.

A legal proceeding for designation of land (Swedish: *markanvisning*) is held at the request and cost of the concession-holder (Minerals Act (1991, last amended 2021) Chapter 9 Section 20). This designates land within the concession area that the concession-holder may use for exploitation of the mineral deposit. A decision is also taken regarding the land, within or outside the concession area, that the concession-holder may use for activities related to the exploitation. In this connection the nature of the activity shall be stated, such as tailings storage, waste rock or supporting infrastructure.

Water

Demonstration of the right to water directly impacted by drawdown is required as a prerequisite for submittal of the environmental permit application to the Environmental Court. Demonstration of the land access agreements for all lands required for a project, including land within the exploitation concession and land required for project infrastructure if outside the exploitation concession is required before a permit can be validated. As such, it is planned that water rights will be in place in advance of submitting the environmental permit application.

4.4.3 Permit status

A summary of the permit status as of February 2022 is given in Table 4-3.

Table 4-3: Rönnbäcken permit status

Permit Status	Rönnbäcksnäset	Vinberget	Sundsberget
Exploitation concession	Approved June 2010	Approved June 2010	Approved October 2012
Environmental permit	MKB2 to be started in 2022		
Construction permit	Building permit applications to be prepared following receipt of environmental permit		

Mining Permits

Exploitation concessions for Vinberget (Rönnbäcken K nr 1) and Rönnbäcksnäset (Rönnbäcken K nr 2) were granted in 2010 and Sundsberget (Rönnbäcken K nr 3) was granted in 2012 to then owner Nickel Mountain AB ("Nickel Mountain"), as shown in Table 4-4. The formerly active exploration permits have now expired. No other permits or approvals have been granted, including environmental, water abstraction or building permits.

Table 4-4: Exploitation concession summary details

Exploitation concession	Grant Date	Expiration Date	Area (ha)
Rönnbäcken K nr 1	23 June 2010	23 June 2035	49.00
Rönnbäcken K nr 2	23 June 2010	23 June 2035	195.75
Rönnbäcken K nr 3	01 October 2012	01 October 2037	144 .32

The granting of the exploitation concessions has received objections from the local Sámi village (Swedish: *sameby)* of Vapsten along with environmental groups and human rights advocacy groups. A summary of the exploitation concession history is provided below:

- **February 2010**: former owner Nickel Mountain applied to Mining Inspectorate for exploitation concessions Rönnbäcken K nr 1 and Rönnbäcken K nr 2. The application documents were sent for observations to the Västerbotten CAB, to affected property owners and interested parties, including the Vapsten Sámi village.
- **June 2010**: Mining Inspectorate approved concessions (nr 1 and 2), with the condition that Nickel Mountain engages in annual consultations with the Vapsten Sámi village.
- **June 2010**: Mining Inspectorate's decisions appealed to the Swedish Government (Ministry of Enterprise, Energy and Communications) by the Vapsten Sámi village.
- **June 2010**: Swedish Government rejected the appeal on the basis that, in its opinion, reindeer husbandry could operate simultaneously with mining and it is a site of national interest (Swedish: *Riksintressen*) for both reindeer husbandry and mining of critical minerals.

- **January 2011**: Vapsten (backed by other local petitioners including local Environmental Justice Organization ("EJO" named *Stoppa Gruvan I Rönnbäck*[4])) applied for a judicial review of the government decision to the Supreme Administrative Court ("SAC"; Case No. 443-11). This was on the basis that entitled persons can apply for judicial review of such decisions from the Swedish Government if it is regarding civil rights as in article 6.1 in the European Convention on Human Rights[5].
- **December 2011**: Nickel Mountain applied for exploitation concession Rönnbäcken K nr 3.
- **May 2012**: SAC revoked the Mining Inspectorate's decision to grant exploitation concessions (nr 1 and 2) on the grounds the Inspectorate had not included an assessment of which of the conflicting national interests, the mineral extraction or reindeer husbandry, should be given priority and requested a re-examination of the case.
- **October 2012**: Mining Inspectorate approved the 3rd concession (Rönnbäcken K nr 3), with the condition that Nickel Mountain engages in annual consultations with the Vapsten Sámi village. Subsequently, Vapsten appealed the decision to the State of Sweden, requesting that the three concessions be processed jointly.
- **August 2013**: in the decision by the State of Sweden, it found that the area designated as being of national interest for reindeer husbandry was considerably larger than the areas included in the exploitation concessions, so the mining concessions would only apply to a small part of the areas available for reindeer husbandry. All three concessions were reinstated.
- **October 2014**: SAC rejected the petitioners' application for a judicial review, ruling that the Government's decision concerning the three exploitation concessions was to be upheld.
- **January 2018**: a new law was passed (law 2017:961) and reflected in the Minerals Act (1991, last amended 2021) thereafter that required more engagement and consultation with key affected parties and alignment with the Environmental Code.
- **November 2020**: United Nations ("UN") International Convention on the Elimination of All Forms of Racial Discrimination ("CERD") provided an opinion on the possible human rights infringement over the handling of the exploitation concessions. They concluded: *"the petitioners' rights under article 5 (d) (v) of the Convention[6] (The right to own property alone as well as in association with others) have been violated*"; and that "*the Swedish mineral and environmental legislation violates the Sámi village's right to redress through a fair trial under article 6 (effective protection and remedies by the State)."[7]*. They recommended the State of Sweden:
    - "provides an effective remedy to the Vapsten Sámi Reindeer Herding Community by revising effectively the mining concessions after an adequate process of free, prior and informed consent ("FPIC")."
    - "amends its legislation, in order to reflect the status of the Sámi as indigenous people in national legislation regarding land and resources and to enshrine the international standard of free, prior and informed consent."

[4] Rönnbäcken Nickel Mine, Västerbotten, Sweden | EJAtlas
[5] European Convention on Human Rights (coe.int)
[6] OHCHR | International Convention on the Elimination of All Forms of Racial Discrimination
[7] The CERD Committee's decision regarding Rönnbäcken case — Sámiráđđi (saamicouncil.net)

- "give wide publicity to the Committee's (CERD) views and to translate it into the official language of the State party as well as into the petitioners' language."

- **February 2021**: State of Sweden responds to the CERD report and restates its position regarding the decision to award the exploitation concessions and its position on human rights. Under the Swedish constitution, the Government is not authorised to overturn decisions made by independent courts under the application of law.

To conclude, although the three deposits are currently covered by three separate, valid exploitation concessions, there is opposition from international, regional and local stakeholders who are seeking revocation of the concessions. The main opposition stems from a lack of requirement by law for engagement with local communities, in particular providing the Vapsten Sámi village with the opportunity for FPIC. This is considered by some to require legislative reform to align the Minerals Act, Environmental Code, Reindeer Husbandry Act and international human rights legislation, such as the European Convention on Human Rights and International Convention on the Elimination of All Forms of Racial Discrimination (Raitio, Allard and Lawrence 2020).

As a result of the discussions, the Swedish Government (Ministry of Trade and Industry) has initiated a review into the 'processes and regulations for a sustainable supply of innovation-critical metals and minerals'[8]. This review aims to ensure the Minerals Act (1991, last amended 2021) and granting of permits relating to mining projects considers environmental and societal impact, as well as economic. The review is due to be completed by October 2022.

Notwithstanding the above, the local government (Storuman Municipality) in 2011 released a zoning plan that outlined National Interest designations in the Björkvattendalen valley as part of the Storuman Municipality 2011 Master Plan[9]. This indicated that the mining areas would take precedent over the reindeer herding interests. A new master plan is likely to be produced in the coming years for which the Company must participate in discussions.

Environmental Permits

The Project does not yet have any environmental permits in place. The process of applying for the permit was started but not completed by the previous owners (IGE). Key milestones relating to the environmental permit concerning the Project include:

- Biophysical, physical, socio-economic baseline commenced between 2009 and 2011.
- Exploitation concessions granted (see above) following submission of two MKB1 studies for these projects (one for Vinberget and Rönnbäcksnäset and the other for Sundsberget).
- Designation of the Project as being of National Interest for mineral extraction by the Swedish Geological Survey in June 2010, strengthening the Company's position ahead of applying for the Environmental Permit.
- Preparation of the second MKB (MKB2) for the application of an environmental permit began in August 2010 by an initial consultation with the CAB on the content of the MKB2. This process stalled when the previous owner discontinued operations.

[8]Sweden mineral permitting overview: Swedish Review into Mineral Permitting
[9]Storuman Kommun 2011 Master plan: Kommunövergripande översiktsplan - Storumans kommun

- Project presupposes the construction of a tailings dam including clarification pond, and access road banks within a natural water area. To carry out such activities within water areas requires a "water permit" in accordance with the environmental code. The required right to apply remains to be secured by acquiring the area in question from the landowner or to receive an easement to the area from the Landowner.

The Company has not yet designed a permitting schedule or timeline; however, SRK understands the Company plans to initiate the MKB2 studies in 2022 alongside the PFS. This will require a technical team to be in place on the ground in Sweden in addition to selecting local consultants to conduct the MKB2 baseline studies; this has yet to be finalised.

4.5 Surface Rights

As long as the project proponent holds either an exploration or exploitation authorisation, it is permitted entry over that land for the purposes of the activities outlined in their authorisation; however, all activities that cause damage to that property must be paid for; either in terms of payment for damage to the landowner, or outright purchase of the property if the damage is extensive. Surface rights and rights of access to the property and other required land must be purchased or leased. Although the landowner is not considered to have a right to the sub-soil of their land, the Minerals Act (1991, last amended 2021) makes it clear that '*0.15% of the value of the mineralized rock*' must be paid to the landowner in compensation. In the event there is more than one landowner, this must be shared amongst them.

Notwithstanding this, SRK notes the final access to land and water areas is a process of negotiation that the Company will need to undertake and must be finalized before filing an application for an environmental permit.

The Company has not yet developed plans for further invasive exploration on the Project and so has not engaged with local landowners.

4.6 Environmental liabilities

SRK is not aware of any environmental liabilities on the Project area from previous mining operations. The small trial pit completed by Boliden in 1974 was visited by SRK during a site visit in 2021 with no evidence of environmental degradation visible.

4.7 Payments

SRK is not aware of any special royalties, back-in-rights, payments or any other agreements associated with the Rönnbäcken Project in addition to the 0.20% royalties prescribed by the Swedish Mining Act (1991, last amended 2021).

4.8 Ownership

The mineral rights covering the Rönnbäcken Project are held by Nickel Mountain AB, wholly owned by Bluelake Mineral AB (previously Nickel Mountain Resources AB). An organisational chart is provided in Figure 4-5.

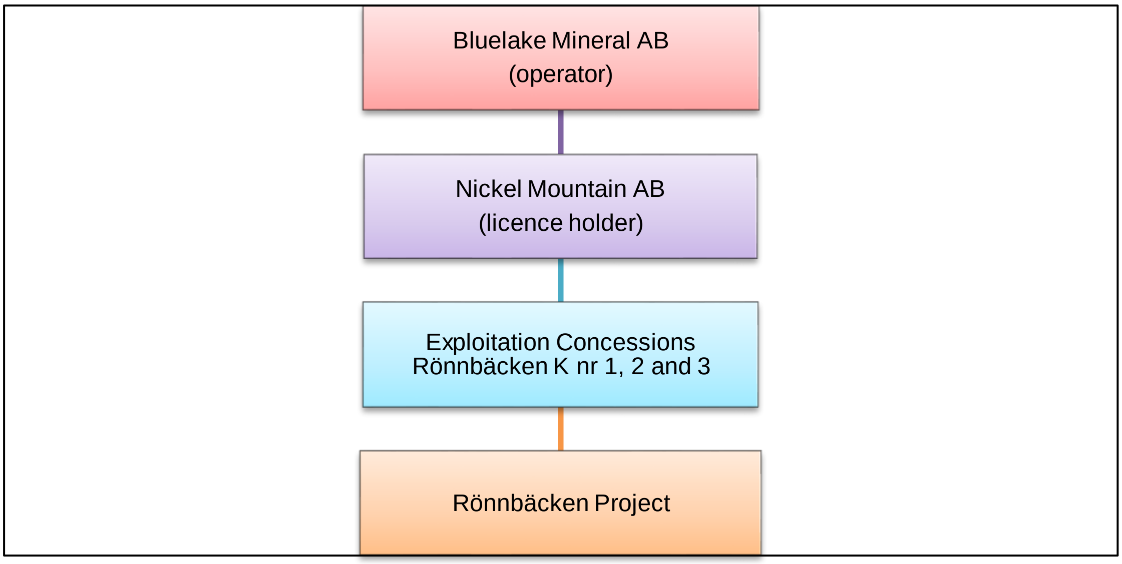


Figure 4-5: Rönnbäcken Project ownership

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

This section provides a summary of the relevant parts of the geographical, environmental and social setting of the Project that may influence the statement of Mineral Resources and the preliminary design concepts outlined in this PEA.

5.1 Property Access

The Project can be accessed from both north and south from highway E12. From the north via the town Tärnaby (E12), it is necessary to travel west for 9 km and then on gravel roads approximately 31 km passing the community of Ängesdal on the way to the project site. From the E12 in the south, over the Ajaure hydroelectric dam, it is approximately 14 km on gravel road to the Project site.

The nearest airport to the Project is Hemavan-Tärnaby Airport in Hemavan, 15 km northwest of Tärnaby and roughly 40 km from the project area. The airport has daily flights to and from Stockholm depending on the season (Figure 5-1).

Figure 5-1: Hemavan-Tärnaby airport

5.2 Physiography and Climate

5.2.1 Topography & elevation

The elevation within the exploration permits ranges from 395 metres above sea level (masl) to 666 masl; that is, a difference of approximately 270 m from the lowest to the highest point. The deposits are in low mountain terrain. The area is covered by coniferous forest, principally spruce and pine trees, except for some higher areas in which birch trees predominate, with a typical view shown in Figure 5-2.

The continental glaciation movement direction in the area is from the southeast. The till cover in the exploration permit is generally thin but can be up to 20 m thick in some places. The most frequent type of exposed lithology in the area is ultramafic rock, as this rock type has been more resistant to glacial erosion compared to the surrounding phyllites.

Figure 5-2: View from Geavmoeaesie hill (adjacent to Vinberget) looking north at Lake Gardiken and Rönnbäcksnäset island

5.2.2 Water

Water bodies

Rönnbäcksnäset island containing the Rönnbäcksnäset deposit is surrounded by the lakes which now form part of the artificial reservoir Lake Gardiken. This lake, along with the rivers and streams around the Project area, flow into the Umeå River (Swedish: *Umeälven*). The Umeå River, like most rivers in northern Sweden, flows dominantly southeast and drains into the Baltic Sea. The names of the original lake and the river sub-catchments are shown in Figure 5-3.

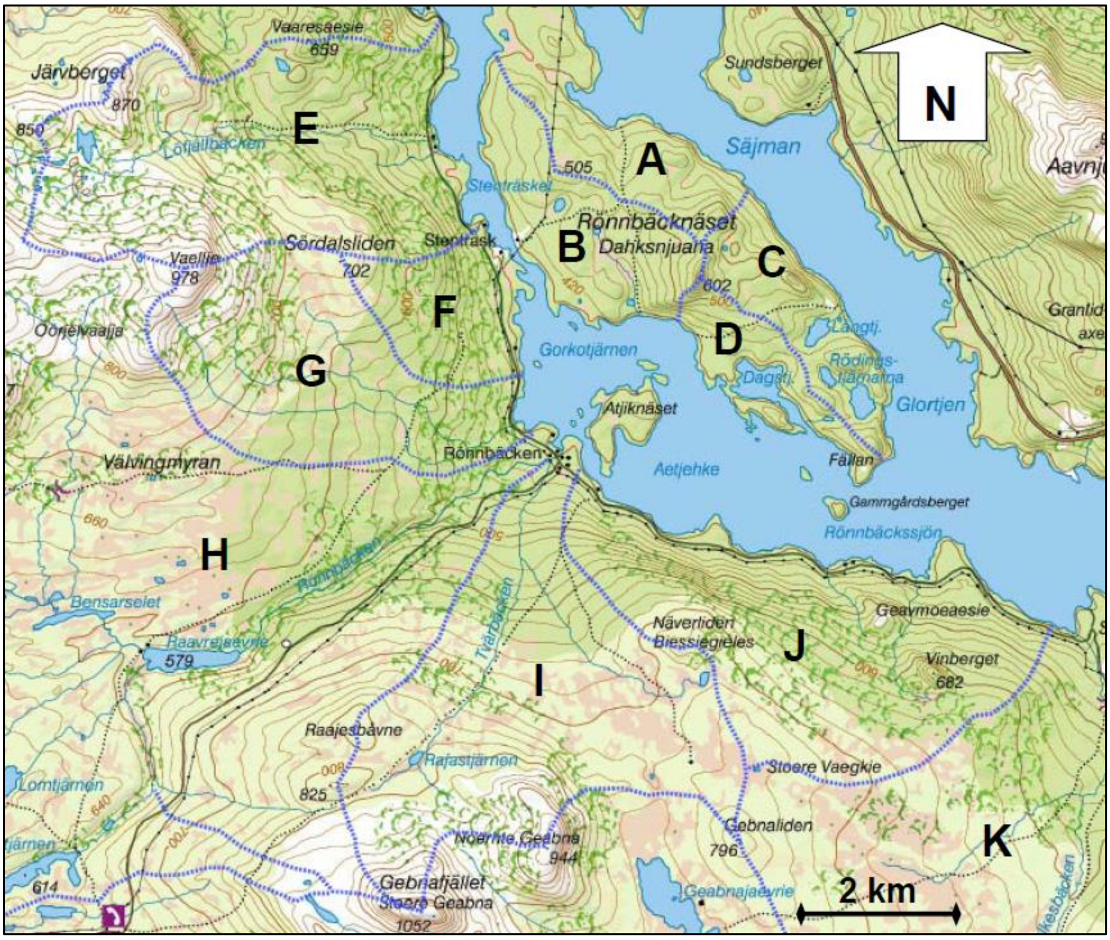


Figure 5-3: River sub-catchment boundaries (Pelagia Miljökonsult AB 2010)*

**Notes: A) Rönnbäcknäset North; B) Rönnbäcknäset West; C) Rönnbäcknäset East; D) Rönnbäcknäset South; E) Löfjällbäcken; F) Sördalsliden; G) Stallsbäcken; H) Rönnbäcken; I) Tvärbäcken; J) Näverliden; K) Björkåsbäcken*

Hydroelectric power station reservoir

Lake Gardiken surrounds the island of Rönnbäcksnäset and is controlled by Gardiken hydroelectric power station, located at the Lake Gardiken outlet in the Umeå River approximately 300 km from the river mouth. Water levels may vary throughout the year by as much as 20 m. As the lake is an artificial lake with fluctuating water levels, there are limited settlements on the lake shore and few water users.

Water quality

Preliminary water quality measurements from the 2010 MKB1 based on benthic fauna surveys determined the water quality to demonstrate "*very good environmental conditions at all premises in the area, with the exception of Location 6*" (locations shown on Figure 5-4). Assessments of ecological quality were based on Average Score Per Taxon ("ASPT"), DJ-index for eutrophication and multimeric acidity index ("MISA") and specific pollution sensitivity Index ("SPI") using benthic fauna. In addition, hydrochemistry sampling was undertaken including metal (including nickel, mercury, chromium and phosphorous) concentrations, ionic strength and absorbance. The data was compared to levels within the 2007 Environmental Protection Agency (Swedish: *Naturvårdsverket*) handbook on water quality (Naturvårdsverket 2007) and considered to be of "*high status*". No recent data on water quality has been collected for SRK to comment on.

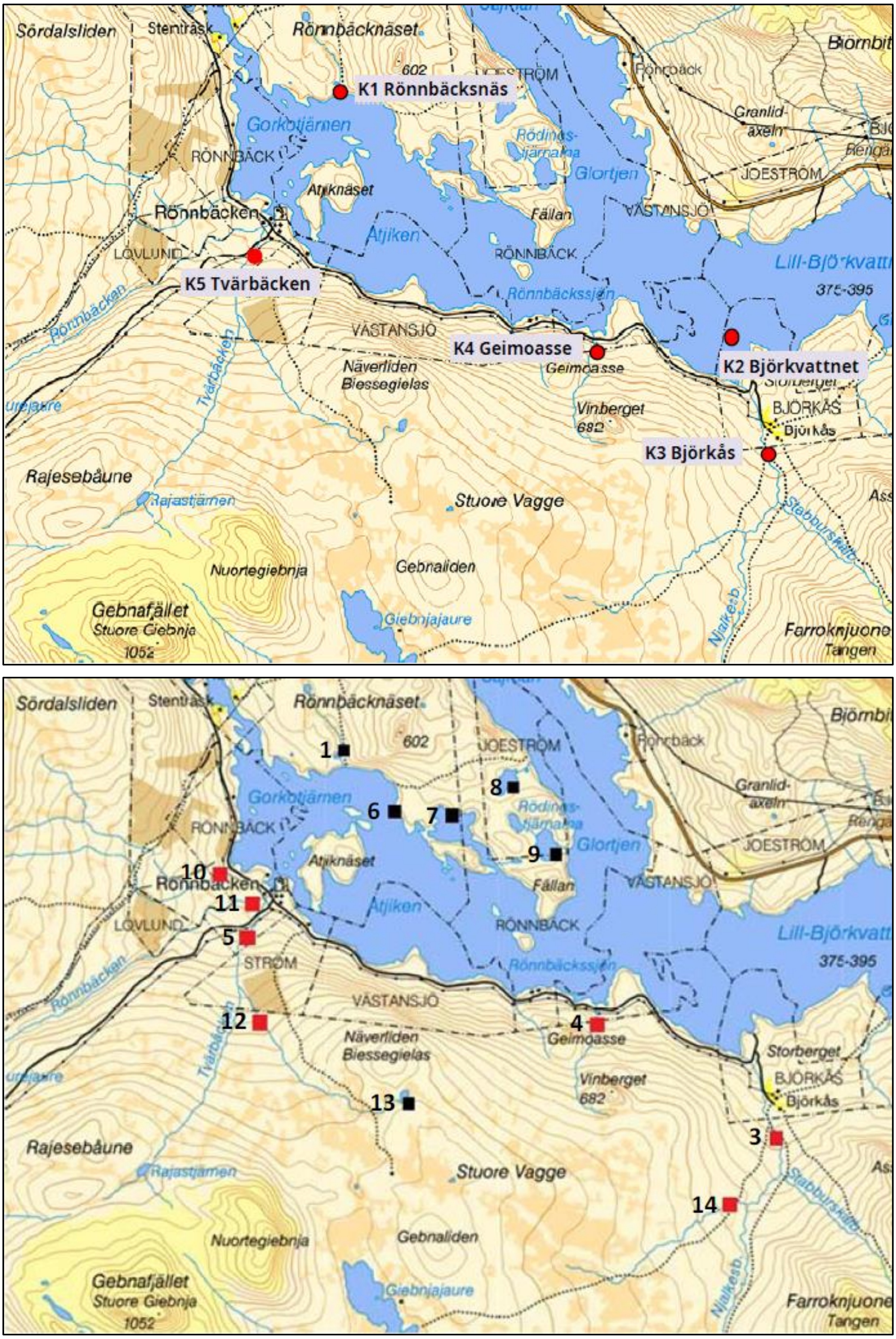


Figure 5-4: MKB1 hydro-chemistry (top) and benthic fauna (bottom) sampling locations boundaries (Pelagia Miljökonsult AB 2010)*

5.2.3 Ecology and Biodiversity

The area is split between the 'Scandinavian Montane Birch forest and grasslands' and 'Scandinavian and Russian taiga' Ecoregions[10]; however, as noted in the MKB1 studies, it has been significantly modified by human activity mainly through logging and flooding due to the Gardiken hydroelectric dam.

The area around Rönnbäcken has distinctive flora due to a combination of unique bedrock (serpentinite) and relatively low altitude for the region. This results in a diverse composition of species (termed 'Serpentinophytes'), and in some cases their distinctive habitats, rather than occurrences of rare species distinctive habitats, that constitutes the special character of the area rather than occurrences of rare species (Pelagia Miljökonsult AB 2010). The serpentenite hills in the Project areas are dominated by pine forests, whereas in areas outside the serpentenite, spruce forests are more dominant.

The fauna of the area has not been studied in detail but the MKB1 studies describe brief surveys of benthic fauna, fish and birds. The analysis described three bird species of conservation concern within the area: Eurasian three-toed woodpecker (*Picoides tridactylus*, classified under International Union for the Conservation of Nature ("IUCN"[11]) as 'vulnerable'), Siberian jay (*Perisoreus infaustus*, near-threatened) and golden eagle (*Aquila chrysaetos*, near-threatened). In addition, the Rönnbäcken and Njalkesbäcken rivers are important for the reproduction of trout. The surveys also used information from the Swedish University of Agricultural Sciences (Swedish: *Sveriges lantbruksuniversitet*, "SLU") nature database (Swedish: *Artdatabanken*) and red list (Swedish: *rödlista*).

An inventory of lichens and large fungi was completed for the Rönnbäcknäset area[12]. The dominant species identified were the border lichen (*Nephroma parile*) and the lung lichen (*Lobaria pulmonaria*, least concern). For the large fungi, the dominant species identified were the wire tick (*Climacocystis borealis*), harticka (*Inonotus leporinus*), scented leather (*Cystostereum murraii*, near-threatened) and wrinkled skin (*Phlebia centrifuga,* least concern).

As part of further studies required for the environmental permit, biodiversity (species and habitat) on land will be mapped within the proposed planning area as part of the MKB2. Furthermore, indirect effects on land and in the aquatic environment within the area of influence of the underground ore mines will be investigated. Impacts and possible consequences on the terrestrial and aquatic environment are expected to be a salient issue that requires management and monitoring.

As described above, the MKB1 studies identified several areas around the Project site that were assessed to contain high nature values. Figure 5-5 shows the distribution of areas referred to as High Nature Values 1 and 2 in the MKB1 studies, as defined below:

- Value class 1: area has high values that the area may justify a protection status.
- Value class 2. area houses (or has a high probability of housing) vulnerable species (Sweden Red Listed species as of 2011). The area has the conditions for these species to remain in the long term.

[10]Ecoregions website: Ecoregions 2017 ©
[11]International Union for the Conservation of Nature: IUCN Red List of Threatened Species
[12]Artportalen – website for recording flora/fauna sightings: Artportalen

- Value class 3. area has certain natural value.
- Value class 4. Area has no specific natural values observed or expected.

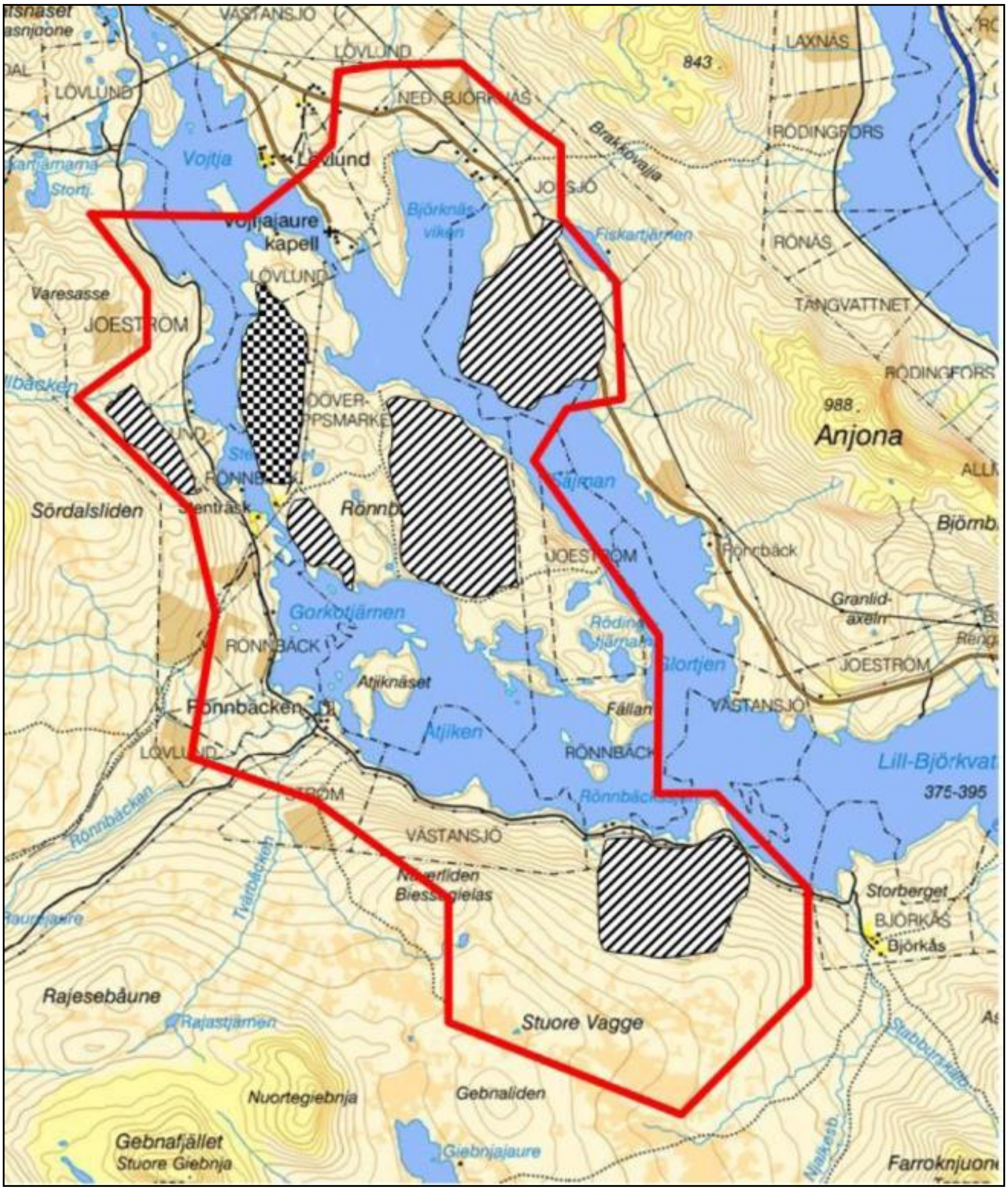


Figure 5-5: MKB1 high nature value ratings (1 = checked, 2 = striped)

5.2.4 Protected Areas

There are no environmentally protected areas (such as Natura 2000, Ramsar, National Parks) in the vicinity of the Project.

5.2.5 Climate

Historical climate

Northern Sweden belongs to the temperate coniferous-mixed forest zone (Köppen classification) with cold, wet winters, where the mean temperature of the warmest month is no lower than 10°C and that of the coldest month no higher than -3°C, and where the precipitation is, on average, moderate in all seasons. Annual precipitation in the Lappland Mountain area in general ranges between 1,000 mm and 1,500 mm.

Temperatures in Hemavan (15 km northwest of Tärnaby) average -0.8°C annually and range between -16°C in January and 14°C in July, with an average precipitation of 1,140 mm/year. Figure 5-6 shows the recent average temperature and precipitation for Hemavan.

Bogs, lakes and rivers are typically frozen for four to five months of the year. Exploration work can be conducted during the winter by taking advantage of the frozen ground, which minimises environmental impact during access. Notwithstanding this, should the Project be put into operation, it should be able to operate throughout the entire year.

Northern Sweden has aspects of both maritime and continental climate depending on the direction of airflow. When westerly winds from the Atlantic Gulf Stream prevail, the weather is warm and clear. When airflow is from the east, the Asian continental airflow prevails resulting in severe cold in winter and dry heat in summer. The mean temperature in northern Sweden is several degrees higher than that of other areas in these latitudes such as Siberia and southern Greenland due to the moderating effect of the Atlantic Ocean and the Baltic Sea.

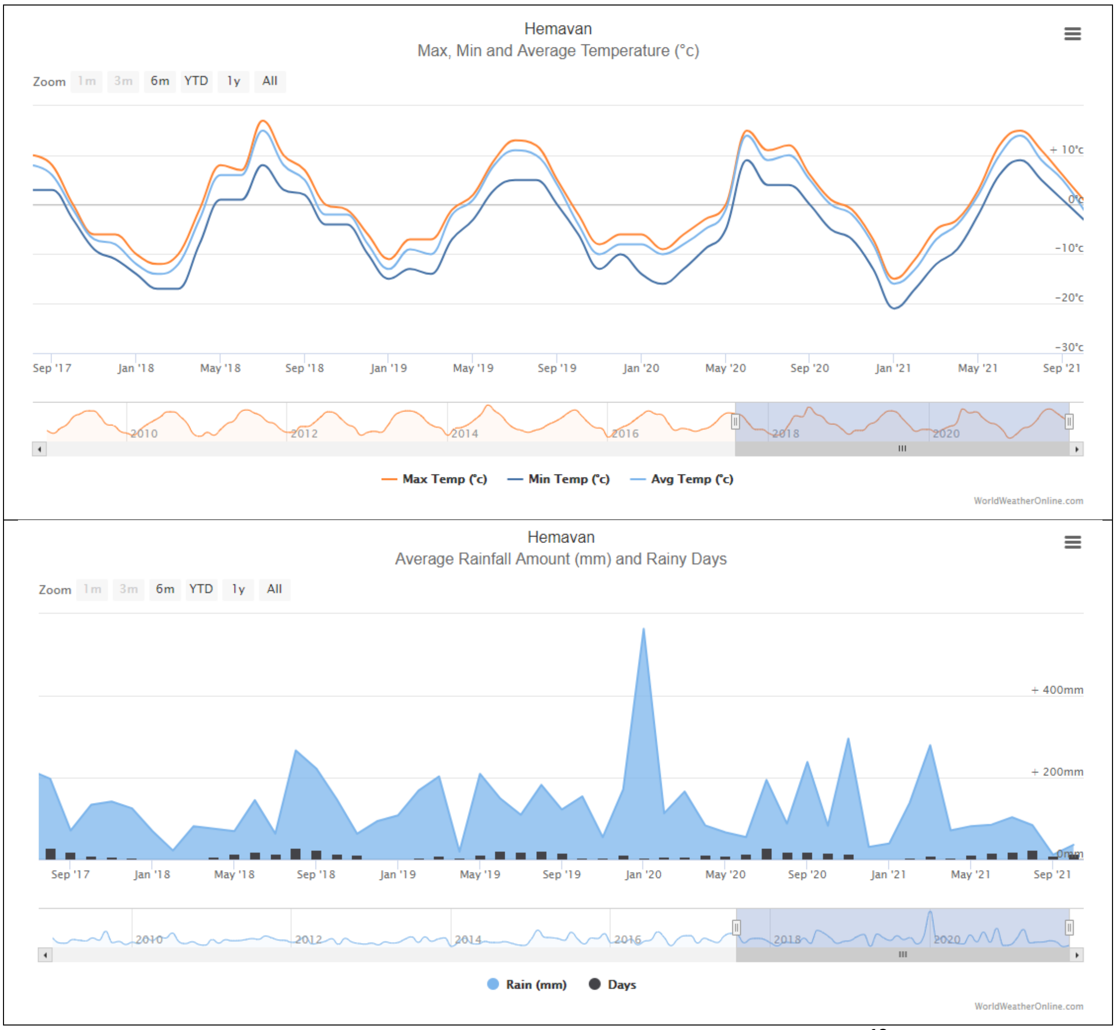


Figure 5-6: Temperature and precipitation averages for Hemavan[13]

Climate change

Predicting future climate changes is challenging and not within SRK's scope of work; however, it is clear from reports from the Intergovernmental Panel on Climate Change ("IPCC") that the northern Europe regions are predicted to warm at a higher rate than other regions globally and are predicted to experience increased annual precipitation, as described in the IPCC 4th report (Intergovernmental Panel on Climate Change 2007) and shown in Figure 5-7.

These expected changes will need to be considered in the design of operational infrastructure, particularly that associated with water management, and in closure planning.

[13]World Weather Online: [Klimpfjall, Vasterbottens Lan, Sweden | World Weather Online]

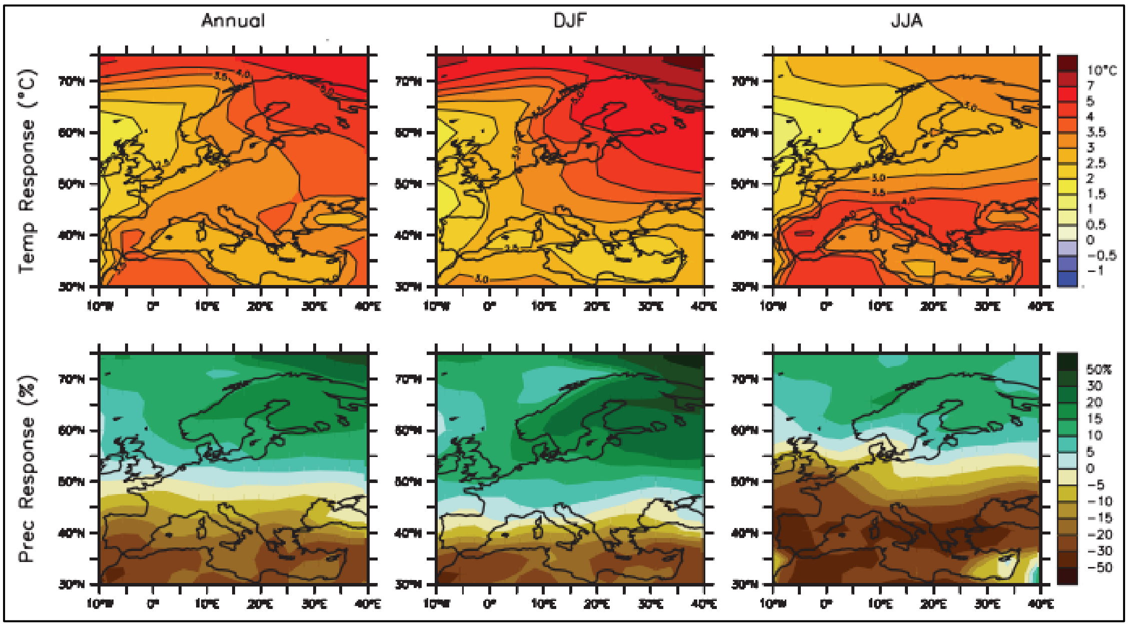


Figure 5-7: IPCC Climate Change projections (Source: (Intergovernmental Panel on Climate Change 2007)[14])*

**Notes: DJF = December-February average, JJA = June-August average*

5.3 Infrastructure

The Ajaure hydroelectric power plant, rated for 85 MW, is located upstream of Lake Gardiken, approximately 12 km from the Project site by gravel road (Figure 5-8). European route E12 road is 14 km from the Project site, running in a southeast-northwest direction connecting Storuman to the port of Mo i Rana in Norway. This port is 166 km distant and is the closest of three within 500 km. The nearest rail access is at the town of Storuman approximately 110 km to the southeast. Water is plentiful around the site, but permission must be obtained to use it.

5.4 Local Resources

The nearest major town is that of Storuman with a population of approximately 2,200 in 2010, in addition the villages of Tärnaby (480 inhabitants in 2010) and Hemavan (220 inhabitants in 2010) are closer to the Project. Along with having a regional airport, Tärnaby also has services such as shops and medical facilities.

The current land use in the planned mining area and in the immediate area consists primarily of reindeer husbandry, as well as recreation, tourism and outdoor life, including hunting and fishing.

[14]From IPCC: *Area-averaged temperature and precipitation changes are presented from the coordinated set of climate model simulations archived at the Program for Climate Model Diagnosis and Intercomparison (PCMDI; subsequently called the multi-model data set or MMD)*

The Project area is sparsely populated year-round. There are a number of small settlements close to the proposed mining infrastructure. Figure 5-9 shows the buildings in the vicinity of the Project area. Many of these buildings are related to logging and hunting activities and are not occupied. The exceptions are the hamlets of Stenträsk, Rönnbäcken, Lövlund and Nedre Björknäs. In addition, the Vapsten Sámi village community has rights to herd their reindeer throughout the area but does not have permanent residences.

Human resources are also available in the region with workers skilled in logistics, logging, infrastructure, construction and quarrying in the area. Although the region directly surrounding the Project does not contain currently operating mines, the town of Storuman is located on the western extent of the 'Gold Line' where several previously and currently operating gold mines are located. In addition, the Skellefte District to the east contains a number of operating base and precious metal mines.

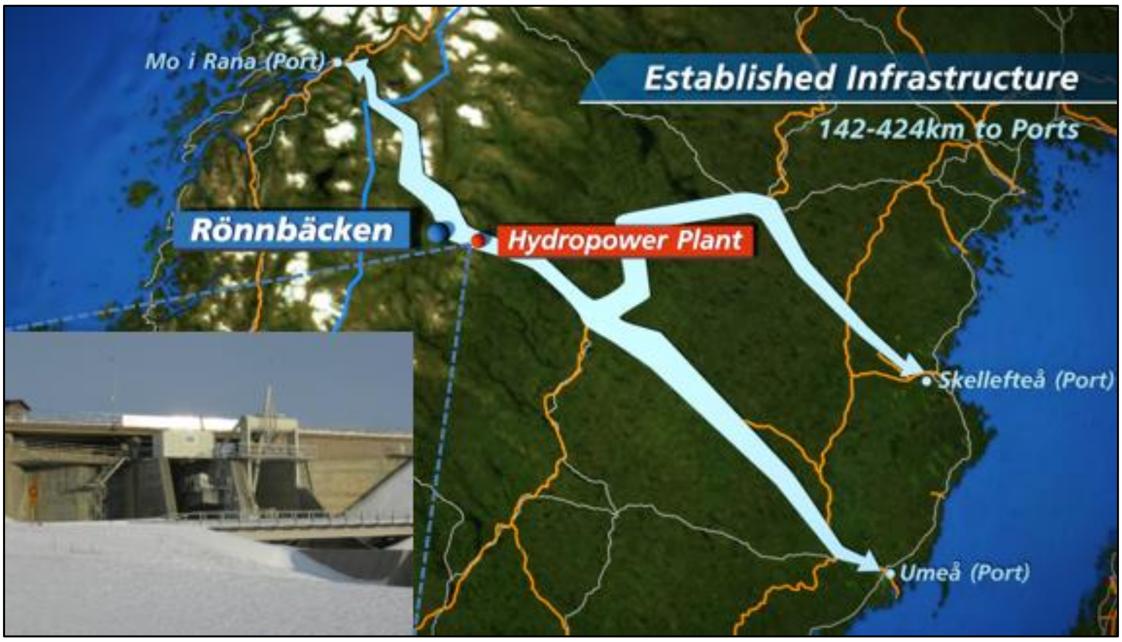


Figure 5-8: Rönnbäcken Project relative to existing infrastructure and (inset) Ajaure hydropower plant

5.5 Cultural heritage

The Project is situated close to a cultural monument in the Voltjajaure kapell church that is protected as a cultural environment protected site (Swedish: *kulturmiljövården*) by the Swedish Heritage Board (Swedish: *Riksantikvarieämbetet*[15]). It is located close to the village of Lövlund on the northern side of the reservoir (see Figure 5-9). In addition, the lake to the north (Stor-Björkvattnet) is also protected due to the presence of unusually preserved buildings, as shown on Figure 5-12. In addition, it is a popular tourist and outdoor recreation (fishing) location.

[15]Cultural protection sites: AC_riksintressen.pdf (raa.se)

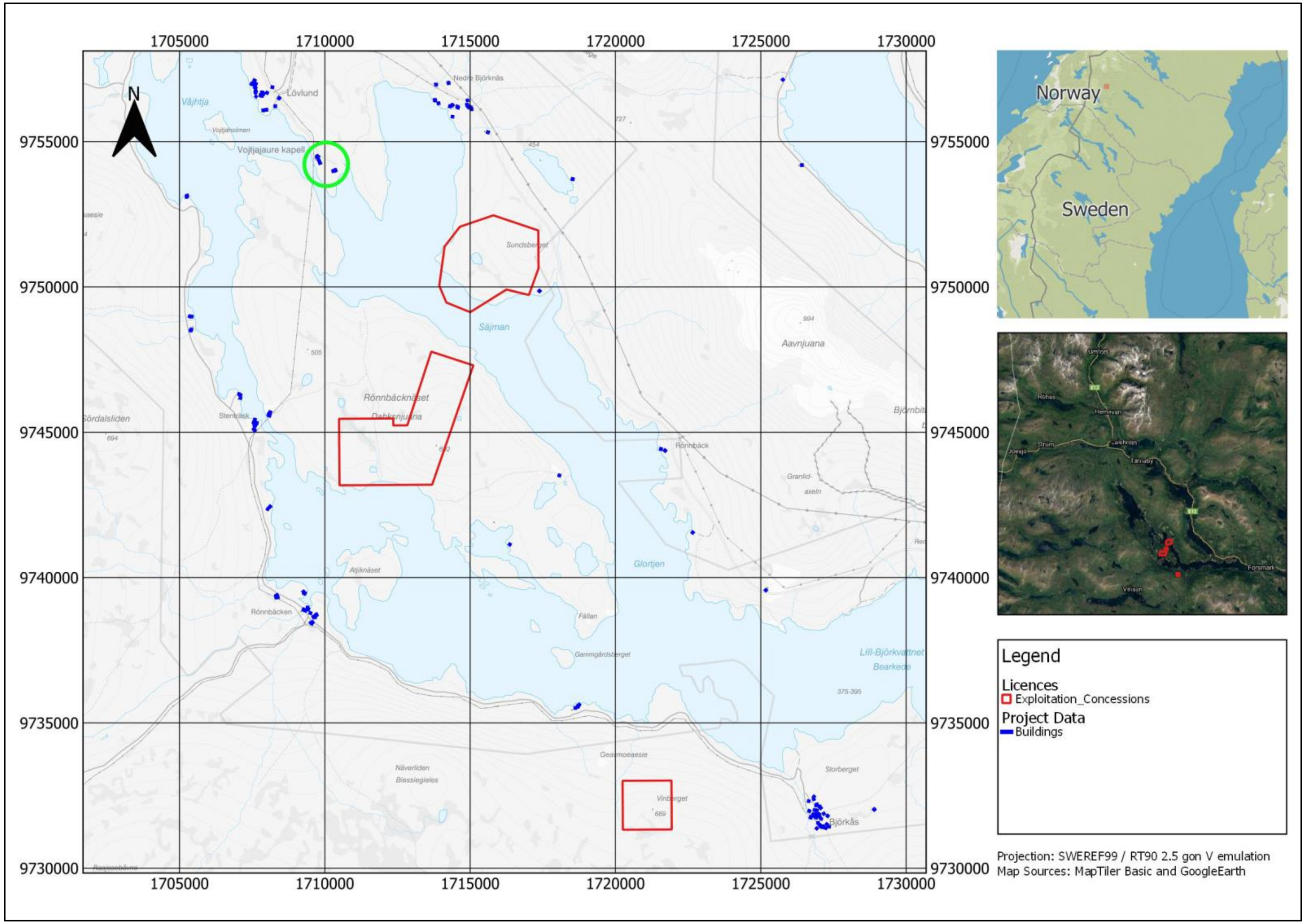


Figure 5-9: Locations of buildings (blue dots) and Voltjajaure kapell (green circle) adjacent to Rönnbäcken Project with exploitation concession boundaries (red polygons)

5.6 Land use Priority (national interests)

Sweden has a system in place for activities or industries to be given land use priority depending on whether they are considered as important at a national level, these are so-called national interests (Swedish: *Riksintressen*).

Notably, the SGU classified the Rönnbäcken Project as an "Area of National Interest for Mineral Extraction" (Swedish: *Riksintressen Mineral*) on 25 August 2010 (Figure 5-10 and Figure 5-11) and remains in place as of February 2022. Areas of National Interest are assessed and selected by SGU with reference to certain criteria relating to, for example, community development and emergency supply preparedness. Chapter 3, Section 7, paragraph 2, of the Environmental Code states that for such areas, the extraction interest shall be protected against measures that may be prejudicial to extraction; however, the area is significant for the Sámi reindeer herders, with areas of designated national interest (Swedish: *Riksintressen rennäring*) for reindeer herding overlapping national interest for minerals, as shown in Figure 5-10. It is not currently clear how the two designations will interact; however, as noted in Section 20.5, the local municipality states the mining designation takes precedence in the mineral national interest area.

As part of the 2011 municipal plan, Storuman Kommun also designated the land covering the Project as where mining activity is 'prioritized', as shown on Figure 5-12. The zoning map also shows areas where reindeer herding is prioritized and where cultural protection is in place; this relates to the larger, natural lake to the north of the Project (Stor-Björkvattnet) and the Voltjajaure kapell church.

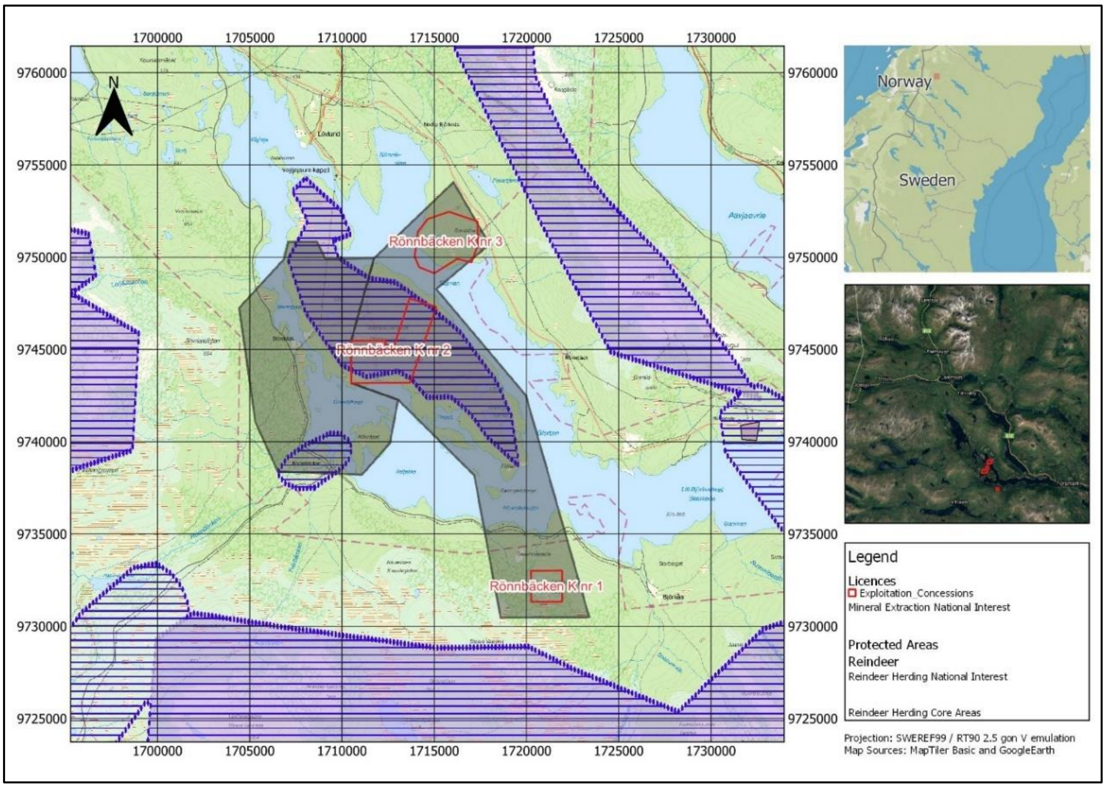


Figure 5-10: Areas designated as National Interest for Reindeer Herding (blue, no shading) including 'core areas' (blue, with shading) along with National Interest for Minerals (black) and exploitation concessions (red outlines)

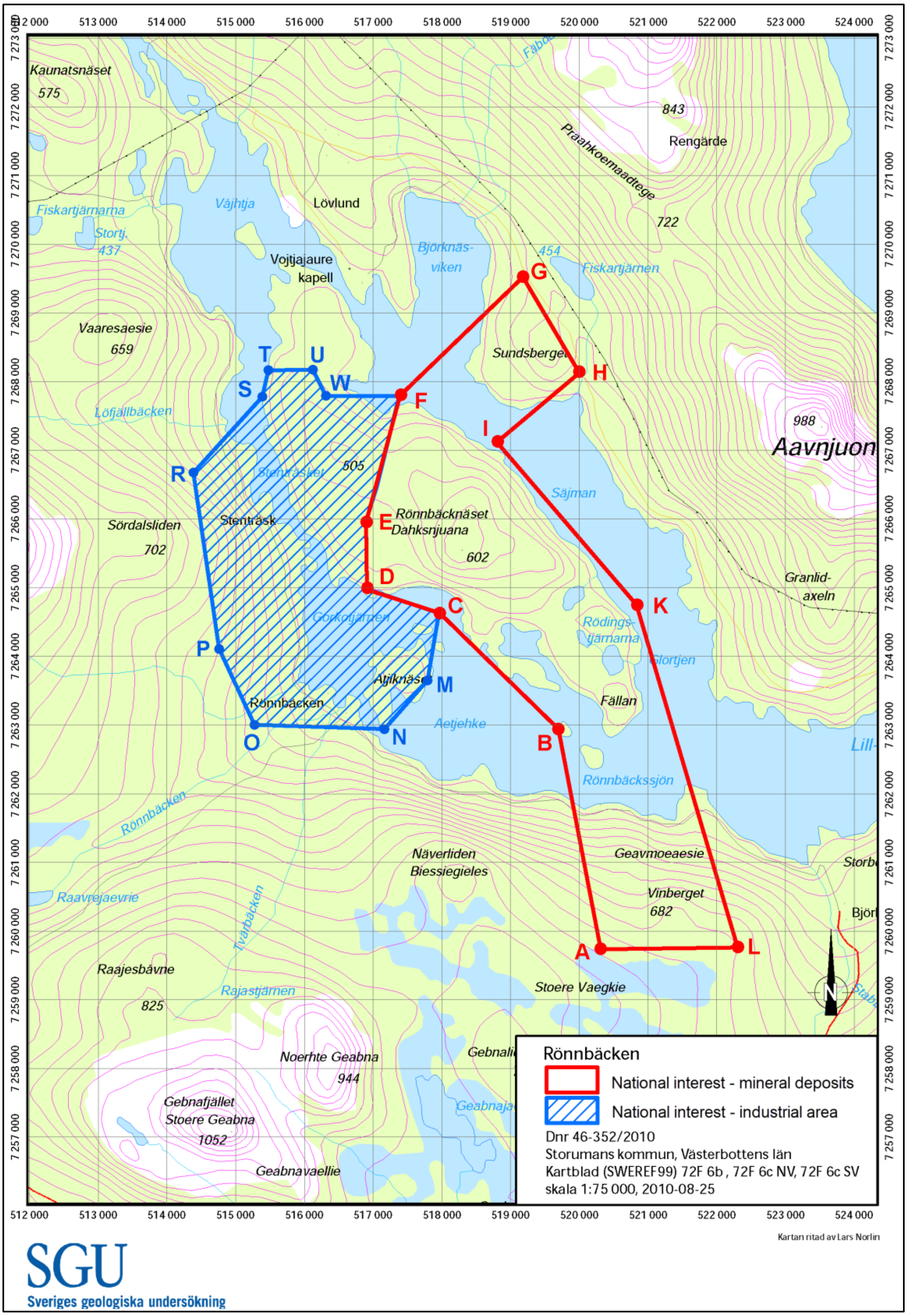


Figure 5-11: Deposits of National Interest (Source: SGU, 2010)

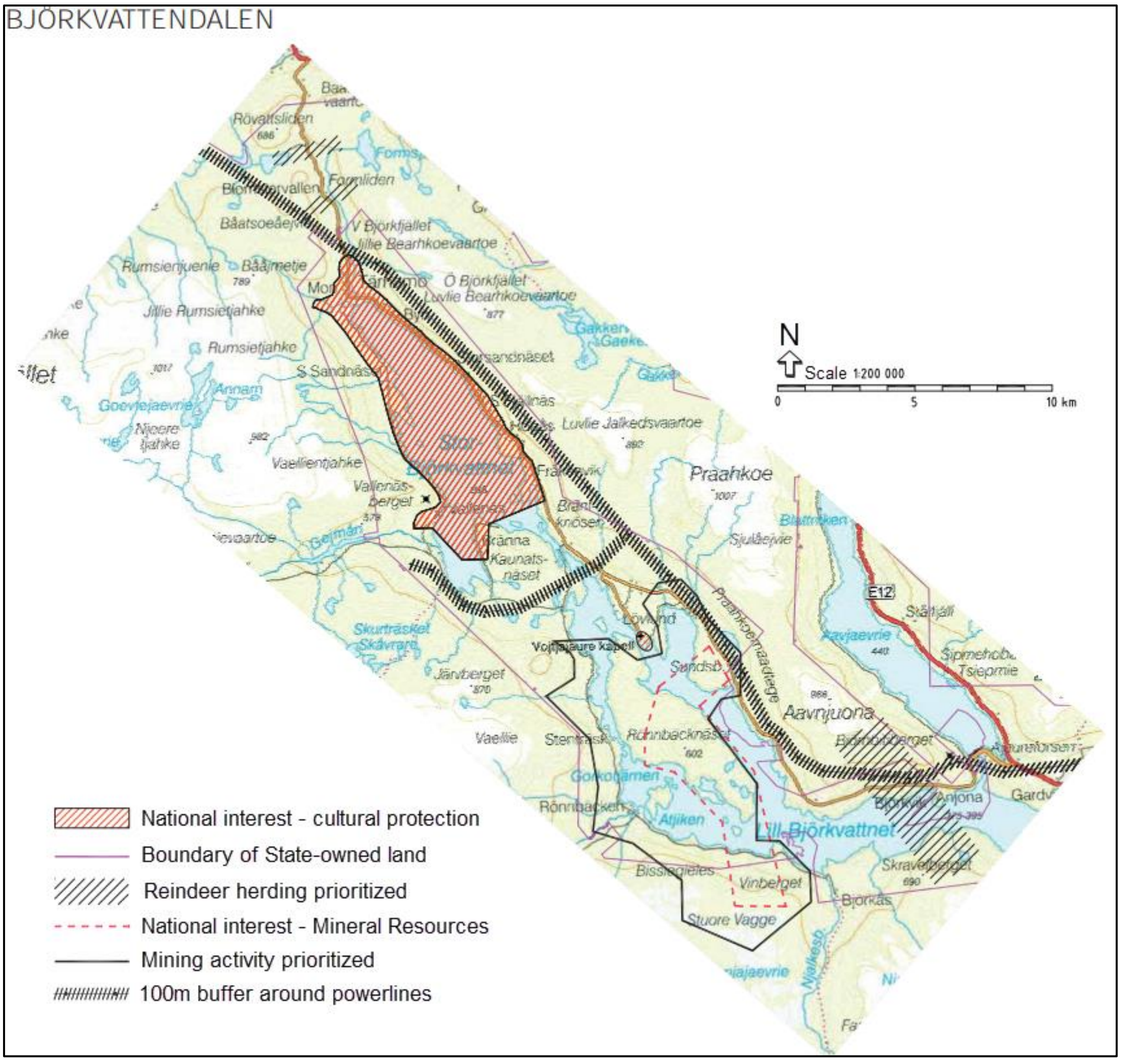


Figure 5-12: National Interest designations in the Björkvattendalen valley (Source: Storuman Kommun website[16])

[16] *Storuman Kommun Master Plan 2011: Kommunövergripande översiktsplan - Storumans kommun*

6 HISTORY

6.1 Discovery & Early Exploration

The chromite exploration campaign undertaken during the Second World War resulted in a discovery of nickel rich sulphides in ultramafic rocks collected in the Björkvattnet-Seimajaure region. Some extraction test work for nickel was undertaken without success.

The Boliden Mining Company ("Boliden") first staked exploration permits in two areas in 1942. Metallurgical tests to recover nickel were performed in the 1960s with promising results. Nickel metal prices were rising at the time and a number of companies began to explore in the mountain chain and investigated assay techniques for nickel.

In the 1970s, Professor P. G. Kihlstedt at the Royal Institute of Technology ("KTH") in Stockholm conducted research studies on the extraction of nickel from the peridotites and serpentinites from the Caledonian mountain chain. The work was funded by the Board for Technical Development (formerly "STU", currently called "NUTEC"), The Northland Fund (Norrlandsfonden), and a private company which was part of the Johnson Group. Three diamond core drillholes were drilled at the Murfjället, Graipisvare, and Rotiken properties funded by the Northland Fund. The cores were used for metallurgical test work. Boliden drilled one core hole in 1972 along the road below the Vinberget deposit. The core intersected 125 m of serpentinite and was used for metallurgical tests at KTH in Stockholm and Boliden. The surveys were supplemented by studies of the possible by-products, including magnesite and brucite, for extraction of magnesium.

6.2 Boliden

Boliden performed extensive studies during the 1970s on the sulphide nickel-bearing ultramafic rocks along the Caledonian mountain chain. In Rönnbäcken, grab samples were taken by blasting of exposed outcrops (68 samples in total). The samples were distributed over the exposed outcrops on Vinberget and on parts of Rönnbäcksnäset. The samples were analysed for sulphur, total nickel, and bromine-methanol-soluble nickel. The latter was intended to determine the proportion of nickel present in nickel sulphides. Metallurgical tests were carried out on some of the samples.

Boliden drilled a total of 21 holes in the area. Apart from the hole below Vinberget Hill, Boliden drilled 20 core holes on the Rönnbäcksnäset Island. The holes on Rönnbäcksnäset consisted mainly of short vertical holes of approximately 10 m, one vertical hole down to 50 m, and one inclined hole (dipping 50°) to 81.4 m. Analyses were conducted on sulphur, total nickel, and bromine-methanol-soluble nickel. The drillholes were not drilled for the purpose of producing a resource estimate but rather just to highlight the vertical distribution of nickel sulphides. Analysis was made in intervals of 10 cm to 5 m. No significant leaching of sulphide nickel was detected at surface. The leaching of nickel in sulphides was to a depth of less than 0.5 cm to 1.0 cm which correlates to the weathering that also could visually be seen in the colour, brown to greyish, of the surface.

Pilot mining of 4,000 t in an open pit was conducted by Boliden in 1974 adjacent to the road below Vinberget. The average grade of the bulk sample was 0.21% Ni, 0.11% Ni in sulphide, and 0.07% S. The sample was used for metallurgical test work in Boliden's pilot plant in Boliden which produced nickel concentrates grading 26% Ni to 34% Ni, 1.5% Co, 5 g/t Au, and 2 g/t combined PGM at a sulphide nickel recovery of 67% to 73%. SRK notes that the grades of this sample are not representative of the current resource at Rönnbäcken and this area is not within the Mineral Resource estimate due to a lack of representative sampling.

The investigations in outcrops, core drilling, and beneficiation experiments were compiled and used for an application of exploitation concessions (Swedish: *Utmål* (formerly), later replaced by the new term *Bearbetningskoncession*) submitted in 1976 for an area on Rönnbäcksnäset and one area on Vinberget. An exploitation concession was only granted to those restricted areas where the drillholes and pilot mine were located, and not the parts that were sampled in outcrops. The exploitation concessions Rönnbäck nr 26 and nr 59 were granted to Boliden in 1982 following the application in 1976. In 1990-1993, Boliden held an exploration permit in connection with the exploitation concessions, but no exploration was carried out. The exploitation concessions were released in 2003 by a notification of withdrawal from Boliden.

6.3 Post-Boliden

A summary of the ownership history of the Project is provided below:

- **2005**: International Gold Exploration AB (parent company) through subsidiary IGE Nordic AB granted the Rönnbäcksjön nr 1 exploration permit in the area around Vinberget.
- **2007**: Rönnbäcksjön nr 1 exploration permit transferred to the new subsidiary company, Nickel Mountain Resources AB ("NMR") under licence holding company Nickel Mountain AB ("Nickel Mountain"). Additional exploration permits granted to Nickel Mountain between 2007 and 2010.
- **2010**: parent company name was changed to IGE Resources AB.
- **2014**: parent company name was changed to Nickel Mountain Group AB ("NMG").
- **2015**: acquisition of 99.6% of the shares in NMR by investment group Archelon AB under subsidiary Archelon Natural Resources AB.
- **2016**: NMG changed its name to Axactor AB.
- **2020**: NMR changed name to Bluelake Mineral AB.

6.3.1 Exploration Permits and Exploitation Concessions

Exploration permits were granted over the Project area in 2008 to the previous operators and were modified following exploration results. These permits expired between August 2011 and December 2016; there are no currently valid exploration permits.

On 12 February 2010, two exploitation concession applications were submitted to the Mining Inspectorate of Sweden (Swedish: *Bergsstaten*), namely Rönnbäcken K nr 1 (Vinberget) and Rönnbäcken K nr 2 (Rönnbäcksnäset). These exploitation concessions were granted on 23 June 2010, and took legal effect on 22 October 2010, after an appeals process; they expire on 23 June 2035. The Rönnbäcken K nr 3 concession surrounding Sundsberget was granted to Nickel Mountain AB on 01 October 2012 and currently expires on 01 October 2037.

6.3.2 Work Conducted

Nickel Mountain carried out ground magnetic surveys and core drilling on Vinberget and Rönnbäcksnäset in the spring of 2008. In addition, metallurgical testwork was carried out on drill core material and material from Boliden's historical test mining pit. A technical report inclusive of a Mineral Resource estimate was prepared by Scott Wilson Roscoe Postle Associates Inc and was published in April 2009 (Scott Wilson RPA 2009).

Geological mapping, geophysical surveys and outcrop sampling around the Project area was conducted in the summer of 2009 and the Scott Wilson RPA Report was then completed in November 2009. From the mapping and sampling carried out during the summer of 2009, several potential drill targets were identified. Drilling commenced at Sundsberget at the end of 2009 and following this, on several other targets in the Project area. A reconnaissance ground magnetic survey was then conducted in 2010, covering a large part of the Project area.

Between 2010 and 2012, Nickel Mountain conducted significant diamond core drilling to provide samples for Mineral Resource estimation, mineralogy and metallurgical sampling. A PFS and updated ESIA (“MKB2”) was commenced by Nickel Mountain in 2013; however, due to funding issues, this study was only partially completed.

A Competent Persons’ Report (“CPR”) was completed annually by SRK between 2014 and 2016 on behalf of Nickel Mountain Resources AB (and parent Archelon AB) to summarise the work undertaken on the Project for stock exchange requirements. Since Bluelake took ownership of the Project, no exploration or other technical work has been completed. The PEA is the first technical work on the Project since SRK’s 2016 CPR report.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Project is located in the Swedish Caledonian mountain chain which formed approximately 400 to 510 million years ago (“Ma”) with the closure of the Iapetus Ocean, previously formed during the late Precambrian off the continent of Baltica. It is generally believed that the ocean crust moved downward along a subduction zone, with simultaneous build-up of sediment-filled basins linked to island arcs along the marginal zones of the ocean. The closure of the Iapetus Ocean and eventual collision between the two continents Baltica and Laurentia, created an extensive rock complex that was then thrusted over the Fennoscandian shield. These units are termed allochthons, subdivided into nappe and nappe complexes, and may have been transported several hundreds of kilometres to the east or southeast over the shield. The top nappe is usually associated with the longest transport distance, while the lower units tend to be more local. Alpine-type ultramafic rocks are tectonically displaced from the mantle into the crust. They occur along nappe boundaries in the Scandinavian Caledonides and most frequently in the Upper Allochtonous which host the Seve and Köli nappes. The regional geology is illustrated in Figure 7-1 and Figure 7-2.

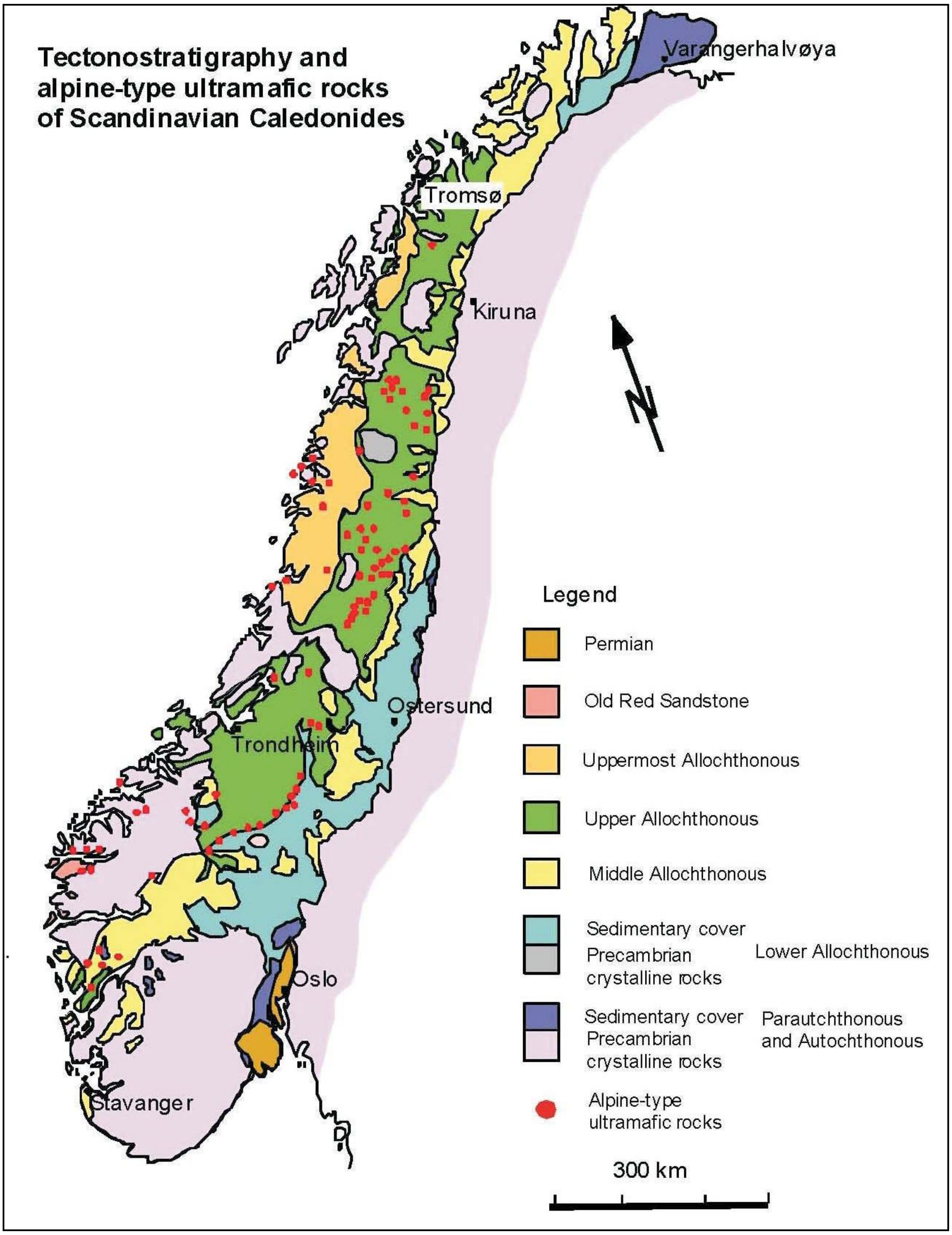


Figure 7-1: Tectono-stratigraphic map showing ultramafic rocks of the Scandinavian Caledonides (Source: modified after (Moore and Qvale 1977))

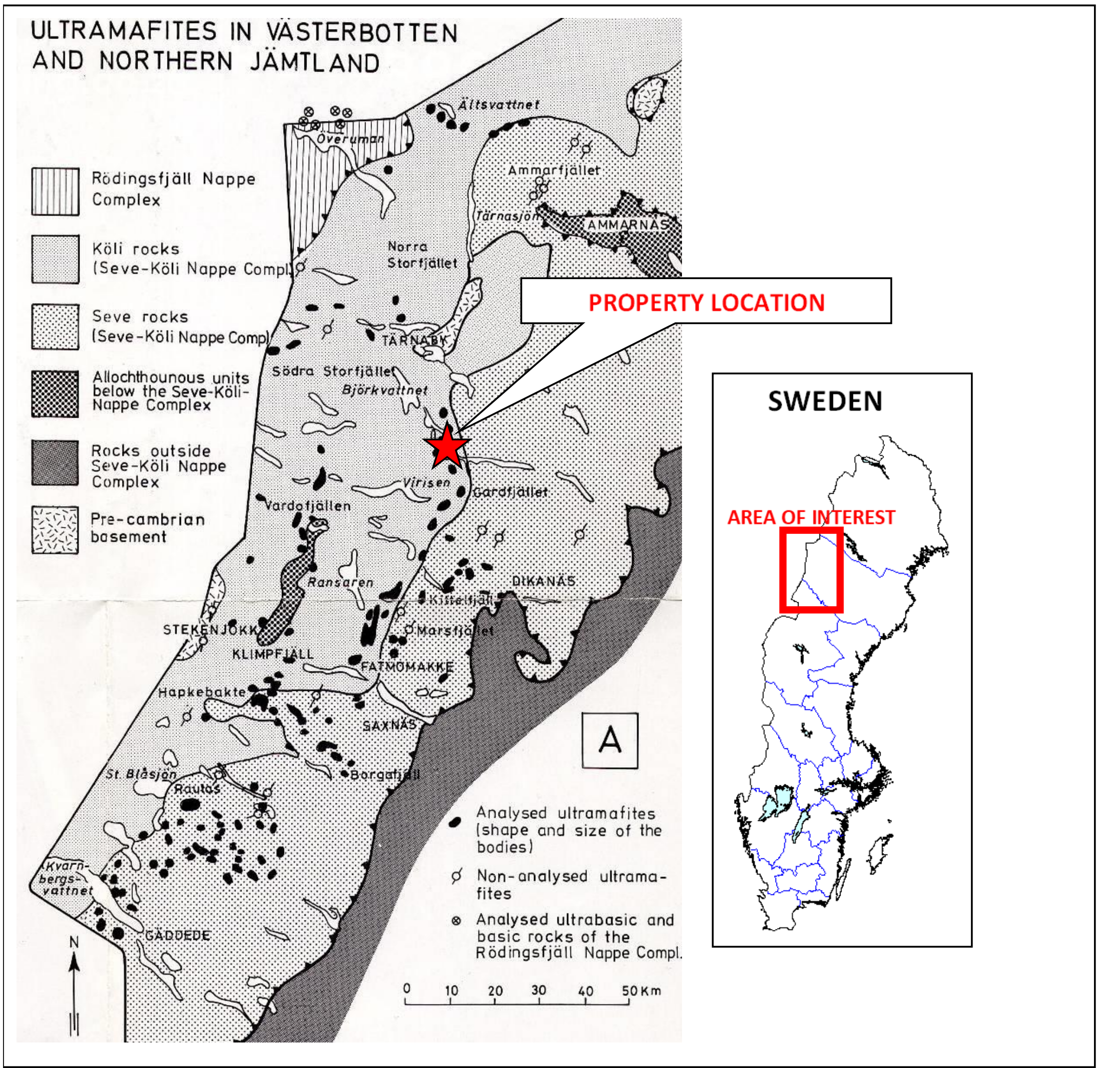


Figure 7-2: Simplified geological map of the ultramafic units in Västerbotten and Northern Jämtland County (Source: (Stigh 1979))

7.2 Local Geology

The geology in the Rönnbäcken area, as shown in Figure 7-3, is dominated by the Köli Nappe which is situated near the border to the Seve Nappe in the east. The Köli Nappe includes rocks of greenschist metamorphic facies and the Seve Nappe rocks, which are of higher metamorphic facies, mainly amphibolite facies. The rocks in the Köli Nappe include the Tjopasi Group which in the Rönnbäcken area consist primarily of phyllite and felsic to mafic metavolcanics and nickel bearing ultramafic rocks. The ultramafic rocks occur as lenses of various sizes over an area of approximately 15 km^2. The complex folding has resulted in local variations in strike and dip. The ultramafic rocks are serpentinized, which is seen in the colour of the weathering surface. The most serpentinized rock is often grey, while more olivine and pyroxene rich rocks have a more brownish colour. The rocks vary from massive lenses to compositional layered rocks to erosion products such as serpentinite conglomerates and sandstones. In general, the ultramafic rocks are more serpentinized in the Köli Nappe, while the Seve Nappe consists of rocks that are more olivine and pyroxene rich and also contain less nickel in sulphides.

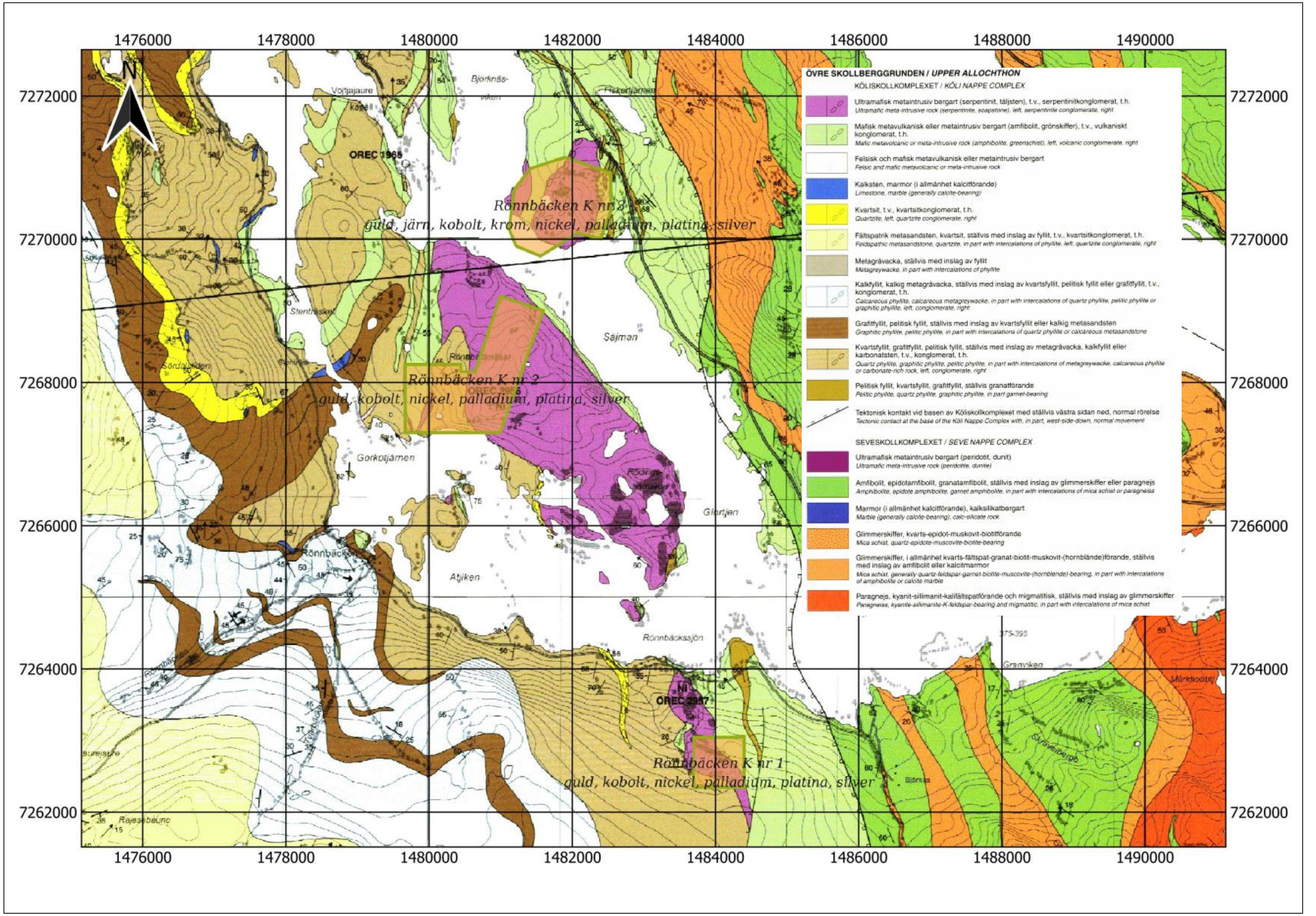


Figure 7-3: Local geology map (Source: map data from SGU, 2021)

7.3 Property Geology

The geology in the immediate Project area comprises highly serpentinized rocks which have been the target for the exploration of sulphide nickel mineralization. Some of the ultramafic lenses known in the area are less serpentinized and therefore demonstrate lower potential for nickel sulphide mineralization.

The Vinberget deposit comprises a homogeneous serpentinized tabular-shaped deposit up to 350 m thick, 300 m wide and 700 m long. The deposit is steeply dipping to the northeast and plunges to the northwest and is primarily hosted within a graphite bearing pelitic phyllite with intense quartz veining. A zone of soapstone between 1 to 5 m wide has been intersected at the contact between the mineralisation and the phyllite. The foliation of the phyllite follows the contact zone.

The Rönnbäcksnäset deposit comprises two serpentenite horizons separated by 80 m to 140 m of chloritic phyllite. The horizons dip approximately 45° west in the north and flatten out into a bowl-shaped geometry to a dip of roughly 30° north in the southwest. The deposit has a strike length of roughly 2.4 km and a width of up to 400 m at its widest point. The upper horizon is thin and of less economic interest and is most likely not present in the southwestern area. This is overlain by pelitic phyllites, while chlorite dominates altered phyllite between the upper and lower horizons. The lower serpentinite horizon that is of economic interest is divided into the following four units:

1. Upper serpentinite unit.
2. Lower serpentinite unit.
3. Mafic intrusion unit (pyroxenite).
4. Low sulphur unit.

The mafic intrusion is found mainly between the upper and lower serpentinite unit throughout the area. The low sulphur unit is found in the two western sections in the Rönnbäcksnäset south area. The lower serpentinite horizon is underlain by pelitic phyllites though near the contact with the mineralisation these contain a series of minor quartz conglomerate horizons.

The Sundsberget deposit consists of a single serpentinite body that strikes in a north-northeast to south-southwest orientation and dips roughly 30° to the north-northwest. The deposit measures roughly 1.2 km along strike and 500 to 600 m in width. The serpentinite is overlain mainly by chloritic phyllite and pelitic phyllites. Below the serpentinite, in the footwall pelitic phyllites dominates but as at Rönnbäcksnäset there are also quartz conglomerate horizons. There are mafic intrusions within the serpentine unit, but the geometry of these is not yet certain.

Talc alteration zones are a common feature at the contacts zones between serpentinite and country rock in all three deposits.

7.4 Mineralization

To date, the majority of work to characterise the nature of mineralisation in the Project area has been undertaken on samples collected from the Rönnbäcksnäset and Vinberget deposits. As such, the following sections of this report focus on these deposits. The initial indication from visual inspection of drill core, multi-element ICP analysis and metallurgical testwork is that the nickel sulphide mineralisation at Sundsberget is of a similar character to that at Rönnbäcksnäset and Vinberget.

The nickel sulphide mineralization in the Project area is hosted in serpentinized ultramafic rocks, which were altered from dunites and peridotites. The gangue mineralogy is dominated by antigorite, olivine, pyroxene, chlorite, carbonates (mainly calcite and dolomite), magnetite, and chromite.

The dominating nickel-rich sulphides in the deposits Rönnbäcksnäset, Sundsberget and Vinberget are heazlewoodite (Ni_3S_2), pentlandite $(Fe,Ni,Co)_9S_8$, and to a lesser extent millerite (NiS). Other minerals found are cobaltite (CoAsS) and maucherite ($Ni_{11}As_8$), which probably are the most frequent arsenic bearing minerals. The dominating cobalt bearing minerals are pentlandite, millerite, and cobaltite. Only traces of pyrrhotite and pyrite are present. Nickel is also found in various amounts in olivine, serpentine, magnetite, and brucite.

In Vinberget, pentlandite dominates as the most frequent nickel rich sulphide. In Rönnbäcksnäset and Sundsberget, however, the mineralization is more variable, both in terms of grade, nickel sulphide species and host rock type. In some parts, heazlewoodite dominates and in other areas pentlandite occurs as the most frequent nickel sulphide.

The elements arsenic, gold, and sulphur are not unique to any of the lithologies and may have been introduced later or have been remobilized. Overall, the nickel sulphides are fine grained (often around 25 µm) and occur as individual grains in serpentine or oxides or as mineral aggregates together with other nickel sulphides or magnetite.

Various mineralogical investigations have been carried out by Ekström Mineral AB ("Ekström"), Xstrata Process Support (Xstrata), Outotec Research Oy (Outotec research centre, or "ORC"), Finland, Qumex Material Teknik AB ("Qumex"), and more recently by the Geological Survey of Finland ("GTK"). The results of this work are summarised below.

7.4.1 Ekström – Optical Microscopy

Eleven samples from six drill cores, two from Rönnbäcksnäset and four from Vinberget, were sent to Ekström for basic mineralogical thin section study and for Scanning Electron Microscope/Energy Dispersive Spectroscopy ("SEM"/"EDS") analysis of the sulphides.

7.4.2 Rock forming minerals

All of the samples were found to be dominated by serpentine, except one sample from Rönnbäcksnäset (RON 5801) which was found to be dominated by chlorite with lesser pyroxene. Carbonate was found to be common in samples from Vinberget. Chrysotile asbestos was identified in three of the samples. The major mineral composition is shown in Table 7-1

7.4.3 Opaque oxides

Magnetite and chromite dominate the opaque minerals, with magnetite formed as an alteration product from chromite during the serpentinization process.

Table 7-1: Mineral composition and relative frequency of samples from Rönnbäcksnäset

Drill core number Sampled at	RON 5801 31.0 m	RON 5802 47.2 m	RON 5702 50.4 m
serpentine (antigorite)		xxxx	xxxx
carbonate	x		x
chlorite	xxxx	x	
amphibole	xx		x
olivine			xx
pyroxene	xxx		xx
phlogopite	xx	xx	
chrysotile asbestos		xx	
bolingwite			xx
iddingsite			x
brucite		xx	xx+
epidote	xx		
magnetite		xxx	xxx
chromite		xx	x
pentlandite		xx	xx
heazlewoodite		x	x
maucherite		xx	r
millerite		x	r
violarite,mackinawite		x	
chalcopyrite	x		
pyrrhotite			
ilmenite	r		

Relative frequency: xxxx = high, xxx = intermediate, xx = little, x = acc, r = rare

7.4.4 Sulphides

Pentlandite and heazlewoodite were identified in all samples except RON 5801, with pentlandite as the dominant sulphide phase. The results of the study, including accessory and rare sulphide phases, are illustrated in Table 7-2 and Table 7-3.

Table 7-2: Mineral composition and relative frequency of samples from Vinberget

Drill core number Sampled at	Vin2601 20.0 m	Vin2604 80.0 m	Vin2702 40.0 m	Vin3001 40.0 m	Vin3003 120.0 m	Vin3005 200.0 m	Vin3101 10.0 m	Vin3103 90.0 m
serpentine antigorite	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx	xxxx
carbonate	xxxx	xxx	xxx	xxx		xx	xxx	xxx
chlorite								x
amphibole								xx
olivine	xx					pseu	xx	x
pyroxene	x				xx	pseu		xx
phlogopite							x	
chrysotile asbestos		xxx					x	
epidote								
iddingsite	x						x	
brucite	x	x	r	x		xx	x	
magnetite	xxx	x	xxxx	xxx	xxx	xx	xxx	xxx
chromite	xx	x	xxx	xx	xxx	xx	xx	x
pentlandite	xx	xx	xx	xx	xx	xx	xx	xx
heazlewoodite	x	x		xx	xx	x	x	x
maucherite				x	r			
millerite	r							
violarite mackinawite	r		x					
chalcopyrite		x						
pyrrhotite		x						
awaruite					r			r
cobaltite						xx	x	x
pyrite		x						

Relative frequency: xxxx =high, xxx = intermediate, xx= little, x= acc, r =rare

Table 7-3: SEM-EDS Analysis (RON58 & 57, VIN26, 30 & 31)

Mineral	Formula	Range % Ni	Range % As	Range % Co	Comment
Pentlandite	$(Ni,Fe,Co)_9S_8$	39.8-44.2		1.5-2.8	
Millerite	NiS	69.1-69.8			
Heazlewoodite	Ni_3S_2	71.5-76.3			
Maucherite	$Ni_{11}As_8$	50.8-51.4	44.6-45.85	0.2-0.4	1.5-1.7%Sb
Cobaltite	CoAsS			23	
Pyrrhotite		1.6-2.3			
Chromite					>5% Mn

7.4.5 Ekström – Qualitative Fibre Measurement

Two samples of diamond drill core from VIN30 at 219.2 m and RON58 at 52.3 m were selected for qualitative analysis of fibres and examined with optical microscopy by Ekström for light refraction, anisotropy, angle of extinction, elongation, and pleochroism. Both samples showed the same optical properties as chrysotile.

7.4.6 Xstrata – QEMSCAN and EPMA

Mineralogical studies were performed by Xstrata using Quantitative Elevation of Materials by Scanning Electron Microscope ("QEMSCAM") and Electron Probe Micro Analysis ("EPMA") on four composite samples. The samples were composed of a quarter of the core and crushed and successively sieved to avoid the finest fraction.

The objective of the study was to characterise the Ni bearing species in each composite and to produce quantitative measurements of Ni deportment as a basis for comparison to total nickel and sulphide nickel chemical assays. The assays were completed at ALS Chemex in Vancouver Canada and at Labtium in Finland. Modal mineralogy, grain size distributions, and mineral composition data was also presented as part of the study.

The modal abundance of gangue and sulphide minerals present in each sample is presented in Figure 7-4 and Figure 7-5.

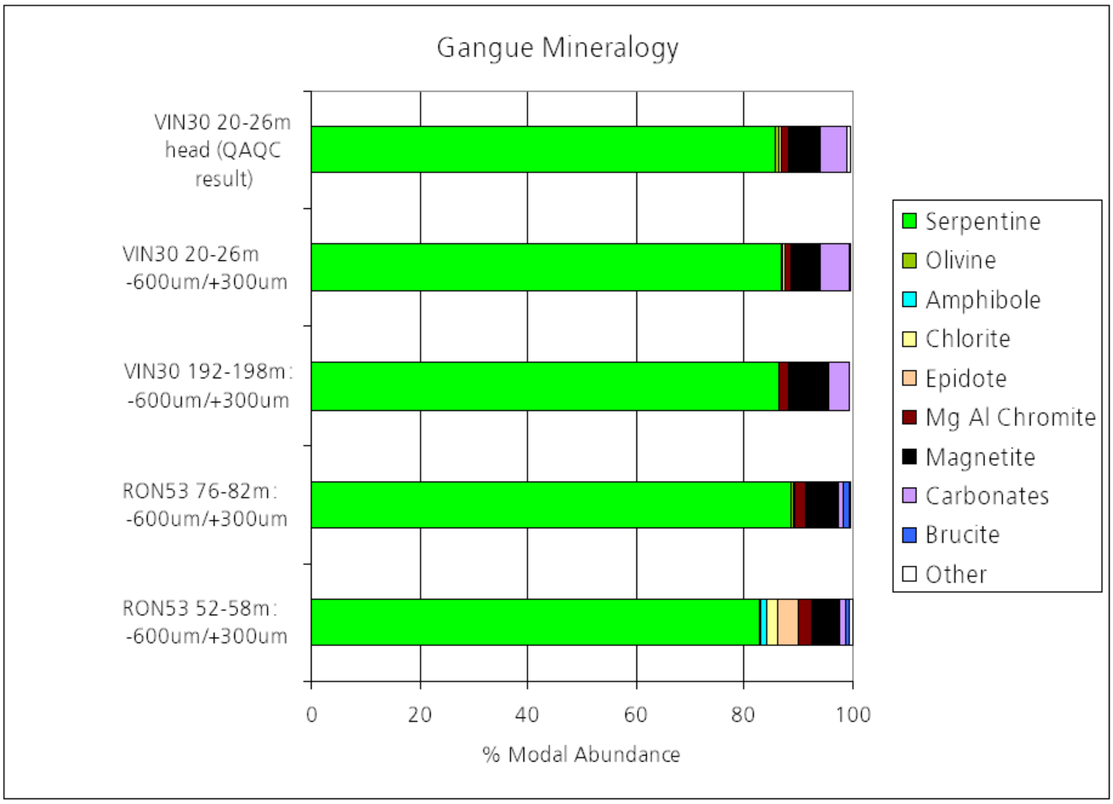


Figure 7-4: Gangue Mineralogy in selected samples

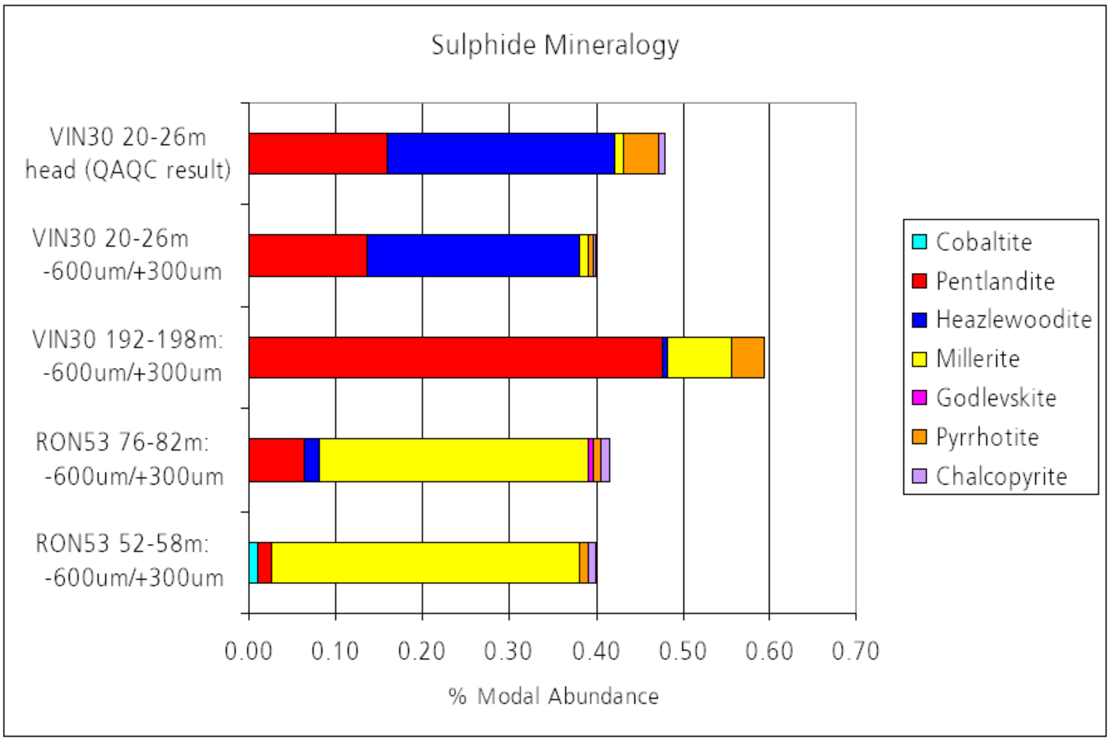


Figure 7-5: Sulphide Mineralogy in selected samples

Modal analysis highlighted minor mineralogical differences between the RON53 and VIN30 samples, including a higher percentage of carbonates in the VIN samples and the presence of brucite in the RON samples. The samples were also found to vary with respect to the proportion and type of Ni (Fe) sulphide as indicated above. Cobalt was found to occur in solid solution in pentlandite and millerite. A few cobaltite grains were also found.

The following observations were made with respect to these Ni deportment calculations:

- Gangue minerals (oxide + silicate) contributed approximately 30% of the total Ni in the VIN30 samples, and 40% of the total Ni in the RON53 samples.
- The major Ni bearing sulphide in the two RON53 samples was millerite. A minor amount of the nickel was contributed from pentlandite and heazlewoodite.
- The two VIN30 samples had different proportions of Ni-bearing sulphide species. VIN20 20-16 m contained much more heazlewoodite, compared to VIN30 192-198 m, which was dominated by pentlandite.

One of the key objectives of the mineralogical study performed by Xstrata was to assess the reliability of assays, both in terms of total Ni and sulphide Ni. Analyses was completed on nine size fractions from VIN30 (20 to 26 m) plus the coarse fraction (-600/-300 µm) from the remaining composite.

Reconciliation between total nickel chemical assays and calculated total nickel assays from the mineralogical analyses was found to be, in general, very good. The analyses were completed on the 9 size fractions from VIN30 20-26 m, plus the coarse fraction (-600/+300 µm) from the remaining three composites. The difference between measured and calculated total nickel was found to be less than 0.02% in nine of the twelve measurements. In one of the twelve comparisons the difference was marginally greater than 0.03%Ni.

A reconciliation between sulphide nickel content as determined from chemical assays and sulphide nickel content calculated from mineralogy was completed on the same twelve samples. Seven of the twelve measurements compared very well (within 0.01% Ni), while the chemical assay and calculated assay differed by 0.03-0.06% Ni in the remaining five samples; these results are summarised in Figure 7-6.

SRK notes a comparison of calculated sulphide Ni determined from the mineralogical measurements made against sulphide Ni assays performed at ALS Chemex was completed using method ME-OG62. A comparison against sulphide Ni assays performed at Labtium using ammonium citrate hydrogen peroxide leach with ICP-AES finish (method code 240P), may have been more appropriate given that this was IGE Nordic's principal laboratory and assay method used for determination of sulphide nickel Rönnbäcken.

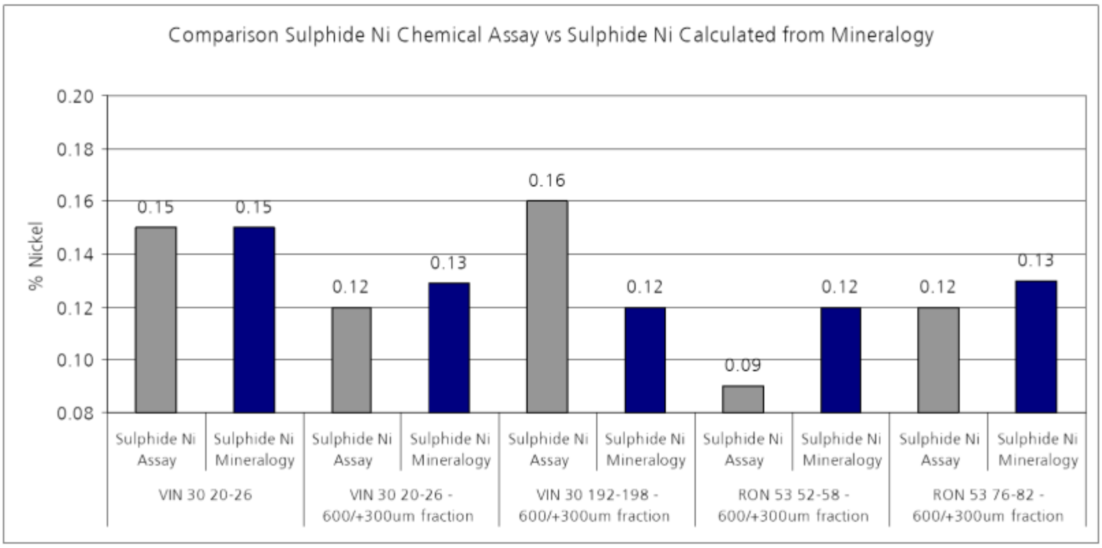


Figure 7-6: Sulphide Ni assays performed at ALS Chemex vs calculated sulphide Ni determined from mineralogical measurements

Nickel sulphide grain size distribution was assessed as part of the Xstrata study. The size fraction chosen for measurement was -600/+300 µm, coarser than the liberation state, so as to ensure all textures and original grain sizes were maintained. QEMSCAN measurements of Ni-bearing sulphides were isolated and plotted as a distribution. All nickel-bearing sulphide species were combined and are referred to as Ni (Fe) Sulphide. A total of 11,121 Ni (Fe) Sulphide particles were included in this analysis. The grain size distributions of Ni (Fe) sulphide for each of the four samples is presented in Figure 7-7.

The results of the work indicated that the majority of nickel-bearing sulphides fall within the range of 15 to 50 µm with averages closer to 25 µm.

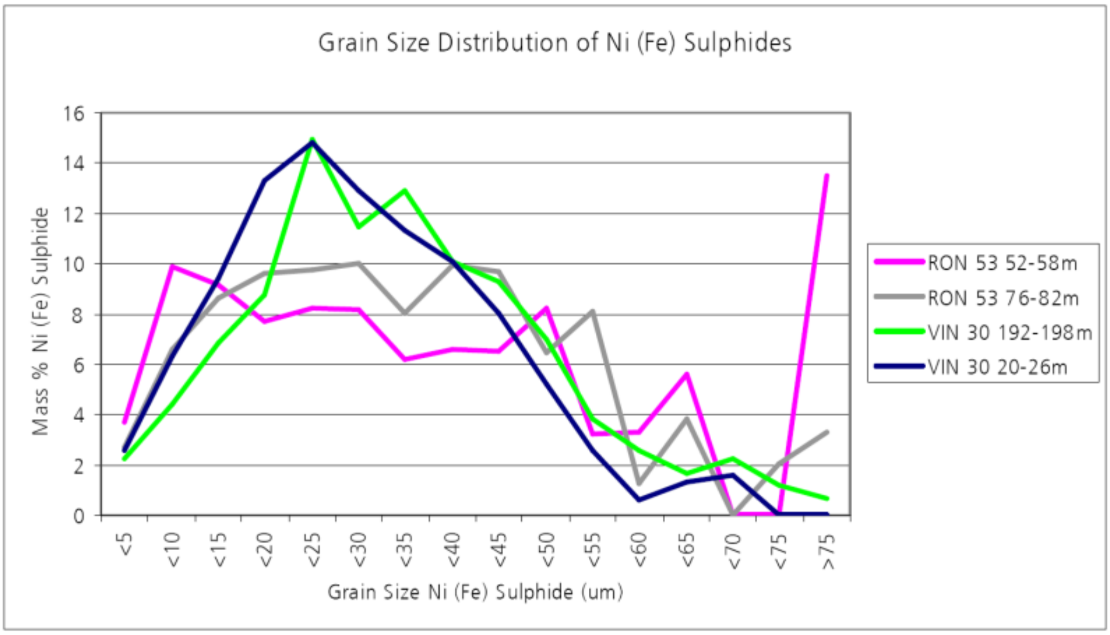


Figure 7-7: Grain Size distributions of Ni (Fe) Sulphides from -600 µm/+300 µm fraction

7.4.7 QUMEX – Quantitative Fibre Measurement

Samples were collected from particularly fibrous-rich parts in the cores and sent to Qumex for quantitative analysis of fibres. The samples were prepared, crushed, and pulverized for the standard intervals, for assaying of 2 m core length. The samples were evaluated using an electron microscope with a magnification of 250 times, with 25 fields per sample evaluated regarding fibre content (volume units).

Table 7-4: Fibrous volume in samples

Hole	Section	Fibrous Volume	Report	Date
VIN27	20.0 – 22.0	0.1	4360-01-08	2008-06-03
RON53	92.0 – 94.0	0.5	4431-01-08	2008-11-19

7.4.8 GTK Modal Mineralogy Study

A selection of samples including 48 thin section samples from Rönnbäcksnäset and Vinberget, and 32 drill core samples from Sundsberget were sent to GTK for modal mineralogy study by Mineral Liberation Analyser and measurement by XMOD-std. One thin section was prepared by for each of the drill core samples submitted from each deposit. The results are illustrated in Figure 7-8 to Figure 7-13.

While serpentine is the dominant gangue mineral in all three deposits, there are slight differences in gangue mineralogy, with more pyroxene and chlorite at Rönnbäcksnäset and Sundsberget than at Vinberget. Talc occurs at the footwall contacts.

The modal abundance of magnetite is relatively constant in all three deposits, with slightly higher levels at Sundsberget. Pentlandite dominates the sulphide mineralogy at Vinberget while Heazlewoodite is more prevalent at Rönnbäcksnäset and Sundsberget.

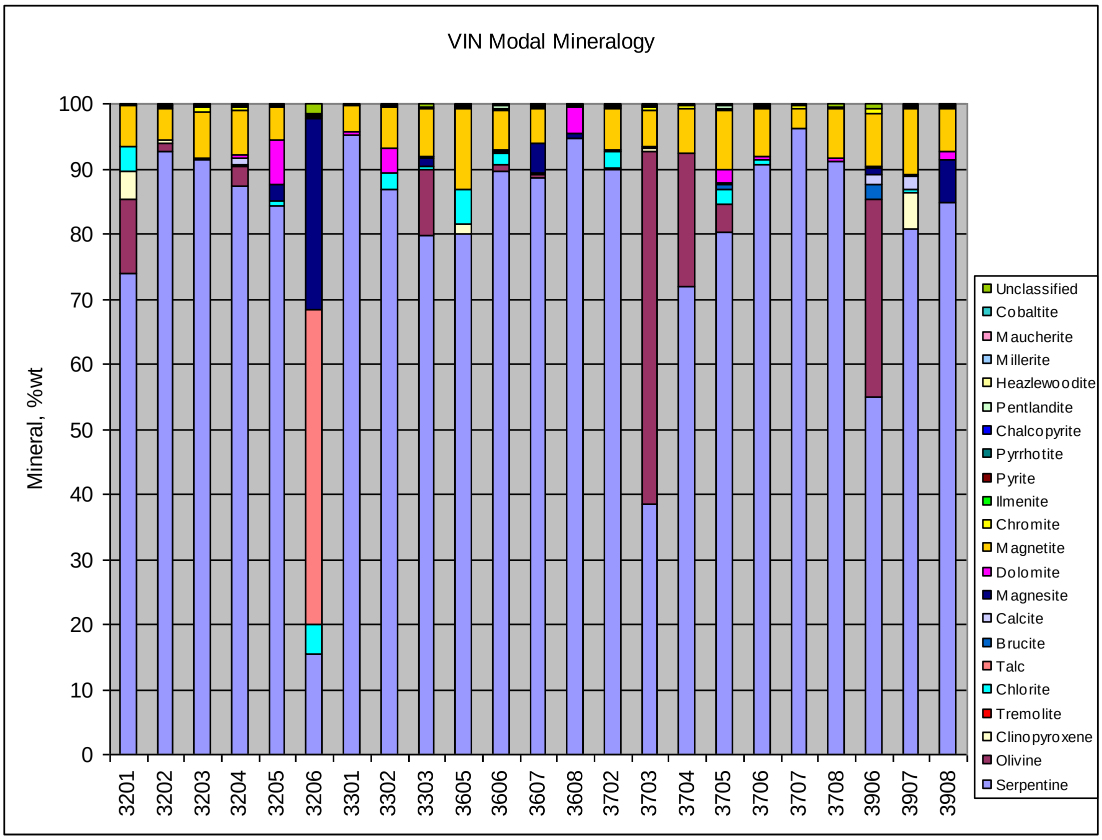


Figure 7-8: Modal mineralogy in 23 thin section samples from Vinberget

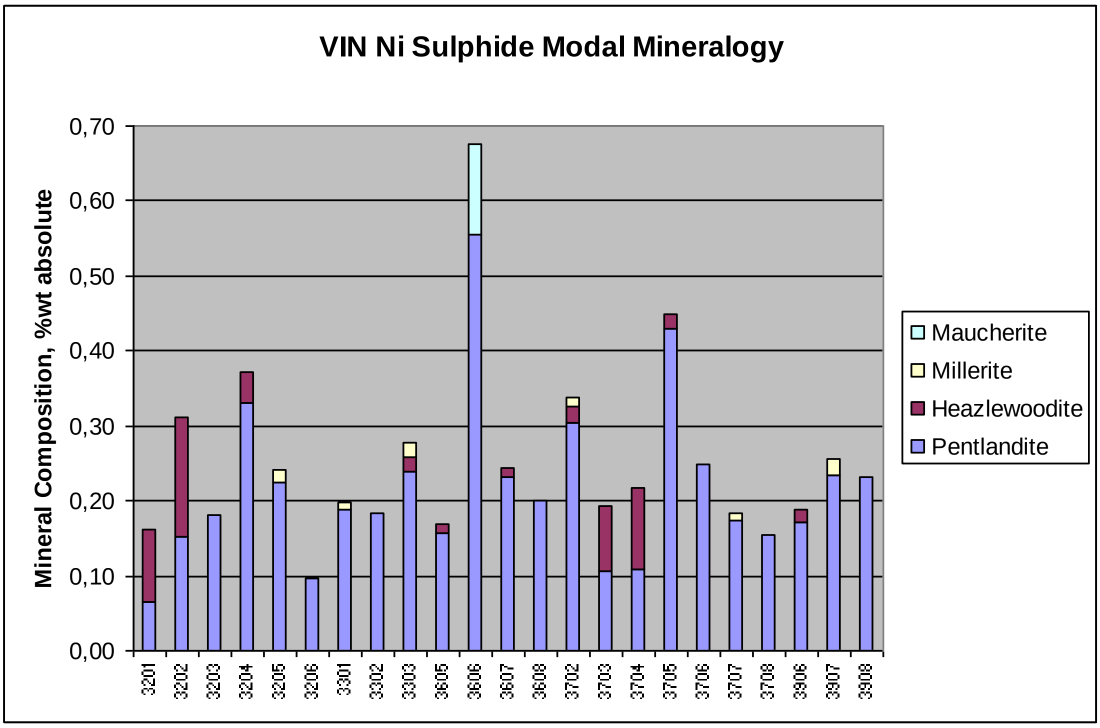


Figure 7-9: Nickel sulphide modal mineralogy in 23 thin section samples from Vinberget

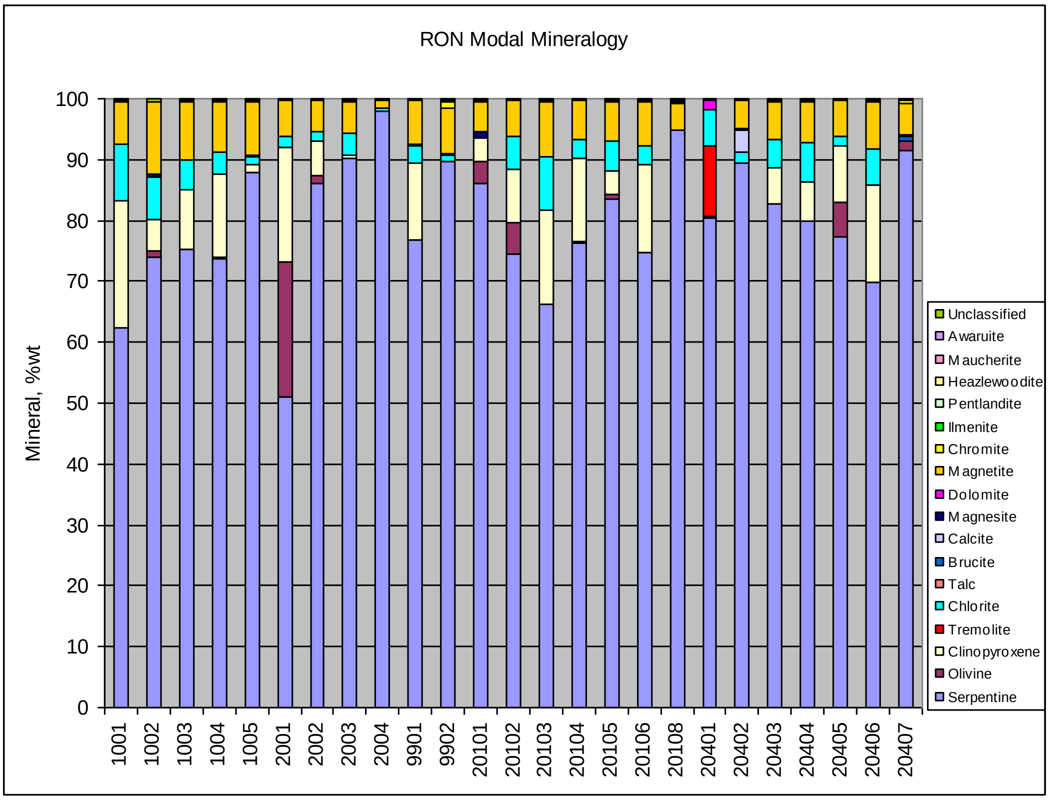


Figure 7-10: Modal mineralogy in 25 thin section samples from Rönnbäcksnäset

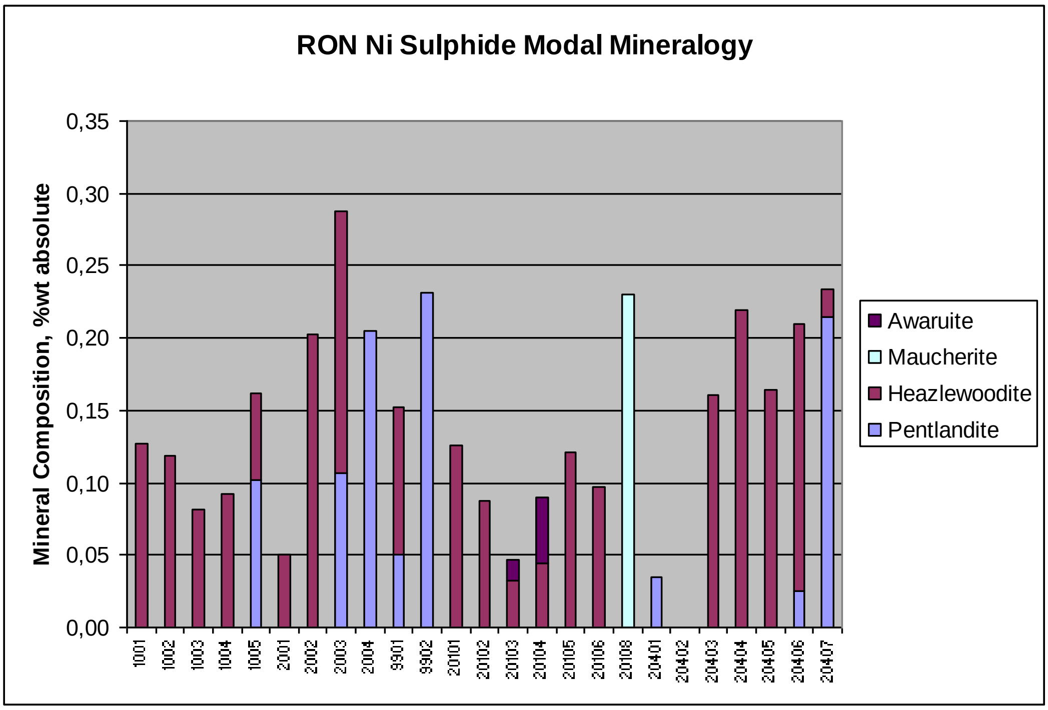


Figure 7-11: Nickel sulphide modal mineralogy in 25 thin section samples from Rönnbäcksnäset

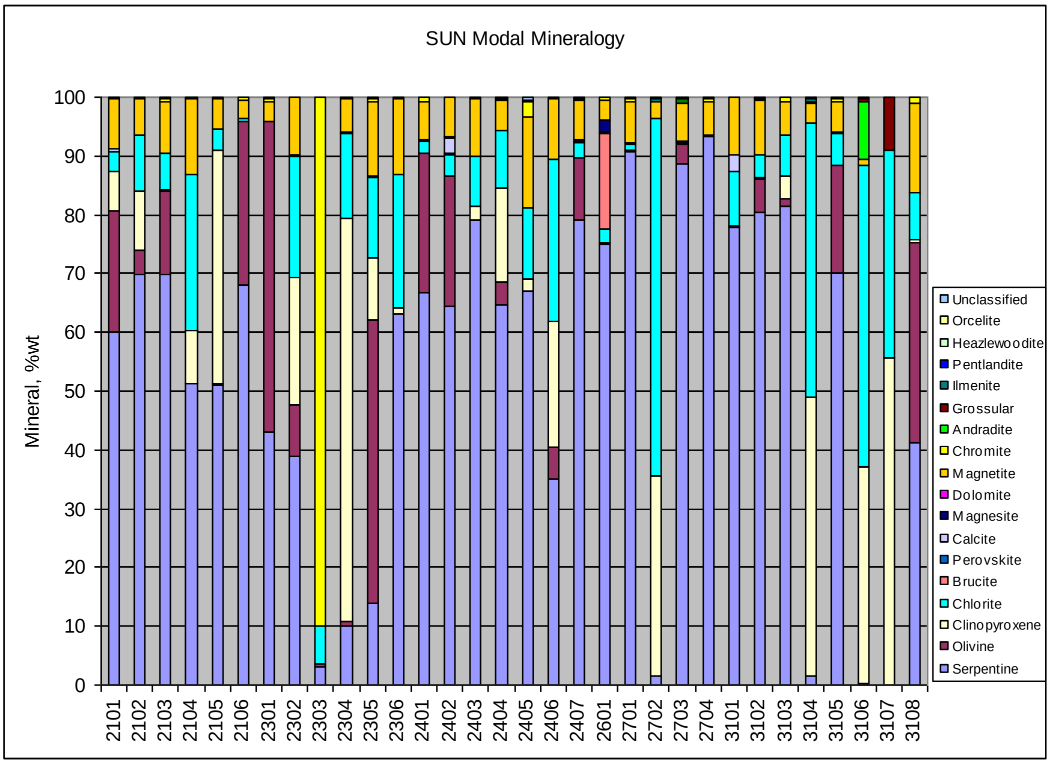


Figure 7-12: Modal mineralogy in 32 thin section samples from Sundsberget

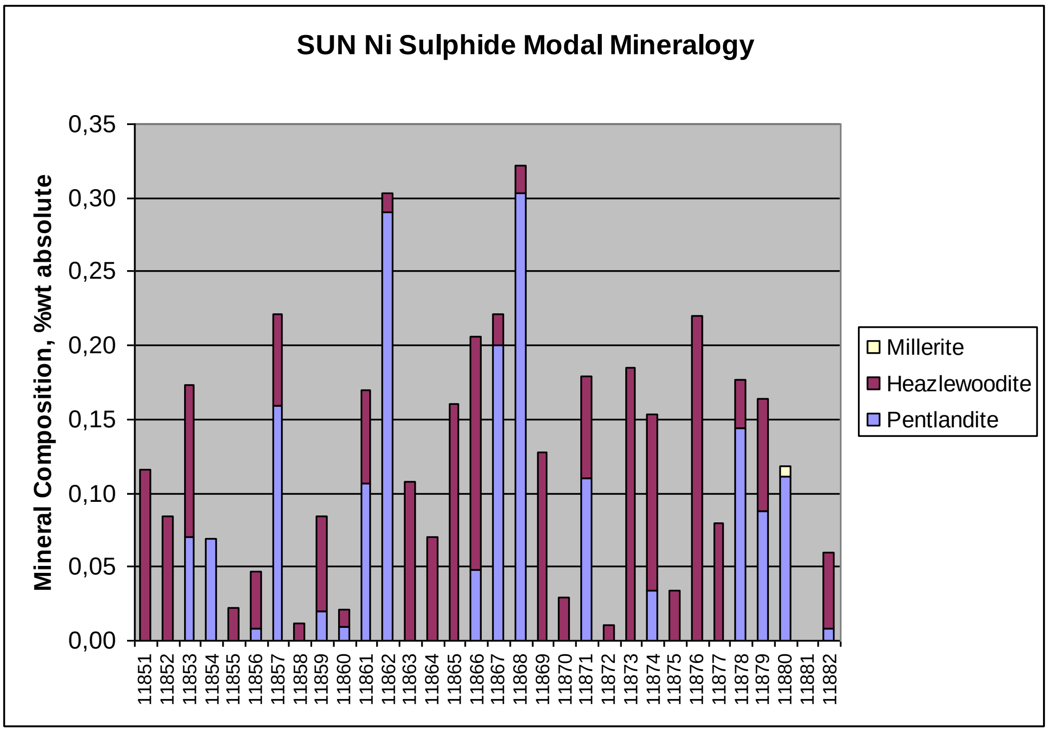


Figure 7-13: Nickel sulphide modal mineralogy in 32 thin section samples from Sundsberget

8 DEPOSIT TYPE

Mineralization in the project area is hosted by serpentine and is mainly of an epigenetic, nickel-sulphide type, with minor magmatic nickel sulphides. Nickel was originally located mainly in the olivine lattice in the ultramafic rocks, such as dunites and peridotites.

Due to serpentinization of the olivine, the nickel in the olivine was released and nickel bearing sulphides were formed depending on sulphur availability. Olivine in the ultramafic rocks is magnesium-dominant and contains up to 0.5% NiO. Serpentinization of ultramafic rocks and the olivine occurs through the supply of water, S, and CO_2. The reaction can be summarised as follows:

Olivine (Ni) + H_2O + S_2 + CO_2 → Serpentinite + Brucite + Carbonates + Fe_3O_4 + Ni_xS_y* + H_2

** Ni-rich sulphides*

Serpentinization of the ultramafics within the three deposits (Vinberget, Rönnbäcksnäset and Sundsberget) is pervasive. As a consequence, both nickel sulphide and magnetite are widespread and of relatively consistent grade throughout.

9 EXPLORATION

Exploration programmes carried out to date at the Project have comprised geological mapping, outcrop sampling, ground magnetic surveys, magnetic susceptibility surveys and drilling programmes. The following chapter is extracted from the 2011 PEA (SRK Consulting (Sweden) AB 2011). Bluelake and its subsidiaries have not conducted any exploration on the Project to date; all information described in this section is from previous owners.

9.1 Geological Mapping and Sampling

The previous owner IGE sampled serpentinite outcrops in the Rönnbäcken area for the first time in the summer of 2005 within the framework of a regional sampling programme. The programme included tests on several exploration permit along the borders of the Caledonian mountains with the objective of testing the serpentinites for potential nickel, platinum, and palladium.

The Klumpliklumpen, Rotiken and Fjelkaområdet areas were tested in addition to Rönnbäcken. In total, approximately 70 samples were taken of which five were from Rönnbäcksnäset, four from the Rönnbäcksjön nr 1 exploration permit, and one sample from the Rönnbäcksjön nr 4 exploration permit. In 2007, an additional 30 samples were collected by IGE, the emphasis this time being the serpentinite outcrops within the exploration permits Rönnbäcksjön nr 3 and nr 4.

In the summer of 2009, IGE mapped approximately 15 km^2 and collected 117 samples for analyses by the ammonium citrate method for Ni, Co, Cu, and S in an attempt to identify ultramafic rocks suitable for future drill targets. Twenty-three of the samples returned values greater than 1,000 ppm (0.1%) Ni as determined by ammonium citrate method (“Ni-AC”). In addition to analysis of nickel in sulphides, analysis of major elements, trace elements and precious metals were performed as well as surveys of specific gravity and magnetic susceptibility.

In total, IGE collected 157 rock samples from within the Rönnbäcken permits.

9.2 Geophysics

Much of the magnetite in the project area is secondary, having formed during the process of serpentinization, and as such, has been used by IGE's geologists as an exploration tool in the field as well as during the core logging to identify areas of serpentinization and possible nickel sulphide mineralisation.

Magnetic susceptibility measurements on core were initially taken routinely every metre, on every bag of coarse rejects, as well as on outcrops during the geological mapping programme. In 2009, magnetic susceptibility surveys were taken on all outcrops mapped on the Rönnbäcken project. A total of 2,287 readings were taken.

Between 2008 and 2010, ground magnetic surveys were performed with a GEM system, GSM-19T proton magnetometer. Measurements were taken at ten metre intervals along sections some 100 m or 200 m apart. For the reconnaissance survey of the Project area, measurements were taken at twenty metre intervals on 500 m sections. The results of the geophysics helped to define drilling targets.

9.3 Test Mine

Pilot/test mining of 4,000 t was conducted by Boliden in 1974 in an open pit adjacent to the road below Vinberget. The location of the pit is shown on Figure 9-1 surrounding drillhole VIN115. Figure 9-2 shows a photograp of the trial mine taken during the September 2021 site visit.

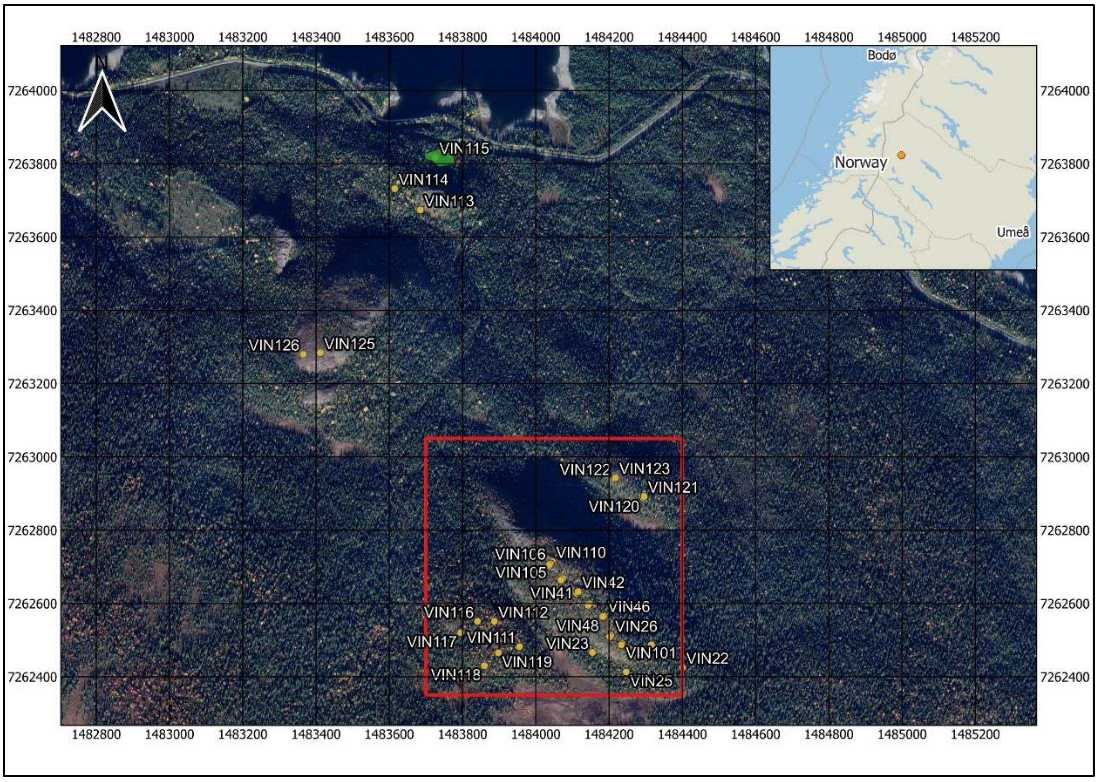


Figure 9-1: Boliden trial mine (green) in relation to Vinberget collars and exploitation concession

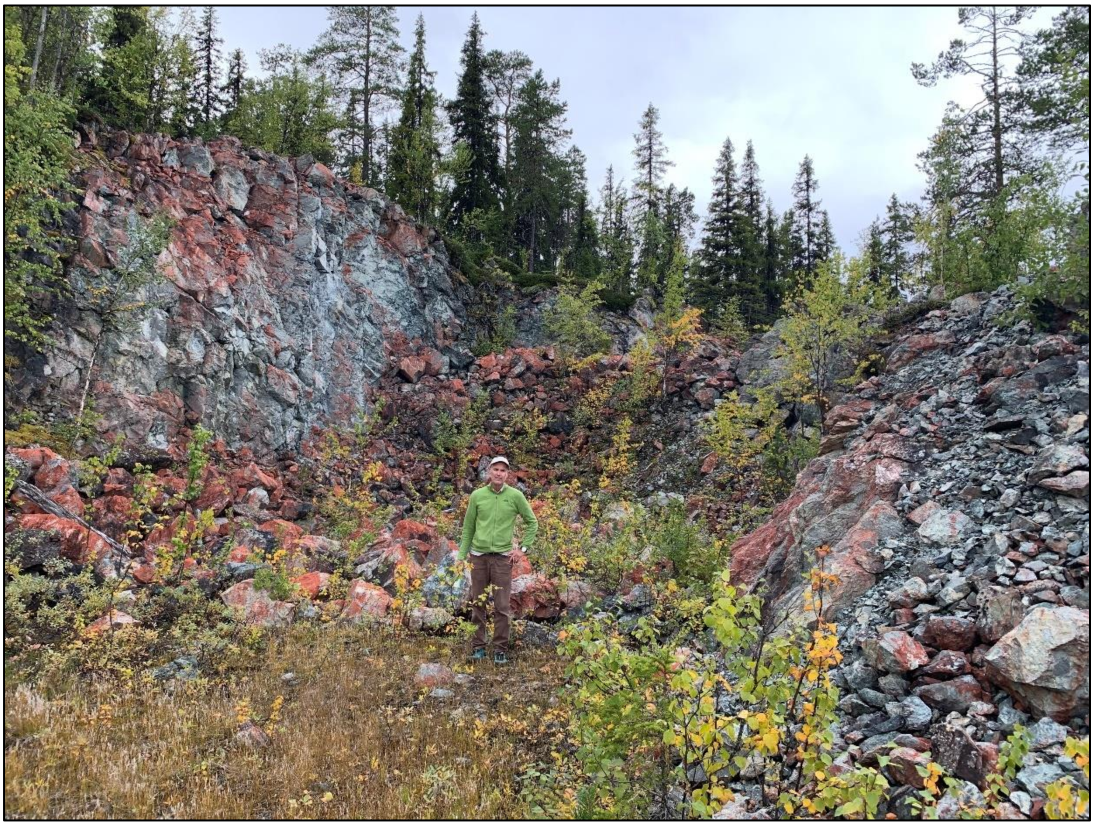


Figure 9-2: Boliden trial mine site (September 2021)

9.4 Geochemistry

The only geochemical surveys performed in the area were the rock geochemistry programmes described above.

9.5 Exploration Potential

The Rönnbäcksnäset deposit is open down dip of the existing drill data and the pit optimisation studies undertaken by SRK and described later in this report show that if the mineralisation does continue at the same grades and thickness then it does have potential to be exploited economically and therefore to add to the overall Mineral Resource. The current exploitation concession boundary, however, limits potential depth extension; this may be adjusted in future if deemed beneficial at a later stage.

Based on surface sampling and interpretation of ground magnetic data, IGE drilled three target areas outside the main deposits. This comprises Area 11 and 13 on Rönnbäcksnäset island and Area 7 to the north of Vinberget around the site of the Boliden test mine (Figure 9-3). Two of these targets (Area 11 and Area 7) have returned encouraging results and have the potential to increase the Mineral Resource in future should exploration activity at these sites prove to be successful.

Two holes (VIN125-126) were drilled on a large ultramafic outcrop of rock northwest of the Vinberget deposit. Only two holes has been drilled to date on the southern border of this outcrop, with initial results from these holes intercepting mineralisation and justifying further drilling in this area in order to determine the extent of the exploration potential. This area was visited by SRK during the site visit in 2021, with exposures of serpentenite clearly identified.

Four holes (RON207-210) were drilled on an outcrop of ultramafic rock on Rönnbäcksnäset Island, located just opposite to the Sundsberget deposit. The holes were drilled on the western side of the outcrop at a spacing of approximately 100 m. The positive assay results from this area justify further drilling in the area in order to determine the extent of the exploration potential.

The last area to be drilled is situated east of the Rönnbäcksnäset deposit. Six holes (RON211-216) have been drilled to test out the eastern side of the island. Assay results and core logging do not indicate any strong serpentinization in the area.

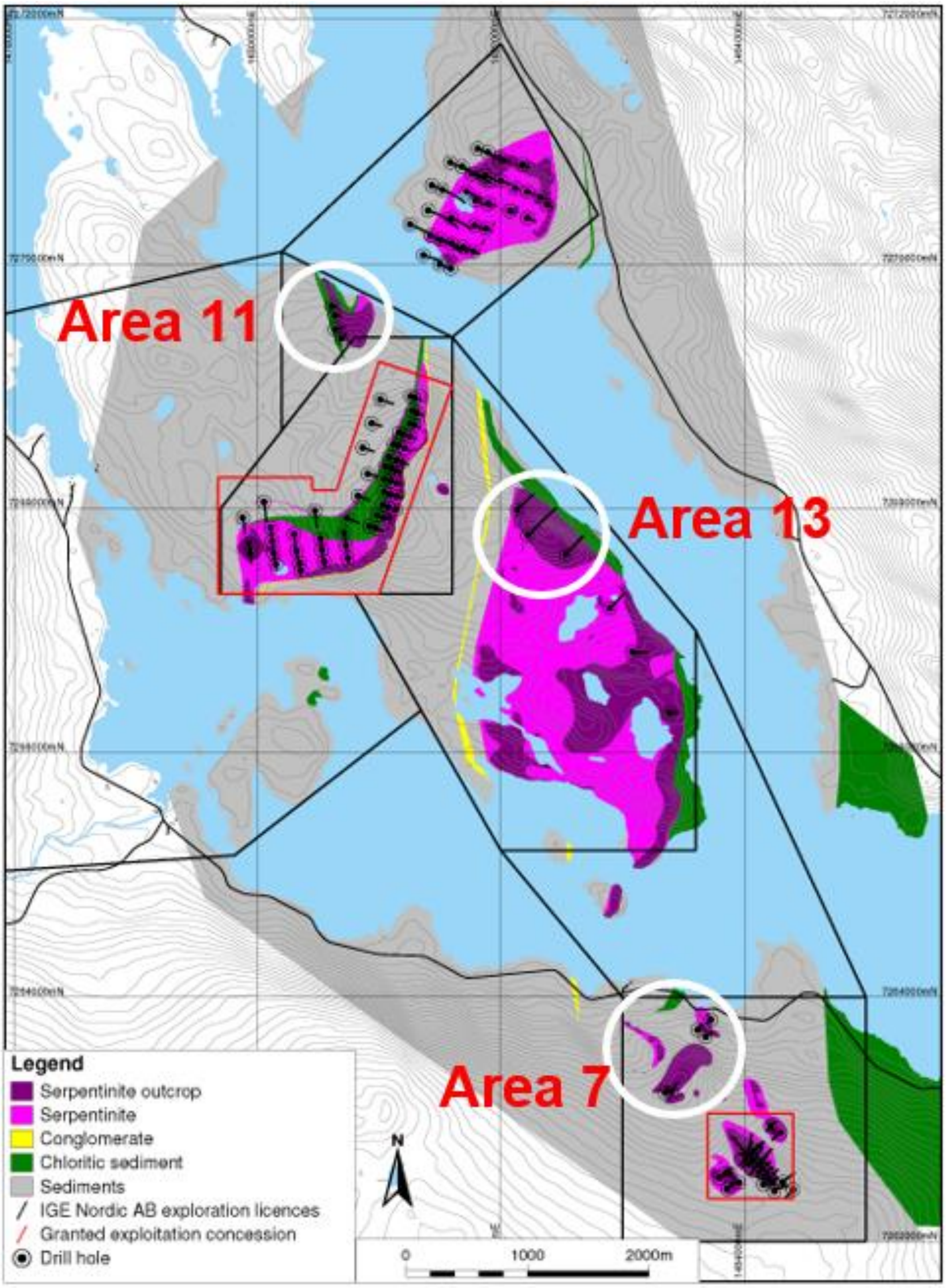


Figure 9-3: Bedrock geology and exploration drilling targets (Source: geological data from SGU and IGE mapping, 2011)

10 DRILLING

This section outlines the methodology and results of the drilling completed on the Project to date. SRK notes no further drilling has been completed since the previous Mineral Resource update completed on Rönnbäcksnäset in August 2012. Bluelake and its subsidiaries have not conducted any exploration on the Project to date; all information described in this section is from previous owners.

10.1 Summary

A total of 21 historical holes were drilled by Boliden in the 1970s for 443.5 m. Information relating to these data has not been provided to SRK and it has not been used in the MRE.

Nickel Mountain commenced its Phase 1 drilling campaign, comprising approximately 8,000 m, in April 2008. Phase 2, also approximately 8,000 m, started in October 2008, with drilling completed in January 2009. Subsequent to this, a drill programme was initiated in December 2009 and continued through to 2011. Drilling at Rönnbäcksnäset was on-going during SRK's field visit in February 2011.

All drilling has been diamond core drilling. The drilling completed by Nickel Mountain to date was undertaken by the contactor Styrud Arctic AB ("Styrud"), previously known as Bergteamet AB and RATE Diamantborrning AB. Initially, two Onram 1000 drill rigs were used. These were later changed to Atlas Copco DIAMEC U6 rigs. Both drill rig types were mounted on Morooka 1500 band dumpers to drill BTW core (42 mm). Drilling in the Project area has consistently been undertaken using environmentally certified hydraulic fluids to minimise environmental impacts in the event of leakage.

Figure 10-1: Drill rig in operation on Vinberget (February 2011)

10.1.1 Vinberget

Steep slopes on either side of the Vinberget ridge dictated the drilling pattern at Vinberget. Drilling was carried out in fans from a several positions at the top of the ridge and designed to achieve a horizontal distance between holes of 50 to 60 m at a downhole depth of 150 m. The drillhole locations are shown in Figure 10-2 and Figure 10-3. SRK notes the northernmost holes drilled on separate hills (see Area 7 on Figure 9-3) are now excluded from the area currently licenced by Nickel Mountain (previously in the exploration licences). No geological models have been created in these areas due to the lack of spatial representivity of the holes and no Mineral Resources have been declared here. In addition. two smaller hills to the northeast and southwest on the main Vinberget hill have also been drilled but not sufficiently to allow for a model to be produced.

IGE reported that drilling conditions were for the most part favourable, with occasional clay zones causing bogging of the drill rods, particularly when drilling towards the southwest.

10.1.2 Rönnbäcksnäset

Drilling began on Rönnbäcksnäset northeast with three drill holes at 50 m intervals along 100 m sections. Thereafter, a fourth hole was drilled in every second section to check for a possible downward extension of the mineralization and to investigate the associated magnetic anomaly. The drillhole locations are shown in Figure 10-4 and Figure 10-5. Infill and down-dip drilling was completed in 2011 to confirm the geological model with 6 holes for 2,396 m completed.

Drilling conditions at Rönnbäcksnäset were found to be more variable than in Vinberget given the lower competency of some units.

10.1.3 Sundsberget

The drillhole database at Sundsberget was carried out on a 200 m line spacing with an approximate 80 m across strike spacing. The drillhole locations are shown in Figure 10-6 and Figure 10-7. As can be seen, three of the holes (SUN008, SUN010 and SUN012) were drilled in an area covered in water at high water mark but not during lower water levels in the reservoir.

Drilling conditions at Sundsberget were found to be good compared to the other deposits.

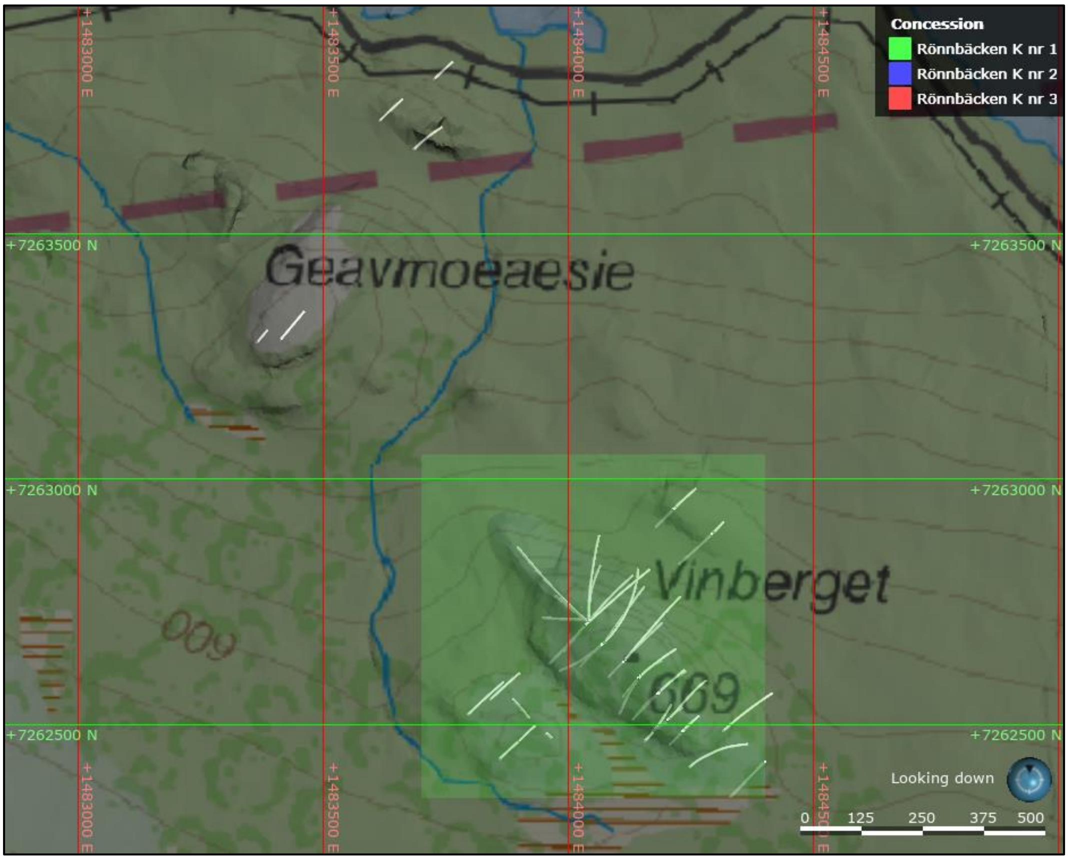


Figure 10-2: Vinberget drillholes with exploitation concession

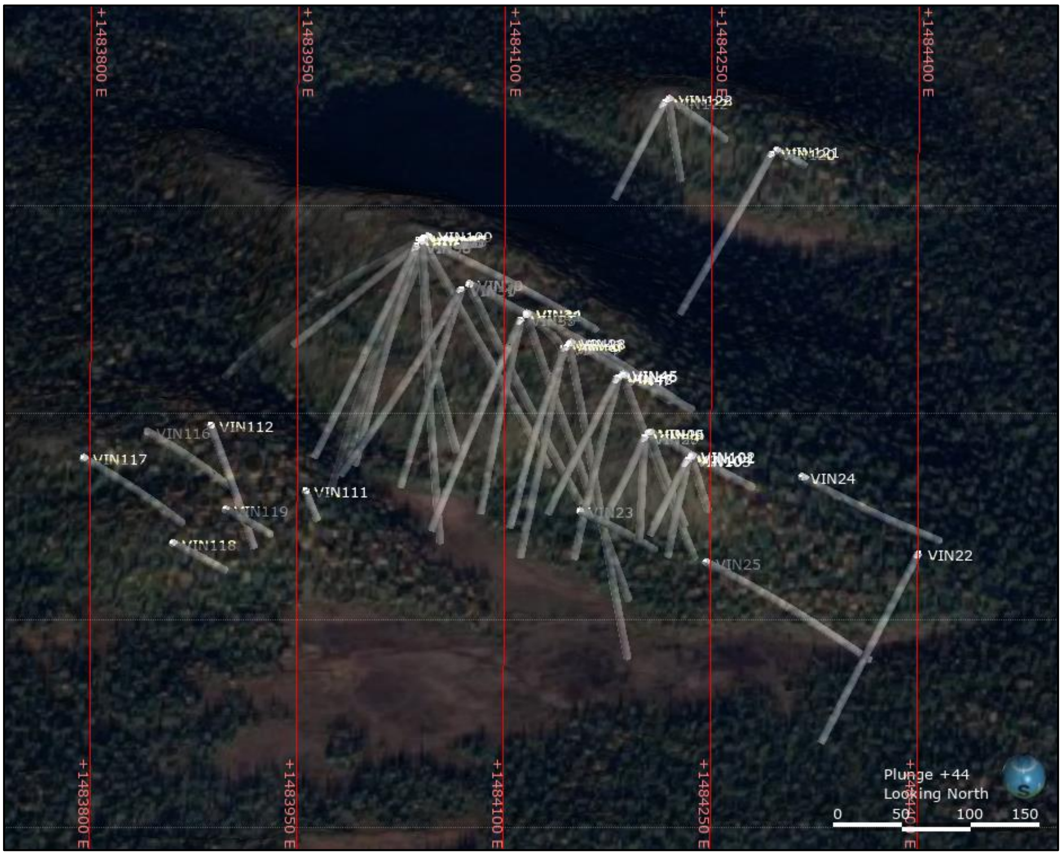


Figure 10-3: Oblique 3D view (looking north) of Vinberget drillholes in main area

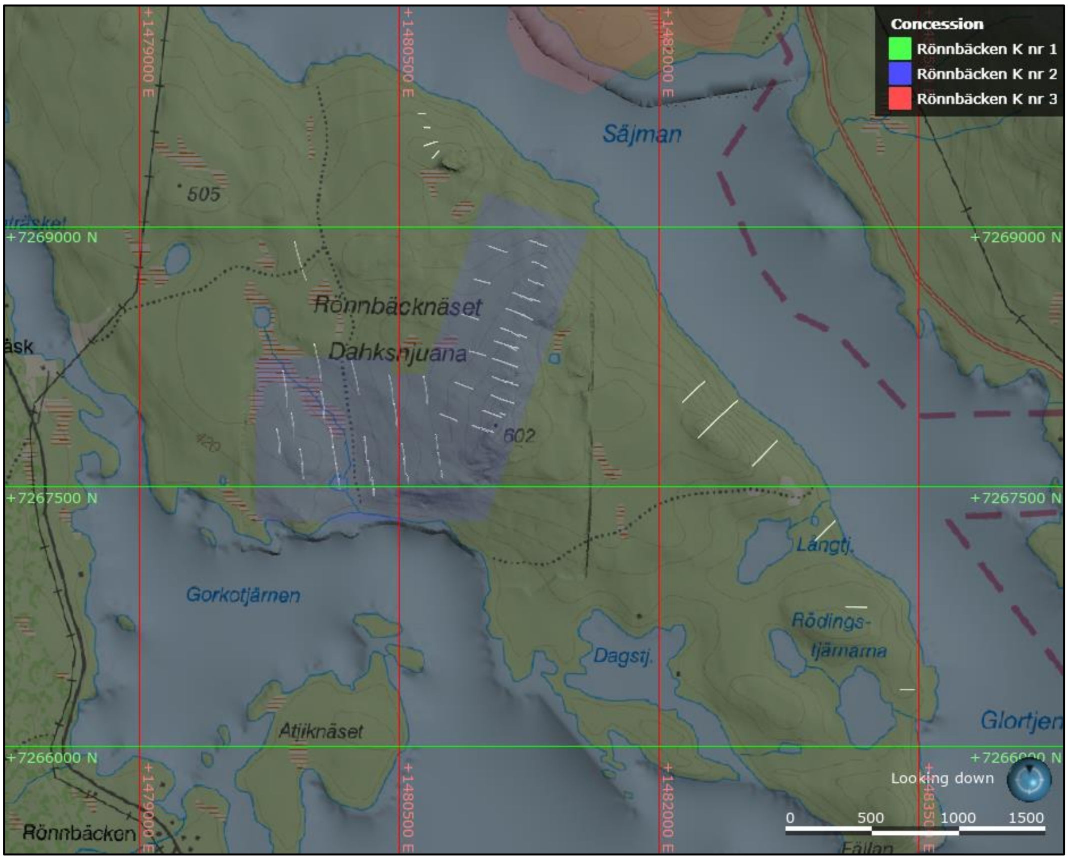


Figure 10-4: Rönnbäcksnäset drillholes with exploitation concession

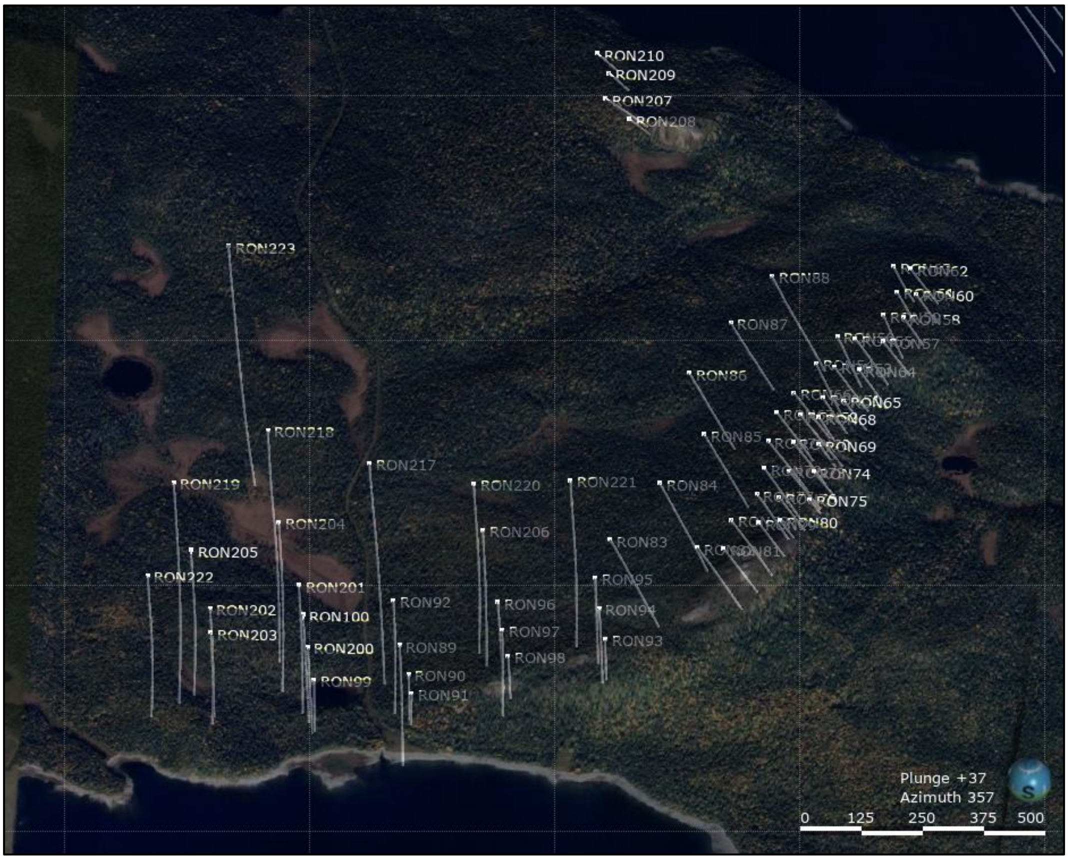


Figure 10-5: Oblique 3D view (looking north) of Rönnbäcksnäset drillholes

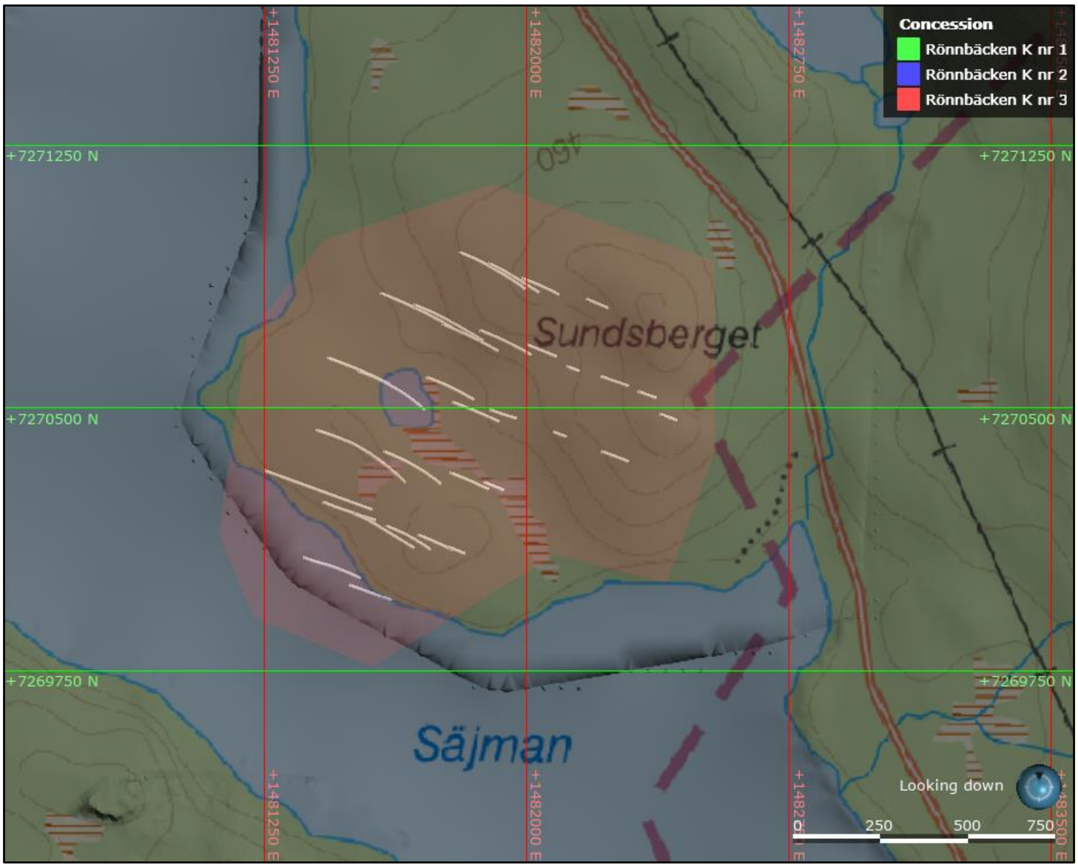


Figure 10-6: Sundsberget drillholes and exploitation concession

Figure 10-7: Oblique 3D view (looking north) of Sundsberget drillholes

10.2 Casing

IGE indicated that casings above ground level were cut in accordance with Swedish Association of Mines, Mineral and Metal Producers' ("SveMin") guidelines to less than 10 cm above ground and sealed with the cap stamped with the drillhole number. SRK has been unable to confirm this due to either the depth of snow cover at the time of the first site visit (2011) or access issues during the most recent visit in 2021.

10.3 Downhole Surveys

All the deviation surveys were performed using a Reflex Maxibor II instrument which measures the trace of the drillhole with optical technology. Surveys from Vinberget and Rönnbäcksnäset were mainly carried out by IGE staff and, to a lesser extent, by contractors Sten Wikström, Skellefteå Bergsupport AB and/or Elin Broström, Styrud.

10.4 Collar Surveys

Drillhole locations were set out using a hand-held GPS. The collars were later surveyed by Tyréns and Mikael Norén using Leica System 1200 GPS technology, using the following projection and with the following measurement accuracy:

- plan projection: RT 90 2.5 gon V 0:-15;
- accuracy in plan projection ±2 to 3 cm;
- vertical projection: RH 70; and
- accuracy in vertical projection ±3 to 4 cm.

IGE indicated that drill collar azimuths were calculated from two survey points, one from the top of the casing and another at the top of a 3 m long steel rod that were put down 1 m inside the casing.

Holes drilled after 2008-11-03 were surveyed by hand-held Garmin 60csx GPS only.

10.5 Topography

A topographic survey was provided to SRK by Nickel Mountain prior to undertaking the MRE in 2012. The accuracy of this survey is unknown; however, in comparison with freely available shuttle radar terrain mission ("SRTM") data (30 m resolution in X-Y) it is higher resolution and likely to be in the order of <5 m X-Y. The topographic surveys match well to the high-accuracy collar surveys undertaken (see above); this allows SRK to have a reasonably high level of confidence in the accuracy of the topography.

10.6 Core Logging

IGE geologist or field technician inspected drill core at the site during drilling on a continuous basis and stopped the drilling at a predetermined depth in mineralized material or at a particular lithological intersection. The drill contractor was responsible for transportation of the drill core to the IGE's core archive and logging facility in Skellefteå, Sweden.

The core was photographed and logged at the logging facility. All of the drill cores were logged by IGE staff members or sub-contractors to capture relevant geological and geophysical (susceptibility logs) information. The geologic logging intervals were based on lithological variations in the rock and in addition a qualitative estimate of fibrous asbestiform mineral content was noted.

Rock Quality Designation ("RQD") measurements were taken on the basis of the assay intervals (roughly every 2 m).

Initially, magnetic susceptibility was measured at every metre in mafic and ultramafic intersections, using a SM-20 instrument manufactured by GF Instruments. This procedure was abandoned in the 2009-2010 drilling campaign, with susceptibility measurements henceforth being taken only on coarse rejects representing assayed intervals.

Dry bulk density measurements were carried out by IGE staff members or sub-contractors at the core logging facility using the water immersion method on unsealed drill core. Within the serpentinite, density measurements were taken at every assayed interval (every 2 m). Representative density measurements were also taken for the main waste rock lithologies. A total of 10,579 bulk density measurements are recorded in the database.

The bulk density of the core was measured to obtain densities for use in the MRE but also to get a value of the degree of serpentinization. The transformation of olivine to serpentine lowers the density from greater than 3.0 g/cm^3 to 2.7 g/cm^3. For similar reasons, the magnetic susceptibility has been surveyed on drill core, outcrops, and on sample bags of the coarse rejects from the sample preparation. Magnetite is formed as a secondary product during serpentinization.

All core logging data was recorded onto paper and later entered into Microsoft Excel spreadsheets. A hardcopy check list was prepared and completed as standard for each drillhole by the supervising geologist / technician to maintain data capture protocols.

10.7 Interpretation of Results

On the basis of IGE's drilling, mineralisation wireframes were digitized by SRK for Rönnbäcksnäset, Sundsberget and Vinberget using Datamine software.

Rönnbäcksnäset is the largest of the mineralised deposits and contains the most drillhole intercepts. It measures 2.5 km along strike, 1.6 km on a 16^0 azimuth, in the northwest, and 1.2 km along strike on an 85^0 azimuth in the southeast. The south-eastern portion has a maximum true thickness of roughly 350 m and dips at 25^0 towards the north-northwest, while the northeast portion has a maximum true thickness of roughly 60 m and dips at 40^0 towards the west-northwest. The Rönnbäcksnäset wireframe was modelled to an elevation of -1 masl and contains 337.4 Mm^3 of material. The Vinberget mineralised deposits measures 686 m along strike, on an azimuth of 321º, and 300 m across strike at the widest point. It was modelled to a depth of 307 masl, with a sub-vertical dip. The Vinberget wireframe contains 22.3 Mm^3 of material. The Sundsberget mineralised deposit measures 1,200 m along strike on an azimuth of 10º, and 500 to 600 m across strike at the widest point. It was modelled to a maximum down dip depth of approximately 500 m from surface, with a dip of 40° to the west and contains 183.5 Mm^3 of material.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

Bluelake and its subsidiaries have not conducted any exploration on the Project to date; all information described in this section is from previous owners. It should be noted that certification of laboratories used for the exploration analysis was at the time of writing the 2011 PEA and therefore may now be out dated.

11.1 Samples for Assay

All serpentinite core intersections were sampled, along with most of the weakly mineralised mafic unit at Rönnbäcksnäset to ensure that all sulphide nickel mineralisation was entirely captured (Figure 11-1).

The core was marked for sampling by IGE geologists or sub-contracting technicians, starting at the contact of the mineralization and then every two metres beginning at the first even numbered metre. Consequently, every sample at the footwall and hanging wall of the mineralized material represents a non-regular length.

Two metre sample intervals were initially selected to better understand the distribution of the accessory mineralization and to provide sufficient detail to correlate possible layered ultramafics. Sample intervals and numbers were either recorded onto paper and then entered into a Microsoft Excel spreadsheet or entered directly into Microsoft Excel. SRK considers that the IGE has sampled the host serpentinite in an unbiased fashion using a consistent technique for all intersections.

Once assay results were issued by the laboratory in Excel format, they were merged with the sample interval data in Excel by either the IGE exploration manager or the project geologist. The merged files were imported into Micromine and validated.

SRK notes no systematic logging of core recovery has been carried out by IGE; however, serpentinite intersections in drill core observed during the field visit to Rönnbäcken and the core logging and storage facilities in Skellefteå in 2010, showed very good recovery and generally good quality core. SRK does not consider core loss to be a material issue with regards quality of data used in the MRE.

Figure 11-1: Typical drill core and serpentenite (SUN016 at 274 - 279 m)

11.2 Thin Section Samples

Samples were systematically collected by IGE for thin section work at approximately 40 m intervals.

11.3 Samples for Metallurgical Tests

Two samples of 20 to 30 kg each were taken from the old Boliden test pit and were tested at Minpro AB. The pit is located at the road 1 km north of the drilled area at Vinberget. The sample was a composite sample comprised of small fragments collected from throughout the pit.

In an early stage of the drill programme, five samples of 30 to 35 kg each were taken for new tests at the Outokumpu Research Centre ("ORC"), three from Vinberget and two from Rönnbäcksnäset. The three samples collected from Vinberget comprise coarse reject from the sample preparation of two drillholes, VIN30 and VIN29. The sample from VIN30 represented one lower grade zone higher up and one higher grade zone deeper down in the hole. A third similar type of sample was collected in VIN29. At Rönnbäcksnäset, two samples were collected from drillhole RON53 in the same way as in VIN30. RON53 is located in the north-eastern part of the Rönnbäcksnäset deposit. For the second phase of testing at ORC, two composite samples were prepared using coarse rejects from the two drilled areas at the end of the drill programme.

At Vinberget, all sample rejects were composited into a 2.5 t sample from selected holes. The 1,008 sample intervals and 1,216 m of core drilling represented intersected the mineralization at depths of between 630 to 500 masl. At Rönnbäcksnäset, the samples were selected from coarse rejects from 15 core holes drilled in the south-western part of Rönnbäcksnäset.

The samples were split in two halves, with one half included in the sample. A total of 264 samples were included, weighing 366 kg and representing 528 m core drilling. This in turn represents approximately two years of production from the area down to 400 masl. The sample was dominated by the upper pyroxene bearing serpentinite and comprises relatively little of the higher-grade lower serpentinite zone with similarities to the Vinberget serpentinite. The sample also does not include any of the low-grade mafic intrusion material or the low-grade zone with almost no sulphides.

SRK recommends further work is conducted to clarify metallurgical sample provenance (hole number, interval and sample weight) for more samples to support future studies and specifically to verify metallurgical sample representivity, to understand test work results in the context of deposit geology and to provide support to core sample assays via reconciliation of concentrate grade with original sample grade.

11.4 Sample Preparation

The sample preparation was conducted by ALS Chemex in Piteå, Sweden.

The aim of the sampling has been to delineate mineralization that could be recovered by established metallurgical methods, namely, flotation of sulphide minerals. The adapted assay technique was therefore a partial leach that selectively dissolves nickel in sulphides and leaves the nickel bearing silicates and oxides unaffected. As the sulphur content is low, analyses of sulphur must be performed by methods with low detection limits, better than or equal to 0.01% S.

As the selective nickel leaching technique is not an accredited method for assaying nickel in sulphides, other accepted methods were included in the assay package such as aqua regia leach and near-total four acid leach. To support the values of the grades of nickel in sulphides, mineralogical studies and metallurgical tests were also carried out by IGE and are discussed elsewhere in this report.

Sulphur assays from four acid and aqua regia digestion give higher sulphur values, when compared with associated sulphur-AC results. Sulphur assays using the ammonium citrate technique are thought to dissolve the free milled and the exposed sulphides at oxide and silicate mineral surfaces and thereby present a better indication of the nickel sulphides amenable to recovery by conventional milling and flotation techniques.

11.5 Chain of Custody and Sample Preparation

The drill contractor was responsible for transportation of the drill core from site to IGE's core archive and logging facility in Skellefteå.

During the logging stage, the core was measured, and sample intervals selected by IGE staff geologists or sub-contracting technicians for sample analyses. These intervals were marked on the core and on the core boxes.

ALS Sweden AB, a subsidiary of ALS Chemex ("ALS"), was contracted to split the core and carry out the sample preparation. A separate room for sample preparation was set up for the Project as a precaution against the health risks associated with asbestos.

The samples were logged in the tracking system, weighed, and split with a diamond saw (Almonte Core Saw). One half of the sawed core was treated according to ALS code PREP-31, which included drying and crushing to 70% -2 mm (Tyler 9 mesh, US Std Nr 10). A split of up to 300 g was taken and pulverized to 85% -75 µm (Tyler 200 mesh, US Std Nr 200). The 300 g sample pulp was then split in two or three subsamples and sent to two different primary assay laboratories (Labtium and ALS Chemex). A third laboratory (ACME) was used for the control assays. The remainder of the coarse reject was labelled with the analytical number and stored at the assay laboratories. After a holding period at the laboratories, all of the rejects and pulps were returned to IGE's storage facility in Skellefteå. The pulps at Labtium Oy in Rovaniemi, Finland ("Labtium"), duplicates of the pulps stored in Skellefteå, have been discarded.

A more detailed description of the sample preparation process is illustrated in the flowchart in Figure 11-2. Note that the sample split was modified to up to 300 g instead of 250 g.

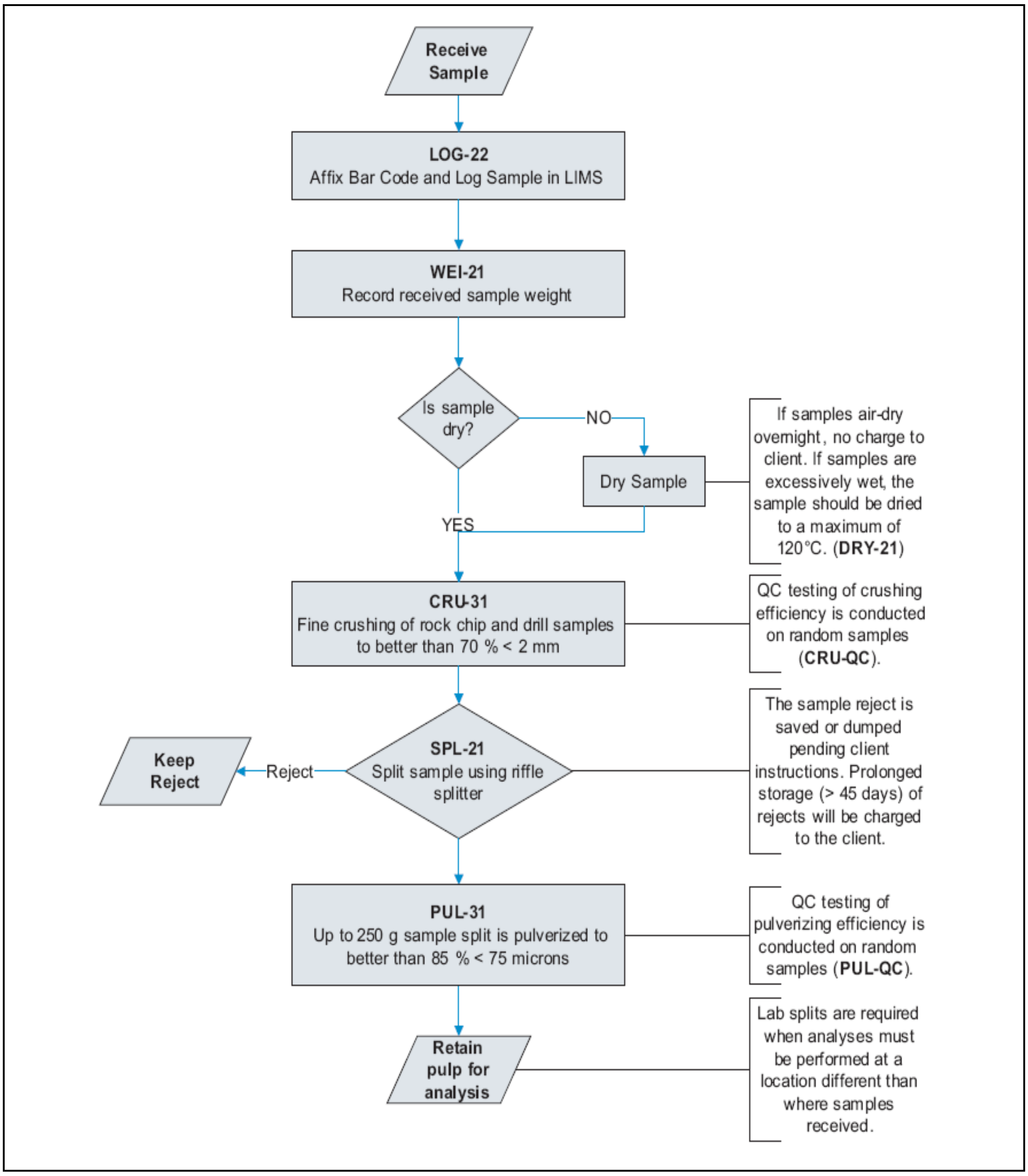


Figure 11-2: Sample preparation flow sheet (modified from ALS Chemex 2009)

11.6 Sample Analysis

11.6.1 Summary

Two assay laboratories were contracted for the analyses: Labtium in Rovaniemi, Finland, and ALS in Vancouver, Canada. Check analyses were mainly performed by Acme Analytical Laboratories Ltd ("Acme") in Vancouver, Canada. The analyses carried out by the three laboratories are summarised Table 11-1 and Table 11-2.

Table 11-1: Analytical methods 2008-2009, Vinberget & Rönnbäcksnäset

Lab	Lab code	Sample digestion	Type	Sample size (g)	Analytes	Main interest	Use
ALS Chemex	ME-MS81	Four-acid	Near total	0.25	38	Ni, Co, S	Original
	ME-4ACD81	Four-acid	Near total	0.25	9	Ni, Co	Original
	ME-ICP06	Four-acid	Near total	2	14	Major Element	Original
	ME-ICP61	Four-acid	Near total	0.25	33	Ni, Co, S	Original
	PGM-ICP23	Fire Assay	Total	30.00	3	Au, Pt, Pd	Original
Labtium	240P	H2O2+NH4 citrate	Sulphides	0.15	3	Ni, Co	Original
	510P	Aqua regia	Partial	0.15	14	Ni, S	Original
Acme	G7TD	Hot four-acid	Near total	0.50	23	Ni, S	QC
	8NiS	H2O2+NH4 citrate	Sulphides	1.00	1	Ni	QC
Labitum	307P	HF +HClO4	Near total	0.20	13	Ni	QC
	720P	Na2O2 Fusion	Total	0.20	12	NI, S	QC

Table 11-2: Analytical methods 2009-2010, Sundsberget

Lab	Lab code	Sample Digest	Digest Type	Analysis Type	Sample Size (g)	Analytes	Main interest	Use
ALS Chemex	ME-4ACD81	Four acid	Near total	ICP-AES	0.25	9	Ni, Cu, Co	Original
	ME-MS81	Lithium borate fusion	Total	ICP-MS	0.2	38	Ni, Cu, Co	Original
	ME-ICP06	Lithium borate fusion	Total	ICP-AES	0.2	13	Whole rock	Original
	ME-MS42	Aqua regia	Near total	ICP-MS	0.5	6	As, Bi, Hg, Sb, Se, Te	Original
	OA-GRA05	Fusion	Total	Gravimetric	1	1	LOI	Original
	TOT-ICP06	Calculation based on LOI and ME-ICP06				1		Original
	PGM-ICP23	Fusion	Total	Fire Assay (ICP-AES)	30	3	Au, Pd, Pt	Original
	C-IR07	High temp evolution	Total	Leco furnace		1	C	Original
	S-IR08	High temp evolution	Total	Leco furnace		1	S	Original
Labtium	240P	H2O2 + NH4 citrate	Sulphides	ICP-AES	0.15	4	Ni-AC, S-AC	Original
Acme	7TD	Hot four acid	Near total	ICP-AES	0.5	22	Ni, Cu, Co	QC
	8NiS	H2O2 + NH4 citrate	Sulphides	ICP-AES	1	1	Ni-AC, S-AC	QC

For exploration programmes during the past 12 months, the ME-ICP61 method was replaced by a “Complete Characterisation Package” which includes the methods ME-ICP06, ME-4ACD81, ME-MS81. The new package is intended to provide additional information on rock type to aid in the geological interpretation.

The database received by SRK from IGE, contained a total of 11,444 analyses, of which 10,615 related to primary core samples while 1,122, or 10%, comprised a variety of QA/QC analyses. This is considered by SRK to be a reasonable number of check assays. A summary of the analyses is presented in Table 11-3.

Table 11-3: Analysis Summary

Deposit	Core Samples	Duplicates	UM-4 (CRM)	Blank	Acme check	Coarse reject	Sub-total QC	Total Assays	Labtium internal duplicates
VIN	3,419	107	68	76	68	15	334	3,753	130
RON (2008-10)	2,706	94	58	66	56	14	288	2,994	105
RON (2011)	1,556	69	40	36	0	62	207	1,763	0
SUN	2,934	116	72	72	33	0	293	2,934	0
Total	**10,615**	**386**	**238**	**250**	**157**	**91**	**1,122**	**11,444**	**235**

SRK notes for low grade sulphide deposits such as Rönnbäcken, the silicate nickel contribution to the nickel assay can be significant. For this reason both the total nickel content and the nickel content in sulphide, the latter by partial leach methods, namely Labtium’s 240P method (ammonium citrate and hydrogen peroxide), were utilised.

11.6.2 Labtium

Labtium had FINAS T025 accreditation ISO/IEC 17025:2005 at the time of writing the 2011 PEA. According to FINAS, “a laboratory's fulfilment of the requirements of ISO/IEC 17025:2005 means the laboratory meets both the technical competence requirements and management system requirements that are necessary for it to consistently deliver technically valid test results and calibrations. The management system requirements in ISO/IEC 17025:2005 are written in language relevant to laboratory operations and meet the principles of ISO 9001:2008 Quality Management Systems Requirements and are aligned with its pertinent requirements”. This accreditation represents a higher standard than ISO 9001:2000. According to the website of Labtium, “Labtium’s quality system fulfils the requirements of the Standards Council of Canada (CAN-P-1579), Guidelines for Accreditation of Mineral Analysis Testing Laboratories”; however, the ammonium citrate leach procedure is not covered by the accreditation as the method is relatively new to Labtium.

Ammonium citrate hydrogen peroxide leach (“AC”), Labtium code 240P, is described as follows. A 0.15 g subsample is leached in a mixture of ammonium citrate and hydrogen peroxide (1:2; total volume 15 mL). The leach is done on a shaking table for two hours at room temperature. The solution is decanted from the sample powder directly after the leach. The solutions are diluted (5:1) and measured with ICP atomic emission spectroscopy (“ICP-AES”). It is a partial leach and is selective at dissolving nickel, cobalt, and copper from sulphide mineral species while leaving those elements in silicates unaffected. The detection limits are 10 ppm.

This method was used to determine the recoverable nickel content for this Project, that is, specifically to obtain accurate estimates of the metals that can be recovered by established metallurgical methods, such as flotation.

Aqua regia digestion, laboratory code 510P at Labtium, is described as follows. A 0.15 g subsample is digested with aqua regia (3:1 mixture of concentrated hydrochloric acid and concentrated nitric acid) by heating at 90°C in an aluminium-heating block for 1.5 hours and diluted to 15 mL with water. An aliquot is centrifuged before instrumental analysis. Aqua regia is a partial leach for silicates but is an almost complete leach for sulphides and oxides. It is a much better leach for this Project than the “near total” leach, however, as silicates are partially dissolved, even this method will overestimate the metal content. It is mainly included as a comparison to the sulphide nickel method for the sulphur content and other elements, such as arsenic, that can exist in sulphide phases.

The results from Labtium are reported with three significant digits (zero uncounted) or <X where X is the detection limit. The latter is preferable to the ALS reporting method, even if the last digits are not significant.

IGE reported that for the 2009-2010 exploration programme, aqua regia digestion has been abandoned in preference for the 240P method.

11.6.3 ALS

ALS had accrediation by ISO 9001:2000 overall and conformed to the requirements of CAN-P-1579 and CAN-P-4E (ISO/IEC 17025:2005) by the Standards Council of Canada (SCC) for a number of specific test procedures, including the two methods employed by IGE (at the time of writing to 2011 PEA).

ALS code ME-ICP81 requires the pulp to be digested with perchloric, nitric, hydrofluoric, and hydrochloric acids (HNO3-HClO4-HF-HCl). The residue is topped up with dilute hydrochloric acid and the resulting solution is analysed by ICP-AES. Results are corrected for spectral inter-element interferences. Four acid digestions are able to dissolve most minerals. However, although the term "near-total" is used, depending on the sample matrix, not all elements are quantitatively extracted. Therefore, the leach is less useful to the Project as an estimate of recoverable metals. It is mainly included to demonstrate the need of the partial leach method and to provide an extra check of sulphur content.

More detailed descriptions of ALS codes ME-4ACD81 and ME-MS81 follow. For ME-4ACD81, a prepared sample (0.25 g) is digested with perchloric, nitric, hydrofluoric and hydrochloric acids. The residue is topped up with dilute hydrochloric acid and the resulting solution is analysed by inductively coupled plasma-atomic emission spectrometry. The results are corrected for spectral inter element interferences. For ME-MS81, a prepared sample (0.200 g) is added to lithium metaborate flux (0.90 g), mixed well and fused in a furnace at 1000°C. The resulting melt is then cooled and dissolved in 100 mL of 4% nitric acid. This solution is then analysed by inductively coupled plasma-mass spectrometry. The detection limits of PGM-ICP23 are 1 ppb for Au and Pt and 5 ppb for Pd. The upper limit is 10 ppm and has never been reached. The results from ALS are reported by increments of the detection limits. For example, if the detection limit is 1, the result given is <1, 1, 2, 3, etc, with some exceptions such as Pb (<2, 2, 3, 4, etc.).

11.6.4 ACME

ACME is accredited as complying with ISO 9001:2000. Check assays were mostly done at ACME using the four-acid digestion and ammonium citrate methods.

11.7 Quality Assurance and Quality Control (QA/QC)

11.7.1 Summary

IGE's Quality Control/Quality Assurance ("QA/QC") programme comprised submitting sample blanks, standard reference samples, sample duplicates, and inter-laboratory check samples. The approximate rate of sample submissions is summarized in Table 11-4.

Table 11-4: QC Sample Frequency

Sample Type	Frequency
Blank	1/50
UM-4 (Reference material)	1/50
Duplicate	1/25
Interlaboratory check assays	1/50

Additional checks were done on near total and total nickel on coarse rejects. In addition, the laboratories performed analyses of duplicates, in-house standards, etc, which were also forwarded to IGE. The QA/QC results from the laboratory were checked as they were returned.

11.7.2 Sample Blanks

For the Rönnbäcksnäset and Vinberget deposits, IGE submitted sample blanks into the sample stream to check for contamination and drift. The blanks were prepared from pale coloured granite and were inserted by the sample preparation laboratory (ALS Chemex, Piteå). The relevant checks are for Ni, Ni-AC, and Co-AC and their detection limits are 1 ppm, 10 ppm, and 1 ppm, respectively.

11.7.3 Reference Material

Reference samples were inserted in the sample stream to check the accuracy of the assay laboratory. Reference UM-4 sample was purchased from CANMET Mining and Mineral Sciences Laboratories (“CANMET”) and originated from the Werner Lake - Gordon Lake district of north-western Ontario, Canada. The reference sample is intended as a reference material for the determination of ascorbic acid/hydrogen peroxide-soluble copper, nickel, and cobalt in ultramafic rocks. There are no certified standards for the sulphide selective leach method used, mostly due to the lack of laboratories offering such analytical services. Therefore, no round robin test was completed, and no performance gates were recommended which are normally based on the Round Robin statistics. The reference grades recommended by CANMET are 0.19% Ni and 0.007% Co.

For the Rönnbäcksnäset and Vinberget deposits, IGE submitted UM-4 samples for analysis by the ammonium citrate method (“Ni- AC”) described in Section 11.6.2 above.

11.7.4 Duplicate Pulp Samples

For the Rönnbäcksnäset and Vinberget deposits, IGE renumbered and submitted sample pulps to Labtium for assay as duplicates.

11.7.5 Duplicate Coarse Reject Samples

In the case of the Rönnbäcksnäset and Vinberget deposits, samples of coarse rejects were renumbered and resubmitted for assay to test if the 70% -2 mm crush size would achieve repeatable results.

11.7.6 Interlaboratory Check Assays

For the Rönnbäcksnäset and Vinberget deposits, samples originally assayed at Labtium were submitted for assay at ACME principally as a check on the accuracy of the Ni-AC results.

11.7.7 SRK Duplicate Samples

During a visit to the IGE exploration office and core archive facilities in Skellefteå in 2011, SRK collected 16 sample pulps at random from the sample pulp archive originating from the Project area. These sample pulps were re-bagged, assigned a new sample numbers and sent to Labtium for assay by method code 240P.

11.7.8 Density Measurements

Check bulk density determinations were carried out at ALS Chemex (Piteå) on a total of 79 samples using the water immersion method. Of these samples, 44 were from Vinberget and 35 from Rönnbäcksnäset.

11.8 Security

11.8.1 Storage of Drill Core

Drill core, coarse rejects, and pulps are stored in a locked storage building inside a fenced area at the core depot in Skellefteå and a second secure facility at Bastuträsk.

11.8.2 Database

During exploration, all project data was stored on IGE's exploration office server, with data backup. In addition, a full version of the database was managed through consultant MRG in Perth, Western Australia, using industry standard DataShed™ software. The database has not changed since 2012.

11.9 Summary Comments

In SRK's opinion, the logging and sample preparation procedures in place have enabled the logical flow of the core from the drill rig through to sample dispatch; the core shed, logging, sampling and preparation facilities are clean, organised and appear well managed; appropriate security procedures are in place and the assaying has been carried out using appropriate techniques and by qualified laboratories.

12 DATA VERIFICATION

SRK analysed the quality assurance/quality control ("QA/QC") data provided by IGE as part of the 2011 PEA and MRE update in 2012. This includes blanks, reference material and duplicates as described above in addition to density measurement duplicates. The results of the QA/QC analysis are not repeated herein but SRK is of the opinion that the assay and density information available of sufficient quality to support the estimates of Mineral Resources presented later in this report.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

A significant amount of metallurgical testwork has been undertaken and is commented upon in Section-17 Recovery Methods.

14 MINERAL RESOURCE ESTIMATES

SRK produced the Mineral Resource estimates for all three deposits as part of the PEA completed in February 2011. This focussed on the main elements of interest: nickel (Ni) and cobalt (Co). As part of the updated PEA in December 2011, iron ("Fe") in magnetite was modelled and reported in addition to Ni and Co. Since the December 2011 PEA, SRK has completed two updates to the geological modelling and Mineral Resource reporting:

- **February 2012**: Rönnbäcksnäset geological model and Mineral Resource statement updated to account for infill drilling completed in 2011.
- **August 2012**: geological modelling update for Sundsberget and block models re-estimated to incorporate all available data and to model deleterious elements. The block models were used for internal purposes only and no updated Mineral Resource statements were produced. The elements and materials estimated as part of this update were as follows: fibres (asbestiform), talc, arsenic (As) and chromium (Cr).

The following section summarises the geological work completed on the three deposits to enable updated Mineral Resource statements to be reported as part of this PEA update. The work completed as part of this PEA update mainly comprised running updated pit optimisations.

14.1 Data

A summary of drillholes, total metres drilled and associated total number of nickel assays (ammonium citrate method) used to derive the MRE last updated in 2012 is summarised in Table 14-1. The database does not include any holes drilled by Boliden and as such no historic drilling data was used. In addition, assays from a number of the holes drilled in outlying areas in Vinberget were not provided to SRK; this is not considered a material issue as they relate to areas with insufficient drilling data to generate reasonable 3D mineralisation models.

Table 14-1: Summary of drillholes by deposit used in the 2011-2012 MRE

Deposit	Number of Drillholes	Metres Drilled	Metres assayed by Ni_AC method
Rönnbäcksnäset	74	12,876	8,499
Vinberget	55	9,284	3,925
Sundsberget	33	7,111	6,106
Total	**162**	**29,271**	**18,530**

14.2 MRE Process

A summary of the MRE process undertaken by SRK for the PEA 2011 (with the same process adopted in the 2012 updates) is provided below:

- **Data validation**: all data used for the MRE was validated, including:
  - Checking assay results in the database compared to laboratory outputs.
  - QA/QC checks for standards, duplicates, blanks and density checks.
  - Checking topographic surveys against collar surveys.
- **Statistical analysis**: prior to geological modelling, a statistical analysis of the main elements and minerals was completed to understand the domaining requirements. This included an analysis of the total nickel and cobalt compared to sulphide nickel and cobalt. In addition, arsenic is considered as a potentially significant deleterious element and was also used as domaining criteria.

- **Geological modelling**: a lithological model was not considered necessary due to the generally homogenous nature of the ultramafic complex. The main geological modelling defined the overburden glacial till material from bedrock along with the different internal domains within the serpentenised unit. The updated models completed in August 2012 included generation of wireframe solids based on mineralogy (high/low Ni:Ni_AC) and unmineralised internal waste.
- **Block modelling**: the wireframes were used to define block models with ½ the average drillhole spacing used as the block size and an assumed bench height for the block height. The following parent block sizes were used (with sub-blocks used for better volume definition only; parent block estimation was used to assign grades):
    - Rönnbäcksnäset: 50 (X) x 50 (Y) x 10 (Z/bench) m
    - Vinberget: 25 x 25 x 10 m
    - Sundsberget: 50 x 50 x 10 m
- **Statistical and geostatistical analysis**: statistics of domained drillhole data were check and variograms produced for each domain to ensure domains were viable for use in grade interpolation (stationary). Prior to statistical analysis, compositing drillhole data was completed with 2 m composites chosen based on dominant drillhole sampling length and considering mineralisation variability.
- Grade interpolation/estimation:
    - **Metal/mineral grades**: block model was populated ordinary kriging to interpolate grades. Search ellipse parameters were guided using variogram ranges (with a 2/3 total variogram range used for the 1st search ellipse radii). Quantitative kriging neighbourhood analysis ("QKNA") was undertaken to optimise grade interpolation parameters (using Ordinary Kriging, "OK")
    - **Density** values: dry bulk density values were estimated into the model using OK.
- **Model validation**: block models were validated using three main techniques: visually on a block-by-block basis; global comparison of statistics in each domain; and through swath plots (sectional slices comparing statistics locally).
- **Mineral Resource Reporting**: the block models were reported using the 2014 Canadian Institute of Mining Standing Committee on Reserve Definitions' guidelines on Mineral Resources and Reserves.

The block models generated in 2012 have subsequently been used as part of this updated PEA to update the pit optimisation and re-report the Mineral Resources using up-to-date parameters.

14.3 Geological Models

The latest (2012) geological modelling wireframes delineating the mineralised units are shown in Figure 14-1 to Figure 14-6.

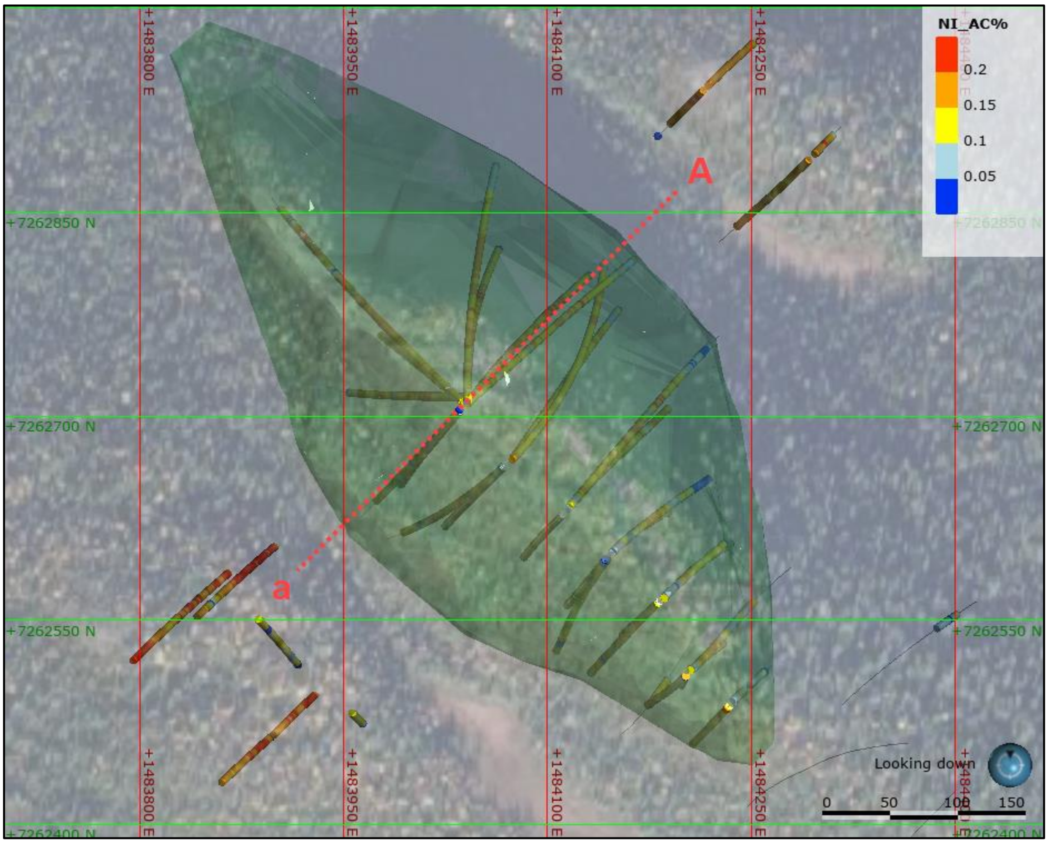


Figure 14-1: Plan view of Vinberget mineralisation wireframe with drillholes coloured by Ni_AC% grades

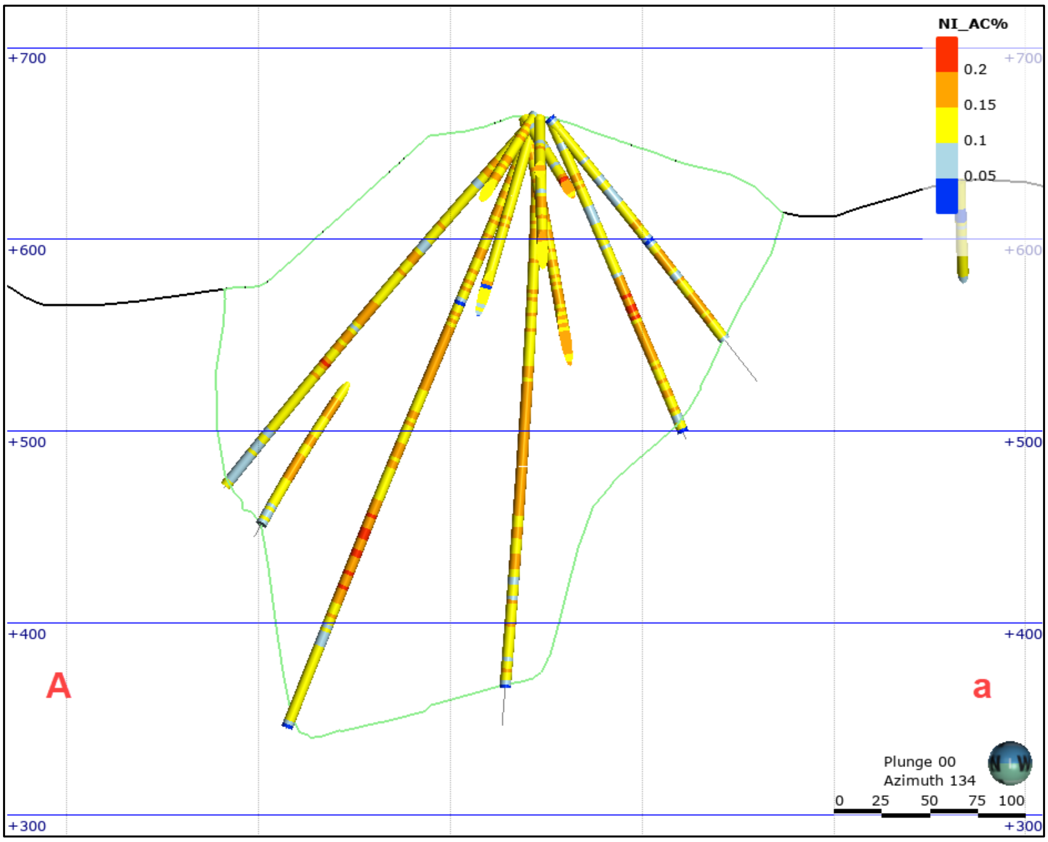


Figure 14-2: Cross-section view (looking southeast) of the Vinberget mineralisation wireframe with drillholes coloured by Ni_AC% grades

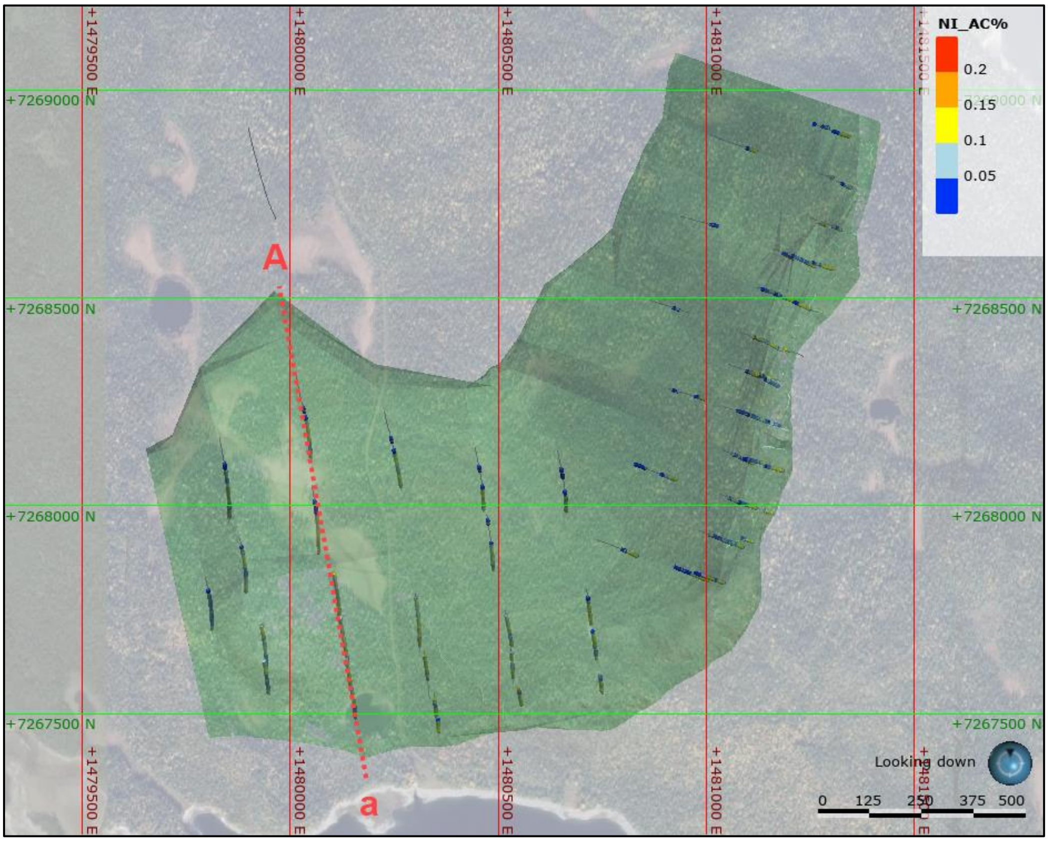


Figure 14-3: Plan view of Rönnbäcknäset mineralisation wireframe with drillholes coloured by Ni_AC% grades

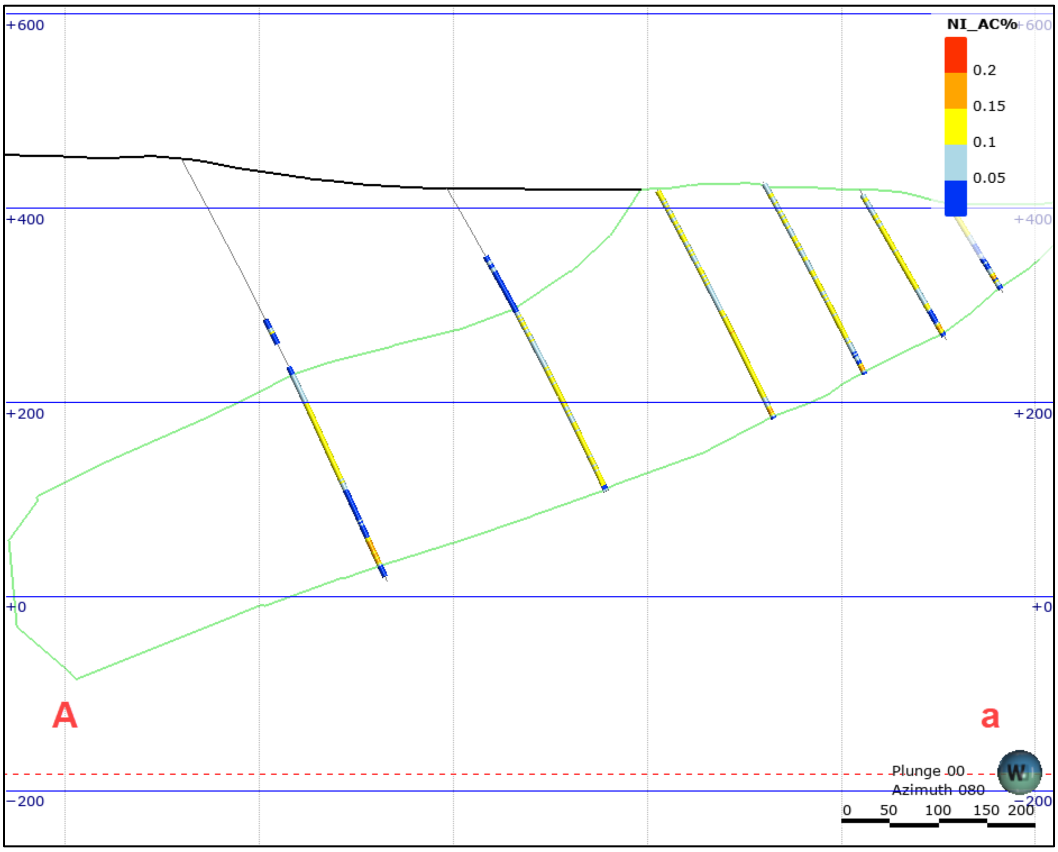


Figure 14-4: Cross-section view (looking east) of the Rönnbäcknäset mineralisation wireframe with drillholes coloured by Ni_AC% grades

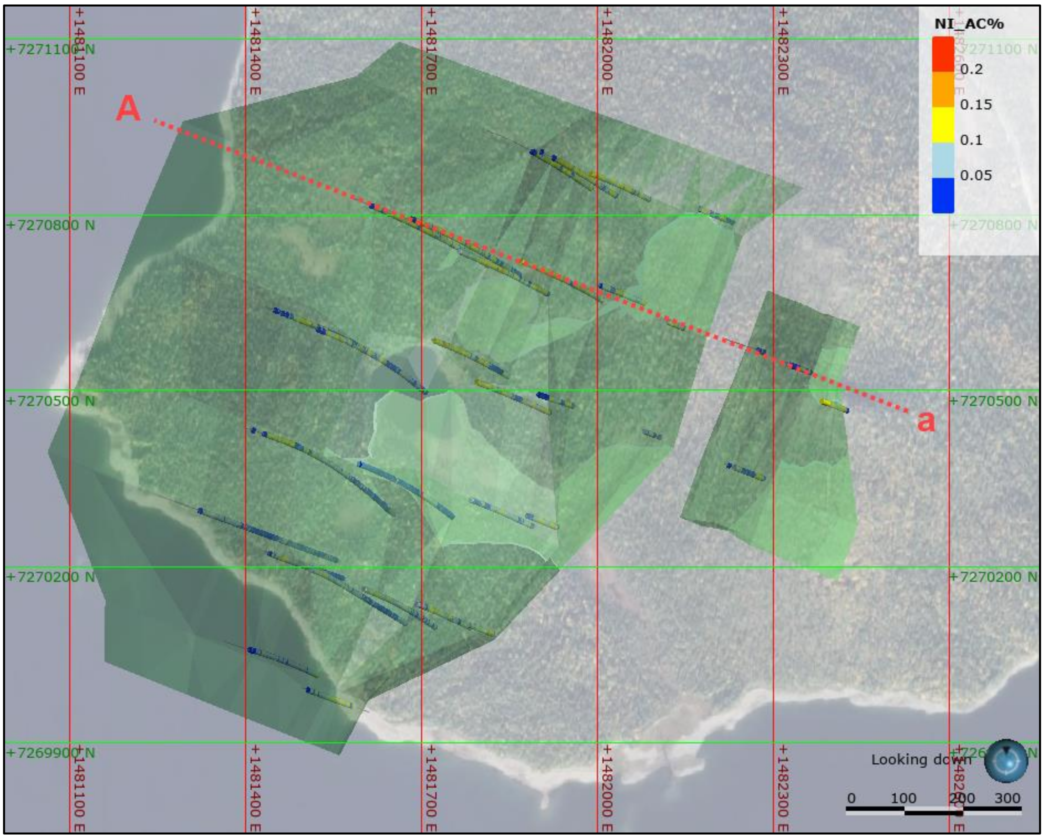


Figure 14-5: Plan view of Sundsberget mineralisation wireframe with drillholes coloured by Ni_AC% grades with section line shown

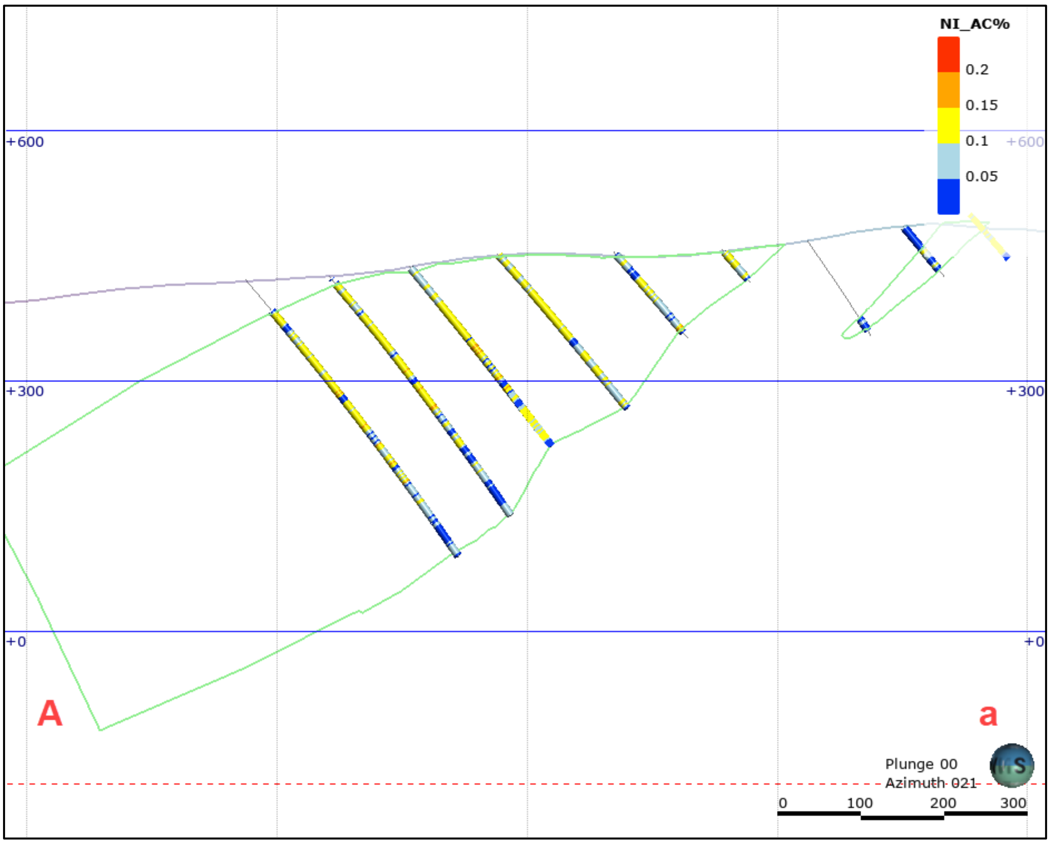


Figure 14-6: Cross-section view (looking northeast) of the Sundsberget mineralisation wireframe with drillholes coloured by Ni_AC% grades

14.4 Block Models

An example of the block models generated by SRK and coded by zone to distinguish the different geological domains identified is shown in Figure 14-7. The domains modelled and used in the MRE for the three deposits are shown in Table 14-2.

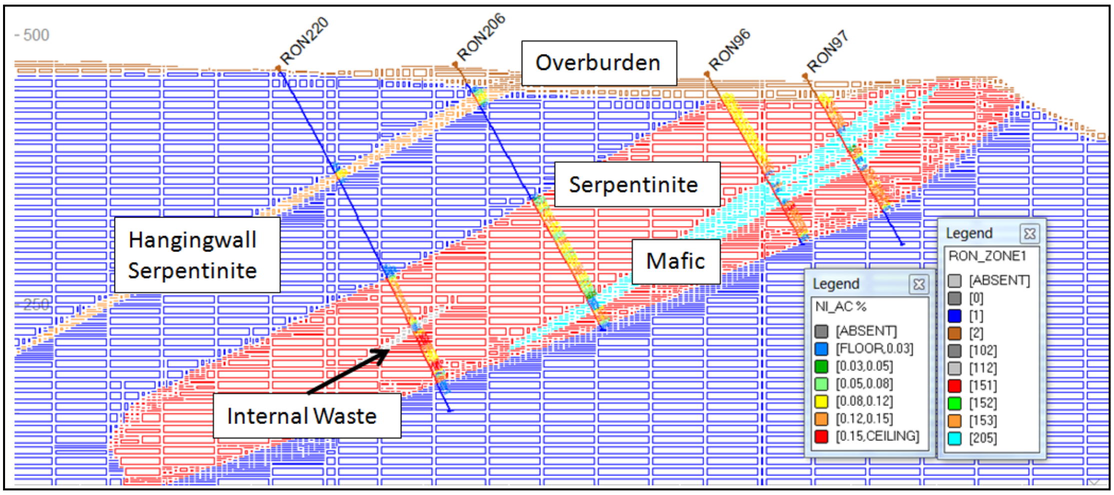


Figure 14-7: Cross-section (looking east) through Rönnbäcknäset block model coloured by estimation zone and showing drillholes coloured by Ni_AC% grades

Table 14-2: Domains modelled for each deposit

Deposit	Geology	Zone Code
Rönnbäcksnäset	Metasediments	0
	Overburden	2
	Internal waste (NE)	102
	Internal waste (SW)	112
	High Grade Serpentinite	151
	Low Grade Serpentinite	152
	Mafics	205
Vinberget	Metasediments	0
	Overburden	2
	Serpentinite	151
Sundsberget	Metasediments	1
	Overburden	2
	High Grade Serpentinite	151
	Low Grade Serpentinite (low Ni-AC%)	152
	Low Grade Serpentinite (low Ni-PCT %)	153
	Mafics (internal waste)	205

14.5 Mineral Resource Classification

The 2011 PEA included Mineral Resource statements for all three deposits, with the Rönnbäcknäset Mineral Resource statement updated in February 2012. The August 2012 block model updates were for internal planning use only and no Mineral Resource statement were updated.

The Mineral Resource statements were reported using the 2014 Canadian Institute of Mining Standing Committee on Reserve Definitions' guidelines on Mineral Resources and Reserves.

14.5.1 CIM Definitions

Mineral Resource

Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated, and Measured categories. An Inferred Mineral Resource has a lower level of confidence than that applied to an Indicated Mineral Resource. An Indicated Mineral Resource has a higher level of confidence than an Inferred Mineral Resource but has a lower level of confidence than a Measured Mineral Resource.

A Mineral Resource is a concentration or occurrence of natural, solid, inorganic or fossilized organic material in or on the Earth's crust in such form and quantity and of such a grade or quality that it has reasonable prospects for economic extraction ("RPEEE"). The location, quantity, grade, geological characteristics and continuity of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge.

The term Mineral Resource covers mineralisation and natural material of intrinsic economic interest which has been identified and estimated through exploration and sampling and within which Mineral Reserves may subsequently be defined by the consideration and application of technical, economic, legal, environmental, socio-economic and governmental factors. The phrase RPEEE implies a judgement by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction. A Mineral Resource is an inventory of mineralisation that, under realistically assumed and justifiable technical and economic conditions, might become economically extractable. These assumptions must be presented explicitly in both public and technical reports.

Inferred Mineral Resource

An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade or quality can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity. The estimate is based on limited information and sampling gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drillholes.

Due to the uncertainty which may attach to Inferred Mineral Resources, it cannot be assumed that all or any part of an Inferred Mineral Resource will be upgraded to an Indicated or Measured Mineral Resource as a result of continued exploration. Confidence in the estimate is insufficient to allow the meaningful application of technical and economic parameters or to enable an evaluation of economic viability worthy of public disclosure. Inferred Mineral Resources must be excluded from estimates forming the basis of feasibility or other economic studies.

Indicated Mineral Resource

An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters, to support mine planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drillholes that are spaced closely enough for geological and grade continuity to be reasonably assumed.

Mineralisation may be classified as an Indicated Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such as to allow confident interpretation of the geological framework and to reasonably assume the continuity of mineralisation. The Qualified Person must recognize the importance of the Indicated Mineral Resource category to the advancement of the feasibility of the project. An Indicated Mineral Resource estimate is of sufficient quality to support a Preliminary Feasibility Study which can serve as the basis for major development decisions.

Measured Mineral Resource

A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade or quality, densities, shape, physical characteristics are so well established that they can be estimated with confidence sufficient to allow the appropriate application of technical and economic parameters, to support production planning and evaluation of the economic viability of the deposit. The estimate is based on detailed and reliable exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drillholes that are spaced closely enough to confirm both geological and grade continuity.

Mineralisation or other natural material of economic interest may be classified as a Measured Mineral Resource by the Qualified Person when the nature, quality, quantity and distribution of data are such that the tonnage and grade of the mineralisation can be estimated to within close limits and that variation from the estimate would not significantly affect potential economic viability. This category requires a high level of confidence in, and understanding of, the geology and controls of the mineral deposit.

14.5.2 Classification Criteria

Introduction

To classify the Rönnbäcksnäset, Vinberget and Sundsberget deposits, the following key indicators were used:

- geological complexity and understanding;
- quantity of data used in the estimation;
- quality of data used in the estimation, including QA/QC (drilling, sampling, assaying, density, collar surveys, downhole surveys);
- results of the geostatistical analysis, including variography and QKNA results; and
- quality of the estimated block model.

Geological Complexity and understanding

Due to the large amount of drill data, it is possible to see clear geological continuity between sections and deduce a clear geological model for the deposits with all of the mineralisation occurring within the serpentinite body. The drill spacing has allowed for the interpretation of a continuous zone of mafic material with a low associated Ni-AC grade. Internal waste pods have been interpreted that are harder to join from adjacent sections, but these are limited in number and form a small part of the overall serpentinite body.

A statistical study of the data shows a low variability in the grade distribution with near normal populations of data being present. A continuous low grade serpentinite unit has been identified from the statistical study that was subsequently domained as a separate unit.

It is the opinion of SRK that the associated risk relating to geological complexity is low.

Quality of the Data used in the Estimation

Quality assurance and quality control (QA/QC) checks were implemented throughout the assaying period that included the insertion of standards, blanks, laboratory duplicates and the use of an umpire laboratory. Overall, SRK is confident that the results of the QA/QC analysis have validated the accuracy of the database being used to generate the MRE.

A comprehensive dataset of density was generated by IGE throughout the sampling period that has enabled SRK to estimate density into the model. SRK is therefore confident that the associated tonnages estimated should be reasonable.

Results of the Geostatistical Analysis

The data used in the geostatistical analysis resulted in robust variogram models being produced for all three deposits. This enabled the nugget and short-scale variation in grade to be determined with a high level of confidence. The detailed variography allowed for the determination of appropriate search ellipse parameters to be determined through the application of multiple QKNA tests prior to the grade interpolation (using OK).

Quality of the Estimated Block Model

The validation tools show that the input data used to estimate the model is replicated in the estimation. Mean grades of the block model and composites are comparable for all modelled domains.

Classification Approach

All three deposits have been classified as containing a combination of Indicated and Inferred Resources, with Vinberget also containing Measured Resources due to the closer spaced drilling in some areas.

Measured Resources at have been assigned where the following criteria have been met:

- low geological complexity;
- drillhole spacing of much less than the 2/3rd geostatistical range;
- all blocks were estimated in search volume one, using the optimum search parameters determined; and
- slope of regression values dominantly greater than 0.8.

At Sundsberget and Rönnbäcksnäset, the same criteria as explained above for Measured Resources have been used to assign Indicated Resources with the exception that the minimum slope of regression was set at 0.5. Indicated Resources at Vinberget have been extended approximately 100 m down dip of the last drillhole intersection on the section line.

Inferred Resources at Rönnbäcksnäset and Vinberget have been calculated by extending the Indicated boundary 50 m down-dip and by including areas where internal waste pods are defined and unsupported by more than two drillholes on a section line. Due to the regular drilling pattern and the simple geometry at Sundsberget, the Indicated blocks account for all the well-informed blocks; therefore, no Inferred Resources were assigned.

In all cases, the above have been used to model zones for the each of the classification categories for each deposit rather than to assign this on a block-by-block basis.

Figure 14-8, Figure 14-9 and Figure 14-10 show the block models coloured by classification for Rönnbäcksnäset, Vinberget and Sundsberget, respectively.

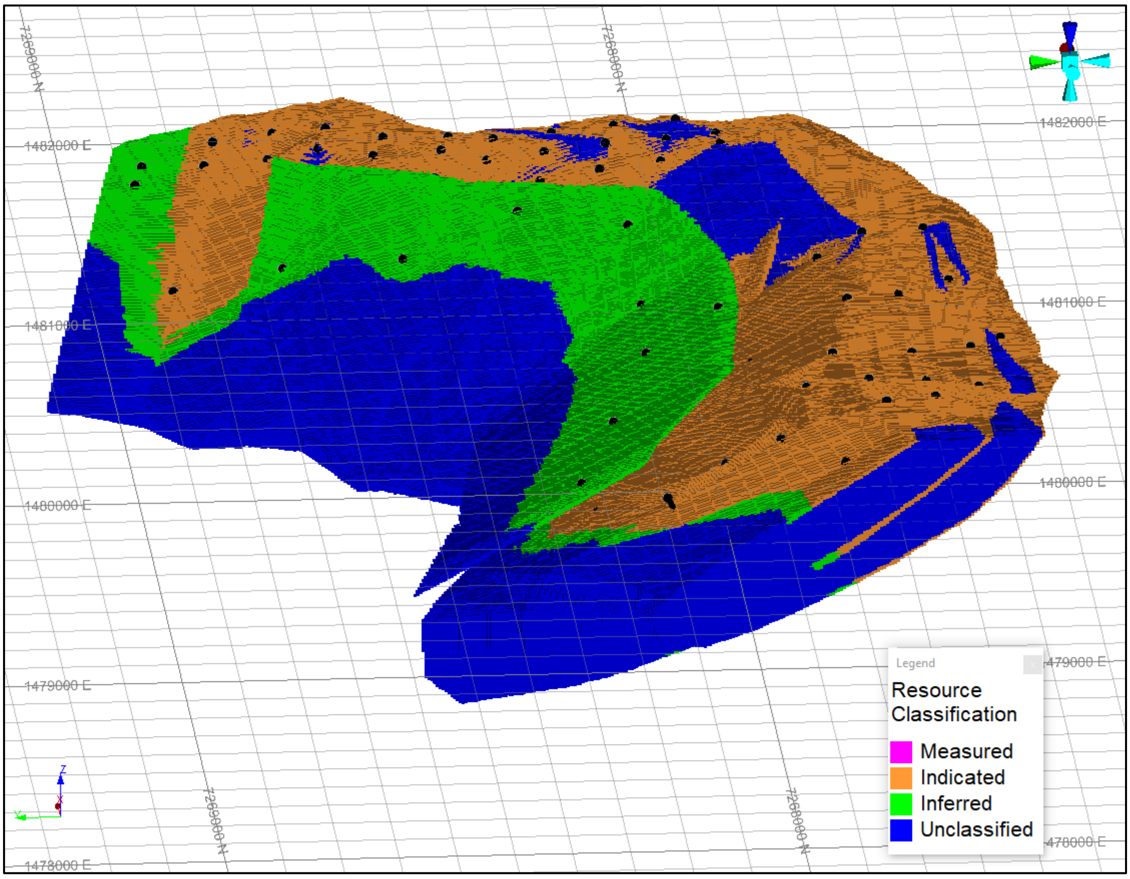


Figure 14-8: Oblique view (looking east) of the Rönnbäcksnäset block model coloured by Mineral Resource classification

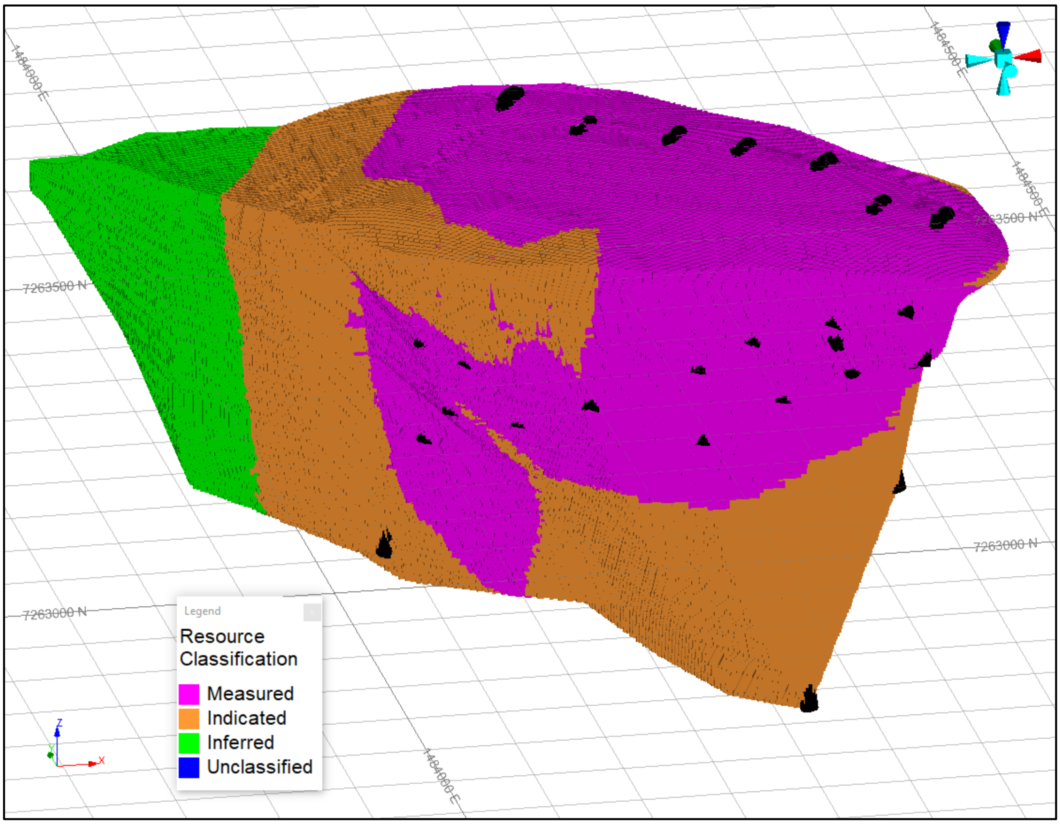


Figure 14-9: Oblique view (looking northeast) of the Vinberget block model coloured by Mineral Resource classification

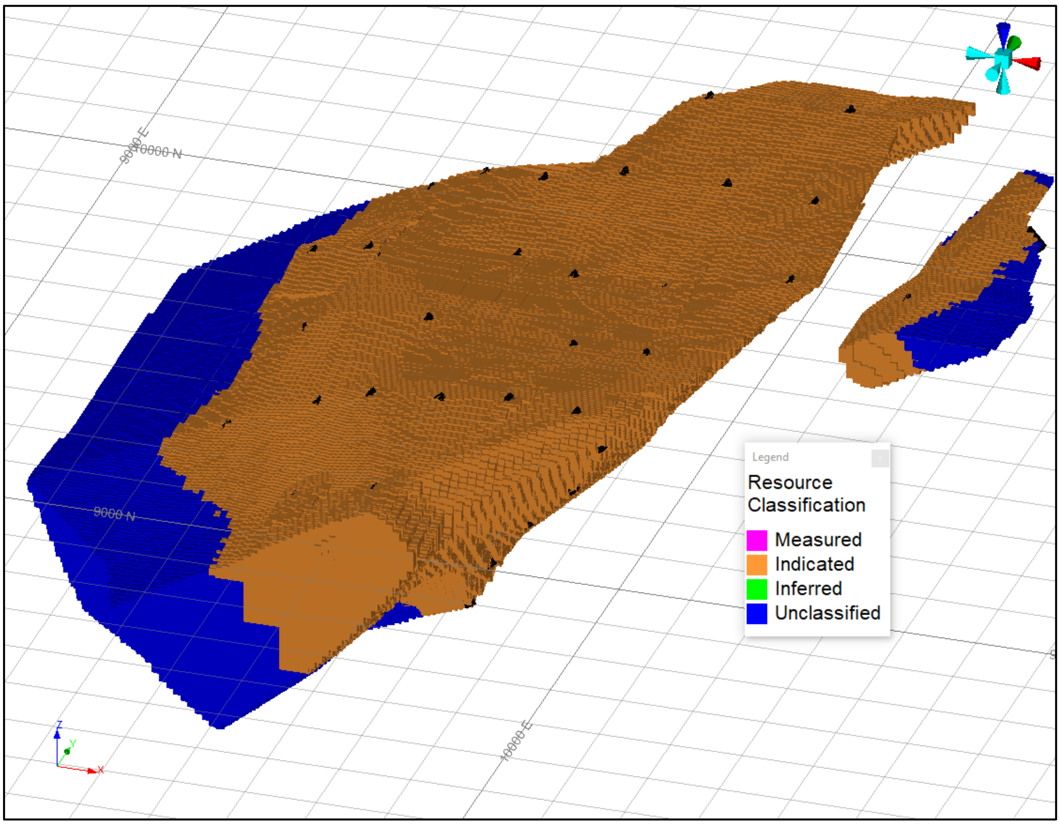


Figure 14-10: Oblique view (looking northwest, local grid) of the Sundsberget block model coloured by Mineral Resource classification

14.6 Mineral Resource Reporting

A pit optimisation and cut-off grade study has been completed by SRK as part this PEA in order to report the Mineral Resources according to the CIM definitions (Canadian Institute of Mining, Metallurgy and Petroleum (CIM) 2014) by demonstrating RPEEE. SRK used updated parameters reflecting the current situation of the Project, including all technical (including ESG) and economic considerations.

At this stage of the Project, no Mineral Reserves have been declared as this requires PFS or Feasibility Study ("FS") to be completed[17]. SRK considers some of the aspects to be well-advanced, including the geology and Mineral Resource along with mineral processing testwork; however, most other aspects are still considered to be at a PEA (or Scoping Study) level.

As part of this updated PEA, SRK has reviewed the technical and economic aspects of the Project to ensure they reflect the changes to the circumstances since the 2011 PEA. This information was used when considering RPEEE for reporting Mineral Resources, where the CIM definitions standards (last updated in 2019) states that RPEEE: '*implies a judgment by the Qualified Person in respect of the technical and economic factors likely to influence the prospect of economic extraction'.*

In addition, the CIM standards follow the global Committee for Mineral Reserves International Reporting Standards ("CRIRSCO") template. The CRIRSCO template was updated in 2019 with material changes implemented, particularly with respect to ESG aspects. The NI 43-101 standards for disclosure and CIM definition standards are in the process of being updated as of 2022 with material changes expected in line with the new CRIRSCO template. This may include the following guidance (from clause 7.3 of the CRIRSCO template): *'The term 'reasonable prospects for eventual economic extraction' implies a judgement (albeit preliminary) by the Competent Person in respect of all Modifying Factors'*. Modifying factors, according to CRIRSCO, are: '*considerations used to convert Mineral Resources to Mineral Reserves. These include, but are not restricted to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social and governmental factors*'.

In order to ensure the PEA takes cognisance of these changes in reporting, SRK has built this thinking into the RPEEE considerations. Therefore as part of the RPEEE assessment, all technical (and economic) factors influencing the potential of the Project to be successful (economic extraction) were considered.

14.6.1 Pit optimisation parameters

The pit optimisation parameters used to define the Mineral Resource pit shells is provided in Table 14-3. Further details are provided in Section 16.2 Mine Optimisation. A cut-off grade assessment was completed using operating costs (except for mining-related costs) and selling price assumptions resulted in a marginal cut-off grade of 0.05% Ni (sulphide).

[17] CIM guidelines (2014): '*The public disclosure of a Mineral Reserve must be demonstrated by a Pre-Feasibility Study or Feasibility Study*.'

Table 14-3: Pit optimisation parameter summary

Parameter	Unit	Rönnbäcksnäset	Vinberget	Sundsberget	Source
Geotechnical					
Slope angle (overall)	°	48	48	49	SRK estimate
Mining					
Dilution	%			2.5	SRK estimate
Recovery	%			95	SRK estimate
Metallurgical					
Ni recovery	%			80	Outotec testwork
Co Recovery	%			70	
Fe Recovery	%			90	
Nickel in Ni-con	%			28.0	
Cobalt in Ni-con	%			0.9	
Iron in Fe-con	%			66.0	
Operating Costs*					
Mining base rate	USD/t Rock			1.53	SRK estimate (benchmark)
Incremental mining cost (below reference level)	USD/t ore			0.07	
Processing	USD/t ore			6.00	SRK estimate adjusted from Outotec 2009
Rehabilitation (closure)	USD/t ore			0.17	SRK estimate
General & administrative	USD/t ore			0.5	SRK estimate (benchmark)
Selling Costs					
Royalty	%			0.2	State rules
Ni selling cost (Ni-con)	USD/t			4,899	SRK estimate (benchmark)
Co selling cost (Ni-con)	USD/t			31,971	
Fe selling Cost (Fe-con)	USD/dmtu			0.473	
Selling Price					
Nickel (Ni-con)	USD/lb			10	Supplied by Bluelake
	USD/t			22,046	
Cobalt (Ni-con)	USD/lb			26	CMF long-term forecast +30%
	USD/t			57,320	
Iron Ore (Fe-con)	USD/t			97	
	USD/dmtu			1.5	

**Mining costs are excluded from the cut-off grade analysis to ensure a 'marginal' cut-off grade.*

14.6.2 Pit optimisation results

The resulting pit shells used for reporting the updated Mineral Resource statement are shown in Figure 14-11 to Figure 14-13.

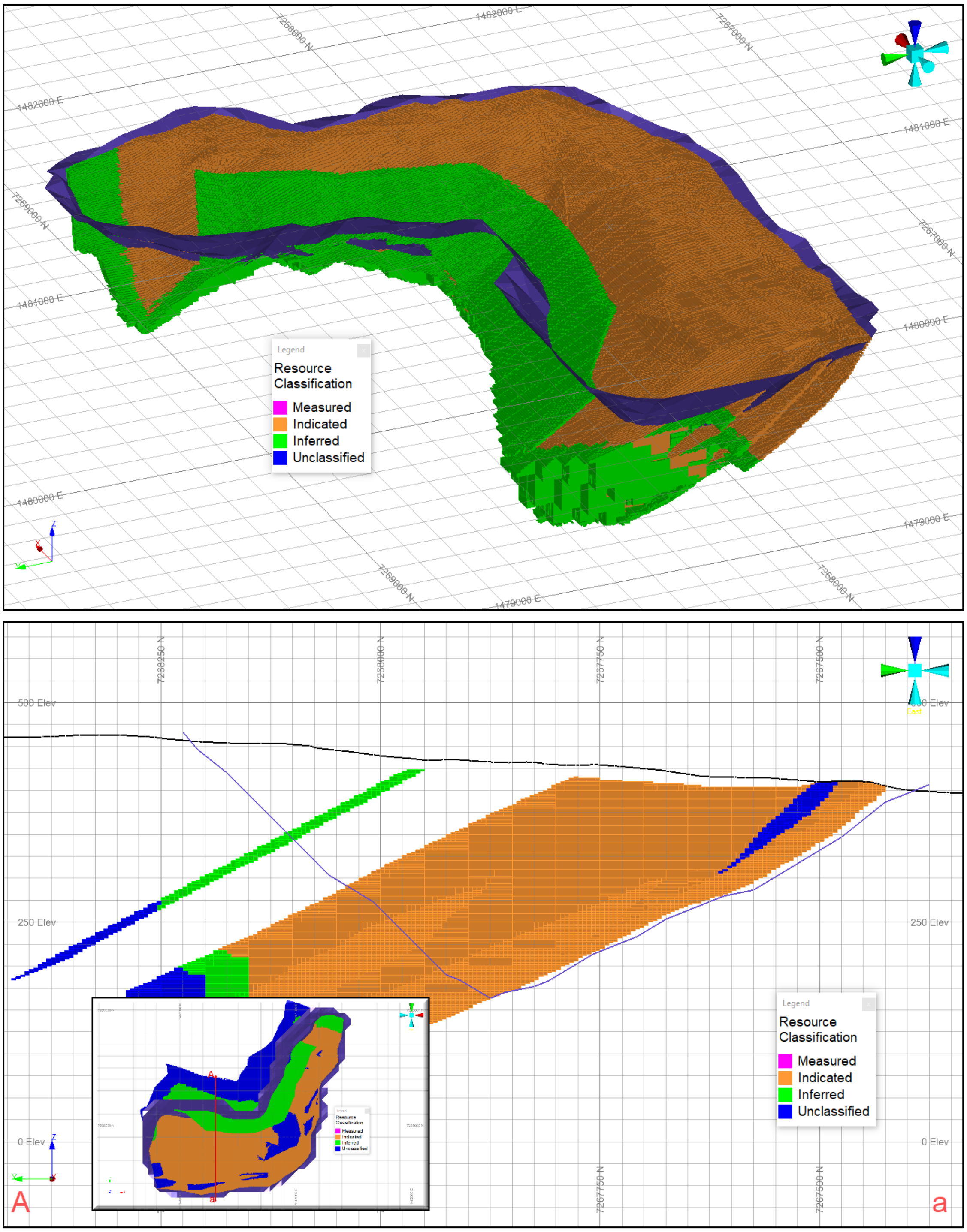


Figure 14-11: Mineral Resource pit shell for Rönnbäcksnäset (top = 3D view looking southeast; bottom = cross-sectional view looking east)

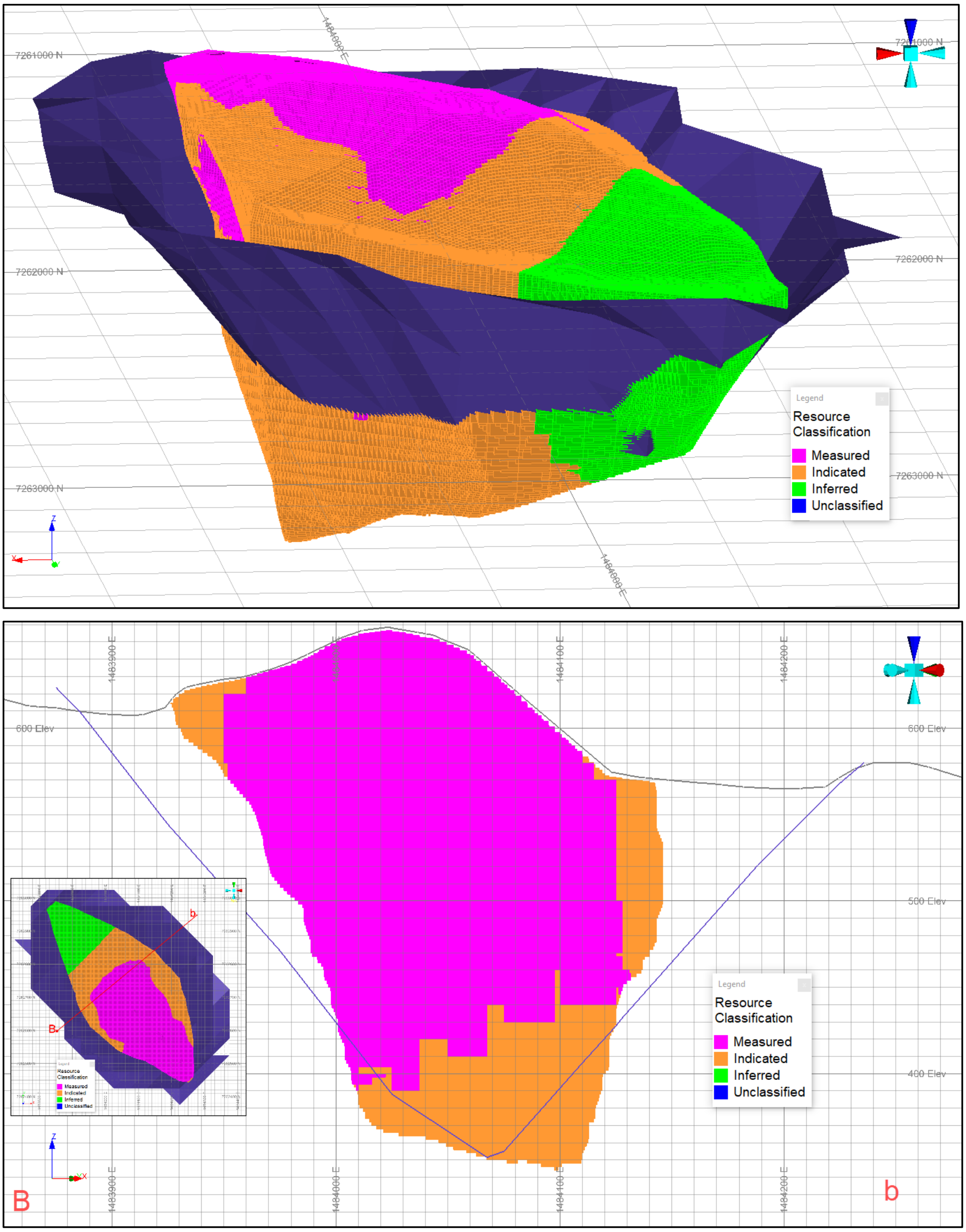


Figure 14-12: Mineral Resource pit shell for Vinberget (top = 3D view looking south; bottom = cross-sectional view looking northwest)

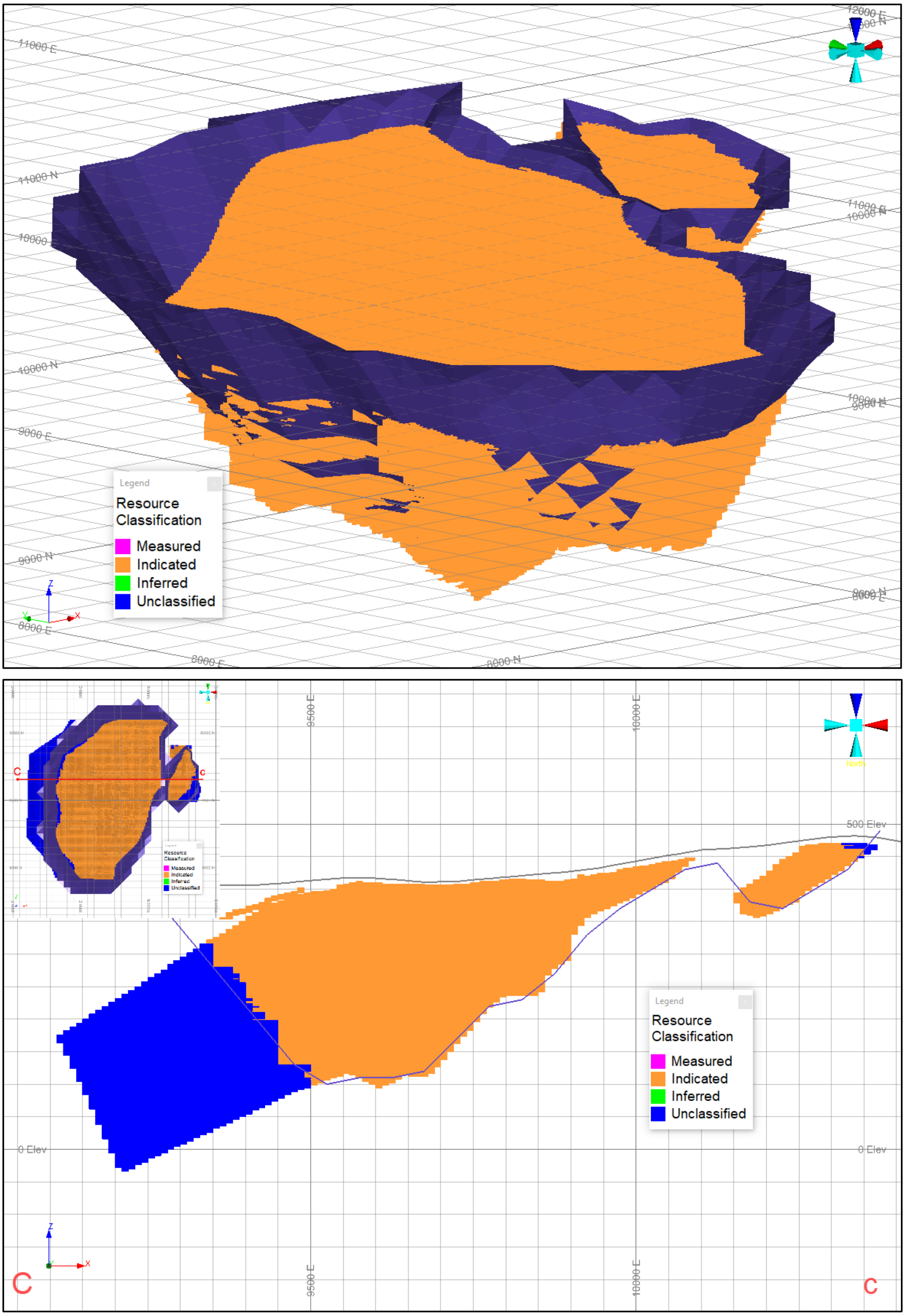


Figure 14-13: Mineral Resource pit shell for Sundsberget (top = 3D view looking northeast*; bottom = cross-sectional view looking north*)

**Sundsberget reported in local coordinate system.*

14.6.3 Mineral Resource statement

The updated Mineral Resource statement, with an effective date of 28 January 2022, produced by SRK for this PEA update is provided in Table 14-5. The statement is constrained to an open pit shell based on technical parameters described herein and optimistic metal selling prices stated in Table 14-3.

Table 14-4: Rönnbäcken Mineral Resource Statement updated PEA 2022*

Deposit	Mineral Resource Category	Tonnes (Mt)	Ni_T (%)	Ni_S (%)	Co_S (%)	Fe_{total} (%)
Rönnbäcksnäset	Measured	-	-	-	-	-
	Indicated	270	0.18	0.10	0.003	5.5
	Measured + Indicated	**270**	**0.18**	**0.10**	**0.003**	**5.5**
	Inferred	10	0.17	0.09	0.004	5.1
Vinberget	Measured	30	0.19	0.13	0.006	5.2
	Indicated	20	0.18	0.14	0.006	5.1
	Measured + Indicated	**50**	**0.19**	**0.13**	**0.006**	**5.2**
	Inferred	10	0.18	0.14	0.007	5.2
Sundsberget	Measured	-	-	-	-	-
	Indicated	280	0.17	0.09	0.003	5.9
	Measured + Indicated	**280**	**0.17**	**0.09**	**0.003**	**5.9**
	Inferred	-	-	-	-	-
Total (Measured & Indicated)	**Measured**	**30**	**0.19**	**0.13**	**0.006**	**5.2**
	Indicated	**570**	**0.18**	**0.10**	**0.003**	**5.7**
	Measured + Indicated	**600**	**0.18**	**0.10**	**0.003**	**5.7**
Total (Inferred)	**Inferred**	**20**	**0.18**	**0.11**	**0.005**	**5.2**

**Notes:*
(1) The effective date of the Mineral Resource Statement is 28 January 2022.
(2) Dr Mike Armitage is the QP for this Mineral Resource estimate and statement but has not visited site. Site visits were undertaken by Mr Johan Bradley (previously of SRK) in February 2011 and Mr Ben Lepley of SRK in September 2021. Technical work was undertaken by a team of consultants and overseen by Dr Armitage.
(3) The Mineral Resource reported for Rönnbäcksnäset, Vinberget and Sundsberget deposits was constrained within a Lerchs-Grossman pit shell defined by a marginal cut-off-grade of 0.05% Ni_S, a nickel metal price of USD 10/lb (USD 22,046/t), cobalt selling price of USD 26/lb and iron ore selling price of USD 1.47/dmtu; slope angles of 48º, 48º and 49° respectively; a mining recovery of 95%; a mining dilution of 2.5%; a base mining cost of USD 1.53/tonne mined and an incremental mine operating costs of USD 0.07/tonne/10 m below a reference RL; process operating costs of USD 6.00/tonne ore; G&A costs of USD 0.50/tonne ore and rehabilitation/closure cost of USD 0.17/tonne ore.
(4) The pit shell constrained to exploitation concession boundaries. No other factors were used to constrain the Mineral Resource such as environmental and social, permitting or land use.
(5) There is no guarantee that Inferred Mineral Resources will convert to a higher confidence category after future work is conducted.
(6) Mineral Resources are reported as undiluted and no mining recovery has been applied.
(7) Tonnages are reported in metric units and have been rounded to the nearest 10 Mt.

14.6.4 Comparison to previous Mineral Resource statements

The previous Mineral Resource statement produced by SRK as part of the December 2011 PEA and last re-stated in the 2016 CPR is provided in Table 14-5. There are minor differences between the 2016 and 2022 statements. This is mainly due to changes to the updated pit optimisation parameters, and also the updated block model produced in 2012 for Rönnbäcksnäset where a portion of Indicated was upgraded to Indicated through infill drilling. This updated block model was not re-optimised and re-reported for the 2016 CPR and so the statement remained the same.

Although changes have been made to operating costs, selling prices and slope angles, there has not been a material change due to the use of an optimistic selling price in both cases. A selling price of USD 11/lb was used in 2016 compared to USD 10/lb in 2022; this is the main cause of the slight reduction in tonnage (8%).

Table 14-5: Rönnbäcken Mineral Resource Statement CPR 2016*

Deposit	Mineral Resource Category	Tonnes (Mt)	Ni-Total (%)	Sulphide Ni (%)	Sulphide Co (Co-AC)	Fe_{total} (%)
Rönnbäcksnäset	Measured	-	-	-	-	-
	Indicated	225	0.176	0.101	0.003	5.41
	Measured + Indicated	**225**	**0.176**	**0.101**	**0.003**	**5.41**
	Inferred	87	0.177	0.100	0.003	5.17
Vinberget	Measured	28	0.188	0.132	0.006	5.19
	Indicated	23	0.183	0.133	0.006	5.14
	Measured + Indicated	**51**	**0.186**	**0.133**	**0.006**	**5.14**
	Inferred	7	0.183	0.138	0.007	5.58
Sundsberget	Measured	-	-	-	-	-
	Indicated	297	0.170	0.088	0.003	5.93
	Measured + Indicated	**297**	**0.170**	**0.088**	**0.003**	**5.93**
	Inferred					
Total (Measured & Indicated)	**Measured**	**28**	**0.188**	**0.132**	**0.006**	**5.19**
	Indicated	**546**	**0.173**	**0.095**	**0.003**	**5.68**
	Measured + Indicated	**574**	**0.174**	**0.097**	**0.003**	**5.66**
Total (Inferred)	**Inferred**	**93**	**0.177**	**0.103**	**0.003**	**5.55**

**Notes:*
(1) Effective date of the Mineral Resource Statement for Rönnbäcksnäset and Vinberget 25 February 2011. The effective date of the Mineral Resource Statement for Sundsberget 28 October 2011.
(2) Mineral Resource reported for Rönnbäcksnäset, Vinberget and Sundsberget was constrained within a Lerchs-Grossman pit shell defined by a marginal cut-off-grade of 0.031% Ni-AC, a metal price of USD11/lb; slope angles of 50º, 48º and 49° respectively; a mining recovery of 95%; a mining dilution of 2.5%; a base mining cost of USD1.35/tonne mined and an incremental mine operating costs of USD0.07/tonne/10 m below the 450m reference RL and USD0.05/tonne/10m above the 450m reference RL); process operating costs of USD4.96/tonne ore; an effective charge per lb Ni in smelter feed of USD1.14, G&A costs of USD0.40/tonne ore and concentrate transport cost USD0.10/tonne.

15 MINERAL RESERVE ESTIMATES

Due to the stage of the Project, no Mineral Reserves have been declared as part of this PEA. In order to declare Mineral Reserves, a PFS level of study is required for all modifying factors. This is not currently the case and a PFS is planned to commence as soon as possible after financing allows.

16 MINING METHODS

The mining method considered for the PEA is an open pit conventional mining with a production cycle consisting of drilling, blasting, loading, hauling, dumping and run of mine ("RoM") stockpiling. The mining study was completed to a conceptual/scoping level, associated with cost estimate accuracies of 30 to 50%.

A pit optimisation study was completed with physical and economic input parameters based on previous technical studies, benchmark information and market price forecast sourced by the Company.

The pit optimisation software was used to select phases for the sequence and a production profile was developed incorporating mining practicality considerations in a conceptual manner.

The production profile from the pit optimisation study was used to test various mining options in the technical economic model ("TEM"), which included initiatives that seek to reduce environmental and social impacts with a focus on reducing greenhouse gas ("GHG") emissions.

16.1 Mining Geotechnical Assessment

For this PEA, indicative overall slope angles on a lithology basis were estimated using rock mass classification ratings derived from photo logging of selected drillhole core carried out by Gary Dempers of Dempers and Seymour Pty Ltd ("D&S"). SRK has reviewed this logging data with spot checks on several core photographs of the rock types forming the slopes. The slope positions are based on the PEA optimisation pit shells for each deposit.

The pit shells for the three deposits are shown in Figure 16-1. Slope angles are estimated for the optimisation work of the three deposits (locations) and these constitute the maximum stable angles from empirical assessment only as the information is limited to several core photographic logs and no oriented core available to provide joint fabric information.

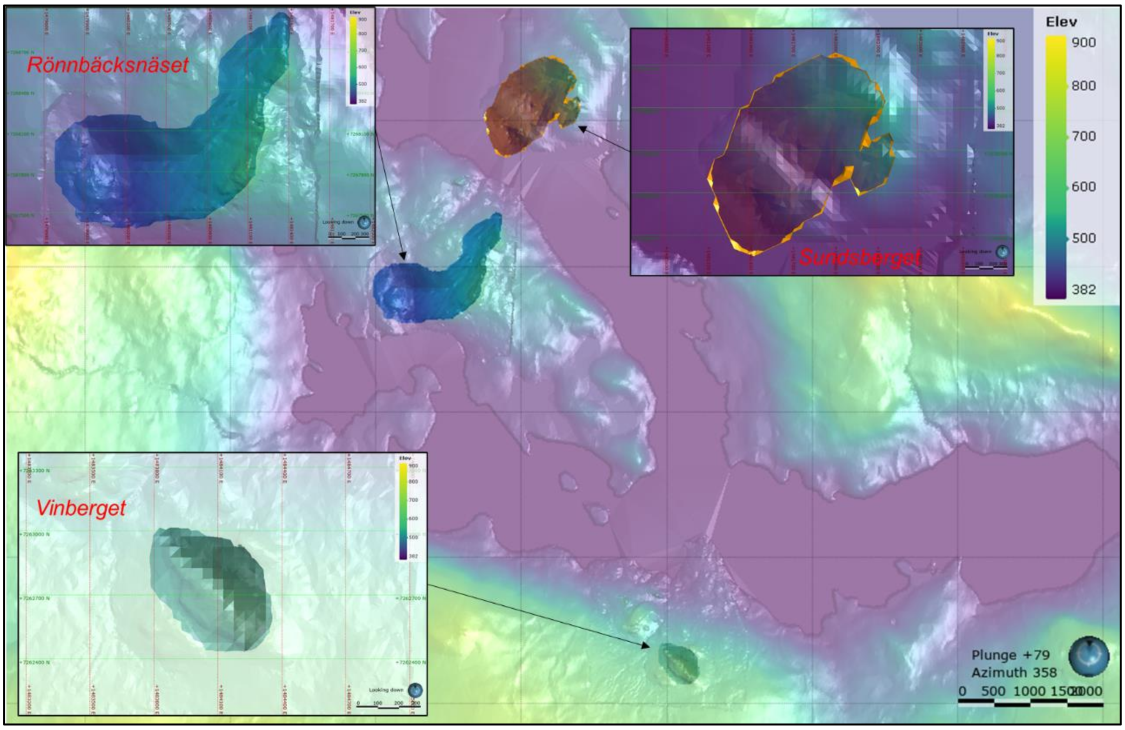


Figure 16-1: Optimised pit shells and surface elevation heights

16.1.1 Data and rock quality

A logging database of Rock Quality Designation ("RQD") is provided for most of the available drillholes. This an index of rock fracturing presented as a percentage of each logged interval with fractures >10 cm apart. While indicative, for comparative rock quality characterisation, it has limited application to slope stability assessment; however, these data are useful to assist in structural geology interpretations.

The logging data is provided by D&S in 2010. The inputs for MRMR were collected by photographic logging and therefore, the joint condition is a visual estimate and judgement based on rock type descriptions only. A total of 35 drillholes (7,649 m) were logged to provide input to produce Laubscher mining rock mass ratings ("MRMR") for the three deposits; 14 for Rönnbäcksnäset (North and South; 2,603 m), 9 for Sundsberget (2,743 m), and 12 for Vinberget (2,303 m). The MRMR classification system used the fracture frequency, intact rock strength and the joint condition to calculate values for each interval. The drilled locations and available logging for MRMR and RQD is displayed in Figure 16-2.

The calculated MRMR values are adjusted to account for the potential effects of mining and exposure. The following MRMR adjustments were applied:

- Weathering: 1.0
- Stress: 1.0
- Orientation: 0.9
- Blasting: 0.95

The unadjusted and adjusted MRMR value for each lithology at each deposit was calculated using mean, lower and upper quartile values for fracture frequency, intact rock strength and joint condition. The joint orientation adjustment is averaged, and this is a limitation as it should be adjusted to the main controlling joint based on slope orientation, when this information is available.

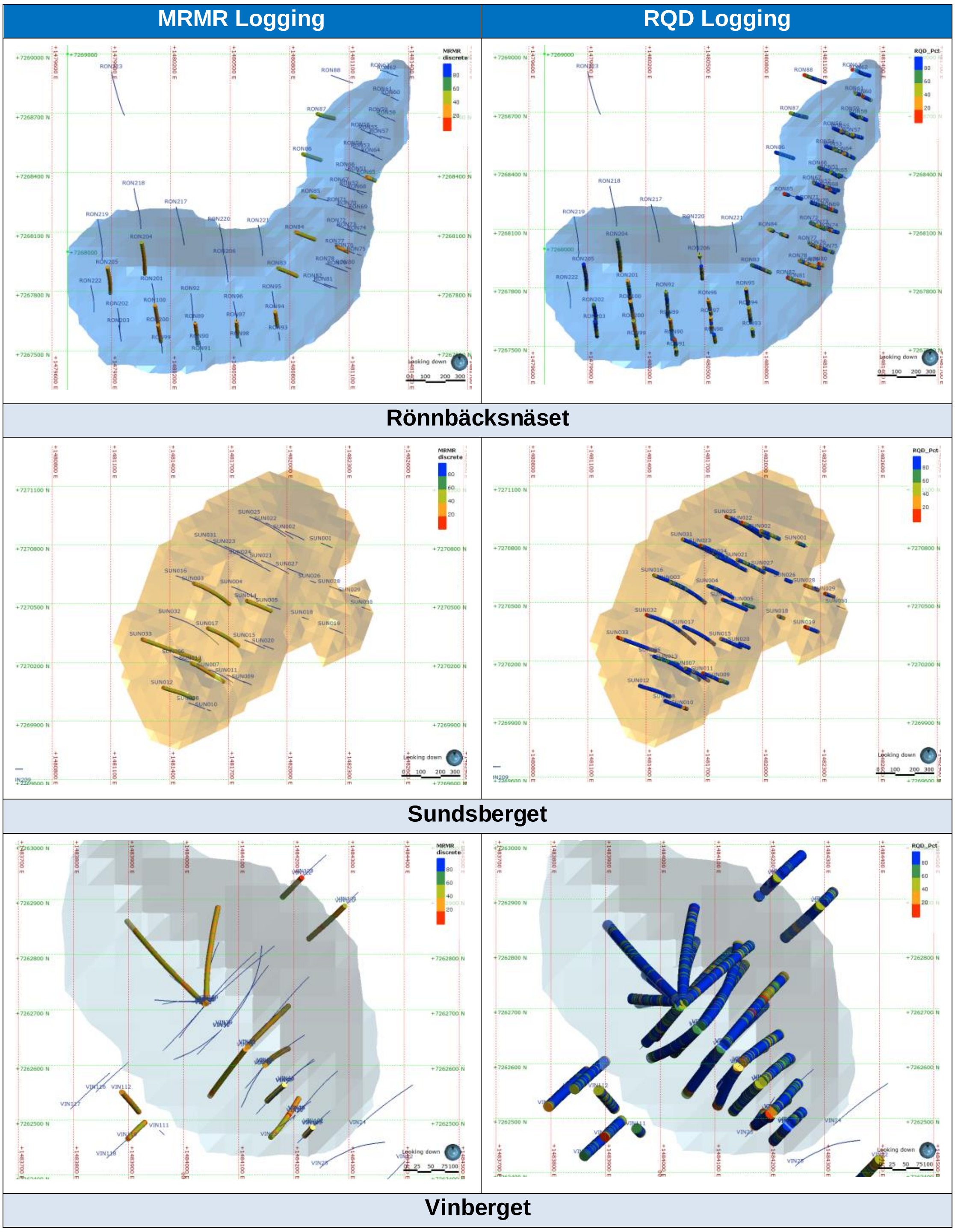


Figure 16-2: Available drilling locations with MRMR and RQD logging

16.1.2 Slope angle estimation

The Haines-Terbrugge empirical slope design chart, which related adjusted MRMR to slope angle and slope height for specified factors of safety, was used to estimate slope angles. A maximum vertical slope height per lithology of 160 m and a nominal factor of safety ("FoS") of 1.2 was used. It must be noted that this method applies the MRMR value that may not be scaled to the dominant joint orientation in specific slope orientations. It is considered an initial estimate that requires updating with further characterisation of the conditions for the different joints.

The results of this evaluation are presented in Table 16-1 for the mean and lower quartile values only. Given the preliminary nature of the study and the method by which the slope angles have been estimated, SRK considers it inappropriate to consider the use of slope angles (for overall slope angle) derived from the upper quartile of the data set. The minor lithologies, such as the conglomerate, are not shown as they do not make up a significant proportion of the slope.

SRK has reviewed the methodology used to estimate slope angles and considers this to be to internationally accepted standards and appropriate for a PEA level.

Table 16-1: Slope angles by lithology for each deposit

Deposit / Area	Rock Type	Percentile	RQD	MRMR	Slope Angle	Rock Mass Class	Swedish Lithology Nomenclature
Rönnbäcksnäset north	Serp	Lower Quartile	39	34	47	Poor	Serpentinit, Ni rik; Serpentinit, pyroxenforande; Serpentinit, lag haltig
		Mean	44	37	49	Fair	
	Seds	Lower Quartile	48	41	51	Fair	Fyllit
		Mean	50	43	52	Fair	
	Mafic	Lower Quartile	50	43	52	Fair	Basisk intrusion
		Mean	52	44	52	Fair	
	Chlor/Seds	Lower Quartile	42	36	48	Fair	Kloritiskt Fyllit
		Mean	49	42	51	Fair	
Rönnbäcksnäset south	Serp	Lower Quartile	34	29	44	Poor	Serpentinit, Ni rik; Serpentinit, pyroxenforande; Serpentinit, lag haltig
		Mean	40	34	47	Poor	
	Seds	Lower Quartile	38	32	46	Poor	Fyllit
		Mean	44	38	49	Fair	
	Mafic	Lower Quartile	50	43	52	Fair	Basisk intrusion
		Mean	52	44	52	Fair	
	Chlor/Seds	Lower Quartile	34	29	44	Poor	Kloritiskt Fyllit
		Mean	45	38	49	Fair	
Vinberget	Serp	Lower Quartile	40	35	47	Poor	Serpentinit, Ni rik; Serpentinit, pyroxenforande; Serpentinit, lag haltig
		Mean	44	38	49	Fair	
	Seds	Lower Quartile	39	34	47	Poor	Fyllit
		Mean	45	39	49	Fair	
Sundsberget	Serp	Lower Quartile	42	36	48	Fair	Serpentinit, Ni rik; Serpentinit, pyroxenforande; Serpentinit, lag haltig
		Mean	46	40	50	Fair	
	Seds	Lower Quartile	42	36	48	Fair	Fyllit
		Mean	49	42	51	Fair	
	Mafic	Lower Quartile	46	39	50	Fair	Basisk intrusion
		Mean	49	42	51	Fair	
	Chlor/Seds	Lower Quartile	45	38	49	Fair	Kloritiskt Fyllit
		Mean	49	42	51	Fair	

16.1.3 Recommended slope angles for pit optimisation

In order to use these individual lithology slope angles to develop an overall slope angle for pit optimisation, SRK overlaid Whittle shell profiles on geology sections and constructed pit slopes from the floor of the Whittle shell to the crest using the individual lithology slope angles. This is illustrated in Figure 16-3 for a cross section through the Rönnbäcksnäset deposit. The results for all cross sections analysed in this way are presented in Table 16-2.

Figure 16-3: Cross-section showing original pit shell and new pit slopes (average and minimum) overlaid

Table 16-2: Updated hangingwall and footwall pit slope angles

Pit	Section	Base of Pit (AOD) (m)	Depth (m)	Whittle Angle - HW (°)	HW Angle (°) Lith Average	HW Angle (°) Lith Minimum
Hangingwall						
Rönnbäcksnäset North	400	315	185	60.5	50.4	48.6
	900	350	130	46.8	51.1	49.4
	1100	350	135	54.9	51.2	49.4
Rönnbäcksnäset South	200E	215	235	49.6	50.7	48.7
	200W	190	230	55.6	49.4	47.4
Vinberget	700	320	255	54.6	51.4	50.2
	550	455	155	44.1	52	51
Sundsberget	2600	230	165	48.1	50.6	49.1
	3200	100	305	50.4	50.2	48.6
Footwall						
Rönnbäcksnäset North	400	315	260	43	43	43
	900	350	190	40	40	40
	1100	350	180	36	36	36
Rönnbäcksnäset South	200E	215	225	27	27	27
	200W	190	210	29	29	29
Vinberget	700	320	295	52.5	51.3	50.8
	550	455	165	35.1	52	51
Sundsberget	2600	230	180	20	20	20
	3200	100	365	33	33	33

SRK notes for Rönnbäcksnäset and Sundsberget the footwall dip is relatively shallow, and the pit walls follow the dip of the deposit. The dip of the Vinberget deposit is steeper and consequently the angle of the footwall slope is also steeper. Using the data gathered from the individual section checks, there appears to be little difference to overall slope angle whether using minimum or average slope angles.

The recommended maximum footwall and hangingwall overall slope angles for pit optimisation are listed in Table 16-3. To include the practical formation of benches, berms and ramps for the proposed pit heights, the recommended maximum stable angles are refined, also presented in Table 16-3. As such, SRK has chosen to use the lower bound slope angles for the PEA.

Table 16-3: Maximum stable overall angles used for optimisation

Pit	Maximum Stable angle from MRMR inputs	Realistic Maximum OSA including bench and ramp configuration
Rönnbäcksnäset	48°	48°
Vinberget	50°	48°
Sundsberget	49°	49°

16.2 Pit Optimisation Study

The pit optimisation study was completed using Geovia Whittle advanced multiline modules Simultaneous Optimisation (“SIMO”). The SIMO modules enable the assessment of various production options between the three open pit mines. The study was undertaken to understand the optimal interaction between the three open pit mines of Rönnbäcksnäset, Vinberget and Sundsberget.

The process started with a traditional pit-shell optimisation (Lerch-Grossman / Pseudoflow) to produce optimal pit shells and pushbacks for each deposit through skin analysis of the respective deposits.

From a set of input parameters (block models, economics and mining constraints, etc), in collaboration with the Company, various throughput options were tested with the aim of maximising profit through NPV.

16.2.1 Optimisation Parameters

The pit optimisation input parameters used for the study was based on a combination of inputs from the previous PEA study and/or more recent benchmark information. The input parameters for the pit optimisation study is summarised in Table 16-4.

Table 16-4: PEA pit optimisation input parameters

Parameters	Units	2011 PEA	2022 Base Case	Source
Production				
Production Rate - Ore - RoM	(Mtpa)	32.85	30	SRK 2011 PEA
Total Material Moved - Ore & Waste	(Mtpa)	45-65	45-65	
Geotechnical				
Rönnbäcksnäset	(Deg)	48	48	SRK 2011 PEA
Vinberget	(Deg)	50	48	
Sundsberget	(Deg)	49	49	
Mining Factors				
Dilution	(%)	2.5	2.5	SRK 2011 PEA
Recovery	(%)	95.0	95.0	
Operating Costs				
Mining Base Rate	(USD/$_{moved}$)	**1.35**	**1.91**	SRK 2011 PEA / 2022 SRK Benchmark information
Mining Incremental Cost (Reference elevation - See below for respective pits)	(USD/t/10 m bench)	**0.07**	**0.07**	SRK 2011 PEA
Processing Cost	(USD/t_{ore})	5.03	6.00	SRK 2011 PEA - adjusted for inflation for 2011 & increased energy costs
General & Administrative	(USD/t_{ore})	0.38	0.44	SRK 2011 PEA - adjusted for inflation for 2011
Rehabilitation	(USD/t_{ore})	0.13	0.15	SRK 2011 PEA - adjusted for inflation for 2011
Total pit optimisation cost (no mining)	**(USD/t_{ore})**	**5.54**	**6.59**	
Processing Recovery				
Processing Recovery Ni	(%)	80.00	80.00	SRK 2011 PEA
Processing Recovery Co	(%)	70.00	70.00	
Processing Recovery Fe	(%)	90.00	90.00	
Conc. Grade (Ni)	(%Ni)	28.0	28.0	
Conc. Grade (Co)	(%Co)	0.90	0.90	
Conc. Grade (Fe)	(%Fe)	66.0	66.0	
Metal Price				
Ni	(USD/lb.Ni)	9.00	10.00	Metal Price suggested by Bluelake February 2022
	(USD/t.Ni)	**19,841.58**	**22,046.20**	
Co	(USD/lb.Co)	15.00	20.00	CMF Jan 2022 - Reserves
	USD/t.Co	**33,069.30**	**44,092.40**	
Fe	(USD/tconc)	72.60	74.58	CMF Jan 2022 - Reserves - Fines China
	(USD/dmtu)	**1.10**	**1.13**	
Other				
Discount Rate	(%)	8.0	8.0	SRK 2011 PEA
Royalty (Government 0.15% + Private 0.05%)	(%)	0.20	0.20	SRK 2011 PEA
Selling Cost				
Nickel				
Total Transport Cost (Dry tonnes)	(USD/t_{conc})	74.00	85.10	SRK 2011 PEA - adjusted for inflation
	(USD/t.ni)	**264.29**	**303.93**	
Ni Payability	(%)	93.00	93.00	SRK 2011 PEA
	(USD/t.ni)	**1,388.91**	**1,543.23**	
Ni Treatment charge (TC)	(USD/t_{conc})	225.00	225.00	
	(USD/t.ni)	**803.57**	**803.57**	

Ni Refining charge (RC)	(USD/lb)	0.70	1.00	SRK Benchmark data 2022
	(USD/t.ni)	**1,543.23**	**2,204.62**	
Royalty	**(USD/t.ni)**	**39.68**	**44.09**	
Total Ni Selling Cost	**(USD/t.ni)**	**4,039.68**	**4,899.45**	
Cobalt				
Co Payability	(%)	55.00	55.00	SRK 2011 PEA
	(USD/t.co)	**14,881**	**19,842**	
Co Refining charge	(USD/lb)	2.75	2.75	
	(USD/t.co)	**6062.71**	**6062.71**	
Royalty	**(USD/t.co)**	**66.14**	**88.18**	
Total Co Selling Cost	**(USD/t.co)**	**21,010.03**	**25,992.47**	
Iron				
Transport Cost for Fe Concentrate (Dry)	(USD/t_{conc})	27	31.05	SRK 2011 PEA - adjusted for inflation
	(USD/dmtu)	**0.41**	**0.47**	
Royalty	**(USD/dmtu)**	**0.0022**	**0.0023**	
Total Fe Selling Cost	**(USD/dmtu)**	**0.411**	**0.473**	

Production rate

The study tested various throughput rates in 7.5 Mtpa ore production increments, and it was concluded that due to the relatively low grade of the deposit, economies of scale dictate that 30 Mtpa is the preferred case.

Mining Factors

The pit optimisation used the in-situ resource model as is, and regularisation of blocks to a selective mining unit (“SMU”) was not considered for the study. It is recommended that future studies would include a SMU investigation so as to quantify the impact on dilution and losses. For the PEA, global mining factors dilution (2.5%) and a mining recovery (95%) was applied to the in situ model.

Operating costs

Mining operating costs were sourced from previous technical studies and SRK benchmark information for a mine with similar tenure, stripping ratio and operating conditions. Further detail regarding the operating costs is provided in Section 21.2.1.

Metal price

A metal price of USD 10/lb Ni (USD 22,046.20/t) was based on internal research completed by the Company. SRK periodically deduce a consensus market forecast (“CMF”) metal price index which is the median price forecast from 11 different market forecast sources. Based on the CMF in January 2022, SRK considers the Ni price recommended by the Company more optimistic than the CMF. The relatively high metal forecast relates to an optimistic view held for the potential future premiums for a nickel product that is responsibly sourced with sound environmental, social and governance (“ESG”) credentials. The January 2022 CMF prices were used for cobalt and iron in the form of magnetite for the mining study.

Selling cost

The selling costs were adjusted to account for inflation where applicable and checked against benchmark data for similar mines in the region.

16.2.2 Optimisation Results

The nested pit shell graphs resulting from the pit optimisation study is shown in Figure 16-4 to Figure 16-6 for the respective pits. For each of the pit shells, at the throughput rate (30 Mtpa), the revenue factor (“RF”) 1 (100%) pit produced the highest undiscounted cashflow. Table 16-5 provides a summary of the mined tonnage and grade inventory contained within the pits.

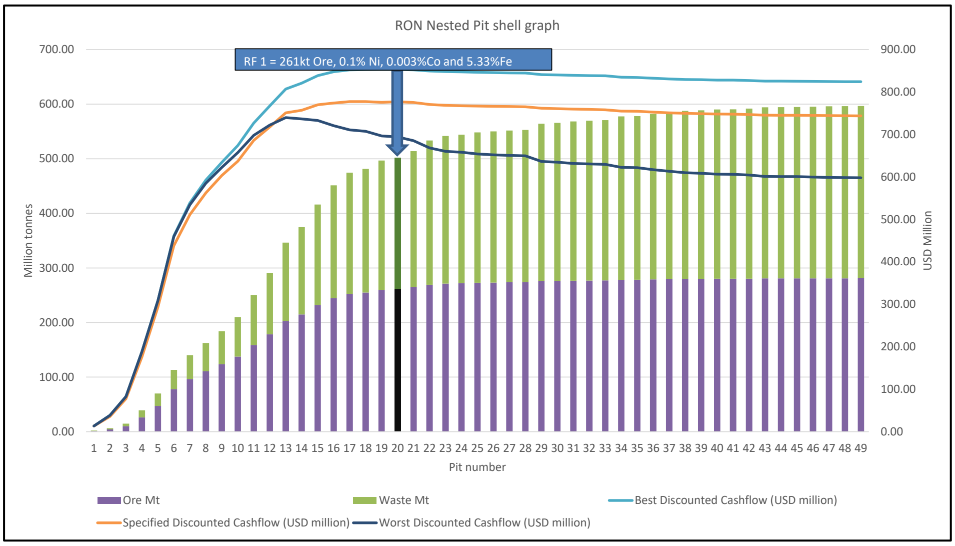


Figure 16-4: Rönnbäcksnäset nested pit shell graph

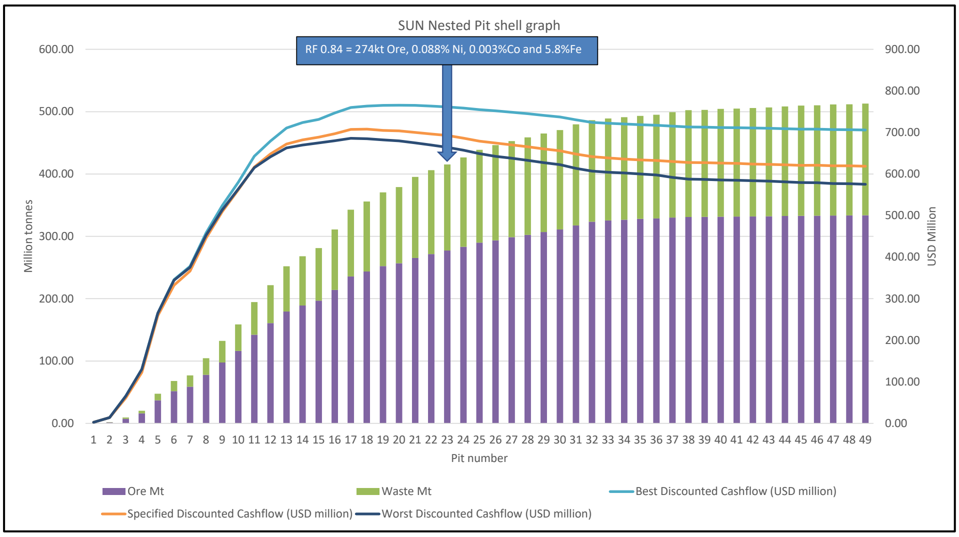


Figure 16-5: Sundsberget nested pit shell graph

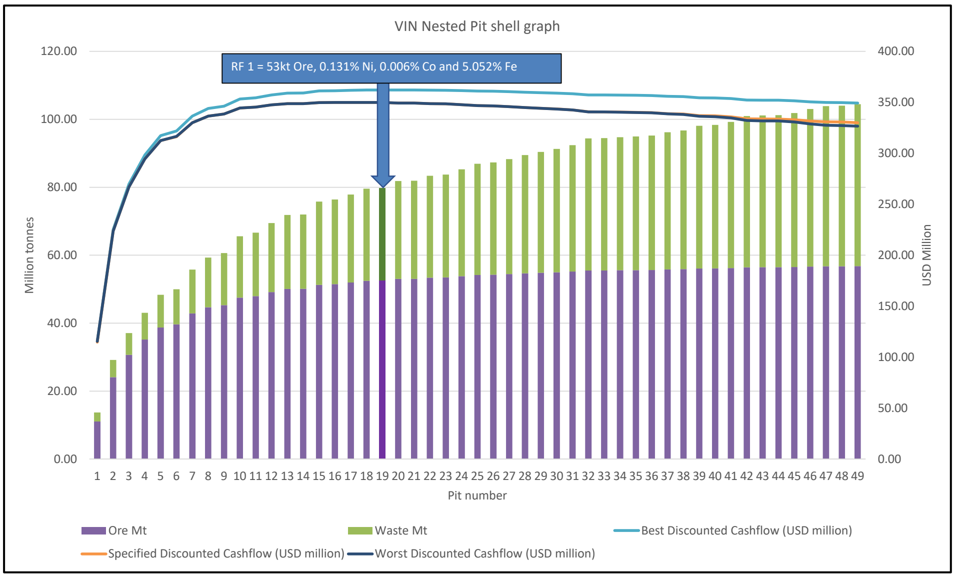


Figure 16-6: Vinberget nested pit shell graph

Table 16-5: Mining Inventory results from the pit optimisation

Mining inventory (Inclusive of Dilution and Losses)	Unit	Total
Mined material Grand Total	**(Mt)**	**934**
Waste sub-total	**(Mt)**	**348**
Ron	(Mt)	225
Sun	(Mt)	96
Vin	(Mt)	27
Mineralisation sub-total	**(Mt)**	**586**
Ron	(Mt)	261
Sun	(Mt)	274
Vin	(Mt)	53
Total Grade	**(%)**	
Ni (total)	(%)	0.245%
Ni (sulphide)	(%)	0.094%
Co (sulphide)	(%)	0.003%
Fe (total)	(%)	5.5%

16.3 Mine Design

No mine design was included for the PEA. The production schedule was based on pushbacks and final pit shells generated by the pit optimisation software. The pushbacks and pit shells are 3D geometric shapes adhering to a geotechnical overall slope angle and selected to optimise the mining sequence to achieve the highest NPV for the mine.

The pushbacks and final pit shell are shown for each of the three production areas in Figure 16-7 to Figure 16-9.

The pushbacks were selected to ensure that a 75 m minimum mining width can be achieved.

For further detailed studies, such pushbacks and pit shells can be used to guide the final pit designs.

Waste Rock Dumps

Waste Rock Dump (“WRD”) designs were included for the PEA. The mining study identified that 348 Mt of WRD storage would be required for Rönnbäcken. Given the limited space in the surrounding areas, this would require further investigation in detailed studies. Such further detailed investigations should include:

- Waste rock dumping in such a manner so as to serve as noise attenuation barriers to the surrounding areas.
- Investigate suitable loose densities of material based on swell and compaction.
- In pit back filling with waste rock in the mining sequence.
- Detailed WRD 3-dimensional geometric designs optimised for future rehabilitation.

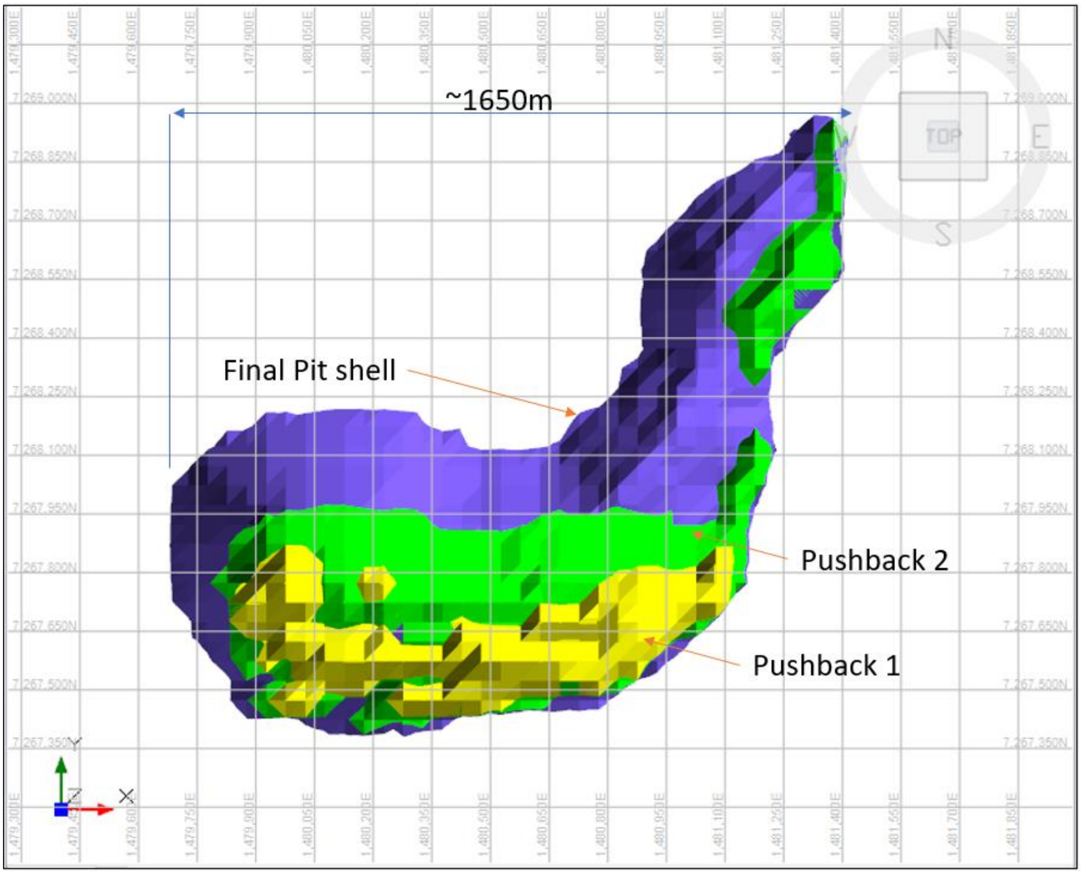


Figure 16-7: Rönnbäcksnäset pit shell pushbacks

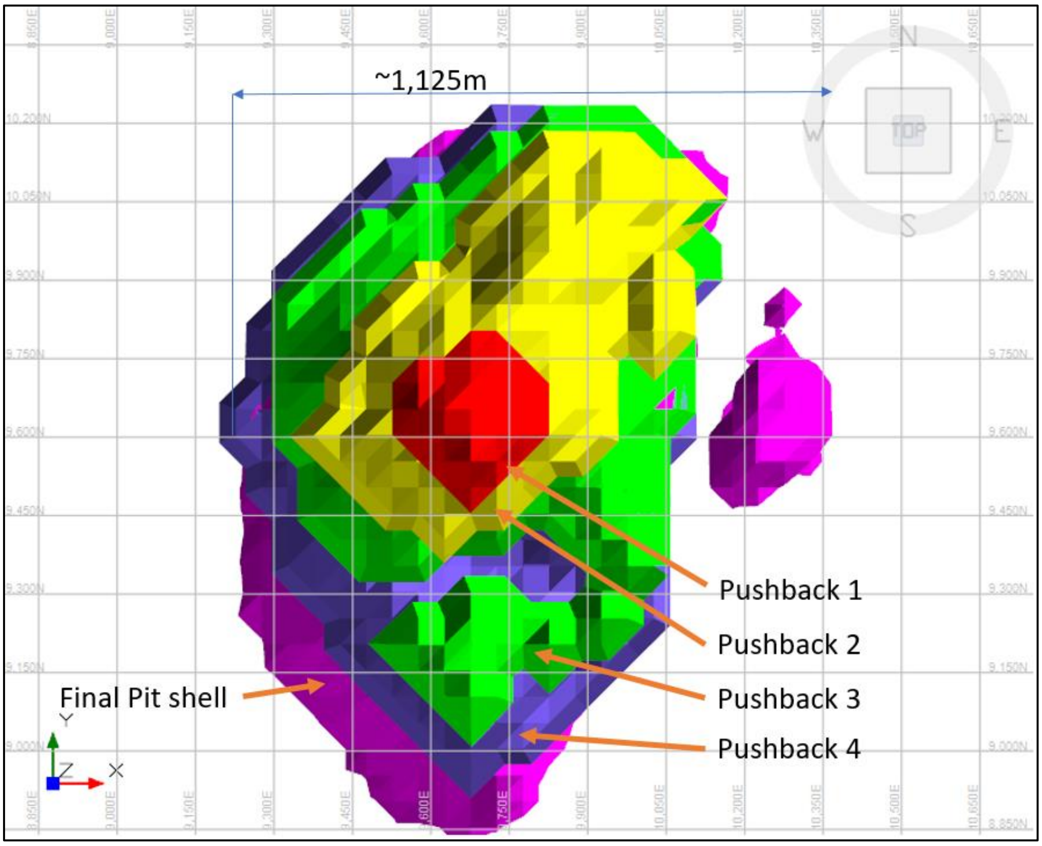


Figure 16-8: Sundsberget pit shell pushbacks

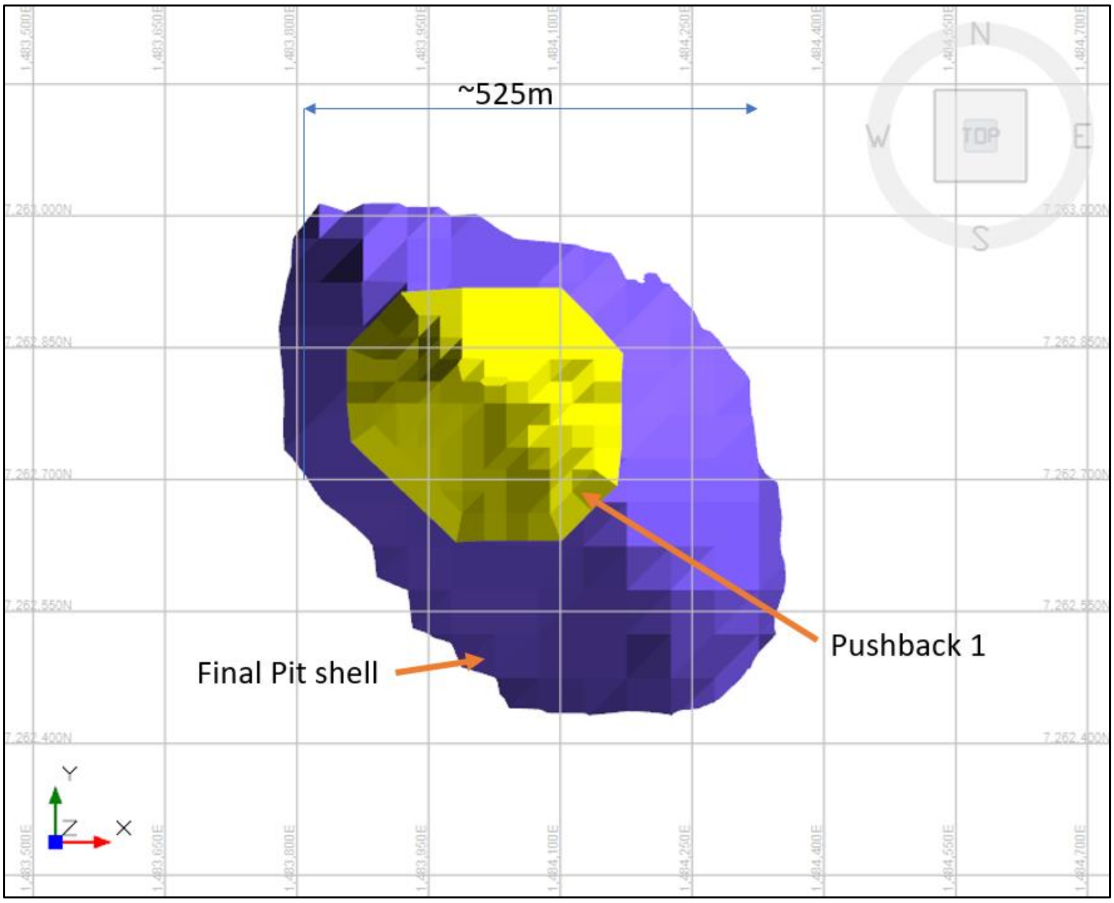


Figure 16-9: Vinberget pit shell pushbacks

16.4 Mining Schedule

The mining production schedule was developed using SIMO. The geological block models for the three different mining areas were combined into a single model using the SIMO block model tool. The pushbacks and final pit shells discussed in Section 16.3.

A maximum sink rate of approximately 100 m per annum was applied in the production profile, to ensure that the future conceptual level production schedule would be practical.

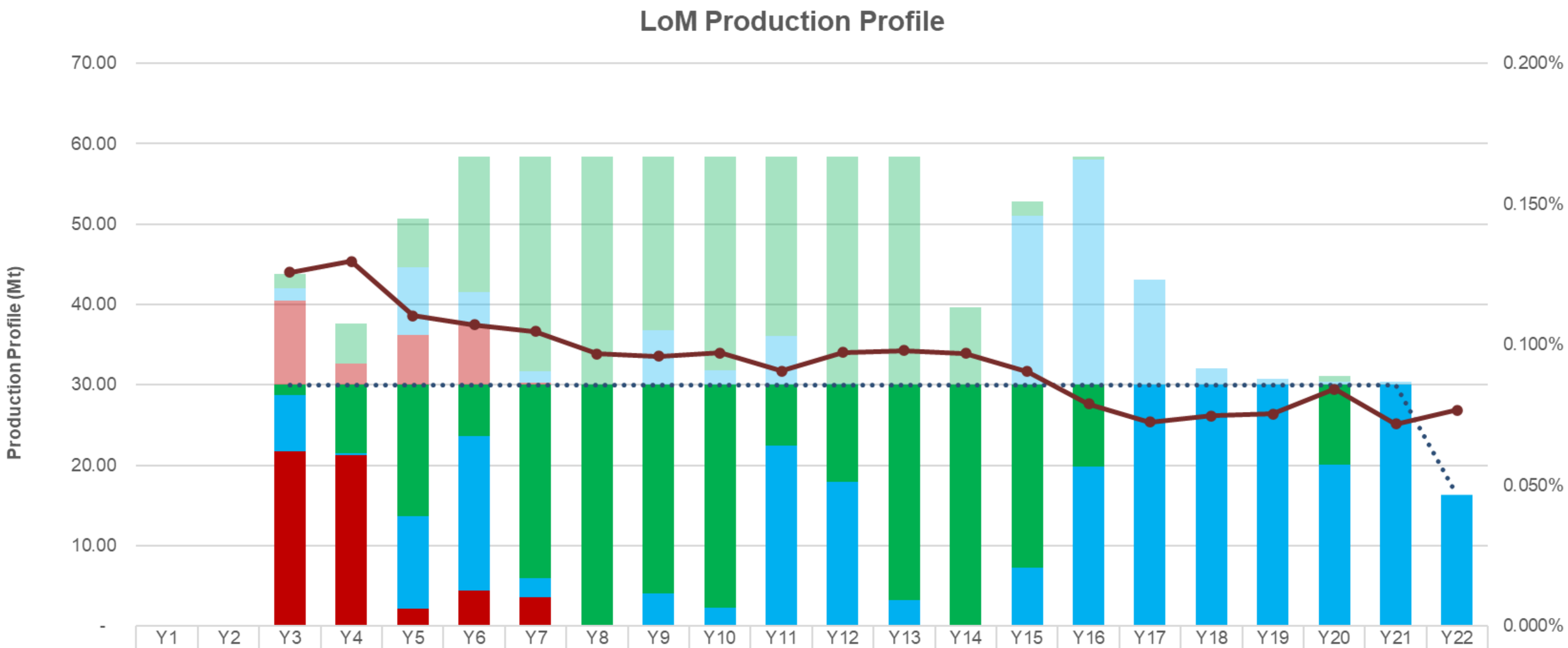
The SIMO software's prober algorithm extracts the ore which will generate the highest cashflow earliest in the LoM based on the mining faces available at the time.

The resultant production schedule, presented in Table 16-6 and Figure 16-10, though optimised for economics, might not be best suited for a mining fleet as it requires increases and reduction of various pushbacks throughout the LoM.

The mine plan succeeded in producing 30 Mtpa RoM ore over 22 years (including 2-year pre-production construction), whilst not exceeding 28 Mtpa waste mining.

Table 16-6: Production schedule

Production	Unit	Total	Year																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mined Total	**(Mt)**	**934**	**-**	**-**	**44**	**38**	**51**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**58**	**40**	**53**	**58**	**43**	**32**	**31**	**31**	**30**	**16**
Waste Sub-total	**(Mt)**	**348**	**-**	**-**	**14**	**8**	**21**	**28**	**28**	**28**	**28**	**28**	**28**	**28**	**28**	**10**	**23**	**28**	**13**	**2**	**1**	**1**	**0**	**0**
Rönnbäcksnäset	(Mt)	225	-	-	2	5	6	17	27	28	22	27	22	28	28	10	2	0	-	-	-	1	-	-
Sundsberget	(Mt)	96	-	-	2	0	9	4	1	-	7	2	6	0	0	-	21	28	13	2	1	0	0	0
Vinberget	(Mt)	27	-	-	10	3	6	7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ore Sub-total	**(Mt)**	**586**	**-**	**-**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**30**	**16**
Rönnbäcksnäset	(Mt)	260	-	-	1	9	16	6	24	30	26	28	8	12	27	30	23	10	-	-	-	10	-	-
Sundsberget	(Mt)	274	-	-	7	0	12	19	2	-	4	2	22	18	3	-	7	20	30	30	30	20	30	16
Vinberget	(Mt)	53	-	-	22	21	2	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Grade																								
Ni (total)	(%)	0.245%	-	-	0.160%	0.125%	0.240%	0.235%	0.278%	0.335%	0.336%	0.330%	0.331%	0.323%	0.336%	0.229%	0.290%	0.296%	0.220%	0.163%	0.157%	0.164%	0.154%	0.169%
Ni (sulphide)	(%)	0.094%	-	-	0.126%	0.130%	0.110%	0.107%	0.105%	0.097%	0.096%	0.097%	0.091%	0.097%	0.098%	0.097%	0.091%	0.079%	0.073%	0.075%	0.075%	0.084%	0.072%	0.077%
Co	(%)	0.003%	-	-	0.006%	0.006%	0.003%	0.004%	0.003%	0.002%	0.002%	0.003%	0.003%	0.004%	0.004%	0.003%	0.003%	0.003%	0.002%	0.002%	0.002%	0.003%	0.002%	0.002%
Fe	(%)	5.5%	-	-	5.2%	5.2%	5.4%	5.5%	5.3%	5.3%	5.3%	5.4%	5.5%	5.6%	5.3%	5.4%	5.5%	5.7%	5.6%	5.7%	5.8%	5.7%	6.0%	6.4%



	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Y20	Y21	Y22
Ron (Wst)	-	-	1.8	4.9	6.0	16.9	26.7	28.4	21.6	26.6	22.3	28.4	28.4	9.7	1.8	0.4	-	-	-	0.7	-	-
Sun (Wst)	-	-	1.6	0.0	8.5	4.2	1.4	-	6.8	1.9	6.1	0.0	0.0	-	21.0	28.0	13.1	2.1	0.7	0.3	0.3	0.1
Vin (Wst)	-	-	10.4	2.7	6.2	7.4	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ron (Ore)	-	-	1.2	8.6	16.3	6.4	24.1	30.0	26.0	27.7	7.6	12.1	26.9	30.0	22.8	10.1	-	-	-	10.0	-	-
Sun (Ore)	-	-	7.0	0.1	11.6	19.2	2.3	-	4.0	2.3	22.4	17.9	3.1	-	7.2	19.9	30.0	30.0	30.0	20.0	30.0	16.3
Vin (Ore)	-	-	21.7	21.3	2.1	4.4	3.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Ore			30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	16.31
Ni Grade			0.13%	0.13%	0.11%	0.11%	0.10%	0.10%	0.10%	0.10%	0.09%	0.10%	0.10%	0.10%	0.09%	0.08%	0.07%	0.07%	0.08%	0.08%	0.07%	0.08%

Figure 16-10: LoM production schedule profile

16.5 Mining Equipment Selection

The selected benchmark information details that informed the mining equipment selection is summarised below for a 30 Mtpa production rate:

- benchmark assumes a stripping ratio (t:t) of 1.0;
- 2.4 Mt of pre-production stripping will be required prior to mining operations;
- ore will be hauled on average 4 km for each haulage cycle to a centralised processing facility;
- waste will be hauled on average 2 km for each haulage cycle to a waste rock dump situated close to the pit; and
- 7.5 km of haul roads will need to be constructed prior to mine operation.

Based on the benchmark information, the following equipment selection formed the basis of the mining cost estimate:

- 26 x 180 t rear dump trucks will be used with 2 x 26 m^3 bucket face shovels for the primary equipment;
- 3 x 380 mm - rotary drills will be required; and
- ancillary equipment such as bulldozers, graders, water tankers, lighting plants and pickup trucks typically required for an open pit mine is included.

The following daily consumables was assumed within the benchmark data:

- 60,000 L diesel fuel per day;
- 60,000 kWh / day electricity;
- 40,000 kg of bulk explosives per day;
- 92 caps of explosives per day;
- 88 primers per day;
- 2.4 drill bits per day; and
- 1,300 m detonating cord per day.

SRK would caution that the above details on the equipment are a summary of a suitable selected benchmark operation and not estimates developed from first principles. The benchmark information selected is in SRK's view conservative in nature and suitable for a PEA level study, and it is recommended that further detailed investigations would further seek to optimise the equipment selection.

16.6 Decarbonisation Considerations

Within the mining industry, a strong drive for improving efficiency and minimising environmental and social impacts has recently increased drastically, with the Nordic region leading the way in Europe with the electrification of mines and the drive for lowering the GHG emissions being the focus for current ongoing technological developments in the mining industry. A more detailed review of the available decarbonisation strategies is provided in 20.4.6.

The following section discusses some of the main existing and future technologies that are showing potential for efficiency improvements with downstream GHG emissions reductions:

- trolley assist;
- autonomous trucking;
- battery operated trucks; and
- battery operated autonomous trucks.

16.6.1 Trolley assist

A trolley assist system, as implemented at Boliden's Aitik mine in Sweden, involves large (220 t) diesel electric trucks with the ability to connect to overhead powerlines. The trolley system can power alternating current electric wheel motors when the fully loaded truck is hauling up an inclined ramp.

As most of the fuel is burnt on hauling material up the haul ramp in a cycle, a significant overall reduction in fuel consumption is made possible by trolley assist. The cost saving is realised through electricity costs usually being much lower per kWh for the same power requirements.

SRK notes the following regarding trolley assist:

- For a trolley assist system, the mine needs to be designed for trolley assist, since there are certain mine design limitations associated with trolley assist:
  - haul ramp needs to be relatively straight;
  - ideally, at least 100 m of vertical lift needs to be possible along a relatively straight haulage ramp; and
  - considerable electricity supply is required.
- Currently, a 1 km overhead trolley powerline will cost approximately USD 4 M along with required infrastructure.
- Trolley assist-ready trucks are currently only commercially available for the larger sized diesel electric mining trucks above 200 t payload, although some equipment suppliers are developing smaller trolley assist-ready trucks in the 100 t category.
- Currently, the conversation of a suitable 200 t diesel electric truck to trolley assist-ready costs approximately USD 0.5 M per truck.

The current depths of the pit shells for the three mining locations, as well as the current optimised production sequence, as well as the suggested benchmark trucks (180 t) size, would suggest that it is unlikely that the mine would benefit from a trolley assist system. A vertical lift of more than 100 m will only be possible later in the life of the operation when the pit has been deepened sufficiently. Further trade-off studies will be required to confirm whether a trolley assist system would be beneficial to the mine.

16.6.2 Autonomous trucking

Autonomous trucking systems have been around since 2008, typically used in the bulk mining industries such as the Australian iron ore and coal surface mines, where long, straight haulage routes are generally possible. The savings are realised mainly through an improvement in effective utilisation of the truck through:

- more concise adhering to accurate dispatching systems; and
- eliminating shift changes and breaks.

Further costs savings are possible through lower overall labour costs. Existing case studies reference a 15% improvement in effective utilisation as typical for an unmanned fleet compared to a manned fleet. One white paper suggests the overall cost savings associated with autonomous trucks could be in the order of approximately 30%; see Figure 16-11.

Autonomous trucking systems are often a difficult sell, since the truck drivers in an open pit mine constitute the largest number of jobs made available by the new mine. As the permitting processes often hinge on community engagement, the promise of local employment is used as a positive socio-economic impact. Autonomous systems are stigmatised as taking jobs from people. Autonomous trucking systems are also reliant on very good electronic data communication systems, which in turn requires highly specialised skills for the systems to work effectively.

As with trolley assist, the mine also needs to be designed specifically around the autonomous trucking system as shown in Table 16-7. It is recommended that autonomous trucking options would be developed in further detail to determine their suitability for the Project.

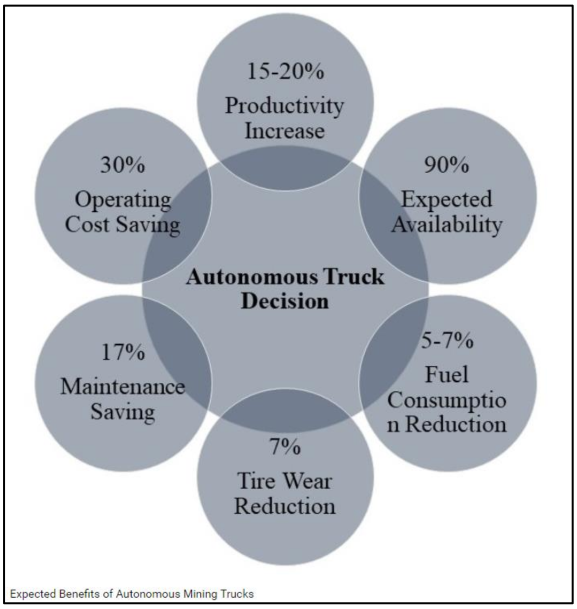
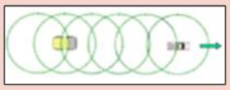
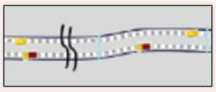
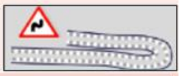
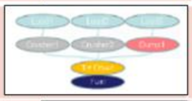
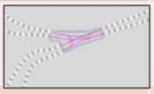
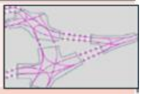
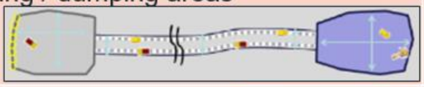


Figure 16-11: Autonomous trucking potential savings

Table 16-7: Design considerations for autonomous trucks

Preferred	Undesirable
Segregation of AHS area from Manned operation 	Frequent interaction of services in AHS area 
Straight roads / low curves 	Tight curves / winding roads  
Constant Gradient 	Varying Gradient 
Simplistic routes 	Complex routes 
Minimal intersections 	Multiple intersections 
Wide loading / dumping areas 	Narrow areas of loading / dumping 
Well maintained haul roads 	Rough haul roads 

16.6.3 Battery operated trucks

The largest battery-operated truck in the world, the “eDumper”, was tested in Ciments Vigier SA, a quarry in Biel-Bienne in Switzerland (see Figure 16-12). The truck is based on the Komatsu HD605-7 which has a 63 t payload. The lithium battery fitted to the truck weighs 4.5 t and it costs approximately USD 1 M to retrofit a truck to operate as an eDumper. Whilst the battery in an eDumper is the largest battery ever fitted to a commercial vehicle, it enables the eDumper to benefit from regenerative breaking which stores energy from the downhill run in the batteries.

The electric motors fitted to the trucks produce higher torque compared to a similar sized diesel truck, so theoretically could safely climb steeper gradients of up to 13%. The electric components are generally considered to be more robust, with less wear and tear when compared to its mechanical counterpart, so maintenance costs are expected to be lower.

Some of the challenges with the eDumpers is that it needs about 8 hours to charge for every 3 days of operating. There are also still some safety concerns associated with a 4.5 t battery whereby the battery needs to be designed in such a way that a failing cell cannot affect neighbouring cells.

For a 30 Mtpa operation, the suggested truck size from the benchmark information, is in the 180 t payload range. To implement technology such as the eDumper would require a large number of trucks which might cause congestion in the pit. SRK suggests that further detailed trade-off studies would be needed to see if a proportion of the mining can be done by eDumpers.

Figure 16-12: Battery operated 63 t eDumper mine haul truck (Source: Komatsu)

16.6.4 Autonomous battery electric trucks

Another electric truck which is looking promising is the Volvo HX 02 is the battery electric load carrier (see Figure 16-13). Limited information is available about these smaller sized trucks other than:

- 15 t payload;
- smaller size and low passing tolerances associated with autonomy could imply that haul route sizes can be reduced; and
- bi-directional loading where no reversing is required close to the loader, so theoretically smaller footprint loading areas would be possible, with smaller minimum mining width.

As with the eDumper, the current truck size might be too small for the scale of production required at Rönnbäcken. Future trade-off studies is suggested to investigate of some part of the orebody, or perhaps one of the pit areas could be run on electric autonomous trucks.

Figure 16-13: Volvo HX 02 autonomous battery electric truck (Source: Volvo)

16.6.5 Comments on future potential future cost savings

SRK notes the following regarding potential future cost savings and improved environmental and social opportunities: The current three pit locations would need to require further trade-off studies and investigation to establish whether trolley assist systems will be suitable. The current mine plan and conceptual mining approach is largely driven by the revenue generated from mining the highest value material first. With trolley assist systems, often a compromise between reduced revenue and cost reduction needs to be reached due to mining practicality. This needs to be included in the mine design, whereby a permanent ramp with 100 m vertical lift will be used for an extended period of time for the trolley assist.

As with trolley assist, autonomous trucking would need to be investigated in greater detail through trade-off studies. The mine design will need to be adapted iteratively based on the limitation set by the autonomous systems. Autonomous trucking will also require advanced skills on site.

Battery operated trucks looks promising; however, the size of the required batteries and the current small payload of battery-operated trucks will require too many trucks to move 30 Mtpa. Future trade-off studies could investigate whether some part of the mine can be mined solely by battery operated trucks.

As with battery operated trucks, battery operated autonomous trucks being developed are currently more suitable for smaller mines, which generally produce less tonnages. But might be suitable for a proportion of these deposits.

16.7 Mine Workforce

Using the selected benchmarks discussed in Section 16.5, total of approximately 300 people are assumed for operating the mine, of which the largest group include:

- 70 - 75 x truck drivers;
- 70 - 75 x mechanics/electricians; and
- 100 - 130 x day labourers.

16.8 Mining Cost Considerations

The benchmarked summary costs associated with mining are presented in Table 16-8. Given the ongoing advances in mining technology, for the PEA, it was assumed that at some point in the future, technological advances (as discussed in Section 16.6) would be able to reduce the operating costs for the mine by approximately 20%.

Table 16-8: Benchmarked 30 Mtpa mining cost estimate summary

Cost Description	Unit	Value
Operating cost	USD/t mined	1.91
Capital costs	USD M	285
Capital costs (excluding sustaining & working capital)	USD M	249.2
Sustaining / working capital	USD/t RoM	0.12

17 RECOVERY METHODS

This section outlines mineral processing and metallurgical testwork completed on the Project to date.

17.1 Mineralogy

The predominant nickel-bearing minerals in the Rönnbäcken material are heazlewoodite and pentlandite. Heazlewoodite, relatively uncommon in other deposits, is a low iron nickel mineral and results in a higher-grade nickel concentrate. Pentlandite contains iron, is more common, and nickel concentrates tend to be lower grade.

Nickel sulphide mineralisation is hosted by serpentines, formed during the release of nickel from olivine through a process of alteration and serpentinization of the precursor dunite and peridotite rocks. The deposit is an ultramafic hosted disseminated nickel sulphide deposit where nickel is contained in both sulphides and in silicates such as olivine and pyroxene.

Typically, across all three orebodies the total Ni is 0.177% of which 58% is nickel sulphide at 0.103%; Co is 0.003%, Fe is 5.55% and magnetite is around 6 to 10% (Eurus Mineral Consultants 2013). It is important to differentiate between total nickel (Ni_T) and sulphide nickel (Ni_S); recovery figures presented herein refer to Ni_S recovery.

Historical mineralogical work has been a mix of qualitative and quantitative work, consisting of optical microscopy examinations, and scanning electron microscope analysis of the various minerals observed, together with mineral liberation analysis (“MLA”) of head samples, and selected concentrates and tailings samples. In general terms, the samples were produced from testing composite samples from each of the major deposits.

The mineralogical assay of magnetite was approximately 10% and appears to be high when compared to the more reliable Satmagan magnetite assay which was lower at 6 to 8%. Satmagan assays are used in magnetite recovery studies.

White asbestos fibres have been identified in the three mineralised deposits, with 8 to 9% of the samples studied contained fibres and the average number of fibres in these samples was approximately 1.7. Serpentine asbestos minerals (chrysotile or white asbestos) was the main type of fibre. It should be noted that this is less hazardous than amphibole fibres. The presence of this material should be considered in the design and operation of the tailings disposal system and should be noted in the process design as it can result in slurry viscosity issues.

17.1.1 Rönnbäcksnäset Sample

In the Rönnbäcksnäset sample, antigorite (magnesium-iron rich silicate) was found to predominate, but with heazlewoodite (Ni_3S_2) as the dominant nickel sulphide mineral. Grain size was found to vary mainly from 10 to 100 µm, while very small grains of Co-pentlandite and maucherite were encountered together with heazlewoodite.

Heazlewoodite is the main nickel sulphide, while only a few grains of pentlandite (Ni,Fe_9S_8), were found and, in each case, they were Co-rich. Heazlewoodite was found to occur mainly as locked grains with antigorite and, to a lesser degree, with magnetite. No pyrite or pyrrhotite was noted.

The total nickel content (Ni_T) of the Rönnbäcksnäset sample was assayed as 0.189% Ni, with sulphide nickel (Ni_S) assayed using the bromine methanol method ("BM") measured at 0.117% Ni. This indicates that 62% of the nickel is in sulphide form, and 38% is in non-sulphides.

Optical microscopy indicated that a relatively fine grind is required for good liberation. Mineral liberation analysis studies showed 89% liberation at a grind of 39 µm. Both methods indicate that relatively high-grade concentrates can be produced albeit at a fine grind.

Outotec Research Centre ("ORC") reported that the main arsenic carrier was found to be maucherite (Outotec Research Centre 2013).

17.1.2 Vinberget Sample

The predominant mineral in the Vinberget sample is antigorite, but significant amounts of chlorite are also present suggesting that altered peridotite or pyroxenite rock types exist in addition to serpentinites. Diopside was also found.

Pentlandite is the main nickel sulphide, but some heazlewoodite is also present. Heazlewoodite occurs mainly as lamellae in pentlandite. Based on optical observations the pentlandite to heazlewoodite ratio is approximately 3 to 1. Antigorite was found to contain trace amounts of nickel, at an average of 0.1% Ni. Magnetite and chromite present also contain low amounts of nickel.

The total nickel content of the Vinberget sample was assayed as 0.177% Ni. Sulphide nickel was measured as 0.118% Ni, using the BM method. This indicates that 67% of the nickel is in sulphide form, and 33% is in non-sulphides.

Optical microscopy examinations showed that 50% of the nickel sulphides were liberated at <45 µm, 65% at <38 µm, and 90% at <20 µm. MLA showed that 91% liberation is achieved at a 38 µm grind. This indicated that a primary grind of approximately P_{80} 45 µm was required in order to achieve the desired liberation and that regrinding will be required in the flotation cleaner circuits in order to produce acceptable Ni concentrate grades. The predominant unliberated particles were identified as binaries with antigorite.

17.1.3 Sundsberget Sample

The Sundsberget sample consists mainly of the silicates antigorite and diopside, chlorite, magnetite, chromite and magnesite. Tiny amounts of carbonates, olivine, chromium-bearing magnetite, Ni-sulphides and maucherite, a nickel arsenide, are also present. Heazlewoodite is the main nickel sulphide, containing approximately 54% of the total nickel. Pentlandite is the secondary nickel sulphide containing approximately 11% of the total nickel. The remaining nickel is contained in magnetite (19%) and silicates.

The total nickel content of the Sundsberget sample was assayed as 0.190% Ni, with sulphide nickel measured at 0.112% Ni, using the BM method. This indicates that 59% of the nickel is in sulphide form.

Iron is present as magnetite (66%) and serpentine (23%); MgO % is nearly 36%.

As with the Rönnbäcksnäset and Vinberget samples, the nickel grain size was found to vary mainly from 10 to 100 µm.

17.2 Metallurgical Testwork

17.2.1 General

A number of metallurgical testwork programs have been conducted since the 1970s. Metallurgical testwork has been performed and reported by Boliden Mineral AB (Boliden 1974), Minpro AB ("Minpro"; 2007), ORC (2008 to 2013) and the Geological Survey of Finland ("GTK", 2008). Since 2007, scoping level laboratory scale test work was conducted almost exclusively on Rönnbäcksnäset and Vinberget. Sundsberget has to date only been subjected to six batch tests. A mini pilot plant campaign was run on a 1:1 blend of Rönnbäcksnäset and Vinberget in 2010. This was very small scale; the feed rate was 22 kg/h.

The testwork results have been reviewed in detail by Mr Jan Hultqvist in March 2012 and Mr Martyn Hay, Eurus Mineral Consultants ("EMC") in June and December 2012 and August 2013.

In general terms, the historical metallurgical testwork conducted on various samples from the Rönnbäcken area, have indicated that nickel can be recovered by conventional flotation into commercially acceptable sulphide concentrates at nickel recoveries between 67 and 73% and at concentrate grades of 26 to 34% Ni. Typically, a fine primary grind of P_{80} 44 µm was required.

Preliminary testwork performed by ORC has also demonstrated that a magnetite concentrate can also be produced, albeit at a fine grind size to produce a 66% Fe magnetite concentrate.

17.2.2 Historical Testwork

Initial bench-scale studies were performed in the early 1970s by the Royal Institute of Technology in Stockholm. Standard flotation tests were performed on three different samples from the Rönnbäcken area, and the nickel concentrates produced contained 31% Ni to 47% Ni, 1.5% Co to 2.8% Co, 4 g/t Au to 8 g/t Au, and some minor PGM at recoveries reported to be 80% of the sulphide nickel.

In 1974, Boliden carried out test mining in the Rönnbäcken area and conducted pilot flotation testing. Nickel concentrates containing 26% Ni to 34% Ni, 1.5% Co, 5 g/t Au, and 2 g/t combined PGM at a recovery of 67% to 73% were produced. In addition, grinding was tested using both a rod mill – pebble mill and autogenous ("AG") mill – pebble mill circuits. The best metallurgy was obtained using AG – pebble mill circuit with a P_{80} of 44 µm. The total energy consumption using two-stage fully autogenous grinding was reported to be approximately 25 kWh/t.

The suitability of autogenous grinding was confirmed by industrial scale testing at a Boliden concentrator and demonstrated that Vinberget ore media were very competent, comparing favourably with ore from the Aitik copper mine which utilises the large diameter AG mill – pebble mill grinding circuit configuration.

Helsinki University of Technology grindability of Vinberget and Rönnbäcksnäset samples 2007

Standard Bond grindability and Mergan grinding tests were performed on samples of Vinberget and Rönnbäcksnäset under the supervision of Outotec; the results are presented in Table 17-1. These results characterize the ore as medium-hard in a typical ball milling size range, with Rönnbäcksnäset slightly softer than Vinberget

Table 17-1: Standard Bond grindability and Mergan grinding tests

Sample	Bond Wi (kWh/t)	Mergan (kWh/t)
Vinberget	17.57	17.54 (P_{80} 39 µm)
Rönnbäcksnäset	16.44	15.41 (P_{80} 37 µm)

Minpro Tests 2007

In 2007, standard bench scale flotation tests were performed at Minpro laboratories on a historical sample from the earlier Boliden investigations. Despite the earlier work, two coarser primary grind sizes, P_{80} 80 and 60 µm were investigated.

Minpro reported total nickel (Ni_T) rather than only sulphide nickel (Ni_S) in their report. Even at the low head grade of 0.10% Ni_S , concentrate grades as high as 25% Ni were achieved. The best tests resulted in a recovery of sulphide nickel to the rougher concentrate of 90%. After two stages of cleaning in an open circuit test, a concentrate grading 18% Ni was produced at approximately 77% recovery (estimated due to assays reported as Ni_T).

Outotec Research Centre (ORC) Tests – ORC Phase 1 Testing 2008

In 2008, five 25 kg samples were tested at ORC in Finland. The samples were from two drill holes at Vinberget (VIN29 and VIN30) and one drill hole at Rönnbäcksnäset (RON53). The samples provided were half core, crushed to -2 mm. In addition, a reference sample was provided from the Boliden test pit near Vinberget which had previously been used in the Minpro tests.

The range of nickel analyses of the five samples was 0.104% to 0.153% Ni_S and 0.182% to 0.202% Ni_T.

During this phase of testing, ORC conducted a total of 14 standard rougher flotation tests using primary grinds of approximately P_{80} 80, 50 and 40 µm to determine the best grind size. The reagents used were potassium amyl xanthate ("PAX") as collector, a standard dispersant, Dowfroth 250, and sulphuric acid for pH control.

The results from the first phase ORC testing could be summarized as follows:

- sulphide nickel recovery to rougher concentrate ranged from 75% to 85%;
- improved results were achieved at the finer grind sizes;
- the rougher concentrate typically contained approximately 1% Nis and contained many liberated gangue minerals; and
- sedimentation of solids in the tailings was slow but manageable.

ORC Phase 2 Testing 2009

The objective of this testing was to produce higher grade concentrates in laboratory scale batch flotation tests while improving operating costs.

Two composite samples representing the Vinberget and Rönnbäcksnäset deposits were used. The composite feed assays are shown in Table 17-2.

Table 17-2: ORC Phase 2 Testing 2009 composite head grades

Sample	$\%Ni_S$	$\%Co_S$	$\%Ni_T$	$\%Co_T$	$\%Fe_T$	MgO
Vinberget	0.118	0.006	0.177	0.009	5.36	35.6
Rönnbäcksnäset	0.117	0.002	0.189	0.009	5.31	34.8

This test work focused on standard flotation tests using a finer grind. Initial tests were conducted at a P_{80} 50 µm, while in the later stages the grind size was varied between P_{80} 38 µm and 31 µm. The reagent additions were modified throughout the testing using the following general scheme:

- PAX as a collector;
- Dowfroth 250 as a frother;
- sulphuric acid (H_2SO_4) as a pH modifier;
- carboxymethyl cellulose ("CMC") as a dispersant or magnesium oxide (MgO) depressant (predominantly for Vinberget); and
- second standard dispersant (predominantly for Rönnbäcksnäset sample).

A total of 18 rougher flotation tests and 14 cleaner flotation tests were conducted on the two composite samples and were limited to open circuit batch tests.

The finer grind sizes, P_{80} 38 µm and 31 µm, produced much better results than coarser grinding. Concentrate grades of 25% to 35% were produced at overall sulphide nickel recoveries of 50% to 60%. Typical rougher recoveries at the finer grind were 77% to 83%, and typical cleaner recoveries were 66% to 70%. The results for the Vinberget sample were generally slightly better than those for the Rönnbäcksnäset composite at lower concentrate grades; however, at a grade of 28% Ni, the recovery from both composites was similar.

Following this testwork ORC simulated closed circuit metallurgical performance in a commercial plant using HSC Chemistry® steady state simulation software, by using the kinetic information from the laboratory results for the Vinberget ore only. The results were validated against the open circuit results for Vinberget but have not been validated on closed circuit results, such as via locked cycle tests. SRK considers this methodology to be acceptable but concurs with recommendations that locked cycle flotation testing should be performed to verify these closed-circuit simulation predictions. Based on the simulation work, after four stages of cleaning, ORC predicted that a cleaner concentrate would contain 28% Ni at 74.5% recovery and approximately 1.0% Co.

Other potential payable metals include gold, silver (Ag), platinum (Pt), and palladium (Pd). There are only minor quantities of these metals in the ore, so it is unlikely that these will contribute much revenue and, therefore, they have not generally been assayed for in the test work. The estimated recoveries based on the very limited data available from one test at ORC are 20% recovery of Au and Ag, and 35% recovery of Pt and Pd.

ORC Phase 3 Testing 2009-2010

The phase 3 testing at ORC was performed in November 2009 through to March 2010 to investigate the effects of a coarser primary grind prior to rougher flotation followed by cleaning incorporating concentrate regrinding. The primary grind was P_{80} 50 to 60 µm. In summary, batch flotation gave a recovery of 65% at 25% nickel grade. Overall, the results of these batch flotation tests indicated an improvement in metallurgical performance and the HSC plant simulations indicated 78% nickel recovery at a 28% concentrate grade.

GTK Phase 4 Mini pilot plant testing 2010

In March 2010 phase 4 mini pilot plant testing was performed at the GTK in Finland using a 50:50 blend of samples of Vinberget and Rönnbäcksnäset ores. The composite used in the phase 1 to 3 tests was exhausted in early 2010 and a second composite blend (Comp 2) of 50:50 Vinberget and Rönnbäcksnäset ore was made.

The Comp 2 analysis was 0.128 % Ni_S and 0.203 % N_T, 0.004% Co_S and 0.011 % Co_T, and 0.074% S.

Laboratory tests were performed on Comp 2 to compare the flotation response with Comp 1. In general, the nickel recovery was below that achieved with Comp 1 by approximately 10%. No specific reason was identified for this effect.

In the mini-pilot tests, 1300 kg of sample was used, over a six-day period, in six 10-hour tests. Typically, the feed rate was 21 to 22 kg/hour.

The grinding circuit product size was P_{80} 45 to 60 µm over the testing period. A number of circuit configurations and reagent regimes were tested, and the best results were achieved with four stages of cleaning. Nickel recovery was 80% at a concentrate grade of 22.3 % Ni, and 75% recovery at a 25.8% Ni.

It would be expected that the results in a larger pilot plant, incorporating full stream recycle, would improve these results.

ORC Phase 4 testing of Sundsberget

Preliminary laboratory testing of ore from Sundsberget was performed in 2010. The testing was limited and only six batch tests were performed. Test results indicated a similar metallurgical response to that achieved with the blends of Vinberget and Rönnbäcksnäset ores and consequently SRK considers it reasonable to apply similar nickel recovery and grade predictions to Sundsberget ore.

Further, more extensive metallurgical testing of blends containing Sundsberget material is recommended.

ORC Phase 4 Testing 2010

Further laboratory testing of the Comp 2 blend of Vinberget and Rönnbäcksnäset was performed in 2010 and demonstrated further improvements in the nickel grade – recovery relationship at lower reagent dosages.

ORC flotation test work on geometallurgical domain samples September 2013

Additional laboratory testwork was performed by ORC using optimum flotation conditions determined in the previous test work. Kinetic rate flotation testing on 22 domain samples (10 Rönnbäcksnäset, 7 Sundsberget and 5 Vinberget samples) was performed as a part of geometallurgical domaining of the deposits. Standard kinetic rate flotation tests were conducted for both rougher and 1st cleaner stages.

Ni_S grades in the samples ranged from 0.015 up to 0.172% mainly in the form of heazlewoodite and pentlandite. Arsenic content in samples ranged from 4.1 up to 323 ppm which is carried by nickel arsenides such as orcelite and nickeline.

The feed was ground to P_{80} of 50 µm. The recovery of Ni_S ranged from 60.7 up to 90.3% in the rougher stage. Nickel grades were from 0.20 up to 2.41 %. Mass recoveries ranged from 4.8 to 23.6%. The presence of floatable gangue improved the recovery of fine nickel-sulphide particles and increased the overall nickel recovery. It was noted in some tests that nickel losses occurred in the very fine fraction even when liberation was not an issue.

Stage recoveries of nickel were above 80% in the first cleaner stage tests and in many of them as high as over 95%.The grade of the first cleaner concentrates varied over a broad range, from 0.51 up to 10.6% Ni_S.

In the rougher flotation stage, the recovery of arsenic seemed to be related to the head grade but once the nickel arsenides had been floated into the rougher concentrate they could be refloated in the first cleaner stage with stage recoveries above 80%. The floatability of heazlewoodite can be regarded as good even from low head grades. Pentlandite recoveries seemed to be more related to the content of the mineral in the feed.

ORC Magnetite recovery from flotation tailings

Preliminary testwork to investigate the recovery of a magnetite concentrate was performed by Outotec in 2011. In order to avoid complications with the sulphide flotation, preliminary magnetic separation tests were performed on head samples of both Vinberget and Rönnbäcksnäset ores. Consequently, the levels of nickel, cobalt and sulphur in the magnetite concentrate were probably higher than would be expected from the testing or treatment of flotation tailings. Feed samples typically contained 5 to 6% Fe and most of the recoverable iron was in the form of magnetite.

These tests focused on low intensity magnetic separation (“LIMS”), using roughing and up to four stages of cleaning. Fine grinding was required to achieve satisfactory magnetite liberation. Preliminary results indicated 53% of the contained iron, over 90% of the magnetite, could be recovered into a low-grade iron concentrate grading 53% Fe with minimal sulphur. Further tests produced improved concentrate grades up to 60% Fe. The concentrate grade were below the 65 to 66% Fe normally required and the impurity levels (SiO_2, MgO, Cr_2O_3) were too high. Further testwork is required to investigate the improvement of both the iron grade and the reduction of impurity levels, to acceptable levels.

EMC reported that in 2011 ORC tested LIMS. A flowsheet involving various desliming and LIMS stages followed by regrinding and reverse flotation generated a magnetite concentrate of 62.4% Fe at 70% magnetite recovery. Tests performed on mini-pilot plant tailings using a flowsheet involving LIMS only with intermediary regrinding and the addition of dispersant achieved a magnetite concentrate of 66.2% Fe at 90.3% magnetite recovery.

17.2.3 Testwork conclusions and recommendations

Flowsheet

Testwork is required to finalise the optimum flowsheet for blends of the three deposits Vinberget, Rönnbäcksnäset and Sundsberget.

Using single stage milling to obtain the fine grind of 80% passing 50 µm would almost certainly overgrind gangue and Mg-bearing minerals, rendering them more floatable than they would realistically be in a production environment. This in turn would make achieving concentrate grade difficult and result in a recovery-grade trade-off leading to a lower nickel recovery. Two stage grinding (50% -75 µm and 80% - 50 µm) to reduce overgrinding of gangue minerals together with two stage flotation after primary and secondary grinding has been shown to increase nickel recovery while maintaining grade. Further flotation testwork is required.

The flowsheet based on the existing testwork includes primary crushing, primary autogenous grinding to 50% -50 µm followed by first stage rougher flotation, secondary autogenous grinding to 80% -50 µm followed by secondary rougher and rougher scavenger flotation. Combined rougher concentrate cleaning in 4-stages plus regrind, magnetite recovery from full flotation tailings including roughing and cleaning including regrind, and nickel and magnetite concentrate dewatering by thickening and filtration and tailings dewatering to a filter cake for dry stacking.

Comminution

Autogenous grinding appears to be feasible for the Project. The primary grind for flotation feed is fine, typically 80% -50 µm. This will necessitate a high grinding power requirement.

Comminution testwork on variability samples from the three deposits and blends of the different feed materials in line with the proposed mine plan is required. Testwork should include laboratory scale testing of samples to establish drop weight tests and SMC values and SAG design testing together with conventional bond work index and abrasivity tests. Fine grinding testwork should be performed. These tests should be completed after discussion with the main mill suppliers to identify specific requirements.

While two stages of autogenous grinding may be possible to achieve 80% -50 µm, it may be more energy efficient to use three stages of grinding using a vertical mill as the final stage. This will require further study and optimisation in consultation with grinding mill suppliers.

Pilot scale grinding testwork should be performed.

Flotation and dewatering

Flotation testwork to investigate the production of a high grade, predominantly heazlewoodite, nickel concentrate and a low grade, high recovery nickel concentrate should be performed for evaluation.

Following a detailed review of all testwork reports a final laboratory testwork program should be performed to finalise the metallurgical understanding of the deposit. A variability testwork program should be established to finalise the process flowsheet and to establish the process conditions and metallurgy for design. This should include:

- Kinetic tests to provide information for process simulation for nickel and gangue mineral. Prior to establishing the testwork program the simulation package should be identified to ensure that the testwork will produce the correct data for modelling.
- Reagent optimisation for the secondary mill/float stage.
- The impact of operating the 2nd and 3rd cleaners at pH 6 or whole cleaner circuit at pH 6.
- Single-stage vs. two-stage mill/flotation circuits should be evaluated at pilot plant scale for the various options including operating only the final cleaners at pH 6 and the whole cleaner circuit at pH 6.
- Large scale pilot testing of the circuit using different feed blends from the three deposits should be conducted to confirm metallurgy, the effects of recycling and reagent requirements.

Concentrate testing

Pilot testing will also produce larger samples of concentrate to be used for marketing purposes and for evaluation of particle size and properties and the potential for downstream processing options by others.

Concentrate Transportable Moisture Limit testing ("TML") should be performed for nickel and magnetite concentrates for shipping evaluation.

Magnetite recovery

It has been demonstrated that iron can be recovered to a fine-grained magnetite concentrate. Further testwork is required to optimise iron recovery, magnetite grade and process conditions. Testwork using flotation tailings of different feed blends has to be performed to confirm the magnetite grade-recovery relationship, the level of impurities, the optimum process conditions for magnetite roughing and cleaning and the regrinding requirements. A relatively large concentrate sample should be collected for product evaluation and marketing purposes.

Dewatering

Thickener and filtration tests should be performed on nickel and magnetite concentrates and on tailings.

17.2.4 Concentrate Quality

The historical testwork has demonstrated that the nickel content of the concentrate is relatively high compared to other nickel concentrates. The Ni : Fe ratio is also lower than concentrates produced predominantly from pentlandite mineralisation. Average assays from the cleaner tests performed in the phase 2 ORC tests are given in Table 17-3. It should be noted that this concentrate would be considered fairly unique amongst Ni concentrates as it has a high Ni content and very low Fe content, owing to the high percentage of Ni contained in heazlewoodite (Ni_3S_2), and would, potentially, make this concentrate attractive to smelters.

Table 17-3: Average nickel concentrate analyses from Phase 2 ORC batch tests

Sample	%Ni	%Co	%S	%Fe	%As	%MgO	$\%SiO_2$
Vinberget	26.3	1.33	19.8	13.5	0.295	12.7	19.8
Rönnbäcksnäset	36.0	0.74	16.3	3.7	0.173	13.4	16.3

Based on typical smelter terms, the high nickel grade would be attractive, but the MgO content would probably attract a penalty. Typically, nickel concentrates attract penalties at MgO levels greater than 8% and sometimes as low as 4%. The penalties are smelter dependent. Based on the results to date, it is likely that the concentrate would be penalised. The SiO_2 content is also high compared to other concentrates and may be problematical. The As content may attract a penalty depending upon the smelter treating the concentrate. Despite these concerns it may be possible that the attractiveness of the high Ni : Fe ratio will offset potential disadvantages from MgO, SiO_2, and As.

Further testwork is required to investigate the possibility of reducing these impurity levels.

17.2.5 Metallurgical Performance

General

Recovery figures relate to the Ni_S content of the mineralised material. Cobalt recovery into the nickel concentrate will be around 70%.

Overall nickel metallurgy

In general, based on the results of the batch flotation and the mini pilot tests, together with the ORC simulations, the metallurgical performance of nickel in a commercial plant should be approximately 80% recovery at an overall grade of 28% Ni.

"Two-concentrate" process metallurgy

EMC prepared a preliminary kinetic and simulation analysis of the "two-concentrate" process, assuming full and beneficial effect of depressant to improve slow floating mineral-gangue selectivity, which suggested a nickel recovery improvement of 8% at a slightly better concentrate grade. EMC stated that this is a *purely indicative model*, but it shows that the process could have potential. An upside case is an additional 4% nickel recovery at the same concentrate grade.

Magnetite metallurgy

For the purposes of the evaluation the magnetite iron recovery will be 90% to a 65 to 66% Fe, very fine grained magnetite concentrate. Further testwork is required to confirm these figures.

17.3 Processing Flowsheet

The Rönnbäcken flowsheet consists of crushing, autogenous grinding, flotation, and dewatering steps. The concentrator will have a capacity of 30 Mtpa, will operate 8,000 hours per year (91.3% availability) at a feed rate of 3,750 tph and will produce approximately 80,000 to 110,000 tpa of nickel concentrate containing 25 to 28% Ni (see production schedule Table 16-6).

The mining schedule indicates that a blend of mineralised material will be produced from the three deposits, predominantly Vinberget and Sundsberget in the first 4 to 5 years and Rönnbäcksnäset and Sundsberget in subsequent years. The Vinberget mineralised material has a slightly higher Ni grade than the other two deposits and consequently the plant feed grade will be approximately 0.116% Ni in years 1 to 5 and approximately 0.103% Ni in later years when Rönnbäcksnäset and Sundsberget material is processed.

As part of the investigation, it was requested by the Company to split the processing plant into two 15 Mtpa modules each with two parallel streams, each rated for 7.5 Mtpa throughput, to facilitate a mining production ramp-up and to phase the plant capital expenditure.

For the phased approach, the primary crusher and crushed ore stockpile will be installed for the final design tonnage. The outcome of the phased investigation was unfavourable economically, and is suggested that a phased approach should be investigated in further detailed studies. The option to locate smaller primary crushers at the different open pit locations should be investigated by further study.

17.3.1 Flowsheet outline

The flowsheet based on the existing testwork includes primary crushing, primary autogenous grinding to 50% -50 µm followed by first stage rougher flotation, secondary autogenous grinding to 80% -50 µm followed by secondary rougher and rougher scavenger flotation. Combined rougher concentrate cleaning in 4-stages plus regrind, magnetite recovery from full flotation tailings including roughing and cleaning including regrind, and nickel and magnetite concentrate dewatering by thickening and filtration and tailings dewatering to a filter cake for dry stacking.

Crushed ore will be fed from the stockpile by apron feeders onto belt conveyors to feed the grinding circuits each comprising a primary AG mill, secondary pebble mills and tertiary vertical mills. The pebble mills are fed directly from the discharge of the primary mills and pebbles will be extracted automatically from the AG mills as required.

As noted in Section 17.2.3 using single stage milling to obtain the fine grind of 80% passing 50µm would almost certainly overgrind gangue and Mg-bearing minerals. Two stage grinding (50% -75 µm and 80% - 50 µm) to reduce overgrinding of gangue minerals together with two stage flotation after primary and secondary grinding has been incorporated in the circuit.

The grinding circuit products will be classified using hydrocyclones. Hydrocyclone overflow will report by gravity, via trash screening, to rougher conditioning prior to flotation.

A dispersant will be added directly to the grinding mills, along with collector. Water will be further added to the conditioners to reach an optimal pulp density of approximately 30% solids. Sulphuric acid will be used to modify the pH. Additional reagents will be added to the flotation circuit as required.

The conditioned slurry will be pumped to rougher flotation consisting of several 500 m^3 flotation cells. Flotation tailings will be pumped to the tailings paste thickeners, located at the tailings pond site.

The rougher concentrate, approximately 5% to 10% by weight of the feed, will be pumped to the concentrate regrind circuit from where it will be pumped to a four stage cleaner flotation circuit consisting of 200 m^3 , 100 m^3, 50 m^3 and 10 m^3 flotation cells.

A final nickel concentrate grading approximately 28% Ni will be produced. The Ni-con will be quite fine, typically 50 to 60 µm with a moisture content of 10-15%.

The final concentrate will be pumped to two concentrate thickeners from where it will be pumped to a single concentrate holding tank. The concentrate will be dewatered in two pressure filters. The filter cake will report to a concentrate loading system for bulk shipping by truck.

Magnetite will be recovered from the flotation tailings using conventional low intensity magnetic separation. Limited magnetite recovery testwork has been performed but it is likely that the concentrate will be extremely fine, typically 20 to 30 µm, with a final filtered moisture content of 10-15%.

Final tailings will be thickened and filtered for dry stacking in the tailings management facility. Thickener overflow will be recycled back to the plant, primarily to the grinding circuit.

SRK considers the flowsheet to be a conventional flotation concentrator utilising the accepted Scandinavian autogenous style grinding circuit configuration. All equipment would be large but proven.

The plant throughput is large and while 500 m^3 flotation cells have been included, larger cells should be considered during the feasibility study.

17.3.2 Concentrate production

The nominal concentrate production, based on mass yield is shown in Table 17-4.

Table 17-4: Nominal concentrate tonnages

Item	Quantity
Throughput (Mtpa)	30
Ni concentrate (tpa)	105,000
Fe concentrate (tpa)	1,500,000

17.3.3 Flowsheet options

The testwork has indicated that a fine grind is required for nickel flotation which necessitates a large grinding power requirement. Further testwork to optimise the primary grind size, the impact on rougher flotation and the rougher concentrate regrinding and cleaner flotation should be undertaken.

Preliminary indications from simulation of the two-stage mill/float – mill/float option has indicated that increased nickel recovery may be possible by reducing overgrinding of fast floating gangue minerals; this needs further testwork to confirm.

Further testwork and study are required to determine whether two stage or three stage grinding is required.

The flotation cells incorporated are conventional cylindrical cells. Alternative cell types (such as Woodgrove), requiring less power, should be evaluated during the PFS.

The testwork, ORC tests (report 12046-ORC-T, suggested that it should be possible to produce two separate nickel concentrates, a high-grade concentrate containing 46% Ni and 6% MgO and a low-grade concentrate containing 12% Ni and 34% MgO. These would represent 56% and 44% of the recovered nickel. Other splits of the concentrate grades should be possible. Investigation of this concept was also recommended by EMC in the testwork review and suggested that a significant improvement in overall nickel recovery might be possible. The evaluation was purely indicative but shows that the process could have potential and EMC recommended additional testwork should be performed to prove the concept and to establish nickel recoveries and concentrate grades and the level of impurities in both concentrates. The production of the low-grade concentrate, containing a high level of MgO, would necessitate an evaluation of downstream processing options including concentrate leaching and the potential for marketing this type of concentrate. This should include the possibility of adding the low-grade concentrate to existing plant feeds for existing pressure leaching and heap leaching operations in the region.

The metallurgical testwork has not considered the differential flotation of heazlewoodite and pentlandite. The metallurgical testwork for the Crawford nickel project, referenced in Section 21.1.2, has demonstrated the possibility of separating fast floating heazlewoodite from slower floating pentlandite to produce a high nickel grade, low iron heazlewoodite concentrate and a low nickel grade, predominantly pentlandite, concentrate; this should be investigated in further detail in future studies.

Additional testing is required to evaluate the magnetite recovery. The flowsheet for this part of the circuit has still to be established.

17.4 Processing Plant Location and Layout

In previous studies, the processing plant site location was selected to be in close proximity to the Rönnbäcksnäset deposit and the planned tailings management facility.

This was chosen to utilize the natural topography of the area. The proposed location would be suitable for the size of the plant and would allow for a conventional flow of material from the crusher to milling and to flotation, and finally to the concentrate handling and tailings handling parts of the plant.

No further engineering studies have been performed since the 2011 PEA to optimise the location of the plant relative to the three open pit developments or the proposed staged development of the deposits.

17.5 Plant Workforce

SRK estimates from other similar scale projects, total of approximately 100 to 120 people would be required for operating the plant. This includes engineers, mechanics, operators, labourers, laboratory technicians and management/supervisors.

17.6 Risks and Opportunities

17.6.1 Risks

The recovery figures for nickel are based on process metallurgical modelling by EMC and include plant scale simulations including recycle streams. These results are considered reasonable but have not been achieved directly in the testing performed to date.

A fine grind is required for recovery of nickel sulphides and consequently the power requirements will be high. The Project will be susceptible to increases in energy costs.

The testwork has demonstrated that iron can be recovered from flotation tailings into a magnetite concentrate but insufficient testing has been performed to confirm the metallurgy. The reduction of impurities in the concentrate may reduce the iron recovery. Provided that the impurity levels are within accepted norms it may still be necessary to reduce the grade to maintain an acceptable recovery.

The fineness of the magnetite concentrate may be problematical for downstream processing (by others) and may restrict the marketing opportunities for this material.

The production of a high- and low-grade concentrate appears feasible. The evaluations have indicated that the low-grade concentrate will contain significant impurities that might restrict the downstream processing options (by others). Further metallurgical testwork is required to try and improve the low-grade concentrate quality.

17.6.2 Opportunities

Further metallurgical testwork and optimisation may improve the nickel recoveries to concentrate. Preliminary indications from simulation of the two-stage mill/float – mill/float option has indicated that increased nickel recovery may be possible by reducing overgrinding of fast floating gangue minerals. The use of three stage milling to achieve the fine grind for flotation may reduce the grinding power slightly which will reduce the operating costs.

The use of new flotation technologies may reduce the power required for this part of the plant. This assumes that suitably sized equipment for the large throughput is available.

Treatment of the low-grade nickel concentrate by existing leach operations in the region should be investigated; this would require additional testwork.

18 PROJECT INFRASTRUCTURE

The current vision of the Project comprises:

- Rönnbäcken site where open pit mining and processing is to be undertaken;
- dedicated access road ("Project Road") to a rail load-out facility at Storuman; and
- product logistics system (to point of sale) utilising national road and rail infrastructure.

The overall regional project infrastructure layout is presented in Figure 18-2 with the site layout in Figure 18-1. Buildings and installations, utilities connections, and power are required to support the mining and processing operations, which is described in this section. Site-wide water management is covered within the water management section (Section 18.11). Processing plant (including all support infrastructure within the fence line) and tailings and waste management are covered in separate Sections 18.9 and 18.10.

18.1 Workforce

SRK estimates from other similar scale projects, total of approximately 75 to 100 people would be required for operating the logistics and infrastructure elements of the Project. This includes engineers, mechanics, operators, labourers and management/supervisors.

18.2 Regional Infrastructure

18.2.1 Location

The Project is located in Storuman Municipality, Västerbotten County. The Project lies approximately 110 km northwest of Storuman and 310 km from the Swedish east coast, and 40 km southwest of the border with Norway. Storuman has a population of around 2,200 (2010 census). The Project is close to the NE-SW trending European route E12 and the NW-SE trending "Inland Railway Line" (Swedish: *Inlandsbanen*), which intersect at Storuman.

18.2.2 National Roads

The European route E12 (Mo i Rana, Norway, to Umeå, Sweden), passes the Project to the north, and is a two-way single lane carriageway. Current access to site is via this road and a smaller "Lövlund road" after around 15 km from the intersection with the E12. There are a number of other non-metalled gravel roads around the property.

18.2.3 Railways

The nearest national rail is at Storuman where the Inland Railway Line passes. This line is a standard gauge line, 1,288 km in length, which extends between Kristinehamn (south) and Gällivare (north). The line is not electrified, and the permitted axle load is 20 t. The line is owned by the Swedish State and currently operated by Inlandsbanan AB.

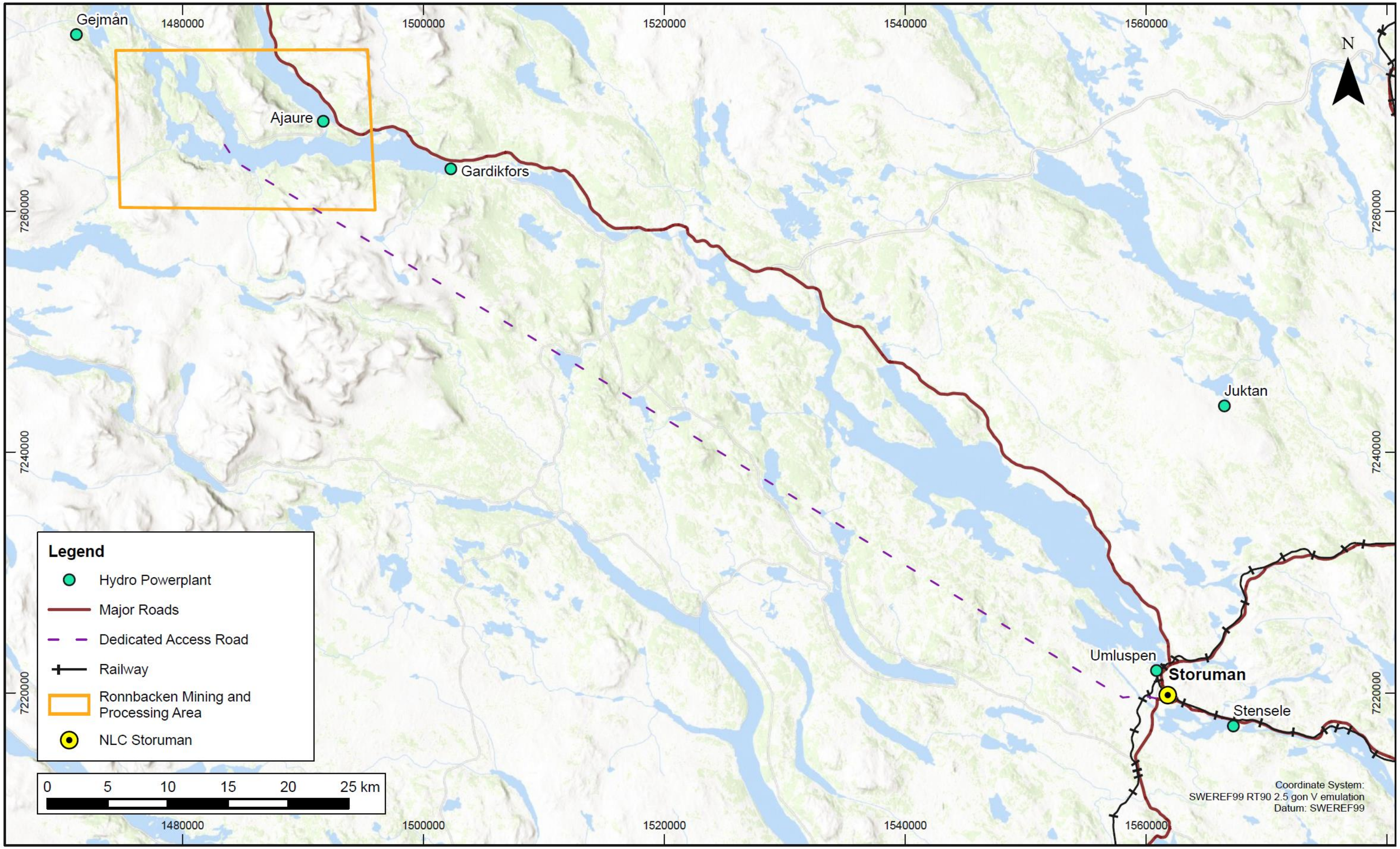


Figure 18-1: Regional infrastructure

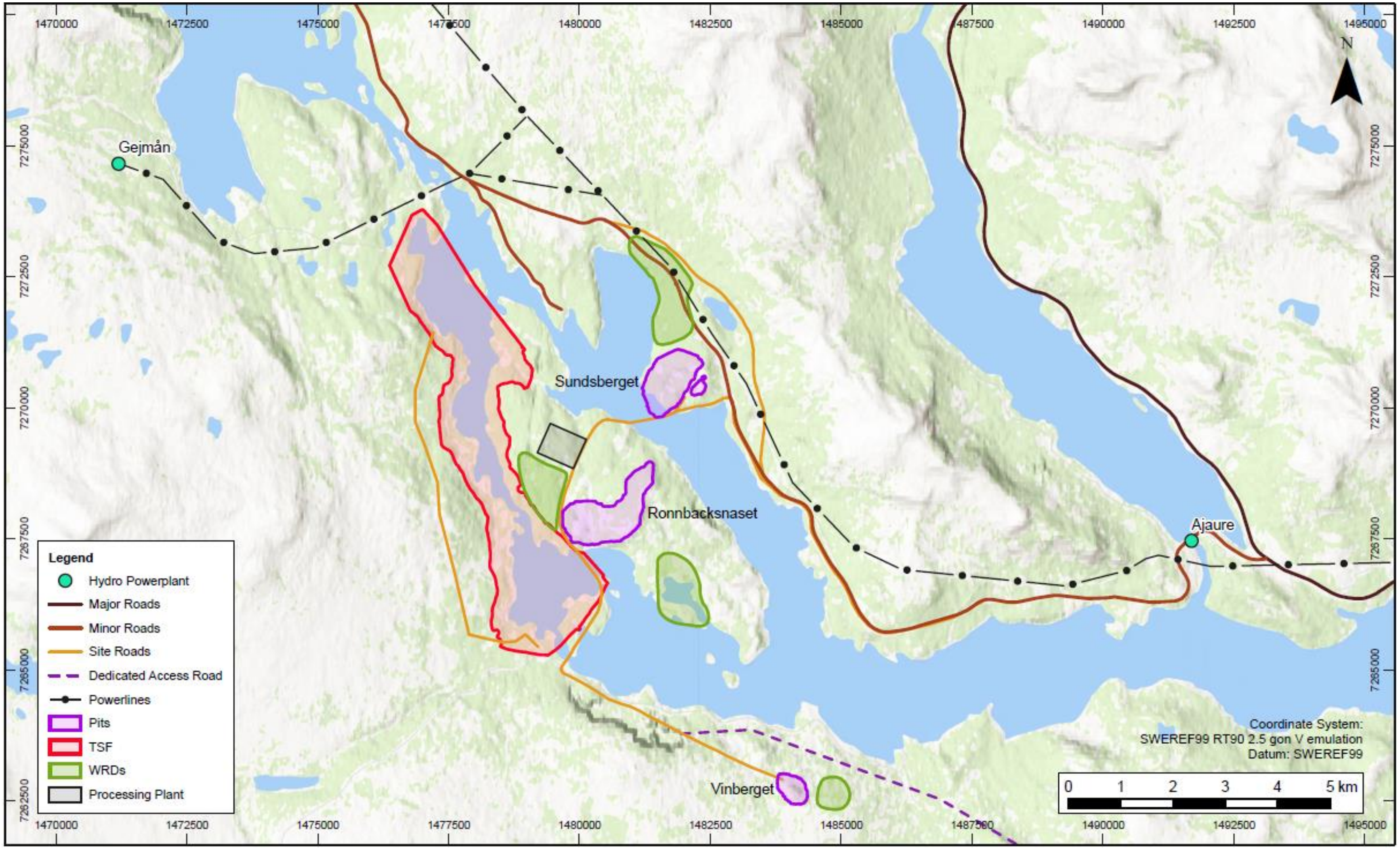


Figure 18-2: Local infrastructure

As well as Storuman railway station, a bulk rail terminal, constructed in 2012, is located around 1 km to the southeast of Storuman town and is known as the "Nordic Logistic Center in Storuman"[18] ("NLC Storuman") (Figure 18-3). At present, the rail terminal primarily handles timber but there is land and potential for other bulk commodities to be handled. The terminal is operated by ILC Storuman AB. NLC Storuman is serviced by Green Cargo freight and Hector Rail AB. The bulk rail terminal lies on a spur from the Inland Railway Line which eventually reaches Vännäs, where the line splits and a spur heads east to Umeå or to the south. This line appears to mainly be a passenger line with trains running between Umeå and Lycksele operated by Norrtåg, and with some limited freight traffic in the southern portion.

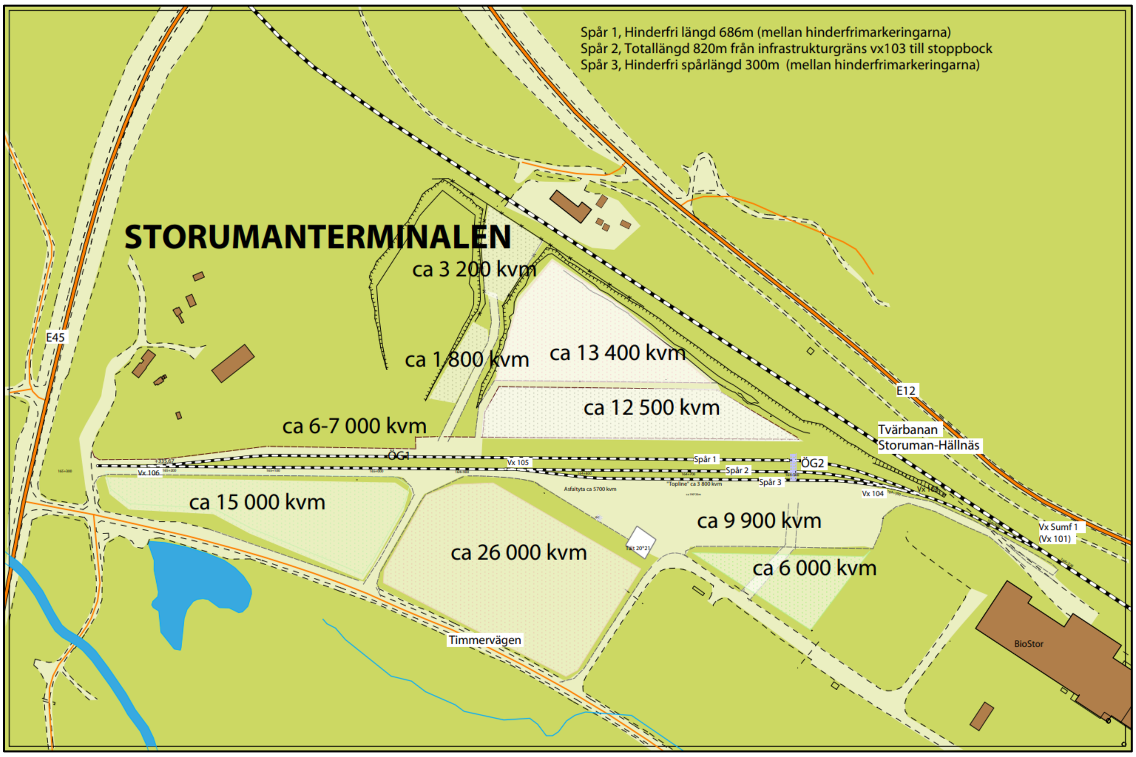


Figure 18-3: Storuman Rail Terminal (storumanterminalen.se, accessed 04/01/2022)

18.2.4 Ports

There are three proximal ports, all accessible by road: Mo i Rana (Norway), Skelleftehamn (Sweden, east coast), and Umeå (Sweden, east coast).

[18]NLS Storuman: A5_Engelsk_1811_webb.pdf (storumanterminalen.se)

Port of Umeå: Umeå is situated on the Gulf of Bothnia with access to the Baltic Sea and connection to the Atlantic Ocean through the Öresund Strait (also referred to as the Øresund Sound), between Sweden and Denmark. Umeå is 375 km by road from Rönnbäcken. The port of Umeå is an integrated part of Nordic Logistic Center. It is one of the largest ports in northern Scandinavia with an annual freight volume of 2.4 Mt[19]. Container volumes are in the order of 40,000 “twenty-foot equivalent unit” containers (“TEU”) annually. The port is strategically located on the naturally shortest route across the Northern Bothnian Sea and has good connections to Finland, the continent, and the UK. Umeå harbour is a year-round port with good conditions during the winter period. There is a large outdoor laydown with rail access and also indoor storage warehouses.

Port of Mo i Rana: Located at the head of Rana fjord, Mo i Rana is a deep-water harbour with four terminals, three of which are owned and built specially for the heavy industry. The fourth quay is the Town Quay (Norwegian: *Toraneskaia*) operated by the port authority together with the Bulk Terminal. In 2001 a new container terminal was completed. Mo i Rana offers an ice-free harbour all year round and is 142 km by road from Rönnbäcken.

Port of Skelleftehamn: An alternative shipping point on the Gulf of Bothnia is Skelleftehamn (to the southeast of the city of Skellefteå), which is approximately the same distance by road, 387 km, as to Umeå and handing a similar amount of cargo.

18.2.5 Power

The Swedish electricity market is integrated with those of the other Nordic countries. The strong transmission connections between the four Nordic countries ensures high reliability. The price for electricity is established by Nord Pool, the Nordic power exchange, in an open competitive marketplace. The spot price fluctuates according to seasonal demand and business cycles. For large industrial consumers, long-term prices can be negotiated with the power companies.

The area is crossed by a number of local and regional powerlines. The Project lies adjacent to the Ajaure hydroelectric power plant, which is situated in the upper part of the River Umeå, about 12 km from the Project. The Ajaure power plant is owned and operated by Vattenfall[20] and is understood to have a capacity of 80 MWe. Vattenfall has two other hydroelectric power plants within 20 km of the project, Gardikfors (60 MWe) and Gejmån / Abelvattnet (65 MWe combined).

The area is serviced by 220 kV overhead lines, 40 kV overhead lines as well as local 10-20 kV lines.

18.3 Bulk Power Supply

18.3.1 Supply Strategy

The Project will be connected to the Swedish National grid system via new grid connection to the regional 220 kV transmission grid to which the Ajaure hydro-powerplant main substation is connected. A high voltage transmission line(s) and Project substation will be constructed.

[19] Umeå port: www.kvarkenports.com/umea
[20] Ajaure hydroelectric dam: powerplants.vattenfall.com/ajaure/

18.3.2 Concept Overview

The following is anticipated, which will be studied in more detail at Prefeasibility study ("PFS") level:

- Connection at the nearest substation on the 220 kV grid considered to be near the Ajaure hydro-powerplant.
- Double circuit transmission line to the project site 130 kV or 220 kV depending on the distance.
- Project main substation where the voltage is stepped down to site distribution voltage or suitable voltage for the major plant equipment (<20kV, for example).
- Consumer substations (such as the plant substation at the plant fence line, and around the site) receiving power at site distribution voltage.
- Back-up power generation system will be needed to provide power in the event of an outage. The system would maintain power to critical health and safety systems and to allow the safe shut down of the plant.
- The area falls under power pricing area SE2, where power is mainly generated by hydro powerplants. The Project envisages receiving power from the nearby hydro powerplants with additional needs imported via the grid also via "green tariff".

18.3.3 Power Demand

The current processing of Rönnbäcken material envisages a very fine grind that will be very power intensive. The maximum power demand is currently estimated at 200 MW with a continuous load of 166 MW. The power demand does not currently take recharging for electric vehicles into account; this needs further study as part of the PFS.

18.3.4 Power Infrastructure

The following infrastructure is assumed for the PEA:

- connection point on the 220 kV grid 15 km from the project main substation;
- two 130 kV overhead transmission lines with total capacity of 200 MW;
- Project main 130/20/0.4 kV substation with a reserve "N+1" transformer; and
- distribution at 20 kV to consumer substations around the site where the voltage is transformed to either low voltage or a medium voltage appropriate for the equipment.

Design and construction work for the main connection is likely to be completed by a Power Engineering Contractor certified to work on the Swedish National grid system at the cost of the Company. Once constructed, ownership of the new grid infrastructure will be transferred to the Svenska kraftnät (national electricity transmission grid operator) for operation and maintenance. Any works required to reinforce the nearby 220 kV system to meet the demands of the project would be undertaken by the Swedish National grid. The design and construction of the power distribution network around the site will be the responsibility of the Project owner.

18.3.5 Cost of Power

Nuclear power and hydropower are the main sources of electricity generation in Sweden (as of 2021: nuclear 31%, hydroelectric 43% and wind 17%). Sweden is part of the Nordic electricity market, which is a common market for electricity in the Nordic countries, where energy is traded on a number of trading indexes (such as NASDAQ). Sweden is divided into four bidding areas and Rönnbäcken is within bidding area SE2. Prices were very low during 2020, and higher pricing was seen in 2021 and 2022, which was more in line with pre-2020. A power unit cost of US¢ 6.6 per kWh has been used and this is based on a recent benchmark. The value aligns to expectations from recent average wholesale prices over the last five years when including for add on costs such as transmission, tax, and other levies. Energy is a significant operating cost and an up-to-date tariff and unit cost per kWh should be established in more detail by the Company during future studies.

18.4 Bulk Water Supply

Water will be abstracted from the adjacent lake system via the pit dewatering systems and dedicated pumping station(s). The plant will be designed to recycle as much water as possible with primary losses due to evaporation, tailings and to concentrates. This aspect of the Project is covered in the water management section (Section 18.11). Potable and drinking water will be produced on site via a packaged water treatment plant.

18.5 On-Site Infrastructure & Utilities

18.5.1 Overview

Buildings and installations are required to support the processing, mining, and logistics operations. These facilities are positioned within independently fenced areas according to function:

- in addition to the plant and process buildings, within the plant fence line will be the plant offices, fixed plant workshop, warehouses, distribution systems etc;
- a mine maintenance area will contain mobile equipment workshops and the related infrastructure to support mining operations; and
- general project facilities for management, general site maintenance, and other centralised functions.

Buildings will be pre-engineered steel portal framed or column and beam style buildings with insulated panel roofs and cladding and with all necessary internal electrical, piping, fixtures and fittings, and architectural details. It's likely that some auxiliary buildings will be prefabricated and pre-fitted, modular, or converted container style buildings. The Project will seek to employ the low carbon and carbon neutral construction techniques ("green steel") available at the time.

18.5.2 Project general facilities area

The Project facilities area provides services to all mining, processing, and auxiliary operations. They consist of the following:

- gatehouse and weighbridge(s);
- administration building, including offices (for administrative functions), technical services offices, stores, training, security offices, first aid;

- change-house and ablutions;
- facilities maintenance building;
- canteen and dining area; and
- centralised heating and hot water plant.

Related to the concentrate transport and logistics, there will also be a logistics base with truck parking and vehicle recharging area.

18.5.3 Processing plant support area

The processing plant requires the following infrastructure, which is integrated within the plant compound and considered within the plant cost:

- buildings that house the processing equipment and materials handling;
- control rooms;
- consumables and reagents day storage;
- plant workshop (for fixed plant), spares warehousing, and laydown area;
- laboratory;
- reticulation of services within the compound (electricity, water, compressed air, etc); and
- raw and return water ponds and water treatment (receiving from all infrastructure areas).

The area will be independently fenced and secured to manage ingress / egress. Within the plant site will be the concentrates storage and loading area.

18.5.4 Mine maintenance area

The Mine Maintenance Area ("MMA") is a separate compound to service and maintain the open pit mining and waste dump operations. The MMA will be constructed by the Project and can be used either under an owner operator strategy or for Contractor Mining. The following buildings and installations will be constructed:

- mining office;
- mining heavy equipment and light vehicles Workshop with integrated tyre change / tyre storage area;
- mining warehouse;
- vehicle wash including raw water tanks & dispensing;
- storage & dispensing (self-bunded containerised tanks);
- external laydown and parking;
- waste collection and recycling area (scrap, oils, tyres, etc);
- surface water management and collection for contact run-off; and
- reticulation of services within the compound (electricity, water, compressed air, etc).

The mining equipment workshop will have multiple bays and be a pre-engineered structural steel-clad building and include machine shop and welding bay. All required maintenance, including major overhaul, is anticipated to be undertaken on site. The area will be independently fenced and secured to manage ingress / egress of materials and personnel.

SRK notes the MMA noted above does not include electric vehicles recharging facilities; this needs further study as part of the PFS.

18.5.5 Accommodation block

A total workforce of circa 550 people are estimated to cover two 12-hour shifts. This excludes those outsourced components such as magnetite concentrate ("Fe-con") haulage, NLC Storuman operations and any rail operations.

The town of Storuman is around a 1-hour drive and as such, around 30% of the workforce is likely to be resident in the local area and thus an accommodation block is required for 75% of the workforce. The accommodation block and shift rota would be designed to optimise capacity and so the total capacity is currently envisaged as circa 360 beds. The accommodation block would include laundry, accommodation office, first aid centre, recreational facilities, kitchen, and canteen.

18.5.6 Site wide utilities

The following site wide utilities and services are required, which will originate from centralised facilities and be distributed to the fence line of each area:

- MV / LV electrical distribution (power plant to compound fence lines and consumer substations);
- heating and hot water production and distribution;
- area lighting: roads and general areas;
- potable water storage and reticulation (e.g. for ablutions, kitchen, dining);
- raw water storage and reticulation from the main raw water tank (fire water, vehicle washing, dust suppression – note that process water storage and recycling are within the plant compound);
- fire water reticulation to fire water tanks in plant, compounds, and areas;
- stormwater / surface water management and pollution control;
- sewerage and wastewater reticulation and treatment;
- IT, communications, telephone; and
- security systems (including front gate), alarm, CCTV, and movement detection systems.

Within the infrastructure areas and compounds, the utilities connections from the fence line to individual installations and buildings are assumed within the individual costs.

18.6 Access Road / Haul Road

Access and logistics for both the construction phase and for Fe-con transport will be a very "visible" component of the project and a cost factor. Nickel concentrate ("Ni-con") transport is considered less "visible" due to the relatively low annual tonnages. A review of transportation options for the Fe-con specifically was undertaken including potential costs. As a result the option to build a dedicated access road, which could also be used for concentrates transport, was selected, and is described here. In the early stages of project construction, access for early works will be via the existing site access from the E12 national road.

18.6.1 Review of transport options

Objective

The high-level review of transport options for Fe-con was undertaken into order to provide commentary with regards to the challenges and constraints therein, and to assist in how the Project concept is developed.

Quantities

Table 18-1 is based on feedback from mining and processing for immediate ramp up to 30 Mtpa, the final concentrate production is achieved through a four year ramp up period.

Table 18-1: Quantities per product (wet tonnes)

Concentrate production	Tonnes (Mtpa)
Ni-con (kt)	988.4
Fe-con (kt)	1,650

Transport of Ni Concentrate

A suitable solution for Ni-con transport will be to load to bulk bags (0.5-1 t), and transport these in TEU loaded onto trucks for export via a nearby port (see Section 18.2.4) or rehandled to rail at Storuman. It is envisaged that in the future, hybrid electric, battery electric or hydrogen powered trucks will be used. As stated above, no additional costs associated with recharging facilities or additional power requirements have been included at this stage; this needs further study as part of the PFS.

Magnetite Concentrate Transport Options

Transport of Fe-con has much higher tonnages. Figure 18-4 shows the location of the Project in relation to Storuman, Mo i Rana, the national road (E12), and the nearest railhead at Storuman, as well as the lake and river system between the Project area and Storuman.

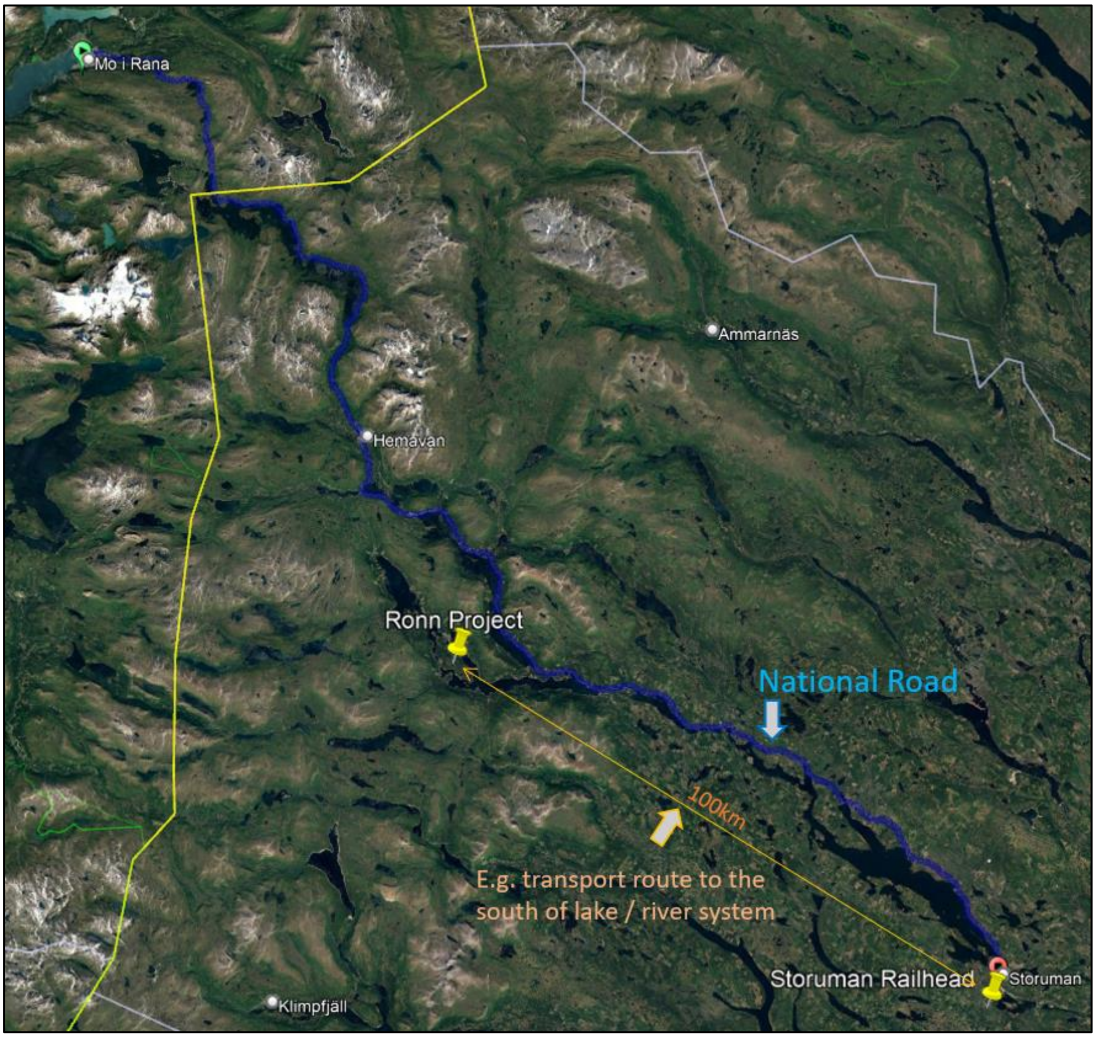


Figure 18-4: Location of Project in relation to nearest coastline and railway (Source: GoogleEarth, 2021)

As part of the PEA, SRK considered the following transport options :

- truck haulage: existing national roads to Mo i Rana / Storuman;
- truck haulage: dedicated project access / haul road to Storuman;
- railway spur to Storuman;
- conveyor options (overland troughing belt, pipe, aerial ropeway, aerial conveyor) to Storuman; and
- slurry pipeline to Storuman.

With the exception of the first option, these options are considered only for transport to Storuman. None is considered suitable for reaching Mo i Rana given the terrain, greater distance, reindeer herding routes, border crossing, other major land uses between the Project and Mo i Rana, and thus capital cost and development constraints will be higher compared to Storuman.

Discussion of Options

While there may be potential to haul Fe-con on the E12 road in the "early" years (when volumes are low and shielded by construction traffic), subject to traffic analysis and ESIA for permitting, as a long-term solution irrespective of whether trucks are powered by a combustion engine, battery electric, or hydrogen fuel cells, this is likely to be difficult. This is due to the high number of truck passes per hour, which is likely to reach eighteen truck passes per hour for Fe-con haulage alone assuming a 40 t payload, 16 hours per day operation, and a single destination. SRK considers this an unlikely option due the numerous impacts to be considered in addition to traffic volumes such as noise, vibration, dust, safety, speed, etc.

An alternative is to construct a *dedicated* haul road to Storuman on the south side of the lake / river system. Here, the population density is less than on the north side meaning 24 hour-a-day operation may be possible and the road could be built to support high tonnage trucks (50 t and possibly higher 60 t), which would reduce traffic, but would result in higher end of specifications impacting costs (such as geometry criteria and pavement design). This road could then also be used as an access road for construction and consumables import to reduce impact on the existing national road and the also for consumables import. The traffic may still impact reindeer herding routes (in particular) and also other human activities (including tourism, hunting and foraging).

A railway spur from the Inland Railway Line could be built to reach the Project. The alignment is envisaged to run along the south side of the lake system. A route has yet to be determined but it seems plausible a route could be found, certainly as far as Forsmark. For rail operations, haulage units / locomotives and wagons would be provided by an operator under contract and tariff paid. Line maintenance would also be outsourced. There could be the opportunity in the future to electrify the line.

Four conveyor technology options were also assessed:

- overland troughing belt conveyor (ground bearing, fully covered, winterised);
- overland pipe / tube conveyor (ground bearing, winterised);
- aerial ropeway; and
- aerial conveyor.

Overland belt or pipe conveyors to Storuman are considered viable options although these would be some of the longest conveyors in the world. An envisaged route would follow an existing powerline, which traces from Forsmark to Storuman. A key challenge for both options would be to mitigate the construction of an approximately100 km long ground bearing structure which would form a "barrier" for reindeer (among other animal) movements. A second challenge for the pipe conveyor option specifically is the designing of a single conveyor to cope with the range of production rates in a ramp-up scenario (not currently being considered). The capital cost for these conveyor options will be high and for a relatively small capacity.

Due to the fine size fraction of the Fe-con, the aerial options are not considered as reasonable due to the impracticalities of fully enclosing and preventing of dust / losses. The capital cost is likely to be higher than for rail or ground bearing conveyors; however, the operating cost is unlikely to be materially lower than for the ground bearing conveyors.

Other options including a "slurry pipeline" were discounted on the basis of high capital cost, inability to cope with incremental increase in throughput, requirement to dewater, filter and dry at Storuman, and heating and winterisation of the pipeline. River barging of concentrate along sections of the river and lake network is not a viable option due to the freezing temperatures during winter.

A more detailed review of the available decarbonisation strategies is provided in Section 20.4.6

Estimated Costs

Based on high-level benchmarking review to inform a preferred option for inclusion in a PEA for the Project:

The lowest capital cost solution for export of the Fe-con is a dedicated haul road between the Project site and a dedicated warehouse and railway loading siding at Storuman, which is estimated in the range of USD 100 M. All other options are upwards of USD 260 M, with the conveyor options being considerably more.

Benchmark operating costs (USD/t/km) show the trucking option to be three to four times higher (as expected) than the railway or conveyor options.

The results of a "cost analysis" comparing capital, sustaining capital and operating costs for each option over a 20-year period for the "immediate ramp" option indicated the haul road gives the lowest cumulative cost on both a discounted (and undiscounted) basis (Table 18-2) with the railway option being the second lowest. Although the cost per tonne for the road haulage is much lower than for the other options, the tonnages transported are relatively low.

Table 18-2: Results of order of magnitude level cost analysis(*1)

Option	Total Cumulative Cost – Discounted (USDM) (*2)	Total Cumulative Cost – Undiscounted (USDM) (*2)
Haul Road (*1)	220	500
Railway (*2)	325	585
Conveyors	400	732
Aerial (*3)	445	830

*(*1) assumptions: two-year initial construction period until first production; 10% discount rate; capital cost for conveyors and rail applied in year 2 and 3 and commissioned ready for year 4; diesel trucks. (*2) cumulative of total capital, sustaining capital and operating costs over a 20-year period.*

18.6.2 Design overview

Construction - Initial Phase

In the early stages of project construction, access for early works will be via the existing site access from the E12 national road. This will be an upgrade to the existing 15 km section of local road, which crosses the Ajaure hydroelectric power plant, to achieve a width of at least 7.5 m (excluding verges) and a suitable pavement. It is very likely, although unconfirmed, that axle load / gross vehicle weights will be restricted when crossing the hydroelectric dam.

Construction – Main Phase

The dedicated access road will be built to facilitate construction traffic, including import of major equipment and the first two years of concentrate transport using 40 t payload on-highway trucks.

Operation – Main Phase

Once construction is finished and the Project production rate has ramped up to 30 Mtpa, the final road surfacing will be finished to support increased payload trucks and road trains (≥50 t upwards).

18.6.3 Route and alignment

A preferred horizontal alignment (routing) will be determined at PFS stage. For this study, a selection of different route options has been considered in order to develop a basis for the cost. The total distance ranges from 97 km (shortest) to 115 km (longest) between the southern end of the project area and the existing NLC Storuman railhead. Utilising the NLC Storuman railhead rather than constructing a dedicated railhead adds around 4 km which includes a rail and main road crossing. Accessing the Project will require either a causeway across a typically shallow section of lake or two bridges crossing across the river immediately south of the Ajaure hydroelectric power plant dam and just north of Forsmark.

The vertical alignment will be important given high-capacity truck and trailer combinations are targeted and constraint on gradient will impact the horizontal alignment and costs. Considered routings are cognisant of and where possible:

- avoiding areas of population or lake shores;
- aligning to existing access tracks and roads;
- aligning to the existing powerline where gradients permit;
- targeting areas where the existing average gradients are <5% or a limiting gradient of 5% should be achievable with reasonable earthworks construction (significant earthwork cuttings and earthwork embankments will necessary); and
- minimising or avoiding water courses and other transport crossings.

Maintaining control on gradients will be key to providing a suitable road alignment for high-capacity truck and trailer combinations.

18.6.4 Traffic / Vehicles

Construction phase traffic will be estimated at Prefeasibility or Feasibility Study stage; however, typical on-highway style vehicles are expected. The current estimated traffic volumes for Fe-con traffic are presented in Table 18-3.

Ni-con traffic will only slightly increase the overall traffic flows. Daily, weekly and monthly deliveries of consumables and other supplies will increase traffic. If the majority of deliveries arrive by rail and are first be delivered to an external warehouse at Storuman, then potentially some concentrate haulage lorries could "back-haul" consumables and supplies.

Table 18-3: Estimated Fe-con traffic increases as the project ramps up to full production based on 24/7 on a dedicated haul road for 40t and 50t trucks

Production Rates	7.5 Mpta	15.0 Mpta	22.5 Mpta	30 Mpta
000's con per annum	450	860	1,250	1,650
000's per day	1.4	2.8	4.2	5.6
40 t payload trucks				
Trucks per day carrying **40 t**	31	61	91	121
Trucks departing per hour departing	1	3	4	5
Trucks passes per hour (no.)	3	5	8	10
Truck Passing every (mins):	23	12	8	6
50 t payload trucks				
Trucks per day carrying **50 t**	25	49	73	97
Trucks departing per hour departing	1.0	2.0	3.0	4.0
Trucks passes per hour (no.)	2.1	4.1	6.1	8.1
Truck Passing every (mins):	29	15	10	7

18.6.5 Road geometry

The following road geometry (cross section) is envisaged, which is subject to future investigations and design:

- two 3.75 m wide running lanes with a 2.5% cross fall from centre;
- 1 m road verges;
- cutting slopes ranging from 1V:2H in geotechnical soils and 3V:1H in competent rock;
- earthwork embankment slopes 1V:2H; and
- 1 m deep, 2 m wide longitudinal drains running either side (or up-gradient side on cross slope sections).

18.6.6 Earthworks and pavement

Prior to bulk earthworks construction, the road width will be cleared, and topsoil carefully excavated and removed to topsoil storage areas for later reclamation works.

The volumes for bulk earthwork cut and fill will be determined during a later stage of study. While significant earthwork cuttings and earthwork embankments will necessary, much of the road intersects gradually undulating topography.

For the purposes of the study, the total pavement thickness is estimated at between 300 mm and 450 mm assuming a subgrade CBR of 10-15%.

18.6.7 Drainage and culverts

The pavement itself will be cambered to promote run-off to the verges. Longitudinal v-drains will run the length of the road to aid drainage of the road pavement. Culverts will be constructed at specified locations to ensure cross flows are managed and maintained.

18.6.8 Structures

The eventual routing will determine the number of significant structures (road, rail crossings, causeways, bridges, etc). There are likely to between one and five major structures depending on the route alignment.

Near the Project, the road either needs to cross the lake once *or* cross the Ajaure and Gardikfors dams north of Forsmark. The lake crossing would be a culverted causeway (800 m to 1500 m in length) where the water depth is known to be relatively shallow. The crossings of the Ajaure and Gardikfors dams would be concrete or steel structures downstream of the embankment structures (on the assumption that these embankment structures are not currently designed to cope with the traffic and upgrade, or modification of these structures is not deemed sensible).

If the existing NLC Storuman railhead is utilised, near to Storuman a rail and national road overpass / underpass would be needed.

18.6.9 Road / Winter maintenance

Road maintenance will include regular inspections of all assets. Repairs to road surfaces, structures and earthworks will be required. In winter, the road will be requiring ploughing and upkeep. All vehicles and trailers will have studded tyres in accordance with national laws.

18.7 Rail Logistics Facility

18.7.1 Basis / Objective

A railhead and logistics facility ("rail logistics facility") near to Storuman is proposed. The objective of the facility would be:

- receive by rail, store, and distribute incoming consumables to the project site (tyres, fuel, spares empty containers, and plant consumables such as grinding media and reagents);
- receive Fe-con, storage as required, and rail wagon loading for onward logistics to off-takers; and
- receive Ni-concentrate in containers and rehandle to rail wagons if required.

The railhead and logistics facility could be used during construction as well as operations.

The benefits would be the optimisation and better management of logistics operations in terms of cost and environment (such as, more goods arriving by rail, opportunity to marshal goods and optimise loads and deliveries, opportunity backhaul imports on product haulage trucks, etc).

18.7.2 Construction options

The Project has two options relating to rail logistics construction:

- build, own and operate a dedicated project logistics facility (herein termed the "PLF"); or
- utilise the third party "NLC Storuman" facility under contract.

The build, own and operate option will likely have an impact capital on cost but lower life of mine operating costs compared to the NLC Storuman option. The Project footprint would overall be larger for the NLC Storuman option as a slightly longer road is needed. The NLC Storuman option would very likely also mean enlargement of the existing facility to cope with the increased freight traffic and requirement to handle different commodities / cargo; however, this would be an expansion of an existing facility rather than a "greenfield" construction.

18.7.3 Infrastructure / Concept

The required infrastructure for either option is described in Table 18-4.

Table 18-4: Construction scope

Scope	Owner Facility	NLC Storuman
Railway infrastructure		
Mainline connection	New	Already in place
Spur (track and formation)	Required	Possible investment in new dedicated spur and siding
Sidings (track and formation)	Required	Possible investment in new siding to cope with demand
Signalling	Required	Already in place
Shunting locomotive	To be purchased	Already in place
Stockpiles / export area		
Truck unloading building	Required	Required as "unique" operation
Storage for Fe-con	Required	Required as "unique" operation
Rail wagon loading building	Required	Required as "unique" operation
Container Handling area (Ni-con)	New laydown area and reach-stacker	Potentially, existing areas could be used. Equipment in place.
Laydown / import area		
Arrivals – Rail	Rail infrastructure needed	Connection already in place
Arrivals – Road	A road link to the main highway would be needed	Connection already in place
Open laydown	New laydown area	Potentially, existing areas could be used
Covered warehouse	New building	Given the freight requirements, a new building would be required
General Facilities		
Earthworks and land clearance	Required	Less Required
Site Roads	New network	Extend existing
Offices	Offices and support infrastructure required	Expand existing (if required)
Utilities	New network	Extend existing
Communications / security etc.	New networks	Expand existing

18.8 Product Logistics

18.8.1 Concentrate

The Ni-con is fine material at nominally 55 to 60 μm with a moisture content of 10-15%. The Fe-con will also a fine material at nominally -20 μm and with a similar moisture content. These size fractions are very fine (a powder) and this together with the moisture content will need to be considered at PFS study level (such as the type and form of storage vessel and trailer / wagon type, etc). A summary of expected cargo types is presented in Table 18-5.

Table 18-5: Products by cargo type

Product	Description	Cargo Type	Transportation
Ni Con	55 to 60 μm with a moisture content of 10-15%	Bulk bag; containerised (TEU)	TEU trailers / TEU rail wagons
Fe-con	-20 μm with a moisture content of 10-15%	Bulk cargo	Bulk trailers / rail wagons / bulk bags

18.8.2 Point of sale

The following primary points of sale are assumed:

- Ni-con: the point of sale is assumed as "Free-on-Board" Sweden east coast port (Umeå or Skelleftehamn, for example) or "Free-on-Board" Norway west coast port (namely, Mo i Rana).
- Fe-con: the point of sale is assumed as "Free-on-Board" Sweden east coast port (such as Umeå) or an in-country off-taker within 350-500 km rail distance from the railhead at Storuman.

18.8.3 Ni-concentrate logistics system

Within the processing plant area the Ni-con will be loaded to "bulk bags" (1 m^3) and placed into TEU containers, which are sealed ready for transport. Each TEU will contain approximately 20 t of concentrate. The TEU are loaded by crane or mobile reach-stacker to an on-highway truck carrying between one and three containers depending on the configuration and destination. A stockyard area is required at the plant for storage of containers and loading of trucks and a similar stockyard area will also be required at the railhead where TEU would be loaded to container wagons. TEU arriving by road directly to a port (such as Mo i Rana) would be received into the port's own container handling terminal.

18.8.4 Magnetite-concentrate logistics system

In order to maximise the transport distance, this product (up to 1.7 Mtpa, see Table 18-3) needs to be transported to the railhead at Storuman for transfer to the Swedish national rail system. The following logistics system is proposed:

- loading of road haulage trucks within the processing plant area;
- road haulage via the dedicated access road to the railhead at Storuman (the trucks would be electric and would be owned, operated and maintained by a haulage Contractor);
- unloading and storage at the railhead at Storuman (owner operated or operated by a Contractor);
- loading of rail wagons at the dedicated rail siding (owner operated or operated by a Contractor); and
- transport via national rail system to an off taker using a rail freight company who provide wagons, locomotives and arrange access to the rail system.

The concentrate is very fine grained and will contain a moisture content. Work is required to confirm the optimum method of materials handling and storage (tanks, open storage, conveyor types and wagon types). There is potential for "freezing" during transport.

18.8.5 Logistics map

The product logistics concept for the Project is presented in Figure 18-5.

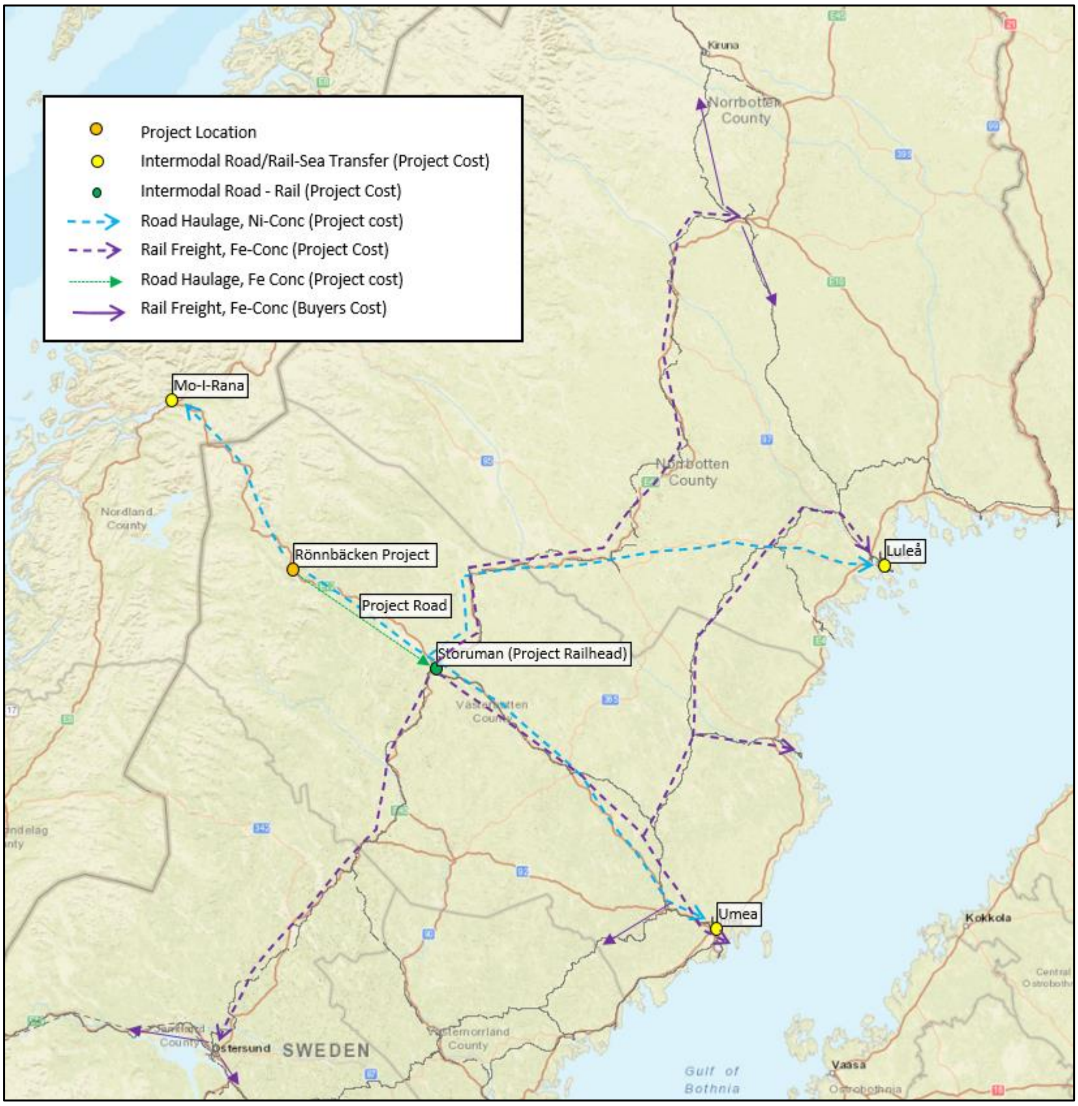


Figure 18-5: Proposed product logistics routes

18.9 Tailings Management

The current mine plan for the three pits estimates a total of 586 Mt processed ore. Ore will be processed at a rate of 30 Mtpa from the beginning of operations. It is estimated that 7.5% of the processed material will be shipped off site as concentrate, which leaves a total of 542 Mt of tailings material that needs to be stored in an engineered impoundment. Figure 18-6 provides a conceptual illustration of the Project layout during operation (prior to siting the tailings management facility, “TMF”; also referred to as a tailings storage facility, “TSF”).

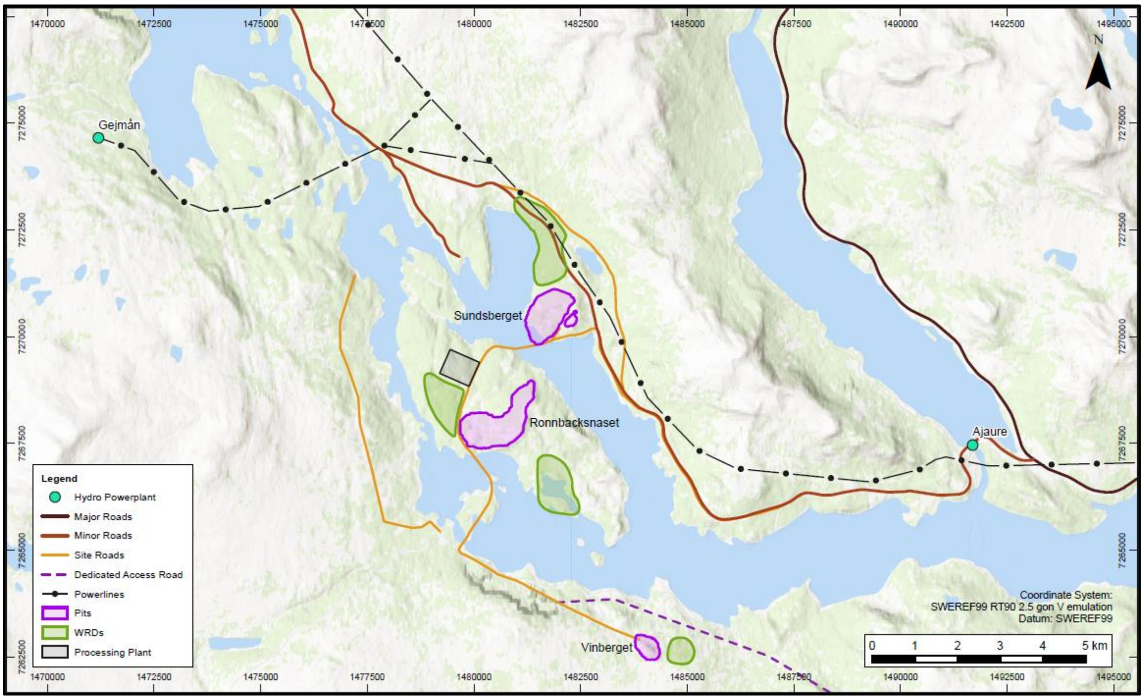


Figure 18-6: Conceptual layout of the Project during operation (without TMF)

18.9.1 Historic Tailings Assessment

Previous studies by MKB1 evaluated tailings storage options for up to 350 Mm^3 (525 Mt) in one or more 'sand reservoirs' (tailings facilities). Prior to this study, work had been carried out considering storing up to 300 Mm^3 (450 Mt) in three alternative locations. The options were appraised based on production and environmental aspects but also in connection with the outcomes of informal meetings with the Sámi community and Swedish authorities. The conclusions of these assessments were that land based options were generally less favourable due to the greater impact on reindeer husbandry and on the landscape.

The Västerbotten County Administrative Board ("CAB") commented that the locations study should consider the potential for the volume of ore to increase, on the basis that once production begins more ore is likely to be found. SRK has modelled TMF options to accommodate up to 400 Mm^3 (600 Mt) and considers this to be a reasonable approach for a PEA level of study.

Four water-based alternatives were proposed in the MKB1 studies (TW / TS / TW+TN / TN + TS), the locations are presented Figure 18-7.

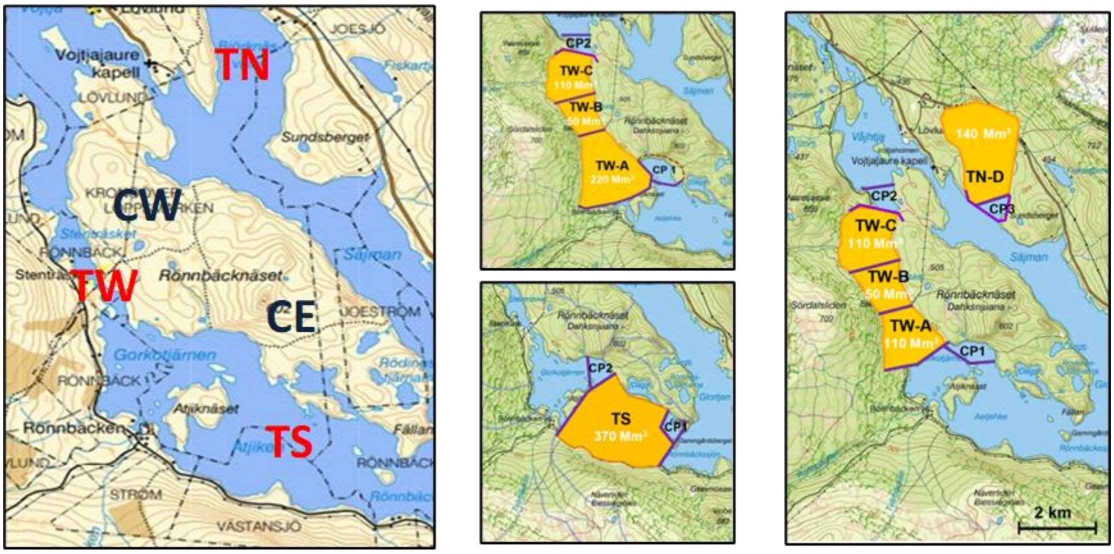


Figure 18-7: IGE TMF locations from MKB1

Alternative TW (defined as the preferred alternative by the report authors) was divided into three storage compartments, with the diversion of a public road required and was designed to accommodate 380 Mm^3 (570 Mt). Alternative TS was designed to utilise the entire water area called Aetjehke to accommodate 370 Mm^3. Alternative TW+TN utilises the combination of two reservoir locations with the option to fill northwards onto land in TN, with the ability to accommodate 410 Mm^3. Alternative TN+TS is a combination option that uses Aetjehkemagasinet and Björknäsviken with the ability to accommodate 350 to 510 Mm^3.

In addition to the four-above alternatives, two land-based alternatives were discussed but at the outset were classified as less suitable due to potential impacts on environmental and social receptors.

This study also considered the deposition of an enrichment sand which could be dewatered to produce paste consistency tailings, for deposition in the same impoundment areas. SRK has not taken this idea further as part of this study and has assumed tailings will be delivered to the TMF at a lower solids content of approximately 50% w/w.

18.9.2 Regulatory requirements

SRK has considered several guidance documents when preparing this study, including the following:

International Guidelines

- Global Industry Standard on Tailings Management ("GISTM", 2020).

European Union Guidelines

- EU Best Available Technique Reference Document: European Commission Reference Document on Best Available Techniques for Management of Waste from the Extractive Industries, in accordance with Directive 2006/21/EC 2018.

Canadian Dam Association:

- Technical Bulletin: Dam Safety Reviews (2016).
- Dam safety guidelines (2013).

Mining Association Canada

- A Guide to the Management of Tailings Facilities. Version 3. (2019).

18.9.3 Design criteria

The tailings will be subject to a thickening process adjacent to the mill complex where excess water will be recycled into the mill building. The thickened tailings will be pumped to the TMF. The design criteria assumed for the purposes of this assessment are summarised in Table 18-6.

SRK has added a contingency for storage volume in the TMF over and above the target volume outlined. The LoM storage requirement is therefore 400 Mm^3, which accounts for potential additional Mineral Resource discovered at a later stage of the Project.

Table 18-6: Rönnbäcken TMF design criteria*

Criteria	Units	Value (Ore Sorting Case)	Notes
Tailings Physicals			
Life of Mine (LOM)	Years	20	2012 Block Models
Total ore processed	Mt	586	Total from 3 pits.
Mass pull to conc (5%)	Mt	30.2	SRK Assumption
Average SG	-	2.7	SRK Assumption
Tailings target moisture content	%(Wwater/Wtotal)	45%	SRK Assumption
Assumed tailings density (in-situ dry density)	t/m^3	1.5	SRK Assumption
Target tailings storage volume	Mm^3	360 (400)	SRK Calculation
Main Embankment Geometry			
External Berm Width	m	20	SRK Assumption
Maximum External Slope Inclination	-	1V:3H	SRK Assumption
Overall Slope Inclination	-	1V:3H	SRK Assumption
TMF Consequence Category			
High*			GSTM
Hydro Design Criteria			
Design Storm (PMP) Freeboard Allowance	m	3	Used for all options

**Note: The potential tailings locations identified are located in sparsely populated areas and the tailings are thought to be of low risk from an acid generation and metal leaching perspective; therefore, the category is assumed to be "High".*

No geotechnical testing has been carried out on representative tailings samples. SRK has assumed a tailings porosity at deposition and used the density of the mineralised material to determine an assumed in-situ density for the purpose of volumetric modelling.

Given the magnitude of forecast tailings production, only conventionally thickened tailings storage options have been considered at this stage. This method allows considerably more flexibility with regards to both sub-aqueous and surface storage options in this environment. As of 2022, there is no precedence for filtered tailings (dry stack) alternatives on projects with annual production rates over 13 Mtpa, this option was hence discounted at this time.

18.9.4 TMF site selection

Minebridge software MuK3D was used to identify and model potential TMF alternatives utilising natural topography to store the required tailings volume.

Owing to the relatively large overall volume of tailings, there are few locations within a reasonable distance from the proposed mine that can be considered for tailings disposal. An overview of locations considered is presented in Figure 18-8.

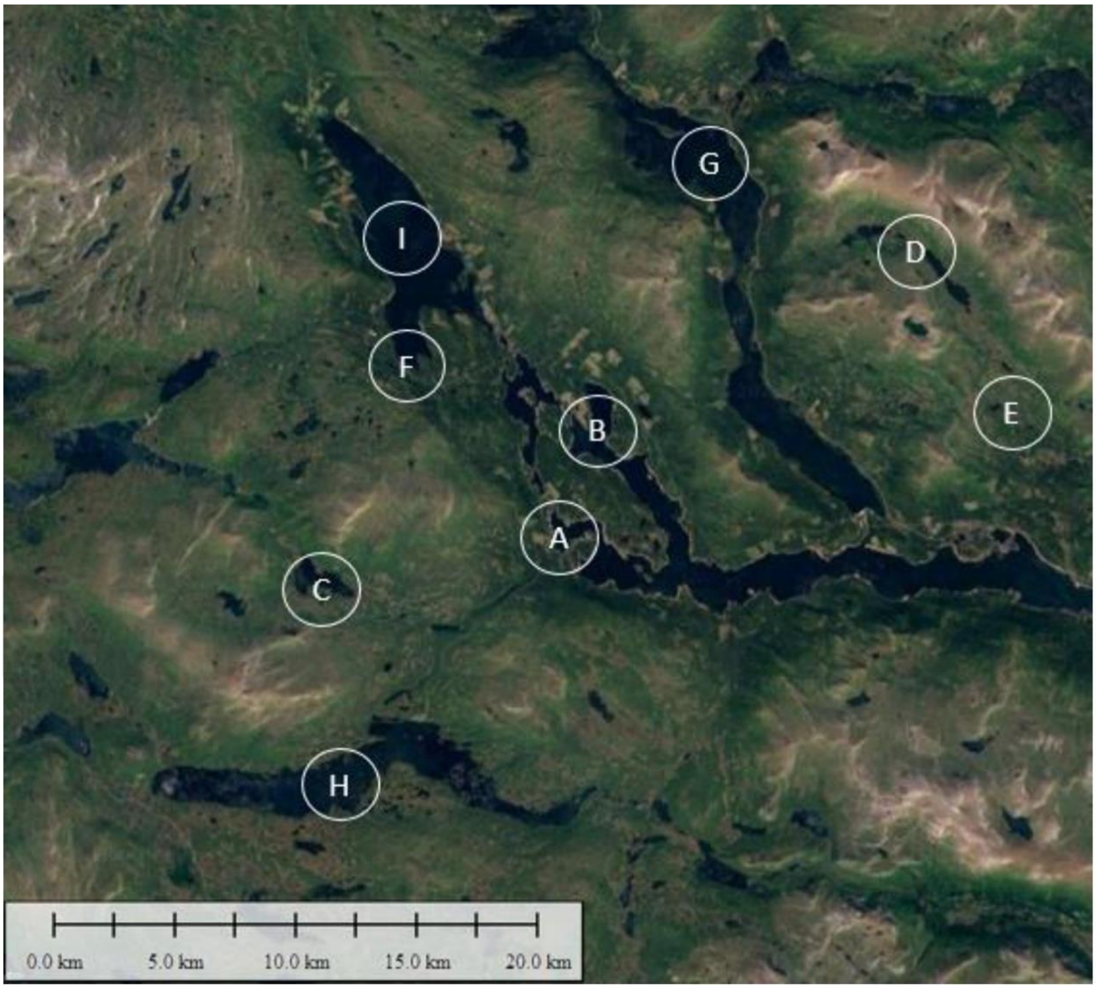


Figure 18-8: Potential locations considered for tailings disposal

A series of valleys (sub-aerial deposition) and lakes (sub-aqueous deposition) were targeted to reduce overall embankment fill requirements.

Many of the options presented in Figure 18-8 have significant vertical elevation gain between the site location and the TMF area (locations C, D, E, G, H). This would likely result in significant challenges associated with transport of tailings; therefore, the nearby options are considered more favourable.

Some of the previously proposed TMF locations have been considered, but with minor changes to the layout. Each TMF is visually presented in Figure 18-9 and the key details are presented in Table 18-7.

Table 18-7: Summary of TMF options modelled*

TMF Option	Distance from pit (km)	Elevation Difference (m)	Deposition Type	No. of embankments	Embankment Crest Elevation (mRL)	Height of embankment (m)	Embankments Volume (m^3)	Storage Efficiency (%)
A	<5	<5	In-Lake	2	436	51	34,148,991	8.5
B	<5	-20	In-Lake	3	440	58	29,842,331	7.3
C	8	200	In-Lake / Land	2	694	60	17,697,703	4.4
D	16	280	In-Lake / Land	2	770	136	31,161,084	7.7
E1	17	150	Land	1	708	154	133,813,371	33
E2	18	150	Land	1	696	136	178,071,571	44
F	8	-10	In-Lake / Land	2	465	75	35,648,123	8.8
G	12	45	In-Lake	2	464	24	1,544,677	0.4
H	12	200	In-Lake	3	625	17	2,706,341	0.6
I	8	5	In-Lake	1	409	50	538,209	0.1

**Notes: Storage efficiency is the volume of embankment material divided by the volume of tailings material storage, as a percentage.*

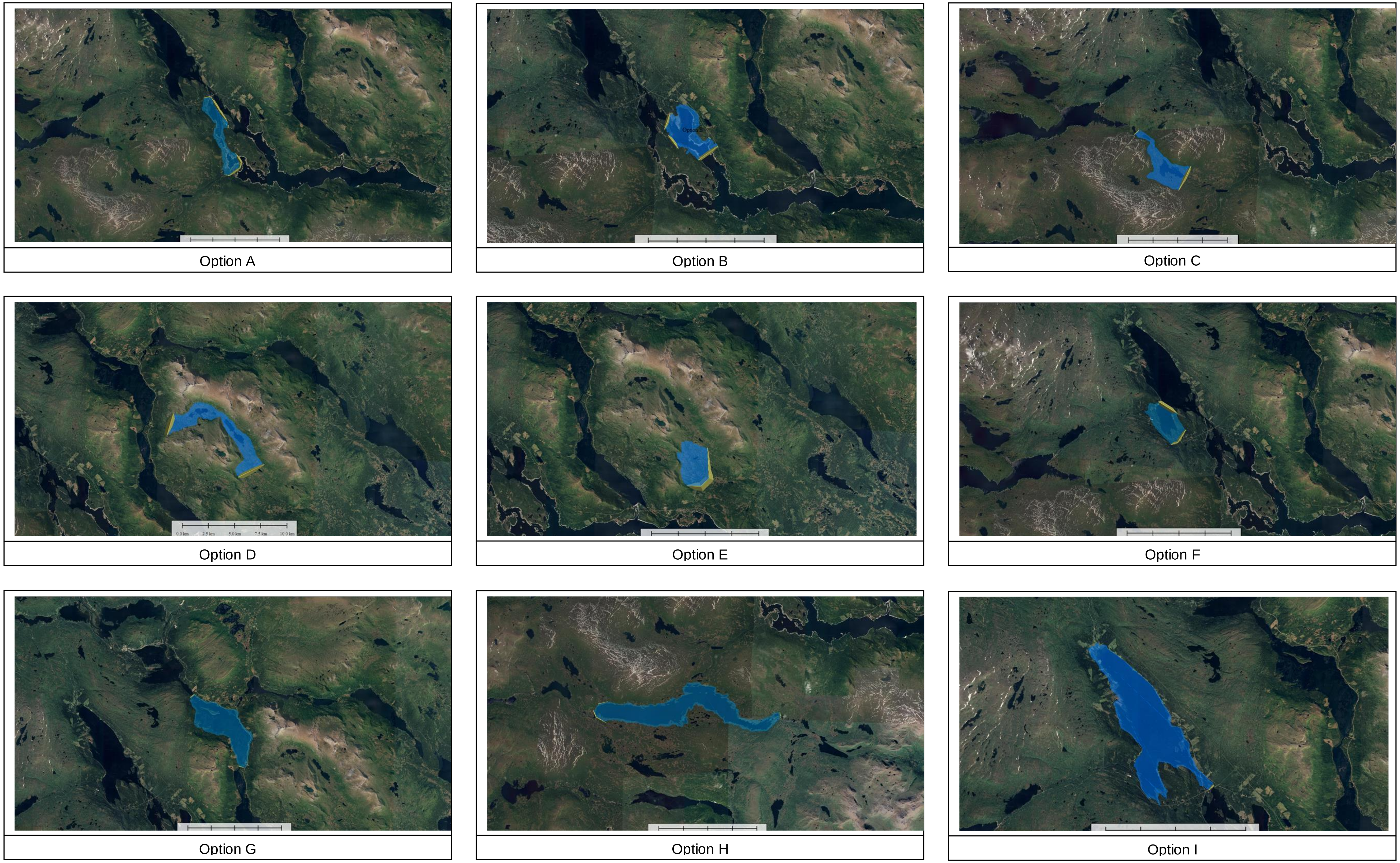


Figure 18-9: TMF Storage Options Modelled

A qualitative assessment of environmental and social impacts associated with each development option was carried out to ensure that these factors were considered during the TMF site selection process.

Each proposed development option was ranked on the basis of the following criteria:

- current land use and the disruption to natural habitats;
- likely impact on surface water and groundwater;
- visual impact;
- nuisance dust;
- nuisance noise;
- consequences of a TMF main embankment failure;
- disruption of existing transport routes (road and rail, if applicable); and
- energy usage (function of distance from plant and sizing of pumps/pipelines, etc); and
- storage efficiency

A weighting value was assigned for the relative importance of each factor as part of the site selection process. The weighting values range between 1 (little overall significance) and 5 (high overall significance). For each factor, the proposed construction location is assigned a 'negative impact ranking' that ranges from 1 (lowest relative negative impact) to 5 (highest relative negative impact). For each selected construction locality option, the results of the assessment are presented as:

- ranking total: sum of individual rankings from all factors considered; and
- weighted total: sum of rankings multiplied by weightings from all factors considered.

The lower the weighed total, the more preferable the option location is for the environmental and social factors considered. A summary of results from the comparison exercise are included in Table 18-8.

Table 18-8: Rönnbäcken TMF assessment multicriteria analysis*

Item	Criterion	Weighting	Option A	Option B	Option C	Option D	Option E	Option F	Option G	Option H	Option I
1	Current Land Use	5	2	3	3	3	2	4	2	2	4
2	Disruption of Natural Habitats	5	2	3	3	3	4	3	3	2	3
3	Surface / Ground Water	5	3	3	2	2	2	3	4	4	4
4	Visual impact	4	3	3	4	4	5	3	2	2	2
5	Nuisance Dust	4	2	2	2	2	2	2	2	2	2
6	Nuisance Noise	4	2	2	2	2	2	2	2	2	2
7	Consequence of failure	5	2	2	2	2	2	2	1	3	1
8	Disruption of existing infrastructure (roads, power lines etc.)	3	1	5	1	2	2	2	3	1	2
9	Transport distance and elevation gain	4	1	1	3	4	3	1	3	4	1
10	Storage Efficiency	5	2	2	2	2	5	2	1	1	1
Unweighted Total			**20**	**24**	**21**	**22**	**26**	**21**	**20**	**20**	**20**
Weighted Total			**90**	**112**	**107**	**114**	**129**	**108**	**100**	**103**	**104**
Overall Ranking			**1**	**6**	**5**	**7**	**8**	**3**	**2**	**3**	**4**

**Note: negative impact ranking – 5 = highest, 1 = lowest*

Based upon the outcomes of this assessment, the following conclusions can be made regarding the site selection process:

- Option A received the most favourable score of all the options. The proximity to the open pit, combined with the lowest impact on current land use by utilising in-lake deposition and the limited potential for dust and noise impacts makes this site the preferred alternative. Seepage from the facility into the adjacent open pit will, however, have to be carefully managed and assessed with further hydrogeological studies. The location requires re-routing an important trout-spawning stream and may constrain how the location can be used.
- Option B is considered to be located very close to one of the open pits, and as such will require careful management of seepage, to avoid interaction with mining operations. This location is considered less favourable than Option A as embankments would have to be constructed in deeper water in the central body of the reservoir.
- Option C shows not significant advantage over Option A since it is located at high elevation with similar efficiency rating, and less of the footprint is within a lake (which is considered favourable).
- Options D and E ranked lowest, due the volume of construction material required for the embankments and distance from the open pit.
- Option F would necessitate significant surface water diversion structures and has been discarded from further consideration.
- Options G and H received similar rankings, as they all utilised in-lake deposition with relatively small embankments, but at significant distance and elevation gain from the open pit.
- Option I appears to be an optimal location for storing tailings from a technical standpoint since it likely requires very little embankment fill to retain the tailings; visual impacts would also be minimised as the final height of the facility would be significantly lower than the other alternatives. However, this natural lake is a culturally protected site (see Section 5.5) and highly unlikely to be a viable option on this basis.

Based upon the 3D modelling exercise and qualitive ranking assessment, Option A was selected as the preferred alternative to take forward for the costing exercise.

18.9.5 TMF conceptual design

It is assumed for sub-aqueous deposition of tailings. A waste rock embankment will be constructed around the south and north flanks of the TMF to safely retain tailings solids and prevent migration into downstream areas of the reservoir. A starter embankment will be constructed in the south to a height of 20 m to store a minimum of 30 Mm^3 of tailings. This will provide sufficient storage capacity for 1.5 to 2 years of tailings production (depending on bathymetry), as outlined in Figure 18-11. It has been assumed the embankment will be raised throughout the LoM up to a maximum height of 55 m.

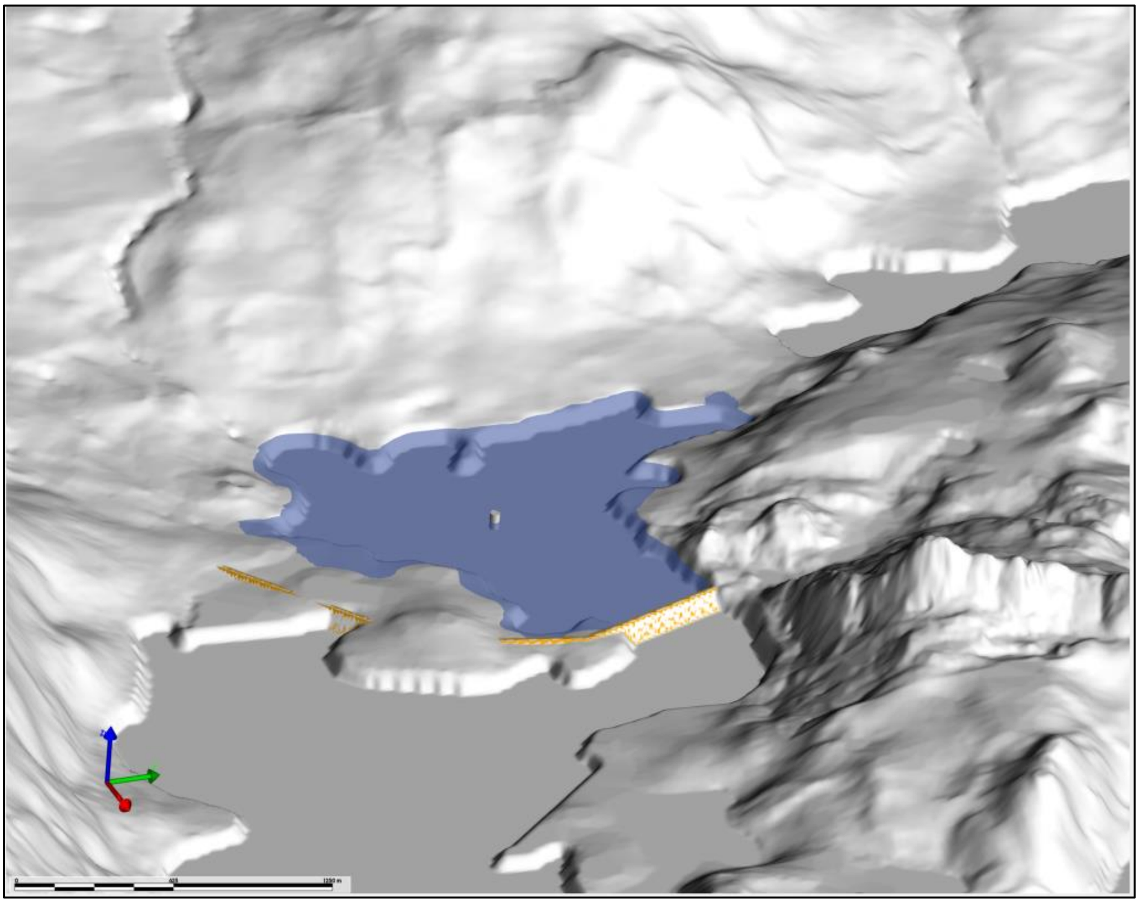


Figure 18-10: 3D view (looking northwest) of starter embankment configuration

Tailings are anticipated to be deposited into the facility via a slurry delivery pipeline system which will be placed on the embankment crest in the south to start with. The spigots will potentially need moving around the facility to ensure deposition from the north and to ensure the pond is kept in the centre of the facility, away from the embankments.

To manage surface water from two adjacent catchments (located west of the facility), lined diversion channels will be required. These will need to be designed appropriately based on anticipated flow rates and to remain functional. It has been assumed that they will be constructed in glacial till, with grubbing out to 2.0 m and lined with non-woven geotextile and rip rap to provide erosion protection.

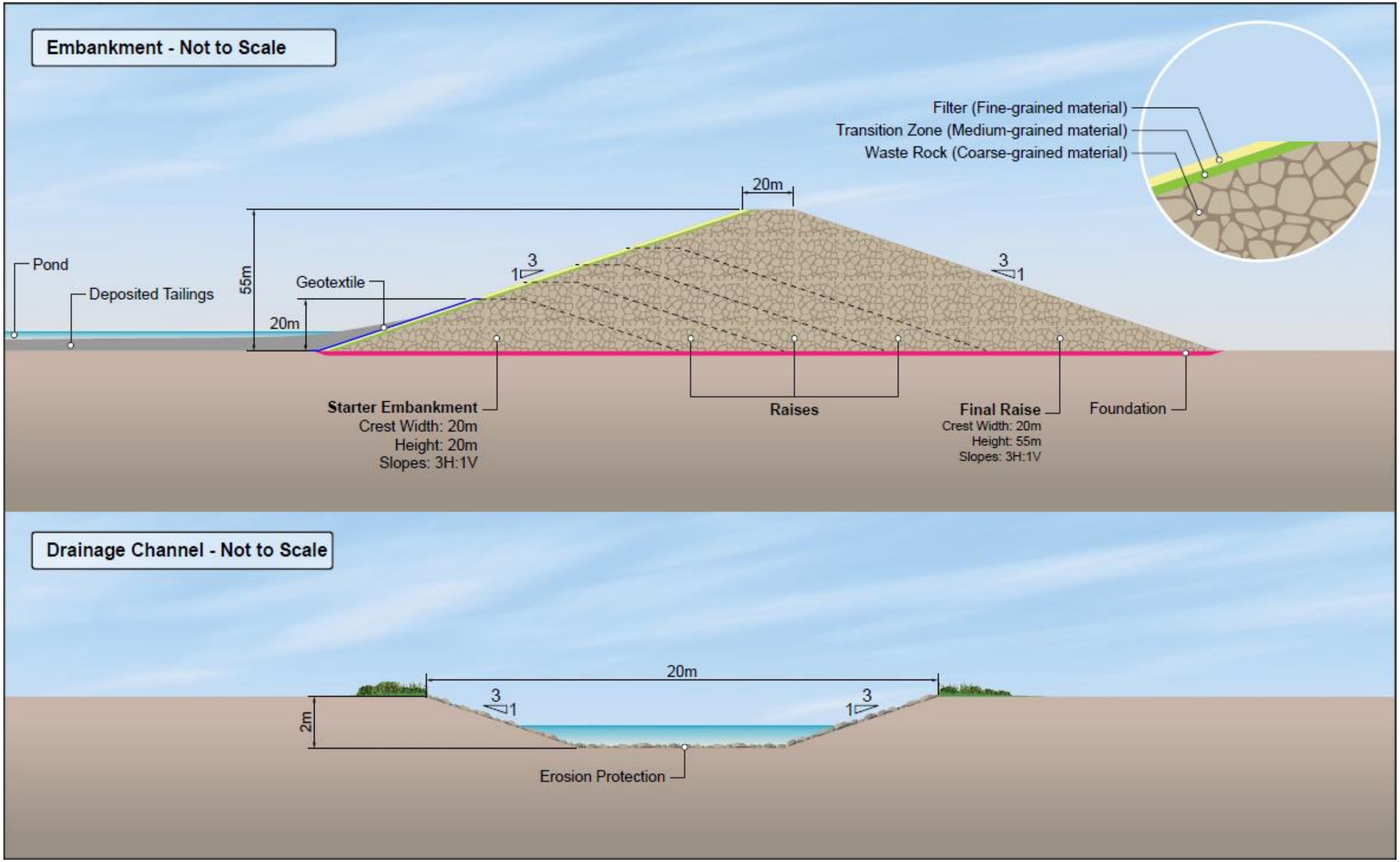


Figure 18-11: Cross-sections through schematic preliminary TMF design

The proposed dam concept consists of a pervious rockfill dam that will not restrict the movement of pore water between the deposited tailings and the dam. It is designed to retain the tailings particles and act as a drain. The dams will include a filter zone on the tailings side for restricting the movement of fine particles with the groundwater flow. The current approach is to import filter material from a source located within roughly 30 km from the mine site (to be defined during further material investigations).

Due to the rate of deposition, there will be a surplus of water in and on the impounded tailings. Water within the TMF that does not seep through the permeable rockfill dam will be transported back to the mill using a series of pipes and pumps.

The runoff of this water will either flow through the drainage system or the decanting outlet or seep through the dam. Some of that water will reach the downstream reservoir and river system. To minimize the transport of particles via surface runoff, the decanted water will pass through a clarification pond where most of the suspended particles settle.

During the construction period of the tailings impoundment, there will be periods when the external, regulated water level will be higher than the surface of the tailings immediately close to the dam. Reservoir water will infiltrate the tailings impoundment during that period and come in contact with the tailings. The potential for contamination will be dependent on the properties of the tailings; however, preliminary geochemical assessments indicate there is low potential for acid generation and metal leaching.

The possible transport of suspended solids and the risk of contaminated water from the tailings should therefore be assessed and the consequences of mitigating measures on the operation costs be evaluated.

18.9.6 Cost basis

SRK has prepared material take-offs ("MTO") which allow for the development of a cost estimate for all capital and sustaining capital items associated with construction and operation of the development options. Capital costs included costs to construct the embankment and tailings delivery pipeline. The details of the capital and operating costs are summarised in Section 21.

Major capital cost items include:

- site clearance including clearing and grubbing of the starter embankment footprint area (on land);
- restricted excavation (sub excavation beneath the starter embankment and for surface water diversions);
- dredging of shallow sediments where embankments are to be constructed within the bounds of the current reservoir, in submerged areas;
- embankment construction (mass fill using waste rock from mining operations);
- tailings pipeline installation; and
- installation of monitoring equipment in the embankment.

Sustaining capital refers to the ongoing (yearly) capital investment that a project must make to continue to operate. For this project, this includes the earthworks associated with subsequent external buttress construction. Construction costs were estimated using the same procedure as outlined above.

Operating costs are expenses associated with the operation, maintenance and administration of the tailings transportation to the TMF. Operating costs, based on USD/t, were from similar projects in the region.

Operating cost items include:

- slurry pumping costs from plant the TMF and maintenance of the slurry pipeline; and
- monitoring of the embankment.

No allowances have been made for the following items in developing the capital and operating cost estimate:

- foreign currency exchange fluctuations;
- environmental, permitting, ecological, and archaeological considerations;
- consequences from encountering different geotechnical conditions during future project phases than those upon which the existing design criteria and assumptions are based;
- force majeure events such as changes in government regulations, social disturbances, and industrial actions, whether legal or illegal, during the execution of the works;
- social, sustainability, and community related items;
- support required to produce capital asset register or closeout report;
- field road and access provided and maintained by others;
- site security provided by others; and
- closure costs (included in alternate scope).

The unit costs which have been derived for the purposes of cost estimation are summarised in Table 18-9.

Earthworks unit rates have been benchmarked from similar projects in the region. Rates used were compiled based on projects of similar size and scope. Where comparable unit rates are not available from these projects, SRK estimated costs based on a first principals approach.

Waste rock haulage rates (including drilling, blasting and loading) are based on typical rates used in the mining component of this study. These have been factored to estimate haulage component as well as placement and compaction.

Table 18-9: Tailings cost study unit rates

Description	Unit	Cost (USD)
Earthworks		
Removal of surface vegetation and tree felling	m^2	1.50
Grub out of surface material for embankment foundations	m^3	0.43
Dredging of sediments below the water for embankment foundations	m^3	5.00
Shallow foundation excavation	m^3	4.00
Embankment Construction		
Base Preparation of approved material - Compacted to 95% Standard Proctor Dry Density	m^3	7.12
Waste Rock fill (load-haul-place-compact)	m^3	4.50
Geotextile filter system on upstream face (supply and install)	m^2	6.85
Placement of transition material - assumed thickness 0.5m (load, dump, compact)	m^3	2.25
Placement of filter material - assumed thickness 0.5m (load, dump, compact)	m^3	2.20
Surface Water Management and Tailings Delivery Pipeline		
Tailings delivery pipeline	m	1500
Water return pipeline	m	1500
Floating Barge and Water Return pump	ea.	1,500,000
Non-contact Water Management		
Excavation of diversion channels	m^3	4
Erosion Protection for surface water diversions	m^3	10
Embankment Monitoring		
Installation of monitoring equipment (starter embankment only)	ea.	250,000

18.10 Acid Rock Drainage and Metal Leaching (ARDML)

Preliminary acid rock drainage and metal leaching studies of tailings and waste rock material at Rönnbäcken have been carried out by Tom Lundgren of Ambiental Ltd. It is stated in the Ambiental (2011) memorandum that:

'*The process of permitting the mining of the Rönnbäcken ore deposits according to the Environmental Act will to a large extent be based on evaluations of the risk that waste deposits from the operation will generate acid leachates that contaminate the groundwater or the downstream surface waters with trace elements'. These evaluations are made at three stages where the first stage results in a classification of the waste in "inert" or "not inert waste". This is conducted with respect to the potential to generate acid and to hold potentially harmful substances. If classified as "inert" the waste is judged not to need any more detailed investigations with regard to its environmental properties*.

At this stage, the "acid generating" aspect is based entirely on the concentration of sulphur. If it is lower than 0.1% by weight it is judged not to be able to produce acid irrespective of its content of neutralizing agents. If the percentage of sulphur is higher than 1%, special studies have to be carried out to show if and how much acid will be produced and what the quality is of the resulting leachate in terms of dissolved, potentially hazardous elements. If the sulphur concentration is between 0.1 and 1.0%, the internal ability of the waste to neutralize the acid shall be considered. This is accomplished by a standardized procedure called acid base accounting ("ABA") where the potential to produce acid is calculated from the sulphur concentration and the neutralizing capacity is measured by titration with acid. The procedure is defined and described in the standard prEN 15875. If the ratio between the neutralizing potential and the acid potential in the sample is higher than 3 (and the sulphur content <1%), the waste is classified as "inert".

If the waste is not classified as "inert", a permit for disposal of the waste according to the EU directive on management of waste from extractive industries (2006/21/EC) must be based on a prognosis of the amount of acid and potentially hazardous elements that will be produced from the deposit. Such a prognosis should be based on kinetic tests such as column leaching tests and humidity cell tests'.

The exploration drilling data have shown that the sulphur content of the waste rock is variable, between 0.38 and 0.02%, but that the tailings is well below 0.1%. In conjunction with the ABA assessment, the tailings will be classified as "inert" waste and it is stated that no kinetic tests are needed for this waste type; however, results from the analysis of the tailings decant water indicate high levels of sulphate in solution, >1,300 mg/L, that could imply the potential oxidation of any sulphides present yet from the metallurgical testing the ore has a high buffering pH, that requires pH correction during the processing of the ore. This pH correction was undertaken with sulphuric acid, reported at 12 kg/t of ore, and this addition could explain the excess of sulphate ions observed. In more recent process tests, this consumption of sulphuric acid has been reduced to less than 2 kg/t of ore. SRK would therefore recommend that further analysis of the new tailings decant water is undertaken to confirm the material's 'inert' classification.

For the other waste rocks it is less clear as to their classification due to the minimal sampling and characterisation undertaken to date.

The sampling procedure is also described in Ambiental (2011) as follows. Key aspects are underlined:

'*The samples used for the ABA-tests are master (composite) samples collected from rock cores taken at the exploration drillings for the Vinberget and Rönnbäcksnäset nickel deposits. These cores were taken to delineate the ore bodies. Hence, they were taken in the mineralized zone (ore) and in close vicinity to the ore (waste rock). Therefore these rock cores do not represent the whole rock mass that will be excavated if the ore body will be exploited. The extent of the waste rock volume will be defined at a later stage of the project when supplementary studies of the ARD potential have to be carried out.*

The program for sampling was established with the objective to compose a set of samples that are representative for those parts of the waste rock types that were found in the exploration rock cores with the highest sulphur content of the two ore deposits Vinberget and Rönnbäcksnäset. Based on core log data the exploration geologists identified four main types of rock types that are present in the immediate vicinity of the ore bodies at Vinberget and Rönnbäcksnäset. They were named "Mafic" (felsic-mafic metavulcanite, pyroxenite), "Sed" (phyllitic schist of the regular type for the area), "G-Sed" (graphite schist) and "K-sed" (chlorite schist). The exploration geologists made a selection of cores that represent the four "high-sulphur" main types of waste rock at both exploration areas and from these cores 10 subsamples were randomly selected for each of the four master samples representing the respective waste rock type. The master samples were delivered to the Swedish Geotechnical Institute for acid-base-accounting according to the standard prEN 15875.'

The above extract describes the sample selection procedure for Rönnbäcken. It is clear that the assessment is still in the early stages of development and further work needs to be completed to define the waste rock.

The results of the acid-base-accounting were reported by the Swedish Geotechnical Institute. Table 18-10 is a compilation of that report, which also includes acid-base-accounting on a sample of tailings that was retrieved from a mini-pilot test on thickening of tailings from the Vinberget and Rönnbäcksnäset ore resources.

The two samples having a neutralization potential ratio ("NPR"; neutralising potential:acid potential) that is lower than the stipulated value 3 for "inert" waste are marked with orange.

Table 18-10: Compilation of the acid-base-accounting on the sample of tailings and the four master samples of waste rock*

Sample	S-content (%)	AP (mole H+/kg)	NP (mole H+/kg)	NNP (mole H+/kg)	NPR
Thickened tailings	0.056	0.035	1.00	0.96	28
Mafic waste rock "Mafic"	0.31	0.19	0.28	0.089	1.5
Sedimentary waste rock "S"	0.32	0.20	1.85	1.65	9.4
Sedimentary waste rock "G"	0.38	0.24	0.41	0.17	1.7
Sedimentary waste rock "K"	0.02	0.015	0.85	0.83	56

**Note: AP = acid potential; NP = neutralising potential; NNP = net neutralising potential (NP-AP)*

18.11 Water Management

18.11.1 Hydrological setting

The Project area is located in low mountain terrain with an average precipitation of around 750 mm/year and up to 2.7 mm/day or 97 mm/month for July when the most precipitation occurs. Rainfall events are mainly frontal or orographic. The annual snow-melt, which generally occurs in April or May, is also an important consideration when sizing surface water control infrastructure.

No site-specific groundwater data has yet been collected at Rönnbäcken and so the current hydrogeological interpretation of the site relies on the current geological understanding, publicly available data and SRK's experience in similar deposits in Scandinavia and other areas of the world. Further work will be required at the next stage of investigation in order to better define the hydrogeological understanding and assess the potential implications on pit water management, water supply and water and tailings dams.

The geology of the Rönnbäcken deposits and surrounding area are discussed in detail in previous sections of this report. Broadly, geology at Rönnbäcken comprises mainly greenschist and amphibolite metamorphic facies, phyllites, metavolcanics, metasediments and serpentenised ultramafic rocks, in which the nickel sulphides are hosted. Matrix permeability in the majority of these rocks is likely to be on the whole low and therefore groundwater flow in the bedrock will be almost exclusively limited to fractures associated with faults and jointing, which in turn is likely to be mainly structurally controlled although lithological differences will have an influence on the nature of fracture properties and development.

The basement rocks in the area belong to two significant nappe complexes, formed during a continental collision. As in the rest of the Caledonides, the bedrock of this region is therefore structurally complex, with a significant amount of large-scale folding and faulting. Brittle structures have the potential to be highly transmissive and it is the nature and distribution of local and regional brittle structures that is likely to be the dominant controlling factor for groundwater flow in the area. The basement rock is overlain by a generally thin (generally <5 m but <20 m in some isolated locations) cover of overburden sediments. The permeability of these sediments is likely to be variable, but they are unlikely to be significant in terms of groundwater inflows to mining operations due to their limited thickness. Hydraulic properties of the overburden and bedrock formations will require further investigation at the next stage of investigation including structural interpretation.

Some initial surface water catchment analysis has been undertaken by the Company as part of initial options studies for the location of the proposed TMF. This study showed catchment areas for surface water courses in the vicinity of the proposed deposits to be generally small (<50 km^2); however, the steep topography and relatively impermeable basement in many areas may lead to rapid run-off during snowmelt or rainfall events leading to temporarily high (flashy) surface water flows. Continuous river gauging data are publicly available for surrounding catchments and these data should be used to inform the next stage of hydrological characterisation.

18.11.2 Pit water management

The deposits at Rönnbäcken are adjacent to, or surrounded by in the case of Rönnbäcksnäset, Lake Gardiken which has formed behind the Gardiken hydroelectric power station dam, approximately 20 km to the east. All three proposed pits will progress below the level of the lake which will provide a constant source of recharge for pit inflows should a permeable pathway exist between the pit and the lake. Although the permeability of the unfractured rock mass surrounding the proposed pits is likely to be low, discrete fractures provide the potential for locally significant inflows to the pit driven under high head differences, which could be sudden and impact on mining operations.

Furthermore, although the role of groundwater on pit slope stability is as yet unknown, pore water pressures in the pit slopes especially those behind the pit lakes are likely to be high throughout the mine life.

Significant further investigation is therefore required in order to:

- estimate groundwater inflows to the pits, including the potential for a hydraulic pathway between the lake and the pits, and to derive a cost effective solution for control of these inflows; and
- evaluate potential pore water pressures in the pit slopes and the feasibility of any depressurisation required.

Such an investigation would require structural analysis and interpretation as well as an investigative hydrogeological field programme, ideally including discrete interval testing such as packer or spinner tests. These structural and hydrogeological investigations would likely be best undertaken in tandem with a geotechnical field programme for reasons of cost effectiveness and data sharing.

Site-specific climatological data will be required as the project progresses as the mountainous terrain may mean that some climatic variables differ between site and the nearest long-term weather station at Hemavan. It is therefore recommended that at least one weather station be installed on-site as soon as practically possible. A surface water study will be required in order to evaluate surface water inflows to the pit and to size sump equipment and pit perimeter bunding or ditches.

The bedrock aquifer may provide yields of groundwater sufficient to supply the mine's potable water supply demand, although this would require further investigation.

18.11.3 Water supply

The plant water demand is expected to be up to 500 m^3/h. Groundwater inflows to the pits are not expected to be high enough to meet the plant make-up water demand due to the relatively low permeability of the bedrock and abstraction of groundwater to meet water supply demand is unlikely to be feasible for the same reasons. It is therefore expected that make-up water will be sourced from Lake Gardiken, the total storage capacity of which is 875 Mm^3. A seasonal site water balance will be required to accurately estimate the make-up water requirement and to optimise water use. Water supply from the lake is likely to be relatively straightforward from an engineering point of view but will require further work to support permitting.

18.11.4 Surface water management

Modelled flood extents will need to be derived at the next stage of investigation to help with siting of mine infrastructure. Stormwater management infrastructure will need to be designed for protection of key project infrastructure, especially asphalted areas and roads.

Sediment control structures will need to be sized and located according to predicted discharge of site run-off.

Seepage from waste dumps, tailings storage and any water retention dams will also need to be assessed.

18.11.5 Water stewardship

No site-specific groundwater data has yet been collected at Rönnbäcken and further work will be required at the next stage of investigation to better define the hydrogeological understanding and assess the potential implications on pit water management, water supply and water and tailings dams.

A network of groundwater monitoring drillholes for baseline monitoring of groundwater levels and quality will need to be installed. As with the hydrogeological investigations, discussed above, this might be best completed in conjunction with geotechnical drilling, if possible. Baseline monitoring of stream flows, lake levels and surface water quality will also need to be initiated.

The potential impacts of mining and water abstraction on human and ecological receptors dependant on surface water and groundwater should be assessed upon completion of surface water and groundwater investigations and in conjunction with baseline monitoring data. This should be done as the Project moves to the next phase and in conjunction with the PFS. This assessment should adopt a water stewardship approach, considering other key stakeholders in the catchment and downstream catchments that could potentially be impacted and engaging early, where appropriate. A water stewardship approach requires looking beyond the operational footprint to the wider region to identify risks and opportunities for water management, in partnership with communities and authorities as well as other water users in the catchment.

18.12 Risks and Opportunities

18.12.1 Risks

The following risks need to be investigated further at the next stage of study (PFS):

Infrastructure and Logistics

- The capability of the nearby 220 kV grid to deliver the required power at the point of connection assumed in the study needs to be confirmed.
- Transport concept for Fe-con is reliant on the permitting of a dedicated access road, which still needs to be investigated.
- First 10-15 km of the dedicated access road will be challenging engineering (gradients, water crossings) and there is a risk of cost variation in this area.
- Haulage contract costs assume no mobilisation fee is payable, which needs to be confirmed.
- Assumed agreement with NLC Storuman is still to be negotiated. If the Project elected to build a dedicated facility, the capital cost would increase by some USD 15 to 30 M dependant on the scope.
- Products have a very fine grain size (based on the assumed processing route) and so product handling studies are needed to understand the constraints and optimal method for storage and handling.
- Freezing of concentrate during transport may be an issue and thus additional heating loads may need to be considered in future studies.
- Fe-con transport costs assumes high-capacity payload trucks.
- Current logistics concept assumes, particularly for Fe-con, that an off-taker can be found in northern Scandinavia.
- As shift / rota assumptions change, the cost for accommodation may rise.
- It has been assumed that no works or upgrades are required to the main E12 national road to facilitate enabling works until a point when the dedicated access road is constructed.
- Furthermore, it is assumed that the Ajaure hydropower plant dam has the capacity to carry traffic loads during the early stages of construction.

Water

- A high degree of uncertainty exists regarding water management requirements and risk at present as no site-specific data relating to water has been collected to date.

- Groundwater inflows could be significant and/or sudden given the proximity of the lake and pore water pressures in the pit slopes need consideration.
- Potential for flow and/or quality impacts on water dependent ecosystems and other waters users within the catchment and downstream catchments requires consideration at an early stage within the project, such that any required mitigation can be considered in conjunction with engineering design.
- Water management requirements after mine closure have not yet been considered.

Tailings

SRK has assessed a number of technical risks which require further investigation to ensure adequate mitigation measures are in place, including:

- Excessive seepage flows from planned TMF area migrating towards the operating open pit. Extensive dewatering effort will be required around the open pits.
- Unsatisfactory foundation conditions for the embankments.
- Difficulty with installation of filter system below the existing reservoir level.
- Depth of lake unknown; no bathymetric surveys have been completed.
- Geochemical properties of the tailings not allowing for in-lake deposition.
- Costs of pumping slurry tailings becomes prohibitive due to energy consumption.
- Potential for accumulation of contaminants over time which could lead to need for water treatment during operation and/or closure.
- Potential for tailings to impact water quality of the current reservoir.

SRK recommends that, if in-lake deposition of tailings is pursued for the next stage of design, a detailed risk assessment is undertaken at a very early stage, such that both engineering and administrative controls can be more clearly defined and incorporated into decision points and detailed designs and operating and management plans.

18.12.2 Opportunities

The following opportunities have been identified which should be explored further in future design phases:

Infrastructure and Logistics

- Once the study progresses to the next level of detail, there will be an opportunity to begin to undertake trade-off studies and optimise costs.
- The opportunity to extend the railway (and the funding for this) to the site should be explored in more detail.
- Given the location in Västerbotten and near to the Inland Railway Line, the Project has a great opportunity to connect to national rail systems and low-cost renewable power.
- Removing the Fe-con, if this was economically viable at a Project-wide level, could potentially reduce the capital cost burden by negating the need for the dedicated access road and requirement for a railhead. Power demand would also be reduced.

Water

- Early engagement with other stakeholders in the catchment might provide opportunities for shared water management.

Tailings

Given the current conservative nature of the assumptions and preliminary designs, there are some opportunities which should be explored further in future design phases.

- The overall tonnages of waste rock generated over the life of mine will be broadly comparable with the tailings. Once mining and waste haulage schedules have been defined at the next stage of the project, a co-disposal strategy involving sub-aqueous disposal of waste rock and tailings could be considered. This may reduce the size and aerial extents of the surface waste rock dumps, thus minimising visual and dusting impacts associated with these facilities.
- The depth of the lake is currently unknown and the volume of tailings that can be stored within the lake may be significant. A bathymetric survey should be completed to outline to volume of storage available and the elevation of the embankments may change.
- It may be advantageous to partially drain the reservoir to prepare the tailings embankment foundations and determine a more accurate storage capacity for the facility. The prospect of lowering the water level should be investigated.
- There is potential to reduce the overall capital cost by delivering waste directly from the pit without rehandling. This needs further investigation to identify if significant cost savings can be realized.

19 MARKET STUDIES

SRK relied on marketing information provided by Bluelake for the nickel product economic analysis. No recent detailed market study has been undertaken for the Project. An independent study into nickel concentrate markets was produced by Raw Materials Group ("RMG") for the 2011 PEA on behalf of the previous Project owners; however, this is now considered outdated and is not presented herein. A study into the potential to produce iron ore products was presented by Tata Steel Consulting ("Tata") in 2015 on behalf of the previous Project owners; a summary is provided below.

19.1 Nickel

Nickel markets are forecast to undergo a structural change due to the advent of policy mandated widespread replacement of internal combustion engine ("ICE) powered vehicles with electric vehicles ("EV"). Nickel is considered a key component in various cathode chemistries for EV's due to it providing a desirable high energy density. The rapidly growing EV battery sector is eager to secure supply chains of key battery elements with a strong consideration of ESG credentials. Forecast of battery nickel demand suggests Europe is second only to China for future demand growth (Section 19.2 below for further details).

The Rönnbäcken Project will produce a nickel sulphide concentrate with an expected payable cobalt by-product. In addition, Rönnbäcken will produce an iron concentrate. A metal production schedule is shown in Figure 19-1.

Based on the testwork described herein, the Ni-con is expected to yield a relatively high-grade at 28% Ni, with cobalt ranging from 1.1% to 0.7% Co over the mine life. At an annual production rate of approximately 25,000 t of Ni-con, Rönnbäcken could produce 50% of the current mine nickel production in the EU.

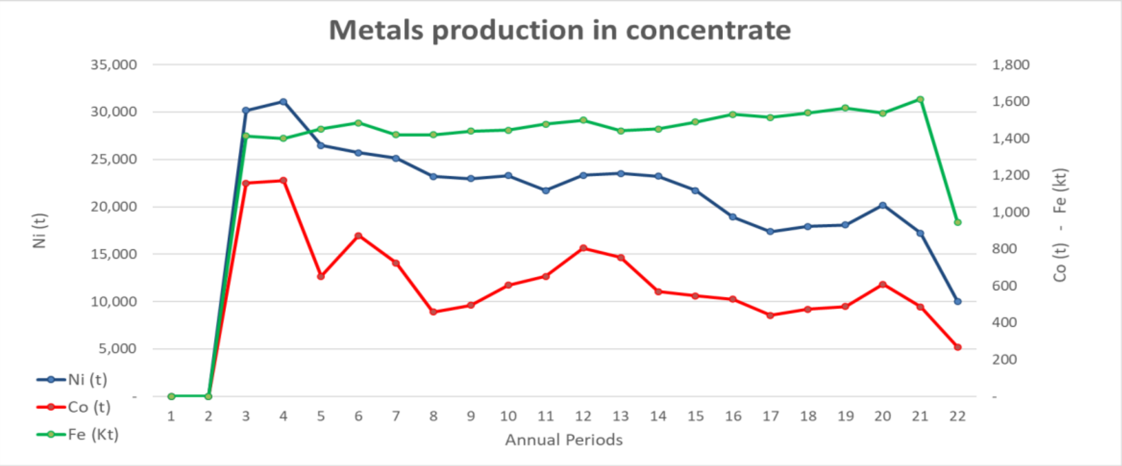


Figure 19-1: Metal in concentrate production schedule for Rönnbäcken

19.1.1 Nickel Concentrate market

In addition to marketing the Rönnbäcken concentrate to nickel smelters globally, the Company believes that new intermediary businesses that process high-grade nickel sulphide concentrates to nickel sulphates are likely to be developed in the EU to service the EV car battery industry. A brief overview of the global nickel sulphide concentrate markets follows.

The dominant source of nickel throughout the last century has been sulphide concentrates, from sources such as Vale's (formerly Inco) operations in the well-known Sudbury Basin and at Thompson, Manitoba, from Xstrata`s (formerly Falconbridge) Sudbury operations, and from Norilsk's huge complex in Siberia and its other sites in the Kola peninsula of northwestern Russia. The Finnish operation, Outokumpu (now Norilsk-owned), brought additional mining, smelting and refining capacity on-stream, as did Western Mining Corporation (WMC), now BHP Billiton's Nickel West, at its Kalgoorlie smelter and Freemantle refinery. In China, Jinchuan has steadily increased capacity through phased expansions, as has Jilin. Notably, all of these operations were originally integrated, sourcing nickel from their own mine operations. All of these, however, are now mature operations suffering from declining mine resources and grades, difficult or expensive mine expansion, and increasing costs; the latter is especially true of western operations such as those in Canada. In order to minimize unit costs and maximize both plant capacity utilization and extra revenue generation, these operations have, for a number of years, sought outside sources of concentrates to smelt and refine. An additional part of the costs saving realized through treatment of third-party concentrates comes from deferral of investment in new mine exploration/discovery and development, and the corresponding avoidance of associated risk, all of which can be very significant, especially in fluctuating metal markets.

The growth of world nickel demand in the last decade, indeed of demand in all commodities, has been driven to a large extent by China, and to a lesser extent by India. Forecasts of supply-demand balances in the early to mid-2000s predicted a massive shortfall in supply. This resulted in the start-up of many small sulphide mining operations around the world, especially in Australia. Most of these were too small to support smelting and refining facilities on their own; however, a natural synergy between these new, small sources of nickel, and the underutilization of capacity at existing sulphide smelters/refiners was quickly recognized. The result has been the growth of trade in the sale of nickel concentrates from a relatively small portion of world nickel supply (less than 5%) to an estimated 15% of currently nickel supply. The nett effect is that currently, there exists a very real, competitive marketplace for the sale of nickel concentrates produced from smaller operations.

The other type of ore from which nickel is produced is lateritic, or oxide (non-sulphide) ores. They are treated either by hydrometallurgical processes (Murrin-Murrin, Goro) or via reducing pyrometallurgical techniques (Koniambo), depending on the specific type of laterite ore sourced. To date these resources have proved difficult to exploit with numerous technical problems resulting in higher capital and operating costs than originally envisaged. Relatively high nickel prices will probably be required to support these projects in the long term. Despite this, as sulphide resources continue to decline, it is likely that these types of ores will represent a significant source of future nickel production. Sulphide operations, whether integrated or not, will benefit from this situation. They have the advantages of long-established smelting/refining operations which have little requirement for new capital, and very low technical risk. In summary, they will continue to have available capacity for third party concentrates and hence will be able to take advantage of the higher metal prices. As such, small nickel-sulphide concentrate producers, selling to existing smelters/refiners will have an excellent opportunity in the current and future marketplace for supplying concentrates to integrated operations facing declining supply from captive source.

A key part of the synergy between independent concentrate producers and smelter/refiners is defined in the smelting-refining marketing contracts that exist between these parties. First, unlike the copper concentrate market, there is no standard form or structure of contract, and there is no transparent marketplace. The contract terms are negotiated individually and tend to be confidential. There are differences between the capabilities of each smelter and each refinery which may be reflected in the terms offered. These differences may show up in the percentage of payable metal (Ni, Cu, Co, Au, Ag or PGM) the smelter/refiner is prepared to pay for. The grade of the concentrate will be important for more than just the obvious calculation of gross metal value. The level of minor elements such as As, Hg, Sb, F and Cl can affect the smelter/ refiner's ability to safely handle the material. Levels of MgO in the range of 4% - 8% are likely to trigger extra costs at the smelter; these may be passed back to the concentrate supplier.

Blending a concentrate, containing higher than normal levels of impurities, with other concentrates typically reduces any processing problems, allowing for treatment. Use of removal systems, as for mercury, can facilitate successful treatment; however, there may be thresholds for these or other elements, above which a smelter may not be prepared to accept. A marketing contract needs to recognize all of these issues and outline how they will be dealt with, especially during the start-up period when quality control of the final concentrate is likely to be less stable. Contracts can be relatively simple, or quite complicated. The format will affect the level of risk and return to each of the two parties as prices vary over time. Some contracts provide for price participation wherein the smelter/refiner receives a share of the higher returns at higher metal prices. Most contracts are for life of mine, but others have an expiration date. While the latter allows for a better reflection of changing markets over time, it creates an unpredictable risk for each party. Other items, such as transport of concentrate from the concentrator to the smelter may absorb a significant portion of the metal value of the concentrate, especially at low prices and/or with low payable metal grades. On the other hand, some contracts provide a transport credit to the supplier. As a general rule, risk (such as price risk) is passed on to the concentrate supplier, who needs to ensure their operation`s viability during periods of low metal prices. The flexible format of contracts allows for tailoring each contract to the needs of both parties and the particular analysis of the concentrate. Ultimately, the result is one of informed negotiation. While the lack of transparency in nickel concentrate markets may be disconcerting, a body of knowledge has developed over the years within the industry which ensures a fair and competitive result.

The market for custom concentrates is comprised of the following traditional, established smelter/refiners of Vale (Sudbury, Canada), Glencore (Falconbridge, Canada), and Norilsk (Harjavalta, Finland), and the more recent participants of Jinchuan (China), Votorantim (Fortaleza, Brazil) and Jilin (China). In 2018,Vale shutdown of smelting at Thompson, Manitoba, thus removing one potential smelter from the list. It is likely that Vale will use their new hydrometallurgical facility at Long Harbour, Newfoundland, Canada, to process custom concentrates, thus replacing Thompson as a custom operation; however, little is known about the requirements or limits in terms of quantity and quality of third party concentrate which Long Harbour will be prepared to handle. There is a reasonable understanding of the capabilities of the traditional smelter/refiners. Sulphide smelting employs two basic processes, flash smelting and roast/reduction. It is likely that with either process, blending of Rönnbäcken concentrate will be required to handle its low natural fuel level (low Fe, S), high MgO level, and possibly to reduce As, Sb or Hg levels. Flash smelters may be less sensitive to As than roast-reduction smelters (Xstrata). The volume and nature of the other concentrates being handled by a smelter at a given time will affect the extent to which blending of Rönnbäcken, or other adjustments to processing, will be necessary. Note that the accuracy and applicability of these comments, and those following, are heavily influenced by the current and forecast concentrate supply-demand situation (quantity and quality) at each smelter/refiner, a situation which is in a constant state of change.

With the shutdown of Vale’s Thompson operation, only Glencore’s Falconbridge smelter will be using roast–reduction. This process provides excellent metal recoveries, particularly for cobalt, but has high power costs. It can recover all payable metals Ni, Cu, Co, Au, Ag or PGM, subject to the usual minimum deductions, but it is sensitive to high MgO, and As. The smelter is located just outside Sudbury, Ontario, requiring rail (or road) transport from a port such as Quebec City or Montreal, Quebec. The facility has a well- established group experienced in receiving, sampling, handling, blending and smelting custom concentrates along with their own captive concentrates, which operates under a business philosophy of including the treatment of custom materials.

Vale’s Sudbury smelter is also experienced in all aspects of custom concentrate treatment. It uses its own proprietary flash smelting process requiring oxygen, generated on-site. Ni, Cu and Au, Ag or PGM recoveries are competitive, but cobalt recoveries are lower than most of the other facilities. As for the Glencore smelter, labour costs are high. Despite this, and the 600 km inland transport from Quebec City (the smelter is located just on the opposite side of Sudbury from the Falconbridge smelter), Vale has, in the past, succeeded in acquiring custom concentrates against competition from Glencore and Norilsk (Harjavalta). Custom concentrates have allowed deferral of capital investment in Vale`s Sudbury mines; capital which is now being put back into those mines. With this investment, but with Voisey`s Bay concentrates being sent to Long Harbour starting in 2014, and Thompson concentrate being sent to Sudbury, the future net demand for custom concentrate at Vale’s Sudbury smelter needs to be determined.

In Newfoundland, Vale commissioned the Long Harbour Nickel Processing Plant, a hydro-metallurgical facility in 2014 with a capacity of 50,000 tpa Ni, to treat concentrate from Voisey’s Bay. The Rönnbäcken concentrate, with its high nickel grade compared to that of the Voisey’s Bay concentrate, and low PGM content, would make an attractive alternative feed at Long Harbour, as hydrometallurgical processing does not have the capability to refine PGM. The facility would, however, need to be modified to accommodate concentrates with higher impurity levels, including MgO.

The smelter at Harjavalta (which became part of the Nornickel Group in 2007) has been treating third party custom concentrates longer than all others, and is well equipped to do so. Having no nearby captive ore sources, it is effectively a fully custom smelter. It uses the Outokumpu double flash furnace for both smelting and converting (the 'DON' process). It employs a slag cleaning unit to improve metal recoveries, especially that of cobalt. Very competitive for Ni and Co, the smelter is less so for Cu and Au, Ag or PGM; however, it is close to port facilities, and is the closest smelter to Rönnbäcken, advantageous in terms of transportation costs and work-in-process inventory considerations.

The Fortaleza smelter in Brazil treats concentrate from Mirabela's new Santa Rita mine which went bankrupt in 2018 and is currently in re-start mode. Fortaleza uses the Outokumpu DON process, with the mattes shipped to and refined at Harjavalta. There is potential to provide additional concentrate to make up any shortfall. The smelter is limited in its capacity to accept higher MgO levels. Fortaleza`s total concentrate capacity is limited, and without the new smelter, could treat only part of Rönnbäcken's output.

China offers a good potential for off-take as a number of nickel concentrates from Australia and Spain are currently smelted there. The major nickel producer, Jinchuan, operates three smelters in China. At its largest smelting facility in Gansu, Jinchuan has capability of processing 350,000 tpa concentrate using a modified WMC smelter design, which itself was based on the early Outokumpu flash process. Metal recovery capability is competitive. Jinchuan has offered terms which have been very favourable to the supplier at times and has successfully sourced feed globally from third parties in Australia, Spain and Zambia. It has publicly stated that it will expand its smelting/refining capacity to meet China's needs, but cannot source adequate nickel supplies in China, thus suggesting it might wish to absorb all of the output of an external supplier such as Rönnbäcken. Jinchuan's facilities have the capability to take MgO-bearing feeds.

Jilin has recently doubled the capacity of its Ausmelt smelter with capacity of 200,000 tpa of concentrates to produce 15,000 tpa of nickel in nickel-copper matte. Some capacity for third party feeds may thus exist.

The grade of Rönnbäcken concentrate needs discussion in light of the smelting/refining processors in the marketplace. The likely need for blending has already been mentioned. Most striking is the high nickel content at 28%. This ranks the concentrate grade as one of the highest available in the nickel business, captive or custom.

Secondly, with a relatively low iron content at 9-10%, the Ni/Fe ratio is very high. In the smelting process the Fe creates slag which causes nickel losses; however, with a low Fe content, the slag quantities and hence nickel (and cobalt) losses should also be very low. This indicates that Rönnbäcken concentrate should realize the highest possible nickel accountabilities, at least 93%. Cobalt accountabilities should also be very good. The high grade, of course, also helps reduce the costs of transportation, handling and smelting on a unit cost basis (USD/lb nickel). The precious metal content, which, although low, may be sufficient to attract some accountability and revenue, particularly at higher prices. Considering the structure of typical custom concentrate contracts, the high grades indicate that this concentrate should be able to carry costs and charges over the whole range of foreseeable prices, and be able to survive the price lows while generating excellent returns to both parties at higher prices. The extent to which the grade advantage is offset by the need to blend or handle penalty elements must be determined through discussion and negotiation with each potential smelter/refiner.

The planned production rate should provide Rönnbäcken with some flexibility in negotiations and help in attracting competitive terms. Each of the four larger smelter/refiners has the capacity to handle all the production; however, as a hedge against strikes or other disruptions to production, Rönnbäcken could, for example, split the tonnage between two or more smelters. The split volume would still be sufficient to be attractive to a smelter/refiner.

In summary, a significant market has developed over the last 20 years for custom concentrates, one which is forecast to grow. Annual volumes of 20 to 25 kt nickel contained from Rönnbäcken are near ideal quantities with which to engage in this market. High grades allow a concentrate supplier to better carry extra costs of processing, if any, such as for penalty elements, while surviving periods of low prices. Returns to the supplier of the concentrate are subject to confirmation through final and binding negotiation with the smelter/refiners. With its very high grade and near ideal tonnage, Rönnbäcken concentrate should be very competitive in the custom concentrate marketplace.

19.1.2 Potential hydrometallurgy/custom concentrate treatment

Technological advances in battery manufacturing have led to new projects targeting direct-from-concentrate nickel sulphate for battery manufacture.

Terrafame is majority-owned by the Finnish state and started operations in August 2015, having acquired the assets of the defunct Talvivaara operation. The company owns the Sotkamo nickel deposit in Eastern Finland and uses bio-heap leach processing. At full capacity, the operation could produce 32,000 tpa of Ni-in mixed sulphide precipitate ("MSP"). The company has also committed EUR 240 M (USD 271 M) to building a nickel and cobalt sulphate plant at Sotkamo, making it the EU's first mine-integrated producer of nickel sulphate (Fraser, et al. 2021).

Blackstone Resources Ltd. is advancing nickel sulphide resources in Vietnam toward mining development while at the same time conducting a Prefeasibility Study and piolet plant-scale nickel sulphide refinery that would produce precursor nickel-cobalt-manganese ("NCM") for use in battery cathodes. Blackstone's business model is to supply the rapidly growing EV battery market in Asia from an integrated upstream and downstream operations.

The company believes that further development in these business models that provide nickel products customized to the EV battery market will grow and may provide Rönnbäcken with alternatives to the traditional smelter intermediary.

19.1.3 Nickel demand: forecast growth from electric vehicle industry

As described above, nickel is considered a key component in various cathode chemistries for EV due to it providing a desirable high energy density. The data and graphs from this section are from a 'White Paper' commissioned by the European Union in 2021 entitled: Study on future demand and supply security of nickel for electric vehicle batteries, External study performed by Roskill for the Joint Research Centre (Fraser, et al. 2021).

EV battery manufacturing capacity is forecast to grow from 444 GWh in 2020, to 2,000 GWh in 2030, and 4,900 GWh in 2040 on a global basis. Within the EU, EV battery manufacturing capacity is forecast to grow from 47 GWh in 2020, to 1,100 GWh in 2040

Nickel consumed by 'Giga factories' (large-scale battery manufacturing facilities) on a global basis is expected to rise from about 250 kt in 2020, to 1.5 Mt in 2030, and 2.2 Mt in 2040.

Figure 19-2 highlights current and estimated annual global nickel demand (2.41 Mt Ni) and forecast growth to 2040 with the demand more than doubling (>5.00 Mt Ni) driven principally from the growth in the battery sector.

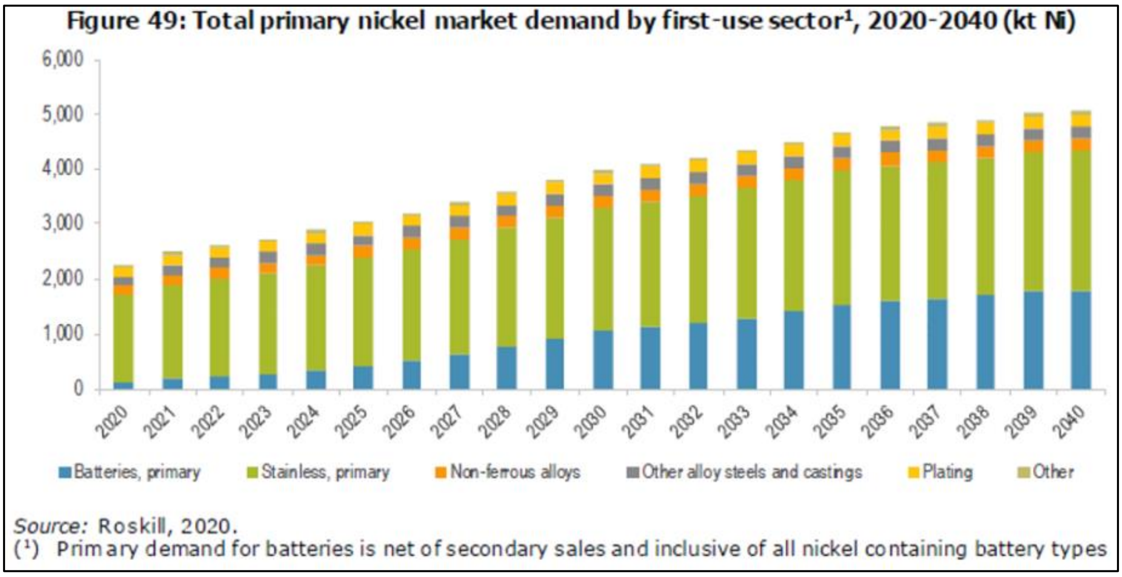


Figure 19-2: Total estimated primary nickel demand (Source: (Fraser, et al. 2021)

The White Paper (Fraser, et al. 2021) also highlights that globally, and within the EU, mine supply from nickel sulphide deposits is forecast to be flat due to no significant new projects recognized. The White Paper acknowledges that there is extra nickel mine supply capacity in laterite/saprolite class of deposits in tropical weathered terranes such as Indonesia and Philippines; however, the battery sector in the EU would very much prefer locally-hosted nickel sulphide deposits because of their ESG benefits over distal nickel laterite/saprolite deposits.

Figure 19-3 shows the EU supply and demand relating to batteries. By 2025, the EU would be in a structural deficit with a project maximum of 165 kt Ni by 2030.

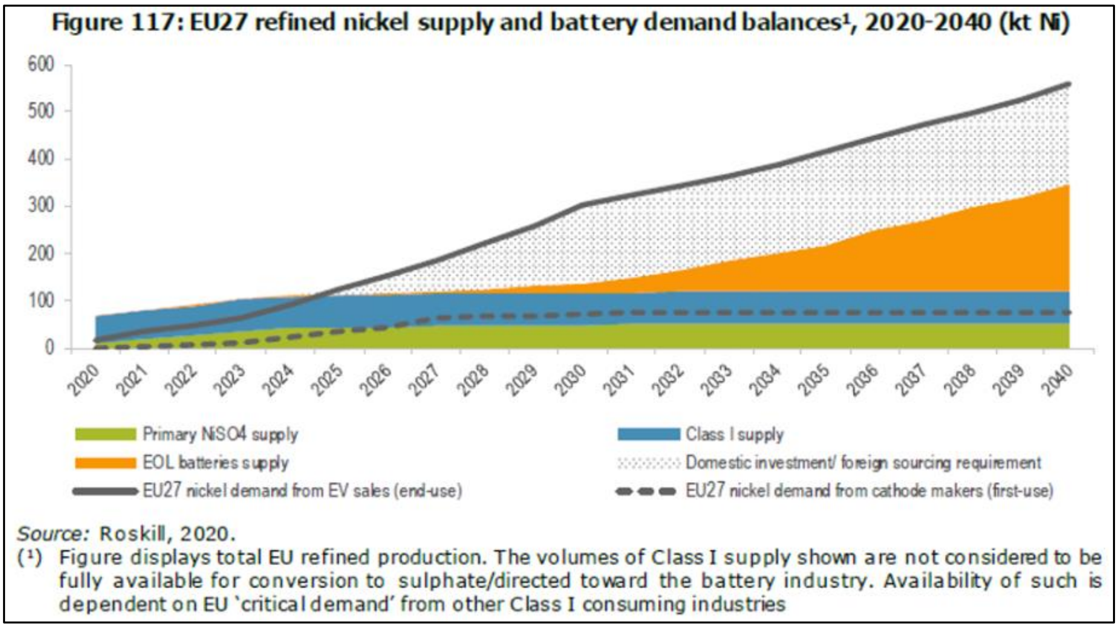


Figure 19-3: EU refined nickel supply and demand for batteries (Source: (Fraser, et al. 2021)

To meet the supply shortfall for EU sulphide nickel feedstock, the White Paper estimated the Ni supply deficit is plotted as cumulative investment (in billion euros "€ Billion") required in greenfield projects to meet the projected demand as shown on Figure 19-4.

It is also noted that the chemistry of batteries is likely to evolve with nickel predicted to become even more dominant at the expense of cobalt-bearing chemistries. Figure 19-5 is also from the White Paper (Fraser, et al. 2021) and highlights the predicted changes in chemistry that will increase the relative proportion of nickel.

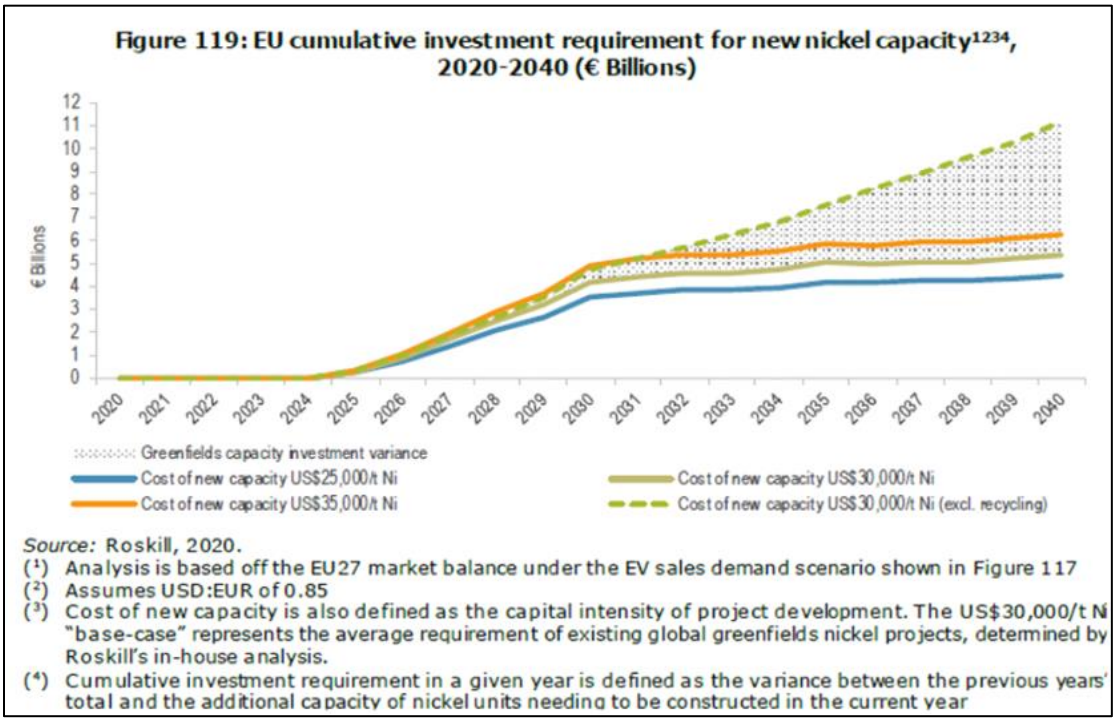


Figure 19-4: EU cumulative investment requirement (Source: (Fraser, et al. 2021)

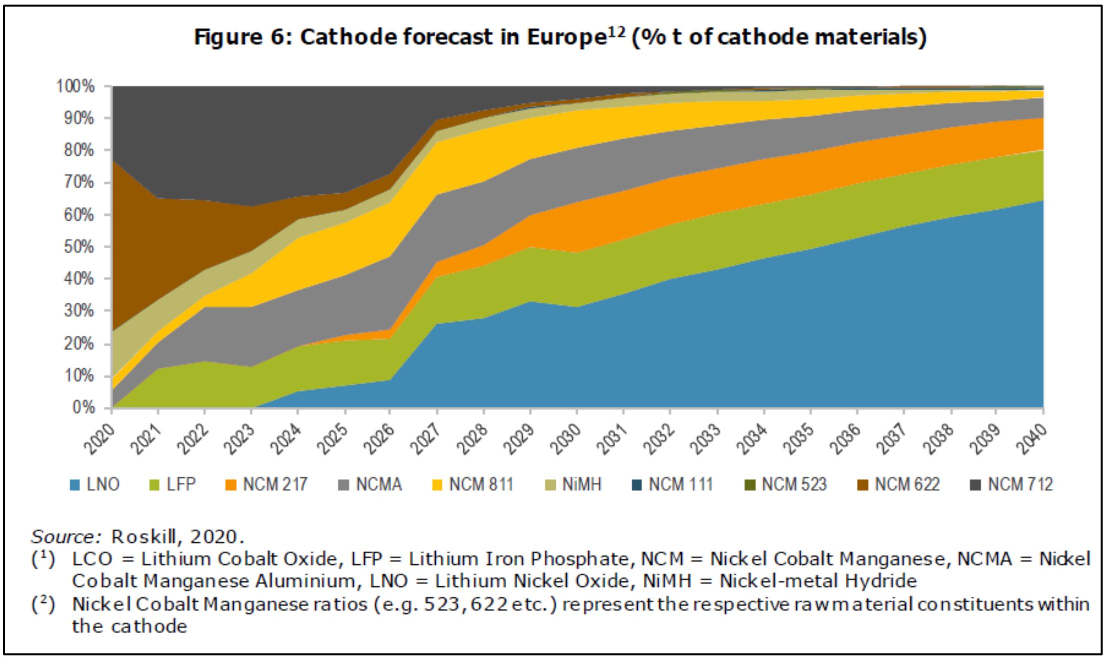


Figure 19-5: Battery cathode chemistries (Source: (Fraser, et al. 2021)

19.1.4 PEA Price

The current nickel selling price is currently at an 11 year high (spot price of USD 24,147.5/t or USD 11.0/lb on 18 February 2022). As shown on Figure 19-6, data from the London Stock Exchange (“MLE”) show the nickel price increasing by over 25% over the last 12 months whilst warehouse stocks have remained low due to high demand.

The Company believes that the Project can supply Europe with responsibly produced nickel sulphide feedstock for the burgeoning EV battery manufacturing industry which is requesting local supply chains with responsible ESG credentials including low carbon footprints.

In this context, the Company believes the Project could command a premium price and requested that SRK uses a price of USD 10/lb (USD 22,046/t) for the economic analysis. SRK checked this price against the CMF long-term price (“LTP”) for nickel that SRK often uses as a basis for economic assessment. As of Q1 2022, the median LTP across 11 analysts was USD 7.35/lb (USD 16,000/t), and so the USD 22,046/t used represents a 36% premium. Given the shift in market supply and demand, along with likely future preferential purchasing from lower-carbon sources (including influence of the EU CBAM requirements, see Section 20.4.6), SRK accepts this as a reasonable price for the purposes of the PEA. As part of the PFS, marketing studies will be undertaken for a more detailed economic analysis

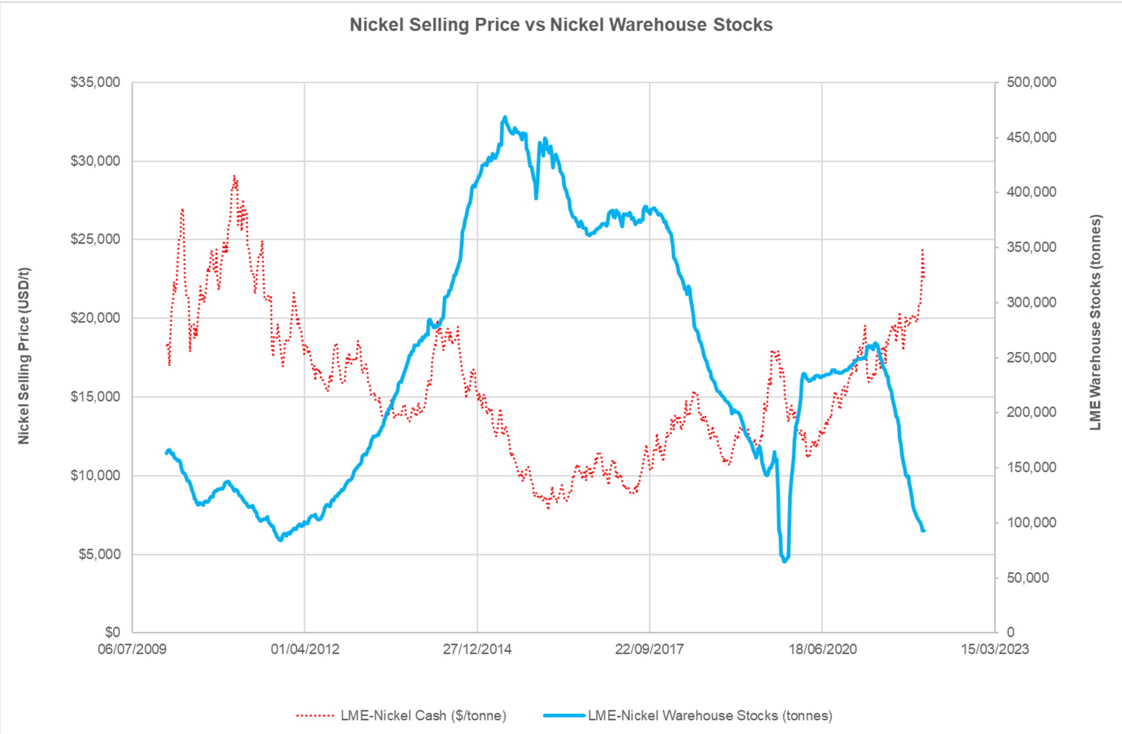


Figure 19-6: Nickel selling price and warehouse stocks (Source: LME, 2022)

19.2 Iron

19.2.1 Iron Ore Market

Iron ore, typically provided in the form of a concentrate or crushed and screened product, is used primarily in the steel making process where it is smelted in a blast furnace ("BF") with coke and limestone to produce molten pig iron, an intermediate product that is subsequently converted to steel.

Iron ore concentrate is used to make sinter or iron ore pellets, which, along with iron ore lump, are the primary raw materials used in the BF iron-making process. This process converts iron ore pellets, sinter, or natural lump ore into liquid pig iron, which is subsequently converted by integrated steel mills with small amounts of scrap to produce virgin steel in the BF process.

Steel is one of the fundamental building blocks of modern society and is generally considered to be a critical driver of economic and industrial development. Its end-market applications cover a wide range of industries including construction, engineering, heavy machinery, pipes and tubes, energy, automotive, packaging and appliances.

Global crude steel production has grown at a steady rate since the 1990s, with a record 1,900 Mt of crude steel produced in 2021 (Figure 19-7). This growth has been led by China, which produced over 1,050 Mt in 2020 (57% of global production). As a result of policy decisions and strong economic growth, Chinese demand has a significant influence on the global market for steel and iron ore.

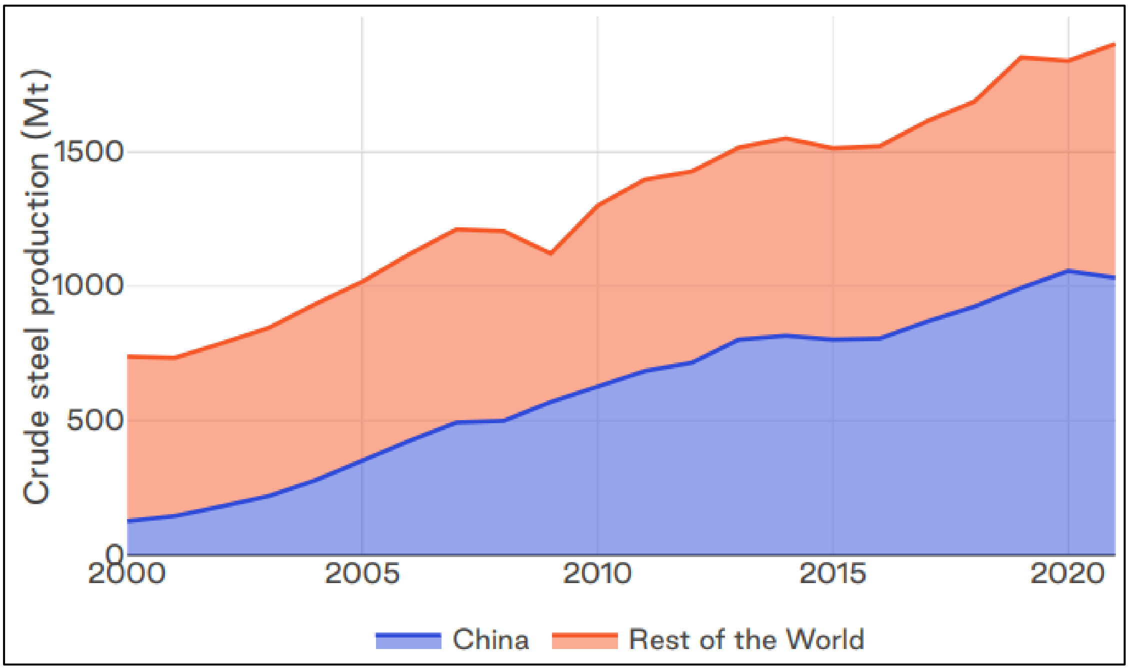


Figure 19-7: Crude steel production in China and rest of the world 2000-2021 (Source: (Worldsteel Association 2021))

In determining the price of a particular iron ore product, miners and steel mills consider four fundamental factors. These are the iron content, the chemical composition/impurities, granulometric characteristics and freight costs. That is to say, ores with identical compositions, delivered from the same point of origin will theoretically have the same price on a delivered basis. Value-in-use is a term used to describe the adjustments made against a benchmark price to account for differences in ore quality.

Prices for iron ore products are generally set against the '62% Fe Fines Spot Price' cost and freight ("CFR"[21]) North China benchmark prices and adjusted for value-in-use and freight differentials. The benchmark 62% Fe Fines Spot Price is typically considered to have the following quality parameters: 4.5% silica (SiO_2), 2% alumina (Al_2O_3), 0.075% phosphorous (P), 8% moisture and 0.02% sulphur (S). The costs incurred at a steel mill are influenced, to an extent, by differing ore chemistries. The premium and discount applied to the benchmark price for a specific ore is calculated based on the difference in iron content to benchmark and the impurity levels relative to trigger grades (silica over 5.5%). Key impurities considered are silica, alumina, phosphorus and sulphur.

19.2.2 Tata Steel study

A study was completed by Tata in 2015 on the potential to generate a pig iron or direct reduced iron ("DRI") (in the form of hot briquetted iron, "HBI") product from the iron (magnetite) by-product at Rönnbäcken. The below summarises Tata's findings:

- Tailings from nickel sulphide flotation operation can be used to generate a high-grade magnetite concentrate containing just over 66% Fe_{Total} using low intensity magnetic separation.
- Studies on the mineralogy of the concentrate material showed elevated levels of some deleterious elements (magnesium, chromium and nickel), even after grinding extremely finely to 99% < 0.020 mm (20 µm).
- Fastmet process was identified as being the most suitable route to DRI/HBI and either Fastmelt or AusIron as being the most suitable process for production of pig iron. Both methodologies would negate the need to pelletise the iron material but this is another option.
- Further detailed studies are required to confirm the mineralogy and chemistry including the variability across the three deposits.

19.2.3 PEA price

In the absence of a detailed demand-supply-price analyses from an iron ore market expert, SRK has sourced the median of LTP from an independent CMF. Furthermore SRK considers that the LTP as derived from such analyses to be appropriate for determination of Mineral Reserves, and, on inclusion of an appropriate premium (+30%), as appropriate for incorporating into support for assessing the economic potential of Mineral Resources.

For the economic analysis, SRK has assumed that the iron concentrate could be sold on the open market and used a price of USD 1.13/dmtu (which results in USD 74.6/t for concentrate grading 66% Fe). This is based on a median of forecasts from 10 analysts for CFR China (fines). SRK notes this is significantly lower than current spot prices (for example USD 1.79/dmtu on 17 January 2022). As part of the PFS, marketing studies will be undertaken for a more detailed economic analysis.

[21] Cost and freight (CFR) is a legal term used in foreign trade contracts. In a contract specifying that a sale is cost and freight, the seller is required to arrange for the carriage of goods by sea to a port of destination and provide the buyer with the documents necessary to obtain them from the carrier. With a cost and freight sale, the seller is not responsible for procuring marine insurance against the risk of loss or damage to the cargo during transit.

19.3 Cobalt

19.3.1 Cobalt Market

Cobalt is also used in the production of batteries, along with other speciality uses including superalloys, high-temperature alloys, cutting tools, magnetic materials, petrochemical catalysts, pharmaceuticals, steels and glaze materials.

The most significant driver of the demand for cobalt is the electric vehicle manufacturing industry; however, it is reliant on the chemistry of the battery, as described above. Due to the historic human rights issues relating to cobalt mined in central Africa, there has been a shift in momentum away from batteries reliant on cobalt to nickel-dominated chemistries such as NMO.

Currently cobalt mining – generally as a by-product from nickel and copper mines – is dominated by the Democratic Republic of Congo ("DRC"), but with China, the Philippines and Australia also key producers. Annualised production of mined cobalt material for the DRC and the rest of the world ("ROW") shown in Figure 19-8.

The following note on the future demand is reproduced from the Cobalt Institute (Cobalt Institute 2021): "*with annual market growth of over 5% since 2013 and a robust and growing market for cobalt in Lithium-ion batteries for Electric Vehicle applications, demand looks set to continue growing with increased focus on the battery sector. Strong growth is expected in electric vehicle demand and NEV sales are forecast to increase by nearly 30% year on year to 2025*".

Historic spot selling prices for cobalt are shown in Figure 19-9.

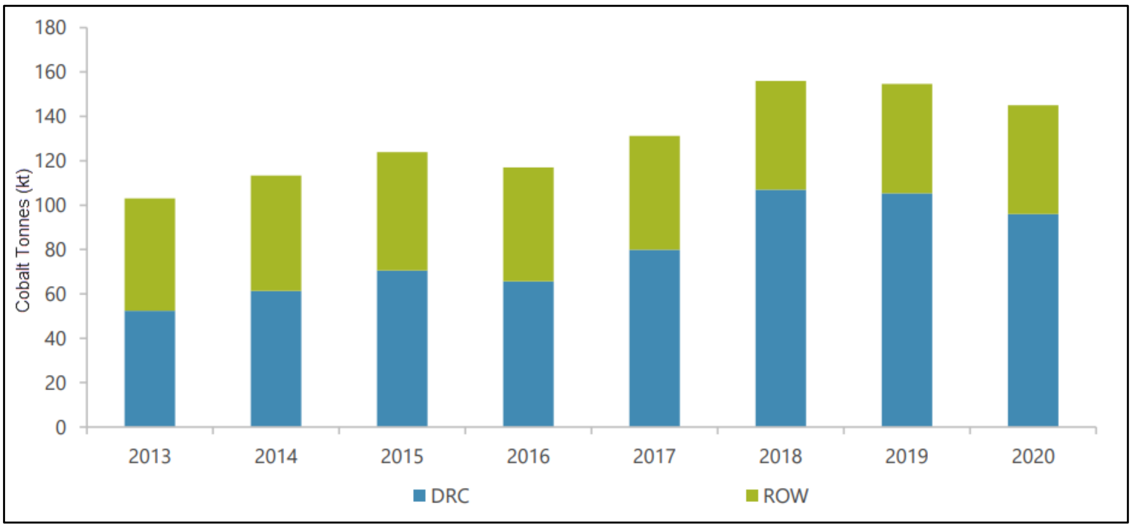


Figure 19-8: Cobalt production (Source: Roskill data (Cobalt Institute 2021))

Figure 19-9: Cobalt spot selling price (Source: dailymetalprice.com; 15 February 2022)

19.3.2 PEA price

In the absence of a marketing study for cobalt, SRK utilised the CMF LTP for the PEA. This results in a cobalt selling price of USD 20/lb (USD 44,092/t). As can be seen from Figure 19-9, this is significantly lower than current spot prices (for example USD 32/lb on 11 February 2022). As part of the PFS, marketing studies will be undertaken for a more detailed economic analysis.

20 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

This section highlights the potential salient issues and material risks identified for the environmental, social and governance ("ESG") aspects of the Project. The main source of information is the preliminary Environmental Impact Assessment ("EIA") reports (Swedish: *Miljökonsekvensbeskrivning*, 'MKB') completed in 2010 and 2011. This is supplemented with subsequent information primarily from SRK's site visit in September 2021 and information available in the public domain. SRK's comments on the status of these issues and risks is given along with an indication of whether they impact RPEEE for reporting Mineral Resources, are considered material to the Project and how they are planned to be managed.

20.1 Permitting Status, Land and Water Access Rights

The permitting status was discussed in Section 4.3. SRK notes the exploitation concession boundaries restrict the Mineral Resource for Rönnbäcksnäset. It is feasible this boundary could be adjusted in future if required; however, at this stage the concession boundary is used to define the limit of the Project under the ownership of the Company.

Water rights for those areas directly impacted by drawdown of water from the pits must be obtained prior to submission of the environmental permit application, whilst land access rights must be obtained before construction commences.

20.2 Approaches to Environmental and Social Management

Bluelake is yet to conduct active exploration in the Project area and does not currently have a technical team on the ground. On completion of the PEA, and assuming funding is available, the Company aims to create a team to run the Project including the MKB2 and PFS studies along with active stakeholder engagement.

20.2.1 Management systems and plans

Bluelake does not currently have an environmental management system ("EMS") or health and safety management system in place. In addition, no environmental management plans ("EMP") have been produced for specific activities. Prior to conducting the next phase of Project technical work, including any exploration drilling and testwork, SRK expects the Company will have EMP developed and will consider an EMS.

20.2.2 Governance standards

Bluelake is a publicly-listed entity on the Nordic Growth Market Small-Medium Enterprise stock exchange ("NGM Nordic SME"). This exchange is not a regulated market and, as such, has limited requirements in terms of governance and required filings.

Bluelake will develop a strategy for ESG reporting, including which governance frameworks to align with, as part of the PFS and ESIA.

20.2.3 Waste and water management

There are no planned exploration activities for the Project and so no management procedures or EMP are in place to cover waste and water management. Prior to conducting the next phase of Project technical work, including any exploration drilling and testwork, SRK understands the Company will have procedures developed to manage waste and water aspects.

20.2.4 Greenhouse gas emissions and climate change

The Project is located in Sweden, part of the EU, with mandatory legislation and requirements in terms of GHG emissions and climate change action. The Company aims to operate a low-emission mine and create low-emission products through a decarbonisation strategy. Prior to conducting the next phase of Project technical work, SRK understands the Company will have procedures developed to manage GHG emissions.

20.2.5 Stakeholders

Bluelake is in dialogue with a number of key stakeholders, including the local authorities, local communities, investors and partners, and will continue to do so as the Project progresses. Prior to conducting the next phase of Project technical work, SRK understands the Company will have stakeholder engagement procedures developed.

20.2.6 Health and Safety

There are no planned exploration activities for the Project and so no health and safety management procedures are currently in place. Prior to conducting the next phase of Project technical work, including any exploration drilling and testwork, SRK understands the Company will have an occupational health and safety management plan.

20.3 Environmental and Social Studies

Baseline environmental and social studies for the Project were completed as part of the MKB1 studies between 2009 and 2011, in anticipation of developing the environmental permit application that was planned to be submitted to the Environmental Court in 2012. Due to cashflow issues with the previous parent company, IGE, this process was not completed and no application for an environmental permit has been submitted to date.

Table 20-1 lists the baseline categories as defined by EU legislation and the corresponding categories under Swedish legislation. It indicates which of these were investigated for the Project and which consultancy performed the works. Figure 20-1 illustrates the geographical extent of the studies carried out to date in the Project area.

Table 20-1: Baseline requirements and completed work

EU EIA[22]	Swedish Environmental Code[23]	Nickel Mountain EIA Baseline categories	Company
Population	People, incl heatlh	Human beings	Nickel Mountain
Flora and fauna	Animals & plants	Biodiversity	PelagiaMiljökonsult AB
Water	Water	Surface water	PelagiaMiljökonsult AB
Water	Water	Groundwater	Ambiental
Soil	Land	Soil	Ambiental
Air	Air	Air	Nickel Mountain
Climatic	Climate	Climate	Ambiental
Material assets[24]	Cultural environment	Cultural heritage	LK Konsult, 2009 & 2010
Landscape	Landscape	Landscape/geography	Perbkonsult
Population	Cultural environment	Indigenous people	Hifab,
Population; Material Assets	Cultural environment	Macro economics	Nickel Mountain
Population; Material Assets	Cultural environment	Micro economics	Nickel Mountain
Inter-relationship between factors	Management of land, water and the physical environment in general	Captured during impact assessments	Perbkonsult

Figure 20-1: Extent of the MKB1 baseline studies (2011)

22 EU EIA Dir Annex III paragraph 3
23 Swedish Environmental Code (Eng lang vers), Chapter 6, Section 3
24 Including the architectural and archaeological heritage

20.4 Opportunities and benefits

SRK has identified a number of key opportunities and benefits the Project could have on various stakeholders.

20.4.1 Socio-Economic Benefits

As with many inland communities in the north of Sweden, Storuman Municipality has been experiencing depopulation over recent decades. This trend shows no sign of abating. Quality of life through rewarding employment opportunities is one of the key reasons for this trend. The Project may halt or even partially reverse this trend through the employment creation when the operations are in full production. This provides the Storuman Municipality some 20 years to develop alternative business and commercial sectors and to diversify the economy, using the Project as an economic driver.

The following socio-economic benefits are expected to arise from the execution of the Project:

- Employment created directly at the mine (direct employment). It is estimated that the planned operations could result in approximately 550 direct employment opportunities at full production including contractors and sub-contractors. This includes approximately 300 in the mine, 125 in the plant, 75 in logistics/infrastructure, 25 technical services (geology, mining, environment, health and safety etc.) and 25 auxiliary staff.
- Employment created in the local economy (indirect employment) via subcontractors and service industries in the surrounding communities.
- Local economic activity increase.
- Taxes and other revenue for the public sector increase, which may be used to improve:
  - infrastructure such as roads and energy supply infrastructure; and
  - municipal services such as education, health care and other public services.
- Improved international exposure of the region for other investors, including other mining companies.
- Demographic and other social parameters may improve through the movement of workers and their families into the area.
- Availability of goods, services and operations in the region improve.
- Tourism (post-mining) may benefit from improved and increased housing and infrastructure in tourist centres of Hemavan and Tärnaby.

Although SRK notes they were completed in 2011 and require updating as part of MKB2, according to the MKB1 studies, the impact of the operations on the social economy has been assessed to be positive.

20.4.2 Governmental support

Although there are some serious as yet unresolved stakeholder concerns (see Section 20.5), the Project has received support from governmental organisations. This includes the Storuman Kommun, as indicated in its zoning plan (Section 5.6 and Figure 5-12) and by the Mining Inspectorate through approval of exploitation concessions.

20.4.3 Low sulphide and heavy metal content

The low sulphide content of the material in addition to the relatively high ratio of calcium to sulphur is considered to benefit the Project. The waste produced, either as waste rock during mining or as tailings, is expected to be low in sulphides (and therefore unlikely to be acid-forming) and high in calcium (neutralises acid). It is worth noting that all of these initial conclusions on geochemical behaviour are only based on analysis of four waste rock samples and no tailings samples. If the initial assessment is correct, then this would result in a relatively low acid-generating potential. In addition, the sulphide material present is almost entirely in the form of nickel-sulphides with low levels of other sulphides (such as pyrite and chalcopyrite). This also leads to a low quantity of waste containing sulphides.

Levels of other deleterious elements, such as heavy metals (for example lead, cadmium), are also low. This reduces the potential toxicity of the waste and any contact water (water coming into contact with the material). During the humidity cell tests there was some leaching of potentially deleterious elements by some of the cells, the proportion of the full scale waste rock dump that these cells represent needs to be determined to ascertain any potential impacts.

Detailed geochemistry studies will be needed during future project development studies to fill these gaps and confirm these assumptions and ensure alignment with the extractive waste regulatory requirements. Such studies can have relatively long lead times and thus will need to be prioritised during the PFS.

20.4.4 Low stripping ratio

Given the thick, outcropping nature of the mineralised bodies, there is an estimated low stripping ratio (low waste component compared to ore). This results in relatively low quantities of waste rock to be handled and stored.

20.4.5 EU Green Deal and critical materials

The introduction of the European Green Deal announced by the European Commission in 2020 is significant for the Project. The aim of the Green Deal is to facilitate the energy transition, decarbonising technology, combat climate change and reduce environmental degradation with promises including ensuring the EU provides '*globally competitive and resilient industry'.* Part of this green deal is a focus on sourcing of raw materials for low-carbon technologies, such as batteries, through building secure supply chains within Europe and specially the EU.

The Project is well-placed within the EU to provide two key battery metals, nickel and cobalt, to the EU market. In particular, the European battery factory is rapidly expanding with approximately 30 projects either planned or in construction as of late 2021. The majority of the batteries will contain a significant proportion of nickel and cobalt. The EU does have nickel producers in the region, notably Boliden's Kevitsa mine and Harjavalta smelter, but currently none in Sweden. The demand for battery metals is expected to increase significantly once the battery factory production increases. Although nickel is not currently considered as a critical raw material by the EU, cobalt is on the 2020 list[25], and nickel is being "monitored closely, in view of developments relating to growth in demand for battery raw materials due to the high economic importance" (European Commission 2020).

[25] *Critical raw materials (europa.eu)*

20.4.6 Decarbonisation

Decarbonisation is the reduction of CO_2 emissions (and other contributing GHG such as methane and nitrous oxide) through changes in design to avoid emissions and the use of low-emission technology, achieving a lower output of GHG into the atmosphere. To meet expected national and global expectations regarding GHG emissions, new projects will need to show how their designs have considered decarbonisation of the construction and operations processes. Best available technology and methodologies for decarbonisation are advancing rapidly.

Mining activities consume significant quantities of fossil-fuels for transport, processing and power. In Sweden, due to the dominance of hydroelectric power, there is a lower reliance on fossil fuels from the grid compared to most countries globally. This allows the Project to have a relatively low carbon footprint if electrification of equipment is considered. Currently, electrification of large-scale mining vehicles is in the development and research phase but is developing quickly. Electrification will undoubtedly have a key role in reducing the carbon footprint of the mining operation when electric vehicles become available.

Three categories of emissions require assessment and strategies for reduction:

- Scope 1: Direct emissions by the Company from processes on-site and activities controlled by the Company; for example, fuel usage of vehicles and generators along with other sources of emissions source as explosives.
- Scope 2: Indirect emissions required for the operation for example, electricity or heat generation purchased from the grid.
- Scope 3: All other emissions related to the Company's activities, services and products within the entire supply chain; such as downstream (customers, sub-contractors) and upstream (consumables, equipment providers and manufacturers). These are harder to quantify, but these can be further investigated during the PFS by requesting equipment suppliers to provide GHG emission information as part of their tender processes.

As with the actions on reducing environmental and social impacts, there is a clear mitigation hierarchy as to how to action change:

- Avoid: This is the highest priority and is considered the best strategy.
- Mitigate: If an impact cannot be avoided, reduce the impact through mitigation strategies.
- Compensate (or offset): If an impact cannot be avoided or mitigated to the point of being negligible, the last strategy is compensating or offsetting for the impact.

Table 20-2 describes a number of possible approaches (as currently envisaged) to decarbonising the Project; this list is not exhaustive and is intended to provide a brief overview of some areas that can be considered during the next phase of project development. The options will have capital and operating cost implications, which SRK is currently unable to assess but can be addressed in more detail as part of the PFS.

In addition to the national and EU requirements to lower GHG emissions to meet this target, the Company has the vision of constructing a low-impact Project. As stated on the Bluelake website, the Company strives "*to conduct a maximum resource and environmentally efficient operation during the period up to the mine start, during mining and after mining operations have ended*".

Table 20-2: Strategies for decarbonisation

Area	Strategy*	Comment
Power Supply	Green Tariff (S2)	Northern Sweden has abundance of renewable energy sources; a "green tariff" will be sought.
	Power demand reduction (S1/S2)	The aim will be to utilise the most effective technology to reduce power consumption.
	Back-up power generation (S1)	Traditionally these would be diesel generators, but biodiesel could be used or a battery system (a battery system has higher upfront capital requirements).
	Energy trade-offs (S1/S2)	Across the project as part of the PFS there will need to be trade-off studies to identify the lowest emissions options for various functions and processes (e.g. inclusion of conveyors versus trucks). There will also be capital and operating cost implications. In this PEA, road-haulage is assumed – this does not impact power supply although charging of electric trucks will add additional burden to the power supply.
	Site specific renewables (S1)	The installation of wind turbines to provide energy to ancillary infrastructure can be explored.
Heating and hot water	Alternative fuels (S1)	Significant amounts of heating and hot water will be required. Alternatives include biomass fuel, electrical power (under a green tariff) etc.
Construction	Alternative fuelled construction equipment (S1)	Battery electric / hydrogen fuel cell powered construction equipment is being developed and may be available for construction.
	Low carbon building materials (S1)	Sweden is a world leader in the advancing "green steel" production industry (replacing coking coal, traditionally needed for steel making, with fossil-free electricity and hydrogen). Use of fossil-free steel and low carbon concrete ('green cement') will need to be explored in more detail.
	Re-use of site won materials (S1)	Reduce, re-use, recycle will be a key driver in the design work to optimise costs, reduce wastage, optimise footprints.
	Low-Carbon Building Materials (S1)	There are many initiatives into low carbon building materials including use of building materials made from recycled materials.
	Repurposing construction for permanent infrastructure (S1)	For example, construction office being repurposed to operations offices; this will reduce capital cost and wastage.
Processing reagents	Identifying low-GHG sources of reagents (S3)	As shown in Minviro's LCA (Section 20.6), reagents used in the processing plant contribute significantly to the global warming potential. Finding suppliers with low embodied GHG emissions could help reduce this impact.
Transportation (Product)	Alternative fuels (S1)	Sweden is at the forefront of battery electric vehicle technology and is reported to have a circa 35% penetration into the vehicle market. The option for battery electric trucks is considered in the report. Other options include hydrogen fuel cell or biodiesel. In recent years, northern Sweden has transformed into a region of innovation and growth and green hydrogen and green steel is a key part of this.
	Maximise export by rail (S1)	Rail transport is understood to in general reduce emissions compared to road haulage (diesel trucks). Railway system should be used where possible.
Supply Chain	Maximise importation by rail (S1)	The Project will utilise railway where possible instead of road transport.
	Petition for electrification of the Inland Railway (S3)	The inland railway line and connection to Umeå is yet to be electrified. While it is beyond the scope of the project to electrify the Inland line, the development of the project may well promote the national rail infrastructure owner to move in this direction to decarbonise supply chains in the area
	Load optimisation at railhead (S1)	Use of the export trucks for backhaul of consumables from the railhead will optimise emissions
	Low-emission suppliers (S3)	Influence other companies in the supply chain to reduce emissions and preferentially selecting suppliers/customers on their own emission reduction strategies.
Offsetting	Carbon sequestration	The potential of the Project to sequester carbon for example in tailings could be assessed. See Section 20.4.7
	EU Emissions trading scheme (EUETS)	The EUETS has been in place since 2003 and is prescribed in EU Directive 2003/87/EC 'Establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC'. SRK has reviewed the planned activity against the qualification criteria in Annex I of the Directive and at present has not identified any aspect of the activity that would mandate the Project's inclusion in the EUETS. However, the policy and legislative landscape around GHG, and in particular their pricing, is changing rapidly.
	Sweden carbon tax	In addition to the ETS, Sweden has a separate carbon taxation scheme[26]. The tax is "levied on all fossil fuels in proportion to their carbon content, as carbon dioxide emissions released in burning any fossil fuel are proportional to the carbon content of the fuel". As of 2021, a price of SEK 1,200/t CO_2 is recommended (USD 133/t using SEK 9:1 USD). This is directly applicable to industries and individuals burning fossil fuels and is therefore included in the TEM for the non-electric scenarios as part of this PEA.

**S1, S2 and S3 relate to Scope 1, Scope 2 and Scope 3.*

20.4.7 Carbon sequestration

Bluelake retained the services of Carbin Minerals Inc ("Carbin") to undertake a high-level assessment of the carbon sequestration potential of the tailings at Rönnbäcken. The section below is taken from a memo produced by Carbin for Bluelake in February 2022.

The most durable form of carbon storage is to convert the CO_2 that is present in air and anthropogenic emissions into mineral carbonates (Lackner 2003), a process referred to as *carbon mineralization*. This process proceeds naturally during chemical weathering, but at a slow rate. Increased reactive surface area in finely ground ultramafic mine tailings speeds up these reactions (Wilson, et al. 2014), thus presenting an opportunity to reduce the GHG emissions of some mines. Because the capacity for carbon storage in ultramafic tailings is typically much greater than mine emissions, these mines have the potential to become sites of negative emissions, contributing towards permanent carbon removal from the atmosphere.

The reactions that sequester CO_2 require reactive minerals that supply divalent metal cations (typically Mg^{2+} and Ca^{2+}). The carbon mineralization potential of ore and tailings is therefore primarily dependent on mineral content. Ultramafic rocks are rich in Mg and can contain minerals that react quickly with air and groundwater. They can be broadly classified as fresh igneous rocks dominated by olivine and pyroxene, as hydrated versions dominated by serpentine (serpentinites), and as carbonate-altered equivalents that contain talc, magnesite and/or quartz (ophicarbonate, soapstone, and listwanite). Thermal metamorphism of serpentinites can further diversify the mineralogical content to include chlorite, amphibole, pyroxene, and olivine. Of these rock types, serpentinites are generally the most reactive upon exposure to CO_2 in air. This is because of the high specific surface area of serpentine group minerals and the presence of accessory phases, such as brucite and hydrotalcite minerals, which form during serpentinization react and are highly reactive to CO_2 (Wilson, et al. 2014); (Turvey, et al. 2018)).

Based on the provided mineralogical data, the capacity for carbon mineralization at Rönnbäcken is estimated based on two assumptions. The first calculation assumes that mineral reaction rates are limiting to CO_2 mineralization. It assumes complete extraction of labile magnesium from serpentine via mineral surface exchange reactions based on experimental data for reaction of serpentine with CO_2 at concentrations of about 400 ppm. These data are derived from laboratory leach tests (Lu, et al. 2022). Results, presented in Table 20-3, indicate that mineralization rates of up about 60 kt CO_2 per year could be realized.

Table 20-3: Annual CO_2 mineralization potential based on mineral reaction rate

Item	Quantity	Unit	Source
Tailings production	27	Mtpa	2022 PEA SRK
Tailings serpentine content	85%	Percent (mass basis)	Testwork,
Serpentine labile Mg content	0.6%	Percent (mass basis)	(Lu, et al. 2022)
CO_2 mineralized per year	57,300	Tonnes CO_2/year	Calculated

[26] Sweden carbon tax: Sweden's carbon tax - Government.se

The second estimate is based on the rate of CO_2 transport to reactive mineral sites, based on field studies at the Mount Keith Nickel Mine (Wilson et al. 2014). These rates are assumed to apply across an estimated land area of the tailings management facility of 11 km^2 and it is assumed that CO_2 capture can operate for on average three months per year in the summer months. Estimates for CO_2 capture under winter conditions are not currently available and that rate is likely much less than in summer months because liquid water is required for reactions to proceed. Based on these calculations an annual carbon mineralization rate of about 5,400 t CO_2 per year is estimated, as shown in Table 20-4. These estimates are highly uncertain due to the substantial difference in environmental conditions between the Rönnbäcken site and those at the Mount Keith nickel mine. It is unlikely that passive rates of carbon capture at Rönnbäcken will exceed these rates.

Table 20-4: Annual CO_2 mineralization potential based on CO_2 transport rate

Item	Quantity	Unit	Source
Tailings management facility	11	km^2 in land area	2022 PEA SRK
CO_2 capture rate from air	0.20	kg CO_2/m^2/month	Wilson et al (2014)
CO_2 mineralized per month	2,220	Tonnes CO_2/month	Calculated
CO_2 mineralized in three months	6,600	Tonnes CO_2/year	Calculated

The rate of carbon mineralization will generally be limited by either mineral reaction rate or CO_2 capture rate, and whichever is slowest will dictate the overall rate of CO2 capture. On that basis, it is estimated that the rate of CO_2 capture from air under passive conditions will be approximately 6,000 t CO_2 per year or less. No studies in to the impact of 'active' sequestration have been completed to date, i.e. speeding up the process through improving the environmental conditions for reactions.

These estimates of carbon mineralization rate are highly uncertain due to the lack of carbon reaction capacity of Rönnbäcken tailings under the environmental conditions of the tailings storage facility. They also rely on average bulk mineral data and assume that highly reactive minerals such as brucite and hydrotalcite are absent. Even trace amounts of these minerals could substantially increase the carbon mineralization potential of the tailings. Based on available rock bulk chemical data, it is estimated that about 5% of ore could contain these minerals. For example, 235 of 3,110 drill core assay samples contain bulk MgO contents of >40 wt.%. This is a typical threshold for presence of trace minerals such as brucite and hydrotalcite.

20.4.8 Climate change adaptation

Along with reduction in impacts associated with the Project, climate change is already modifying local climate conditions and will continue to do so for the foreseeable future. As a result, it is important for a major infrastructure project, such as a mine, to embed climate change adaptation into the project design. Predictions on future changes to climate are provided in Section 5.2.5.

This changing climate may require adaptations in design of the Project, particularly for assuring long term stability of remaining infrastructure post-operation (such as the WRD and TMF). This includes considering the impact of elevated temperatures on the duration of ice and snow cover along with increased quantity and pattern of precipitation that may require management.

20.4.9 Industrial zone / modified water body

The lake surrounding the Project area is classed as 'heavily modified water body' under the EU Water Framework Directive (2000/60/EC), as the lake was formed due to the Ajaure hydroelectric dam, meaning the area has already been significantly modified for industrial purposes. This will be taken into consideration during the environmental permitting phase of the Project.

20.5 Salient issues and material risks

The salient environmental and social issues along with material risks to the Project identified through a review of the MKB1 studies and other available data are summarized below with the exception of mine closure and rehabilitation, which is discussed in Section 20.7.

Salient issues are described as issues that could potentially cause harm to the people, the environment and flora and fauna. Material risks are considered as those issues that may cause financial or reputational loss as a result.

It was noted the majority of impacts occur during construction when site preparation takes place and infrastructure, roads and transport corridors are built. This largely includes land clearance, which has an impact on local biodiversity and will cause change to the currently quiet and peaceful nature of the area.

20.5.1 Reindeer husbandry

Rönnbäcken is located in an area that includes prime land for the Vapsten Sámi village for reindeer husbandry (Swedish: *rennäringen*) all-year round. An impact assessment, including limited social aspects, was completed in 2009 in cooperation with Vapsten Sámi village to better understand potential impacts and to identify potential mitigation measures (Hifab International 2009). A key concern is whether the project will irreversibly impact on the Vapsten Sámi village's ability to continue reindeer husbandry practices in the future. Because of this Vapsten Sámi village has objected to and is opposed to the establishment of the Project.

Parts of the Project area are classified as a 'Core Area' of National Interest for Reindeer Husbandry (as shown on Figure 5-10), with a reindeer migration route passing through the Project area, utilised twice per year. The 2009 impact assessment concluded the following key impacts on the Vapsten Sámi village:

- reduced grazing land, including increased risk for predation due to reindeer being concentrated on a smaller grazing area;
- impact to the migration route;
- disturbance to reindeer through project activities;
- likely increase in man-hours to compensate for the changes to husbandry patterns;
- increased risk of traffic accidents involving reindeer;
- increased need for supplementary feed.

Potential management measures suggested by the 2009 study included:

- creation of a specific communication channel between the Company and Vapsten Sámi village;

- knowledge sharing such that Company employees understand the specifics of reindeer husbandry and how their work may impact upon it, and for the Vapsten Sámi village members to learn about the proposed mining operations to better aid planning reindeer husbandry activities in the area;
- localisation and design of project infrastructure to reduce as much as feasible intrusion into grazing and migratory lands, and to integrate project infrastructure with the natural environment;
- construction of fences to prevent reindeer, in particular those unmarked, moving into neighbouring Sámi villages;
- construction of a new migratory path around Rönnbäcken;
- protection and care of valuable lichen areas where in proximity to project infrastructure;
- timing of project activities to take into consideration particularly sensitive periods for reindeer husbandry;
- support for any additional labour or other resources required as a consequence of the project; and
- rehabilitation and revegetation plan such that post-closure the Vapsten Sámi village can continue reindeer husbandry across the area.

20.5.2 Noise, vibrations and dust

During operations, sustained activities, such as heavy vehicle transport, blasting, excavation, transport and crushing of ore, deposition of waste rock and tailings, leads to a consistent level of impact including noise, dust, vibration, blast waves and regulated discharges to water and air and unregulated discharges to soil. These can cause impacts based on intensity, frequency, duration and consequence of the activity. According to the 2011 MKB1 studies, such impacts can be mitigated or reduced to acceptable levels.

Due to the host rock containing natural fibre-bearing asbestiform minerals (such as serpentine minerals chrysotile), there was concern raised by stakeholders relating to air quality. Although some testwork has been completed (Section 7.4.5 and 7.4.7), further detailed assessments specific to the impact of blasting on airborne fibres along with potential carbon mineralization (with dual effect of sequestering CO_2) is required.

A small number of permanent and temporary residences and properties will need to be acquired purchased to mitigate any risk to people and/or property from blasting and mining activities.

Following cessation of mining activities, most impacts cease and conditions will gradually return to the prior to Project circumstances; however, there will be residual impacts in the form of pits lakes and topographic highs formed by the WRD and TMF.

20.5.3 Water

A description of water bodies and water quality is provided in Section 5.2.2. A description of current vision of water management techniques and water use requirements is provided in Section 18.11. This section relates to potential impacts related to water during construction and operation.

The Project is not expected to lead to any reduction in the water quality of the area, due to integrating water protection measures into project design, such as diversion channels to keep contact and non-contact water separate, and collection of contact water, pumping it to clarification ponds before release (assuming it complies with stipulated release standards).

The Rönnbäcken/Raavrejhoke river, southeast of the Rönnbäcksnäset deposit is an important trout breeding river as discussed in the MKB1 studies. Engineering design will be used to ensure this migratory route is not impacted; the planned location of the TMF may require a diversion for the Rönnbäcken river with a new outlet into Atjiken (Aetjehke) lake. Figure 20-2 provides the location of the main water bodies (lakes and rivers) in and around the Project (previously separate, the conjoined lakes are now all part of the Gardiken reservoir).

The placement of the TMF in Gorkotjärn-Stenträsket lakes reduces water storing capacity of the reservoir resulting in a limited loss of revenue from hydroelectric production. This loss of revenue is due to the reduced ability to keep water volume from summertime to wintertime, with a limited loss of power value for the producer as power in wintertime is priced higher than in summertime; however, the overall annual power production is not expected to be reduced. After decommissioning of the operations, it may be possible to return water storing capacity to the reservoir by connecting it to the water-filled open pits. No financial implications have been assumed in the technical economic model as part of this PEA related to loss of earnings.

The placement of the TMF is also predicted to result in the loss of bottom fauna and fish habitat; however, Lake Gardiken is classified as a heavily modified water body with annual water level amplitude of some 20 m. This means the banks of the lake presents significant challenges for the natural biodiversity to establish, notably bottom fauna.

The three pits and WRD cause some loss of water catchment area with a corresponding loss of direct water runoff into Gardiken, which is expected to be compensated by increased flows via other routes. Runoff from the waste rock management facilities and precipitation in the pits, along with groundwater infiltration, will be directed to the clarification pond for use in process plant.

Groundwater drawdown around the pits is expected, although along fracture zones it may extend further. Sealing of such fracture zones by cement injection may be necessary and would limit such drawdown. Given the low-pressure gradient and low hydraulic conductivity, impacts to groundwater are currently considered to be minor but further studies are required to confirm this.

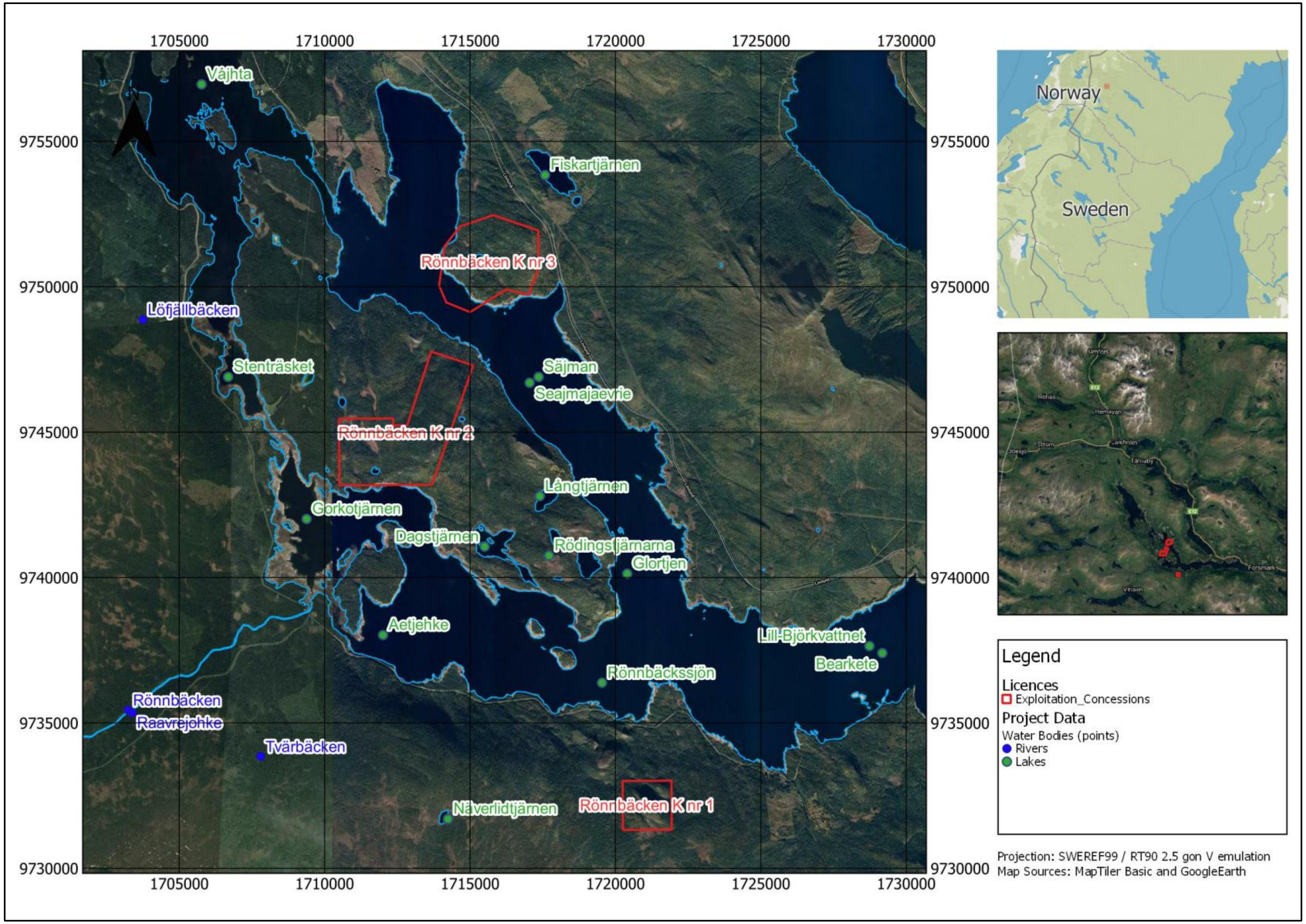


Figure 20-2: Location and name of main water bodies around Project (lakes = green dots; rivers = blue dots)

20.5.4 Landscape

The operations will lead to changes to the existing landscape. Pit lakes and new topographic highs from the waste rock and tailings storage facilities will remain once operations cease. These need not be negative impacts; especially as acid rock drainage potential is expected to be limited and mitigated through design of the facilities including how they are closed. With capping and re-vegetation, these new topographic highs may return value to local stakeholders by replicating the pre-existing vegetation.

20.5.5 Non-Sámi Swedish cultural heritage

The Project is situated close to a protected cultural monument in the Voltjajaure kapell (church). It is located close to the village of Lövlund on the northern side of the reservoir. Within the current plan, it will be within 2 km of both the Sundsberget pit and processing plant infrastructure. Consideration is required when planning activities are close to the church so as to avoid impacts where possible. Engagement with stakeholders related to the church will also be important as part of the MKB2 study.

20.5.6 Summary

The section below summarises SRK's understanding of the salient issues and potential material risks for the Project along with some preliminary thoughts on potential management solutions. It is recommended these provide the main focus of the MKB2 studies to understand in detail and develop management processes:

- Reindeer husbandry and Sámi culture:
  - Main issues: mining and processing will have a direct negative impact on land use rights and ability to herd reindeer through noise, increased traffic and construction of the TMF.
  - Potential management solutions: engage local team to start-up the dialogue with the Vapsten Sámi village to further refine mitigation measures with a view to ensure reindeer husbandry can continue effectively at the same time as mining operations take place.
- Resettlement:
  - Main issues: dwellings may require to be relocated and people resettled.
  - Potential management solutions: design to have least impact on settlements, compensation or land acquisition may be needed, ideally through mutually negotiated settlements.
- Noise, vibrations and dust:
  - Main issues: construction, operations and product transport produce emissions that impact surrounding people, flora and fauna. Additionally, presence of fibres from asbestiform minerals such as chrysotile (serpentine) can cause negative health impacts.
  - Potential management solutions: dust suppression, noise barriers (for example waste dumps on pit edges), working hour restrictions. For fibres, carbon mineralization may assist with reducing airborne fibres and also capture CO_2.
- Biodiversity and nature values:

  - Main issues: project footprint impacts on some areas of high nature values that may be eligible for protective status.
  - Potential management solutions: avoid highest nature value areas where possible, identify habitat available nearby for vulnerable species relocation if possible.
- Landscape:
  - Main issues: changes to the existing landscape.
  - Potential management solutions: post-operational land use changes, such as for reservoir storage.
- Non-Sami Swedish cultural heritage:
  - Main issues: no major values directly impacted by the Project; noise from operations may cause an indirect impact on part of the heritage value area (church).
  - Potential management solutions: possibility of cooperating as the Project develops by flooding the disused pits in the post-operation phase.
- Hydroelectric power:
  - Main issues: TMF within Lake Gardiken would reduce the capacity and therefore impact potential earnings for hydroelectric power company.
  - Potential management solutions: cooperate with power company to increase capacity by using the open pits.
- Outdoor recreational activities:
  - Main issues: some loss of recreational opportunity, such as hunting, foraging and fishing.
  - Potential management solutions: compensate those directly impacted.

20.6 Life Cycle Assessment

A preliminary life cycle assessment ("LCA") was conducted alongside the PEA by third party consultancy Minviro Ltd ("Minviro"). The aim of the LCA was to quantify likely sources of environmental impacts and understand where design changes could be implemented to reduce the environmental footprint of the Project.

20.6.1 Methodology

The LCA used the principle of cradle-to-gate to establish the boundaries for the analysis. This meant the environmental impacts were assessed from excavation through to selling the nickel (cobalt) and iron concentrates via a third-party offtake agreement. Impacts associated with downstream processes after leaving the mine gate (transporting concentrate, refining to products, manufacturing and use of final products) were not taken into consideration at this time. The system boundary for the LCA is shown in Figure 20-3.

Two functional units of 1 kg of nickel in concentrate and 1 kg of iron in iron concentrate were used as a reference to define the embodied environmental impacts. A economic allocation was used to ensure the environmental impacts are divided fairly between the main constituent units, resulting in an allocation of 78% for nickel, 17.5% for iron and 4.5% for cobalt.

The focus of the life cycle impact assessment ("LCIA") part of the assessment was global warming potential. This was defined by using GHG emissions measured in kilogrammes of carbon dioxide equivalent ("kg CO_2 eq.").

In addition, two scenarios were tested: a 'current technology case' (assumed to be the base case); and a fully-electrified case.

The LCA was conducted according to the requirements of International Standards Organisation ISO 14040:2006 (LCA principles and framework) and ISO 14044:2006 (LCA requirements and guidelines).

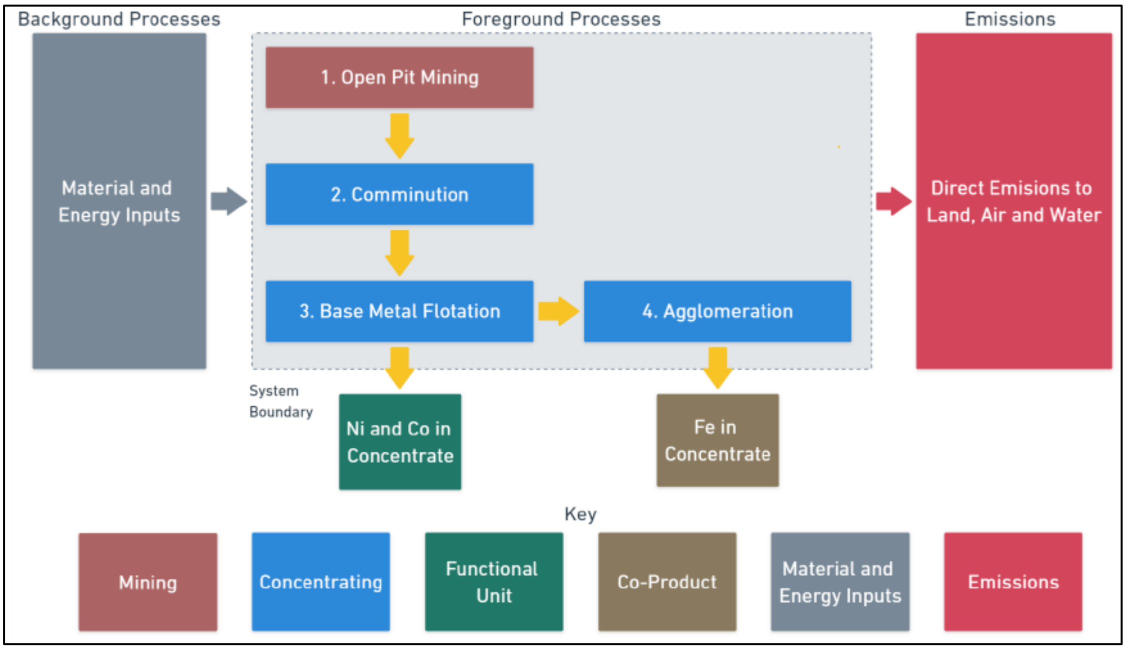


Figure 20-3: LCA system boundary (Source: (Minviro 2022)

20.6.2 Results

The results of Minviro's modelling analysis showed the following (Figure 20-4):

- Base case: 10.0 kg CO_2 eq per kg of nickel in concentrate, includes:
  - Mining: 3.8 kg CO_2 eq.
  - Processing: 6.4 kg CO_2 eq.
  - Reduction from sequestration: -0.2 kg CO_2 eq.
- Electrified case: 7.5kg CO_2 eq. per kg of nickel in concentrate.
  - Mining: 1.3 kg CO_2 eq.
  - Processing: 6.4 kg CO_2 eq.
  - Reduction from sequestration: -0.2 kg CO_2 eq.
- Magnetite concentrate: 0.06 kg CO_2 eq. per kg of iron in concentrate.

The largest contributions to each emissions category for the base case is provided below (Figure 20-5):

- Scope 1: Diesel used by the haulage fleet in the mining stage, which is offset by the CO_2 sequestration potential of the process tailings.
- Scope 2: Electricity in the concentrating stage, with a minor contribution from the use of electricity in the mining stage.
- Scope 3: Use of reagents in the concentrating process, predominantly the use of collectors and dispersants. For mining, the main contributor was the embodied impact of explosives.

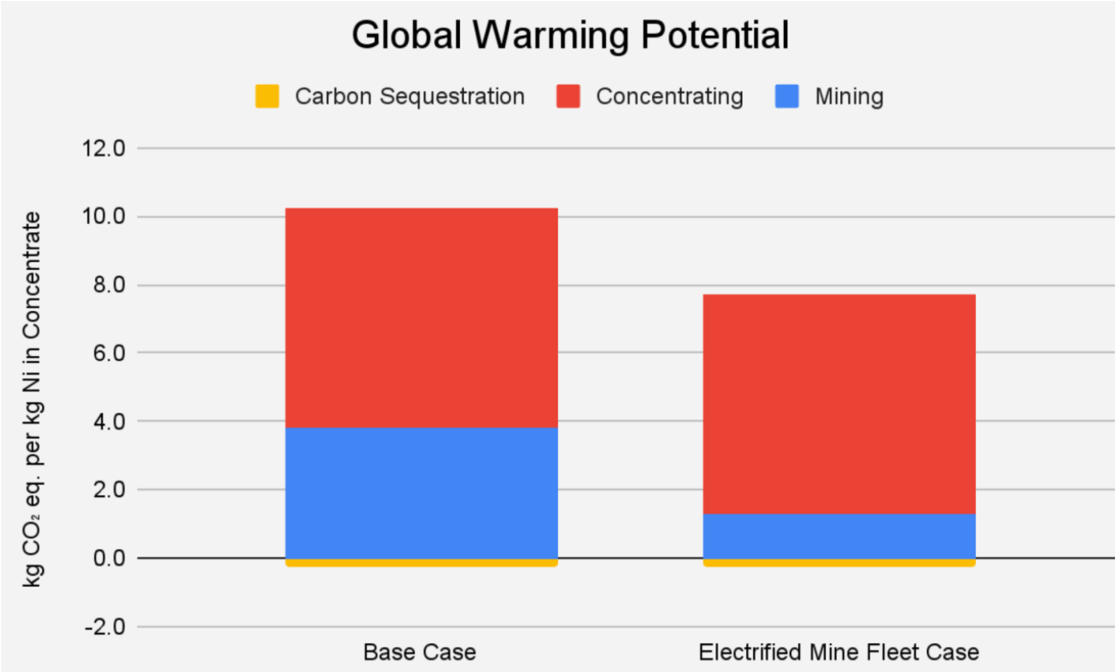


Figure 20-4: LCA global warming potential results for nickel concentrate showing comparison between base case and electrified fleet case (Source: (Minviro 2022)

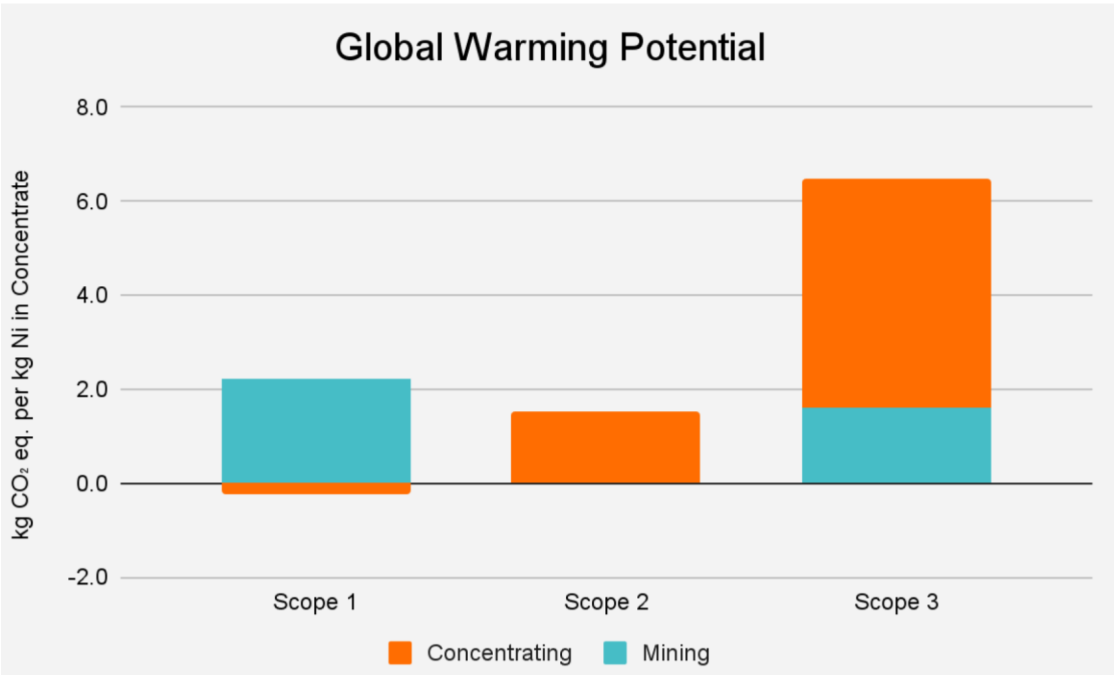


Figure 20-5: LCA global warming potential results for nickel concentrate showing breakdown of scope 1, 2 and 3 emissions (Source: (Minviro 2022)

20.6.3 SRK Comment

The results show the significant impact that changing from diesel to electric fleet could have on the operation (approximately 25% reduction in global warming potential). The use of chemicals such as dispersants, collectors and explosives also provides a significant contribution. Although the Swedish grid is dominated by renewable energy with low global warming potential, the scale of the processing plant requires substantial electricity consumption.

SRK agrees with Minviro's recommendations that the above major contributors should be studied in detail in the PFS to assess the possibility of accessing suppliers of these materials with low embodied GHG emissions and global warming potential.

20.7 Mine Closure

Implementation of the EU Directive relating to wastes from extractive industries (Directive 2006/21/EC) into Swedish law has resulted in the requirement for mine operators to submit a preliminary plan for closure with the environmental permit application (Section 4.3). This closure plan and the associated costs will be approved by the Environmental Court. The operator must then make provision for a financial guarantee to cover the reclamation costs should it not be able to fulfil its duties. The guarantee is required for the actual area of land affected and as such is linked in part to the LoM schedule. During operation, the actual disturbance will be reported to the authorities and the increase in the closure provision will be determined accordingly. If progressive rehabilitation is undertaken, the cost for this can be withdrawn from the bond upon acceptance by the regulatory authority appointed by the Environmental Court. The closure costs and associated bond will be reviewed when the closure plan is reviewed, at least once every three years.

For the purposes of the MKB1 studies supporting the Project mine permit application, there is no requirement to present a closure plan in any detail. As a consequence, the level of closure planning available for review by SRK is limited. The MKB2 studies to be completed as part of the environmental permit application requires more detail on closure to be included.

Future closure costs will include the following:

- Tailings management facility: ensuring the TMF is stable, geochemically inert, has active water management and can sustain alternative post-operational land uses.
- Waste rock dumps: ensuring the WRD are stable, geochemically inert, have active water management and can sustain alternative post-operational land uses.
- Open pits: ensuring the pits are stable, geochemically inert, has active water management and can sustain alternative post-operational land uses. Ensuring the pits are safe and secure for humans and animals and possibly flooded, if considered the best course of action (potential scope for cooperation with hydroelectric power company to increase capacity of Lake Gardiken).
- Processing plant: emptied of reagents, decontaminated, decommissioned, equipment disposed of and footprint rehabilitated.
- Storage tanks, water treatment plants and other infrastructure (such as workshops, fuel farm, explosives magazine, pipes, pumps): emptied of reagents, decontaminated, decommissioned, equipment disposed of and footprint rehabilitated.

- Administration and other buildings: emptied of reagents, decontaminated, decommissioned, equipment disposed of and footprint rehabilitated.
- Power lines and utilities: decommissioning and removal.
- Social transition: a programme of retraining, retrenchment and social transition to adjust to life without the mining operation (it is recognised that successful social transitioning is closely linked to robust community development initiative during operation).
- Monitoring and maintenance: a programme of monitoring and maintenance for a period to be decided between the Company and authorities but assumed to be at least 10 years.

For the purposes of the PEA and to ensure an appropriate cost is assigned in the TEM, SRK has used an order of magnitude cost of USD 50 M spread over the final five years of mine life to cover post-operational closure and rehabilitation costs. Technical and cost assumptions supporting the closure plan should be refined during the next level of study.

20.8 Permitting Strategy

As part of the application for exploitation concessions, preliminary ESIA/MKB1 studies were completed by the previous owner. These studies focussed on possible implications of mining on land use and is not required to be a detailed ESIA, as described in the EU EIA directive (2014/52/EU; refer to Table 4-2).

A second, more detailed ESIA, referred to as MKB2 and more aligned to international EIA requirements, is required to obtain an environmental permit (Swedish: *Miljötillstånd*). Although the previously completed MKB1 contains a preliminary assessment of land use and potential environmental and social issues, no detailed baseline studies have been completed on the Project to date.

The first stage of the permitting strategy is to kick-off ESIA/MKB2 studies as soon as possible alongside the PFS. For this, Bluelake needs a technical team on the ground close the Project along with identifying a consultant to conduct the ESIA work.

21 CAPITAL AND OPERATING COSTS

21.1 Capital Costs

The section below section outlines SRK's updated capital cost estimate for the Rönnbäcken Project.

21.1.1 Mining

A breakdown in the capital cost associated with the mining operation are provided in Table 21-1 quoted in millions of US dollars and are based on benchmark information for a similarly sized mining operation. Sustaining capital expenditure was added to the technical economic model ("TEM") at USD 0.12 / t material moved from year 5 onwards (3rd production year).

The following capital expenditures were distinct for the three mining scenarios (further discussed in chapter 22):

Scenario 1: Current technology: USD 4 M was added which is the current cost to implement a 1 km overhead trolley line in year 12 (year 10 of production). This expense is entered as a placeholder for capital expenditure associated with a more efficient mining method in the future. Typical mining equipment replacements span five years. With this scenario it is assumed that equipment will be replaced with more efficient technologically advanced equipment after the 10th production year.

Scenario 2: Future technology: Similar to scenario 1, the Capital expenditure is assumed from production year 1 onwards. This scenario assumes that technologically advanced equipment will be available from the mines inception, which might realistically only be 5-10 years in the future.

Scenario 3: For the fully electric mine, it was assumed that in the future (5-10 years) it might be possible to retrofit a large mine haul truck with a battery at USD 1.5 M per truck. This additional Capital expenditure was added to the 26 trucks estimated to be required for Scenario 3. As with Scenario 1, in year 12 the mine might likely be in a position to convert to trolley assist type systems, so a further USD 4 M was added in year 12 (10th production year).

Table 21-1: Mining capital cost breakdown

Capital Cost Item	Cost (USD M)
Equipment	143
Haul roads / Site work	7
Stripping	4
Building	35
Electrical	2
Engineering	36
Contingency	23
Total	**249.2**

21.1.2 Processing

The plant capital expenditure has been based on the estimate prepared by Outotec in 2009 (Table 21-2). The original estimate was prepared for a 20 Mtpa plant and costed in SEK. The 2009 costs have been inflated to 2022 costs using available escalation indices and adjusted for 30 Mtpa throughput.

Table 21-2: Outotec 20 Mtpa plant cost estimate (2009)

ESTIMATED INVESTMENT COST				20 Mtpa plant			12/11/2009				
											8 SEK:USD
Description	No	Specification	Power	Unit Costs SEKx1000	Total SEKx1000	Basis	SEKx1000				USD
Crusher	1	3750 ton/hour	520kW	100,000	100,000	BO					
Conveyer to ore storage	1	200 m		10,000	10,000	E					
Ore storage	1	60000 ton		100,000	100,000	E					
Conveyer system to mills	2	200 m		10,000	20,000	E	230,000	8.1%			28,750,000
Primary mills	2	AG 11x12,6	28 Mw	175,000	350,000	BO					
Secondary mills	4	PM 8,5x13,5	36 Mw	90,000	360,000	BO					
Tertiary mills	3	PM 8,5x13,5	27 Mw	90,000	270,000	BO					
Regrinding mill	1	BM 4,0x6,0		25,000	25,000	E & NV					
Crusher	2		1,6 MW	12,000	24,000	BO					
Conveyers	6			600	3,600						
Cyclons	2			2,000	4,000	E & NV					
Sieve	2			2,000	4,000	E & NV	1,040,600	36.5%			130,075,000
Mixing tank	2			5,000	10,000	E & NV					
Flotation cells	30	300 m3		4,500	135,000	BO					
Flotation cells	4	160m3		3,300	13,200	BO					
Flotation cells	4	20 m3		1,000	4,000	BO					
Flotation cells	5	5 m3		690	3,450	BO	165,650	5.8%			20,706,250
Concentrate thickener	2			5,000	10,000	E & NV					
Filter section	2			25,000	50,000	BO					
Concentrate handling	1			10,000	10,000	E & NV	70,000	2.5%			8,750,000
Sand pumping	2			10,000	20,000	E & NV					
Tailings pipe line	2			10,000	20,000	E & NV					
Thickeners	6	35 m		15,000	90,000	E & NV					
Outlet pipeline	4			2,000	8,000	E & NV					
Reclaim water pipelne	1			5,000	5,000	E & NV	143,000	5.0%			17,875,000
Electrical equipment	1			200,000	200,000	E & NV					
Automation and control system	1			200,000	200,000	E & NV	400,000	14.0%			50,000,000
Pumps	1			50,000	50,000	E & NV	50,000	1.8%			6,250,000
Piping and valves	1			200,000	200,000	E & NV	200,000	7.0%			25,000,000
Not specified equipment	1			100,000	100,000	E & NV	100,000	3.5%			12,500,000
Steel structure	1			100,000	100,000	E & NV					
Industrial Building	1			200,000	200,000	E & NV	300,000	10.5%			37,500,000
Foundations for mills	1			150,000	150,000	E & NV	150,000	5.3%			18,750,000
Subtotal							**2,849,250**	100.0%	82.6%		**356,156,250**
Erection	10%						284,925		8.3%		35,615,625
EPCM 10%	10%						313,418		9.1%		39,177,188
Total Mill and Tailings	**excluding the dam**						**3,447,593**		100.0%	80.0%	**430,949,063**
CONTINGENCY	25%						861,898			20.0%	107,737,266
TOTAL MILL AND TAILINGS (excluding dam)							**4,309,491**			100.0%	**538,686,328**

The Outotec estimate did not include a magnetite recovery and dewatering circuit and USD 50 M has been added to cover this aspect of the plant. The magnetite circuit will be large as it will process the tailings stream from nickel flotation.

The plant capital cost includes the processing plant (crushing and stockpile, grinding, nickel flotation, magnetite recovery, nickel and magnetite concentrate dewatering circuits, reagent systems), tailings thickening, plant utilities and services and water reticulation systems. The costs include all design and construction requirements and include a 25% contingency.

The 2009 capital cost for the 20 Mtpa concentrator (excluding the magnetite circuit) was USD 539 M including a 25% contingency.

The capital cost for a 30 Mtpa concentrator escalated to 2022 costs is USD 870 M including USD 50 M for the magnetite circuit and including 25% contingency.

A phased development of the 30 Mtpa project has been assumed, developed as two 15 Mtpa plants, each with two 7.5 Mtpa parallel lines.

Usually, the primary crusher is selected for the final planned tonnage, although with three separate open pits this may be different for Rönnbäcken. There may be a case for a number of smaller primary crushers or mobile crushers at each of the open pits.

All other plant sections can be sized either as discrete lines that can be duplicated and/or expanded by adding extra equipment to raise the tonnage.

The plan would need to take in to account the three potential open pits and how these are scheduled and would need to take in to account the grinding parameters as determined by testwork as this can influence how the comminution circuit is designed for the initial and expanded case.

The two reference publicly available studies with similar level of study and similar project scales have been provided to compare capital cost. It should be noted that neither has a fine grind and consequentially the grinding circuits will be smaller.

Giga Metals nickel and magnetite project

The circuit includes crushing, high pressure grinding rolls (“HPGR”), ball milling, followed by flotation with regrind and magnetite production. The ore has a high work index and an 80 to 85 µm grind. The magnetite concentrate produced requires a more complicated circuit due to Ni mineralogy. The project is developed in two phases, first 15.5 Mtpa and then increased to 32.7 Mtpa.

Phase 1 at 15.3 Mtpa including plant, plant infrastructure and offsite infrastructure plus a 24% contingency is USD 835 M; this excludes mining costs. For the phase 2 expansion to 32.7 Mtpa for the same scope, the total cost is USD 1,296 M, mostly additional plant expansion costs. Allowing for project differences and the project infrastructure, these costs align with the Rönnbäcken costs described above.

Canada Nickel Crawford Nickel project

The circuit includes crushing, SAG, ball milling and followed by flotation with regrind and magnetite production. The primary grind is very coarse, nominally 200 µm and the ore has a low abrasion index that will result in very low grinding media and mill liner consumption. The Ni minerals are heazlewoodite and pentlandite leading to planned production of both high- and low-grade Ni concentrates. The project is developed in three phases 15 Mtpa, to 30 Mtpa and finally to 42 Mtpa.

Looking at the first two phases: phase 1 at 15 Mtpa including plant, plant infrastructure, infrastructure plus a 24% contingency was USD 878 M; this excludes mining. The Phase 2 expansion to 30 Mtpa for the same scope results in a total cost of USD 1,463 M. These plant capital costs, for 30 Mtpa are likely higher than the Outotec costs described herein but are broadly comparable.

21.1.3 Infrastructure and logistics

The capital cost estimate for infrastructure is considered overall to have a achieved a PEA level of accuracy ±40-50% and to follow the guidance provided by the AACE International for a "Class 5" estimate. The basis for these costs is provided in Table 21-3.

Table 21-3: Infrastructure capital cost estimate (±40-50%, Class 5 Estimate)

Item#	Description	Cost (USD M)
100 On-Site Infrastructure		
101	Enabling Works	3.0
102	General Project facilities	12.0
103	Accommodation Block	9.0
104	Site Wide Utilities / Services	8.0
105	Mine Maintenance Area	Included in mining cost
106	Plant Support Infrastructure	Included in plant cost
107	Explosives Storage Facility	Included in mining costs
108	Water Supply	Included in plant costs
200 Off-Site Infrastructure		
201	Access Road (Enabling Works Phase)	2.0
202	Bulk Power Phase 1 – 100 MW	75.0
203	Bulk Power Phase 2 – 100 MW	34.0
204	Construction Access Road (Dedicated)	50.0
205	Upgraded to Dedicated Haul / Access Road	28.0
206	Railhead Logistics Facility	NLC Storuman (no cost assigned)
207	Haulage Trucks	Contractor (no cost assigned)
208	Rail Equipment	Contractor (no cost assigned)
300 Indirect costs		
301	Contractor indirects	Included in the direct costs above
302	EPCM / project management consultant	6.0
303	Owners costs	5.0
304	Contingency	Included in the direct costs above
Total		**232.0**

Infrastructure

Infrastructure capital cost have been derived according to the preliminary scope description, capacity requirements, and indicative layouts. Costs are taken from in-house SRK databases and recent budget quotes or benchmarks. The direct costs are assumed to include fabrication, supply, install, erection works / construction works including any "Contractor indirects".

Earthworks / Civils / Roads

Schematic areas have been measured in accordance with function and cost per metre or square metre for bulk earthworks, civils, and roads. No specific bulk earthworks estimation has been carried out at this stage. The costs allow for asset specific surface water management and drainage. The cost for the dedicated access road is based on a benchmark cost per metre, which includes any anticipated structures. The option with minimal structure (3 no.) is assumed. These are a national road crossing, a railway crossing, and 3 km low causeway near the mine site.

Project General Facilities

In general, buildings will be pre-engineered steel portal framed or column and beam style buildings with insulated panel roofs and cladding and with all necessary internal electrical, piping, fixtures and fittings, and architectural details. It is likely that some auxiliary buildings will be prefabricated and pre-fitted, modular, or converted container style buildings. Where applicable a cost per m^2 has been applied dependant on the usage and anticipated style of construction. Specific installations are based on a benchmark. This includes ancillary support vehicles for general infrastructure.

Accommodation

A benchmark cost of USD 28,000 per bed has been used to estimate the accommodation block cost.

Plant Support Infrastructure

The costs for these items is included within the processing plant cost. The processing plant cost also includes all plant related structures (including but not limited to structural, mechanical, electrical, piping, instrumentation, etc) that are within the fence line including groundworks and foundations.

Mine Support Infrastructure / Mine Maintenance Area

Included within the mining capital cost infrastructure and engineering categories are the costs for the Mine Maintenance Area (heavy vehicle workshops, etc).

Utilities

Allowances have been included under the 'Project General Facilities' cost for the distribution, reticulation, and connection systems around the site. Costs for utilities within the plant fence line and Mine Maintenance Area are included in the plant and mine capital costs respectively.

Bulk Power Supply

Based on the assumed description of the infrastructure. Benchmark costs have been applied for line construction, the main Project step-down substation, and site distribution to the primary substations. The connection at the national grid substation is provided by the national grid. Two 130 kV power lines carrying 100 MW each are assumed in the costs.

Bulk Water Supply

Water supply and mine water management are considered in the water management section.

Explosives Magazine

Explosives supply and any storage requirements will be organised, operated, and maintained by the Explosives Contractor. Any associated capital or operating costs are included under the mining capital cost.

Rail Load-Out Facility

The costs assume that NLC Storuman railhead is utilised. Capital costs associated to this aspect therefore are borne by NLC Storuman and the considered in the logistics costs per tonne under a long-term contract for handling of imports and exports from rail to road and vice versa.

Road Haulage of Product

This is anticipated to be undertaken by a haulage contractor. The contractor provides and maintains equipment within the agreed transport cost.

Rail Haulage of Product

This is anticipated to be undertaken by a freight company under contract, who supplies wagons and locomotives and organises railway access.

Indirect Costs

These are typically Contractor indirect costs, costs associated to engineering (detailed), procurement, and construction management time ("EPCM"), Owner's costs, and Contingency. Contractor indirect costs for infrastructure construction are included within the benchmark costs. EPCM and Owners costs have been included as 8% and 5% respectively of the capital cost excluding the powerline, which is assumed as an EPC construction package.

Exclusions

The following are excluded from the infrastructure capital cost estimate:

- Prefeasibility and Feasibility Studies;
- processing plant equipment and buildings and other items within the fence line;
- land acquisition, planning and permitting costs, environmental impact assessment;
- changes to the current scope assumptions and other items not stated in the scope;
- definition drilling, assaying and related reports and models; and
- mining equipment, mine maintenance area, mine water management;
- TMF, WRD and any major water management infrastructure around the mining area(s; and
- all taxes and duties.

21.1.4 Tailings

A material take off ("MTO") that includes the quantities estimated for each individual line item has been prepared. This has been applied to a cost estimate for the overall capital, sustaining, and operating expenditures for TMF Option A (±50% accuracy). All costs are based on Q1 2022 United States dollars (USD). These costs are summarized in Table 21-4 with a full breakdown presented in Table 21-5.

The estimated project capital estimate for tailings is USD 45 M with the remaining sustaining capital and operating costs assumed to be split evenly across the Project lifespan (USD 17 M per annum, equating to USD 340 M in total). These estimates include an allowance for EPCM and contingencies.

Table 21-4: TMF cost estimate summary

Description	Starter TMF (USD M)	Sustaining Capital (USD M)
Preparatory Earthworks	3.9	11.6
Embankment construction	14.0	155.6
TMF Water Return	6.0	9.0
Tailings Delivery Pipelines	7.5	22.5
Clarification Pond	5.0	-
Non-contact water management	1.0	1.1
Embankment monitoring installation	0.3	-
Tailings Delivery and Maintenance	-	83.8
EPCM and Contingency	7.5	56.7
Total Cost	**45.1**	**340.3**

Table 21-5: Detailed TMF capital cost estimate breakdown

Detail		Unit	Unit Rate	Starter TMF		LoM TMF (Additional)	
				Quantity	Amount (USD M)	Quantity	Amount (USD M)
Preparatory Earthworks	Removal of surface vegetation and tree felling	m²	1.5	288,428	0.43	865,283	1.30
	Grub out of surface material for embankment foundations	m²	0.5	288,428	0.14	865,283	0.43
	Dredging of sediments below the water for embankment foundations	m²	5.0	195,228	0.98	585,685	2.93
	Shallow foundation excavation	m³	4.0	576,855	2.31	1,730,565	6.92
	Sub-total				**3.86**	**-**	**11.58**
Embankment construction	Base Preparation of approved material - Compacted to 95% Standard Proctor Dry Density	m³	7.12	469,800	3.34	-	-
	Waste Rock fill (load-haul-place-compact)	m³	4.5	2,334,515	10.51	34,315,763	154.42
	Geotextile filter system on upstream face (supply and install)	m²	6.85	19,800	0.14	-	-
	Placement of transition material - assumed thickness 0.5m (load, dump, compact)	m³	6.00	-	-	144,459	0.43
	Placement of filter material - assumed thickness 0.5m (load, dump, compact)	m³	10.00	-	-	144,459	0.72
	Sub-total				**13.99**	**-**	**155.58**
TMF Water Return	Floating Barge and Water Return pump	no.	1,500,000	1	1.50	1	1.50
	Water return pipeline(s)	m	1500	3,000	4.50	5000	7.50
	Sub-total				**6.00**	**-**	**9.00**
Tailings Delivery Pipelines	Tailings delivery pipeline(s)	m	1500	5,000	7.50	15,000	22.50
	Sub-total				**7.50**	**-**	**22.50**
Clarification Pond	Clarification pond (foundation prep, waste rock fill placement, geotextile filter)	LS	1	5,000,000	5.00		
	Sub-total				**5.00**	**-**	**-**
Non-contact water management	Excavation of diversion channels	m³	4	50,000	0.20	100,000	0.40
	Stream diversion	m³	4	100,000	0.40	-	-
	Erosion protection (diversion channel)	m³	12	30,000	0.36	60,000	0.72
	Erosion protection (stream channel)	m³	12	5,000	0.06		
	Sub-total				**1.02**	**-**	**1.12**
Embankment Monitoring	Installation of monitoring equipment	no.	250,000	1	0.25	-	-
	Sub-total				**0.25**	**-**	**-**
Tailings delivery	Tailings Pumping	t	0.15		-	542,000,000	81.30
	Ongoing operation of monitoring equipment	Year	125,000		-	20	2.50
	Sub-total				**-**	**-**	**83.80**
Total Capital Cost					**37.60**	**-**	**283.60**
EPCM and Contingency (20%)					**7.52**	**-**	**56.72**
Grand Total (Capital Cost + EPCM + Contingency)					**45.12**	**-**	**340.32**

21.2 Operating Costs

This section outlines SRK's updated operating cost estimate for the Rönnbäcken Project.

21.2.1 Mining

A breakdown of the unit operating cost (based on benchmark data) associated with the mining operation is provided in Table 21-6 as USD/t of mined material. Two separate scenarios for mining were considered for the PEA, one using current technology and one using future technology (currently in research and development), as explained in more detail in Section 22.

Table 21-6: Mining operating cost breakdown (30 Mtpa RoM Ore)

Operating Cost Item	Current Technology case (USD/t_{mined})	Future Technology Case (USD/t_{mined})
Supplies	0.26	0.21
Hourly labour	0.59	0.47
Equipment operation	0.71	0.56
Salaried Personnel	0.19	0.15
Miscellaneous	0.18	0.14
Total	**1.91**	**1.53**

21.2.2 Processing

The processing operating cost from the 2011 PEA were estimated by Outotec Sweden AB based on the treatment of 30 Mtpa of RoM ore. The costs exclude magnetite recovery. A 15% contingency was added to these costs. The summary operating costs are presented in Table 21-7. The updated estimated plant operating costs are presented in Table 21-8, including estimation methodology for the individual cost elements.

Table 21-7: 2011 PEA processing operating costs (30 Mtpa)

	Total Cost SEK/a	Cost per t SEK/t	Total Cost USD/a	Cost per t USD/t
Total Labour	39,433,000	1.31	4,929,125	0.164
Total Consumables	577,623,000	19.25	72,202,875	2.407
Power	418,610,000	13.95	52,326,250	1.744
Maintenance	165,528,123	5.52	20,691,015	0.690
Tailings	33,000,000	1.10	4,125,000	0.138
Process & Tailings Costs	**1,242,994,123**	**41.43**	**155,374,265**	**5.179**
CONTINGENCY	186,449,118	6.21	23,306,140	0.777
Process & Tailings Costs (with contingency)	**1,429,443,242**	**47.65**	**178,680,405**	**5.956**

Table 21-8: Updated plant operating costs

Item	Cost (USD/t)
Consumables	1.540
Power	2.876
Manning	0.377
Maintenance	0.464
Plant G&A	0.700
Total	**5.957**

Reagents/consumables

The reagents and consumables are based on the figures achieved in the mini-pilot plant. No allowance for optimisation has been included. Consumables include an allowance for mill liners.

Unit costs are based on cost data from other projects or in-house information.

Autogenous grinding has been assumed and consequently there are zero costs for steel grinding media.

A 10% allowance is included for other items not specifically identified.

Power

The Rönnbäcken mineralised material requires a very fine grind with substantial power requirements, and this is different to the other projects such as Canada Nickel and Giga Metals (Section 21.2.2). The power requirements for the grinding mills for a 20 Mtpa concentrator as provided by Outotec in 2009 (Table 21-2). The installed mill power has been scaled directly for the 30 Mtpa case.

Three stages of grinding are required to achieve the fine grind for flotation feed. The mill power show the very high grinding power requirement compared to other operations that use coarser grinds. An 80% power draw for the AG mill and 90% draw for the secondary and tertiary mills has been assumed. Other equipment power consumption was assumed as 80% of installed.

It has been assumed the grinding mills represent 60% of total plant kW installed (plants are typically 40 to 45%). This is to reflect the high grinding power requirements and to avoid overestimation of other plant power requirements.

A power unit cost of US¢ 6.6 per kWh has been used, based on a comparable Finnish operation. Energy is a significant operating cost and an up-to-date tariff and unit cost per kWh should be established by the Company for the PFS.

Manning

The plant labour cost has been estimated using a cost from a 10 Mtpa Ni concentrator in Finland. It has been reduced by 5% to reflect a single flotation concentrate., adjusted downwards to reflect only one flotation concentrate.

Plant maintenance

Plant maintenance costs has been based on 4% of mechanical equipment costs per year. It has been assumed that the mechanical equipment cost is 40% of the total capital cost. Plant capital costs for other tonnages have been scaled using the 0.6 rule.

G&A plant

An allowance of USD 21 M has been included based on another concentrator in Finland.

21.2.3 Infrastructure

The operating costs for general operation and maintenance of the site support facilities are covered by general and administrative (“G&A”) costs in the TEM.

21.2.4 Logistics

Transport of Nickel Concentrate to Sales Point

There are multiple transportation routes for the Ni-con once containerised. The cost in the TEM for logistics is considered adequate for movement of concentrates to an off taker situated in the Nordic region and potentially to a point of sale / product destination or to a multiterminal port in northern Europe (such as Antwerp or Rotterdam) dependant on sea-freight (container) rates at the time. Big bags, pallets, empty containers, container stuffing and truck loading are considered to be included within the processing plant cost.

Transport of Magnetite Concentrate to Sales Point

The logistics cost for the Fe-con is lower than for the Ni-con. The transport cost and the sales price constrain the maximum distance the product can travel to reach a potential off taker. Assuming storage and loading at the plant is within the plant operating cost, benchmark costs suggest this distance could potentially be in the range of 350 to 500 km by rail from Storuman (this would be further south than Östersund or north of Gällivare as far as Kiruna). If Fe-con is railed to Umeå, there may be an option of reaching northern Finland. The estimated cost assumes that the initial road transport utilises high-capacity trucks.

Consumables

The cost for supply and delivery of consumables for mining and processing is included in the rates provided for these activities.

21.2.5 Tailings

The operating costs associated with tailings (pumping and pipelines allowance) are included in the sustaining capital cost estimate in Table 21.5.

21.2.6 Closure and rehabilitation

For the purposes of the PEA and to ensure that an appropriate cost is assigned in the TEM, SRK has used an order of magnitude cost of USD 50 M over last five years of mine life to cover post-operational closure and rehabilitation costs.

22 ECONOMIC ANALYSIS

22.1 Introduction

A TEM has been developed as the basis for the preliminary economic of the Project using current understanding and up-to-date assumptions. The capital cost and operating cost assumptions along with the mining schedule used in the TEM are described throughout this report.

As described herein, Bluelake wishes to develop the Project with as low an environmental impact as possible. A key part of this strategy is to reduce the Project GHG emissions, with the main source of direct GHG emissions (Scope 1) being mining equipment. As a result, SRK assessed three scenarios in the TEM based on varying equipment as discussed in Section 16.6.

- Scenario 1: current technology case; assumes mining equipment is commercially available and will consist of a diesel-powered fleet. It assumes that in year 12, the mine would have developed sufficiently to implement a trolley assist type system and or other technology to enable the mining operating cost to be reduced by 20%.
- Scenario 2: optimistic case; assumes that due to technological developments as discussed in Section 16.6, the baseline mining operating cost can be reduced by 20% from the start-up of production and operations.
- Scenario 3: fully electric case; assumes mining equipment is fully electric from start-up of operations, associated with the lowest environmental impact.

22.2 Production Plan

The TEM is based on a mining schedule described in Section 16.4. Total LoM production is presented in Table 22-1. The key assumptions from the schedule are summarised below:

- 2-year construction period;
- 30 Mtpa production rate, low-grade ore (approximately 0.1% Ni_S) from three deposits feeding one processing plant;
- 20-year mine life of mine;
- low stripping ratio (0.6 tonnes waste: 1 tonne ore);
- two concentrate products: nickel concentrate (28% Ni, with cobalt credits) and magnetite iron ore concentrate (66% Fe);
- metallurgical recoveries of 80% Ni_S 70% Co and 90% Fe have been applied;
- conventional comminution and flotation flowsheet for Ni-con with additional magnetite circuit for Fe-con;
- road-based logistics for concentrate transport; and
- assumed product sold to third party smelter (or heap leach) operator.

Table 22-1: Life of mine production summary

Production	Units	All Scenarios
Total mined tonnage	(Mt)	934
Waste tonnage	(Mt)	348
Mineralisation tonnage	(Mt)	586
Ni_T grade	(%)	0.245%
Ni_S grade	(%)	0.094%
Co_S grade	(%)	0.003%
Fe_{total} grade	(%)	5.5%
Ni con tonnage	(kt)	1,577
Ni con grade	(%)	28.0%
Co con grade	(%)	0.808%
Fe con produced	(Mt)	44.1
Fe con grade	(%)	66.0%

22.3 Technical Economic Model Assumptions

22.3.1 Commodity prices

The following commodity prices have been applied in the preliminary economic assessment as requested by the Company:

- Nickel: USD 10/lb (USD 22,046/t);
- Cobalt: USD 20/lb (USD 44,092/t); and
- Iron: USD 1.13/dmtu (which results in USD 74.6/t for concentrate at 66% Fe).

SRK notes the nickel price applied is higher than the range of current (2022 Q1) consensus market forecasts that SRK subscribes to independently, and more in line with current spot prices (in excess of USD 24,000 t as of 10 February 2022). An analysis of the prices is provided in Section 19.

A sensitivity to nickel price is presented in the results Section 22.6.

22.3.2 Smelter terms and freight assumptions

The following smelter terms have been applied, based on general SRK experience from similar projects:

- payabilities of 93.5% for Ni and 55% for Co;
- Ni concentrate treatment charge: USD 225/tcon;
- Ni refining charge: USD 1/lb Ni payable; and
- Co refining charge: USD 2.75/lb Co payable.

Freight cost assumptions are as follows (also refer to Section 21.2.4):

- Ni concentrate: USD 85.1/t dry; and
- Fe concentrate: USD 31.1/t dry.

22.3.3 Macro-economics

The technical economic model is presented in United States Dollars and in real January 2022 money terms.

22.3.4 Other assumptions

The cashflows presented both as pre- and post-tax and also pre finance. As advised by the Company, SRK has applied a corporate income tax of 20% on taxable profit. Depreciation has been modelled at 12.5% of the annual open balance. No working capital or VAT movements have been considered in this assessment.

A royalty of 0.20% of net revenue has been allowed for. A carbon tax of USD 133/t CO_2 has been applied to all direct (scope 1) emissions, where SRK has assumed that only diesel fuel is accounted for. This carbon tax is based on the standard 2021 rate of SEK 1,200/t CO_2 applicable to industries and individuals burning fossil fuels.

22.4 LoM Capital and Operating Costs

A summary of the estimated capital and operating costs used for the three scenarios defined above is presented in Table 22-2 to Table 22-7. Detail of these estimates can be found in Section 21.

Table 22-2: Scenario 1 Current Technology Case: capital cost summary

Item	Unit	Cost	Year																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mining	USD M	309	75	174	-	-	3	3	3	3	3	3	3	7	3	3	3	3	3	3	3	3	-	-
Plant	USD M	870	435	435	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infra	USD M	232	154	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tailings	USD M	379	-	45	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Total	**USD M**	**1,789**	**664**	**732**	**17**	**17**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**24**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**17**	**17**

Table 22-3: Scenario 2 Optimistic Case: capital cost summary

Item	Unit	Cost	Year																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mining	USD M	309	75	174	-	-	3	3	3	3	3	3	3	7	3	3	3	3	3	3	3	3	-	-
Plant	USD M	870	435	435	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infra	USD M	232	154	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tailings	USD M	379	-	45	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Total	**USD M**	**1,789**	**668**	**732**	**17**	**17**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**17**	**17**

Table 22-4: Scenario 3 Electric Case: capital cost summary

Item	Unit	Cost	Year																					
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mining	USD M	352	98	194	-	-	3	3	3	3	3	3	3	7	3	3	3	3	3	3	3	3	-	-
Plant	USD M	870	435	435	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Infra	USD M	232	154	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tailings	USD M	379	-	45	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Total	**USD M**	**1,832**	**687**	**752**	**17**	**17**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**24**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**20**	**17**	**17**

Table 22-5: Scenario 1 Current Technology Case: operating cost summary

Item	Unit	Cost	Year																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mining	USD M	1,567	-	-	84	72	97	112	112	112	112	89	89	89	89	61	81	89	66	49	47	47	46	25
Processing	USD M	3,514	-	-	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	98
Sub-total	**USD M**	**5,082**	**-**	**-**	**264**	**252**	**277**	**291**	**291**	**291**	**291**	**269**	**269**	**269**	**269**	**240**	**261**	**269**	**246**	**229**	**227**	**227**	**226**	**123**
Royalty	USD M	20	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Carbon Tax	USD M	131	-	-	8	8	8	8	8	8	8	6	6	6	6	6	6	6	6	6	6	6	6	6
Closure	USD M	50																		10	10	10	10	10
Total	USD M	**5,282**	**-**	**-**	**272**	**260**	**285**	**300**	**300**	**300**	**300**	**276**	**276**	**276**	**276**	**247**	**268**	**276**	**252**	**246**	**244**	**244**	**243**	**139**

Table 22-6: Scenario 2 Optimistic Case: operating cost summary

Item	Unit	Cost	Year																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mining	USD M	1,429	-	-	67	58	78	89	89	89	89	89	89	89	89	61	81	89	66	49	47	47	46	25
Processing	USD M	3,514	-	-	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	98
Sub-total	**USD M**	**4,944**	**-**	**-**	**247**	**237**	**257**	**269**	**269**	**269**	**269**	**269**	**269**	**269**	**269**	**241**	**261**	**269**	**246**	**229**	**227**	**227**	**226**	**123**
Royalty	USD M	20	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Carbon Tax	USD M	120	-	-	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Closure	USD M	50																		10	10	10	10	10
Total	**USD M**	**5,133**	**-**	**-**	**254**	**245**	**265**	**276**	**276**	**276**	**276**	**276**	**276**	**276**	**276**	**248**	**268**	**276**	**253**	**246**	**244**	**244**	**243**	**139**

Table 22-7: Scenario 3 Electric Case: operating cost summary

Item	Unit	Cost	Year																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Mining	USD M	1,429	-	-	67	58	78	89	89	89	89	89	89	89	89	61	81	89	66	49	47	47	46	25
Processing	USD M	3,514	-	-	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	98
Sub-total	**USD M**	**4,944**	**-**	**-**	**247**	**237**	**257**	**269**	**269**	**269**	**269**	**269**	**269**	**269**	**269**	**241**	**261**	**269**	**246**	**229**	**227**	**227**	**226**	**123**
Royalty	USD M	20	-	-	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Carbon Tax	USD M	-																						
Closure	USD M	50																		10	10	10	10	10
Total	**USD M**	**5,013**	**-**	**-**	**248**	**239**	**259**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**270**	**242**	**262**	**270**	**247**	**240**	**238**	**238**	**237**	**133**

22.5 Results

The results of the cashflow analysis for the three scenarios summarised over the LoM are presented in Table 22-8. SRK notes the three scenarios currently show similar economic results due to the relatively high cost of capital for all scenarios compared to the more variable operating costs. The impact of savings later in the mine life are also minimised by the effect of the discount rate. SRK also notes the Fe concentrate makes a significant contribution to Project revenue (approximately 19%), as shown in Figure 22-1.

Annual net free (post-tax) cashflow and cumulative net free cashflow are presented in Figure 22-2 to Figure 22-4 for each scenario. Differences between the different scenarios are minor. NPV and IRR values pre- and post-tax have been provided as requested by the Company.

Scenario 2 benefits over Scenario 1 from a lower unit operating cost. Scenario 3 has this same mining operating cost, but with higher capital expenditure due to the cost of electric mining fleet over diesel fleet; however, the electric case (Scenario 3) benefits from the lack of carbon tax payments. This means that Scenario 3 results in the best NPV, albeit at a slightly lower Internal Rate of Return ("IRR") than Scenario 2 due to the elevated project capital costs.

SRK notes 100% of the capital cost required for the plant and infrastructure, 80% of the mining capital and 12% of the tailings capital is required in the first two years (construction period) and the remaining is spread throughout the following 20-year operational period.

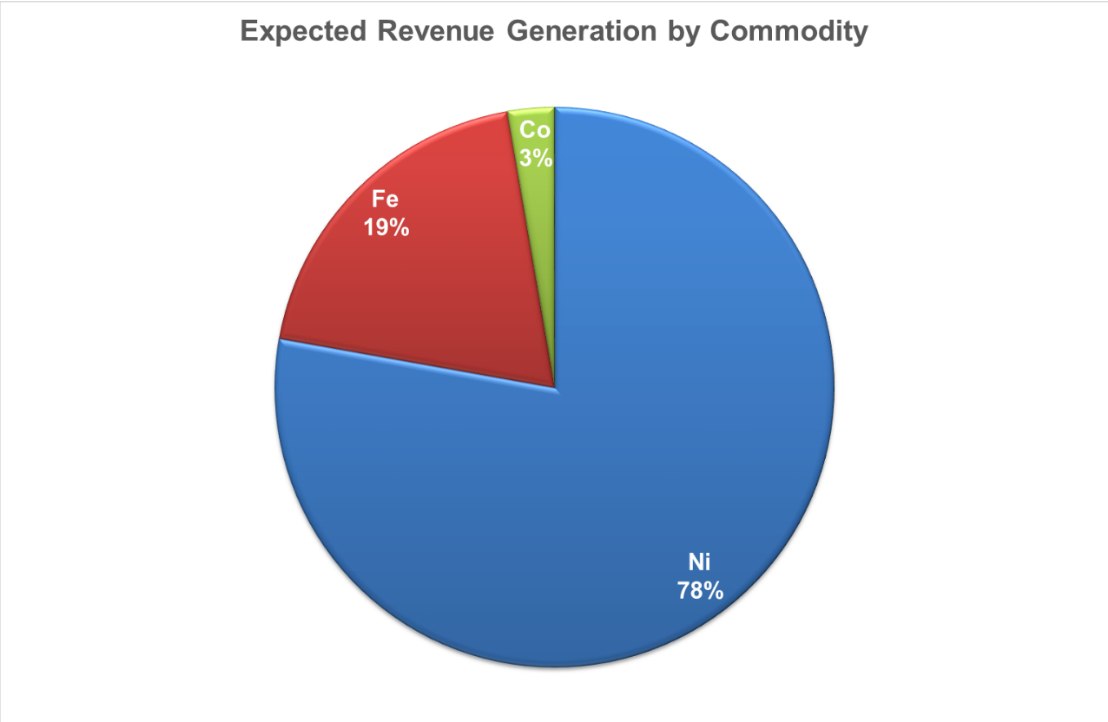


Figure 22-1: Expected revenue generation from each commodity

Table 22-8: Economic analysis results summary

Parameter	Units	Scenario 1	Scenario 2	Scenario 3
Metal Selling Prices				
Ni in Ni-con	(USD/t)	22,046		
	(USD/lb)	10		
Co in Ni-con	(USD/t)	44,092		
	(USD/lb)	20		
Fe in Fe-con	(USD/dmtu)	1.13		
	(USD/t)	75		
Revenue				
Gross Revenue	(USD M)	12,646		
TC/RC/Freight	(USD M)	2,805		
Net Revenue	(USD M)	9,842		
Ni	(USD M)	7,657		
Co	(USD M)	267		
Fe	(USD M)	1,918		
Operating Costs				
Mining	(USD M)	(1,567)	(1,429)	(1,429)
Processing	(USD M)	(3,514)	(3,514)	(3,514)
Sub-total	**(USD M)**	**(5,082)**	**(4,944)**	**(4,944)**
Royalty	(USD M)	(20)	(20)	(20)
Carbon tax	(USD M)	(131)	(120)	-
Closure	(USD M)	(50)	(50)	(50)
Total Operating Costs	**(USD M)**	**(5,282)**	**(5,133)**	**(5,013)**
	(USD/t mill feed)	**9.01**	**8.76**	**8.55**
EBITDA and Tax				
EBITDA	(USD M)	4,560	4,708	4,828
Corporate Income Tax	(USD M)	(595)	(625)	(641)
Cashflow from Operations	**(USD M)**	**3,965**	**4,084**	**4,188**
Capital Costs				
Mining	(USD M)	(309)	(309)	(352)
Plant	(USD M)	(870)	(870)	(870)
Site Infrastructure	(USD M)	(232)	(232)	(232)
Tailings	(USD M)	(379)	(379)	(379)
Total Capital Costs	**(USD M)**	**(1,789)**	**(1,789)**	**(1,832)**
Net Free Post-Tax Cashflow				
Net Free Post-tax Cashflow	(USD M)	2,176	2,295	2,356
Post-tax NPV (8%)	(USD M)	465	538	547
Post-tax IRR	(%)	13.5	14.5	14.4
Post-tax Payback Period	(Years)	6	6	6
Net Free Pre-Tax Cashflow				
Net Free Pre-tax Cashflow	(USD M)	2,771	2,919	2,996
Pre-tax NPV (8%)	(USD M)	713	804	819
Pre-tax IRR	(%)	16.0	17.1	17.0

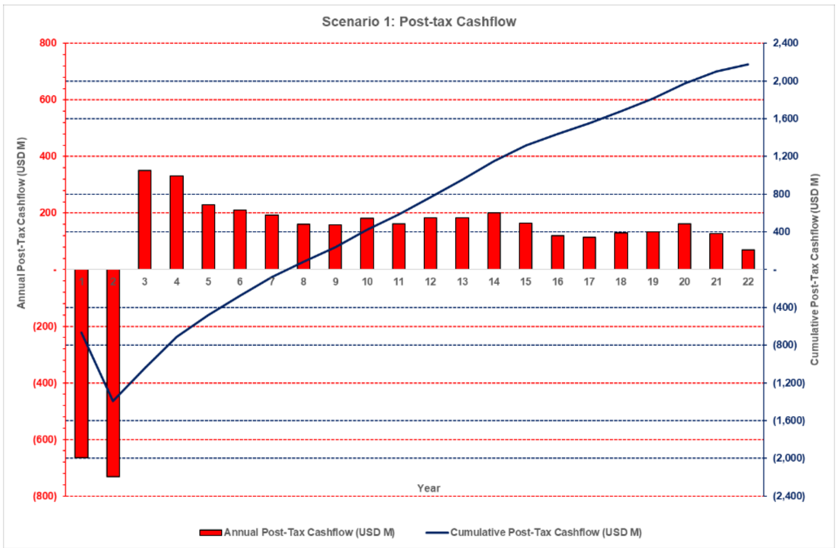


Figure 22-2: Scenario 1 annual and cumulative post-tax cashflow

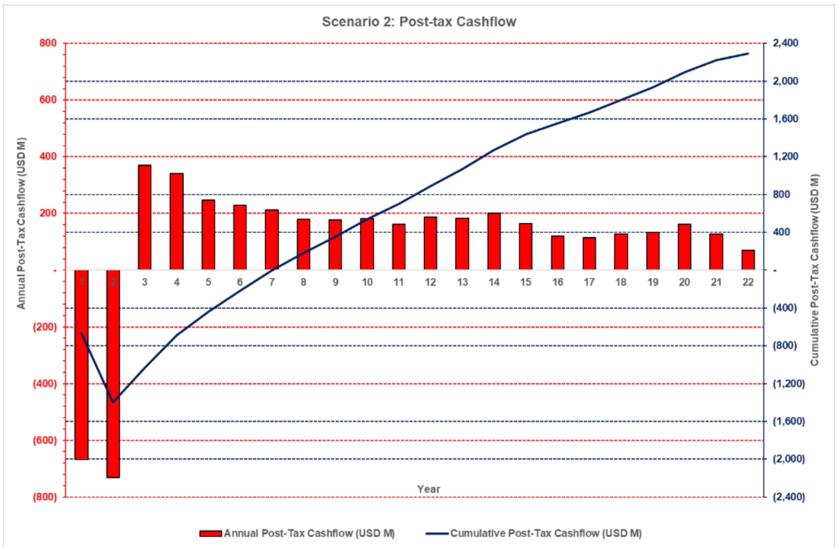


Figure 22-3: Scenario 2 annual and cumulative post-tax cashflow

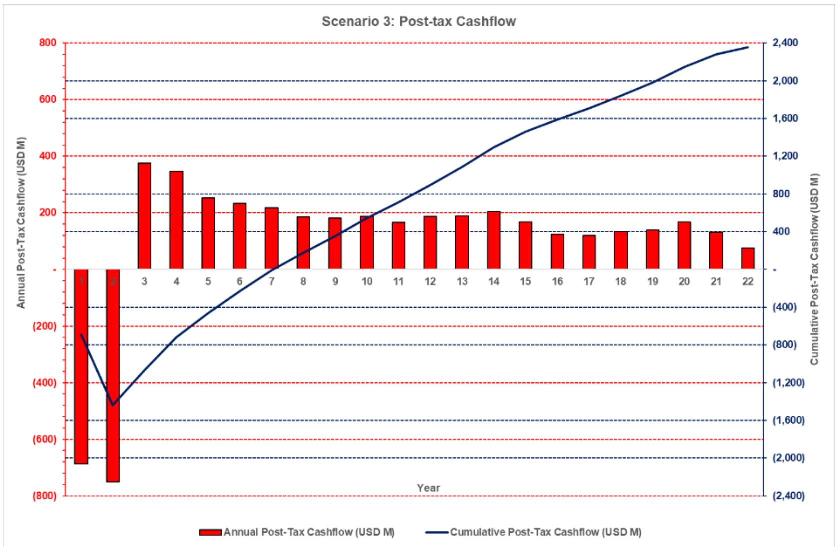


Figure 22-4: Scenario 3 annual and cumulative post-tax cashflow

22.6 Sensitivities

The sensitivity of NPV to specific nickel selling prices is presented in Table 22-9 and Figure 22-5. SRK notes all scenarios return negative NPVs if the nickel selling price drops below USD 19,000/t.

Table 22-9: NPV (8%) sensitivity to nickel selling price

NPV (at 8%)	Unit	Ni Selling Price (USD/t)						
		16,000	18,000	20,000	22,046	24,000	26,000	28,000
Scenario 1	(USDM)	-438	-134	166	465	765	1,064	1,363
Scenario 2	(USDM)	-362	-61	239	538	837	1,137	1,436
Scenario 3	(USDM)	-353	-53	247	547	846	1,145	1,444

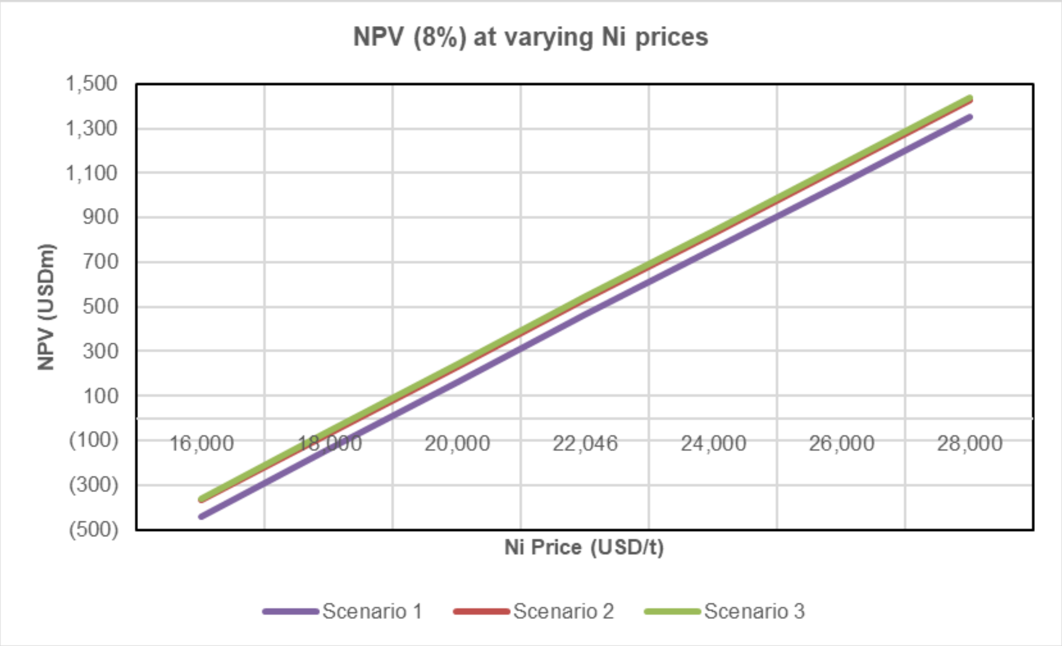


Figure 22-5: NPV (8%) sensitivity to Ni price

SRK has undertaken generic sensitivities for each Scenario of NPV to changes in sales price, operating costs and capital expenditure. The results are graphically presented in Figure 22-6, Figure 22-7 and Figure 22-8 for Scenarios 1, 2 and 3, respectively. The Project is most sensitive to changes in nickel selling price.

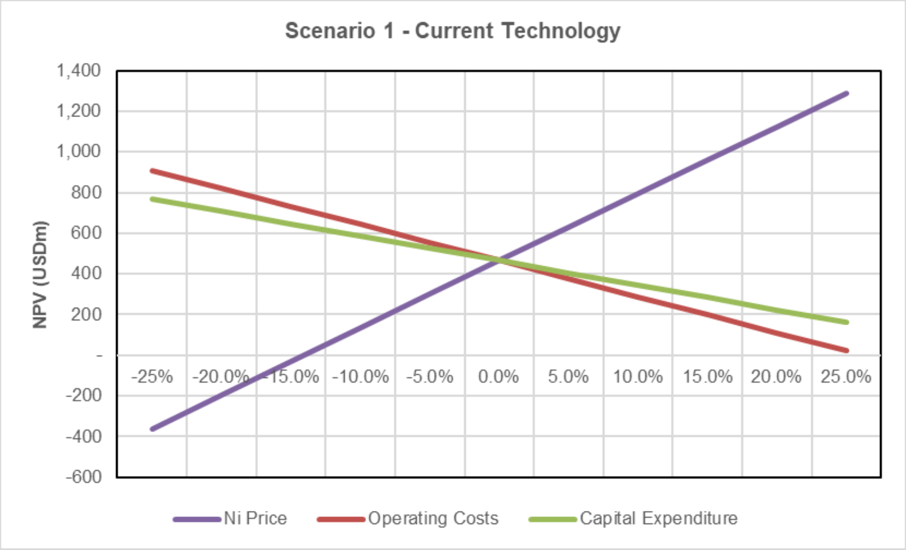


Figure 22-6: Scenario 1 NPV (8%) sensitivity to changes in price, costs and capital

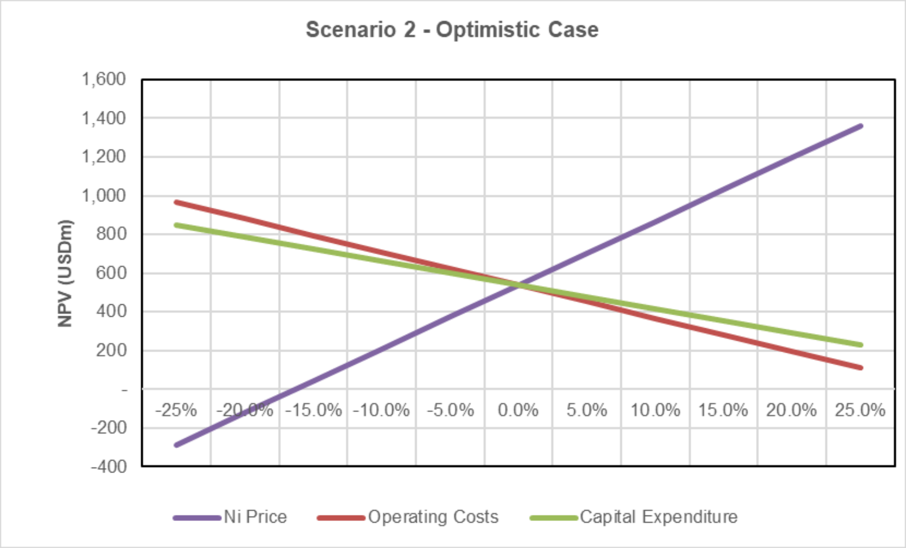


Figure 22-7: Scenario 2 NPV (8%) sensitivity to changes in price, costs and capital

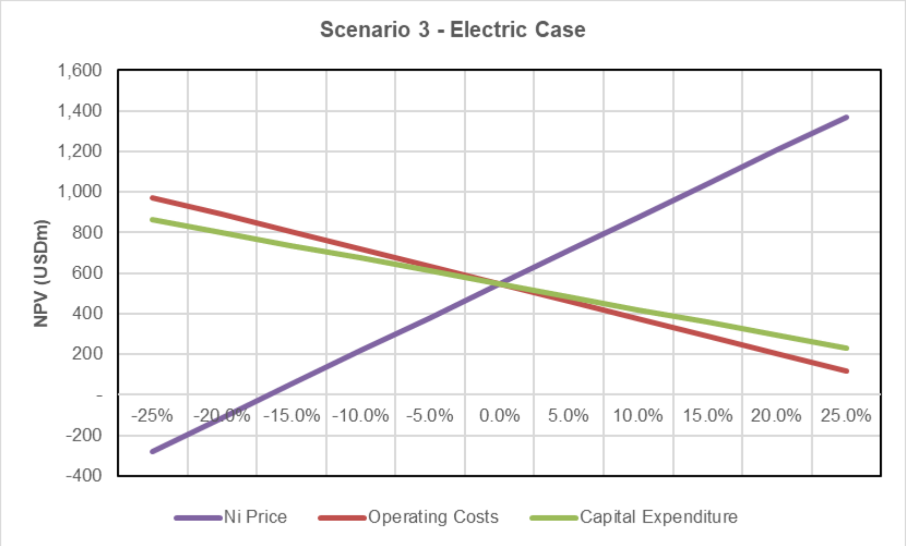


Figure 22-8: Scenario 3 NPV (8%) sensitivity to changes in price, costs and capital

23 INTERPRETATION AND CONCLUSIONS

23.1 Geology and Mineral Resources

The geology of the Rönnbäcken is well-understood through detailed exploration over decades. The three deposits comprising the Project, Rönnbäcksnäset, Vinberget and Sundsberget, are all low-grade disseminated nickel (cobalt) sulphide deposits hosted by ultramafic intrusive bodies.

The Mineral Resource for the Project has been reported using industry standard techniques including geological modelling and block model estimation of grade and tonnage based on mapping and sampling information, primarily from exploration drilling. These block models were last updated in 2012 as part of a commission for previous owners IGE Nordic. The block models were constrained by a conceptual open pit shell generated using technical information for geotechnics, mining, processing and waste management along with optimistic long-term metal selling prices in order to demonstrate ‘reasonable prospects for eventual economic extraction’, as required by the CIM reporting guidelines.

The Mineral Resource statement produced by SRK as part of this PEA update contains 600 Mt of Measured and Indicated Mineral Resources grading 0.10% Ni_S, 0.003% Co_S and 5.7% Fe. In addition, 20 Mt of Inferred Mineral Resources grading 0.11% Ni_S, 0.005% Co_S and 5.2% Fe_{Total} are reported.

23.2 Mining

The approach to costing the mining aspects of the Project is conceptual in nature, based on benchmark information and associated with approximately 50 % accuracy level. The granularity of overall capital and operating cost estimates are therefore insufficient to run sensitivities on fuel price for example. This approach is considered suitable by the industry for a PEA level of study, being conservative to test the robustness of the mine. For future detailed studies, SRK recommends a first principles mining cost calculation based on a detailed haulage analysis for each mine.

The costing information is largely based on North American expenditures, which are generally conservative for the Nordic region; however, the benchmark diesel price (USD 0.48/litre) is much lower than the typical price associated with the Nordic region (approximately USD 1/litre)

The major engineering and maintenance of the large fleet is assumed to take place on site, and the infrastructure and labour complement required to achieve this is included in the estimate. It is recommended that further detailed studies investigate equipment maintenance contracts for major parts maintenance off-site, with only minimal maintenance required on site. This might reduce up-front capital cost but would increase operating cost.

The mining cost estimate for waste is conservative since the benchmark information is based on a stripping ratio of 1, whereas the preliminary pit optimisation results suggest a stripping ratio of 0.6. It is therefore recommended that further first principles cost estimates be based on a haulage analysis for ore and waste rock separately.

A 20% reduction in operating expenditure was included in year 12 of the TEM Scenario 1 and from Year 3 in Scenario 2. This assumes that future technology will be available, and that mining will be designed in a manner suitable for the specific technology in question.

23.3 Processing

Metallurgical testwork has demonstrated that a high-grade nickel concentrate with acceptable impurities can be produced at 80% nickel recovery; however, a fine grind of 80% - 50 µm is required. Magnetite production is feasible, but the particle size will be very fine compared to normal magnetite concentrates and iron recovery and concentrate grade and impurity levels require further testwork to confirm the metallurgical performance.

23.4 Infrastructure and Logistics

The Rönnbäcken Project site is located near to established national road (E12) and the rail infrastructure of the "Inland Railway Line" (Swedish: *Inlandsbanen*). The Project is between 140 km and 280 km from port infrastructure. The nearby town of Storuman already has a working inland logistics hub, NLC Storuman. The Swedish electricity market is well developed, provides low-cost power, with a high penetration of renewables generation, especially in the northern regions. The Project lies adjacent to the Ajaure hydroelectric power plant and high voltage transmission grid. Key to success will be the ability to permit the infrastructure areas and to establish the dedicated project access road between the site and rail infrastructure. There is the opportunity to also assess extending the railway to the site. Sweden and the wider Nordic region are committed to net-zero GHG emission targets and are one of the leaders in the electrification of transportation systems and other decarbonising strategies.

23.5 Water Management

No site-specific data relating to the water environment has been collected to date. At present, a high degree of uncertainty therefore surrounds water management requirements and risk. This applies especially to the risk of significant hydraulic connection between the proposed pits and Lake Gardiken. Potential costs for water management, particularly dewatering of the pits, are therefore currently extremely uncertain and are excluded from the economic analysis herein.

23.6 Waste Management

23.6.1 Tailings

SRK has completed a PEA level assessment identifying a series of in-lake and on-land slurry tailings storage options for the Project. A total of 10 alternatives were modelled, in proximity to the proposed plant site.

Option A was selected as the preferred location for TMF development. This site is located in close proximity to the Rönnbäcksnäset open pit, occupies minimal land space and ranked favourably as part of an multicriteria assessment of environmental and social criteria.

SRK has prepared PEA level (±50% accuracy) capital, sustaining capital and operating cost estimates for the preferred TMF. The costs have been included in the overall TEM for the Project.

23.6.2 ARD

Preliminary testwork from 2011 described the tailings as having a very low content of sulphur and a relatively high neutralization capacity. The NPR of 28 is high enough to ensure that ARD will not be generated from this waste. The same is valid for the rock waste type called “K-sed” which must be designated as having a very low potential to form acid; however, the sulphur content of the remaining three “worst case” waste rock types is substantially higher, in the order of 0.3-0.4 %.

The worst-case sulphur concentrations are considered to be low or moderately high but high enough to be subjected to further evaluation according to the regulation. One of these, the ordinary schist has a high enough neutralization potential to be classified as “inert waste”. In order to be prepared for possible ARD problems, the other two waste rock types should be subject to further studies using kinetic tests.

As was emphasized in the introduction, this study is preliminary and indicative. Further sampling has to be completed for both tailings and waste rock when more specified information is available regarding the waste materials that actually will be generated. A specific programme should be developed to ensure that the samples that are chosen for future studies are fully representative.

23.7 Environmental, Social and Governance

The Project represents an opportunity to provide a local secure supply of raw materials to the burgeoning battery manufacturing industry in northern Europe. Although nickel is not currently considered as a critical raw material by the EU, cobalt is on the 2020 list[27], and nickel is being “monitored closely, in view of developments relating to growth in demand for battery raw materials due to the high economic importance” (European Commission 2020).

Impacts to the natural environment in the vicinity of the Project occur mostly during construction, continuing to a lesser extent through operations. Once the mines have closed and are rehabilitated, impacts are envisaged to largely cease, although some risks remain associated with possible climate change.

The three deposits of Rönnbäcknäset, Vinberget and Sundsberget are located in the same geographic, geo-political and biophysical area. They have similar topography, biodiversity, fall under the governmental jurisdiction from a national to municipal level, and have very similar social aspects.

The Project area includes areas of national interest for three purposes: reindeer husbandry, valuable deposits for mineral supply, and outdoor activities. The Project area also approaches an area of national interest for cultural heritage values (church of Voltjajaure kapell). The Company’s activities, in particular land take, may impact the land use in these areas.

[27] EU Critical Raw Materials*:* *[Critical raw materials (europa.eu)](#)*

Regarding reindeer herding, through dialogue with the Vapsten Sámi village, the engineering and design of the Project can be adjusted to enable their considerations to be incorporated. If impacts on herding routes cannot be avoided, the impacts will be mitigated or (as a last resort) compensation measures will be negotiated. It is noted that there are discussions and investigations ongoing between the State of Sweden and the Sámi Council relating to the permitting process in general (not specific to the Project), as described in Section 4.4.3. This has the potential to impact on the Project in the future as even if government support is obtained. If the social licence to operate is not achieved with the Sámi, then protests may result in delays to project implementation and/or influence investment decisions by other parties.

Notwithstanding the ongoing discussions between the State and the Vapsten Sámi village, social and economic impacts are largely positive particularly through new job creation, increased economy of the region and increased tax revenue to local authorities. Potential negative impacts stem from having to relocate a number of dwellings in the area due to risk from blasting and due to other activities such as mining and transporting ore and waste. Increased transport on roads, safety and disturbances from mining activities are other potential social impacts.

The population is aged and population density is low with mainly summer vacation dwellings within the Project boundary.

Hydroelectric power generation, forestry and reindeer herding are the most important economic sectors active in the area.

There are no areas surrounding the Project designated as environmentally protected; however, MKB1 studies identified vulnerable species in the area along with delineating high nature value areas they may require more robust management and monitoring.

The potential environmental impacts of the proposed Project were not deemed significant in the MKB1 studies. A range of measures were reported to be available to mitigate and/or reduce such impacts. However, these reports are now outdated, and they do not reflect current attitudes towards environmental and social matters. Baseline studies will need to be updated, communities engaged with and impacts re-assessed based on updated life of mine plans. This will be done as part of the MKB2 and used to inform the environmental permit application.

Water and extractive waste management will be of concern to stakeholders; however, due to the relatively low pollution potential of the material and the envisaged management controls, risks associated with this are expected to be manageable subject to appropriate studies being done to accurately define the necessary measures.

SRK has not deemed any of the ESG risks and issues noted in this section as of significant risk to impact reporting of Mineral Resources according to the RPEEE criteria. SRK, however, is aware there is a vocal opposition, particularly regarding concerns attributed to the potential impact on the Sámi reindeer husbandry, and significant effort will be required to ensure all potential negative impacts are assessed, avoided, minimised and/or mitigated. SRK notes there are investigations ongoing by the State into the awarding of exploitation concessions but currently the concessions are in place for the Project. Prior to start-up of operations, however, additional environmental permits will be required following completion and approval of the ESIA (MKB2).

24 RECOMMENDATIONS

24.1 Introduction

The results presented in this PEA are based on information currently considered to be at a 'Scoping' level of study for most areas with cost estimates in the order of ±50% accuracy. The next stage of study for the Project is a PFS; a comprehensive study of a range of options for the technical and economic viability of a mineral project that has advanced to a stage where a preferred pit configuration is established, and an effective method of mineral processing is determined. During a PFS, more detailed technical information is collected, analysed and presented to a higher level of accuracy and confidence with costs estimates expected to be in the order of ±30% accuracy. In addition, the detailed ESIA to support an environmental permit application must begin alongside the PFS.

An approximate budget and schedule to complete the PFS and ESIA work is also provided in Section 24.11.

24.2 Geology and Mineral Resources

A significant amount of technical work has been completed on the geological understanding of the Project to date. As such, no additional drilling or sampling specific to Mineral Resources is recommended; however, a portion of the PEA is based on Inferred Mineral Resources that have an inherently lower degree of confidence. As part of the PFS, Inferred Mineral Resources would be excluded from estimates of Mineral Reserves and life of mine planning. This accounts for 3% of the defined Mineral Resource herein and is therefore not considered material to the Project.

If drilling is completed to collect information on geotechnics, hydrogeology and processing then any data should be used to update the geological models and the Mineral Resource statement could be updated. It is therefore recommended that all drillholes are logged geologically and assayed for the key constituents as a minimum (Ni, Co, Fe, As, S).

24.3 Mining Geotechnical Engineering

The following key workstreams relating to geotechnical engineering should be included in the PFS and will be used to support the ESIA.

Data Capture

Additional data capture will allow slope angles to be optimised and bench/berm configurations to be designed, taking into consideration the interaction of rock structure and groundwater with the pit slopes. These include:

- Photographic logging of additional parameters to identify the jointing fabric is required. Current geological holes require structural measurements for alpha angle and also estimation of individual set spacing where possible from unoriented core.
- Detailed geotechnical investigations comprising the drilling of specific orientated geotechnical drillholes in slope positions is required. Drillhole geophysics scanning for structural measurements is highly recommended.
- Laboratory rock testing for intact rock strength and joint shear strength is required.

- Hydrogeological testing of identified structures that may connect with the lake and other surface water sources.

Modelling

Detailed structural and hydrogeological interpretation is required from surface and downhole information gathered in further drilling studies. These are to be modelled and combined with the master geological modelling.

Analysis Processes

- Slope stability in competent rock is usually governed by the structural fabric. Rock quality and joint fabric inputs into numerical analysis of slope stability are required at the scale of a bench, inter-ramp and overall angle. Results will indicate the practical bench configuration, geotechnical berm and ramp placement and resulting overall angles.
- The influence of groundwater and the close proximity of Lake Gardiken remains to be evaluated with regard to stability of the pit walls. Pore water pressures in the pit slopes especially those behind the pit lakes are likely to be high throughout the mine life. Significant further investigation is therefore required in order to evaluate potential pore water pressures in the pit slopes and the feasibility of any depressurisation required.

Pit Design

Pit designs will be controlled by geotechnical slope design guidance. Once pits are designed, these should be reviewed by the geotechnical engineer for compliance to the design and assessment relative to major structures, water influence, ramp placement, and surface infrastructure considerations.

24.4 Mining

The following key workstreams relating to mining should be included in the PFS and will be used to support the ESIA:

- Investigate the impact of regularising the in-situ resource model based on a Selective Mining Unit approach, to quantify the implied impact on the mining modification factors for loss and dilution.
- Incorporate expected overhaul distance costs for remote resources in the pit optimisation phase.
- Investigate, in a trade-off study, long haul of ore via overland conveyors for the remote deposits of Sundsberget and Vinberget.
- Investigate the potential benefit of Cut-off grade optimisation and strategic stockpiling of the ore.
- Develop detailed pit and phase designs that ensure optimised haulage access to the mining area.
- Incorporate detailed investigations to confirm the availability and suitable locations of waste rock dumps and to consider future in-pit back filling of waste material.
- Develop a detailed scenario for future technology by designing the mine for the selected methodology such as trolley assist, battery electric trucks or electric autonomous trucks.

24.5 Processing

The following key workstreams relating to mineral processing should be included in the PFS and will be used to support the ESIA:

- Additional metallurgical testwork – including investigating different grind sizes and splitting concentrates (separate flotation of heazlewoodite).
- Finalise the flowsheet.
- Prepare an option study to confirm the grinding configuration for:
    - mill-float or two stage mill/float – mill/float;
    - single concentrate or high- and low-grade concentrates; and
    - magnetite recovery circuit.
- Optimisation of the mining and processing schedule to develop a phased construction of the concentrator.
- Discussions on energy saving technologies for the fine grinding and for flotation should be instigated with equipment suppliers.
- Plant capital and operating costs should be developed in detail with up-to-date costs.

24.6 Infrastructure and Logistics

The following key workstreams relating to infrastructure and logistics should be included in the PFS and will be used to support the ESIA:

- General infrastructure and power supply:
    - investigations into general ground conditions across the site (civil geotechnical investigations) and at any special structures;
    - develop a preliminary electrical load-list and load profile and discuss with the utility provider and power grid owners around the options for grid connection, capacity, and pricing.
- Access and Access Road:
    - Assess the capacity of the Ajaure hydropower plant dam for permissible traffic loads for the early stages of construction.
    - Commence a trade-off study for dedicated access route options including preliminary ground investigations and topographic surveying to inform bulk earthworks estimates at key infrastructure locations.
    - Dedicated access route PFS design and costing.
    - Investigate with the relevant authorities (rail authority, Västerbotten CAB) the option for extending the railway to the mine site. Preliminary design work by a rail consultancy will be required.
    - Traffic surveys on potentially affected roads.
- Railhead, logistics and concentrate materials handling:
    - Materials handling laboratory testwork on samples of concentrate, especially Fe-con and the strategy for storage, transport, and handling.

- o Discussions with NLC Storuman around the proposals to expand and utilise the existing railhead. The locations and contractual arrangements could result in a variation in the currently estimated logistics costs.
- o Commence discussions with the rail authority regarding the requirements of the process to manage and control investment projects on the railways (including new connections for sidings, etc).
- o Investigate with the relevant authorities (rail authority, Västerbotten CAB) the availably, constraints and options for regular rail traffic along the spur from the Inland Railway Line to Vännäs and onwards to Umeå.
- o Develop preliminary schedules of material movement and enter into early discussions with one or more potential haulage (road and rail) contractors about equipment and costs.
- o Discussions with road hauliers (and original equipment manufacturers; Scania, for example) around the utilisation of a battery electric truck fleet for road haulage.
- o Understand the off-taker agreements and points of sale.

24.7 Water Management

Further hydrological and hydrogeological investigation will be required to support the PFS and ESIA:

- pit inflows from groundwater and surface water and infrastructure required to manage this water;
- pore water pressures in the pit slopes and optimised solutions for depressurisation, if required;
- surface water protection and management requirements for mine infrastructure including diversions, bunds, culverts, settling ponds, etc;
- seasonal site-wide water balance;
- seepage from waste dumps and tailings storage facility including environmental impact assessment;
- consideration of water impacts on water dependent ecosystems and other waters users within the catchment and downstream catchments; and
- water management requirements after mine closure.

Recording of groundwater strikes and other anecdotal drilling information during further investigative drilling will provide useful data for initial desk-based groundwater studies. This will allow the development of a more targeted groundwater investigation programme, thus saving costs in the long-run. Some significant cost savings might also be derived from developing an integrated hydrogeological and geotechnical field campaign.

24.8 Waste Management

24.8.1 Tailings

SRK has made the following recommendations regarding future design work required for tailings management to support the PFS and ESIA:

- Permitting remains a key factor for all the potential locations and early discussion with relevant planning authorities is recommended in all cases.
- Hydrogeological studies are necessary to understand potential seepage interactions between the TMF and adjacent open pit areas, plus impact on pit dewatering studies.
- Bathymetric survey of the lake to understand potential storage volumes.
- Geotechnical field investigations should be considered within the proposed footprint area of the preferred TMF embankment areas, to confirm the foundation conditions beneath the proposed site. This information can be used to refine the foundation designs for the main embankment and potential refine capital cost estimates.
- Option G should be further investigated from a permitting perspective. While this location has increased elevation and would result in increased pumping costs, there may be potential for in-lake deposition with limited embankment building. This may result in an overall lower cost to the project, providing it is possible to permit.
- SRK notes that Option I appears to be the most favourable deposition location from a technical standpoint (low height embankments, low cost, low consequence of failure, etc), although it is understood that due to cultural protections this area is highly unlikely to be permitted.
- Reuse of mine waste must be further investigated. There is potential to reduce the overall tailings capital cost if mine vehicles can deposit waste directly on the tailings dam during operations with minimal rehandling; however, the dam design may need to be modified to allow this (such as widening the dam crest to allow mine vehicles to safely operate on the crest).
- There is potential to convert the TMF into a co-disposal facility that stores both waste rock and tailings. This could reduce the visual impacts of the waste dumps and result in a final landform that is more conducive to reclamation and closure.
- Appropriate staging needs to be considered to identify the construction volumes throughout the mine life to provide an updated sustaining capital cost estimate that reflects the actual project requirements.
- Mineralogical analysis of high MgO ore is recommended to evaluate if the capacity of those ore types will substantially increase the carbon capture capacity of Rönnbäcken tailings. If brucite or hydrotalcite minerals are present, then laboratory bench reactivity testing can be used to estimate the rate and capacity for carbon mineralization. These tests include far-from-equilibrium flow through dissolution tests, batch dissolution tests, and carbonation tests. These tests are carried out under select pH conditions to assess reactivity to CO_2 in different concentrations depending on whether reactivity to air, flue gas, or other CO_2 streams is sought.

24.8.2 ARD

SRK recommends the following work to be undertaken relating to ARD potential to support the PFS and ESIA:

- Full programme of sampling and testing. The sampling program should take advantage of existing exploration drillhole assay data available in order to determine the variability of sulphur within the waste rock units. In addition, sampling should be undertaken from geotechnical drilling in the waste rock to fully characterise the bulk of the waste. Sample testing should include the following:

  - o Whole Rock Assay (through multi acid digestion or similar);
  - o Acid Base Accounting (in accordance with prEN15873);
  - o two stage deionised water leach testing (in accordance with EN12457-3);
  - o Net Acid Generation (“NAG”) testing (in accordance with EGI, 2002);
  - o Mineralogical Assessment; and
  - o humidity cell testwork (if deemed necessary).
- Kinetic characterisation testing of any materials subsequently not classified as inert to determine their long-term stability.

24.9 Environmental, Social and Governance

As the Project advances, Bluelake must ensure that ESG factors are considered in the assessment and selection of project design alternatives, particularly the siting of infrastructure and waste management facilities. Early ESG input can maximise opportunities for stakeholder engagement and avoiding key impacts and risks on the surrounding environment. This will require two-way communication between the project engineers and environmental and social specialists. Key recommendations include:

- Kick-off ESIA (MKB2) studies as soon as possible alongside the PFS. For this, Bluelake needs a technical team on the ground close the Project along with identifying a consultant to conduct the ESIA work.
- Assess all opportunities for climate change considerations to be embedded in Project design. Design alternatives and option selection should take into consideration energy efficiency, energy supply, water use and project footprint to demonstrate the lowest practical carbon intensity for the overall project design. The Company should look to commit to a ‘net zero’ carbon footprint.
- Other factors likely to be important for the ESIA will be interactions with other land uses (particularly Sámi and reindeer husbandry and hydroelectric power), populated places, cultural monuments and biodiversity. The risks and opportunities need to be considered in light of increased focus on key receptors and viewed from the perspective of environmental and human rights.
- As part of the ESIA, the cumulative impacts of Project aspects and with other projects in the area must be assessed.
- Detailed studies of waste (waste rock and tailings) needs to be conducted. For material that meets the criteria of ‘extractive wastes’ by the EU, a waste management plan will be required, as will permitting of an extractive waste facility.
- Specific studies on the impact of fibres (in asbestiform minerals) on health are required.
- Detailed modelling of the water balance, including how groundwater and surface water flow will be influenced by the Project, needs to be undertaken.
- Detailed modelling of airborne particulate matter and emissions are required.
- Detailed biodiversity mitigation and management measures are recommended to demonstrate a net positive impact from the project in the long term. A detailed biodiversity action plan is a likely requirement as part of the final suite of management plans arising from the ESIA commitments.

- Local and national level stakeholders should be identified and mapped, appropriate engagement methods identified, and a stakeholder engagement strategy developed. Measures should be employed to improve local community's understanding and awareness of the project (including the positive and negative impacts of the Project) through regular interactions and various methods of communication including newsletters and local media.
- Stakeholder engagement and meetings should be recorded and documented. Issues and concerns raised need to be formally documented, progress tracked, and a commitment made to feedback to the communities on these issues. This process can help improve the understanding of the positive and negative impacts on the social environment.
- Formal grievance process should also be developed and implemented in line with the UN Guiding Principles of Business and Human Rights. A formal grievance register should be kept with clear documentation on the grievance made, the steps taken to resolve the grievance and an option for third party resolution for any unresolved disputes.
- Anti-mining sentiment indicates a need for specific consideration on human rights, multi-stakeholder engagement platforms with open and transparent communication and dialogue, combined with increased capacity to mitigate any ongoing community opposition.

24.10 Closure

A detailed closure plan and associated cost estimate should be compiled as part of the PFS and must form part of the MKB2. This allows for a higher level of accuracy in the TEM and a more detailed understanding of the Project to be communicated to stakeholders.

24.11 PFS and MKB2 timeline

Schedules for the PFS and MKB2 studies have yet to be developed in detail by the Company. Table 24-1 provides SRK's approximate estimate of a schedule to complete the PFS and MKB2. A detailed analysis needs to be completed as part of a planning assessment. As shown in the table, the longest lead-time items are the MKB2, processing testwork and geochemical testwork. The schedule assumes drilling and pitting will be required to take samples for the various testwork.

Table 24-1: Prefeasibility Study schedule estimate

Discipline	Budget %	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18
Project Management	1%																		
Drilling & pitting	19%																		
Geology & Mineral Resources	2%																		
Geotechnical engineering	3%																		
Mining	2%																		
Processing	44%																		
Water management	3%																		
Waste management	13%																		
Geochemistry	3%																		
Infrastructure & Logistics	1%																		
E&S (including MKB2)	10%																		
Financial modelling	1%																		
Total	**100%**																		

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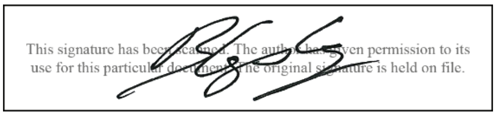
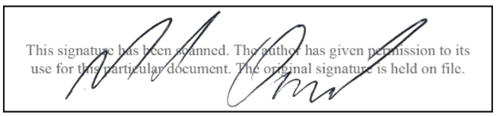


Ben Lepley,
Consultant (ESG),
Project Manager
SRK Consulting (UK) Limited

Fiona Cessford,
Corporate Consultant (ESG),
Project Director
SRK Consulting (UK) Limited



Mike Armitage,
Corporate Consultant (Resource Geology)
SRK Consulting (UK) Limited

Glossary

Decarbonisation	Reduction of carbon dioxide (“CO_2”) emissions (and other contributing GHGs such as methane and nitrous oxide) through changes in design to avoid emissions and the use of low-emission technology, achieving a lower output of GHG into the atmosphere.
Ordinary Kriging	Statistical method for estimating grades into a block model using variograms.
Sámi	Indigenous peoples generally dwelling in the Sápmi area of northern Sweden, Finland, Norway and the Kola Peninsula of Russia.
Serpentinization	Chemical weathering of olivine in ultramafic rocks through reaction with water, sulphur, and carbon dioxide (CO_2) to form serpentenite minerals.
Serpentinophytes	Species of plants specific to soil developed on serpentenite.
Tailings	Fine-grained waste product from processing plants.
Ultramafic	Igneous rock type comprising mainly olivine and pyroxene.
Variogram	Also referred to as semi-variogram. Statistical method of calculating spatial variance correlations and used to inform kriging algorithm (above).

Abbreviations

AP	Acid potential (geochemistry)
ARD	Acid rock drainage
CIM	Canadian Institute of Mining, Metallurgy, and Petroleum
CMF	Consensus market forecast
CO_2	Carbon dioxide, a GHG
Co_S	Sulphidic cobalt (i.e. cobalt only contained with sulphide minerals such as pentlandite, millerite, and cobaltite)
CRIRSCO	Committee for Mineral Reserves International Reporting Standards
ESG	Environmental, social and governance
ESIA	Environmental and social impact assessment (also referred to as an EIA)
FS	Feasibility study
GHG	Greenhouse gas/es
ICP-AES	Inductively coupled plasma-atomic emission spectroscopy (laboratory technique)
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal rate of return
IUCN	International Union for the Conservation of Nature
LoM	Life of mine
LTP	Long-term price
MKB	Swedish ESIA (Swedish: *Miljökonsekvensbeskrivning*)
Ni_S	Sulphidic nickel (i.e. nickel only contained within the crystal lattice of sulphide minerals such as pentlandite, heazlewoodite, millerite, maucherite)
Ni_T	Total nickel (i.e. nickel contained within the crystal lattice of any mineral – e.g. in olivine, serpentine, Ni-sulphides)
NNP	Net neutralising potential (geochemistry)
NP	Neutralising potential (geochemistry)
NPR	Neutralising potential ratio (NP:AP)
NPV	Net present value
P 80	80% of particles passing through a specified sieve aperture (mineral processing)
PFS	Prefeasibility study
RoM	Run of mine (ore production)
RPEEE	Reasonable prospects for eventual economic extraction (Mineral Resource)

SGU	Swedish Geological Survey (Swedish: *Svenska Geologiska Undersökning*)
SEK	Swedish Kroner
TEU	Twenty-foot equivalent containers
USD	United States of America dollars
US¢	United States of America cents (1/100th USD)
USDM	Million US dollars

Ag	Silver
As	Arsenic
Au	Gold
Co	Cobalt
CO_2	Carbon dioxide
Fe	Iron
H_2O	Water
Mg	Magnesium
Ni	Nickel
O	Oxygen
Pd	Palladium
Pt	Platinum
S	Sulphur

Units

dmtu	Dry metric tonne unit (used in iron ore pricing)
g	Gramme
g/t	Grammes per tonne
kg	Kilogramme
km	Kilometres
km^2	Square kilometres
kt	Thousand metric tonnes
ktpa	Thousand metric tonnes per year
ktpd	Thousand metric tonnes per day
kV	Kilovolts (power)
kWh	Kilowatt hour (thousand watts - power)
L	Litres
m	Metres
m^2	Metres squared
m^3	Cubic metres
masl	Metres above sea-level
mL	Millilitres
mm	Millimetres
Mm^3	Million cubic metres
Mt	Million metric tonnes
Mtpa	Million metric tonnes per year
MW	Megawatts (million watts – power)
MWe	Megawatts electric (power)
ppm	Parts per million (same as g/t)
µm	Microns/micrometres
%	Per cent