Keliber Lithium Project, Finland

Technical Report Summary

Prepared for

Sibanye Stillwater Limited

Report Number 592138

Report Prepared by

SRK Consulting (South Africa) (Pty) Ltd

Report Date: 13 December 2023

(Effective Date: 31 December 2022) [§229.1302(b)(1); §229.1302(b)(4)(iv)]

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Sibanye-Stillwater Limited

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Issue Date of TRS: 13 December 2023
(Effective Date of TRS: 31 December 2022) [[§229.1302(b)(1); §229.1302(b)(4)(iv)]

Important Notices

In this document, a point is used as the decimal marker and a space is used in the text for the thousand's separator (for numbers larger than 999). In other words, 10 148.32 denotes ten thousand one hundred and forty-eight point three two.

The word 'tonnes' denotes a metric tonne (1 000 kg).

Wherever mention is made of "Keliber", for the purposes of this Technical Report Summary (**TRS**), it encompasses all of the current and planned activities related to the Keliber Lithium Project, in which Sibanye Stillwater Limited owns an 84.96% share, in Central Ostrobothnia, Finland unless specifically mentioned differently.

This report includes technical information, which requires subsequent calculations to derive subtotals, totals and weighted averages. Such calculations may involve a degree of rounding and consequently introduce an error. Where such errors occur, SRK does not consider them to be material.

The reader and any potential or existing shareholder or investor of Sibanye Stillwater Limited is cautioned that Sibanye Stillwater Limited is involved in exploration on the Keliber Lithium Project and there is no guarantee that any unmodified part of the Mineral Resources will ever be converted into Mineral Reserves nor ultimately extracted at a profit.

This report uses a shorthand notation to demonstrate compliance with Subpart 1300 of the United States Securities and Exchange Commission's Regulation S-K, for example:

- [[§229.601(b)(96)(iii)(B)(2)] represents sub-section (iii)(B)(2) of section 96 of CFR 229.601(b) ("Item 601 of Regulation S-K").

Description of Amendments to Previously Filed Technical Report Summary

This Technical Report Summary (TRS) for the Keliber Lithium Project (Keliber), dated 13 December 2023, serves as an amendment to the TRS prepared by SRK for Keliber for the fiscal year ended 31 December 2022, effective 31 December 2022, which was filed as Exhibit 96.7 to Sibanye-Stillwater Limited's 2022 annual report filed on Form 20-F on 24 April 2023 (the Original 2022 Keliber TRS).

This TRS was prepared by SRK following Sibanye Stillwater Limited's receipt of comment letters and associated dialogue with the staff (the Staff) of the United States Securities and Exchange Commission (the SEC) regarding information in the Original 2022 Keliber TRS. While this TRS incorporates certain changes to the Original 2022 Keliber TRS, it maintains an effective date of 31 December 2022 with regard to assumptions and the knowledge of the Qualified Persons (QPs). This TRS revises the following information in the Original 2022 Keliber TRS as a result of the comments received from the Staff:

- The inclusion in Section ES 6 of the Mineral Resource point of reference as in-situ to comply with Item 1303 (b)(3)(v), thus no dilution and other modifying factors are applied to the estimated Mineral Resource.
  - This change is also added in Section 10.
- The inclusion in Section ES 9 of the Mineral Reserve point of reference as mill-feed to comply with Item 1303 (b)(3)(v), which include dilution and other modifying factors for the estimated of the Mineral Reserve.
  - This change is also added in Section 11.
- Addition of relevant lithium conversions and explanation of such conversions in ES 10, Section 10.2.1 and Section 11.3.1;
- Addition of conversion matrix in Section 10.2.1 (Table 10-6)
- Correction to the Total (Mt) and Ore Production (Mt) total of Table 12-2 to reflect only the open pit production salient features per mining area;
  - Subsequent to the above changes, the stripping ratio and Li_2O (%) presented in Table 12-2 were recalculated to also reflect only the open pit Stripping ratio and Li_2O (%), which were previously averages for the total tonnes, including underground tonnages, and were not limited to open pit production.

- Inclusion of further information regarding the price and demand of spodumene concentrate in Section 15 of this report, which was derived from the Wood Mackenzie (2021) market study (the "Wood Mackenzie Report") and Fastmarkets (March 2022) market study (the "Fastmarkets Report").
    - The Wood Mackenzie Report and Fastmarkets Report were also added to the list of documents provided by Sibanye in connection with the preparation of the Keliber TRS in section 23.1 and text has been added to reference these market studies in Section 18 of this report.
- Removed Table 18-2 and Table 18-3 and text referencing these tables in Section 18 to comply with Item 1302(e)(3) and 1302(e)(6) of Regulation S-K.

Executive Summary

[§229.601(b)(96)(iii)(B)(1)]

ES1: Introduction

This Technical Report Summary (**TRS**) of the Keliber Lithium Project (**Keliber**) was compiled by SRK Consulting (South Africa) (Pty) Ltd (**SRK**) on behalf of Sibanye Stillwater Limited (**SSW,** also referred to as the **Company**) according to Item 601 of the United States Securities and Exchange Commission's (**SEC**'s) Subpart 1300 of Regulation S-K (**S-K1300**). SSW holds an 84.96% share in the Keliber Lithium Project, which is located in Central Ostrobothnia, Finland, through its 100% interest in Keliber Lithium (Pty) Ltd.

Keliber is a combination of two businesses – the mine and the refinery with the concentrator being considered as part of the mine. Both businesses are run as standalone entities. The Mineral Reserves and Mineral Resources can be declared based solely on the economics of the production of concentrate from the mine. The Kokkola lithium hydroxide refinery (Keliber Lithium Refinery) can, similarly, be run profitably when processing third-party concentrates. The Keliber Lithium Refinery is thus not considered a Mineral Asset and discussions in this document include the refinery only because there are synergies, and it is the intention to mostly process own concentrate.

This report is the first TRS for SSW's Keliber Lithium Project and supports the disclosure of Mineral Resources and Mineral Reserves at 31 December 2022. The Mineral Resources and Mineral Reserves have been prepared and reported according to the requirements of S-K1300.

ES2: Effective Date

[§229.1302(b)(iii)(3)]

The effective date of the TRS is 31 December 2022, which satisfies the S-K1300 requirement of a current report.

ES3: Property description, Mineral Rights and ownership

Keliber is situated in Central Ostrobothnia in western Finland in the municipalities of Kaustinen, Kokkola and Kruunupyy. There are seven elements to the project:

- Seven spodumene exploration or mining properties at Syväjärvi, Rapasaari, Länttä, Outovesi, Emmes, Leviäkangas and Tuoreetsaaret;
- The Keliber Lithium Concentrator at Päiväneva next to Rapasaari mining property; and
- The Keliber Lithium Hydroxide Refinery planned for the Kokkola Industrial Park (**KIP**).

Figure ES. 1 depicts the location of the various project elements.

Keliber has applied for a range of permits to facilitate mining. Some of the permits have been approved, others are submitted, and some have been awarded but are under appeal following objections. It is a reasonable assumption that the permits will be awarded, even if with some modified conditions. At present there do not appear to be any environmental or permitting issues that will preclude the declaration of Mineral Resources or Mineral Reserves. While the time required for the authorities to process applications is uncertain and may defer project development if these applications are delayed, there is a reasonable expectation that all the required permits can be awarded. Keliber has progressed well with the permit applications and has indicated that they are not aware of any incorrect filings or red flags related to submitting applications.

The following mineral rights for lithium currently apply:

- Two legally valid mining permits (Länttä and Syväjärvi, including the Syväjärvi Auxiliary Area);
- One granted mining permit (Rapasaari, under appeal);
- Nine valid exploration permits (additional three granted under appeal); and
- One reservation permit.

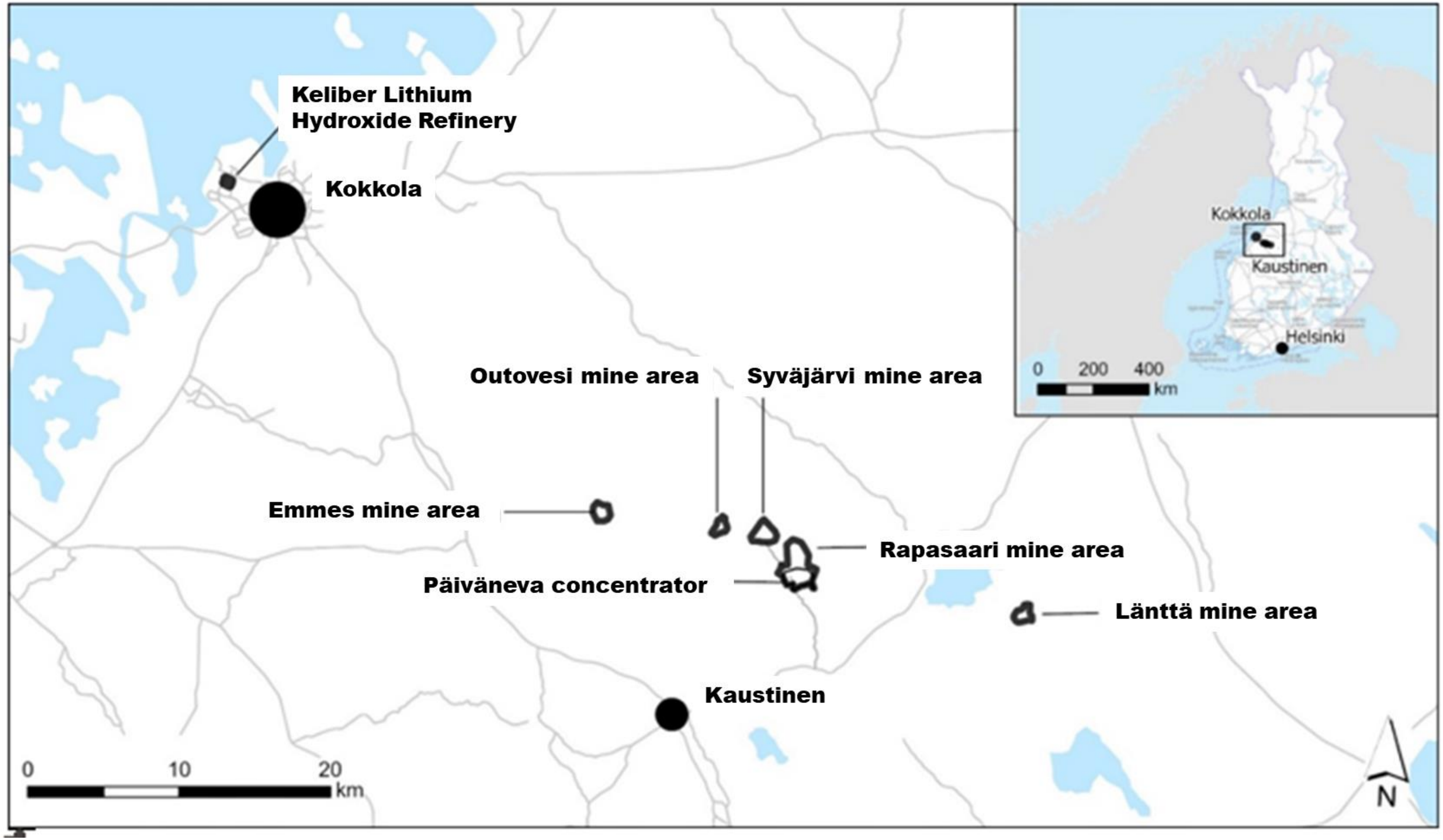
In addition, there are three granted exploration permits where the permitting decision has been appealed and is currently under a legal process in an Administrative Court.

Nine exploration permits are valid until expiry dates ranging from January 2023 to September 2025. Application for a further 28 exploration permits was made between 2018 and 2022; these are awaiting finalisation.

The various permits and applications are summarized in Table ES- 1 and Table ES- 2 and depicted in Figure ES. 2.

Keliber owns land at both Syväjärvi (47.39 ha (~28%) of the current mining area of 166.3 ha) and Outovesi (41.73 ha (~20%) of current claim areas of 209.67 ha).

Compensation to the landowners is due on the valid mining and exploration permits, according to the Mining Act (621/2011 as amended). Compensation on the granted exploration permits and the applications will become due once the permits become legally valid.



srk consulting	**SSW Keliber Lithium Project** Locality plan of the Keliber Lithium Project's elements *(Source: WSP, 2022)*	Project No. 592138

Figure ES. 1: Locality plan of the Keliber Lithium Project's elements

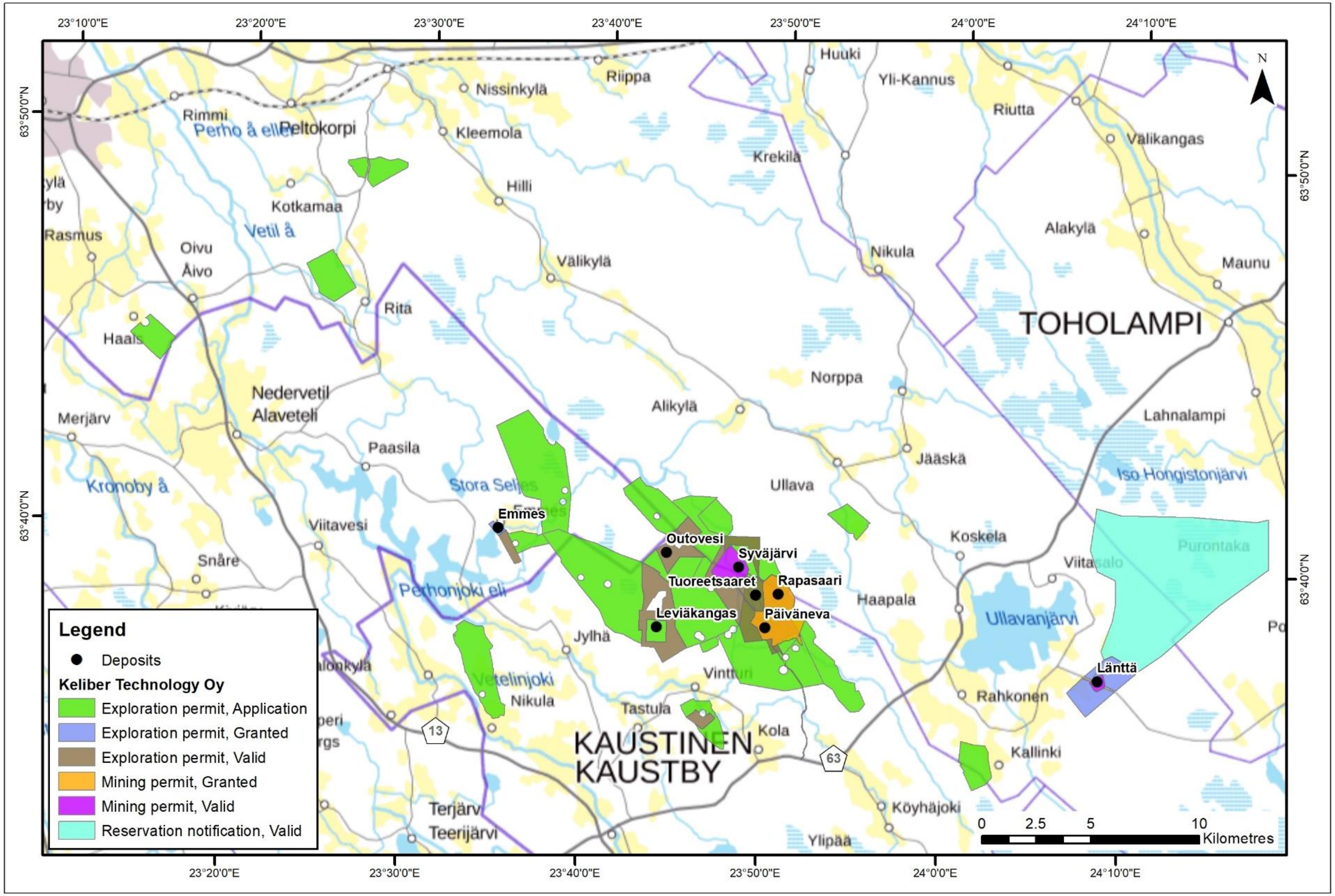
Table ES- 1: Summary of mining and exploration permits

Number	Asset	Number	Status	Decision Date	Expiry Date	Licence Area (ha)
Valid mining permits						
1	Länttä	7025 KL2021:0002	Legally valid	16/08/2016 11/02/2022	20/03/2027	37.49
2	Syväjärvi	KL2018:0001 KL2021:0003	Legally valid	13/12/2018 08/02/2022	Until further notice	186.25
3	Rapasaari[1]	KL2019:0004	Granted	23/03/2022	Until further notice	488.98
					Total area	**712.72**
Valid exploration permits						
1	Emmes 2	ML2019:0052	Legally valid	30/07/2021	06/09/2024	58.1
2	Karhusaari	ML2012:0157	Legally valid	16/12/2019	15/01/2023	167.36
3	Outoleviä	ML2019:0011	Legally valid	30/07/2021	06/09/2024	444.65
4	Outovedenneva	ML2011:0019	Legally valid	30/07/2021	06/09/2024	68.75
5	Outovesi	ML2018:0089	Legally valid	20/03/2020	20/04/2023	144.68
6	Outovesi 3	ML2018:0122	Legally valid	20/03/2020	20/04/2023	12.9
7	Roskakivi	ML2016:0020	Legally valid	30/07/2021	06/09/2025	227.18
8	Syväjärvi 3-4	ML2018:0120	Legally valid	16/12/2019	15/01/2023	115.75
9	Timmerpakka	ML2019:0010	Legally valid	20/03/2020	20/04/2023	53.68
					Total area	**1 293.05**
Valid Reservation						
1	Peräneva	VA2022:0020	Reservation	19/05/2022	04/04/2024	3 915.16
					Total area	**3 915.16**
Granted exploration permits (appealed)[1]						
1	Emmes 1	ML2015:0031	Granted	01/11/2021		19.86
2	Haukkapykälikkö	ML2011:0002	Granted	30/07/2021		350.32
3	Pässisaarenneva	ML2018:0040	Granted	30/07/2021		22.53
					Total area	**392.71**

Note:
1. Permit decision appealed; under legal process in Administrative Court.

Table ES- 2: Summary of exploration permit applications

Number	Asset	Number	Status	Application Date	Licence Area (ha)
1	Arkkukivenneva	ML2021:0045	Pending	31/03/2021	83.78
2	Buldans	ML2020:0001	Pending	16/01/2020	105.57
3	Hassinen	ML2018:0034	Pending	02/05/2018	300.39
4	Heikinkangas	ML2012:0156	Pending	27/05/2019	42.55
5	Hyttikangas	ML2018:0035	Pending	02/05/2018	238.08
6	Kellokallio	ML2019:0032	Pending	27/04/2019	182.19
7	Karhusaari	ML2012:0157-03	Pending	17/11/2022	137.91
8	Keskusjärvi	ML2018:0033	Pending	02/05/2018	211.08
9	Kokkoneva	ML2018:0055	Pending	16/05/2018	284.85
10	Länkkyjärvi	ML2018:0036	Pending	02/05/2018	361.57
11	Leviäkangas 1	ML2013:0097	Pending	05/05/2021	90.69
12	Matoneva	ML2018:0041	Pending	08/05/2018	511.54
13	Orhinselkä	ML2018:0042	Pending	08/05/2018	222.05
14	Östersidan	ML2018:0056	Pending	16/05/2018	204.95
15	Päiväneva	ML2012:0176-03	Pending	19/11/2022	52.02
16	Palojärvi	ML2018:0091	Pending	08/10/2018	35.55
17	Paskaharju	ML2016:0044	Pending	03/05/2022	131.71
18	Peikkometsä	ML2018:0023	Pending	21/03/2018	773.44
19	Peuraneva	ML2018:0032	Pending	02/05/2018	152.67
20	Rapasaari	ML2018:0121-02	Pending	16/11/2022	64.90
21	Ruskineva	ML2020:0002	Pending	17/01/2020	739.35
22	Rytilampi	ML2011:0020	Pending	03/02/2018	163.21
23	Syväjärvi 2	ML2016:0001	Pending	07/04/2021	71.53
24	Syväjärvi 3-4	ML2018:0120-02	Pending	17/11/2022	115.75
25	Timmerpakka 2	ML2020:0025	Pending	23/04/2020	174.96
26	Valkiavesi	ML2018:0031	Pending	02/05/2018	1 037.56
27	Vanhaneva	ML2019:0002	Pending	27/09/2018	368.12
28	Vehkalampi	ML2018:0022	Pending	22/03/2018	1 138.54
				Total area	**5 768.39**



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SSW Keliber Lithium Project
Mining and exploration permits as at 31 December 2022

Project No.
592138

Figure ES. 2: **Mining and exploration permits as at 31 December 2022**

ES4: Geology and mineralisation

Keliber is located within the Kaustinen Lithium Pegmatite Province that covers an area of 500 km^2 in western Finland. Here the host rocks belong to the Palaeoproterozoic (1.95 – 1.88 Ga) age Pohjanmaa Belt that forms a 350 km long by 70 km wide arcuate belt located between the Vaasa Granite Complex to the west and the Central Finland Granitoid Complex to the east. The northern parts of the Pohjanmaa Belt have been intruded by several Lithium-Caesium-Tantalum (**LCT**) type pegmatites with a majority of those belonging to the Kaustinen lithium province being of the albite/spodumene type.

Historical exploration supported by more recent drilling by the Geological Survey of Finland (**GTK**) and Keliber has (to date) resulted in the delineation of five discrete LCT pegmatite deposits, viz. Syväjärvi, Rapasaari, Länttä, Emmes and Outovesi. Each deposit is characterised by a series of pegmatites, veins and dykes, with intrusion geometry often being controlled by regional structural controls as well as host rock rheology.

All of the pegmatites that have been discovered and evaluated to date within the Kaustinen area all have very similar mineralogy in that they are dominated by albite (37 - 41%), quartz (26 – 28%), K-feldspar (10 – 16%), spodumene (10 – 15%) and muscovite (6 - 7%). Spodumene is the only lithium-bearing mineral that is of economic interest and is generally homogeneously distributed throughout most of the pegmatites. Several deposits display frequent inclusion or incorporation of host rock xenoliths within the modelled pegmatites and represent a form of internal dilution to the pegmatites.

Rock strength testing

Overall, the rock mass quality in the studied areas of the deposit indicate good quality, competent rock as evident from the competent drill core and from competent rock mass on the exposed excavations observed during the site visit at Syväjärvi.

The current geotechnical environment at Rapasaari, Syväjärvi and Länttä sites are understood to PFS study level. The intact rock strength parameters for the Syväjärvi site were inferred from those determined from the Rapasaari due to their close proximity to each other in comparison to other mining areas.

To date, no oriented geotechnical drilling was done for any of the sites, with geotechnical logging carried out on geology drill core. The available geotechnical data considered during the review, coupled with reported observations on exposed excavations, during the site visit, determine that the level of understanding of the rock strength parameters and characterization is regarded to be appropriate to define the geotechnical environment for Syväjärvi, Länttä and Rapasaari sites to Prefeasibility Study (PFS) study level. However, the geotechnical conditions at the Outovesi deposit are not currently well defined and are considered to be still at conceptual study level due to data scarcity and will need to be appraised to Prefeasibility Feasibility Study (PFS) through to FS level during project implementation.

Geotechnical conditions vary across the different sites, with open pit reserves having higher geotechnical data confidence due to existing exposures and laboratory test work. In-fill drilling and the associated testwork should consider further focus on discontinuity strength parameters for further improved geotechnical understanding of site and project specific conditions. It is noted that geotechnical data gathering and modelling are a continuous process during project implementation and mining operations, with confidence in rock mass and structural conditions improving over time as mining continues.

ES5: Status of exploration, development and operations

Apart from shallow surface reverse circulation drilling completed by GTK over the Syväjärvi deposit, all drilling (Table ES- 3) on the project has been completed using diamond core methods. Diamond core drilling therefore has been the only method used to generate geological, structural and analytical data over the deposits and these have been used as the basis for Mineral Resource estimation over each of the deposits defined to date.

Table ES- 3: Drilling completed by historical operators, GTK and Keliber to date

Deposit	Historical & GTK		Keliber		Total	
	Number of drill holes	Length (m)	Number of drill holes	Length (m)	Number of drill holes	Length (m)
Syväjärvi	37	4 078	155	16 109	192	20 187
Rapasaari	26	3 653	263	44 482	289	48 135
Länttä	27	2 931	73	6 136	100	9 067
Emmes	84	8 891	23	2 939	107	11 830
Outovesi	-	-	31	2 613	31	2 613
Tuoreetsaaret	-	-	50	10 617	50	10 617
Leviäkangas	99	6 821	24	5 174	123	11 994
Total	**273**	**26 374**	**619**	**88 069**	**892**	**114 443**

Since commencement of exploration in the Kaustinen region, Keliber has completed a systematic exploration and Mineral Resource evaluation programme that has been successful in delineating five discrete spodumene-mineralised pegmatite deposits. The work completed to date has captured all the important variables (mineralogical, structural, lithological) required to properly define host pegmatite/s attitude and importantly, spodumene or grade distribution within the various pegmatites that host each deposit.

In January 2022, Keliber issued a draft Definitive Feasibility Study (DFS) (WSP Global Inc., 2022c) based on the production of 15 000 tpa of battery-grade lithium hydroxide. This DFS used the DFS issued in February 2019 as basis for most of the technical work.

The final DFS was issued on 1st February 2022. SRK reviewed this DFS and classified it as a pre-feasibility study (PFS) in terms of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)]. This implies Capital Cost Estimate (Capex) and Operating Cost Estimate (Opex) accuracy of ±25% and overall project contingency of ≤15% could be achieved. It should be noted, however, that estimation of capital and operating costs is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macro-economic conditions, operating strategy and new data collected through future operations. Therefore, changes in forward-looking assumptions can result in capital and operating costs that deviate more than 25% from the costs forecast herein.

The major reasons for the downgrade of the DFS to PFS level by SRK are as follows:

- The mining cost for the February 2022 DFS was derived by escalating the February 2019 DFS's mining cost by 25%, The RFQ's were thus not updated for the February 2022 DFS.
- Geotechnical test work was not done to DFS level;
    - Geotechnical drilling and testwork was limited to the Rapaasari mining property; and
    - Geotechnical data from the Rapasaari deposit was used to infer geotechnical parameters for the other operations.
- The Keliber concentrator will make use of XRT ore sorting to remove waste material from mill feed;
    - This was only tested on Syväjärvi mining property ore material;
        - The characteristics across the mining property may vary which was not tested; and
        - The efficiency results from the tests were assumed for the mining properties.
- The Market for concentrate of 4.5% Lithium spodumene is unknown as the benchmark is 6% Li_2O in Europe.

ES6: Mineral Resource estimates

The *in situ* Mineral Resources at 31 December 2022 are summarized in Table ES- 4 on an attributable basis (Sibanye-Stillwater attributable ownership is 84.96%) and are reported exclusive of Mineral Reserves.

The Mineral Resources, except for the Emmes deposit, are reported above a cut-off of 0.5% Li_2O, with Emmes reported above a cut-off of 0.7 % Li_2O. No geological losses are considered in the Mineral Resource reporting. The majority of the declared Mineral Resources are classified as Indicated Mineral Resources (50%) with the remaining split between Measured (8%) at Syväjärvi, Rapasaari and Länttä and Inferred (42%) at Syväjärvi, Rapasaari, Leviäkangas and Tuoreetsaaret. The majority of the Measured Mineral Resources are converted to Proven Mineral Reserves and are therefore excluded from Table ES- 4.

Table ES- 4: Mineral Resource Statement for Keliber Oy operations as at 31 December 2022

Classification	Deposit	Mass (Mt)	Li grade (%)	LCE content (kt)
Measured	Syväjärvi	0.0	0.5	0.9
	Rapasaari	0.3	0.5	7.4
	Länttä	0.2	0.5	5.2
Total Measured		**0.5**	**0.5**	**13.5**
Indicated	Syväjärvi	0.4	0.5	10.7
	Rapasaari	1.1	0.4	25.4
	Länttä	0.7	0.5	16.7
	Outovesi	0.0	0.7	1.2
	Emmes	0.9	0.6	27.6
	Leviäkangas	0.2	0.5	4.6
Total Indicated		**3.3**	**0.5**	**86.1**
Inferred	Syväjärvi	0.1	0.4	2.0
	Rapasaari	1.3	0.4	29.3
	Leviäkangas	0.2	0.4	5.3
	Tuoreetsaaret	1.2	0.3	20.6
Total Inferred		**2.8**	**0.4**	**57.1**
Total Mineral Resources		**6.7**	**0.4**	**156.7**

Notes:
1. Mineral Resources are reported exclusive of Mineral Reserves derived from them.
2. The reference point for Mineral Resources are in -situ material.
3. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
4. Mineral Resource are reported above an economic cut-off calculated for each deposit.
5. All figures are rounded to reflect the relative accuracy of the estimates.
6. Note the Mineral Resource tabulation reports the % Li and not % Li2O. Contained Lithium is reported as Lithium Carbonate Equivalent (LCE)

ES8: Mining

Conventional truck and shovel operation has been selected as the most suitable open-pit mining method for Syväjärvi, Outovesi, Länttä and Rapasaari. For Länttä and Rapasaari underground operations is considered for the future. For Emmes, underground mining is the only possible mining method due to the underwater location of the ore body. The underground mining is excluded from the Mineral Reserves at this stage.

A truck and shovel operation refers to the use of large, generally rigid body, off-highway haul trucks being loaded with blasted rock by large shovels or excavators. This combination of mining equipment is a proven technology and is used in many open pit mines throughout the world.

The key points of a truck and shovel operation are:

- The truck and shovel combination is a known and proven mining method, capable of handling most rock types in Finland. Potential mining contractors have suitable equipment readily available;
- The haulage and loading equipment can handle both free-dig and blasted material;
- The blending of ore from multiple deposits if needed is simple compared to other mining methods; and
- The ability to produce the total annual mining rates is anticipated.

In-pit ramps and waste rock haul roads are designed for off-highway trucks with a payload of 90 t. For waste mining, the bench height can vary between 10 – 20 m. Waste rock maximum particle size is not limited.

ES7: Metallurgy and mineral processing

There are three main process stages for producing lithium hydroxide from the Keliber ores:

- Concentration (producing a spodumene concentrate from the ore);
- Conversion (converting the spodumene from the unreactive α phase to the reactive β phase); and

- Hydrometallurgical processing (leaching, purification and crystallisation stages to extract the Li from the β spodumene and precipitate it as high purity lithium hydroxide.

Ore sorting

Initial ore sorting tests focussed on optical and laser sorting. Following further comparative testing, X-Ray Transmission (XRT) ore sorting was selected for the Keliber project. Based on pilot-scale XRT ore sorting test results conducted on Syväjärvi ore samples, it was concluded that ore sorting is 73% efficient. There is a risk that ore sorting efficiency will vary across the Syväjärvi deposit. It is accordingly recommended that ore sorting variability tests be conducted across the Syväjärvi deposit. It was further assumed that the same efficiency would apply to other ore sources and ore types. There is a risk that other deposits will not perform with the same efficiency. It is accordingly recommended that these deposits be subjected to pilot ore sorting and variability tests using XRT ore sorting technology.

The feed to the ore sorting test equipment comprised an artificial blend of Syväjärvi ore and waste rock. There is a risk that performance on mined ore may be less efficient that on the artificial composite ore feed. It is accordingly recommended that samples of mined ore from all deposits be subjected to pilot ore sorting tests using XRT ore sorting technology.

Flotation

Flotation has been tested at bench scale on most deposits and at pilot scale on samples of Länttä, Syväjärvi and Rapasaari ore. Flotation parameters are reasonably well understood but it is recommended that pilot-scale tests be undertaken on the other main sources of ore.

Ore variability flotation tests were undertaken on Rapasaari samples selected from four different mineralised material types. These showed significant variability. It is recommended that similar variability programs be undertaken on all other deposits to ensure adequate understanding of spatial variability in flotation performance. Ultimately this should extend into the development of geo-metallurgical models for all deposits.

Conversion

Conversion test work was carried out by FLSmidth at their facility in the USA. The concentrate was calcined using a 2-stage cyclone preheater rotary kiln system, with 2 hours residence time and the burning zone solids temperature was generally maintained between 1 050-1 100 °C. These conditions resulted in an overall average alpha-to-beta conversion level of approximately 97% as measured by the conventional sulfuric acid solubility method. Some variation in optimum operating conditions were observed for concentrates from the different orebodies.

Hydrometallurgy

Outotec and Keliber have been working on the hydrometallurgical process since 2002.

In June 2018 Keliber completed a DFS for a project to produce battery-grade lithium carbonate from spodumene-rich pegmatite. However, following further market studies it was decided to consider the production of battery-grade lithium hydroxide monohydrate ($LiOH{\cdot}H_2O$). A series of tests was completed to determine the production parameters of lithium hydroxide from spodumene ore, including the proprietary Metso-Outotec lithium hydroxide process at pilot scale.

The key process stages for lithium hydroxide production are an initial alkaline leaching stage, using sodium carbonate and undertaken at high temperature and pressure, reacting the Li in the spodumene to solid phase lithium carbonate, followed by reacting this material with lime to produce lithium hydroxide in solution. The hydroxide is then crystallised out of solution following purification to form the final product.

A continuous hydrometallurgical pilot plant trial was conducted at Metso-Outotec's Pori Research Centre from 7 to 24 January 2020 on converted Syväjärvi concentrate.

The pilot plant data indicated that the Li recovery reached the design figure of 86% for a brief period, with the plant achieving a lithium recovery in the region of the mid 80s for almost 20% of the run.

More recently, Rapasaari spodumene concentrate produced in the GTK Mintec pilot plant was calcined in a continuous rotary kiln by FLSmidth in North America, after which it was shipped to Pori, Finland for hydrometallurgical test work.

The average lithium concentration of the calcines corresponded to a 5.5% Li_2O concentration.

The continuous $LiOH.H_2O$ pilot was operated for approximately 17 days. The main process stages in the process were soda leaching, cold conversion, secondary conversion, ion exchange, $LiOH.H_2O$ crystallization and mother liquor carbonation.

It was reported that in terms of impurity concentrations, almost all impurities were below detection limits. Notwithstanding, it is considered that the assessment of the product quality should be made in the context of developing relationships with potential off takers.

It was reported that there is sufficient evidence in the pilot plant results to give confidence that the design recovery figure can be achieved in practice, following a suitable ramp-up period.

The Keliber project is likely to be the first implementation of this specific lithium hydroxide flowsheet. While the individual unit processes are not novel, and while the Syväjärvi (2020) and Rapasaari (2022) pilot trials have significantly de-risked the flowsheet, a residual risk remains, as it does with the first example of any novel technology. In mitigation of such risk, the Lithium Hydroxide Refinery will commence hot commissioning on third party concentrate approximately nine months before concentrate is received from the Päiväneva concentrator. In addition, a ramp-up period of twenty four months has been allowed to achieve design throughput of Keliber concentrate. Metso Outotec will also provide a process guarantee will also be provided for the plant, although such a guarantee does not ultimately guarantee a process that will work so much as it defines the extent of financial compensation that will apply should it not.

Importantly, it should be noted that the Mineral Reserves for Keliber have been declared on the basis that a ready market exists for the concentrate, without the need for a refinery.

Mineral processing

In February 2022, Keliber issued a DFS and has undertaken engineering studies to produce 15 000 tpa of battery-grade lithium hydroxide.

The lithium hydroxide production process is split between two locations. Mined ore will be beneficiated at the Päiväneva concentrator located near the Rapasaari mine. Flotation concentrate will be transported to the Keliber Lithium Hydroxide Refinery where lithium hydroxide monohydrate will be produced as final product.

The selected overall flowsheet comprises a conventional spodumene concentrator which includes crushing, ore sorting, grinding and spodumene recovery by flotation. Flotation concentrate is calcined to convert alpha-spodumene to beta-spodumene. The converted spodumene concentrate will be processed via the patented Metso-Outotec soda pressure leach to produce lithium hydroxide monohydrate.

Modelled recovery parameters for each deposit are included in the Technical Economic Model.

ES9: Mineral Reserve Estimates

Sibanye-Stillwater announced on 28 November 2022, subsequent to securing an effective controlling interest of 84.96% in Keliber as announced on 3 October 2022, the approval of capital expenditure of EUR588m for the Keliber Lithium Project, beginning with the construction of the Keliber Lithium Hydroxide Refinery at Kokkola. Based on the Project FS completed during February 2022 and updated in October 2022 confirmed the robust economics of the Keliber Lithium Project at hydroxide prices significantly lower than the average prevailing spot prices over the previous 12 months. The open pit Mineral Reserves for the Keliber operations are summarised in Table ES- 5 with reference point for the material at the mill feed.

In the reserve conversion, the dilution and mined ore tonnes are calculated as follows:

$$\text{Mined Ore} = \text{In-situ Tonnes x Mining Recovery x } (100 + \text{Unplanned External Dilution\%})$$

Black rock dilution, which can be reduced by using a sorter, is calculated with the following methodology:

$$Black\ Rock\ Dilution = \frac{Total\ Amount\ of\ Black\ Rock}{Mine\ Ore}$$

The Mineral Reserves are based on the attributable interest of Sibanye-Stillwater in Keliber at 84.96%.

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Table ES- 5: Mineral Reserve Statement for Keliber Oy operations as at 31 December 2022

Classification	Deposit	Mass (Mt)	Li grade (%)	LCE content (kt)
Proven	Syväjärvi	1.3	0.5	37.2
	Rapasaari	1.8	0.5	44.1
	Länttä	0.2	0.5	4.2
Total Proven		**3.3**	**0.5**	**85.4**
Probable	Syväjärvi	0.5	0.4	10.3
	Rapasaari	4.1	0.4	89.0
	Länttä	0.1	0.5	2.1
	Outovesi	0.2	0.6	6.7
Total Probable		**4.9**	**0.4**	**108.2**
Total Mineral Reserve		**8.2**	**0.4**	**193.6**

Notes:

1. Cut-off for open pit reserves 0.40% Li_2O
2. Price EUR23 667/t LiOH.H2O
3. The reference point for Mineral Reserves are material delivered to the mill.
4. Measured material converted to Proven
5. Indicated Material Converted to Probable
6. No Inferred material included in the Mineral Reserve
7. The Rapasaari Mining permit has been granted but is under appeal

ES10: Conversions

In line with industry practice, Li Mineral Resources and Mineral Reserves total metal content is quoted in Lithium Carbonate (Li_2CO_3) Equivalent (LCE), which is one of the final products produced in the Li mining value chain. LCE is derived from in-situ Li content by multiplying by a factor of 5.323. Li Hydroxide Monohydrate ($LiOH.H_2O$) can be derived from LCE by dividing by a factor of 0.88. Li has been derived from Lithium Oxide (Li_2O) by multiplying by a factor of 0.465.

ES11: Infrastructure

Preparations are underway to construct the infrastructure, which will consist of a concentrator, a lithium hydroxide refinery and four open pit mines, together with access roads, power transmission lines, main electrical substations, electrical distribution, security, weighbridges, offices, laboratories, workshops, crushing units and internal roads.

ES12: Environmental permitting requirements

Keliber has obtained mining rights for Syväjärvi including the Syväjärvi Auxiliary Area, Länttä with an expiry date of 20/03/2027 and also for Rapasaari, which is granted, but not yet legally valid due to the appeal process that can continue between 18 to 30 months.

Keliber has obtained prospecting rights for nine exploration areas, that are legally valid for a range of dates from 2023 to 2025. These include Emmes 2, Outovesi, Rapasaari and Syväjärvi 3-4.

The prospecting right for Emmes 1 is owned by Keliber and is granted, but under appeal. Several other prospecting rights owned by Keliber is also granted but under appeal; these are listed in Chapter 2 of this report.

The status of the environmental permitting is shown in Table ES- 6.

Table ES- 6: Status of the environmental permitting

Site	Permit	Status	Date Granted
Syväjärvi mine	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental and water permit	Valid	20.2.2019
	Exception permit to moor frogs	Valid	1.2.2020
	Exception permit for diving beetles	Valid	21.7.2020
	Mining permit 1	Valid	13.12.2018
	The right of use of the mining area	Valid	9.8.2021
	Mining Safety Permit	Valid	13.10.2021
Rapasaari mine	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental permit	Valid	28.12.2022
	Mining Permit	Granted, but not yet legally valid	23.03.2022
	Mining Safety Permit	Not started	
Länttä mine	Environmental Impact Assessment	Finalised	28.6.2018
	Environmental permit	Valid	7.11.2006
	Mining Permit	Valid	16.8.2016
	Mining Safety Permit	Not started	
Outovesi mine	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental permit	Not started	
	Mining Permit	Not started	
	Mining Safety Permit	Not started	
Päiväneva concentrator	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental and water permit	Application submitted	30.6.2021
	Mining Permit (included in Rapasaari mining area)	Application submitted	14.4.2021
	Land use plan, local detailed plan	In progress	
	Building permit	Not started	
	Chemical permit	Not started	
Keliber Lithium Hydroxide Refinery	Environmental Impact Assessment	Finalised	30.6.2021
	Environmental permit	Application submitted	4.12.2020
	Building permit	Not started	
	Chemical Permit	Not started	

ES13: Capital costs

SRK reviewed the DFS and classified it as a pre-feasibility study (PFS) in terms of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)]. This implies Capital Cost Estimate (Capex) and Operating Cost Estimate (Opex) accuracy of ±25% and overall project contingency of ≤15% could be achieved. It should be noted, however, that estimation of capital and operating costs is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macro-economic conditions, operating strategy and new data collected through future operations. Therefore, changes in forward-looking assumptions can result in capital and operating costs that deviate more than 25% from the costs forecast herein.

Keliber presents capital expenditure (capex) as Pre-development and Initial capex and Sustaining capex in the Keliber Lithium Project Draft Definitive Feasibility Study (DFS) Report (WSP, 2022). The capital includes the establishment of the open pits, the capital for the Päiväneva Concentrator and the Keliber Lithium Hydroxide Refinery. The underground mines described in the DFS are not included in the Mineral Reserve and therefore no Capital for the underground mines is declared. All data provided in this chapter is sourced from WSP, 2022 and the updated 18 December 2022 TEM (reference Keliber, 2022). Table ES- 7 is a high-level summary of the capex for the project.

Table ES- 7: Keliber capital summary

Item	Units	Total
Syväjärvi Mine	EURm	8.1
Concentrator Plant (Päiväneva Site)	EURm	156.6
Lithium Hydroxide Plant, Kokkola Site	EURm	276.3
Engineering & Construction Services	EURm	48.1
Site Facilities During Construction	EURm	5.9
Construction Equipment	EURm	7.2
Other Construction Services and Costs	EURm	0.7
Owners' Cost	EURm	23.5
Contingency	EURm	56.0
Total Initial Capex	**(EURm)**	582.5

(Source: Keliber, 2022)

Sustaining capital includes provision for overburden removal for Syväjärvi Mine, development of Rapasaari, Länttä, and Outovesi mines, closure costs for the mines and concentrator plant, and individual item costs for the concentrator and the LiOH Plant. Sustaining capital amounts to EURm110.8.

The Keliber Project has been re-classified as a study at a PFS level as discussed in Section ES5 and Section 1.1. SRK considers that the accuracy of the Capex is ±25% with a contingency of <15% in keeping with Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)].

ES14: Operating costs

Keliber has prepared the operating cost estimates in collaboration with Afry, Sweco, FLSmidth and Metso-Outotec. The operating cost estimate is divided into seven different areas:

- Mining;
- Päiväneva Concentrator;
- Keliber Lithium Hydroxide Refinery;
- Other variable costs;
- Freight and Transportation;
- Fixed costs; and
- Royalties and Fees.

The mining costs for open pit mining has been based on the contractors quotes the resultant averages over the LoM are listed per operation in Table ES- 8. The contractor costs have been increased from the 2019 FS by 25% to include cost escalation since then.

Table ES- 8: Mining costs per open pit mining operation

Site	Total (Mt)	Ore production (Mt)	Stripping ratio	Li_2O (%)	Average waste mining cost EUR/t	Average ore mining cost EUR/t
Syväjärvi OP	12.45	2.08	5.00	1.068	2.67	4.38
Rapasaari OP	63.49	6.88	8.23	0.901	2.89	3.73
Länttä OP	2.09	0.29	6.33	0.886	5.30	9.51
Outovesi OP	2.56	0.24	9.67	1.331	2.71	5.21

Concentration and lithium hydroxide production costs

Lithium hydroxide production of 316 287 tonnes is planned over the life of the project. This includes 96 000 tonnes from external concentrates purchased over 6 years (Jan-42 to Dec-47) after depletion of the mine Mineral Reserves. Production from Keliber's own spodumene concentrate is estimated at 220 287 tonnes $LiOH.2H_2O$.

Non-mining costs for production of lithium hydroxide from Keliber's own concentrate are summarised in Table ES- 9. These include 10% contingency applied to most elements.

Päiväneva Concentrator (crushing, sorting and concentration)

Ore from the mine will be hauled to the primary crusher located at the Päiväneva concentrator.

Primary crushing and sorting costs are then applied to the concentrator area. The operating cost of the concentrator plant includes energy, reagents, consumables, and maintenance. The same items are covered for the water treatment plant which is considered as being part of the concentrator site area.

Energy is calculated based on the electrical load list of the equipment and the estimated power consumption. Reagents are derived from the process reagent consumption and costs are estimated from quotations provided by reagent suppliers. Consumables and maintenance costs were estimated based on recommendations derived from concentrator basic engineering work completed by Metso Outotec.

Concentrator operating cost for the life of the project is estimated at EUR168.9m produced from Keliber concentrates.

Keliber Lithium Hydroxide Refinery (conversion and LHP production)

Operating costs of the Keliber Lithium Hydroxide Refinery are estimated at EUR544.7m or EUR2 473/t of $LiOH.H_2O$ produced from Keliber concentrates. The main contributors to the costs are energy, steam generation and reagents.

Fixed costs

Fixed costs include labour costs, LNG connection fees, LHP connection fees, various water retainer fees, fixed operating costs for heating of buildings, laboratory running costs, property related costs, utility system and G&A costs. These fixed costs are estimated at EUR336.4m over the life of the mines, with labour and G&A costs comprising 48% and 42% respectively.

SRK considers that the Opex for the Keliber Project (mine and concentrator) has an accuracy of ±25%. Contingencies applied do not exceed 10% which satisfies the requirement of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)].

Table ES- 9: Non-mining cost summary

Section	Cost element	LoM cost (EURk)	LoM unit cost (EUR/t $LiOH.H_2O$)
Crushing & Sorting			
	Crushing, Sorting & Stockpiling	6 607	29.99
Concentrator			
	Energy	31 891	144.77
	Reagents	66 167	300.36
	Consumables	31 847	144.57
	Maintenance	17 304	78.55
Concentrator Water Treatment			
	Energy	3 496	15.87
	Reagents	8 541	38.77
	Consumables	1 759	7.98
	Maintenance	1 329	6.03
Concentrate			
	Loading & Transport	22 307	101.26
	Concentrate Purchase	-	-
Conversion			
	Energy/Fuel	70 772	321.27
	Other Consumables / Utilities	9 229	41.89
Lithium Hydroxide Plant			
	Energy	68 527	311.08
	Steam	86 832	394.18
	Reagents	220 959	1 003.05
	Process Water	2 186	9.92
	Consumables	4 527	20.55
	Utilities	12 328	55.96
	Maintenance	16 536	75.07
LHP Water Treatment			
	Reagents	17 238	78.25
	Consumables	8 308	37.72
	Energy	1 575	7.15
	Other Costs	3 395	15.41
Other Variable Costs			
	Service & Handling	1 823	8.28
	Other Costs	550	2.50
Transport & Packing			
	Side Rock Transport	-	-
	Final Product Transport	14 726	66.85
Processing Labour			
	Labour Costs	161 365	732.52
Other Operating Costs			
	District Heat	20 749	94.19
Subtotal Processing Cost		**1 322 619**	**6 004.06**
SG&A			
	General & Administration	139 881	634.99
	Property-related Costs	8 874	40.28
	Others	5 589	25.37
Royalties & Fees			
	Royalties	5 945	26.99
	Fees	11 010	49.98
TOTAL		**1 493 917**	**6 781.67**

ES15: Key risks

The key risks identified for Keliber include uncertainty regarding permitting (especially the duration of the appeal processes), environmental and water-related concerns and issues related to the estimation of the Mineral Resources which directly impacts the Mineral Reserves.

Paucity of geotechnical data, including rock mass strength and characterisation data, as well as confidence in structural geology models, result in conservative design and risk assumption and potential for the associated unknown ground conditions.

ES16: Economic analyses

SRK has placed reliance on Sibanye-Stillwater for the price assumptions and the marketing aspects of the lithium spodumene concentrate and lithium hydroxide products. The Net Present Value (NPV) of the post-tax cash flows for Keliber Mine and Concentrator is shown for a range of discount rates in Table ES-10. The NPV is determined in the model in euros and converted to ZAR and USD at the prevailing spot rate from 30 December 2022, the closest date to the Effective Date for which data is available.

Table ES-10: Sensitivity to Discount Rate

Discount Rate	NPV		
	(EURm)	(USDm)	(ZARm)
6.0%	223	239	4 058
8.0%	176	188	3 198
10.0%	**136.4**	**145.8**	**2 478**
12.0%	103	110	1 872
14.0%	75	80	1 358

The default price assumptions used are from the UBS December 2022 price deck. The average of the surveyed analysts is used in the Economic Analysis. A two-factor sensitivity, showing the sensitivity of the NPV (in EURm) to the USD/t price for spodumene concentrate and the working costs is included in Table ES-11.

Table ES-11: Sensitivity of NPV to Changes in Price and Working Costs

NPV in EURm			Long-term Concentrate Price (USD/t)								
			834	886	938	990	1 042	1 094	1 146	1 198	1 250
		84.7	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%
Working Costs (EUR/t)	61.7	-10%	39	69	100	130	160	190	221	251	281
	65.1	-5%	27	58	88	118	148	179	209	239	269
	68.5	0%	15	46	76	106	**136.4**	167	197	227	257
	71.9	5%	3	34	64	94	124.5	155	185	215	245
	75.4	10%	-8	22	52	82	113	142.8	173	203	234

The average working costs are EUR68.5/t and the forecast long-term spodumene price is USD1042/t. The spot price and the forecast prices are currently very volatile. The operating margin of the mine and concentrator is currently estimated at 42% for the scheduled life of mine (**LoM**). The company has funded the capital for the project and limited liquidity risk is present. The operating margin is generally healthy and although the NPV changes substantially in response to price changes the operating margin is forecast to remain positive under most foreseeable scenarios.

The post-tax NPV of the Mine and Concentrator producing spodumene concentrate for sale to a third-party is estimated at EUR136.4mat a 10% real discount rate with an IRR of 21.5%. This is on a 100% attributable basis. Sibanye-Stillwater owns 84.96%.

The integration of the Refinery significantly improves the economics. However, the Refinery is not considered a Mineral Asset. A more detailed explanation is included in the Economic Analysis chapter along with the cash flows of the integrated business. The company intends to operate the business as an integrated business for the period where both the mine and the Refinery are operating. However, the Refinery will operate independently before and after the mine life and has the potential to expand to process third-party concentrates or produce alternate products during the mine life.

ES17: Conclusions and recommendations

The various aspects of the Keliber Lithium Project study meet the requirements for a prefeasibility study stage property in terms of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)] and the declaration of Mineral Resources and Mineral Reserves. SRK has independently verified the Mineral Resource and Mineral Reserve estimates and confirmed their reasonableness and compliance with the requirements of S-K1300.

In general, the risks identified pertain to the declaration of Mineral Reserves and to work that would de-risk the operational phase.

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1 INTRODUCTION

[§229.601(b)(96)(iii)(B)(2)]

1.1 Registrant

[§229.601(b)(96)(iii)(B)(2)(i)]

Sibanye Stillwater Limited (**Sibanye-Stillwater**, **SSW**, or also referred to as the **Company**), a limited public company with its registered office in South Africa, is involved in the exploration, development, mining and processing of lithium spodumene mineral deposits in Central Ostrobothnia, Finland.

SSW (Figure 1.1) holds a share in the mineral rights to the Keliber Lithium Hydroxide Project (Keliber Lithium Project) through its wholly-owned subsidiary, Sibanye Battery Metals (Pty) Ltd (Figure 1.2), which owns 100% of Keliber Lithium (Pty) Ltd, which in turn owns 84.96% of Keliber Oy (Keliber).

This Technical Report Summary (**TRS**) relates to the Keliber Lithium Project, which consists of exploration and planned mining operations around Kaustinen, a planned mineral processing plant at Kaustinen (the Keliber Lithium Concentrator) and a planned conversion plant at Kokkola, the Keliber Lithium Hydroxide Refinery.

The Keliber Lithium Project plan is based on a definitive feasibility study (**DFS**) dated February 2022 **(WSP**, **2022**). The DFS is based on updated Resource models and additional deposits. After the DFS was reviewed during 2022, a decision was made to report Mineral Reserves for the open pit operations with the understanding that SRK will classify the level of study for the project at Pre-Feasibility Study (**PFS**) level because SRK does not believe that the study satisfies all the requirements of the United States Securities and Exchange Commission's (**SEC's**) Subpart 1300 of Regulation S-K (**S-K1300**), under the Securities Act of 1933 and the Securities Exchange Act of 1934 for a feasibility study (**FS**).

Keliber is a combination of two businesses – the mine and the refinery with the concentrator being considered as part of the mine. Both businesses are run as standalone entities. The Mineral Reserves and Mineral Resources can be declared based solely on the economics of the production of concentrate from the mine. The Kokkola lithium hydroxide refinery (Keliber Lithium Refinery) can, similarly, be run profitably when processing third-party concentrates. The Keliber Lithium Refinery is thus not considered a Mineral Asset and discussions in this document include the refinery only because there are synergies, and it is the intention to mostly process own concentrate.

The declared Mineral Reserves will be for the open pit portion of the study only. Sibanye-Stillwater announced on 28 November 2022, subsequent to securing an effective controlling interest of 84.96% in Keliber, as announced on 3 October 2022, the approval of capital expenditure of EUR 588m for the Keliber Lithium Project, beginning with the construction of the Keliber Lithium Hydroxide Refinery.

The Keliber Lithium Project is classified as a pre-feasibility study (PFS in terms of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)]. A final DFS was made available to SRK during 2022. SRK reviewed the DFS and classified it as a PFS for the open pit mining operations and a Scoping Study for the underground operations. This implies Capital Cost Estimate (Capex) and Operating Cost Estimate (Opex) accuracy of ±25% and overall project contingency of ≤15% should be achieved.

It should be noted that estimation of capital and operating costs is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macro-economic conditions, operating strategy and new data collected through future operations. Therefore, changes in forward-looking assumptions can result in capital and operating costs that deviate more than 25% from the costs forecast herein.

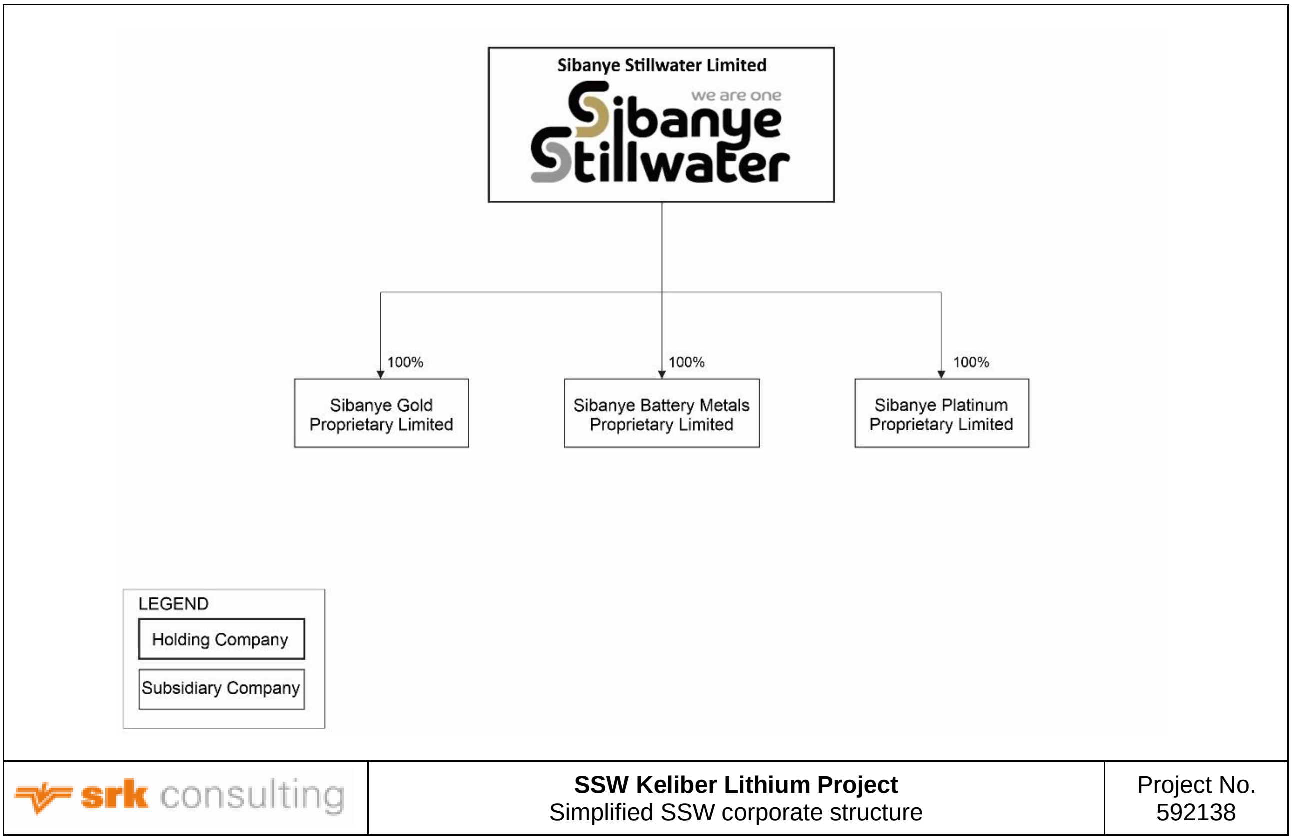


Figure 1.1: Simplified SSW corporate structure

1.2 Terms of reference and purpose of TRS

[§229.601(b)(96)(iii)(B)(2)(ii)]

Terms of reference

SSW commissioned SRK Consulting (South Africa) (Pty) Ltd (**SRK**) to compile this TRS for Keliber according to Item 601 of the United States Securities and Exchange Commission's (SEC's) Subpart 1300 of Regulation S-K (S-K1300), under the Securities Act of 1933 and the Securities Exchange Act of 1934.

Purpose

This report is the first TRS for the Keliber Lithium Project and supports the disclosure of Mineral Resources and Mineral Reserves at 31 December 2022. The Mineral Resources and Mineral Reserves have been prepared and reported according to the requirements of the SAMREC Code (2016 Edition), which uses terms and definitions that are consistent with the requirements of S-K1300.

Compliance

This TRS report has been compiled to ensure regulatory compliance.

Notation

This report uses a shorthand notation to demonstrate compliance with Item 601 of Regulation S-K1300 as follows:

- [[§229.601(b)(96)(iii)(B)(2)] represents sub-section (iii)(B)(2) of section 96 of CFR 229.601(b) ("Item 601 of Regulation S-K").

1.3 Sources of information

[§229.601(b)(96)(iii)(B)(2)(iii)]

Sources of information and data used in the preparation of the TRS are included in Section 24.

SSW has confirmed in writing that to its knowledge, the information provided by it to SRK was complete and not incorrect, misleading or irrelevant in any material aspect. SRK has no reason to believe that any material facts have been withheld.

1.4 Details of personal inspection

[§229.601(b)(96)(iii)(B)(2)(iv)]

The various key sites were visited by SRK from 14 – 16 March 2022 and 23 – 27 January 2023, including the locations of key mining areas, the core shed and the proposed locations of both the Keliber Lithium Concentrator and the Keliber Lithium Hydroxide Refinery.

1.4.1 Qualified Persons

[§229.1302(b)(1)(ii)]

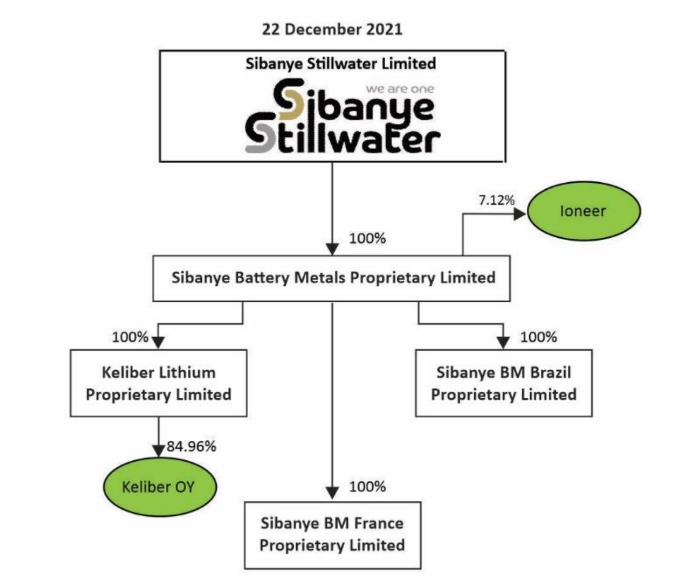
This report was prepared by SRK, a third-party consulting firm comprising mining experts in accordance with §2291302(b)(1). SSW has determined that SRK meets the qualifications specified under the definition of Qualified Person in §229.1300.

References to the Qualified Person, or QP, in this report are references to SRK Consulting (South Africa) (Pty) Ltd and not to any individual employed by SRK.

1.4.2 Independence

Neither SRK nor any of its employees or associates employed in compiling this TRS for Keliber, nor any directors of SRK, have at the date of this report, nor have had within the previous two years, any shareholding in the Company, SSW's subsidiary companies, the Keliber Lithium Project, any of the Company's Advisors, or any other pecuniary, economic or beneficial interest, or the right to subscribe for such interest, whether direct or indirect, in the Company, SSW's subsidiary companies, the Keliber Lithium Project, any of the Company's Advisors or the outcome of the work.

Consequently, SRK considers itself to be independent of the Company, its directors, senior management and Advisors.



srk consulting	**SSW Keliber Lithium Project** Sibanye Battery Metals (Pty) Ltd - corporate structure	Project No. 592138

Figure 1.2: Sibanye Battery Metals (Pty) Ltd - corporate structure

1.4.3 Consent

SRK has given, and has not withdrawn, its written consent for the use of this TRS report for regulatory compliance purposes.

1.5 Previous TRS

[§229.601(b)(96)(iii)(B)(2)(v)]

This TRS serves as an amendment to the Original 2022 Keliber TRS. The Original 2022 Keliber TRS was the first TRS for the Keliber Lithium Project filed by SSW in support of the reporting of Mineral Resources and Mineral Reserves for Keliber. Therefore, no update of a previous TRS is applicable.

1.6 Effective Date

[§229.1302(b)(iii)(3)]

The effective date of the TRS is 31 December 2022, which satisfies the S-K1300 requirement of a current report.

2 PROPERTY DESCRIPTION

[§229.601(b)(96)(iii)(B)(3)]

2.1 Location of property

[§229.601(b)(96)(iii)(B)(3)(i)]

The Keliber Lithium Project is located in Central Ostrobothnia, Finland, approximately 385 km north-northwest of Helsinki, in the municipalities of Kaustinen, Kokkola and Kruunupyy.

The Keliber Lithium Project consists of mining operations around Kaustinen, the Keliber Lithium Concentrator at Päiväneva near Kaustinen and the planned Keliber Lithium Hydroxide Refinery at Kokkola and ongoing exploration activities.

There are nine elements to the project:

- Seven spodumene exploration or mining properties at Syväjärvi, Rapasaari, Länttä, Outovesi, Emmes Leviäkangas and Tuoreetsaaret;
- The Keliber Lithium Concentrator at Päiväneva; and
- The Keliber Lithium Hydroxide Refinery planned at the Kokkola Industrial Park (**KIP**).

The co-ordinates for Keliber in Finnish national grid coordinates (ETRS-TM35FIN) are shown in Table 2-1; the location of the different project elements is shown in Figure 2.1.

Table 2-1: Co-ordinates of the Keliber Lithium Project elements

Type	Area	Geographical Co-ordinates (ETRS-TM35FIN)	
		Latitude (N)	Longitude (E)
Exploration/mine property	Syväjärvi	7 063 218	341 875
	Rapasaari	7 061 966	343 691
	Länttä	7 057 934	358 386
	Outovesi	7 063 902	338 547
	Emmes	7 06 5038	330 803
	Leviäkangas	7 06 0472	338 085
	Tuoreetsaaret	7 061 929	342 665
Concentrator	Päiväneva	7 060 429	343 076
Planned lithium hydroxide refinery	KIP, Kokkola	7 086 600	306 020

2.2 Finnish regulatory environment

[§229.601(b)(96)(iii)(B)(2)(iv)]

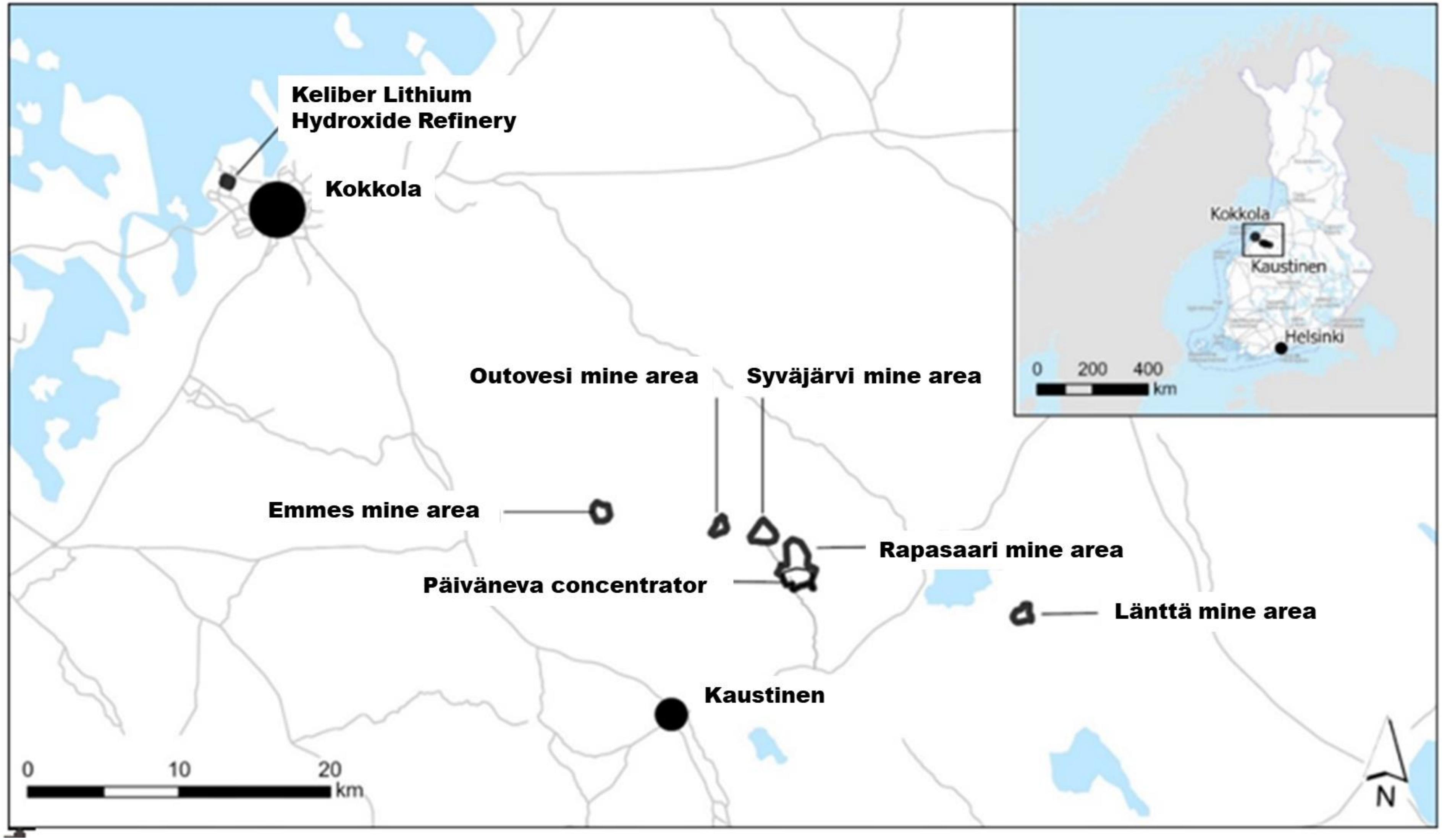
A brief overview of the regulatory environment in Finland within which Keliber operates and that affects Keliber is summarized below.

2.2.1 Constitution of the Republic of Finland (731/1999 amended 2018)

The ultimate source of national law in Finland is the Constitution, which defines the basis, structures and organisation of government and the relationship between the different constitutional organs; it defines the fundamental rights of Finnish citizens and other individuals.

Section 20 of the Constitution covers responsibility for the environment; this states that everyone is responsible for nature, the environment and the national heritage and that ”public authorities shall endeavour to guarantee for everyone the right to a healthy environment and for everyone the possibility to influence the decisions that concern their own living environment”[1].

1 https://www.refworld.org/pdfid/4e5cf5f12.pdf



	SSW Keliber Lithium Project Locality plan of the Keliber Lithium Project's elements *(Source: WSP, 2022)*	Project No. 592138

Figure 2.1: Locality plan of the Keliber Lithium Project's elements

The Mining Act (621/2011 as amended) prescribes how mining activities are conducted in order to meet the objectives of Section 20. This must be read along with the following pertinent legislation:

- Finnish Government Decree on mining safety (1571/2011)
- Finnish Government Decree on mining activities (391/2012); and
- Finnish Government Decree on mine hoists (1455/2011).

2.2.2 The Mining Act (621/2011, as amended)

All minerals are owned by the State of Finland. The objective of the Mining Act 621/2011 (**Mining Act**) is "to promote mining and organise the use of areas required for it, and exploration, in a socially, economically, and ecologically sustainable manner."[2]

The Mining Act defines exploration and mining activities; the applicable permitting that is required for each and the validity and obligations thereof; the definition of a mining area and its establishment; the safety and supervision required on a mine; and the termination of mining and returning the possession of the mine when mining has ceased.

The Finnish Safety and Chemicals Agency (**TUKES**) is responsible for issuing the relevant permits required for exploration and mining activities. The permits are described below.

2.2.3 Permits required

2.2.3.1 Exploration permit

This allows the holder to explore or prospect but not to exploit a deposit. The permit gives the holder the right to:

- to conduct exploration;
- to explore the structures and composition of geological formations;
- to conduct other exploration in order to locate a deposit, investigate its quality, extent, and degree of exploitation;
- to build, or transfer to the exploration area, temporary constructions and equipment necessary for exploration activity; and
- to conduct other exploration in order to prepare for mining activity.

An exploration permit is valid for a maximum period of three years and may be extended until a maximum of fifteen years' validity has been reached. Extension is dependent on the exploration having been effective and systematic; that all Mining Act obligations and all permit regulations have been complied with; that extension will not cause an undue burden to public or private interests and that further research is required to confirm whether exploitation is possible.

The permit holder has priority for being granted a mining permit.

At all times, the property owner retains the right to use and govern the area.

2.2.3.2 Mining permit

A mining permit is required to establish a mine. Once a permit is granted, the permit holder has the right to:

- Perform exploration within the mining area;
- To exploit:
    - The minerals found within the mining area;
    - Any organic or inorganic surface materials, excess rock, and tailings generated as a by-product of mining activities; and
    - Other materials belonging to the bedrock and soil of the mining area, where their use is required for the mining operations.

2 Ministry of Employment and the Economy, Finland. (2011)

Permits are usually granted until further notice, but they may be granted for a fixed period of time; the validity of a fixed term mining permit may be extended if mining has not yet commenced or if operations have been interrupted for a period of five years.

The holder may apply to change the size of the area of a mining permit and may also assign the permit to another party.

The holder must ensure that mining activities do not damage people's health; do not impact public safety; do not cause significant harm to or infringe on public or private interests; do not obviously waste mining minerals and do not cause prevent or hinder the potential future use and/or excavation work at the mine and the deposit.

2.2.3.3 Mining safety permit

A mining safety permit is required to construct and operate a mine (Mining Act (621/2011) and Mining Safety content requirements under Regulation (EU) No 1571/2011). This covers the structural and technical safety of a mine, the prevention of hazards and accidents and the mitigation of adverse effects of an accident. A mining permit must first be legally binding before a mining safety permit can be issued.

2.2.3.4 Surface Ownership

It is not a prerequisite that the entity conducting the exploration and/or mining own the land on which the activities are taking place. However, if the land is privately owned, agreement must be reached with the owner before activities can commence. Conditions to such agreements must be determined and agreed upon by both parties and usually include some form of compensation.

2.2.4 Income tax

Income taxes are based on a company's net income and are levied as prepayments during the fiscal year, which is generally the calendar year. If the company's accounting year differs from the calendar year, taxes are based on the accounting period or the accounting period that ends during the calendar year. Advance payments may be collected in two or twelve instalments during the year:

- Two instalments: if the total tax is ≤€2 000, payments are made in the third and ninth months; and
- Twelve instalments: if the total tax is >€2 000, payments must be made each month, by the 23rd of the month.

Corporate income tax is currently at 20%.

2.2.5 Carbon tax

Finland introduced a carbon tax in 1990 based on the carbon content of fossil fuels. The average tax is currently €62.00 per tonne of CO_2.

2.2.6 Royalties, fees and guarantees

[§229.601(b)(96)(iii)(B)(3)(vii)]

Royalties are payable on any ore mined, as the State owns the minerals. The base rate is €0.5 per tonne of ore mined, indexed to today's value. The royalties are based on agreements between the Ministry of Employment and the Economy and Keliber and are tied to the Producer Price Index.

A range of different fees are also payable; these include:

- Landowner payments according to the Mining Act during the life of mine: €50/ha/year and per payable metal content (0.15% of the concentrate value);
- Exploration tenements: payments to landowners based on exploration permits;
- REACH payments (Registration, Evaluation, Authorisation and Restriction of Chemicals): upfront and annual payments; and
- Property tax.

Closure cost (rehabilitation) guarantees are required by the permit authorities, covering all mines and concentrators.

2.2.6.1 Royalties

Royalties that must be considered are for the state of Finland for the mined ore from Syväjärvi and Rapasaari mines because their exploration licenses have been purchased from the Finnish state.

Agreements between Keliber and the Finnish Government are in place for Leviäkangas and Syväjärvi (dated 19 October 2012) and Rapasaari deposit (signed by the company on 22 October 2014). The following terms apply:

- Keliber will pay €0.5 per tonne of ore (that is, the base rate) after the ore has been mined, treated to produce the products and those products sold;
- For Syväjärvi and Leviäkangas, the royalty is subject to a price adjustment formula:
    - Adjusted price = ((Y/Z)*S(P) + (1-S)*(P))

      Where:
      Z = Index[3] for Base Period (January 2012)
      Y = Index for December month preceding the year Royalty is calculated
      S = Percentage of Price Subject to Adjustment (100%)
      P = Base unit contract Price (€0.5)

      The royalty may be adjusted upward or downward based on the change in the Index from the base value to the December month value preceding the year for which the royalty is to be calculated. The base period for calculating the change will be from the January 2012 date of the Agreement. The royalty payment is payable annually and is made by the end of April the following year.
- For Rapasaari , the royalty is subject to the following price adjustment formula:
    - Adjusted price = ((Y/Z)*S(P) + (1-S)*(P))

      Where:
      Z = Index[3] for Base Period (September 2014)
      Y = Index for December month preceding the year Royalty is calculated
      S = Percentage of Price Subject to Adjustment (100%)
      P = Base unit contract Price (€0.5)

      The royalty may be adjusted upward or downward based on the change in the index from the base value to the December month value preceding the year for which the royalty is to be calculated. The base period for calculating the change will be from the effective date of the Agreement. The royalty payment is payable annually and is made by the end of April the following year.

2.2.7 Finnish environmental legislation

Finland has adopted a comprehensive regulatory framework on environmental issues. Although mostly regulated through national legislation, a large part of Finnish environmental legislation is from European Union (EU) law, either as directly applicable law or through implementation of EU law. The key national legislation and main environmental regimes in Finland are shown in Table 2-2.

3 For Syväjärvi and Leviäkangas, the Index is the Producer Price Index of the Industry (2000 = 100) and for Rapasaari, the Index is the Producer Price Index of the Industry (2010 = 100).

Table 2-2: Key environmental legislation

Applicable Act	Aspect governed by the Act
Environmental Protection Act (Ympäristönsuojelulaki).	Prevention and control of pollution; prevention of generation of waste by certain activities; soil and groundwater conservation and remediation
Waste Act (Jätelaki)	General prevention of generation of waste and prevention of hazards and harm to human health and the environment
Water Act (Vesilaki)	Water resource management and control
Nature Protection Act (Luonnonsuojelulaki)	Nature and landscape conservation
Act on Compensation for Environmental Damage (Laki ympäristövahinkojen korvaamisesta)	Liability for environmental damage
Act on Remediation of Certain Environmental Damage (Laki eräiden ympäristölle aiheutuneiden vahinkojen korjaamisesta)	Remediation of damages to biodiversity and certain water systems
Act on Environmental Impact Assessment Procedure (Laki ympäristövaikutusten arviointimenettelystä)	Environmental impact assessment (**EIA**)
Act on Environmental Impact Assessment of Plans and Programmes of the Authorities (Laki viranomaisten suunnitelmien ja ohjelmien ympäristövaikutusten arvioinnista)	EIA concerning certain plans and programmes
Land Use and Building Act (Maankäyttö- ja rakennuslaki)	Land use and planning
Emission Trading Act (Päästökauppalaki)	Emissions trading
Act on the Use of the Kyoto Mechanisms (Laki Kioton mekanismien käytöstä)	Emissions trading
Land Extraction Act (Maa-aineslaki).	Use and control of certain natural resources
Mining Act (Kaivoslaki)	Use and control of mining resources
Forest Act (Metsälaki)	Use and control of forest resources
Chemical Act (Kemikaalilaki)x	Use and control of forest resources
Gene Technology Act (Geenitekniikkalaki)	Genetic engineering
Nuclear Energy Act (Ydinenergialaki	Nuclear power
Act on Operating Aid for Power Generation from Renewable Energy Sources (Laki uusiutuvilla energialähteillä tuotetun sähkön tuotantotuesta)	Renewable energy/feed-in tariffs
Radiation Act (Säteilylaki)	Radiation control

Key regulatory authorities

The main body that develops environmental policy and drafts environmental legislation is the Ministry of the Environment. Other relevant ministries with adjacent competencies are the:

- Ministry of Employment and the Economy, which handles policy issues concerning mining and energy (including renewable energy); and
- Ministry of Agriculture and Forestry, which handles policy issues concerning the use of water and forest resources.

There are several competent authorities that enforce environmental legislation. Generally, the competent supervisory authorities are the regional Centres for Economic Development, Transport and the Environment (Elinkeino- , liikenne- ja ympäristökeskus) (ELY-keskus), and the municipalities. The competent permitting authorities for environmental permits are the Regional State Administrative Agencies (Aluehallintovirasto) and the municipalities.

Environmental permitting

The Environmental Protection Act governs an integrated permit regime for emissions into air, water and/or soil and the generation of waste. However, an environmental permit does not necessarily cover all activities on site or even all emissions from the site/operations.

Under certain circumstances the permit process for a water permit under the Water Act is integrated with the permit process for an environmental permit.

Environmental Impact Assessments

An Environmental Impact Assessment (**EIA)** must be performed for projects if:

- The project type is listed in the Environmental Impact Assessment Decree, which contains a list of projects (industrial and construction) that are deemed to have considerable environmental impacts.

- The competent authority decides that an EIA must be performed due to the considerable environmental impact of the project even if the project is not included in the Decree.

In addition to the general EIA legislation that applies to projects, public authority plans and programmes also require an EIA under certain circumstances. The most important ones are listed in a separate government Decree. For planning decisions, municipalities are responsible for assessing the environmental impact of the plan under the land use and planning legislation. In addition to typical environmental impacts, impacts on the local economy must also be assessed. If a project or plan may affect the nature conservation values of a Natura 2000 nature conservation site, the impact must be evaluated before the project or plan can be carried out.

2.3 Mineral Rights

[§229.601(b)(96)(iii)(B)(3)(ii)-(iv)]

SSW has confirmed to SRK that all legal information in this TRS is correct and valid and that the company in which it has the shareholding (Keliber) has title to the mineral rights and surface rights for the Keliber Lithium Project through its subsidiary Keliber Technology Oy.

All the permits – both mining and exploration – are wholly owned by the operating company, Keliber Technology Oy and have been applied/granted for lithium. Compensation to the landowners according to the Mining Act applies to all legally valid mining and exploration permits; compensation for all permit applications or the granted exploration permits will only become due once the permits are legally valid.

2.3.1 Mining Rights

As at 31 December 2022, there are two legally valid mining permits, Länttä and Syväjärvi, together totalling some 223.74 ha in extent (Table 2-3). The Rapasaari permit was granted in March 2022, it still needs to become legally valid, the next step in the permitting process.

The Finnish Mining Authority (Tukes) is responsible for granting mining and exploration permits; once a permit is granted, there is a period of 37 days during which an appeal against the permit may be lodged with the Administrative Court. If no appeals are lodged, the permit becomes legally valid. If an appeal is lodged, resolution may delay operations by up to 18 months, or longer if the appeal is escalated to the Supreme Administrative Court (up to around 30 months in total). Any person, company or organisation may lodge an appeal, which are usually on environmental grounds (e.g. noise, dust, increased traffic, etc.)

Mining safety permits

Keliber has an approved mining safety permit for Syväjärvi (Mining permit KL2018: 0001; Environmental permit 36/2019 number: LSSAVI / 3331/2018). The application was completed in March 2021 and signed in October 2021. This would allow Keliber to start site development in spring 2022, which is estimated to require 24 – 28 months to complete. Thereafter, mining is proposed to commence and continue for approximately four years.

Keliber intends to apply for a mining safety permit for Rapasaari in 2023 or as soon as possible.

2.3.2 Prospecting Rights

Eleven exploration permits with a total area of 1 804.29 ha were valid as at 31 December 2022 (Table 2-3) and applications for a further 28 exploration permits (with a total extent of 5 768.39 ha) had been submitted (Table 2-4). Three exploration permits had lapsed, or were due to lapse, and were reapplied for and are awaiting approval:

- Paskaharju (ML2016:0044) expired on 19/05/2022 and was reapplied for on 03/05/2022;
- Päiväneva (ML2012:0176) will end on 15/01/2023 and was re-applied for on 16/11/2022 as ML2012:0176-03 but over a smaller area (52.02 ha as opposed to the previous 82.37 ha) to ensure no overlap with the Rapasaari Mining Permit area; and
- Rapasaari (L2018:0121) will also expire on 15/01/2023 and was reapplied for on 19/11/2022 as ML2018:0121-02, also over a smaller area (64.90 ha, previously 428.87 ha), for the same reason as Päiväneva.

One reservation (Peräneva VA2022:0020) was decided on 19/05/2022 and expires on 04/04/2024. Three additional exploration permits have been granted – Emmes 1, Haukkapykälikkö and Pässisaarenneva – with a combined area of 392.71 ha. In all three cases, the permit decision has been appealed and is currently under a legal process in an Administrative Court.

Table 2-3: Summary of valid or granted mining and exploration permits as at 31 December 2022

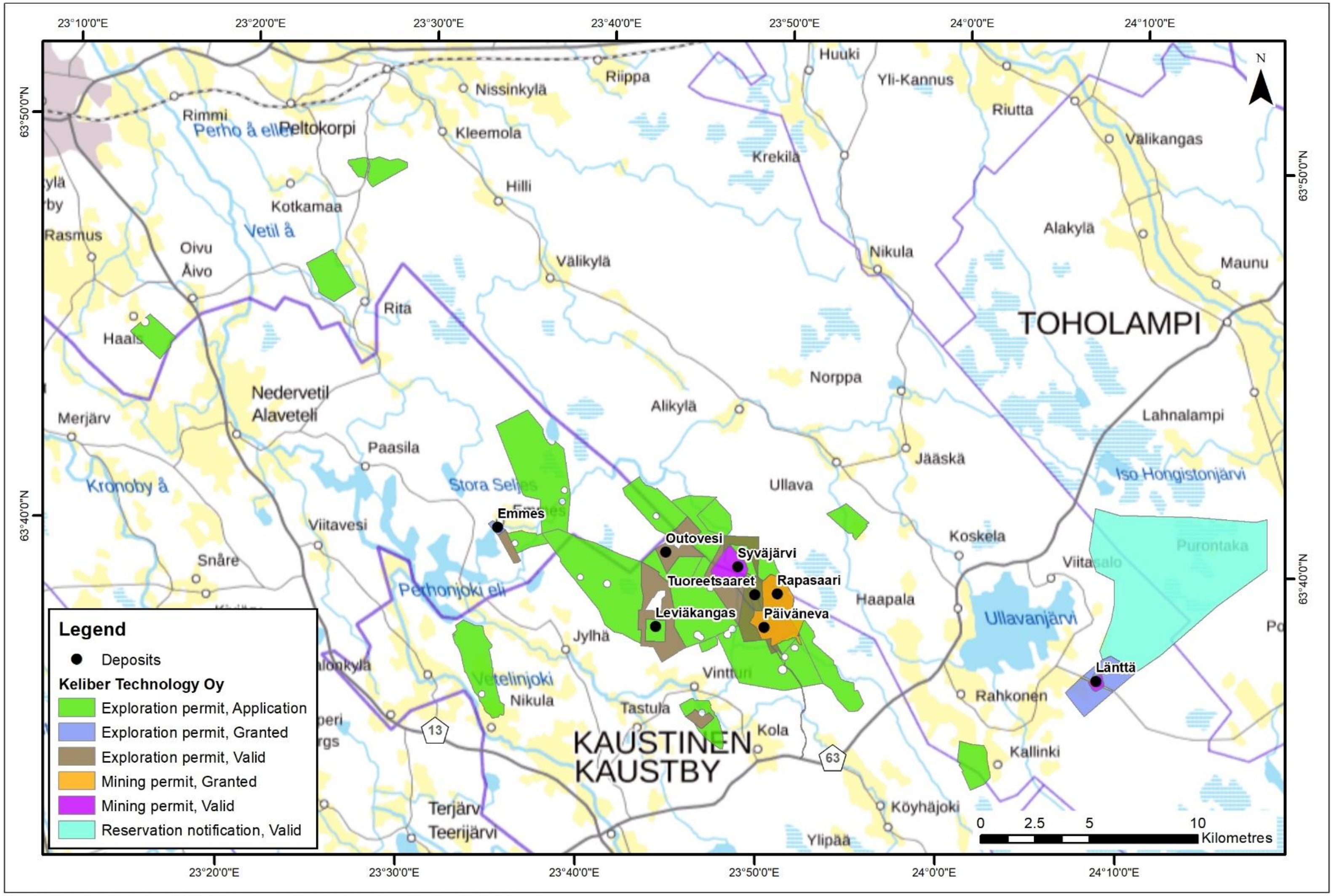
Number	Asset	Number	Status	Decision Date	Expiry Date	Licence Area (ha)
Valid Mining Permits						
1	Läntä	7025 KL2021:0002	Legally valid	16/08/2016 11/02/2022	20/03/2027	37.49
2	Syväjärvi	KL2018:0001 KL2021:0003	Legally valid	13/12/2018 08/02/2022	Until further notice	186.25
3	Rapasaari[1]	KL2019:0004	Granted	23/03/2022	Until further notice	488.98
					Total area	**712.72**
Valid Exploration Permits						
1	Emmes 2	ML2019:0052	Legally valid	30/07/2021	06/09/2024	58.1
2	Karhusaari	ML2012:0157	Legally valid	16/12/2019	15/01/2023	167.36
3	Outoleviä	ML2019:0011	Legally valid	30/07/2021	06/09/2024	444.65
4	Outovedenneva	ML2011:0019	Legally valid	30/07/2021	06/09/2024	68.75
5	Outovesi	ML2018:0089	Legally valid	20/03/2020	20/04/2023	144.68
6	Outovesi 3	ML2018:0122	Legally valid	20/03/2020	20/04/2023	12.9
7	Päiväneva	ML2012:0176	Legally valid	16/12/2019	15/01/2023	82.37
8	Rapasaari	ML2018:0121	Legally valid	16/12/2019	15/01/2023	428.87
9	Roskakivi	ML2016:0020	Legally valid	30/07/2021	06/09/2025	227.18
10	Syväjärvi 3-4	ML2018:0120	Legally valid	16/12/2019	15/01/2023	115.75
11	Timmerpakka	ML2019:0010	Legally valid	20/03/2020	20/04/2023	53.68
					Total area	**1 804.29**
Valid Reservation						
1	Peräneva	VA2022:0020	Reservation	19/05/2022	04/04/2024	3 915.16
					Total area	**3 915.16**
Granted Exploration Permits (appealed)[1]						
1	Emmes 1	ML2015:0031	Granted	01/11/2021		19.86
2	Haukkapykälikkö	ML2011:0002	Granted	30/07/2021		350.32
3	Pässisaarenneva	ML2018:0040	Granted	30/07/2021		22.53
					Total area	**392.71**

Note:

1. Permit decision appealed; under legal process in Administrative Court.

Table 2-4: Summary of exploration permit applications as at 31 December 2022

Number	Asset	Number	Status	Application Date	Licence Area (ha)
1	Arkkukivenneva	ML2021:0045	Pending	31/03/2021	83.78
2	Buldans	ML2020:0001	Pending	16/01/2020	105.57
3	Hassinen	ML2018:0034	Pending	02/05/2018	300.39
4	Heikinkangas	ML2012:0156	Pending	27/05/2019	42.55
5	Hyttikangas	ML2018:0035	Pending	02/05/2018	238.08
6	Kellokallio	ML2019:0032	Pending	27/04/2019	182.19
7	Karhusaari	ML2012:0157-03	Pending	17/11/2022	137.91
8	Keskusjärvi	ML2018:0033	Pending	02/05/2018	211.08
9	Kokkoneva	ML2018:0055	Pending	16/05/2018	284.85
10	Länkkyjärvi	ML2018:0036	Pending	02/05/2018	361.57
11	Leviäkangas 1	ML2013:0097	Pending	05/05/2021	90.69
12	Matoneva	ML2018:0041	Pending	08/05/2018	511.54
13	Orhinselkä	ML2018:0042	Pending	08/05/2018	222.05
14	Östersidan	ML2018:0056	Pending	16/05/2018	204.95
15	Päiväneva	ML2012:0176-03	Pending	19/11/2022	52.02
16	Palojärvi	ML2018:0091	Pending	08/10/2018	35.55
17	Paskaharju	ML2016:0044	Pending	03/05/2022	131.71
18	Peikkometsä	ML2018:0023	Pending	21/03/2018	773.44
19	Peuraneva	ML2018:0032	Pending	02/05/2018	152.67
20	Rapasaari	ML2018:0121-02	Pending	16/11/2022	64.90
21	Ruskineva	ML2020:0002	Pending	17/01/2020	739.35
22	Rytilampi	ML2011:0020	Pending	03/02/2018	163.21
23	Syväjärvi 2	ML2016:0001	Pending	07/04/2021	71.53
24	Syväjärvi 3-4	ML2018:0120-02	Pending	17/11/2022	115.75
25	Timmerpakka 2	ML2020:0025	Pending	23/04/2020	174.96
26	Valkiavesi	ML2018:0031	Pending	02/05/2018	1 037.56
28	Vanhaneva	ML2019:0002	Pending	27/09/2018	368.12
29	Vehkalampi	ML2018:0022	Pending	22/03/2018	1 138.54
				Total area	**5 768.39**



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srk consulting	**SSW Keliber Lithium Project** Mining and exploration permits as at 31 December 2022 *(Source: WSP, 2022)*	Project No/ 592138

Figure 2.2: Mining and exploration permits as at 31 December 2022

2.3.3 Surface rights

Valid exploration permits include the right of access to the land, while legally valid mining permits require the holder to separately acquire the surface rights to the land through purchase, lease or expropriation.

Keliber owns land at both Syväjärvi and Outovesi:

- Syväjärvi: 47.39 ha (~28%) of the current mining area of 166.3 ha; and
- Outovesi: 41.73 ha (~20%) of current claim areas of 209.67 ha.

The remainder of the land covering the proposed mining areas is owned by private owners.

Keliber leases the land (125 149 m^2) for the Kokkola Chemical Plant from Kokkolan Energia Oy with a fixed-duration agreement until 31 December 2049; thereafter the tenancy will continue as valid until further notice. An option for lease of an additional 33 589 m^2 area is included in the agreement.

2.3.4 Legal proceedings

SRK is not aware of any legal proceedings against Keliber.

2.3.5 Potential risks to tenure

The length of time required for the authorities to process the exploration and mining permit applications is unknown. A legal due diligence exercise to understand the permitting risks is currently being completed by Keliber; the resolution of this risk is not required for the declaration of Mineral Resources.

Uncertainty regarding potential objections by the public and/or authorities to the award of tenure for each of the applications exists.

The relevance of the uncertainty is that some of the applications, or specific applications, could either significantly be delayed or are wholly unsuccessful, with knock-on effects to the project.

2.4 Property encumbrances and permitting requirements

[§229.601(b)(96)(iii)(B)(3)(v)]

2.4.1 Environmental, water and waste authorizations, licences and permits

Keliber's operations will be governed by framework legislation that includes several laws, acts, decrees, and permits. The legislation and permits that steer Keliber operations are listed in Keliber's compliance register. The environmental permitting status of the Keliber Project as of December 2022 is summarised in Table 2-5.

Key laws and regulations relevant to the Keliber operations include:

- Mining legislation including the Mining Act (621/2011);
- Environmental Protection Act (527/2014) including the Environmental Protection Decree (713/2014), the Water Act (587/2011) and Environmental Impact Assessment Procedure Act (252/2017);
- Dam Safety Act 494/2009;
- Chemical legislation including Chemical Act (599/2013) and Act on the Safe Handling and Storage of Dangerous Chemicals and Explosives (390/2005);
- Government Decree on Extractive Waste (190/2013 as amended);
- Waste Act (646/2011) and Waste Decree (179/2012);
- Nature Conservation Act (1096/1996)/Natura 2000 (Appropriate Assessment);
- Fire safety legislation including Rescue Act (379/2011);
- Land use and building legislation including the Land Use and Building Act (132/1999);
- Air Pollution Control Decree (79/2017);
- Degree on the Safe Production and Handling and Storage of Explosives (1101/2015); and
- Forest Act (1093/1996).

Permits guiding operations include:

- Environmental permit;

- Water permit;
- Mining permit;
- Mining safety permit;
- Building permit;
- Permit for handling and storage of dangerous chemicals;
- Permit for storage of explosives; and
- Exploration permit.

Table 2-5: Environmental permitting status as at 31 December 2022

Site	Permit	Status	Date Granted
Syväjärvi mine	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental and water permit	Valid	20.2.2019
	Exception permit to moor frogs	Valid	1.2.2020
	Exception permit for diving beetles	Valid	21.7.2020
	Mining permit 1	Valid	13.12.2018
	The right of use of the mining area	Valid	9.8.2021
	Mining Safety Permit	Valid	13.10.2021
Rapasaari mine	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental permit	Valid	28.12.2022
	Mining Permit	Granted, but not yet legally valid	23.03.2022
	Mining Safety Permit	Not started	
Läntta mine	Environmental Impact Assessment	Finalised	28.6.2018
	Environmental permit	Valid	7.11.2006
	Mining Permit	Valid	16.8.2016
	Mining Safety Permit	Not started	
Outovesi mine	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental permit	Not started	
	Mining Permit	Not started	
	Mining Safety Permit	Not started	
Päiväneva concentrator	Environmental Impact Assessment	Finalised	29.3.2021
	Environmental and water permit	Application submitted	30.6.2021
	Mining Permit (included in Rapasaari mining area)	Application submitted	14.4.2021
	Land use plan, local detailed plan	In progress	
	Building permit	Not started	
	Chemical permit	Not started	
Keliber Lithium Hydroxide Refinery	Environmental Impact Assessment	Finalised	30.6.2021
	Environmental permit	Application submitted	4.12.2020
	Building permit	Finalised	
	Chemical Permit	Not started	

Keliber has completed all relevant EIA procedures to proceed with the Project, as discussed below.

Keliber holds a valid environmental permit for the Syväjärvi mining operations and a water permit for dewatering lake Syväjärvi and lake Heinäjärvi. A valid permit states that the permit decision issued by Regional State Administrative Agency (**AVI**) was appealed and appeals were processed in the Vaasa Administrative Court. The Court ruled against appeals and kept AVI's permit decision in force on June 16th, 2021. There were no appeals made to SAC against the Vaasa Administrative Court Decision. The Syväjärvi environmental permit became final in July 2021.

Keliber holds an environmental permit for Läntta, issued in 2006. The permit is valid for mining and operations described in the permit application. If operations or excavation volumes increase, Keliber may need to apply for a new environmental permit. The Läntta mine is not scheduled to commence before 2037 so detailed engineering has not been started yet.

The Rapasaari mine environmental permit application was submitted to AVI on June 30th, 2021. The Päiväneva concentrator environmental permit was submitted to AVI on June 30th, 2021. Concentrator operations require a water permit for raw water intake from river Köyhäjoki and that permit application was also submitted to AVI on June 30th, 2021. A decision by AVI is expected in the summer or fall of 2022.

Keliber received environmental permits for the Rapasaari Mine and Päiväneva Concentrator in December 2022 (Environmental permit 208/2022 number: LSSAVI/10481/2021, LSSAVI/10484/2021). These permits are currently going through an appeal process.

For the Lithium Hydroxide Refinery located in Kokkola, an environmental permit application was submitted to AVI on December 4th, 2020.

The environmental permit has been approved in early 2022 but is currently under appeal.

2.5 Summary of permitting status

The summary of the current permitting status (Table 2-6) has been compiled from information supplied by Hans Snellman, a Nordic law firm with offices in Helsinki and Stockholm and Keliber's legal advisors and updated for the recent granting of the Rapasaari mining permit.

Table 2-6: Summary of permitting status - 31 December 2022

Site	Mining Permit	Mining Safety Permit	Proceedings establishing Mining Area	EIA	Environmental Permit	Zoning	Land Use Rights	Building Permits
Syväjärvi mine	**Valid issued 13/12/2018**	**Valid - issued 13/10/2021**	**Valid 09/08/2021**	**Statement 29/03/2021**	**Valid - issued**	Secured	Secured	N/a, unless buildings to be constructed
Syväjärvi - auxiliary area	**Valid issued** 08/02/2022		Valid 17/05/2022				Secured	
Rapasaari mine	Granted 22/03/2022 Under Appeal	After mining permit finalised	Started 26/04/2022	Statement 29/03/2021	Granted (Under Appeal)	Secured	In Progress	N/a, unless buildings to be constructed
Päiväneva concentrator	Included in Rapasaari permit	After mining permit finalised	Started 26/04/2022	Statement 29/03/2021	Granted (Under Appeal)	Secured	In Progress	Finalised
Kokkola Lithium Hydroxide Refinery	N/a	N/a	N/a	Statement 30/03/2021	Valid - issued	City plan	Secured	Finalised

Note:
N/a = Not applicable
Completed items shown in green; pending items in orange and outstanding items in red, while items that do not apply have no fill.

2.6 Significant factors and risks affecting access, title

[§229.601(b)(96)(iii)(B)(3)(vi)]

There are no known risks affecting access.

The granted mining permit for Rarpasaari is under appeal at the Administrative Court; similarly, the granted exploration permits for Emmes 1, Haukkapykälikkö and Pässisaarenneva are also under appeal, Operational delays may be up to approximately 18 months. Appeals may be extended to the Supreme Administrative Court, in which case, the delays could be extended for a further 12 months.

3 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

[§229.601(b)(96)(iii)(B)(4)

3.1 Topography, elevation and vegetation

[§229.601(b)(96)(iii)(B)(4)(i)]

The average altitude for Central Ostrobothnia is 75 mamsl; the topography of the project area is relatively flat with the total difference in elevation between the various sites being in the order of 40 m. The lowest site is Rapasaari at 82.7 mamsl while the highest is Länttä at 122.0 mamsl.

The Perhonjoki River flows north-northeast through the area, decanting into the Gulf of Bothnia north of Kokkola. Numerous streams and lakes of all sizes occur throughout the area.

The land is cultivated, especially along the river courses, with most of the remaining land covered with forest.

There is no permafrost at these latitudes. The overburden thickness at the mine sites varies in thickness from zero at Syväjärvi and Länttä to 20 m at Rapasaari:

- Syväjärvi: 0 – 10 m;
- Rapasaari: 4 – 20 m;
- Länttä: 0 – 8 m;
- Outovesi: 7 - 13 m;
- Leviäkangas: to be determined; and
- Tuoreetsaaret: to be determined.

3.2 Accessibility

[§229.601(b)(96)(iii)(B)(4)(ii)]

Figure 2.1 shows the location of the various elements of the Keliber Lithium Project.

The chemical plant is situated in KIP, 6 km northeast of the city centre of Kokkola and two kilometres from Kokkola port on the Gulf of Bothnia; the road and rail links between the two are good. Kokkola-Pietarsaari Airport is approximately 13 km south of the city and is serviced by regular Finnair flights as well as charter flights.

The Päiväneva concentrator and the proposed mining areas are located to the north, northeast and east of the city of Kaustinen, in the municipalities of Kruunupyy, Kokkola and Kaustinen in the Central Ostrobothnian region. KIP and the concentrator are approximately 68 km apart.

Kokkola and Kaustinen are connected by national road 13 and are approximately 46 km apart.

The various mine sites are located close to the Päiväneva concentrator; distances and directions are given from the concentrator site:

- Syväjärvi(Kokkola and Kaustinen municipalities) – 3 km north-northeast; accessible via paved national road 63 and gravel forestry road;
- Rapasaari (Kokkola and Kaustinen municipalities) – 1.5 km northeast; accessible via paved national road 63 and gravel forestry road;
- Länttä (Kokkola municipality) – 25 km east-southeast; accessible via paved national road 63 and local road 18097 (approximately first two kilometres are gravel);
- Outovesi (Kaustinen municipality) -10 km northwest; accessible via paved national road 63 and gravel forestry road;
- Emmes (Kruunupy municipality) – 20 km west-northwest; accessible via gravel forestry road, paved national road 63, Emmeksentje road and gravel local road 17947;
- Leviäkangas; (Kokkola and Kaustinen municipalities) – 4.5 km northwest; accessible via paved national road 63 and gravel forestry road ; and
- Tuoreetsaaret (Kokkola and Kaustinen municipalities) – 1.5 km northeast; accessible via paved national road 63 and gravel forestry road .

3.3 Climate

[§229.601(b)(96)(iii)(B)(4)(iii)]

The climate in Central Ostrobothnia is categorized as subarctic with severe winters, cool summers and precipitation throughout the year; it is classified as Dfc in the Köppen climate classification system. Winters are long, freezing, snowy and overcast while summers are short and partly cloudy. The coldest month is January (average temperature of -8°C) and the warmest July (average temperature of 19°C).

Average annual precipitation is approximately 35 mm with July-August being the wettest (~43 mm) and the driest is March-April (~25 mm). Rain is most common between March and January, while snow occurs frequently between October and April, with the most snow falling in January (average of 20 cm).

The windier part of the year is from September to March, with the windiest month being December and the least windy being July.

Daylight hours vary from four hours in December - January to 20 hours in June - July.

Typically, in Nordic countries operations continue in subarctic conditions at Temperatures below -20°C. It is thus expected that Keliber will operate continually during the year. The Rapasaari and Syväjärvi properties were visited during January 2023, and during this time exploration drilling continued and the properties were accessible by the newly constructed road that connects the properties to the public road.

3.4 Local resources and infrastructure[4]

[§229.601(b)(96)(iii)(B)(4)(iv)]

Kokkola

Kokkola is the largest city of Central Ostrobothnia with approximately 48 000 people; the Kaustinen municipality has around 4 200 people (2020 data).

There are two institutes of tertiary education in Kokkola: The Kokkola University Consortium Chydenius and the Centria University of Applied Sciences. High-level research in materials chemistry including lithium-ion battery materials is undertaken in the department of applied chemistry at Chydenius. Centria offers a Bachelor-level degree programme in environmental chemistry and technology, amongst others. Seven vocational schools and an adult education unit can be found in Kokkola, under the Federation of Education in Central Ostrobothnia, which arranges vocational upper secondary education in the region, such as in process technology.

The Keliber chemical plant will be located in the KIP, which has a significant concentration of chemical industry installations: at least 17 industrial operators and more than 60 service companies. Seven hundred hectares of the KIP is zoned for use by the heavy chemical industry. Service enterprises provide commodity and sewage networks, pipe bridges, railways, a factory fire brigade and security. The chemical plant will be immediately adjacent to several important resources such as water, steam, electricity, heat, gas (for example, CO_2) and acids (for example, sulfuric acid), which are all produced in the KIP.

The Port of Kokkola is the largest port serving the mining industry in Finland and includes general port facilities for containers, breakbulk cargoes and so-called light bulk, such as limestone. The port is open all year round and has an All-Weather Terminal (**AWT**) mainly for containers and breakbulk cargo and a Deep-Water Port for bulk cargoes.

Kaustinen

Potable water is available from the Kaustinen municipality water pipeline and the Pirttikoski hydroelectric power plant on the Perhonjoki River in Kaustinen supplies power to the main 110 kV power line.

The area is also serviced by mobile phone networks from all the main Finnish service providers, as well as a fibre optic network from a local service provider.

Planned staffing levels

The planned staffing levels at the various parts of the project are as follows:

- Mine: 6 (the bulk of the activities will be done by a contractor);
- Concentrator: 33;

4 WSP, 2022

- Chemical plant: 51;
- Maintenance: 18;
- Other production (e.g., laboratory, procurement, etc): 23;
- Exploration and geology: 6; and
- Management, support and administration: 17;
- **Total: 154**

4 HISTORY

[§229.601(b)(96)(iii)(B)(5)]

4.1 Previous operations, operators

[§229.601(b)(96)(iii)(B)(5)(i)]

None of the properties have previously been mined, although the mining rights to the Länttä, Emmes and Syväjärvi deposits were first owned by Suomen Mineraali Oy, then by Paraisten Kalkkivuori Oy and from the early 1960s to the early 1980s by Partek Oy. These rights expired in 1992 and the areas were unclaimed until 1999, when Olle Siren, together with private partners, claimed the Länttä deposit and later the Emmes deposit (Table 4-1).

From 2003 to 2012, the Geological Survey of Finland (**GTK**) held the ownership of the Syväjärvi and Rapasaari deposits.

Table 4-1: Previous operators

Deposit	Date	Operator
Länttä, Emmes, Syväjärvi, Leviäkangas	1960 – 1968	Suomen Mineraali Oy
	1963 - 1999	Paraisten Kalkkivuori Oy (later Partek Oy)
All	1992 - 1999	Unclaimed
Länttä	1999	Olle Siren and private partners
Emmes	After 1999	Olle Siren and private partners
Syväjärvi, Leviäkangas, Rapasaari	2003 - 2012	GTK
Länttä, Emmes, Rapasaari, Syväjärvi, Outovesi, remaining exploration areas*		Keliber (previously known as Keliber Resources Ltd.)
Tuoreetsaaret	2020 - 2022	Keliber (previously known as Keliber Resources Ltd.)

Note:

1. Table 2-3 and Table 2-4 contain the details of the mining and exploration permits.
2. Paraisten Kalkkivuori Oy acquired Suomen Mineraali Oy in 1959; both companies operated in the same lithium-potential area, but under the same umbrella.

4.2 Exploration and development work

[§229.601(b)(96)(iii)(B)(5)(ii)]

Since the discovery of spodumene and beryl mineralisation in the Kaustinen region in the late 1950s, the area began to see systematic exploration being initiated in the 1960s by Suomen Mineraali Oy and Paraisten Kalkkivuori Oy. Due to the lack of outcrop throughout most of the area, surface exploration methods were restricted to spodumene/pegmatite boulder hunting and then using these results to delineate the source of origin for the boulder fans using palaeo glacial directions. Apart from the Länttä deposit (discovered as outcrop), this method proved highly successful in the discovery of the Emmes and Syväjärvi deposits by early operators.

Between 2003 and 2012, GTK were also very active in the area, with exploration work including boulder mapping, geophysical surveys, till sampling, re-analysis of historical regional till samples, percussion drilling and diamond core drilling. This work was successful in the discovery of the Rapasaari deposit as well as further delineation of the Syväjärvi deposit. Keliber's involvement in the project began in 1999, when a group of investors, led by Mr Olle Siren began evaluation of the Länttä deposit, where drilling commenced in 2004. Keliber then extended its exploration efforts to the rest of the Kaustinen region where it has completed acquisition of exploration rights and extensive drilling programs over all of the deposits including the discovery of the Outovesi deposit in 2010.

GTK carried out an extensive areal geochemical till sampling programme covering the whole of Finland during the 1970s and 1980s. At that time, no analysis for lithium was conducted. Later, GTK re-analysed the old till samples and large geochemical anomalies were discovered in the Kaustinen area. Some of the known deposits are reflected in lithium anomaly maps, but spotty anomalies extend far outside of the known deposits, especially to the northwest (WSP 2022b).

During 2004 - 2011, GTK carried out 15.5 line kilometres of gravity survey and 4.4 km^2 of gravity and magnetic ground geophysical surveys in seven different exploration areas (Table 4-2). A slingram survey was also conducted at Rapasaari. Ground geophysics was surveyed to support geological mapping and to define the borders of the spodumene pegmatites. High-resolution, low-altitude airborne geophysics data for 2004 were also used (Ahtola *et al* 2015).

Table 4-2: Summary of the sampling and ground geophysics (after Ahtola et al 2015)

Drilling target	Period	Number of diamond drill holes	Ground geophysics			Till sampling (number of samples)	RC drilling (number of samples)
			Total length (m)	Line km/km^2	Method*		
Leviäkangas	2004 - 2008	22	2 032	1 km^2	mg+ gr		60
Syväjärvi	2006 - 2010	24	2 547	1 km^2	mg+ gr		56
Rapasaari	2009 - 2012	26	3 653	2.2 km^2	mg+sl+gr	508	
Total		**72**	**8 232**	**4.4 km^2**		**508**	**116**

Note:
* mg = magnetic, sl = slingram, gr= gravity

The first drilling programmes were undertaken by Suomen Mineraali Oy in 1961 and were executed using small drill rigs. From 1966 to 1981, a core diameter of 32 mm was used by Suomen Mineraali Oy and Partek Oy. These small diameter drilling programmes were executed at Emmes, Länttä, Leviäkangas and Syväjärvi in the 1960s, 1970s and at the beginning of the1980s (WSP, 2022b). The historical drilling activities undertaken by these operators are summarized in Table 6-1, along with the work undertaken under the ownership of Keliber Oy.

5 GEOLOGICAL SETTING, MINERALISATION AND DEPOSIT

[§229.601(b)(96)(iii)(B)(6)

5.1 Regional, local and project geology

[§229.601(b)(96)(iii)(B)(6)(i) (ii)]

The Keliber Project is located within the Kaustinen Lithium Pegmatite Province that covers an area of 500 km^2 in western Finland. Here the host rocks belong to the Palaeoproterozoic (1.95 – 1.88 Ga) age Pohjanmaa Belt that forms a 350 km long by 70 km wide arcuate belt located between the Vaasa Granite Complex to the west and the Central Finland Granitoid Complex to the east (Vaasjoki et.al., 2005). The Pohjanmaa Belt is predominantly comprised of supracrustal rocks comprising micas schists/metasediments, gneisses, metavolcanics with metamorphic grades varying from low to upper amphibolite facies (Alviola *et al.*, 2001).

The northern parts of the Pohjanmaa Belt have been intruded by several Lithium-Caesium-Tantalum (**LCT**)-type pegmatites with a majority of those belonging to the Kaustinen lithium province being of the albite/spodumene type (Cerny and Ercit, 2005). These pegmatites (dated at 1.79 Ga) were intruded into the Pohjanmaa metasediments just after peak regional metamorphism, with the source rocks of the pegmatites being the large pegmatitic granites and granites found within the Kaustinen region (Figure 5.1 and Figure 5.2).

At least ten individual pegmatites have been discovered to date within the Kaustinen lithium province, with nearly all of them being evaluated using drilling methods only, as outcropping pegmatites and their host rocks are rare, most being covered by overburden comprising surficial sediments (glacial till). Most of the pegmatites have intruded at high angles or subparallel to host rock foliations, with nearly all displaying similar mineralogy, being dominated by feldspar, quartz, spodumene and muscovite. Host rocks in the region are dominated by mica schists, coarse-grained metagreywackes and intermediate to mafic metavolcanic rocks, all belonging to the Pohjanmaa Belt (Figure 5.1).

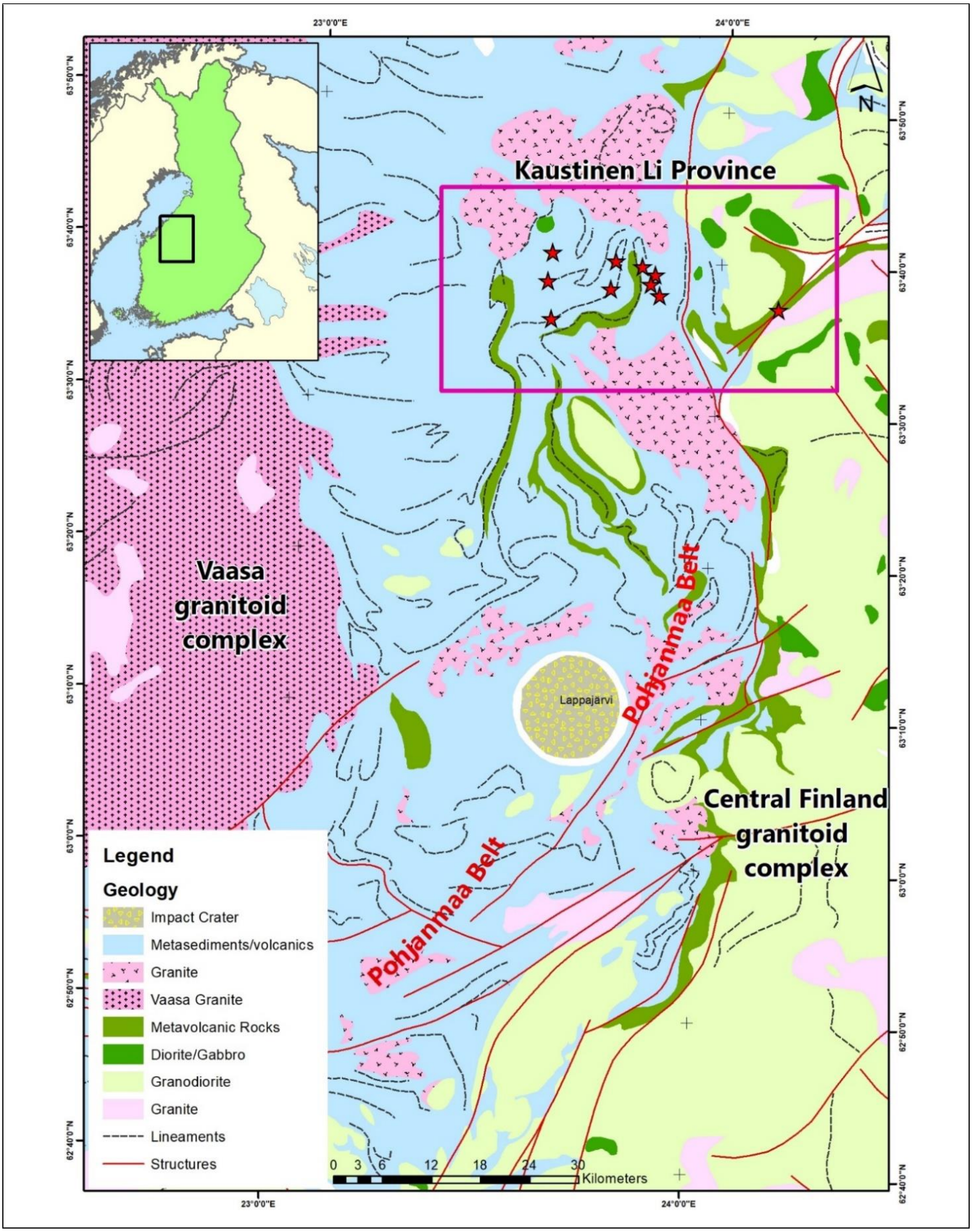
Historical exploration supported by more recent drilling by GTK and Keliber has (to date) resulted in the delineation of five discrete LCT pegmatite deposits, viz. Syväjärvi, Rapasaari, Länttä, Emmes and Outovesi (Figure 5.2). Each deposit is characterised by a series of pegmatites, veins and dykes, with intrusion geometry often being controlled by regional structural controls as well as host rock rheology. Due to the ubiquitous cover of overburden/till/sediments covering most of the region as a whole, project and regional scale geological maps, stratigraphic columns and regional geological cross sections are not available over the region or any of the deposits. However detailed drilling by both GTK and Keliber have been able to delineate most of the larger individual pegmatites to a relatively high level of confidence.

It is noted that it is a SEC requirement to include a stratigraphic column and regional geological cross section of the project area/s. The intrusion type and style of deposit being considered, i.e., vein pegmatite and dyke intrusions, means that the inclusion of a stratigraphic column and section in this TRS is not considered relevant nor can it provide any real technical guidance within the context of the project geological setting being described in the TRS.

5.1.1 Syväjärvi geology

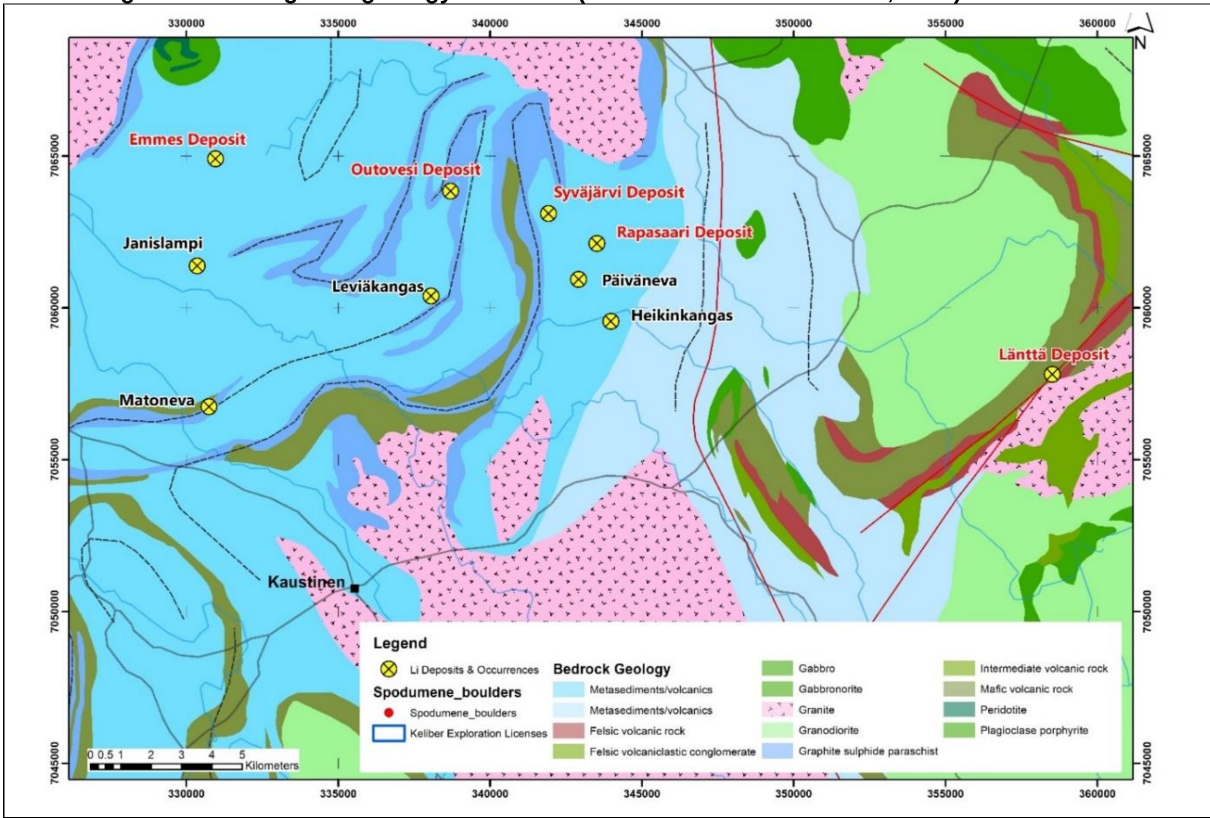
The Syväjärvi deposit is located beneath a cover of sandy till that attains an average thickness of 5 m. Outcrop within the project is restricted to an isolated exposure of a host lithology: plagioclase porphyrite (metavolcanic). The geological model describing the attitude and thicknesses of the various pegmatites and contact relationships with host rocks was derived entirely from surface drilling. Here six modelled spodumene-bearing pegmatites veins have intruded into mica schists, metagreywackes and metavolcanics following a broad antiformal structure forming “saddleback” type reefs. This has resulted in a series of shallow northerly plunging pegmatite veins, the largest of these attaining thicknesses of up to 20 m in places. The strike length totals 365 m for all veins, extending approximately 720 m down dip and to a maximum depth below surface of 160 m. Due to variability of the pegmatite/s strikes and dips, true pegmatite thicknesses were generally 70 - 80% of drill length. The main pegmatite is relatively flat-lying with shallow to horizontal dips (10˚ – 30˚) and plunging to the north (Figure 5.3). Pegmatite boundaries are typically sharp with the frequent development of weakly mineralised or un-mineralised zones of muscovite-rich pegmatite within and along the margins of the pegmatites.

In 2016, Keliber developed an inclined tunnel into the deposit in order to provide a bulk sample for metallurgical test work. Total length of the tunnel was 71 m, including a 17 m intersection of the main pegmatite. Here the pegmatite comprised coarse-grained spodumene, light grey to green in colour with individual spodumene laths displaying lengths varying from 3 cm to as much as 70 cm. Mineralogical analyses by GTK has shown that the pegmatites are comprised of albite (37%), quartz (27%), potassium feldspar (16%), spodumene (13%) and muscovite (6%). Accessory minerals are apatite (fluorapatite), Nb-Ta-oxides (Mn- and Fe-tantalite), tourmaline (schorl), garnet (almandine), arsenopyrite and sphalerite.



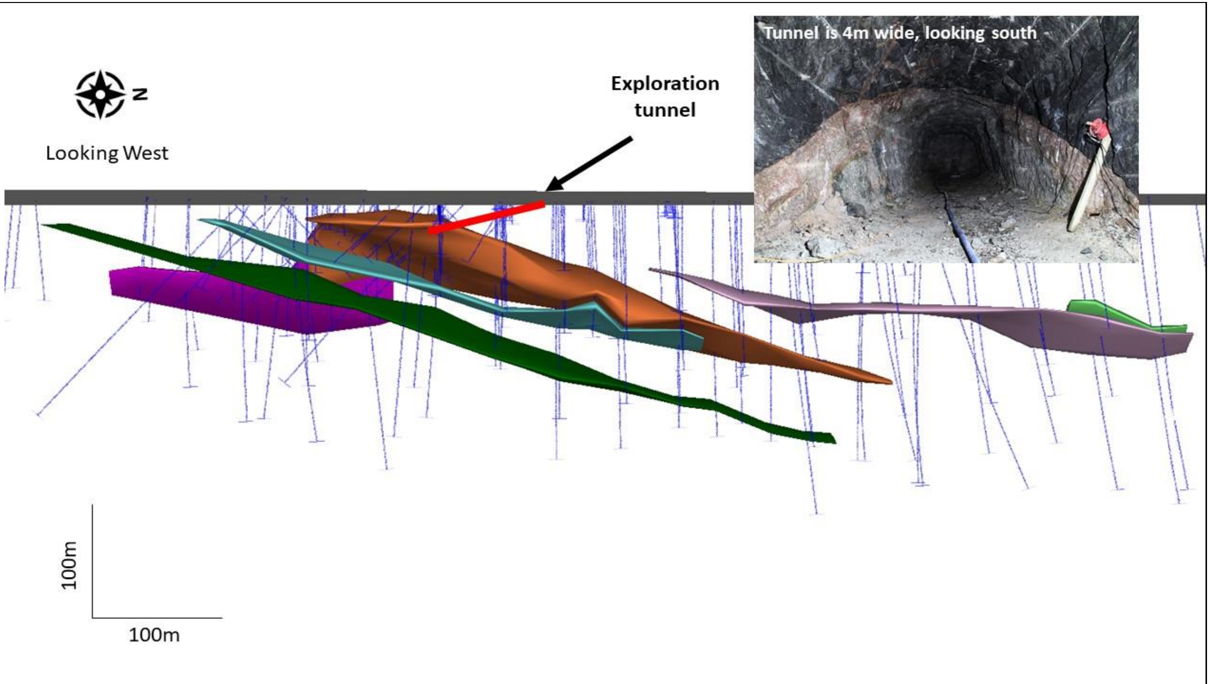
srk consulting	**SSW Keliber Lithium Project** Regional geology of Keliber (modified after Ahtola *et al.*, 2015)	Project No. 592138

Figure 5.1: Regional geology of Keliber (modified after Ahtola *et al.*, 2015)



srk consulting	**SSW Keliber Lithium Project** Project Geology of the Keliber Lithium Project (modified after Ahtola *et al.*, 2015)	Project No. 592138

Figure 5.2: Project Geology of the Keliber Lithium Project (modified after Ahtola *et al.*, 2015)



srk consulting	**SSW Keliber Lithium Project** Syväjärvi - 3D view of modelled pegmatites looking west, with photo showing exposed pegmatite in exploration tunnel *(Photo Source: Keliber Oy)*	Project No. 592138

Figure 5.3: Syväjärvi - 3D view of modelled pegmatites looking west, with photo showing exposed pegmatite in exploration tunnel

5.1.2 Rapasaari geology

The Rapasaari Lithium deposit is covered by a variable cover of till/overburden ranging from 3 m to 20 m in thickness, and thus outcrop is rare. In some cases, till is also overlain by peat that can reach thickness of up to 2 m. The Rapasaari deposit represents a curvilinear, structurally controlled series of thirty-three individually modelled pegmatites that exhibit variable thicknesses, resulting in a series of bifurcating and boudinaged lenses and veins that follow a south-easterly plunging synformal structure. This has resulted in a series of northwest-southeast striking and south-westerly dipping pegmatites (Rapasaari East) and west - east striking, south dipping pegmatites (Rapasaari North) (Figure 5.4). Pegmatites are generally intruded parallel to the host rocks that are primarily composed of mica schists, metagreywackes and metavolcanics. In certain places the mica schists are graphitic and sulfide-bearing, but these are generally isolated.

Pegmatite boundaries are typically sharp, with the frequent development of weakly mineralised or un-mineralised zones of muscovite-rich pegmatite within and along pegmatite margins. The style of pegmatite emplacement has also resulted in the frequent inclusions/xenoliths/rafts of country rocks throughout all the modelled pegmatites at Rapasaari, with these representing internal dilution to the modelled pegmatites.

The three largest modelled pegmatites vary in thickness from 10 m to 20 m, with most of the minor (modelled) pegmatites having thicknesses of less than 10 m. The strike extent totals 1 250 m for all veins - approximately 730 m in the primary dip orientation (east – west) - and to a maximum depth below surface of 240 m. Due to variability of the strike and dip of the pegmatite/s, true pegmatite thicknesses were generally 70 - 90% of drill length. Mineralogical analyses by GTK have shown that the pegmatites comprise albite (37%), quartz (26%), potassium feldspar (10%), spodumene (15%) and muscovite (7%). Accessory minerals are apatite (fluorapatite), zinnwaldite, Nb-Ta-oxides (Mn- and Fe-tantalite), beryl, tourmaline, fluorine, garnet (grossular), andalusite, calcite, chlorite, Mn-Fe-phosphate, arsenopyrite, pyrite, pyrrhotite and sphalerite. In general, spodumene crystals are light greyish-green in colour, with the lengths of minerals varying from 2 cm to 10 cm.

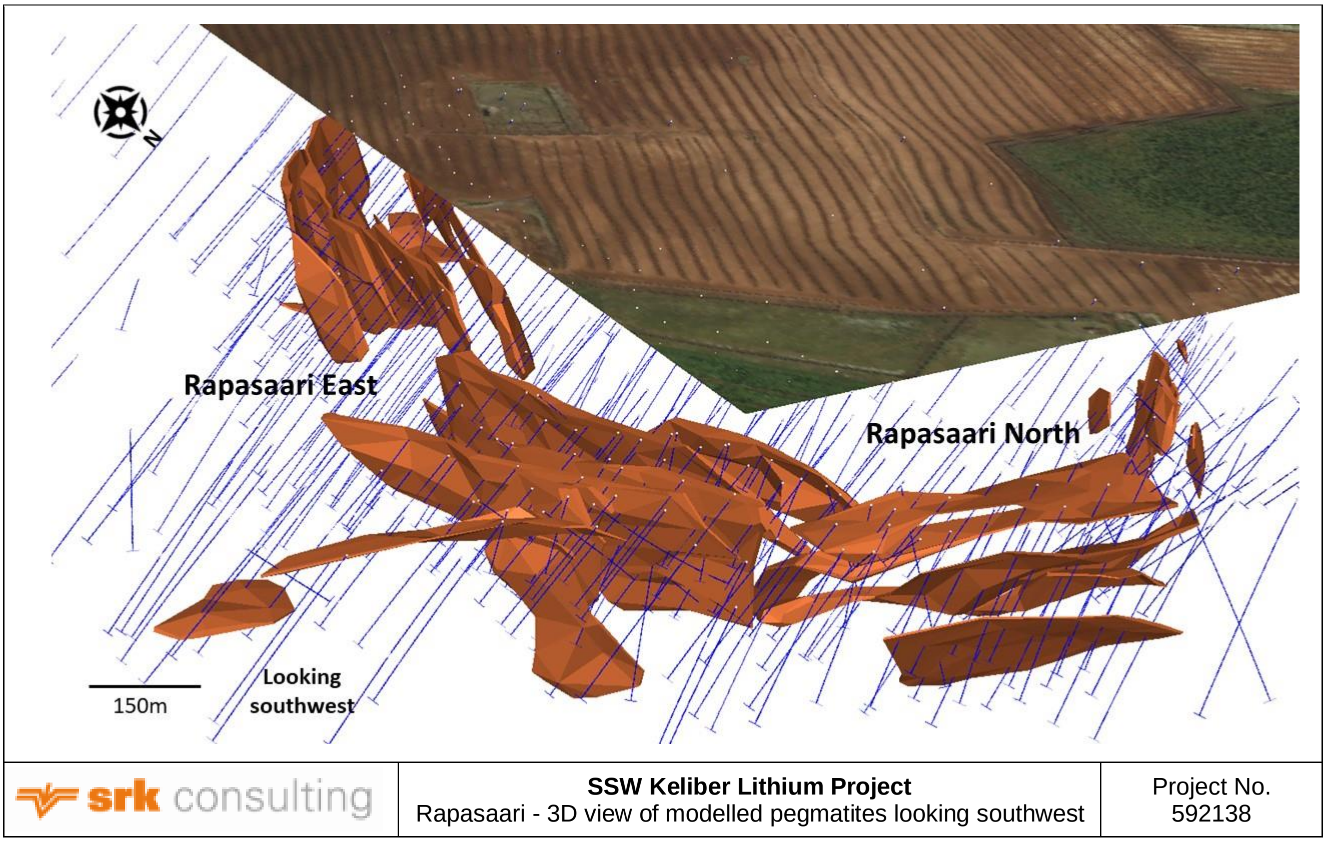
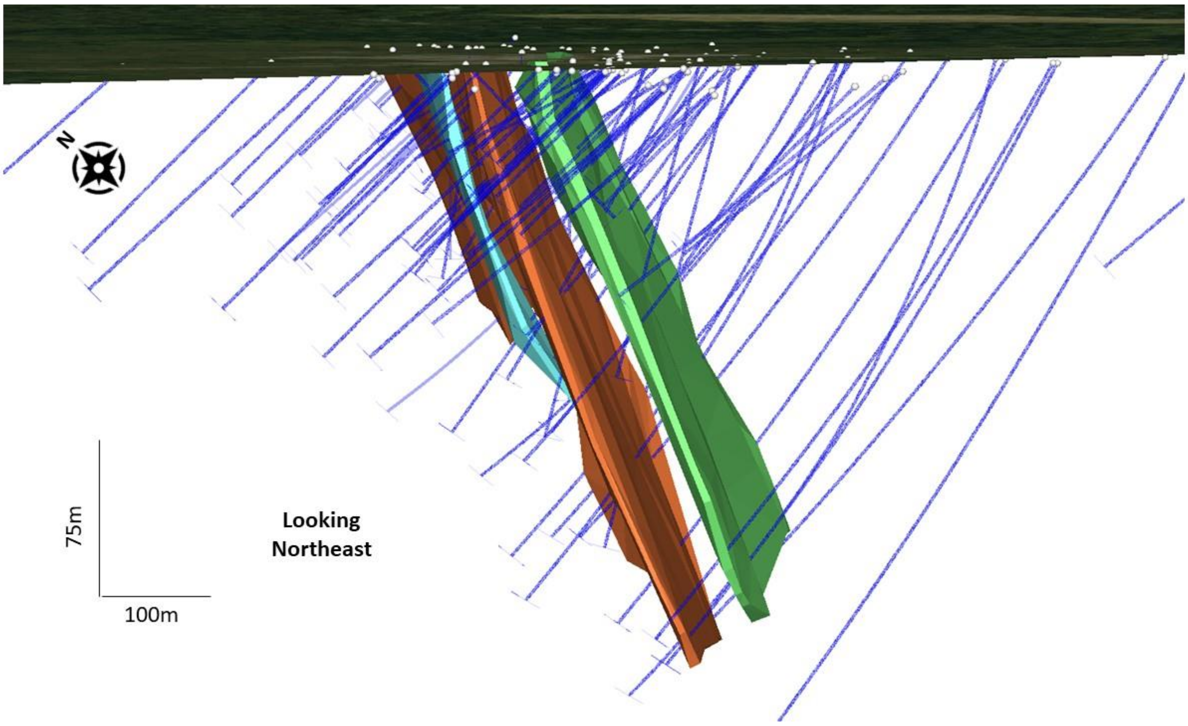


Figure 5.4: Rapasaari - 3D view of modelled pegmatites looking southwest

5.1.3 Länttä geology

The Länttä deposit is covered by a relatively thin veneer of surficial sediments and till ranging from 1 m to 7 m in thickness. The deposit was discovered following road excavation work in the 1950s. Drilling completed by historical operators (Suomen Mineraali Oy and Partek Oy) and Keliber delineated two parallel- trending pegmatite veins with a 400 m north-easterly strike and steep south-easterly dips to a maximum depth of 180 m below surface, extending approximately 100 m southeast of the outcrop location (Figure 5.5). The pegmatites reach an individual maximum thickness of 10 m, and often show localised bifurcating and boudinaging, resulting in the incorporation of inclusions and xenoliths of metavolcanic host rocks into the pegmatites. Due to variability of the strikes and dips of the pegmatite/s, true pegmatite thicknesses were generally 80 - 90% of drill length. Overburden stripping completed in 2010 exposed the pegmatite veins on surface, confirming their boudinaged and variable widths. Host rocks to the pegmatites are metavolcanic rocks containing lenses of metagreywacke schists and plagioclase porphyrite rocks, with pegmatites intruding parallel to prevailing cleavage and bedding of the host rocks. Contacts with the pegmatite and host rocks are sharp and are typically characterised by the development of a tourmaline-rich band that breaks upon contact.

Mineralogical analyses by GTK shows that the pegmatites are comprised of albite (40%), quartz (15%), potassium feldspar (15%), spodumene (15%) and muscovite (2%). Accessory minerals include apatite, garnet, beryl, tourmaline, and columbite-tantalite. Spodumene crystals are coarse grained, elongated and lath-shaped, with lengths ranging from 3 cm to 10 cm, but often reaching 30 cm.

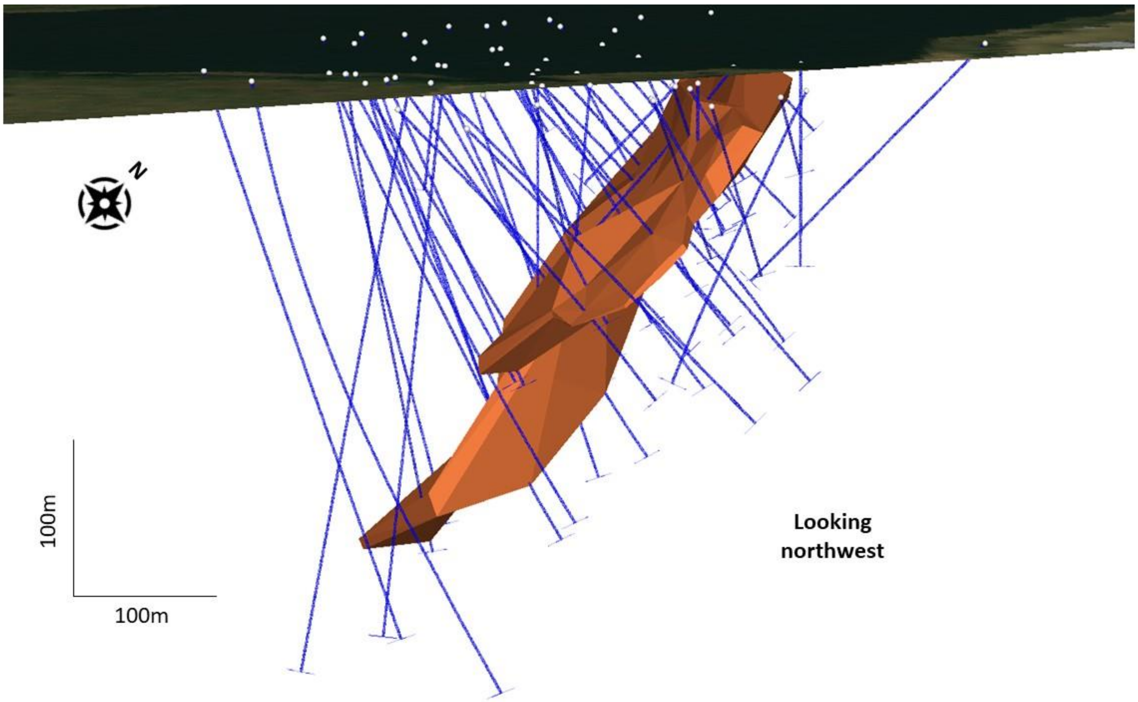


srk consulting	**SSW Keliber Lithium Project** Länttä - 3D view of modelled pegmatites looking northeast	Project No. 592138

Figure 5.5: Länttä - 3D view of modelled pegmatites looking northeast

5.1.4 Emmes geology

A majority of the Emmes deposit is located under Lake Storträsket close to the village of Emmes. Overburden thickness are highly variable reaching 10 m thickness under the lake and as much as 20 m closer to the village. Drilling to date has delineated a single pegmatite vein 400 m long, striking southeast-northwest with variable dips to the southwest, to a distance of 110 m from the outcrop and a depth of 170 m below surface (Figure 5.6). The Emmes pegmatite reaches a maximum thickness of 20 m in places and is intruded into mica schists containing occasional graphitic and sulfidic phases as well as metagreywackes. Spodumene is distributed evenly throughout the pegmatite and shows some alteration to muscovite along the pegmatite margins. Contacts with the host rocks are sharp, with true pegmatite thicknesses being generally 70 - 90% of drill length. Similar to the other deposits, spodumene is light grey to green in colour and the pegmatites modal mineralogy is very similar to that of the other pegmatite deposits, i.e., being dominated by feldspar, quartz, spodumene and muscovite. No inclusions or xenoliths of country/host rock has been identified within the Emmes pegmatite.



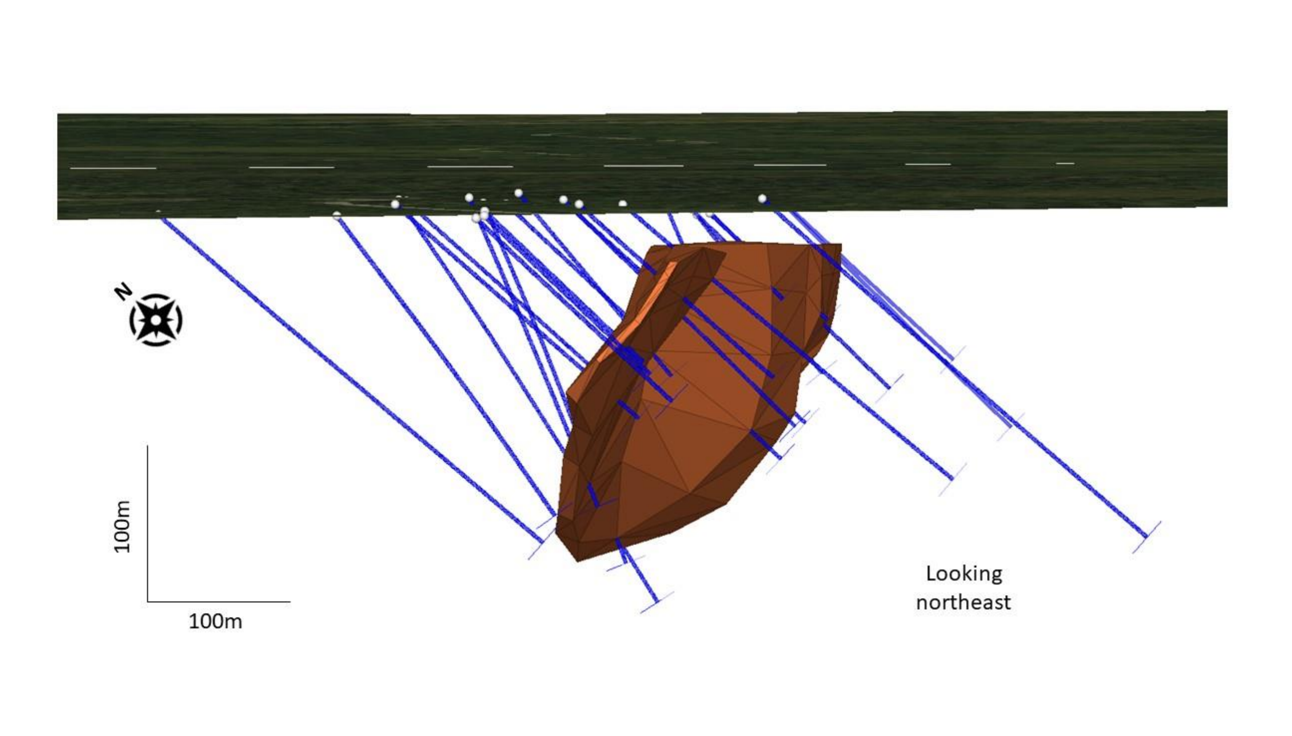
srk consulting	**SSW Keliber Lithium Project** Emmes - 3D view of modelled pegmatites looking northwest	Project No. 592138

Figure 5.6: Emmes - 3D view of modelled pegmatites looking northwest

5.1.5 Outovesi geology

The Outovesi deposit was discovered by Keliber in 2010 and is covered by surficial till sediments that average 10 m in thickness. Keliber's drilling delineated a single pegmatite vein some 400 m long and reaching a maximum thickness of 10 m (Figure 5.7). The pegmatite strikes northeast-southwest for a modelled length of 360 m, with variable dips to the northwest. The vein dips steeply (~80°) to a depth of 75 m below surface. Host rocks are dominated by homogenous mica schists and metagreywackes, with the northern parts of the deposit being hosted by more graphite-rich schists. The Outovesi pegmatite has intruded almost at right angles to the host rock fabric, which is quite different to that at Länttä and Rapasaari deposits, where the pegmatites have generally intruded parallel to host rock fabrics. Contacts with the host rocks are sharp, with true pegmatite thicknesses being generally 90% of drill length.

Although no detailed mineralogy has been completed over Outovesi, the modal mineralogy is anticipated to be very similar to the other deposits, being dominated by albite, quartz, potassium feldspar, spodumene and muscovite. Spodumene crystals are generally light grey-green in colour with individual spodumene minerals reaching lengths of between 2 cm to 10 cm. It is noted that a later stage, possibly hydrothermal, overprint has resulted in a variable zone of alteration close to the pegmatite contacts, and this has resulted in the alteration of spodumene to a lower tenor Li-bearing muscovite.



	SSW Keliber Lithium Project Outovesi - 3D view of modelled pegmatites looking northeast	Project No. 592138

Figure 5.7: Outovesi - 3D view of modelled pegmatites looking northeast

5.1.6 Leviäkangas geology

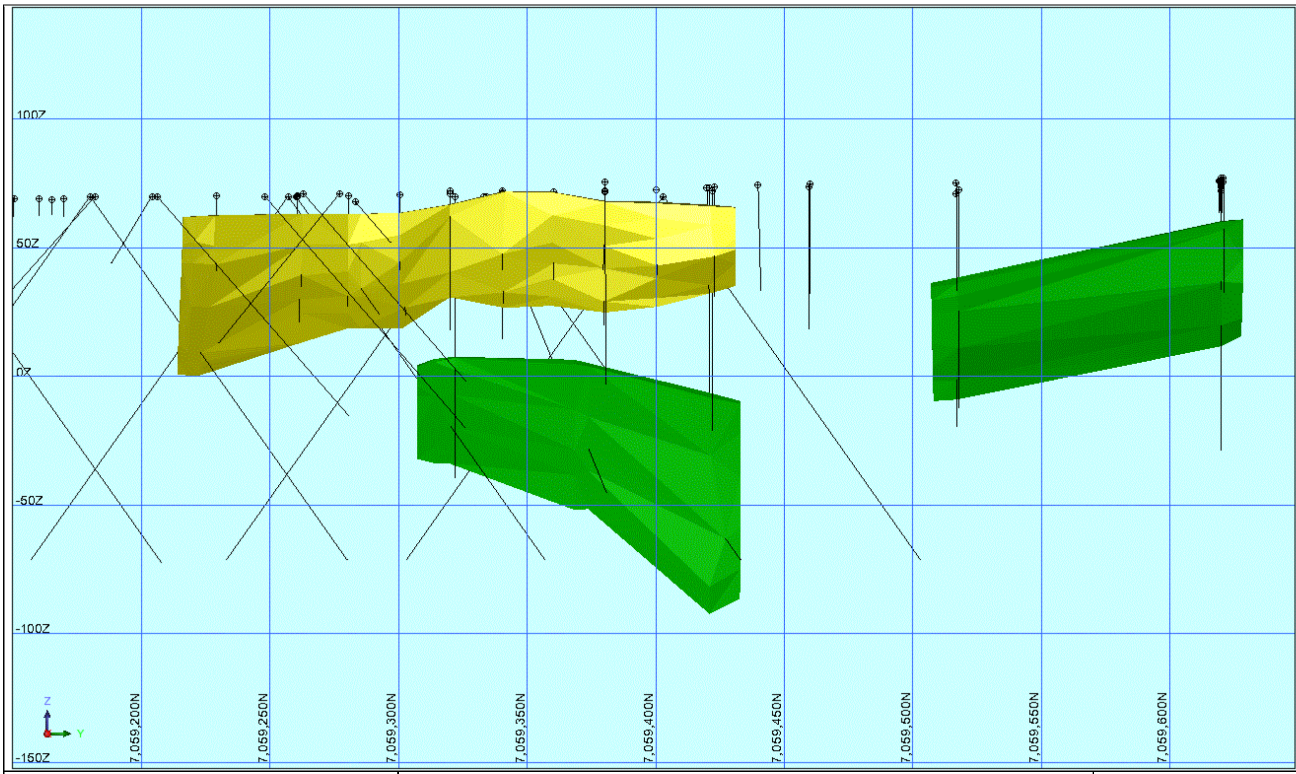
The Leviäkangas lithium pegmatite deposit is located in the Kaustinen Municipality of western Finland some 5 km south of Kaustinen town (Figure 5.2) It comprises three separate spodumene pegmatite veins that are conformably intruded into a mica-schist host rock (Figure 5.8). There is a possibility that these bodies may belong to one vein that has been structurally dislocated. The strike of the pegmatite veins varies between north and north-northwest. The veins are dipping to the west at an angle between 50°and 60°. The thickness of the veins varies from a few metres to 12 m.

The overburden is formed by till with some peat at the surface at Leviäkangas and varies in thickness from 5 m to 10 m.

Close to, and at the contact with, the wall rocks, the spodumene in the pegmatite is altered to muscovite. This persists for a few tens of centimetres up to one and a half metres. In addition, there are a few narrow (0.5 – 3 m) internal waste zones in the pegmatite where the spodumene is replaced by muscovite so that the Li_2O grade is below the cut-off grade.

Spodumene typically occurs as coarse grained, light greyish-green lath-shaped crystals between two and 10 cm long and orientated perpendicular to the contacts of the veins with the wall rock. The pegmatite consists predominantly of albite, quartz potassium feldspar (orthoclase), spodumene and muscovite.

The most recent report on Leviäkangas (Lovén and Meriläinen, 2016), states that the deposit has been defined by 123 drill holes with a total length of 6 823.5 m. The pegmatite has been sampled in 572 intervals and the samples were analysed for Li, Nb, Be and Ta that are also expressed in the oxide forms as Li_2O, Nb_2O_5, BeO and Ta_2O_5. The analyses were done by firstly fusing the crushed and milled sample with sodium peroxide flux to form a glass, which is then dissolved and analysed using the Inductively Coupled Plasma (**ICP**) Optical Emission Spectroscopy (OES) measurement method.



srk consulting	**SSW Keliber Lithium Project** Leviäkangas - vertical section view of modelled pegmatites looking east	Project No. 592138

Figure 5.8: Leviäkangas - vertical section view of modelled pegmatites looking east

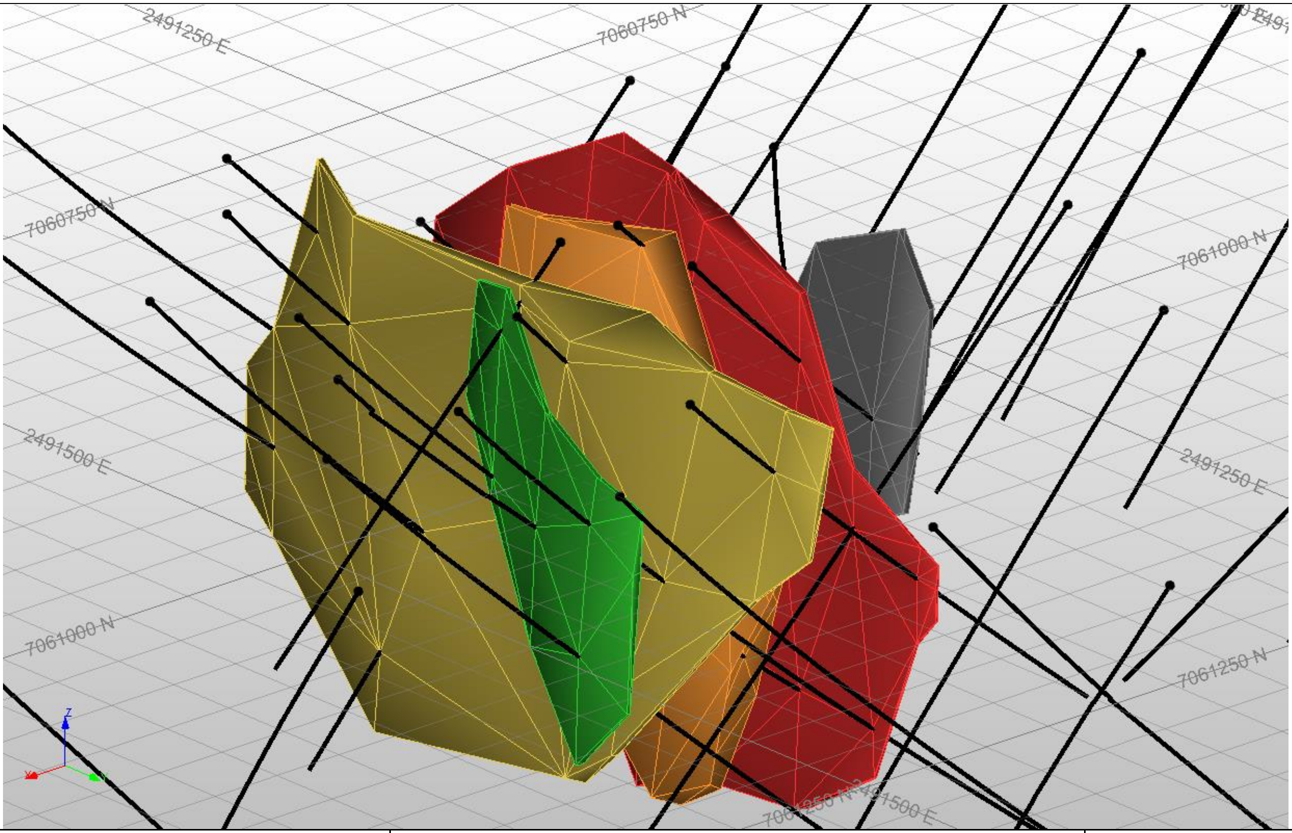
5.1.7 Tuoreetsaaret geology

The Tuoreetsaaret lithium pegmatite deposit is also located in the Kaustinen Municipality of western Finland (Figure 5.2). This deposit was discovered by Keliber using a combination of geological, geochemical and geophysical data that led to the first intersection by diamond core drilling in March 2020. The deposit comprises five lithium-bearing pegmatite vein-like bodies intrusive into a set of rock units including intermediate meta-tuffite, plagioclase porphyrite, mica schist and sulphide-bearing mica schist. The hanging wall is generally formed by intermediate meta-tuffite and the footwall by mica schist and sulphide-bearing mica schist. Plagioclase porphyrite generally forms the middling between the pegmatite veins. The pegmatite veins and their wall rocks are covered by 5 m to 10 m of glacial till with peat at the top.

The pegmatite vein-like bodies at Tuoreetsaaret range in true thickness from 3 m to 25 m. The individual pegmatite veins are steeply dipping to the east (Figure 5.9), trending north-south, and have a confirmed strike length of 100 m to 300 m.

The lithium grains (1 mm to 3 mm in length) are significantly smaller than at Leviäkangas, but the grain size does not differ much between the different veins intersected.

Payne (2022) states that the Tuoreetsaaret ore body model has been based on 50 diamond drill holes, of which 16 intersected the mineralisation. The drill core diameter is 50.5 mm, and it was typically sampled at 2 m intervals within the pegmatite with boundaries sampled to the lithological contacts. The core was halved by diamond saw and one half core was submitted for chemical analysis. The samples were fused after crushing and milling with sodium peroxide, then dissolved and analysed by ICP OES. A 27-element suite was routinely reported with a detection limit for Li of 0.001%.



srk consulting	**SSW Keliber Lithium Project** Tuoreetsaaret – 3D view of modelled pegmatites looking northwest	Project No. 592138

Figure 5.9: Tuoreetsaaret – 3D view of modelled pegmatites looking northwest

5.1.8 Mineralogy and geo-metallurgy

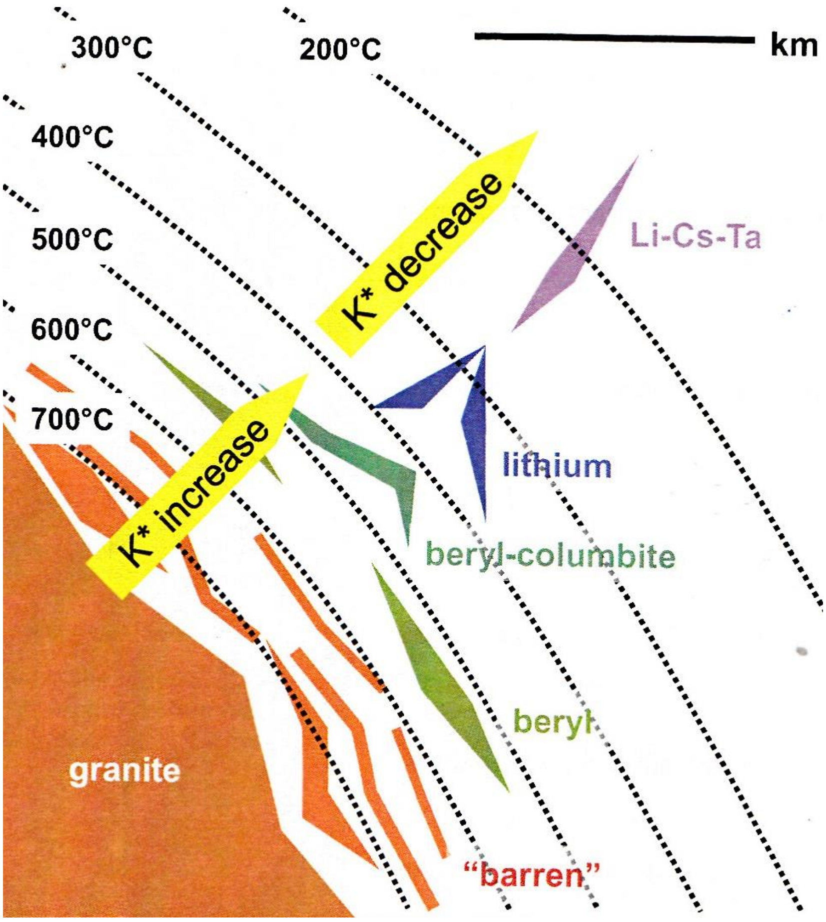
All of the pegmatites that have been discovered and evaluated to date within the Kaustinen area have very similar mineralogy: they are dominated by albite (37 - 41%), quartz (26 - 28%), K-feldspar (10 - 16%), spodumene (10 - 15%) and muscovite (6 - 7%). Internal pegmatite zonation as seen in many other similar LCT-type pegmatites is absent from the Kaustinen pegmatites, with spodumene being the only lithium-bearing mineral that is of economic interest. Other lithium-bearing minerals such as petalite ($LiAlSi_4O_{10}$), lepidolite ($K(Li,Al)_3(Al,Si,Rb)_4O_{10}(F,OH)_2$), montebrasite-amblygonite ($LiAl(PO_4)(OH,F)$ - $LiAl(PO_4)F$), Lithiophilite ($Li(Mn,Fe)PO_4$: $LiFePO_4$ – $LiMnPO_4$), Zinnwaldite ($KLiFeAl(AlSi_3)O_{10}(OH,F)_2$) and Elbaite (Tourmaline) ($NaLi_{2.5}Al_{6.5}(BO_3)_3Si_6O_{18}(OH)_4$) have been only found in minor or trace quantities.

Despite spodumene mineralisation being generally homogeneously distributed throughout most of the pegmatites, the inclusion or incorporation of host rock xenoliths and wall rock material through dilution will impact the metallurgical recovery of spodumene during flotation and metallurgical processing. This will require careful selective mining supported by optical or density sorting methods to mitigate the impacts of dilution on the recovery of spodumene.

5.2 Deposit type

[§229.601(b)(96)(iii)(B)(6)(ii-iii)]

The lithium-bearing pegmatites belonging to the Kaustinen lithium province belong to the LCT group of pegmatites. They also belong to the albite-spodumene subgroup based on the pegmatites' high spodumene and albite content (Cerny and Ercit, 2005). LCT pegmatites are very coarse-grained rocks with similar geochemical affinities to granites that are often considered the source rocks to pegmatites. LCT pegmatites are highly enriched in lithium, and tantalum, and this suite of elements gives them their name and distinguishes them from other rare caesium element pegmatites (Bradley and McCauley, 2016). They typically occur in Cainozoic to Mesoarchaean orogenic belts and have been found on most continents. They are often hosted within metasedimentary and metavolcanic rocks that are frequently metamorphosed to greenschist and amphibolite facies (Bradley and McCauley, 2016). LCT pegmatites often show a broad geochemical zonation pattern, with pegmatites most enriched in compatible elements Li, Cs, Ta typically the furthest away from their source (granite) and represent the last phase of crystallisation (Figure 5.10). The presence of numerous granites (many being pegmatitic granites) in the Kaustinen area are thought to be the potential sources of the pegmatites, although there has been no clear or well-defined zonation observed to date to prove this.



srk consulting	**SSW Keliber Lithium Project** Schematic plan view of a granite source showing evolution through to LCT pegmatite *(Source: London, 2016)*	Project No. 592138

Figure 5.10: Schematic plan view of a granite source showing evolution through to LCT pegmatite

6 EXPLORATION

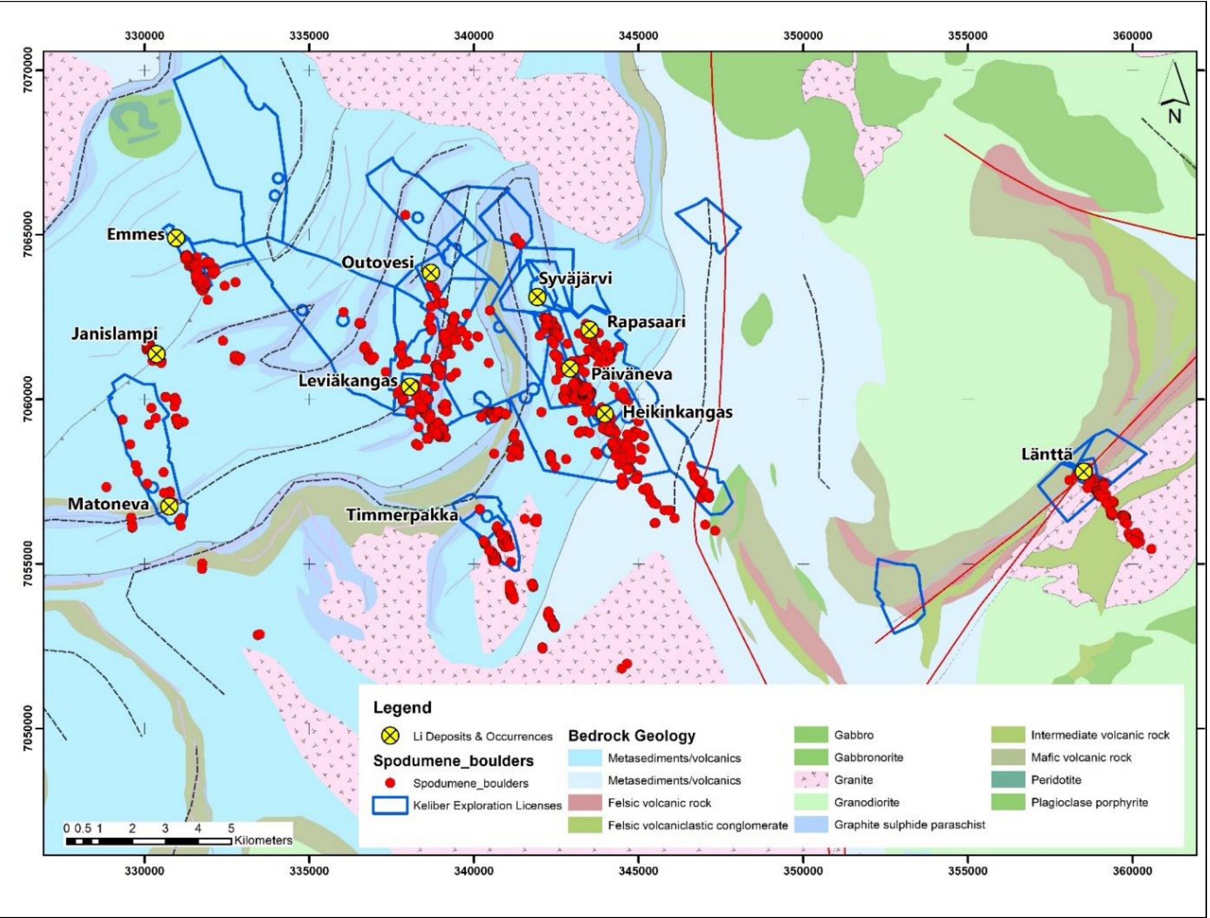
[§229.601(b)(96)(iii)(B)(7)

6.1 Non-drilling activities

[§229.601(b)(96)(iii)(B)(7)(i)]

6.1.1 Geological/boulder mapping

Due to the paucity of outcrop through most parts of the Kaustinen region, traditional geological mapping methods have not been possible, so pegmatite exploration methodologies have primarily been restricted to boulder mapping. This form of litho-geochemical sampling and mapping has been used since the 1960s and remains an effective method to discovering hidden or buried pegmatites. Since beginning exploration work in 2010, Keliber has mapped more than 1 500 spodumene pegmatite boulders, with these boulder fans or distributions being used to identify potential pegmatite source areas. Apart from the Länttä deposit (which was discovered through a road excavation), all of the Kaustinen pegmatites were located through tracing of boulder fans to the northwest (being the regional direction of palaeo-glacial ice movement). Drilling was then focused on areas proximal to the northwest end of the boulder fan (Figure 6.1).

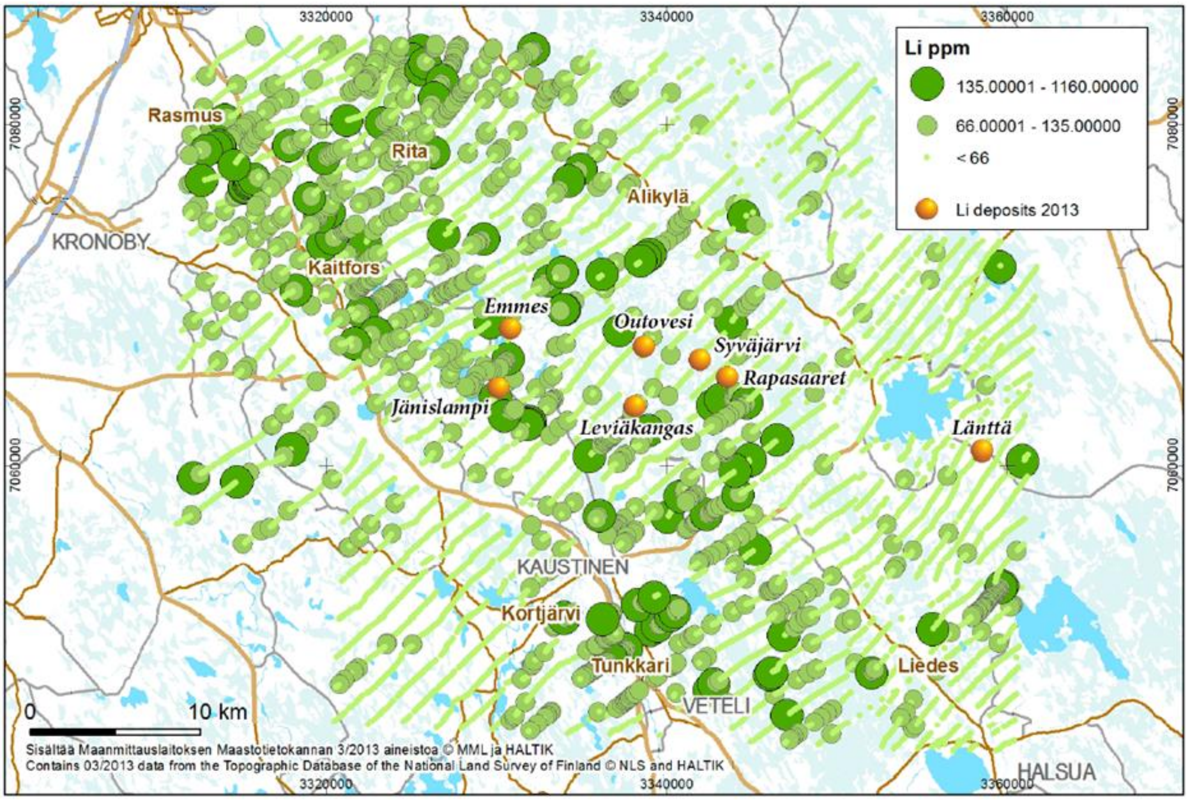


srk consulting	**SSW Keliber Lithium Project** Spodumene pegmatite boulders and deposits *(Source: Keliber)*	Project No. 592138

Figure 6.1: Map showing spodumene pegmatite boulders and deposits

6.1.2 Geochemical sampling

During the 1970s and 1980s, GTK carried out extensive till sampling covering the entire country, including taking over 10 000 samples in the Kaustinen area (Ahtola *et al.*, 2015). Samples were collected from an average depth of 2.4 m and along 500 – 2000 m-spaced lines, with sample intervals varying from 100 m – 400 m. Sample lines were orientated perpendicular to the direction of glacial drift (i.e., southwest – northeast). Lithium was not analysed for at the time, and only in 2010 when GTK reanalysed 9 658 samples from the Kaustinen area was the presence lithium confirmed. Results show broad areas of lithium anomalism that correlate well with the known/existing deposits (Figure 6.2). The results show that the till geochemistry coupled with boulder mapping can be used as an effective exploration tool in this environment.



srk consulting	**SSW Keliber Lithium Project** Regional distribution of Li in till and the locations of known lithium deposits *(Source: Ahtola, 2015)*	Project No. 592138

Figure 6.2: Regional distribution of Li in till and the locations of known lithium deposits

6.2 Drilling, logging and sampling

[§229.601(b)(96)(iii)(B)(7)(ii) (v) (vi)]

Apart from data generated from overburden stripping at Länttä and the exploration tunnel in Syväjärvi, diamond core drilling has been the only method used to generate geological, structural and analytical data and these have been used as the basis for Mineral Resource estimation over each of the deposits defined to date.

Older drilling phases from the 1960s to early 1980s was executed by Suomen Mineraali Oy and Partek Oy targeting the Emmes, Länttä and Syväjärvi deposits. This was followed by GTK who completed drilling over the Syväjärvi and Rapasaari deposits between 2004 and 2012. Since 1999, Keliber has completed extensive drilling programmes focusing on delineating Mineral Resource estimates over each of these deposits, including the Outovesi deposit that Keliber discovered in 2010.

Apart from shallow surface reverse circulation drilling completed by GTK over the Syväjärvi deposit, all drilling on the project has been completed using diamond core drilling. Historical drilling completed in the 1960s through to the 1980s was completed using 32 mm diameter drilling, with GTK drilling using a 42 mm diameter and Keliber a 50.7 mm core diameter, respectively. Most drilling was directed to intersect pegmatites at right angles to their strike, averaging 45˚ with average mean vertical drilling depth of 85 m below surface. Table 6-1 shows details of historical, GTK and Keliber drilling over each of the deposits.

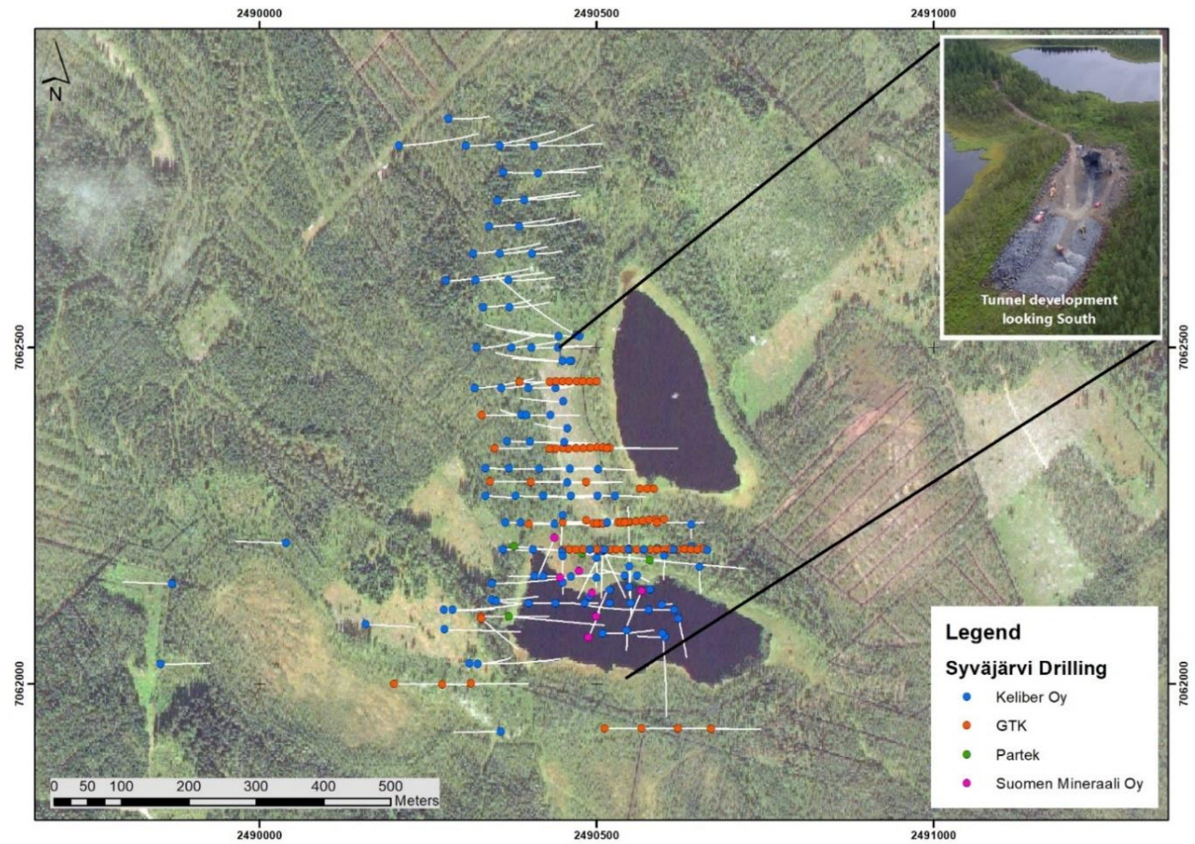
Table 6-1: Drilling completed over the Keliber Lithium Project

Deposit	Historical & GTK		Keliber		Total	
	Number of drill holes	Length (m)	Number of drill holes	Length (m)	Number of drill holes	Length (m)
Syväjärvi	37	4 078	155	16 109	192	20 187
Rapasaari	26	3 653	263	44 482	289	48 135
Länttä	27	2 931	73	6 136	100	9 067
Emmes	84	8 891	23	2 939	107	11 830
Outovesi	-	-	31	2 613	31	2 613
Tuoreetsaaret	-	-	50	10 617	50	10 617
Leviäkangas	99	6 821	24	5 174	123	11 994
Total	**273**	**26 374**	**619**	**88 069**	**892**	**114 443**

6.2.1 Syväjärvi drilling

The Syväjärvi Deposit was discovered by Suomen Mineraali Oy following boulder mapping with the first drilling being completed in 1961. This was followed by drilling by Partek Oy until the 1980s. Detailed drilling was then completed by GTK between 2006 and 2010. Following the acquisition of the project in 2012, Keliber completed several drilling campaigns between 2013 and 2019 with the focus of declaring a high-confidence Mineral Resource estimate. A total of 192 holes have been drilled over the project, totalling 20 187 m (Table 6-1 and Figure 6.3).

Due to the project's location close to Lake Syväjärvi, drilling was only possible during the winter months where access on to the lake could be achieved. Keliber's surface drilling was completed on a broad 50 m x 50 m-spaced grid, with all drill holes having easterly azimuths in order to intersect the pegmatites as close to their true width/attitude as possible (Figure 6-3). Following completion of the exploration tunnel, an additional six underground holes were drilled along the plane of the pegmatite to test and validate its up-dip continuity.

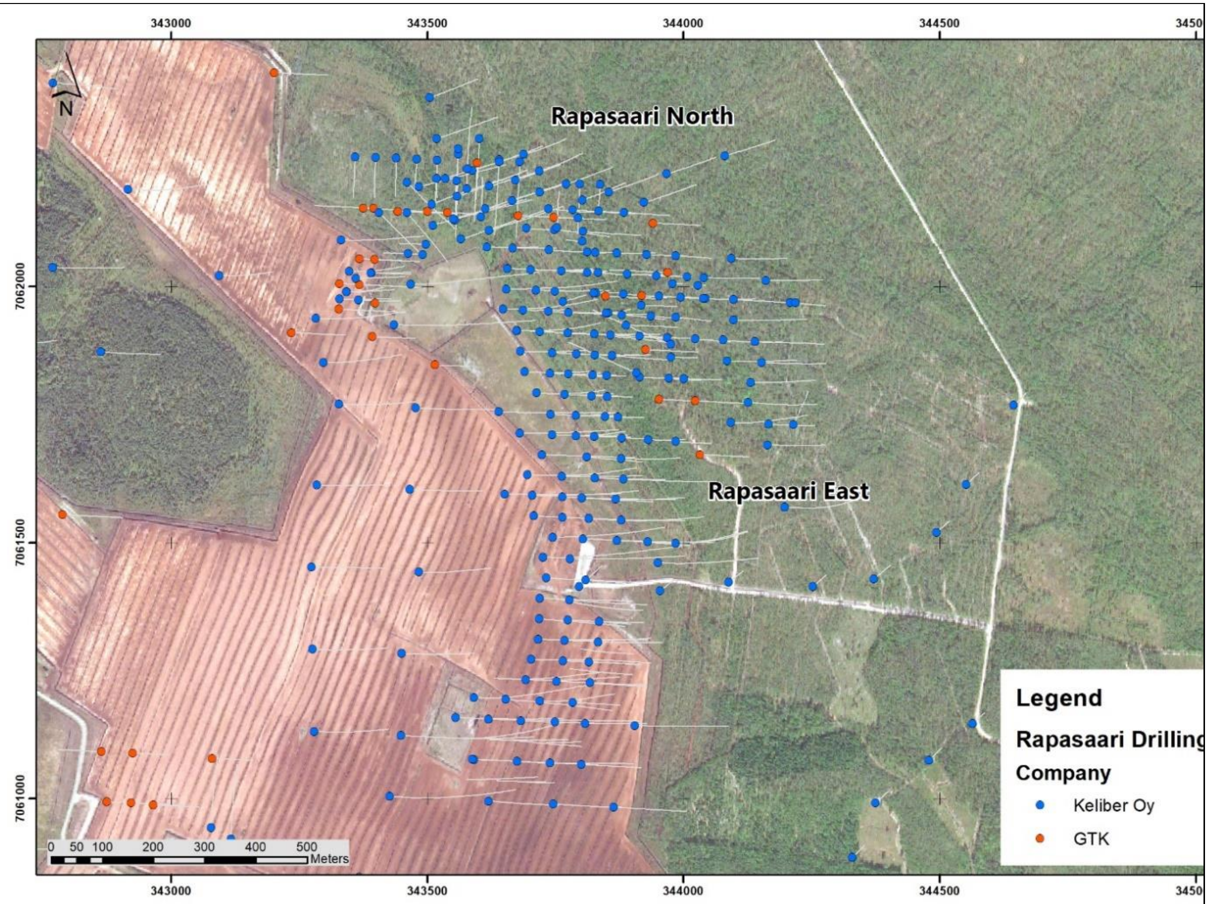


srk consulting	SSW Keliber Lithium Project Syväjärvi – completed drilling with photo showing exploration tunnel	Project No. 592138

Figure 6.3: Syväjärvi – completed drilling with photo showing exploration tunnel

6.2.2 Rapasaari drilling

Following a boulder mapping, till sampling and geophysical programme, GTK discovered the Rapasaari deposit in 2009. During 2009 and 2011, GTK completed a 26-hole drilling programme, with Keliber acquiring the mineral rights to the project in 2014. Since then, Keliber completed numerous drilling campaigns, focusing on properly delineating the Rapasaari deposit geology and structure into three separate zones, two of which became the focus of Mineral Resource estimation - Rapasaari East and Rapasaari North. A total of 289 holes have been drilled over the project, totalling 48 135 m (Figure 6.4). Keliber's surface drilling was completed on a broad 50 m x 50 m-spaced grid, with Rapasaari East drill holes having easterly azimuths and Rapasaari North drill holes having southerly azimuths in order to intersect pegmatites as close to their true width/attitude as possible.

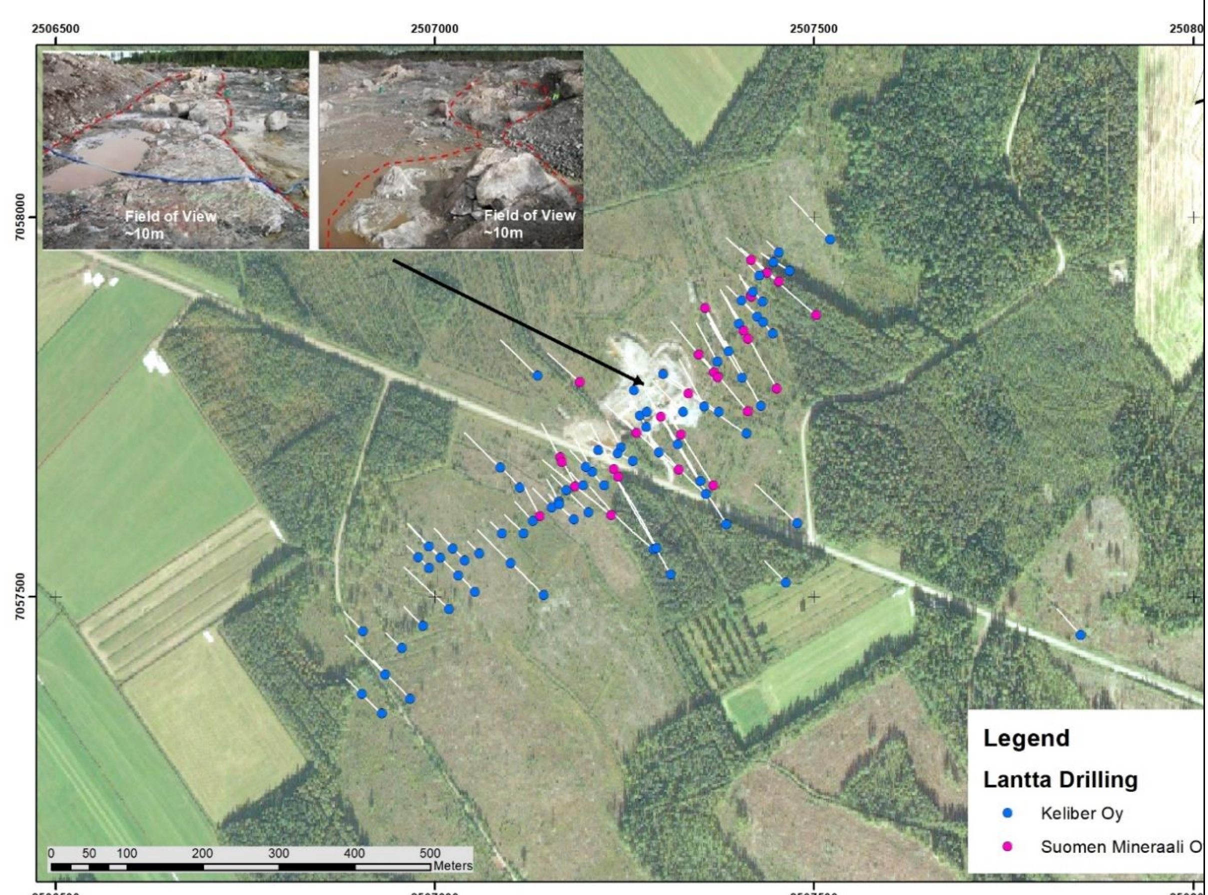


srk consulting	**SSW Keliber Lithium Project** Rapasaari – completed drilling	Project No. 592138

Figure 6.4: Rapasaari - completed drilling

6.2.3 Länttä drilling

Following exposure of mineralised pegmatite during a road working in the 1950s, the Länttä Deposit was initially drilled by Suomen Mineraali Oy. Their work included bulk sampling and metallurgical testing in the late 1970s, but no additional work was completed as the project was considered uneconomic at the time. Keliber acquired the mineral rights to the project in 1999 and completed more detailed exploration in collaboration with GTK. In 2010, overburden stripping and exposure of both pegmatite veins was completed. Bulk samples were drawn for metallurgical test work as well as for samples to generate internal certified reference material (**CRM**) for the project. A total of 100 holes of diamond drill core have been drilled over the project, totalling 9 067 m. Keliber's surface drilling was completed on broad 40 m-spaced section lines with all drill holes having north-westerly azimuths in order to intersect pegmatites as close to their true width/attitude as possible (Figure 6.5).

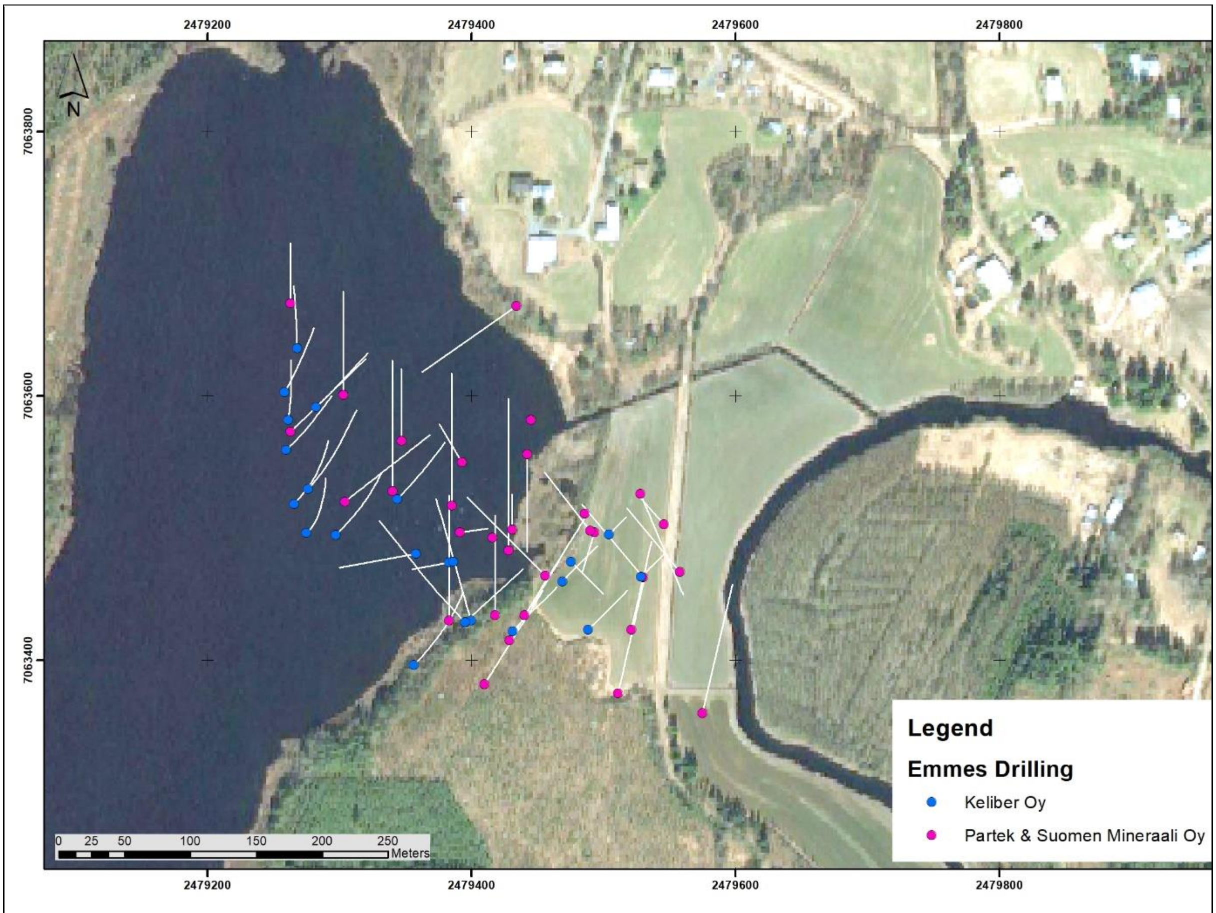


srk consulting	SSW Keliber Lithium Project Länttä – completed drilling with photographs showing exposed pegmatite at surface	Project No. 592138

Figure 6.5: Länttä – completed drilling with photographs showing exposed pegmatite at surface

6.2.4 Emmes drilling

The Emmes deposit was discovered following boulder mapping completed by Suomen Mineraali Oy in the 1960s. Drilling by Suomen Mineraali Oy as well as Partek Oy was completed until 1981. Following acquisition of the rights in 2012, Keliber completed three drilling programs, including several ice drilling programs to validate historical holes as well as to further delineate the extent of the pegmatite beneath Lake Storträsket. A total of 107 holes of diamond drill core have been drilled over the project, totalling 11 830 m (Figure 6.6). Keliber's surface drilling was completed using variable spacing lines with drill holes having north and north-easterly azimuths in order to intersect pegmatites as close to their true width/attitude as possible.



srk consulting	**SSW Keliber Lithium Project** Emmes – completed drilling	Project No. 592138

Figure 6.6: Emmes – completed drilling

6.2.5 Outovesi drilling

The Outovesi deposit was discovered in 2010 by Keliber, with the company completing its mineral resource inventory drilling in the same year. A total of 31 holes of diamond drill core have been drilled over the project, totalling 2 613 m (Figure 6.7). Keliber's surface drilling was completed on broad 40 m-spaced section lines with all drill holes having easterly azimuths in order to intersect pegmatites as close to their true width/attitude as possible.

Figure 6.7: Outovesi – completed drilling

6.2.5.1 Tuoreetsaaret drilling

The Tuoreetsaaret deposit, located between the Syväjärvi and Rapasaari deposits, was discovered in 2020 by Keliber and subsequently drilled during 2021 and 2022. The drilling is towards the east and is approximately perpendicular to the orientation of the pegmatites. As the deposit is located between the two larger orebodies, there are a large number of holes in vicinity, however only 16 of these have intersected the modelled veins. The sub-vertical veins are intersected through both east and west oriented drill holes, on approximately 40 m spaced fence lines. The veins are reasonably closely spaced, at between 10 to 50 m apart.

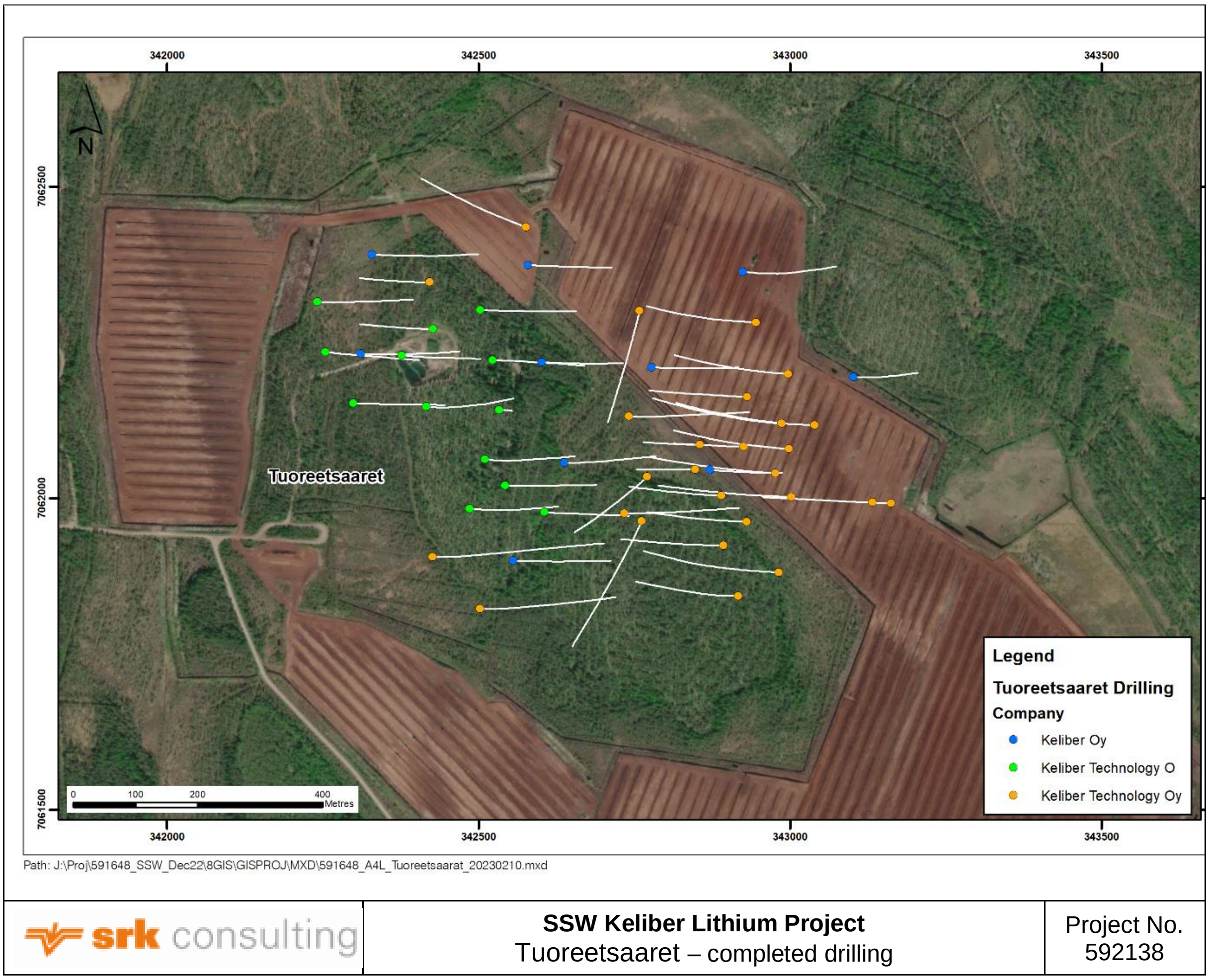
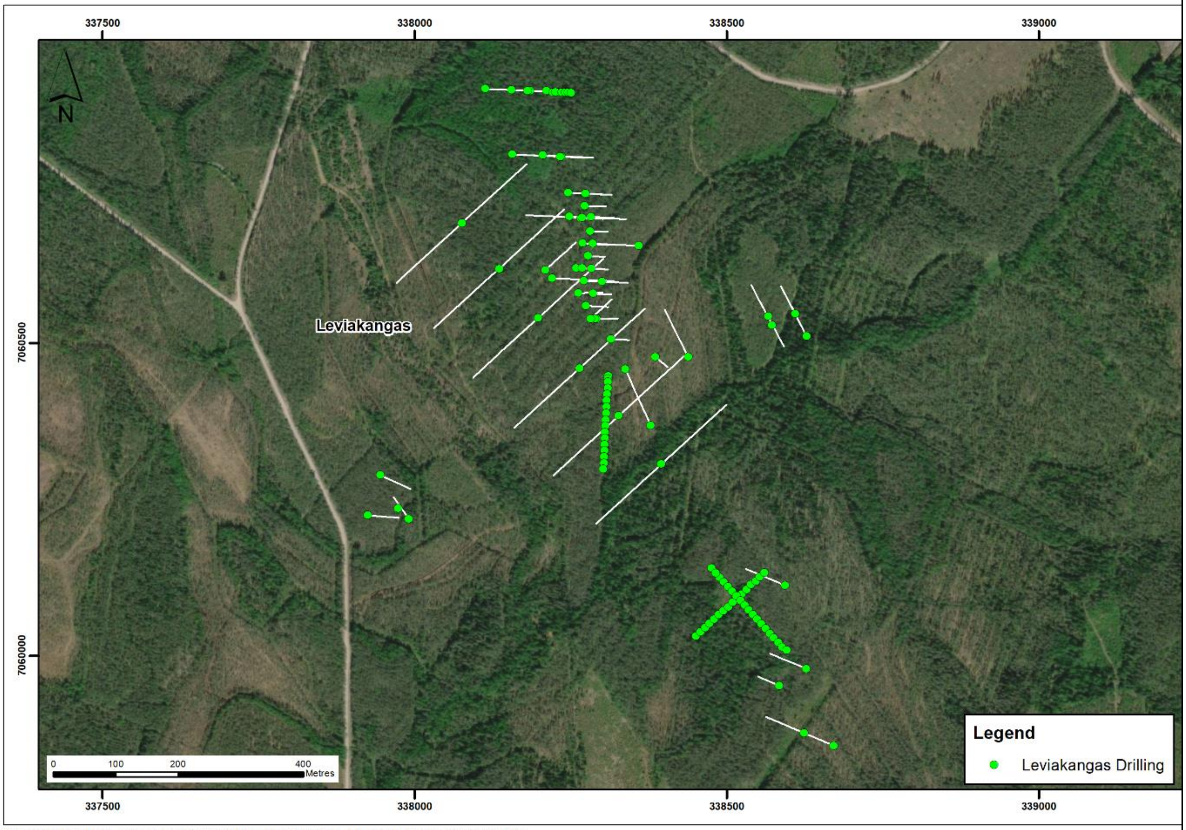


Figure 6.8: Tuoreetsaaret – Completed Drilling

6.2.5.2 Leviäkangas drilling

The Leviäkangas deposit, was discovered initially through boulder mapping, and later by percussion and diamond drilling by Partek Ab. Infill drilling was undertaken by Keliber to follow up on the more promising areas intersected by Partek Ab. The percussion drilling is not used in the Mineral Resource estimation. For the shallowest orebody at Leviäkangas the drilling is fairly closely spaced, and approximately 20 m fence lines, oriented towards the east perpendicular to the strike of the veins. For the two deeper orebodies the spacing is significantly wider at 50 to 100 m. Ove the 123 drillholes in the vicinity of the deposit (including the percussion drilling), only 24 holes, totalling 2 246 m have intersected the modelled orebodies.



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srk consulting	**SSW Keliber Lithium Project** Leviäkangas – completed drilling	Project No. 592138

Figure 6.9: Leviäkangas – completed drilling

6.2.6 Sampling procedures

All logging and sampling of diamond drill core by Keliber was completed at Keliber's core logging and sampling facility in Kaustinen and in accordance with Keliber's Standard Operating Procedures (**SOP**) that were aligned with best practice and in accordance with the JORC 2012 Code. Lithological logging criteria focused on mineralogical, lithological and structural variables, with sample intervals varying from 0.2 m to 2.5 m.

Mineralogical logging focused on recording spodumene crystal size, orientation, colour, and estimated quantity. During earlier drilling phases, core was orientated by drillers (every 10 – 15 m) using the "wax stick method". However, in later phases (post-2016), Keliber utilised a downhole digital Reflex Act III tool that measured the orientation of drill core on each three-metre run, generating more accurate results.

After logging, core boxes were photographed dry and wet. All lithological, structural, mineralogical, density, Rock Quality Designation (RQD) and sampling data was captured into MS Excel® spreadsheets and then compiled into an MS Access® database. After core had been marked up for sampling, it was cut in half along the long axis using an automatic diamond saw, with half of the core being subject to drying, weighing, measurement of specific gravity (SG), further drying and then packing into sample bags for dispatch to the laboratory for preparation and analysis.

6.2.6.1 Density

Keliber carried out density determinations using the water displacement (Archimedes) method and included the use of two standards that were measured at every 10th sample. A majority of Keliber's density measurements were drawn from pegmatite material and included non-mineralised material (host rock inclusions/xenoliths). There is a strong correlation with Li_2O grade (i.e., spodumene content) and density and depending on grade (usually 10 - 20 % spodumene) the density can vary between 2.65 and 2.80 g/m^3. An average density of 2.70 g/m^3 was therefore assumed for fresh pegmatite. This average density was then also applied to host rock metasediments and metavolcanics due to limited density measurements being available over these domains.

7 SAMPLE PREPARATION, ANALYSES AND SECURITY

[§229.601(b)(96)(iii)(B)(8)]

7.1 Sample preparation methods and quality control measures

[§229.601(b)(96)(iii)(B)(8)(i)]

All material used for analyses on the project was sourced from diamond drill core that was split in half using an electric diamond core saw, or a guillotine (for historical core samples). All sampling is completed at the secure core logging and sampling facility in Kaustinen. To ensure confidence in the quality of the results, precision and accuracy, Keliber have since 2013 employed a quality assurance and quality control (QA/QC) SOP over all of its drilling programs at the Keliber Project.

The Quality Control (**QC**) policy includes the insertion of Certified Reference Material (**CRM**), blanks and duplicates into the sampling stream on a frequency of one in every 20 samples (5%). Duplicate QC samples included replicate samples (quarter core samples) as well as pulp duplicate samples. Keliber generated three separate in-house CRMs from samples drawn from the Länttä deposit, as well as a CRM (blank) sample drawn from the Lumppio granite (assumed to outcrop in the region). The CRMs (including the blank material) were prepared by independent laboratory Eurofin Labtium Group (Labtium) in Finland. A commercially available CRM (AMIS0355) was also used by Labtium as part of its internal QC when analysing Keliber's samples.

All sealed samples were delivered to Labtium's independent laboratory in Kuopio, Finland who have carried out all primary sample preparation and assay for the project since 2014.

7.2 Sample preparation, assaying and laboratory procedures

[§229.601(b)(96)(iii)(B)(8)(ii)]

All sample preparation and analyses were completed by Labtium's laboratory facility in Kuopio, Finland. For sample preparation, samples are weighed, dried and crushed to -6 mm, with the coarse crushed samples being split using a rotary splitter to a weight of 0.7 kg. Samples were then pulverized with an aliquot of 0.2 g being used for analyses. Pulp and coarse reject samples were retained for future analysis and possible metallurgical testing. The analytical process applied by Labtium (code 720P) is sodium peroxide fusion (700°C / 5 min) followed by dissolving in HCl plus dilution with HNO_3 and analysis by ICPOES. A 27-element suite is routinely assayed using this method with a lithium detection limit of 0.001%.

Check samples carried out by ALS Ltd in 2013 showed some variance between results, but this was attributable to the four-acid digest used by ALS Ltd (as opposed to a sodium peroxide fusion) being incapable of entirely dissolving silicates such as spodumene and beryl into solution. Keliber have therefore used a sodium peroxide fusion digest (Labtium code 720P) methodology for all sample analyses, as this method provides a more complete digest, and therefore more accurate analytical results.

It is recommended that the residue after the fused material has been dissolved be investigated as the oxide minerals such as tantalite and columbite may not have been broken down.

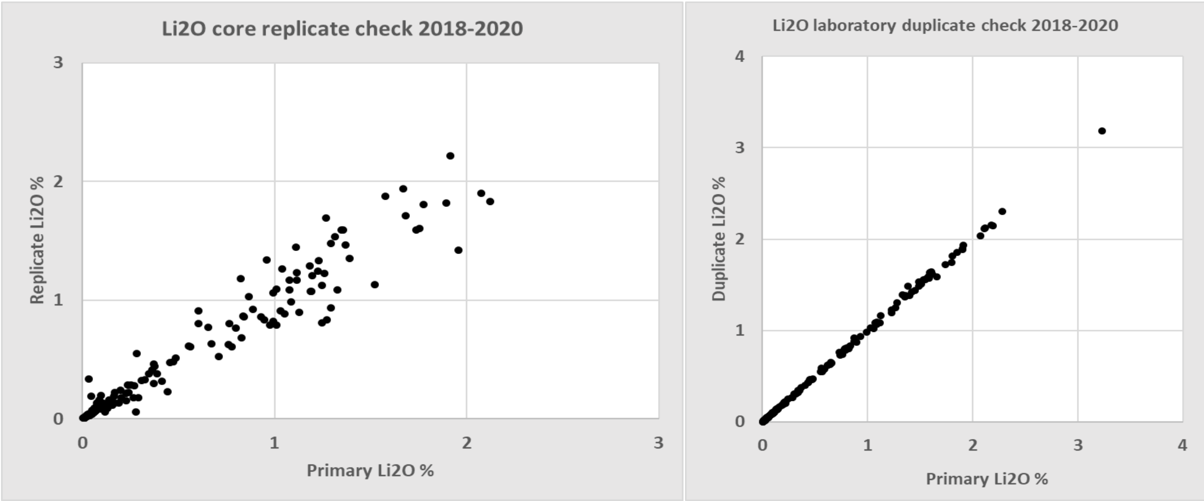
7.3 Quality assurance and quality control measures

[§229.601(b)(96)(iii)(B)(8)(iii)]

Keliber's QC programme included the insertion of four CRMs (including a blank) and replicate samples (comprising quarter core) with the laboratory (Labtium) completing internal QC through use of one CRM (AMIS 0355) and completing pulp duplicate analyses.

7.3.1 Replicates/duplicates

Field replicates comprising quarter core samples were taken randomly for insertion in the sample stream at a ratio of 1 in 20. Results were as expected with some variance shown between the replicate pairs, but this is an expected behaviour based on the very coarse-grained and heterogenous nature of spodumene mineralisation observed throughout all of the mineralised pegmatites. This variance is also emphasised through the differing size of the sample (half core as opposed to quarter core). Pulp sample duplicates were also taken and showed little bias between the datasets (Figure 7.1).



srk consulting	SSW Keliber Lithium Project Plots of core replicate and laboratory pulp duplicate checks for Li_2O from 2018 to 2020.	Project No. 592138

Figure 7.1: Plots of core replicate and laboratory pulp duplicate checks for Li_2O from 2018 to 2020

7.3.2 Certified reference materials

The behaviour of the three in-house CRMs since 2014 has not been consistent and this has been attributable to apparent sample inhomogeneity within all three of the in-house CRMs. In nearly all cases, the mean measured lithium grades are generally lower than the certified lithium grades for all CRMs, with many analyses plotting beyond two standard deviations (Figure 7.2). The commercially available CRM used by Labtium (AMIS0355) also showed a consistent lower bias, also within the same range, but with nearly all data falling within only one standard deviation (Figure 7.3). This would suggest that grades declared by Keliber are slightly conservative (-ve ~0.05% Li_2O). Despite variances between the CRM's, the minor variances identified between them is not considered significant to the impact the quality (accuracy) of analyses generated to date.

The change in the reported Li contents of the internal standards have also been observed by other Competent Persons in the past (Payne, 2022) and this may be better explained by referring to Table 7-1.

Table 7-1: Reported lithium content for the three in-house standards

Standards	A		B		C	
Number of analyses	35		71		17	
Statistic / Laboratory	Mean (%)	Standard deviation	Mean (%)	Standard deviation	Mean (%)	Standard deviation
Rovaniemi	1.02	0.04	0.73	0.03	0.60	0.05
Kuopio	1.01	0.03	0.72	0.02	0.61	0.01
Oulu	0.95	0.05	0.70	0.04	0.59	0.03

(Source: Payne (2022))

Although this change may be regarded as minor, it is more pronounced in the data reported by the Oulu Laboratory and mainly affects the Tuoreetsaaret samples submitted since 2021. This has been brought to the attention of the exploration team and recommended various remedies that are currently being investigated for implementation before a next round of Mineral Resource estimation.

7.3.3 Blanks

Blanks (samples containing negligible amounts of the element of interest) are inserted into the sample stream in order to assess whether any potential contamination has been introduced during the sample preparation stages. The blank used by Keliber was also part of the same suite of in-house CRMs prepared by Labtium, and most probably also potentially suffer from some form of sample inhomogeneity. However, results from this CRM do not show any significant contamination throughout all batches prepared by Labtium.

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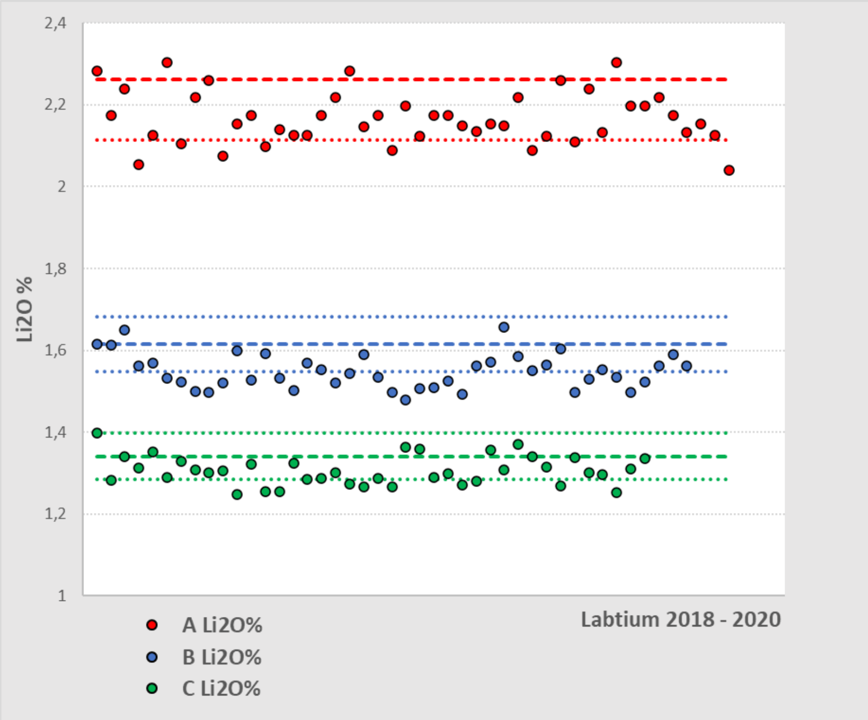
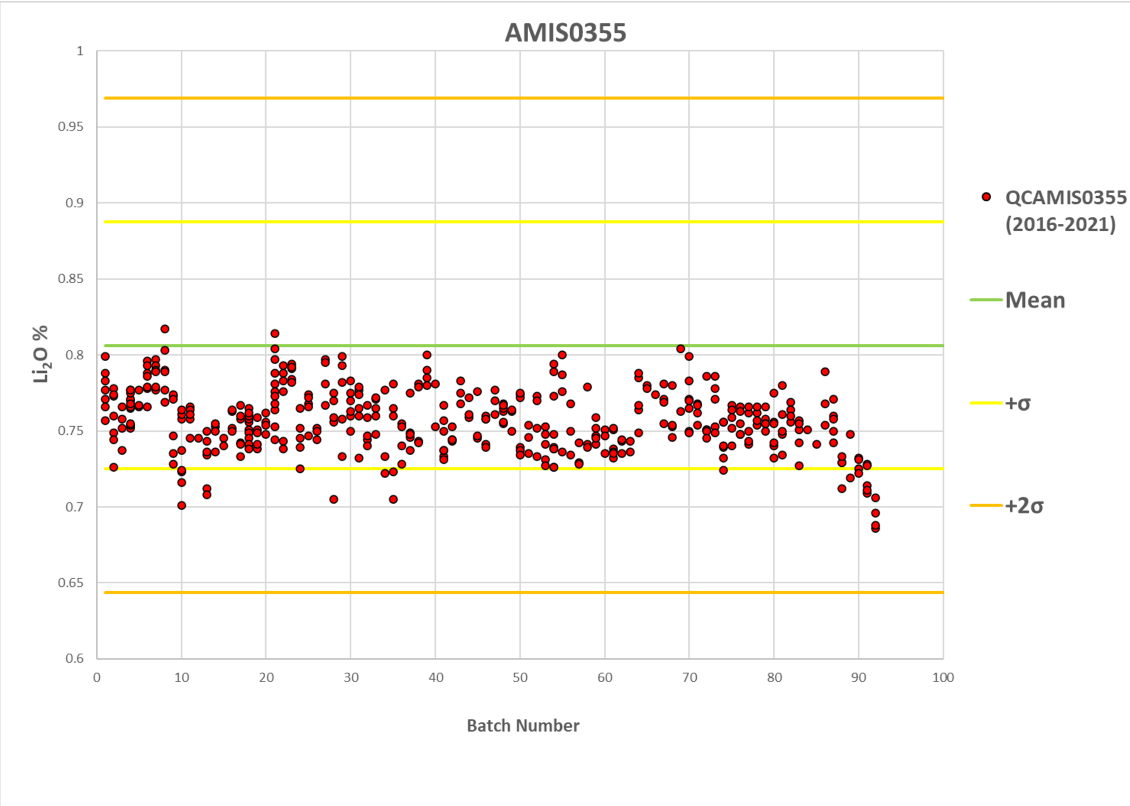


srk consulting	**SSW Keliber Lithium Project** CRM control charts from 2018 to 2020 in analytical order. *Dashed lines: certified grade means; dotted lines: ±2δ for each standard*	Project No. 592138

Figure 7.2: CRM control charts from 2018 to 2020 in analytical order



srk consulting	**SSW Keliber Lithium Project** CRM control chart showing performance of AMIS0355 since 2016	Project No. 592138

Figure 7.3: CRM control chart showing performance of AMIS0355 since 2016

7.4 Adequacy of sample preparation, security and analytical procedures

[§229.601(b)(96)(iii)(B)(8)(iv)]

Keliber has been following a well-defined logging, sampling and analytical procedure since 2014. The sampling and core storage facility in Kaustinen is considered a secure facility with the sample preparation and analytical methodologies considered appropriate for the commodity being evaluated (lithium). Although CRM sample inhomogeneity is to blame for the variance in behaviour of the inhouse CRMs, the results of the external CRM (AMIS 0355) do provide some support to the integrity of the data. The resulting slightly lower or conservative grades are considered negligible (~0.05% Li) and are not considered material with respect for use in Mineral Resource estimation. The sample database is of sufficient quality and accuracy for use in Mineral Resource estimation.

The QP recommends that Keliber utilises an umpire/check laboratory to analyse a subset of the previously analysed samples (~100 samples), representative of the grade range of the deposits, and to include additional commercially available CRMs as part of its QC programme in the future.

7.5 Unconventional analytical procedures

[§229.601(b)(96)(iii)(B)(8)(v)]

No unconventional analytical procedures have been employed by Keliber.

8 DATA VERIFICATION

[§229.601(b)(96)(iii)(B)(9)

8.1 Data verification procedures applied

[§229.601(b)(96)(iii)(B)(9)(i)]

The following data verification exercises on the Keliber exploration data have been completed by SRK, including site visits to the project sites:

- A public domain literature review including several reports (GTK) and academic studies covering the exploration history, geology and evaluation of LCT pegmatites in the Kaustinen area, many of which include references to the deposits referenced in this study;
- Accessed, imported and interrogated all drill hole and geological data over each of the deposits: Syväjärvi, Rapasaari, Emmes, Länttä and Outovesi;
- Completed review of Keliber's SOPs relating to drilling, logging, sampling and QA/QC procedures;
- Visually compared and verified several photographed sampled core logs with captured geology and sample data from each of the deposits;
- Completed a detailed review of QC procedures carried out by Keliber;
- Undertake a site visit to Keliber's operational offices and core yard and sampling facility in Kaustinen;
- A review of selected drill hole core intersections from each of the deposits with comparison to database entries and logs;
- A review of core showing spodumene style of mineralisation and general pegmatite mineralogy in each of the deposits, including level of dilution/xenolith/host rock inclusion in each;
- Site visits to each of the deposits, Syväjärvi, Rapasaari, Emmes, Länttä and Outovesi, and the location of the exploration tunnel at Syväjärvi and exposed pegmatite at Länttä;
- Verification of a Keliber drilling collar at the Rapasaari Deposit and validating its position with the database using a handheld Garmin GPS; and
- Site visit to the proposed concentrator site near Kaustinen, and the proposed chemical plant in Kokkola.

8.2 Limitations in data verification

[§229.601(b)(96)(iii)(B)(9)(ii)]]

There are no limitations to the data validation efforts completed to date; these have included completion of the site visit and associated validation as well as data validation and interrogation of Keliber's data and reports.

8.3 Adequacy of data

[§229.601(b)(96)(iii)(B)(9)(iii)]

Since commencement of exploration in the Kaustinen region, Keliber has completed a systematic exploration and mineral resource evaluation programme that has been successful in delineating five discrete spodumene-mineralised pegmatite deposits. The work completed to date has captured all the important variables (mineralogical, structural, lithological) required to properly define the attitude of the host pegmatite/s and importantly, the spodumene or grade distribution within the various pegmatites that host each deposit.

The exploration data that has been captured to date (consisting primarily of drilling data) is of suitable quality to be used in Mineral Resource estimation and for the purposes used in this TRS.

9 METALLURGICAL TESTING AND MINERAL PROCESSING

[§229.601(b)(96)(iii)(B)(10)]

The first metallurgical tests were completed in the early 1970s by Paraisten Kalkkivuori Oy. Keliber began studying the deposits in 1999 and between 2001 and 2006, in partnership with Outotec, developed a new lithium carbonate production process. More intensive investigations started in 2014. In June 2018 Keliber completed a DFS for a project to produce battery-grade lithium carbonate from spodumene-rich pegmatite deposits in Central Ostrobothnia, Finland. However, following further market studies it was decided to consider the production of battery-grade lithium hydroxide monohydrate (**$LiOH \cdot H_2O$**), or more simply lithium hydroxide (**LiOH**) instead of lithium carbonate. A series of tests was completed to determine the production parameters of lithium hydroxide from spodumene ore. Engineering studies were undertaken to produce 12 500 tpa of battery-grade lithium hydroxide via the following unit processes:

- Concentration comprising crushing, optical sorting, grinding and flotation to produce a spodumene concentrate;
- Conversion of the spodumene concentrate from alpha to beta-spodumene by roasting in rotary kiln; and
- Soda leaching in an autoclave and hydrometallurgical processing including solution purification, crystallisation and dewatering to produce lithium hydroxide.

In January 2022, Keliber issued a draft DFS (WSP Global Inc., 2022c) based on the production of 15 000 tpa of battery-grade lithium hydroxide. A Definitive Feasibility Study was issued on 1st February 2022.

9.1 Metallurgical Testing

9.1.1 Historical metallurgical test work

After the initial metallurgical tests conducted in the early 1970s, further investigation was undertaken between 1976 and 1982. Research included mineral processing tests to produce spodumene concentrate as well as its by-products: quartz, feldspar and mica concentrates.

Keliber restarted metallurgical testing in 2003, which led to the preliminary engineering for a spodumene concentrator and a lithium carbonate production plant. Mineral processing included two-stage grinding, gravity separation, de-sliming, pre-flotation, spodumene flotation and dewatering. Conversion from alpha to beta-spodumene was undertaken in a rotary kiln and the hydrometallurgical process included pressure leaching of beta-spodumene in a soda environment, solution purification with ion exchange, and precipitation of lithium carbonate. Subsequent changes to the process route have principally been in the production of lithium hydroxide.

9.1.2 Recent mineral processing test work

The purpose of the mineral processing circuit is to produce spodumene concentrate for the downstream pyrometallurgical and hydrometallurgical processes. Typically, commercial spodumene concentrate would target a grade of 6% Li_2O. However, given that concentrate transportation costs to the relatively close KIP are low, the concentrate grade will be a point of optimisation. During the production phase the concentrate grade will be optimized depending on the grade-recovery relationship and price of the end product. Generally speaking, the production of lower grade concentrate will be more feasible at high product price. The level of impurities in the concentrate is also important. Keliber test work programmes have revealed iron, arsenic and phosphate to be the main impurities in the spodumene flotation concentrate that impact on the downstream process. The maximum levels have been indicated at 2% for Fe_2O_3, 50 ppm for As and 0.4% for P_2O_5.

9.1.2.1 Länttä pilot test in 2015

In the 2015 PFS, samples of Länttä ore were tested at pilot-scale.

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Three samples with a total mass of 14.8 t and combined grade of 1.27% Li_2O, 0.0092% Nb and 0.0024% Ta, were processed through a pilot plant. The 2022 DFS Report referenced the primary sample but not did not describe the sampling details.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The combined sample of Länttä ore was treated through a pilot mineral processing plant at the mineral processing and materials research unit (Mintec) of the GTK in Outokumpu, Finland. The spodumene concentrates produced were then processed by conversion and hydrometallurgical testing. This is described in sub-section 9.1.3*: Laboratory-scale* conversion tests.

GTK's quality system consists of the following elements:

- GTK's quality manual;
- Standard operating procedures; and
- Appendices and reference material

The ISO 9001 2015 quality system standard is applied in all production-related activities, such as mapping and measuring, and the mineral technology laboratory's research and process operations, among others. The quality system describes the flow of GTK's processes so that everything related to customer service, the reliability and efficiency of operations, and environmental protection is defined to meet the requirements of the standard.

Mineral processing testing and results

The pilot plant included dense media separation (DMS), rod milling with gravity separation and flotation. Sample preparation for the pilot plant test included crushing and screening into two fractions, 0-3 mm and 3-6 mm. DMS was executed separately for these size fractions. Fines were fed directly to the spodumene flotation circuit with a feed rate of 300 kg/h.

Unfortunately, the pilot plant de-sliming cyclones were ineffective, resulting in sub-optimal flotation. Laboratory scale flotation tests were accordingly used to complement the pilot plant results.

It was shown that the combination of DMS and flotation resulted in 2% to 3% increase in lithium recovery compared with simple flotation. Test results obtained from combined DMS, and flotation indicated a recovery of 85.9% with a 4.59% Li_2O in the spodumene concentrate.

9.1.2.2 Syväjärvi laboratory tests in 2015

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Laboratory scale tests were carried out on Syväjärvi sample collected from drill cores with an average grade of 1.47% Li_2O. Primary sampling details were not described in the 2022 DFS Report.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The draft 2022 DFS does not state where these tests were conducted but presumably, they were conducted at the GTK Mintec facility. The spodumene concentrates produced were then processed by conversion and hydrometallurgical testing. This is described in sub-section 9.1.3*: Laboratory-scale* conversion tests.

GTK certification details are provided in sub-section 9.1.2 'Länttä pilot test in 2015.

Mineral processing testing and results

Laboratory scale test work included DMS and flotation with the purpose to compare the metallurgical performance of Syväjärvi ore with the Länttä ore tested earlier in pilot-scale. In addition, a concentrate was produced for subsequent leaching tests.

Tests confirmed that Syväjärvi ore can be processed using a similar flowsheet to Länttä. Recoveries for a concentrate of 4.5% Li_2O were higher than achieved with the Länttä sample: 90.0% when only flotation was applied and 93.5% when both DMS and flotation were used. Phosphorus content of the produced spodumene concentrate was higher in the DMS and flotation alternative: 0.59% P_2O_5 compared with 0.26% when only flotation was applied.

9.1.2.3 Syväjärvi pilot tests in 2016-2017 (PFS)

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

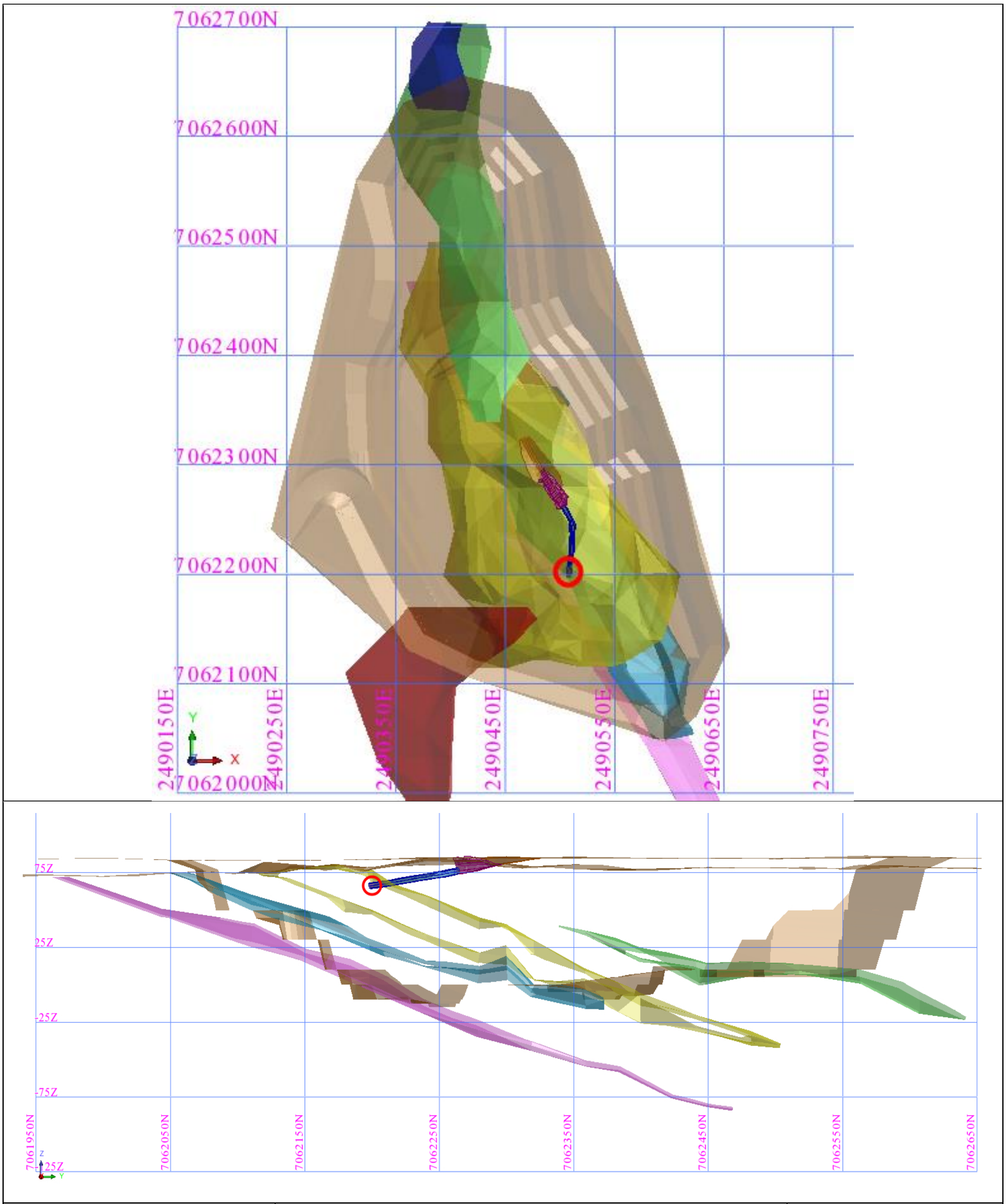
For the PFS, a tunnel was mined during the summer of 2016 to extract a bulk sample for pilot plant and other testing. Four breaks were mined from pure spodumene pegmatite at the end of the tunnel, which were separately stockpiled (Figure 9.1).

The 160 t bulk sample of Syväjärvi ore had a grade of 1.445% Li_2O. A waste rock sample containing 0.188% Li_2O was also collected as dilution in mineral processing tests.

srk consulting	**SSW Keliber Lithium Project** Spodumene pegmatite at the end of the tunnel (top) and numbered ore piles before transport to GTK Mintek (bottom)	Project No. 581648

Figure 9.1: Spodumene pegmatite at the end of the tunnel and numbered ore piles before transport to GTK Mintek

A plan and long section showing the location of the tunnel relative to the Syväjärvi deposit are shown in Figure 9.2.



srk consulting	**SSW Keliber Lithium Project** Syväjärvi pilot sample location plan view (top) and long section view (bottom)	Project No. 592138

Figure 9.2: Syväjärvi pilot sample location – plan and long section views

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

An ore sorting test programme was completed in the TOMRA sorting test facility in Wedel, Germany.

Mineral processing tests were conducted at pilot-scale at the GTK Mintec facility in Outokumpu. The spodumene concentrates produced were further used in laboratory and pilot conversion tests, with the converted concentrate then used in both laboratory and pilot-scale leaching tests. This is described in this report sub-section 9.1.2 Länttä pilot test in 2015. It was noted that the full Keliber process was thus tested at pilot-scale.

TOMRA is certified to the ISO 9001 and ISO 14001 quality system standards.

GTK certification details are provided in sub-section 9.1.2 Länttä pilot test in 2015.

Optical sorting testing and results

Sorting tests were conducted using 4 t of Syväjärvi run-of-mine (**RoM**) spodumene-rich ore (20 to100 mm in size) and 500 kg of black waste rock. The focus of the tests was to remove black plagioclase porphyrite waste rock from the plant feed.

TOMRA's test set-up included a PRO secondary COLOR NIR, which consists of a colour line scan CCD camera and a near-infrared (**NIR**) scanner. The combination of these sensors takes advantage of the absorption fingerprint of minerals in the NIR wavelength range and the colour characteristics.

Ore sorting was found to be effective in removing black waste rock from the ore feed at different artificial waste rock sorter feed compositions. The sorting results indicate around 12% of the mass and 3% of the Li_2O was lost in sorting. After accounting for the 0 - 20 mm fine fraction that will bypass sorting, there was a mass rejection of 10.1% with 2.2% lithium losses.

In 2018, complementary batch-scale tests were carried out on hand-picked samples from Syväjärvi, Länttä and Rapasaari. In addition to the main aim of verifying the separation of the pegmatite ore from the dark country rock, tests were conducted to separate spodumene pegmatite from barren pegmatite. The separation of black country rocks from pegmatite (ore-bearing and barren) was achieved with the COLOR, NIR and XRT sensor. It was noted that the LASER sensor could also be used to separate the spodumene-bearing ore from the barren pegmatite but that further testing at pilot-scale would be needed to verify the mass balance and possible lithium losses.

Mineral processing testing and results

Pilot plant tests using rod and ball mills operating in closed circuit, gravity concentration and flotation were conducted in September 2016 at the GTK Mintec facility in Outokumpu. The pilot-scale processing was divided into two campaigns, with the first processing of 71 t of material with a 10% waste (country rock) dilution and the second 73 t with a 3% dilution.

The flowsheet was based on Länttä pilot plant test but without DMS due to high P_2O_5 concentrations seen previously in Syväjärvi concentrate. The following key unit processes were included:

- Crushing;
- Grinding and classification;
- Gravity concentration;
- De-sliming;
- Pre-float flotation;
- Magnetic separation; and
- Flotation.

Results showed two subsets, with one averaging 75% recovery at 5.3% Li_2O and the other averaging 82% recovery at 4.7% Li_2O. Based on the GTK report, the biggest lithium losses were in the primary de-sliming and the spodumene rougher tails, totalling 9 to10%.

Abrasion and crushing work indices were determined by Sandvik at its test centre in Svedala using Syväjärvi ore and waste rock samples from the pilot feed material as summarised in Table 9-1.

Table 9-1: Syväjärvi comminution characteristics

Material Type	Measurement	Comment
Abrasion Index		
Syväjärvi ore	0.40	Abrasive
Syväjärvi waste rock	0.27	Abrasive
Crusher Work Index		
Syväjärvi ore	12.4 ± 1.9	Soft
Syväjärvi waste rock	13.9 ± 1.8	Medium hard
Rod Mill Work Index		
Syväjärvi ore	15.3	Hard
Syväjärvi waste rock	16.7	Hard
Ball Mill Work Index		
Syväjärvi ore	18.9	Hard
Syväjärvi waste rock	12.6	Medium

9.1.2.4 Laboratory flotation tests for Länttä and Syväjärvi in 2016

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

More than 50 bench-scale, batch flotation tests were carried out in this phase of investigation. The programme included the following sample materials:

- Länttä deep ore drill core sample;
- Syväjärvi drill core sample;
- Outotec (TOMRA) sorting test work samples;
- Cyclone overflow from Syväjärvi pilot plant test work 2016;
- Slimes from Syväjärvi pilot plant test work 2016; and
- Upgraded, Syväjärvi pilot concentrate sample.

The Länttä drill core sample was collected from three drill cores in the central part of the deposit. The samples were from depth levels of between 20 m and 40 m and visible weathering was not observed from the drill cores. The waste rock was excluded from the batch float sample. The Syväjärvi drill core sample was collected from one drill core. The sample contained only spodumene pegmatites and waste rock was excluded from the sample. The sample was taken well below the surface to compare the effect of weathering with the Syväjärvi pilot processing sample.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The batch flotation tests were carried out at the GTK Mintec facility in Outokumpu. The concentrate was also upgraded for subsequent testing for spodumene conversion.

GTK certification details are provided in sub-section 9.1.2 Länttä pilot test in 2015.

Mineral processing testing and results

The focus of the programme was to optimise flotation conditions with the Syväjärvi and Länttä ore samples. The concentrate was also upgraded for subsequent testing for spodumene conversion. Average flotation results are shown in Table 9-2.

Table 9-2: Summary flotation results

Feed	Test	Product	Grade (%Li_2O)	Recovery (% Li)
Syväjärvi Drill core - 3.35 mm	40	Rougher Conc	3.36	95.9
		Cleaner Conc 7	**6.15**	**85.9**
		Calculated Feed	1.46	100
Läntä Drill core -3.35 mm	7	Rougher Conc	2.01	90.9
		Cleaner Conc 7	**5.59**	**82.0**
		Calculated Feed	1.20	100
Syväjärvi Pilot run cyclone O/F 3% wt.	29	Rougher Conc	3.22	90.9
		Cleaner Conc 7	**6.29**	**77.2**
		Calculated Feed	1.36	100
Syväjärvi SPG 7&8 TOMRA	1	Rougher Conc	3.37	92
		Cleaner Conc 7	**6.00**	**87.7**
		Calculated Feed	1.59	100

It was noted that optimisation of the flotation conditions was generally successful.

9.1.2.5 Geo-metallurgical study in 2016 - 2017

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Sampling was designed by Keliber's Chief Geologist and a total of 18 ore samples were collected from the Syväjärvi, Läntä and Rapasaari deposits.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The geo-metallurgical tests were carried out at the GTK Mintec facility in Outokumpu.

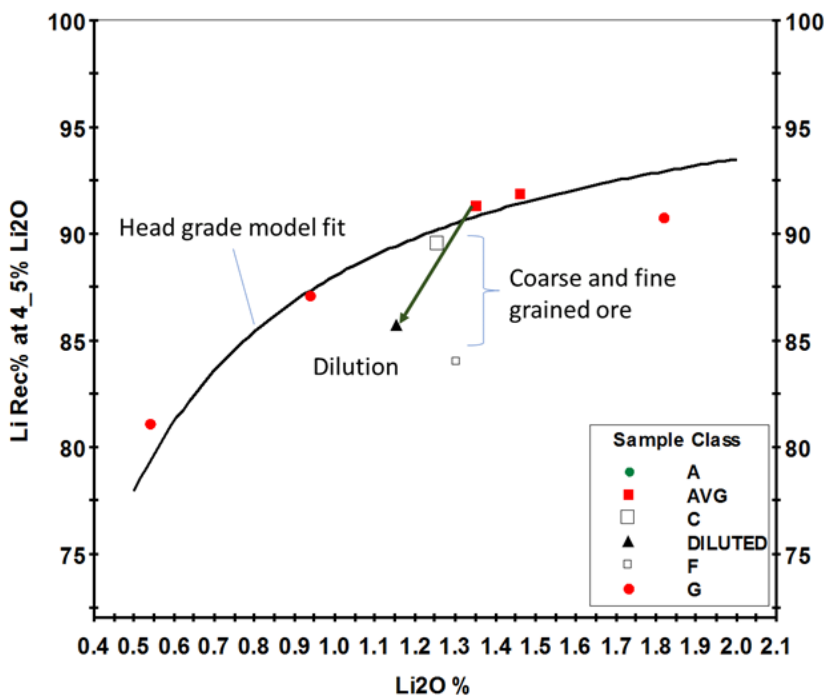
GTK certification details are provided in sub-section 9.1.2 'Läntä pilot test in 2015.'

Geo-metallurgical testing and results

The study included modal analysis by Mineral Liberation Analysis, chemical composition of spodumene by Energy Dispersive Spectroscopy, grindability tests and diagnostic flotation tests. The flowsheet and the conditions in the diagnostic test were similar to the test developed for the Syväjärvi ore. The following properties relevant to processing were considered: lithium grade; spodumene grain size; alteration; and wall rock type and dilution percentage.

Grindability was seen to correlate with spodumene grade in that the higher the grade, the greater the resistance to being ground. No significant difference was observed between deposits.

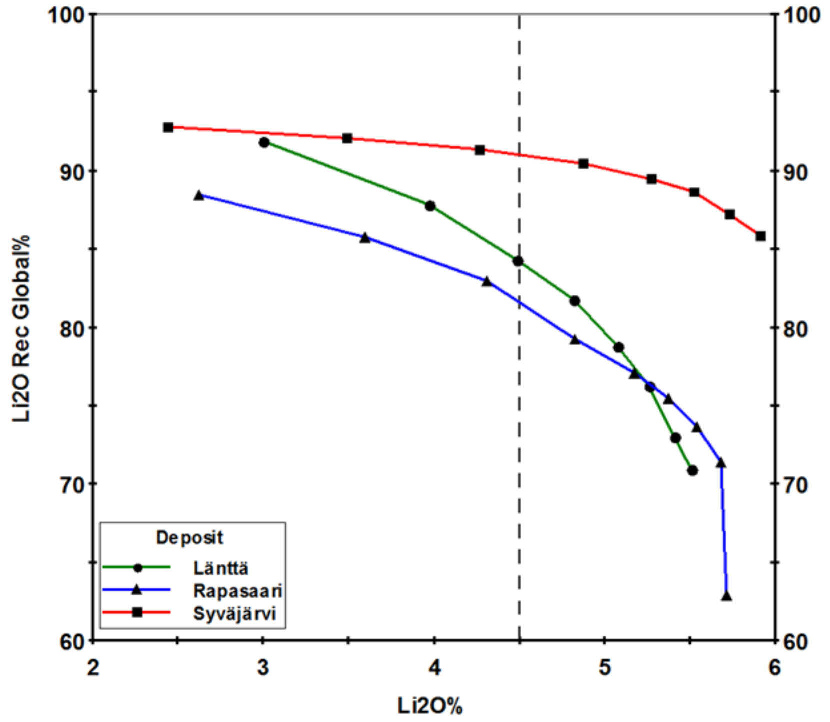
In all the ores, the flotation performance was strongly dependent upon the spodumene head-grade and wall rock dilution. The recovery of lithium at concentrate grade of 4.5% Li_2O, increased with the lithium head-grade as shown in Figure 9.3. The wall rock dilution impacted negatively on the flotation performance.



srk consulting	**SSW Keliber Lithium Project** Lithium recovery as a function of feed grade *(Source: Keliber 2019 and 2021 DFS Reports)*	Project No. 592138

Figure 9.3: Lithium recovery as a function of feed grade

The diagnostic flotation tests showed a significant difference between deposits, with Syväjärvi showing the best performance followed by Länttä and Rapasaari, as seen in Figure 9.4. Individual flowsheet, processing conditions and optimisation will therefore be needed for each ore to maximise the metallurgical performance.



srk consulting	**SSW Keliber Lithium Project** Lithium recovery as a function of concentrate grade *(Source: Keliber 2019 and 2021 DFS Reports)*	Project No. 592138

Figure 9.4: Lithium recovery as a function of concentrate grade

9.1.2.6 Laboratory flotation tests for Rapasaari in 2017

Exploration and resource drilling of Rapasaari during 2016 and 2017, led to the deposit becoming the biggest ore body of the Keliber Lithium Project. Mineral processing testing was, however, quite limited and therefore further testing of Rapasaari was started in July 2017.

Mineral processing testing and results

With the new sample and after optimisation, Rapasaari lithium recovery was reported to be close to that achieved for Syväjärvi.

9.1.2.7 Rapasaari locked-cycle flotation test work 2018 (DFS)

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

The programme was executed with the following Rapasaari sample materials:

- Average ore around 100 kg;
- High grade ore around 87 kg; and
- Waste rock around 40 kg.

The 2022 DFS report did not describe drill core sampling details.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The Rapasaari flotation tests were carried out at the GTK Mintec facility in Outokumpu.

GTK certification details are provided in sub-section 9.1.2.1.

Mineral processing testing and results

The programme included 16 batch flotation tests to optimise flotation conditions and a locked-cycle flotation test. Mineral liberation analysis was utilised to characterise the average ore, waste rock and final flotation concentrate mineralogical properties.

The results of batch flotation tests indicated that coarser grinding had a positive effect upon flotation. Higher waste rock dilution decreased the final concentrate grades and recoveries. Lower collector dosage in the pre-flotation resulted in higher Li_2O recovery in the spodumene flotation but slightly higher magnesium grade in the final concentrate.

In the locked cycle test, the required collector dosage was found to be about 20% of that needed in the open circuit. The locked-cycle grade-recovery points showed about 1% higher lithium recovery than the corresponding grade in open circuit. The final concentrate grade for the last five rounds (average) was 4.34% Li_2O at 88.36% lithium recovery.

9.1.2.8 Emmes laboratory-scale flotation tests and further optimisation tests 2018

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

The 2022 DFS report noted that, as Emmes ore had yet to be tested by Keliber, a representative sample was collected in 2018. Primary sampling details were not described. The Emmes ore sample had grades of 1.43% Li_2O and the wall rock mica schist 0.265% Li_2O. In chemical and modal composition, both the ore and wall rock were reportedly typical for spodumene pegmatite deposits of Central Ostrobothnia. Spodumene was the main lithium mineral but traces of cookeite and siclerite were also detected.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The 2022 DFS report does not state where these tests were conducted but presumably, they were conducted at the GTK Mintec facility.

GTK certification details are provided in sub-section 9.1.2.1.

Mineral processing testing and results

The Emmes ore showed a similar flotation response to Syväjärvi. The lithium recovery at 4.5% concentrate grade was 91.8% and 91.0% at 5.0% grade. Wall rock dilution resulted in an almost linear decrease in the final concentrate grade: e.g., the final concentrate was 5.8% for the sample with no dilution and 5.0% with 10% dilution. With a fixed concentrate grade, the dilution caused a decrease in recovery, but this was significantly lower for Emmes than Syväjärvi: e.g., when wall rock dilution was increased from zero to 10%, Syväjärvi recovery at 4.5% Li_2O decreased from 92.2% to 85.8%, whereas only 0.6% loss to 91.2% was experienced for Emmes.

9.1.2.9 Flotation tests for Rapasaari and Outovesi 2019

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

This programme was initiated in November 2018 and includes ore variability tests on different Rapasaari ore types, initial flotation tests on Outovesi and a locked-cycle test on a Rapasaari drill core sample.

The programme was conducted with the following Rapasaari and Outovesi sample materials:

- Average ore 56 kg;
- High grade ore around 8 kg;
- Waste rock around 35 kg;
- Rapasaari North ore 38 kg;
- Rapasaari West 86 kg;
- Rapasaari South-West 86 kg;
- Outovesi ore 64 kg; and
- Outovesi white and black waste rock total 26 kg.

Primary sampling details were not described in the 2022 DFS report.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

This programme was initiated in November 2018 and completed in April 2019 at the GTK Mintec facility.

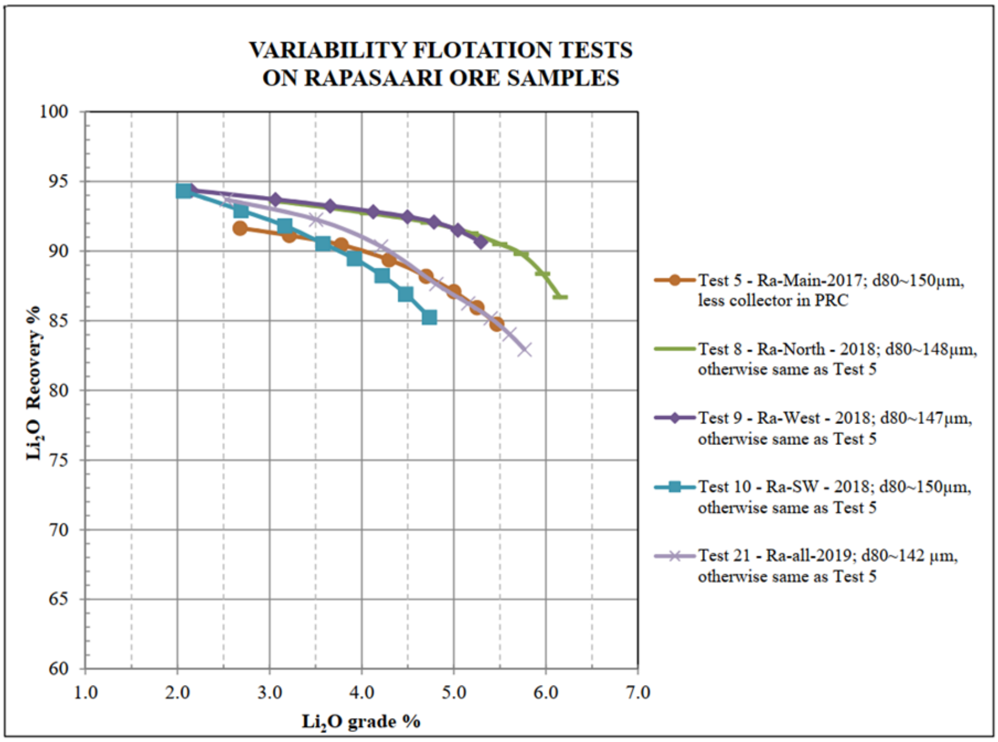
GTK certification details are provided in sub-section 9.1.2.1.

Mineral processing testing and results

Modal mineralogy determined that the spodumene content in Rapasaari samples varied from 13.1% to 20.6%. Small contents of some other lithium-containing minerals were also found, including petalite, trilithionite and triphylite. The primary gangue minerals were plagioclase (25.7 – 36%) and quartz (26.9 – 31%). Other gangue minerals were microcline, K-feldspar and muscovite.

The Bond rod mill work index value was found to be 15.3 kWh/t and ball mill work index15.2 kWh/t. In terms of the JKTech scale, the Rapasaari West sample would be classified as a hard material.

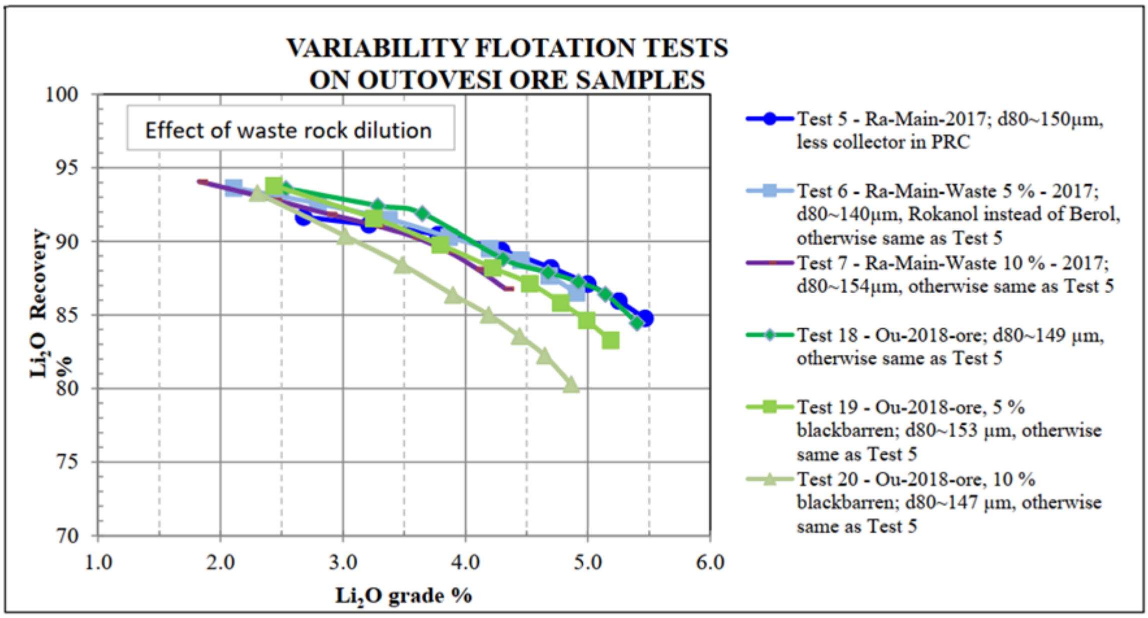
Regarding the spatial variability, the best Li_2O grades and recoveries were achieved from the Rapasaari North sample and the results from the Rapasaari West sample were quite similar. The recoveries were a bit lower from the Rapasaari Main sample. The poorest results were achieved from Rapasaari South-West as shown in Figure 9.5.



srk consulting	**SSW Keliber Lithium Project** Variability in Rapasaari flotation recovery *(source: Keliber 2021 DFS)*	Project No. 592138

Figure 9.5: Variability in Rapasaari flotation recovery

The flotation behaviour of Outovesi mineralised samples were rather similar to Rapasaari Main and Ra-all-2019 composite, as shown in Figure 9.6.



srk consulting	**SSW Keliber Lithium Project** Variability in Outovesi flotation recovery *(Source: Keliber 2021 DFS)*	Project No. 592138

Figure 9.6: Variability in Outovesi flotation recovery

Overall, the higher the waste rock dilution ratio the lower the Li_2O grades and recoveries in the cleanings, regardless of the sample. Based on the results, it seems clear that the head grade will have an effect on Li_2O recoveries. This was confirmed partially by spatial variability testing where the Rapasaari North was found to have the best flotation response and the highest head grade.

The grades and the recoveries in the locked-cycle flotation test with the Ra-all-2019 composite were lower in comparison to the single batch flotation test with the same material.

Flotation without desliming produced good results, as did magnetic separation on the final spodumene concentrate. The normal slurry density of 30% in the conditioning of the pre-flotation stage seemed to work quite well. It was noted in the 2022 DFS report that such process changes should be considered for future studies and process design.

9.1.2.10 Optical ore sorting in 2018

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Sorting tests were conducted in November 2018 using Syväjärvi RoM ore (4 to 35 mm in size) spodumene-rich material and black waste rock. Syväjärvi ore samples included spodumene-pegmatite ore (grey-green) and reddish marginal ore (red, light) including muscovite pegmatite and potassium feldspar. Syväjärvi dark side rock sample includes plagioclase-porphyrite and mica schist. Feed sample for the sorting tests included the Syväjärvi ore and marginal ore in ratio 1:10 with 15% of side rock dilution. Primary sampling details were not described in the 2022 DFS report.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

The sample was crushed and screened at GTK Mintec before dispatch to Binder+Co sorting test facility in Gleisdorf, Austria. AAS and XRF analyses were conducted at Labtium – Eurofins laboratories from the subsamples for each ore types and side rock.

The Certification Body of TÜV SÜD Management Service GmbH certified that Binder GmbH has established and applies a Quality Management System according to ISO 9001:2015.

Mineral processing testing and results

The focus of the tests was to remove black plagioclase porphyrite waste rock from the plant feed. Size classes 12/20 and 20/35 mm were washed at a rinsing feeder before the optical sorting. Additional sorting of smaller 4/12 mm size class was sorted without washing; instead, air knives and dust removal were utilised.

Ore sorting was found effective in removing black waste rock from the artificial composite ore feed. The lithium grade of the reject in the tests was 0.2-0.3% Li_2O. Lithium content of the black waste rock in contact with the ore varied between 0.08 and 0.47% Li_2O with the average being in the range 0.24 - 0.30% Li_2O. It was reported that lithium in country rocks was not included in the Mineral Resources nor in Mineral Reserves. Thus, the recovery of lithium carried by pegmatite was practically 100% in the test work.

9.1.2.11 Optical ore sorting at Redwave in 2019

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Sorting tests were conducted in August 2019 using samples of Syväjärvi spodumene-rich material and black waste rock (12.4 to 20 mm in size). The focus of the tests was to remove black plagioclase porphyrite waste rock from the plant feed.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

An ore sorting test programme was completed in the Redwave sorting test facility in Eggersdorf, Austria.

The Certification Body of TÜV SÜD Management Service GmbH certified that Redwave, a division of BT-Wolfgang Binder GmbH, has established and applies a Quality Management System according to SCC**:2011.

Mineral processing testing and results

The sample was crushed and screened at GTK Mintec before dispatch to Binder for optical sorting testing that is described in sub-section 9.1.2.1. After completing the test work at Binder, the same sample was delivered to Redwave to complete the same test work procedure to support the best sorting equipment selection. Redwave only uses a double-sided Red Green Blue camera as a sensor. The equipment was reported to be robust and suitable for the mining environment.

Unfortunately, laboratory assay results were not available to support the results. More test work including assaying of the products and optimisation of the operating parameters was recommended.

9.1.2.12 Syväjärvi pilot testing in 2019 (DFS)

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

This pilot campaign processed 89 t of the Syväjärvi ore at a waste rock dilution of 4%, being the dilution as modelled in the LoM plan of that time. The feed material was the same as that used in the 2016 pilot campaign discussed in sub-section 9.1.2.1.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

This programme was conducted at the GTK Mintec facility in August 2019.

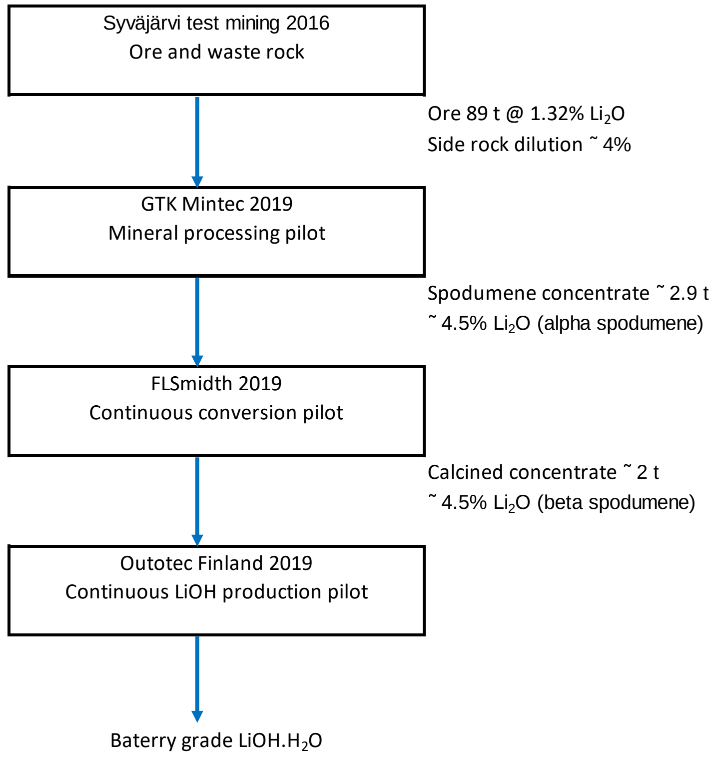
GTK certification details are provided in sub-section 9.1.2.1.

Mineral processing testing and results

Pilot tests conducted are shown in Figure 9.7.

The minerals processing flowsheet included grinding, desliming, pre-float, spodumene flotation and low intensity magnetic separation.

Overall spodumene recovery was increased by 4% from the previous Syväjärvi pilot, to 88%. The recovery increase was achieved by reducing the slime production, optimisation of the pre-float and high intensity conditioning condition and increasing the residence times in spodumene flotation.



srk consulting	**SSW Keliber Lithium Project** Syväjärvi pilot tests 2019	Project No. 592138

Figure 9.7: Syväjärvi pilot tests 2019

9.1.2.13 Dewatering studies on Syväjärvi pilot processing samples by Outotec in 2019 (DFS)

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Samples were extracted from the Sy-väjärvi pilot circuit.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

Outotec representatives were present several days at GTK Mintec during the Syväjärvi pilot processing in August 2019. Outotec performed dewatering tests of the spodumene concentrate at the Outotec dewatering technology centre in Lappeenranta, Finland.

Thickening tests were performed at the Outotec Research Centre in Pori, Finland.

Metso Outotec complies with the requirements of international standards for management systems. The majority of Metso Outotec's major units are certified to ISO 9001 (quality), and the main operational units also have ISO 14001 (environment), ISO 45001 or OHSAS18001 (safety) standards as a framework.

Mineral processing testing and results

Filtration tests of spodumene concentrate

The main objective was to determine moisture content of the cake, confirm filter cloth selection and maximum filtration capacity for vacuum belt and vertical pressure filters. A final moisture content of 9.6% was achieved with the vacuum belt filter and 7.3% was achieved with the vertical pressure filter. Both values are below the moisture limit of 10% for the final concentrate before the hot conversion at the Keliber Lithium Hydroxide Refinery.

Thickening tests

Test work of the pre-float, spodumene flotation feed, tailings, tailings without slime, slime and spodumene concentrate showed that the materials can be thickened successfully. Keliber wanted to test settling of flotation tailing with and without slime to inform decision making on the tailing's storage designs.

Filtration tests of flotation tailings

Filtration of the flotation tailings was a continuation of the thickening tests. Keliber wanted to complete testing to support engineering for potential dry stacking of the flotation tailings. Tailings with slime could be dewatered successfully by an Outotec vacuum belt filter (20.6%), filter press filtration (12.1%) and fast opening filter press filtration (13.3%). Tailings without slime was found difficult to filter with coarser PSD. The following results were achieved: Outotec vacuum belt filter (18.9%) and fast opening filter press filtration (13.9%).

9.1.2.14 Dewatering study of the spodumene concentrate by Metso Minerals in 2019

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Samples were extracted from the Syväjärvi pilot circuit. One barrel containing a 50 kg sample of concentrate was delivered to the Metso Minerals laboratory in Sala.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

During the Syväjärvi pilot processing campaign in 2019 representatives from Metso Minerals visited to witness the pilot plant operation. Metso Minerals proposed vendor test work to support spodumene concentrate filter selection and sizing data.

Details of the Metso Outotec certification are provided in sub-section 9.1.2.1.

Mineral processing testing and results

After thickening and top feed vacuum filtration, the end moisture of the concentrate was measured to be in the range of 10 – 13%.

9.1.2.15 XRT ore sorting tests at Outotec (TOMRA) in 2019

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

Sorting testing at TOMRA was a continuation of testing described in earlier sections with the same ore and waste rock samples.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

Sorting tests were conducted at Outotec (TOMRA).

TOMRA is certified to the ISO 9001 and ISO 14001 quality system standards.

Mineral processing testing and results

The purpose of this test work was to determine the suitability of a TOMRA® sorting system for the Syväjärvi operation. The tested samples were represented in two size fractions: +12.4 - 20 mm and +20 – 35 mm. Before the test, the samples were mixed in a ratio of 79.1% product; 7.9% marginal ore and 13% waste.

Results showed high lithium recovery of approximately 95% for both size fractions, with mass rejection of 16 to 19%.

The results showed positive amenability of TOMRA XRT ore sorting technology with Syväjärvi material. Further testing and engineering were however, recommended for the final flowsheet development of the crushing and sorting circuit.

9.1.2.16 Rapasaari laboratory-scale programme to control sulphides at GTK in 2021

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

In total, 80 kg of pegmatite ore sample from the Rapasaari deposit was collected from rejects of analytical samples of half-cut drill cores. The 50 kg feed sample for the bench-scale beneficiation tests comprised 47.5 kg Rapasaari ore and 2.5 kg waste rock. After homogenisation, the feed material was divided into suitable 1 kg and 5 kg sub-samples for the test work.

In February 2021 approximately 30 kg additional Rapasaari ore and 3 kg of Rapasaari waste rock were packed and sent to SGS Canada for parallel test work purposes (sub-section 9.1.2.17).

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

This programme was conducted at the GTK Mintec facility.

GTK certification details are provided in sub-section 9.1.2.1.

Mineral processing testing and results

Keliber contracted GTK Mintec to study processing alternatives to manage arsenic levels of the final concentrate and develop the process, at bench-scale, for overall arsenic management. The programme included sample preparation, flotation tests, magnetic separation and gravity separation tests.

The arsenopyrite occurred mainly in the waste rock bulk sample, where its content was 0.09%. In addition, the arsenopyrite particles were totally liberated in the ground Rapasaari composite sample. The average Li_2O grade in the Rapasaari composite sample was 1.23% and arsenic 0.021%, calculated from the bench-scale tests. The grain sizes (P_{80}) of spodumene and arsenopyrite were 90 µm and 24 µm in the ground (125 µm) feed samples, respectively.

In total, more than 20 bench-scale flotation tests were performed, with combinations of different unit processes to remove arsenopyrite. High gradient magnetic separation was shown to not be an effective method of removing arsenopyrite. Gravity separation by shaking table worked well; however, several cleanings were required in order to avoid spodumene losses. About 50 – 70% of arsenic could be removed by pre-flotation. Sulphide flotation without pre-flotation and NaOH conditioning had a negative effect regarding selectivity in spodumene flotation.

The programme proved that most arsenopyrite could be removed by sulphide flotation. The process was shown to be very sensitive regarding spodumene flotation and it was reported that fresh water should be used in all stages. It was noted further that it is essential to remove more than 95% of arsenic prior to spodumene flotation, because the arsenopyrite tends to enrich during the spodumene flotation.

9.1.2.17 Rapasaari laboratory-scale programme to control sulphides at SGS in 2021

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

SGS Minerals was provided with the same sample material as used in the programs at GTK Mintec (GTK certification details are provided in sub-section 9.1.2.1.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

Keliber sought a second test work programme and new ideas for the Rapasaari ore flowsheet development in early 2021, especially for the arsenic and sulphur management. This programme was conducted at SGS Minerals.

SGS Minerals is accredited to the requirements of ISO/IEC 17025 for specific tests listed on their scope of accreditation, including geochemical, mineralogical and trade mineral tests.

Mineral processing testing and results

The main objective of the metallurgical test work was to develop an appropriate flowsheet for producing a high-grade spodumene concentrate, with a reasonable recovery, from a composite sample from the Rapasaari deposit. Rejecting arsenic and sulphur content was also a focus. Test work on the composite sample included head characterisation, mineralogical examination, heavy liquid separation, magnetic separation, and flotation.

The lithium grade in the composite sample was 1.18% Li_2O. The iron content after 5% waste rock dilution was low, at 0.77% Fe_2O_3. The sample was radioactive-free, with <0.01% Ta_2O_5. The grades of arsenic and sulphur in the sample were 0.03% and 0.04%, respectively.

Heavy liquid separation (HLS) was completed on the Rapasaari ore sample to evaluate the potential of gravity separation. It was concluded that the Rapasaari ore is not amenable to DMS separation.

Wet high-intensity magnetic separation (WHIMS) tests effectively rejected iron-bearing gangues (possibly pyrite, pyrrhotite, and arsenopyrite, iron silicate minerals) from the 100% passing 48 mesh (300 µm) feed. WHIMS at 5 000 Gauss rejected ~20% Fe_2O_3, 8% As and 29% S, with only 2.4% of the lithium deporting to the magnetic products. Further optimisation on the magnetic separation tests was recommended to reject more iron-bearing gangues with relatively less lithium loss.

Seven flotation tests were carried out after grinding to 100% pass 48 mesh (300 µm). Spodumene upgrading was achieved in a flowsheet that comprised one rougher stage and three cleaner flotation stages. The lithium concentrates produced achieved grades of 5.4 ~ 5.8% Li_2O at 84 ~ 92% lithium recoveries. The Fe_2O_3 and arsenic assays of the flotation concentrate were <1% and <0.005%, respectively, after passing the spodumene concentrate thorough WHIMS. A final stage of WHIMS on the spodumene concentrate played an important role in lowering the Fe_2O_3 grade to less than 1% and also decreased the arsenic content. Optimisation was recommended to further reduce lithium loss to magnetic products.

9.1.2.18 Ore sorting test work at TOMRA for laser and X-Ray Transmission (XRT) sensor trade-off

Representivity of test samples

[§229.601(b)(96)(iii)(B)(10)(ii)]

The sample for this programme was drawn from the 2016 Syväjärvi test mining sample. The sample was loaded and transported to GTK Mintec for sample preparation. For the purpose of this Performance Test, ore (2 400 kg for size fraction 30 – 60 mm and 1 200 kg for the finer-grained fraction 15 – 30 mm) and waste material (250 kg pro fraction) were dispatched to TOMRA.

Testing laboratory and certification

[§229.601(b)(96)(iii)(B)(10)(iii)]

Testing was conducted at the TOMRA facilities in Hamburg, Germany.

TOMRA certification details are provided in sub-section 9.1.2.3.'

Mineral processing testing and results

Earlier studies had proven that optical sorting is efficient at removing dark-coloured waste rock for Keliber samples. Furthermore, and based on the conclusions from the previous programme, Keliber engaged Metso Outotec (TOMRA) to execute a test work programme to compare X-Ray Transmission (XRT) and laser sensor-based sorting to remove barren pegmatite and other light-coloured waste minerals from the ore feed. Unfortunately, the final report from TOMRA was not available at time of writing the 2022 DFS report but the preliminary results were available (Table 9-3).

The material sample for the LASER sorting was washed since this technique requires clean and wet surfaces.

Two settings were used: Setting 1 was less sensitive, where dark waste particles, including plagioclase porphyrite, metasediments and tuffs, were rejected. In addition to these rock types, some feldspar without the spodumene inclusions were separated. The application of the more sensitive Setting 2 allowed separation of feldspar and pegmatite in addition to the dark waste particles. Based on the mass balances and chemical assays, both of the ore sorting techniques are suitable for the Keliber Lithium Project operations.

Table 9-3: TOMRA ore sorting mass balance 2021

Sensor	Size (mm)	Feed (kg)	Feed (%Li_2O)	Product (%Li_2O)	Waste (white) (%Li_2O)	Waste (black) (%Li_2O)	Total Waste (%Li_2O)	Recovery (%)	Upgrade	Waste removal (%)
Laser	30-60	687	1.617	1.939	1.515	0.103	0.223	97%	1.2	19%
Laser	30-60	667	1.432	1.811	0.66	0.097	0.202	97%	1.26	24%
Laser	15-30	362	1.331	1.636	1.59	0.103	0.348	94%	1.23	24%
Laser	15-30	365	1.192	1.64	1.113	0.108	0.438	86%	1.38	37%
XRT	30-60	645	1.48	1.698	1.841	0.138	0.265	97%	1.15	15%
XRT	30-60	642	1.359	1.636	0.75	0.093	0.237	97%	1.2	20%
XRT	15-30	369	1.348	1.742	0.824	0.097	0.196	96%	1.29	25%
XRT	15-30	366	1.234	1.704	0.672	0.097	0.265	93%	1.38	33%

Results showed high lithium recovery in the range 86% to 97% for both size fractions, with mass rejection of 15 to 37%.

9.1.3 Recent conversion test work

9.1.3.1 Laboratory-scale conversion tests

Conversion tests carried out prior to 2017 were of small scale.

In the Länttä ore pilot test of 2016 (sub-section 9.1.2.1), thermal conversion tests were conducted at 1000ºC and a retention time of one hour was found to be sufficient to convert alpha-spodumene to leachable beta-spodumene.

The Syväjärvi concentrate produced in laboratory scale tests in 2016 (sub-section 9.1.2.2) was also treated in a furnace prior to autoclave testing. The Syväjärvi concentrate was found to behave in a similar way to the Länttä concentrate.

9.1.3.2 Conversion pilot for Syväjärvi concentrate by Metso Minerals in 2017

The spodumene concentrate derived from the Syväjärvi sample processed in the 2016 - 2017 mineral processing pilot plant (sub-section 9.1.2.3) was tested in three stages.

- Firstly, a small amount of concentrate was converted in an indirectly heated laboratory scale rotary kiln at the Outotec Research Laboratory. A temperature of 1010ºC for 30 minutes was sufficient to convert alpha-spodumene to leachable beta-spodumene;
- The second test was carried out in Development Center, Danville, PA, USA. The sample was prepared by combining two concentrate samples produced in mineral processing pilot test at GTK (GTK certification details are provided in sub-section 9.1.2.1, 150 kg from Outotec Frankfurt research centre and about 400 kg sent from GTK Mintec. For the conversion tests, the as-received subsamples were mixed in weight ratios 31.36% and 68.64%. Lithium grades of the samples were 2.35% (5.06% Li_2O) and 2.34% (5.04% Li_2O), respectively. The main target of the test programme was to practise the conversion process and collect operational and material characteristics for the design of commercial conversion equipment for production of material to achieve greater than 95% alpha- to bet- spodumene conversion. A secondary objective was to produce product for subsequent lithium pressure leaching tests; and
- A directly heated rotational drum furnace fired with propane gas was employed to complete eight conversion tests, with temperatures ranging from 1000ºC to 1075ºC. It was concluded that the targeted 95% conversion rate was achieved.

9.1.3.3 Conversion tests with Syväjärvi and Rapasaari concentrate 2018

In relation to hydrometallurgical testing for Syväjärvi and Rapasaari concentrates, laboratory conversion tests were also run by Outotec. The conversion was executed in a batch chamber furnace at temperatures of 990°C, 1010°C, 1030°C and 1060°C using three hours' retention time. Conversion of the samples were confirmed by XRD. SEM study on the 1060°C Rapasaari sample showed some melted structures on the spodumene grains, which resulted in lower lithium recoveries in leaching.

9.1.3.4 Conversion pilot for Syväjärvi concentrate by FLSmidth in 2018 (DFS)

The third test series was carried out with a directly fired rotary-kiln at FLSmidth Inc. Pyromet Technology testing facilities, Bethlehem, PA, USA. The sample used was concentrate produced in mineral processing pilot test at GTK (GTK certification details are provided in sub-section 9.1.2.1. The test programme had two targets: (i) to evaluate the physical, thermal and phase conversion properties of a spodumene concentrate sample and (ii) to produce bulk converted sample for subsequent pilot-scale lithium pressure leaching tests.

According to FLSmidth's assays, the lithium grade of the bulk sample was 5.57% Li_2O analysed with Atomic Absorption Spectroscopy (AAS) and spodumene content about 74 to 75% analysed with X-Ray Diffraction (XRD).

The concentrate was held for 30 minutes at 1100°C. Conversion recovery result was 97.5%. The specific gravity of the material decreased from feed level value of 3.04 g/cm^3 to 2.36 g/cm^3 mainly because of the spodumene phase conversion.

9.1.3.5 Conversion pilot for Syväjärvi concentrate by FLSmidth in 2019

A pilot test programme was performed to evaluate the conversion of alpha-spodumene to beta-spodumene using a two-stage cyclone preheater rotary calciner system, followed by product comminution using an open circuit ball mill. The material received for this study included ~3 000 kg of flotation concentrate containing 10.6% moisture and 4.75% Li_2O.

The solids residence time in the rotary kiln was two hours and the burning zone solids temperature was generally maintained between 1050 - 1100°C. These conditions resulted in an overall average alpha- to beta-spodumene conversion level of 96.9%, as measured by the sulphuric acid solubility method.

Stable, sinter-free operation of the preheater kiln system was demonstrated along with a high conversion to beta-spodumene when calcining flotation concentrate. The dusting rate was considered very low. Based on the results of the pilot programme, no adjustments are required to the commercial calcining being offered by FLSmidth.

9.1.4 Recent hydrometallurgical testing for production of lithium carbonate and lithium hydroxide

The June 2018 DFS considered the production of battery-grade lithium carbonate. However, following further market studies it was decided to consider the production of battery-grade lithium hydroxide instead of lithium carbonate. As a consequence, much of the hydrometallurgical test work undertaken was directed at producing lithium carbonate. While not totally applicable, such test programmes are briefly summarised here.

9.1.4.1 Laboratory and pilot test for Länttä concentrate in 2015

The feed material for the testing was from the previous GTK Mintec Länttä 2015 programme (GTK certification details are provided in sub-section 9.1.2.1). Suitable composite samples were prepared so that the feed sample had an average head grade of 4.5% Li_2O.

Lithium yields in laboratory batch leaching and bi-carbonation tests were low, with 86% being the best result achieved. A higher lithium yield of 91% was, however, obtained in the pilot-plant leaching and bi-carbonation tests.

Ion exchange was used to remove metal impurities such as Ca and Mg from the leach solution. The purified solution from the ion exchange was heated above 90°C to crystallise Li_2CO_3. The Li_2CO_3 product contained 17.3 to 18.6% lithium, with phosphorus and silicon being the main impurities.

The Bond ball mill work index for the beta-spodumene was determined as 11.51 kWh/t.

9.1.4.2 Laboratory tests for Syväjärvi concentrates 2016

The main objective of the programme was to confirm the leaching parameters for the Syväjärvi spodumene flotation concentrate produced in the previous GTK Mintec Syväjärvi 2015 batch flotation. Based on the solid fraction analyses, the lithium leaching yield was 95.6%.

9.1.4.3 Laboratory and pilot tests for Syväjärvi concentrates 2017

Feed material was concentrated that had been converted for subsequent hydrometallurgical tests at Outotec Frankfurt Research Centre (sub section 9.1.3.2*).*

The programme included the following items:

- Thermal conversion tests of alpha-spodumene to leachable beta-spodumene in a laboratory rotary kiln;
- Pressure leaching and bi-carbonation tests;
- Solid liquid separation tests of the leach residue (Analcime);
- Ion exchange tests;
- Crystallisation tests of Li_2CO_3; and
- Solid liquid separation tests of the lithium carbonate product (Analcime).

The converted beta-spodumene material was used in leaching and bi-carbonation tests which yielded from 86% to 95% lithium in the batch tests, and 84% to 87% in the pilot plant operation.

Ion exchange was used to remove metal impurities such as Ca and Mg from the leach solution. The purified solution from the ion exchange was heated above 95°C to crystallise Li_2CO_3. The Li_2CO_3 product contained 17.3% to 19.0% lithium, with phosphorus and silicon being the main impurities.

In thickening tests, the leach residue slurry settled to an underflow density of 48% and the overflow clarity was between 70 ppm and 250 ppm. The required flocculant dosage was 20 g/t of Superfloc N100.

In filtration tests, cake moistures of 30% and 44% were achieved pressure filtration and vacuum filtration, respectively. No difference was observed in the lithium recoveries between pressure or vacuum filtration for the un-thickened leach residue slurry. With the thickened leach residue slurry, however, the pressure filtration was more efficient and filtration capacities were higher.

9.1.4.4 Laboratory tests for Syväjärvi concentrates 2017

The test programme included soda leaching tests in a batch-scale autoclave of the concentrate that had been converted during the Metso Minerals pilot-scale conversion tests described above (sub section 9.1.3.2). This programme was conducted at Outotec's facilities.

Alpha-spodumene was not detected in the XRD analysis indicating that the conversion to beta-spodumene was complete. Based on the solid fraction analyses over five batch tests, the lithium yield varied from 79 to 89%.

9.1.4.5 Laboratory tests for Syväjärvi and Rapasaari concentrates 2018

The feed material was produced in the previous Syväjärvi 2017 test programme (sub section *9.1.3*).

Recent Conversion Test Work: Conversion Tests with Syväjärvi and Rapasaari Concentrate 2018). The programme comprised laboratory testing of conversion, soda leaching, bi-carbonation, ion exchange and crystallisation. Lithium carbonate was produced by crystallisation from Syväjärvi and Rapasaari concentrates.

Leaching and bi-carbonation tests were conducted on the converted concentrate in a laboratory autoclave. The autoclave temperature was 220°C with carbon dioxide introduced at a pressure of 3 Bar and a temperature of 30°C. The following lithium yields were obtained in the programme:

- 90 - 95% for the Syväjärvi_2018 concentrate;
- 91 - 96%% for the Syväjärvi_2017 concentrate; and
- 88% for the Rapasaari concentrate at 1010°C and 84% at 1060°C.

SEM study from the calcined Rapasaari concentrate and leach residues revealed that some spodumene grains were covered by melted phase, which decreased the lithium leaching yield compared with the Syväjärvi concentrates.

Lithium carbonate was produced by crystallisation with and without the ion exchange step. Results confirmed that it is possible to produce over 99.5% lithium carbonate end product without the ion exchange step from Syväjärvi samples. The ion exchange, however, decreased the calcium level from 0.02 – 0.05% to less than 0.01%.

9.1.4.6 Lithium hydroxide pilot processing at Outotec 2019 - Syväjärvi

Metso Outotec's patented Lithium Hydroxide process for production of battery-grade lithium hydroxide includes three key unit processes:

- Alkaline pressure leaching;
- Lime conversion leaching; and
- Lithium hydroxide monohydrate crystallisation.

Feed to the two-stage alkaline leach process is beta-spodumene concentrate after calcining. Lithium is first extracted using soda ash pressure leaching, resulting in the formation of soluble lithium carbonate (Li_2CO_3) and mineral component analcime ($NaAlSi_2O_6{\cdot}H_2O$) as the main components. In the second stage lithium carbonate is solubilised in a conversion reaction, producing lithium hydroxide solution and solid calcium carbonate, which will report together with other mineral residues. The alkaline hydroxide and carbonate processing environment ensures very low solubilities of the main impurity elements and compounds, including Fe, Al, Mg, Ca, B, and P, reducing the need for additional impurity removal or precipitation. The Pregnant Leach Solution containing lithium hydroxide is a suitable feed for polishing with Ion Exchange ahead of crystallisation of the final LiOH monohydrate product.

The object of the 2019 test work programme was to study lithium hydroxide production by soda pressure leaching and to produce small amounts of the product for marketing purposes.

A beta-spodumene concentrate sample from conversion in rotary kiln, called 2018 calcine, was the main concentrate used in this work. In addition, comparative hydrometallurgical test work was carried out with a concentrate from 2017, which was calcined in a chamber furnace in Oberursel, Germany by Outotec. Based on the chemical analysis of the calcine samples, they had similar compositions. The lithium concentration of the 2018 calcine was 2.55% Li (5.49% Li_2O) and that of the 2017 calcine was 2.39% Li (5.15% Li_2O). Batch tests were carried out for the soda leaching and LiOH conversion process steps, to produce information for the pilot operation.

The solids analysis showed that 88% lithium extraction was achieved in the LiOH conversion.

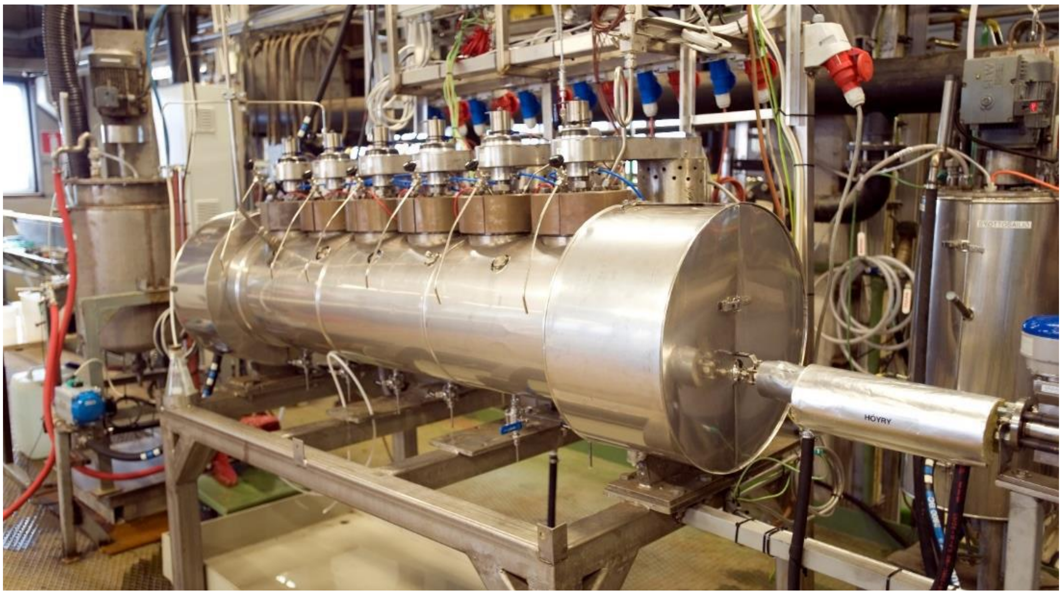
9.1.4.7 Lithium hydroxide continuous pilot processing at Outotec 2020 - Syväjärvi

The Syväjärvi beta-spodumene concentrate used in this hydrometallurgical test work was calcined in the FLSmidth pilot run in 2019. The average lithium concentration of the calcines corresponded to a 4.53% Li_2O concentration.

Soda leaching, cold conversion and secondary conversion batch tests were carried out to verify the lithium extraction as well as to produce information for the planning of the continuous pilot.

The continuous LiOH pilot was operated for 14 days. The main process stages in the process were soda leaching, cold conversion, secondary conversion, ion exchange, LiOH crystallisation and mother liquor carbonation.

Leaching was carried out in a 65 l titanium autoclave at a target temperature of 220°C and target residence time of two hours. (Figure 9.8).



srk consulting	**SSW Keliber Lithium Project** 65-litre Autoclave used in the semi-continuous pilot processing	Project No. 592138

Figure 9.8: 65-litre Autoclave used in the semi-continuous pilot processing

Slurry was flashed off from the autoclave to a flash vessel with 80°C temperature and atmospheric pressure.

Slurry from the autoclave was filtered by pressure filter, with solids being washed with water.

Pulped soda leach residue and lime slurry were pumped to the first 20 l cold conversion reactor, from where the slurry was transferred as overflow to the second 20 l reactor and subsequently, to the filter feed tank. Target temperature in cold conversion was 30°C and residence time was about two hours. Both reactors as well as the filter feed tank were equipped with nitrogen gas feed.

Slurry from the cold conversion was filtered by pressure filter then filtrate was pumped to the secondary conversion feed tank. Solids were washed with water. The wash filtrate was then used in pulping of the soda leach residue and lime slurry preparation.

The filtrate from the second pressure filter and lime slurry were pumped to a 20 l stainless steel reactor for secondary conversion. The residence time in secondary conversion was over two hours and the temperature was ambient. The overflow from the reactor was collected to the feed tank of a filter press polishing filter.

Ion exchange was operated continuously during the pilot with a feeding rate based on the availability of feed solution, with two columns in series.

Crystallisation was carried out at approximately 77°C.

Lithium hydroxide slurry was thickened to solids concentration of 40 - 50% and fed to a pusher centrifuge. Battery-grade lithium hydroxide (Na <50 ppm, K <20 ppm) was produced with a higher wash ratio of 0.17 m^3/t.

Lithium hydroxide monohydrate was dried in a shaking fluid bed dryer. Nitrogen gas was used for drying.

It was reported that the objectives of the pilot were mostly met. The consumption of reagents was investigated and the impact of recycling different process streams on the process was observed. The soda leach circuit was stable, with stable concentrations of Na and K. The cold conversion circuit also proved to be stable. The impurities in the cold conversion solutions stabilised at a low level, with Na having a slight increasing trend. The Li extraction in the soda leaching and cold conversion process stages was initially low, but after adjustments were made to the operating conditions, high levels of extraction were achieved. The operation of the crystallizer had its own challenges related to the differences in the production capacity of the equipment in comparison to the rest of the process. However, a production of approximately 35 kg of moist lithium hydroxide monohydrate product from the centrifuge was achieved. One batch of the centrifuge product was successfully dried with a fluidized bed dryer as well. The product purity achieved with a single crystallisation stage was extremely high. With a second crystallisation, the impurity levels in the crystals could be decreased even further, with Na and K both being <10 ppm. The Si concentration in the crystals was also decreased by the second crystallisation stage

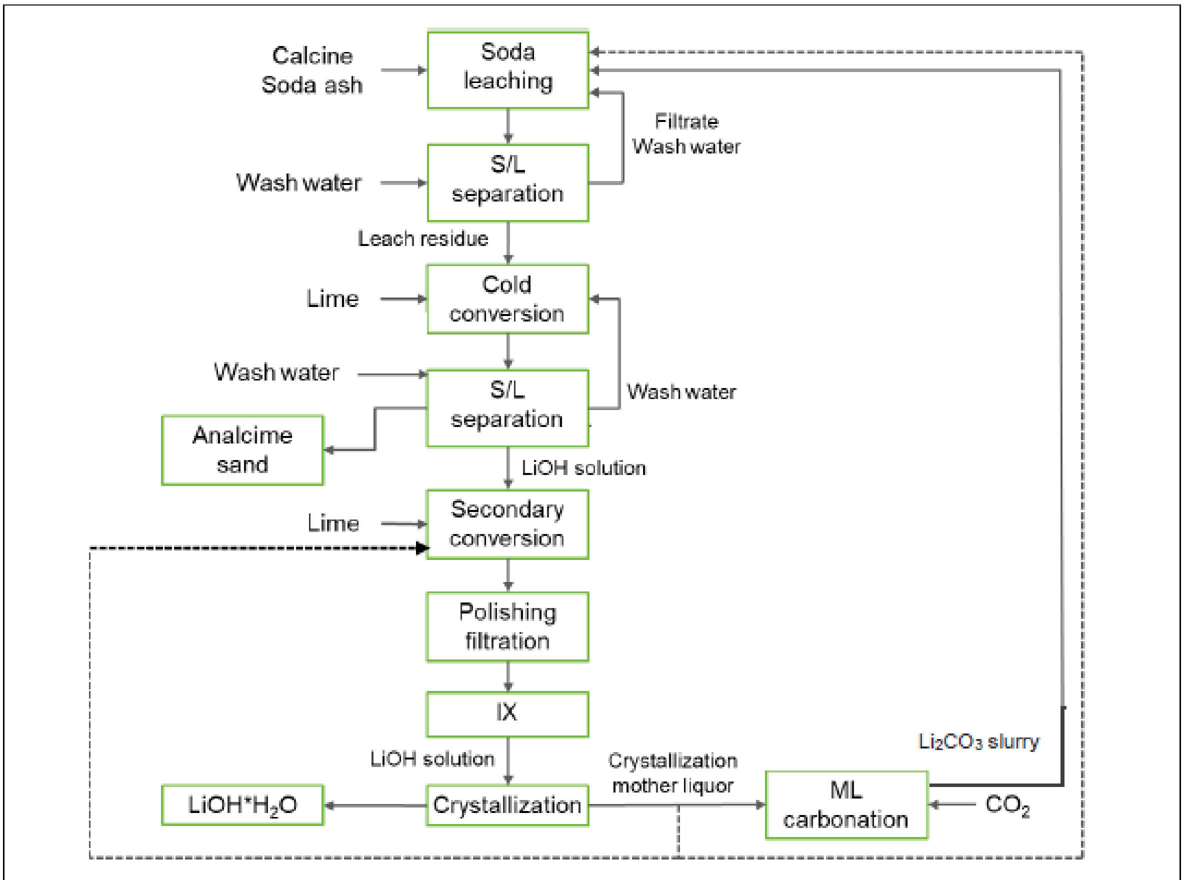
9.1.4.8 Lithium hydroxide continuous pilot processing at Outotec 2022 - Rapasaari

Feed sample

The Rapasaari spodumene concentrate produced in the GTK Mintec pilot plant was calcined in a continuous rotary kiln by FLSmidth in North America, after which it was shipped to Pori, Finland for hydrometallurgical test work.

Test programme

This programme including batch leaching test work as well as continuous piloting of the Metso Outotec LiOH Process, was carried out between April and June 2022. A simplified block diagram of the process flowsheet is shown Figure 9.9.



srk consulting	**SSW Keliber Lithium Project** Simplified process flowsheet of $LiOH*H_2O$ production	Project No. 592138

Figure 9.9: Simplified process flowsheet of $LiOH*H_2O$ production

β-spodumene calcine was initially pulped with water and recycled process solutions. Sodium carbonate was simultaneously fed and dissolved according to the following reaction:

$$Na_2CO_3(s) \rightarrow 2\ Na^+ + CO_3^{2-}$$

Operating conditions in the pressure leaching autoclave are typically 200 to 220 °C and approximately 20 bar. β-spodumene reacts to form lithium carbonate and analcime solids according to the following reaction:

$$2\ LiAlSi_2O_6(s) + Na_2CO_3 + H_2O \rightarrow Li_2CO_3(aq, s) + 2\ NaAlSi_2O_6 \cdot H_2O(s)$$

Some of the lithium remains solubilised, but it is mostly present as a solid lithium carbonate in the leach residue, along with analcime. Autoclave discharge is cooled ahead of solid/ liquid separation, with solids content being forwarded to LiOH conversion.

Pressure leach residue is pulped with water and lime. Calcium hydroxide reacts with the lithium carbonate to form more soluble lithium hydroxide and calcium carbonate, which is precipitated. This reaction is carried out at slightly elevated temperature to limit the solubility of impurities such as aluminium and silicon. The conversion reaction takes place according to the following reaction equation:

$$Li_2CO_3\ (s) + Ca(OH)_2\ (aq) \rightarrow 2\ LiOH\ (aq) + CaCO_3\ (s)$$

After the LiOH conversion, solids and liquid are separated and the solid residue, mainly calcium carbonate and analcime, is the main residue of the process. The filtrate is fed to a secondary conversion stage, where impurities, such as Al and Si are removed from the solution by addition of a small amount of lime. After the secondary conversion, the solution is fed via polishing filtration to ion exchange for the removal of residual divalent metal cations such as calcium and magnesium before crystallisation.

The purified lithium hydroxide solution is fed to the crystallisation stage, where lithium hydroxide monohydrate is crystallised under vacuum from the purified LiOH solution.

Some of the crystallisation mother liquor is fed to carbonation. Carbon dioxide gas is fed to the solution and lithium hydroxide is converted to lithium carbonate, which precipitates due to its lower solubility.

$$2\ LiOH\ (aq) + CO_2\ (g) \rightarrow Li_2CO_3\ (aq, s) + H_2O$$

The product slurry from mother liquor carbonation can be fed to the slurry preparation stage of the soda leaching circuit.

Test results

The average lithium concentration of the calcines corresponded to a 5.5% Li_2O concentration.

Soda leaching, cold conversion and secondary conversion batch tests were carried out to verify the lithium extraction as well as to produce information for the planning of the continuous pilot.

The continuous LiOH pilot was operated for approximately 17 days. The main process stages in the process were soda leaching, cold conversion, secondary conversion, ion exchange, LiOH crystallisation and mother liquor carbonation as previously described for Syväjärvi.

The first stage crystallisation was continuously operated. The average levels of the typical impurities were ~30 ppm Al, 311 ppm Na, 118 ppm Si and 39 ppm K.

During the pilot three samples of the 1st stage $LiOH \cdot H_2O$ products were redissolved and fed to 2^{nd} crystallisation, which was carried out with a rotary evaporator. It was reported that the results of the chemical analyses of the samples were excellent and in terms of impurity concentrations, the final products corresponded to the specification of battery grade $LiOH \cdot H_2O$ provided by Keliber. Almost all impurities were below detection limits, such as Al<5 ppm, K<10 ppm, Cl<20 ppm, F<50 ppm, SO_4<150 ppm and most of the heavy metals being either <1 or <2 ppm. Some Na and Si were detected in two of the samples, but the concentrations were according to the client's specification as well with Na being mostly <30 ppm and Si mostly <20 ppm. Based on LiOH concentrations of both the 1^{st} and 2^{nd} stage samples, there was some residual moisture in the products.

9.1.5 Recovery dependencies in mineral processing of Syväjärvi, Rapasaari and Länttä

Based on bench scale and pilot scale test results undertaken between 2001 and 2017, Keliber developed recovery functions for the main deposits, Syväjärvi, Rapasaari and Länttä. Not all test results were used, with successful and representative tests being chosen.

Based on the test results, it was noted that lithium recovery is dependent on the following key factors:

- Deposit from where the sample originated
- Li_2O grade of the sample (feed of the test)
- Wall rock dilution – wall rock quality and dilution quantity (%)
- Scale of the test (laboratory vs pilot)
- Concentrate grade

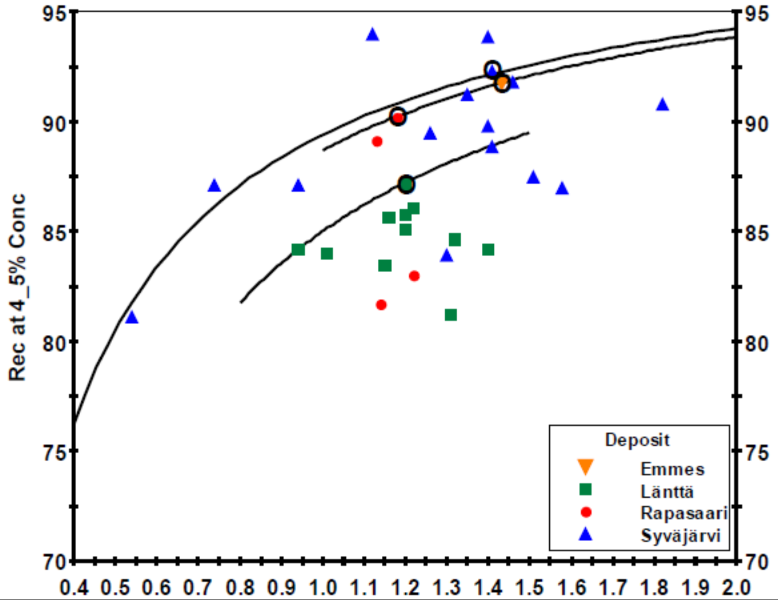
Keliber's basic engineering is based on producing 4.5% Li_2O concentrate. Therefore, the concentrate grade is fixed at 4.5% and only the effect of other parameters was studied.

9.1.5.1 Deposit

The deposits differ from each other by their flotation response. Test results showed that Syväjärvi performed best. Rapasaari was very similar to Syväjärvi with slightly lower recoveries, but Länttä showed poorer floatation behaviour.

9.1.5.2 Head grade

Test results confirmed a clear relationship between lithium feed grade and lithium recovery. Laboratory scale results for pure ore samples without dilution are shown in Figure 9.10.



srk consulting	**SSW Keliber Lithium Project** Lithium recovery at 4.5% Li_2O in the concentrate vs lithium grade in the feed	Project No. 592138

Figure 9.10: Lithium recovery at 4.5% Li_2O in the concentrate vs lithium grade in the feed

9.1.5.3 Wall rock dilution

Wall rock dilution reduces the head grade which would result in lower recoveries, but it was shown that the impact is much stronger than the head grade decrease would cause. The grade-recovery curves of the dilution tests included in the geo-metallurgical study are shown Figure 9.11.

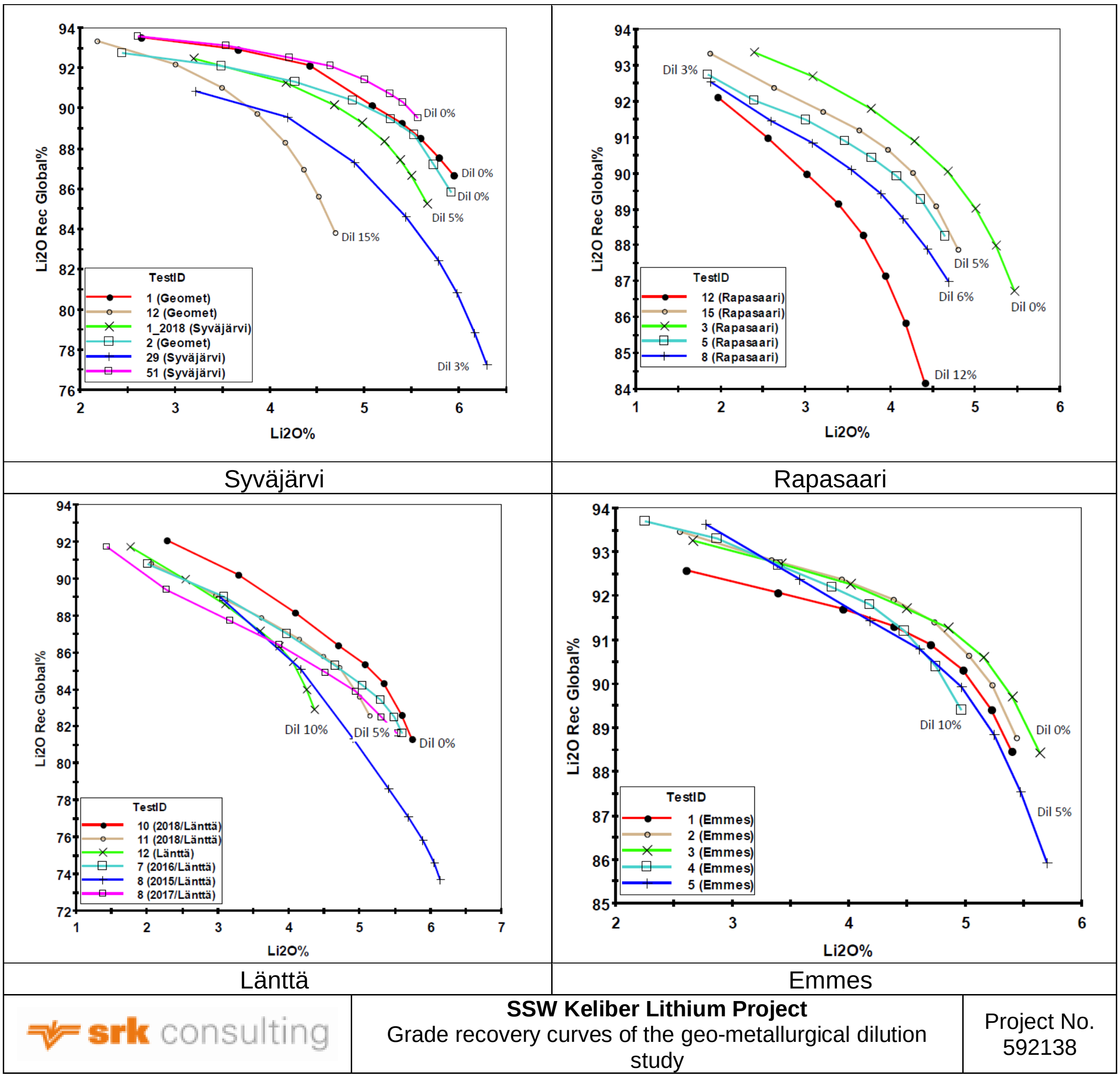


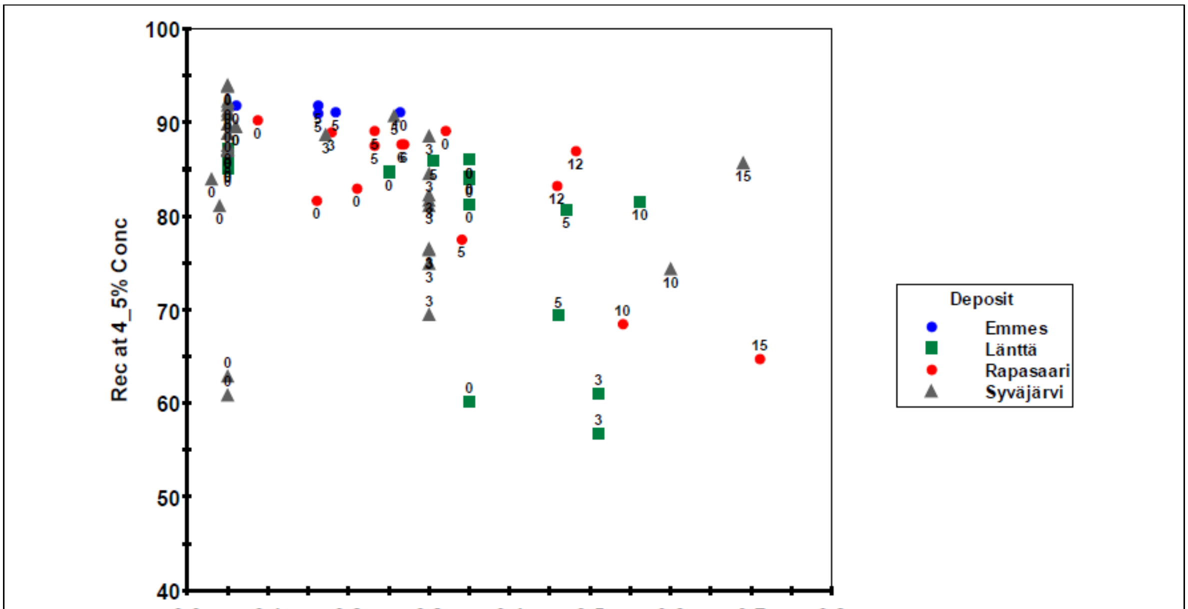
Figure 9.11: Grade recovery curves of the geo-metallurgical dilution study

Observed differences between the deposit are largely explained by the modal composition of the host rocks as summarised in Table 9-4.

Table 9-4: Modal composition of the waste rocks of Syväjärvi, Länttä and Rapasaari

Mineral	Deposit			
	Syväjärvi	Länttä	Länttä	Rapasaari
	Waste/ Country Rock			
	Plagioclase Porphyrite	Amphibolite	Tourmaline	Mica Schist
Quartz	8.90	6.60	13.21	30.85
Plagioclase	46.63	33.46	4.49	13.92
Microcline	1.32	0.44	0.07	1.75
Spodumene	0.36	0.00	0.01	0.02
Muscovite	0.19	0.08	10.26	15.09
Epidote	1.58	6.10	1.86	0.00
Biotite	18.60	8.15	13.97	34.91
Tourmaline	0.00	1.79	45.05	2.38
Amphiboles	19.24	40.05	0.04	0.03
Other Mafics	1.62	2.37	0.80	0.34
Others	1.56	0.96	10.24	0.71
TOTAL	100.00	100.00	100.00	100.00
Mafic Minerals	39.46	52.36	59.86	37.66
Sheet Silicates	18.79	8.23	24.23	50.00

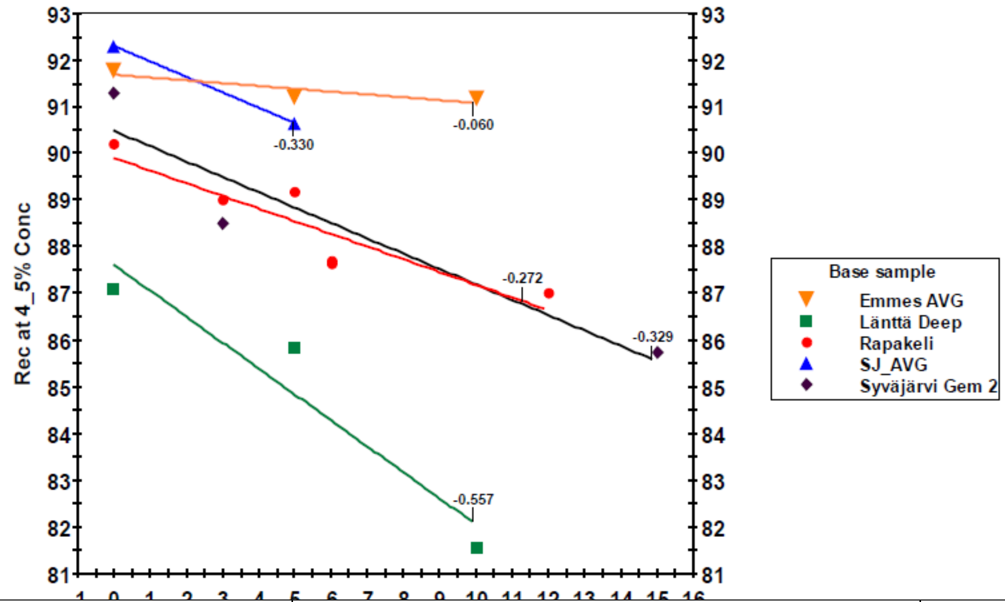
The impact of dilution on metallurgical results was also shown to be dependent on the MgO content where it was shown that where the feed samples included dilution, the final concentrate had higher MgO contents than in the tests without dilution as shown in Figure 9.12.



srk consulting | **SSW Keliber Lithium Project** Recovery at 4.5% Li_2O against MgO% of the feed sample | Project No. 592138

Figure 9.12: Recovery at 4.5% Li_2O against MgO% of the feed sample

Fitted lines for lithium recovery into the spodumene concentrate vs wall rock dilution in the feed sample are shown for Syväjärvi, Rapasaari and Länttä in Figure 9.13.



srk consulting	**SSW Keliber Lithium Project** Fitted lines for lithium recovery into the spodumene concentrate vs wall rock dilution in the feed sample	Project No. 592138

Figure 9.13: Fitted lines for lithium recovery into the spodumene concentrate vs wall rock dilution in the feed sample

9.1.5.4 Ore sorting

Ore sorting operates practically in particle size fractions 20-40 mm and 40-100 mm whereas the 0-20 mm particle size fraction is not sorted due to small particle size and thus will by-pass sorting. Based on Syväjärvi pilot ore mass balance, it was shown that ore sorting was capable of removing 10.9% of the mass when the wall rock dilution was 15%. This equates to 73% efficiency in the sorter. Thus, it was assumed that 73% of the waste rock is removed from all ore types by the ore sorter, while fines are bypassed.

9.1.5.5 Scale-up from laboratory- to full-scale

Keliber considered a number of factors in comparing laboratory and pilot scale test results. This included slime removal, flotation residence time, losses in cleaning stages, entrainment, rheological factors and others. Given challenges such as operating cyclones at pilot scale, it was considered fair to assume that full scale operations could be optimized, and lithium losses could be minimized. Therefore, it was estimated that the scale up factor from laboratory to the full scale would be slightly lower than observed and a conservative value of 1.27 percentage points was used.

9.1.5.6 Summary recovery functions

[§229.601(b)(96)(iii)(B)(10)(iv)]

The final recovery formula applied to mine planning and financial modelling is as follows:

Recovery = 100-P1*(ore grade)^P2-P3*(%dilution)-P4

Where: P1 = Grade parameter 1; multiplier

P2 = Grade parameter 2; exponent

P3 = Dilution parameter

P4 = Scale-up parameter

Individual parameters per deposit are shown in Table 9-5.

Table 9-5: Recovery parameters

Parameter		Syväjärvi	Länttä	Rapasaari	Outovesi	Emmes
P1 (%)	Grade parameter 1; multiplier	10.6	15.0	11.3	11.3	11.3
P2 (%)	Grade parameter 2; exponent	-0.88	-0.88	-0.88	-0.88	-0.88
P3 (%)	Dilution parameter	-0.33	-0.557	-0.272	-0.26	-0.06
P4 (%)	Scale-up parameter	-1.27	-1.27	-1.27	-1.27	-1.27

Modelled parameters included in the Technical Economic Model are shown for each deposit in Table 9-6. Recoveries are shown for selected months with block grades around 1% Li_2O for comparative purposes.

Table 9-6: Modelled lithium recoveries included in the Technical Economic Model

Parameter	Unit	Syväjärvi Open Pit Jun-28	Rapasaari Open Pit Feb-30	Rapasaari U/ground Jun-34	Lanta Open Pit Dec-38	Lanta U/ground Sep-40	Outovesi Open Pit Jun-39	Emmes U/ground Jan-40
Ore Grade in Block	**% Li_2O**	**0.99**	**1.00**	**1.00**	**0.98**	**0.80**	**1.18**	**1.01**
Block wall rock dilution	%	14.30	21.94	36.87	26.92	40.89	29.42	25.57
Block mass	tonnes	64 142.09	61 540.05	12 443.80	43 889.97	51 336.00	25 915.98	28 876.49
Ore Grade % (without dilution)	% Li_2O	1.16	1.28	1.58	1.34	1.35	1.67	1.36
Sorter efficiency %	%	73.00	73.00	73.00	73.00	73.00	73.00	73.00
p1 - Grade parameter / multiplier	%	10.60	11.30	11.30	15.00	15.00	11.30	11.30
p2 - Grade parameter / exponent	%	-0.88	-0.88	-0.88	-0.88	-0.88	-0.88	-0.88
p3 - Dilution parameter		-0.33	-0.27	-0.27	-0.56	-0.56	-0.26	-0.06
p4 - Scale up parameter for full scale		-1.27	-1.27	-1.27	-1.27	-1.27	-1.27	-1.27
p5 - Scale up parameter for pilot scale		-5.42	-5.42	-5.42	-5.42	-5.42	-5.42	-5.42
Targeted Concentrate Grade	% Li_2O	4.50	4.50	4.50	4.50	4.50	4.50	4.50
Corrected Li_2O Recovery % in full scale - Final value	**%**	**88.00**	**87.71**	**87.47**	**82.11**	**78.41**	**88.89**	**89.61**
Conversion degree	%	97.00	97.00	97.00	97.00	97.00	97.00	97.00
Hydro Li_2O Yield	%	86.00	86.00	86.00	86.00	86.00	86.00	86.00
Conversion + Hydro Li_2O Yield	%	83.42	83.42	83.42	83.42	83.42	83.42	83.42
Global Lithium Yield	%	73.41	73.17	72.96	68.50	65.41	74.15	74.75
$LiOH.H_2O$	tonnes	**1 314.61**	**1 262.77**	**254.19**	**828.10**	**750.29**	**634.65**	**614.16**

9.1.6 Adequacy of data

[§229.601(b)(96)(iii)(B)(10)(v)]

9.1.6.1 Ore Sorting

Ore sorter performance was based on pilot-scale tests undertaken at equipment manufacturers' test facilities (Binder & Co, Redwave and TOMRA). Early tests focussed on optical sorting for the removal of dark waste from ore. More recent tests have assessed Laser and XRT sorting.

Optical ore sorting was found to be effective in removing black waste rock from the composite ore feed. With Laser and XRT sorting, dark waste particles, including plagioclase porphyrite, metasediments and tuffs, were rejected. In addition to these rock types, some feldspar without the spodumene inclusions were separated.

In all cases, the feed to the ore sorting equipment comprised an artificial blend of Syväjärvi ore and waste rock. A limited ore sorting programme is reportedly planned to be undertaken on Rapasaari OP ore.

Based on pilot-scale XRT ore sorting test results conducted on the Syväjärvi bulk ore sample, it was concluded that ore sorting is 73% efficient. There is a risk that ore sorting efficiency will vary across the Syväjärvi deposit. It is accordingly recommended that ore sorting variability tests be conducted across the Syväjärvi deposit. It was further assumed that the same efficiency would apply to other ore sources and ore types. There is a risk that other deposits will not perform with the same efficiency. It is accordingly recommended that these deposits be subjected to pilot ore sorting and variability tests using XRT ore sorting technology.

The feed to the ore sorting test equipment comprised an artificial blend of Syväjärvi ore and waste rock. There is a risk that performance on mined ore may be less efficient than on the artificial composite ore feed. It is accordingly recommended that samples of mined ore from all deposits be subjected to pilot ore sorting tests using XRT ore sorting technology.

9.1.6.2 Desliming

The Syväjärvi pilot test conducted in 2019 reported that de-sliming was more efficient with two-stage desliming cyclones. The P_{80} value of slimes was 7 µm, whereas in the 2016 test the corresponding P_{80} value was 16 µm. The smaller sizing reduced the Li_2O loss to tailings from 6.3% in the 2016 pilot operation down to 4.7% level in the 2019 test. The proposed process route includes two-stage desliming with hydrocyclones ahead of flotation, but no specific allowance has been made in recovery estimates for desliming losses.

9.1.6.3 Flotation

Since 2015, flotation tests were conducted on various ores at bench and pilot-scale:

- Bench: Länttä, Syväjärvi, Rapasaari, Emmes and Outovesi; and
- Pilot: Länttä, Syväjärvi and Rapasaari.

Flotation parameters are reasonably well understood but it is recommended that pilot-scale tests be undertaken on the other main sources of ore.

In 2016 - 2017, a geo-metallurgical study was undertaken on 18 mineralised samples collected from the Syväjärvi, Länttä and Rapasaari deposits to assess differences in grindability and flotation performance. Furthermore, ore variability flotation tests were undertaken on Rapasaari samples selected from four different mineralised material types. These showed significant variability. It is recommended that similar variability programs be undertaken on all other deposits to ensure adequate understanding of spatial variability in flotation performance. Ultimately this should extend into the development of geo-metallurgical models for all deposits.

9.1.6.4 Conversion

The objective of conversion is to convert alpha-spodumene to leachable beta-spodumene. Since 2016, conversion tests have been conducted on various concentrates at bench and pilot-scale:

- Bench: Länttä, Syväjärvi and Rapasaari; and
- Pilot: Länttä, Syväjärvi and Rapasaari.

Conversion parameters are reasonably well understood but it is recommended that pilot-scale tests be undertaken on the other main sources of concentrate.

9.1.6.5 Soda leaching and final product production

From 2015 to 2017, bench and pilot scale tests were undertaken on Länttä and Syväjärvi concentrates including the major process stages, from the spodumene concentrate conversion to lithium carbonate.

In 2018 bench tests were undertaken on Syväjärvi and Rapasaari concentrates, including conversion, soda leaching, bi-carbonation, ion exchange and lithium carbonate crystallisation.

Following the decision to produce lithium hydroxide rather than lithium carbonate, semi-continuous bench-scale tests were undertaken in 2019 to produce lithium hydroxide from a beta-spodumene concentrate generated in 2018. This was followed by continuous pilot testing of Syväjärvi concentrate in 2020 and Rapasaari concentrate in 2022. The beta-spodumene concentrates used in this hydrometallurgical test work was calcined in the FLSmidth pilot runs in 2019 and 2021 respectively. The continuous $LiOH.H_2O$

pilot was operated for 14 and 17 days respectively. The main process stages were soda leaching, cold conversion, secondary conversion, ion exchange, $LiOH.H_2O$ crystallisation and mother liquor carbonation.

The soda leach developed by Outotec has been successfully demonstrated at pilot-scale on Syväjärvi and Rapasaari beta-spodumene concentrate. Ideally, other concentrates should also be subjected to conversion and hydrometallurgical testing. However, as the spodumene pegmatites of the Kaustinen area are understood to resemble each other petrographically, mineralogically and chemically, it is likely that their concentrates will perform similarly to that from Syväjärvi and Rapasaari. Notwithstanding this, it is recommended that the mineralogical and chemical similarity of other concentrates be assessed and that they be subjected to conversion and hydrometallurgical testing if significantly different to Syväjärvi or Rapasaari.

9.1.7 Comment

The spodumene pegmatites of the Kaustinen area resemble each other petrographically, mineralogically and chemically. They are typically coarse-grained, light-coloured and mineralogically similar. The main minerals are albite (37 - 41%), quartz (26 - 28%), K-feldspar (10 - 16%), spodumene (10 - 15%) and muscovite (6 - 7%), generally in this quantitative order.

Studies show that the chemical, mineralogical and geo-metallurgical differences between the deposits are small. Currently, spodumene ($LiAlSi_2O_6$) is the only economic mineral identified in the pegmatite veins. Other lithium minerals, for example, petalite, cookeite, montebrasite and sicklerite, are found only as trace quantities. Beryl and columbite-tantalite are important trace minerals, with mean grades of the deposits as follows: beryllium 60 to 180 ppm; tantalum 13 to 60 ppm and niobium 17 to 60 ppm.

The mean chemical compositions of the spodumene grains from three deposits analysed by GTK (Syväjärvi, Rapasaari and Leviäkangas) are as follows:

- SiO_2 64.78 to 65.17%;
- Al_2O_3 26.88 to 27.01%;
- FeO 0.29 to 0.55% and
- MnO 0.09 to 0.13%.

The Li_2O content of spodumene is 7.0%, 7.21% and 7.22% for Syväjärvi, Rapasaari and Leviäkangas, respectively.

Variation in the grindability between the deposits is small and geo-metallurgical studies show that the hard component in the ores is spodumene and therefore the specific grinding energy shows positive correlation with the lithium grade.

In flotation response the deposits show small differences mainly due to variation in the lithium head-grade and proportion of gangue dilution. Variation in the ore texture, spodumene grain size, colour or alteration does not have an impact on processability. The wall rock dilution has been found to have a negative impact for flotation, lowering the concentrate grade. In this sense Syväjärvi, where the wall rock dilution is plagioclase porphyrite, has proven to be slightly easier to process than other deposits hosted by mica schist. Minimising the wall rock contamination in flotation is important and therefore selective mining and ore sorting will play a significant role in controlling the flotation feed.

The Keliber project is likely to be the first implementation of the Metso Outotec soda pressure leaching technology. While the individual unit processes are not novel, and while the Syväjärvi (2020) and Rapasaari (2022) pilot trials have significantly de-risked the flowsheet, a residual risk remains as it does with the first implementation of any novel technology. In mitigation of such risk, the Lithium Hydroxide Refinery will commence hot commissioning on third party concentrate approximately nine months before concentrate is received from the Päiväneva concentrator. In addition, a ramp-up period of twenty four months has been allowed to achieve design throughput of Keliber concentrate. Metso Outotec will also provide a process guarantee, although such a guarantee does not ultimately guarantee that a process will work so much as it defines the extent of financial compensation that will apply should it not.

10 MINERAL RESOURCE ESTIMATES

[§229.601(b)(96)(iii)(B)(11)

10.1 Key assumptions, parameters and methods used to estimate Mineral Resources

[§229.601(b)(96)(iii)(B)(11)(i)]

Keliber holds licences to five major lithium deposits, an advanced project and several prospects in the Kaustinen – Kokkola – Kruunupyy area in western Finland. Keliber has declared Mineral Resources on seven deposits to date: Syväjärvi, Rapasaari, Länttä, Outovesi, Emmes, Tuoreetsaaret and Leviäkangas and are described in this report. The lithium deposits are hosted by spodumene pegmatite veins with a maximum width of 30 m and maximum length of 400 m. The deepest drill intersection of one of the veins is 200 m vertically below the surface. Many of the known spodumene veins are still open at depth and along strike.

All of the deposits are interpreted to be in the form of sheet-like spodumene pegmatite veins and are informed primarily by diamond drilling, and in the case of the Syväjärvi deposit, exploratory underground development exposure.

The estimates have been undertaken by independent consultants to Keliber; Paul Payne (FAusIMM, CP) for Syväjärvi, Rapasaari, and Tuoreetsaaret and Markku Meriläinen (MAusIMM) and Pekka Lovén (MAusIMM, CP) for Länttä, Outovesi, Leviäkangas and Emmes. The QP has reviewed the Mineral Resource estimates and independently conducted verifications on the estimates as described below. All estimates were undertaken using Geovia's Surpac software.

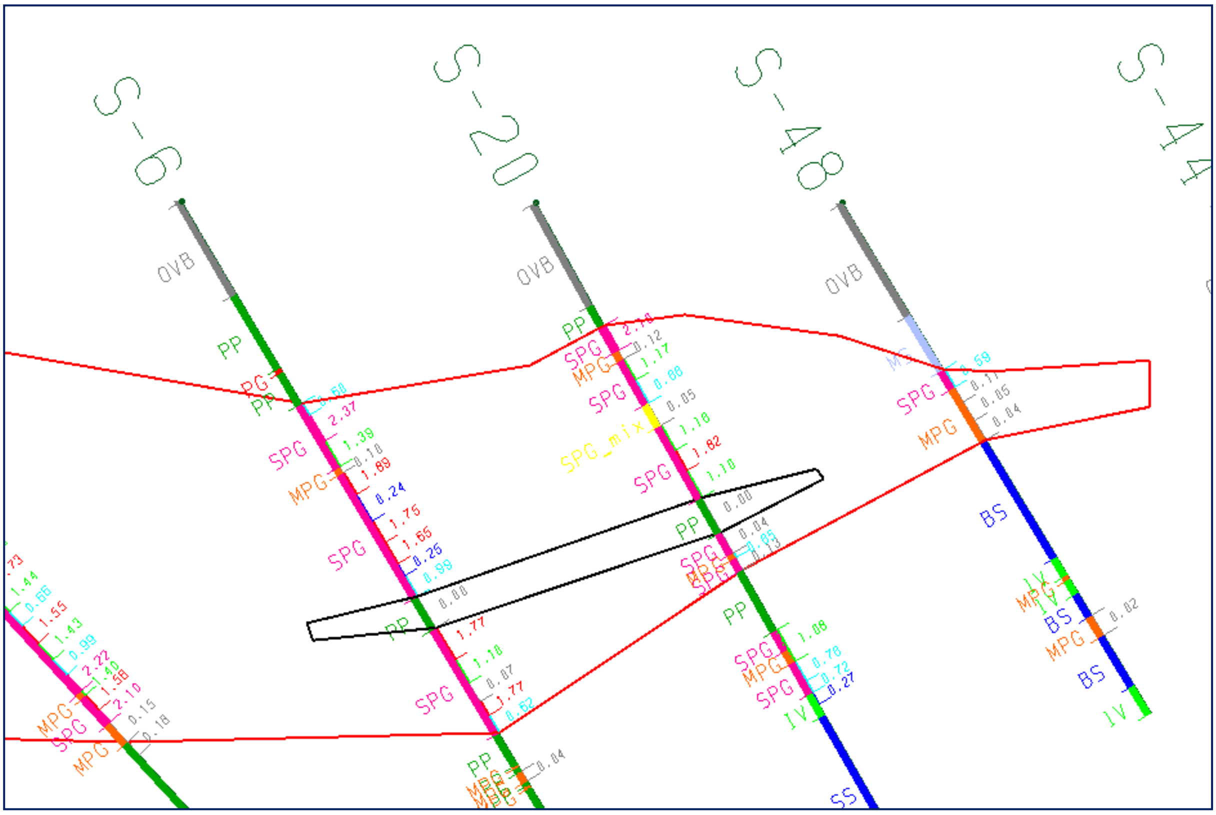
The exploration data have been collected by a number of different companies prior to the acquisition by Keliber, including a number of independent companies and GTK; Keliber has also undertaken its own exploration programmes on all deposits including re-analysis of some of the drill core at Länttä and Emmes. The drill hole data available and used in the Mineral Resource estimates are summarised in Table 10-1.

Table 10-1: Drill hole (and channel sample) data informing the Mineral Resource estimates

Deposit	Number of drill holes in database	Length drilled (m)	Number of drill holes drilled by Keliber	Number of drill holes in Resource estimate	Drilled metres in resource (m)
Syväjärvi	212	17 977	121	101	11 906
Rapasaari	396	63 718	307	191	33 020
Länttä	100	9 067	51	100	9 067
Outovesi	24	1 752	0	24	1 752
Emmes	54	6 284	23	54	6 284
Leviäkangas	123	6 821	24	27	2 246
Tuoreetsaaret	50	10 617	50	16	3 592

Excluded data include percussion drilling at Syväjärvi and Leviäkangas and drill holes that did not intersect meaningful mineralisation.

The drill hole databases reviewed are free from obvious data capture errors such as gaps and sample overlaps, and no collar and down-hole survey anomalies were detected. The wireframes were digitized using conventional sectional interpretation and cut-off values of approximately 0.4% to 0.5% Li_2O were typically used to discriminate between mineralised and non-mineralised intersections. Drill hole spacing is variable across the orebodies, but the section lines are typically spaced approximately 40 m apart, although the spacing ranges between 20 m and 50 m in places. An example of the sectional interpretation at Syväjärvi is shown in Figure 10.1.



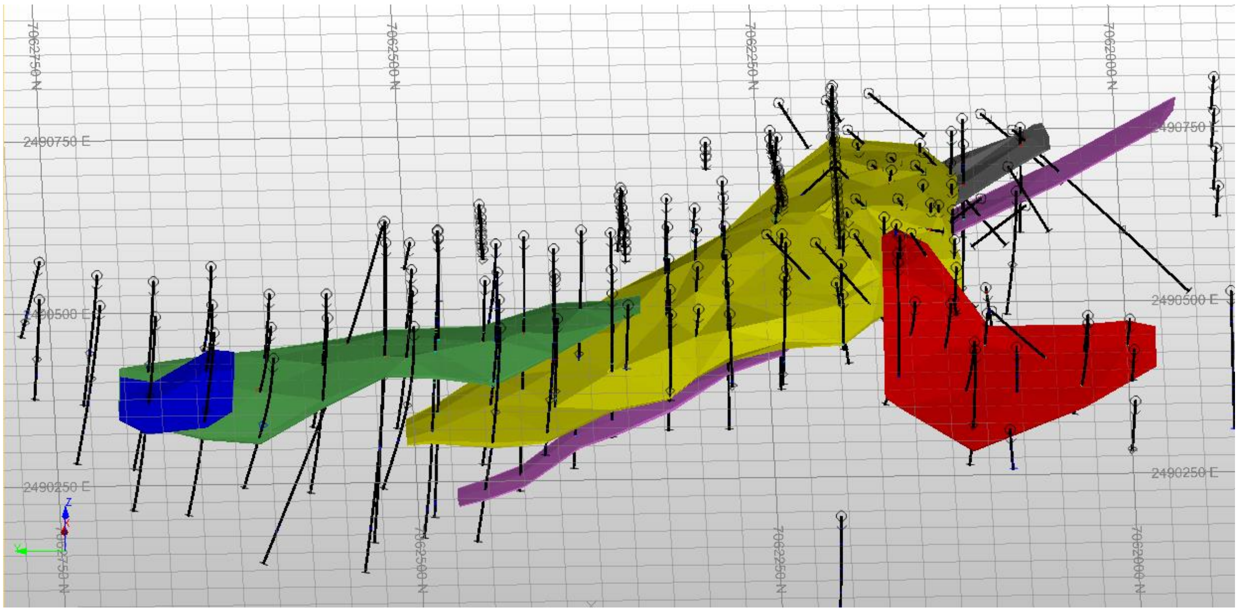
srk consulting	**SSW Keliber Lithium Project** Syväjärvi geological interpretation example on Section 7 062 200N *(Source: WSP, 2022)*	Project No. 592138

Figure 10.1: Syväjärvi geological interpretation example on Section 7 062 200N

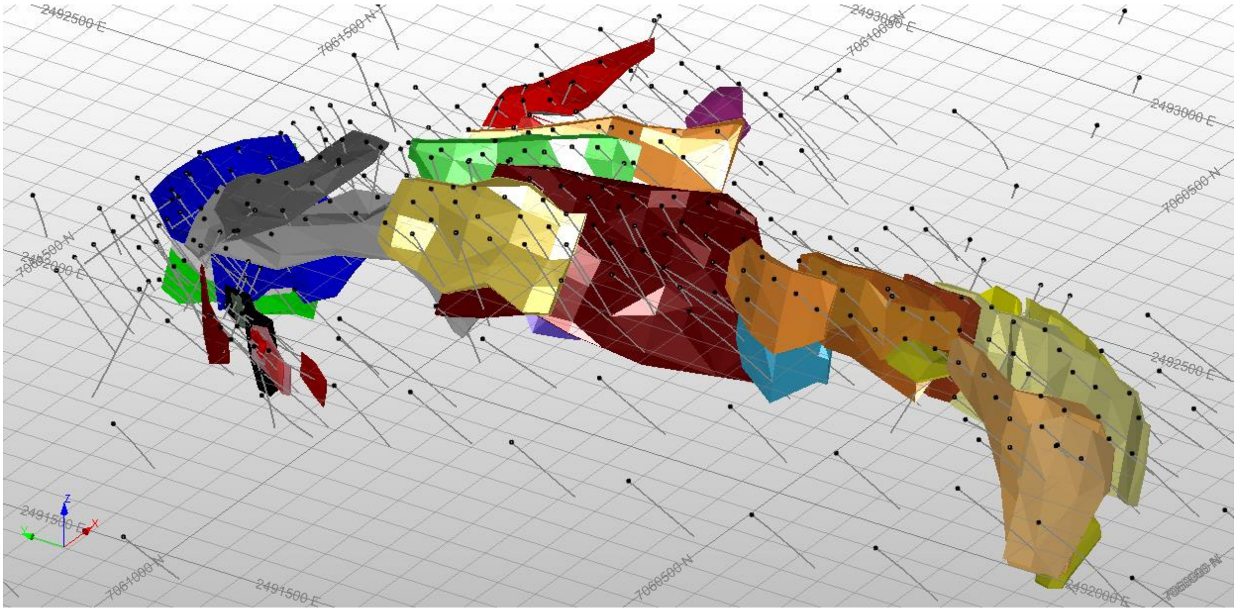
The orebody wireframes and drill hole data for the two largest deposits, Syväjärvi and Rapasaari, are shown in Figure 10.2. The Keliber sampling procedure is to not sample any non-pegmatite lithologies to avoid introducing non-spodumene lithium values into the dataset as the non-spodumene lithium is not recoverable in the planned processing circuit. The missing intervals within the wireframes are assigned a default value of 0.001% Li_2O. There are two treatments of internal waste:

- Where the waste material is large enough to be modelled and separately domained (such as in Figure 10.1) where a lithology (plagioclase porphyrite in this example) is wireframe modelled and assigned zero grade in the block model; or
- Where smaller intersections of material that is not mineralized (e.g., entrained xenoliths) are present (and at times not sampled). In this instance, either the sampled grade is used, or the unsampled grade is set to the default value and used in estimating the blocks.

For all the orebodies, the sampling length is variable, but typically ranges between one and two metres. All the deposits were composited at 2 m intervals, with the composite interval varied so as not to exclude any interval within the wireframes, resulting in composites of approximately 2 m length, but where no sampled material is excluded from the composites. The Li_2O grade distributions are close to normally distributed (not considering the population of un-mineralised samples which form a distinct peak) to weakly positively skewed. Due to the low skewness, and absence of extreme outlier values, capping was not considered necessary.


7062750 N
7062500 N
7062250 N
7062000 N
2490750 E
2490500 E
2490250 E

Syväjärvi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2491500 E
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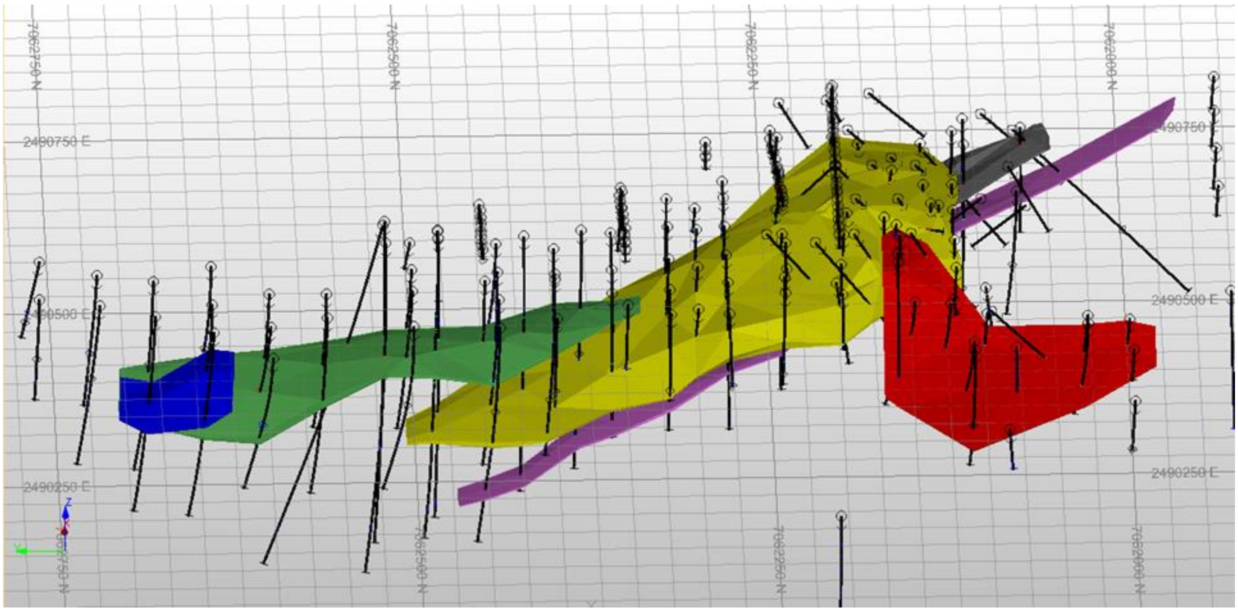
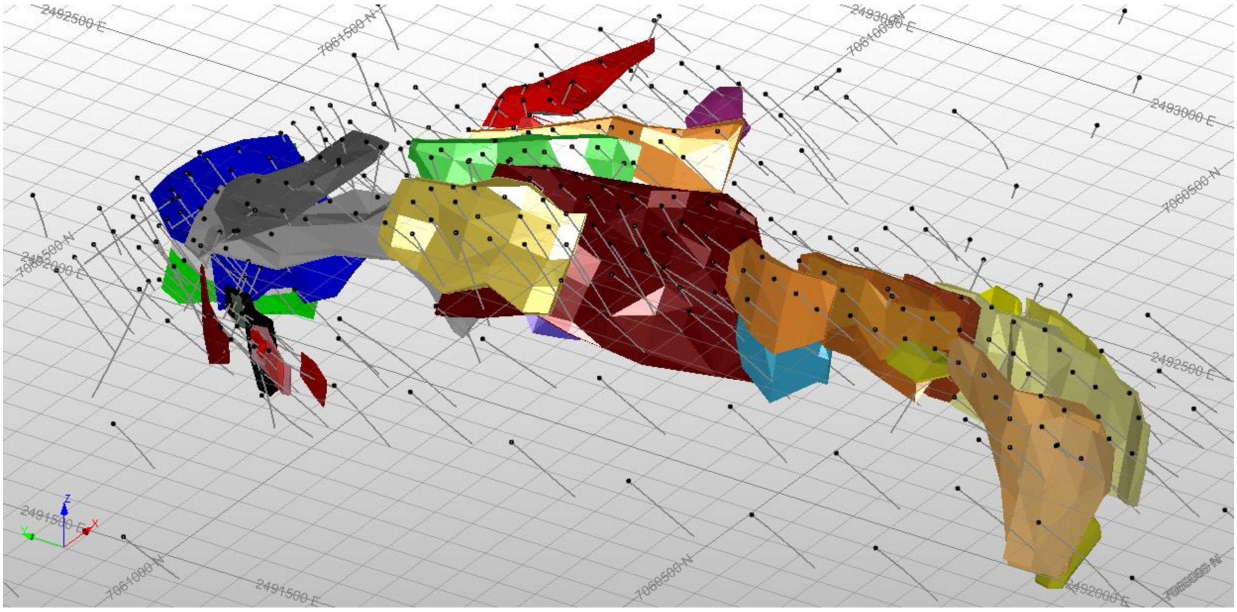
2492000 E



Syväjärvi



Rapasaari

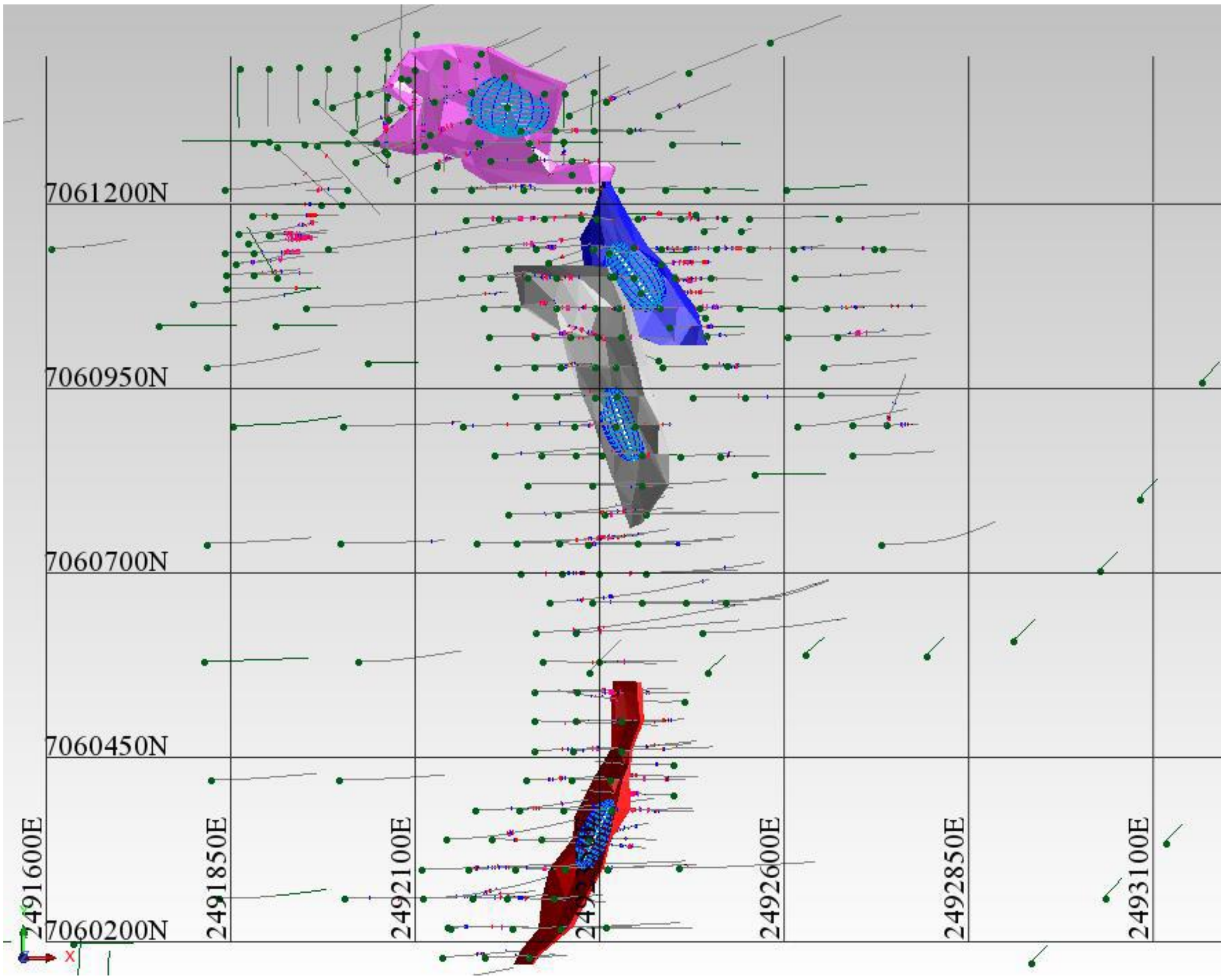
srk consulting	**SSW Keliber Lithium Project** Syväjärvi (looking east) and Rapasaari (looking northeast) orebody overview *(Source: Payne Geological Services, 2021)*	Project No. 592138

Figure 10.2: Syväjärvi (looking east) and Rapasaari (looking northeast) orebody overview

For Syväjärvi, Rapasaari, Tuoreetsaaret, and Leviäkangas, the block models are orthogonal to the cardinal directions, while for the other deposits the block models are rotated around the Z-axis to be approximately parallel to the strike of the veins. Most block models have dimensions of 5 m x 10 m x 5 m along the original X-, Y- and Z-axes. At Emmes the parent blocks are larger at 10 m x 15 m x 10 m, and at Leviäkangas the blocks are 10 m x 10 m x 5 m.

The smaller deposits (Länttä, Outovesi, Emmes and Leviäkangas) do not have sufficient data to be able to generate robustly structured semi-variograms and have been estimated using inverse distance squared or cubed weighting of the 2 m composite datasets within each wireframe. At Rapasaari, mineralisation continuity for Li_2O was examined via semi-variograms for the main sub-vertical pegmatite bodies

(Domains 9, 29, 37) and the main flat-dipping pegmatite (Domain 18), as shown in Figure 10.3. The modelled semi-variograms were applied to the smaller domains with similar orientations.



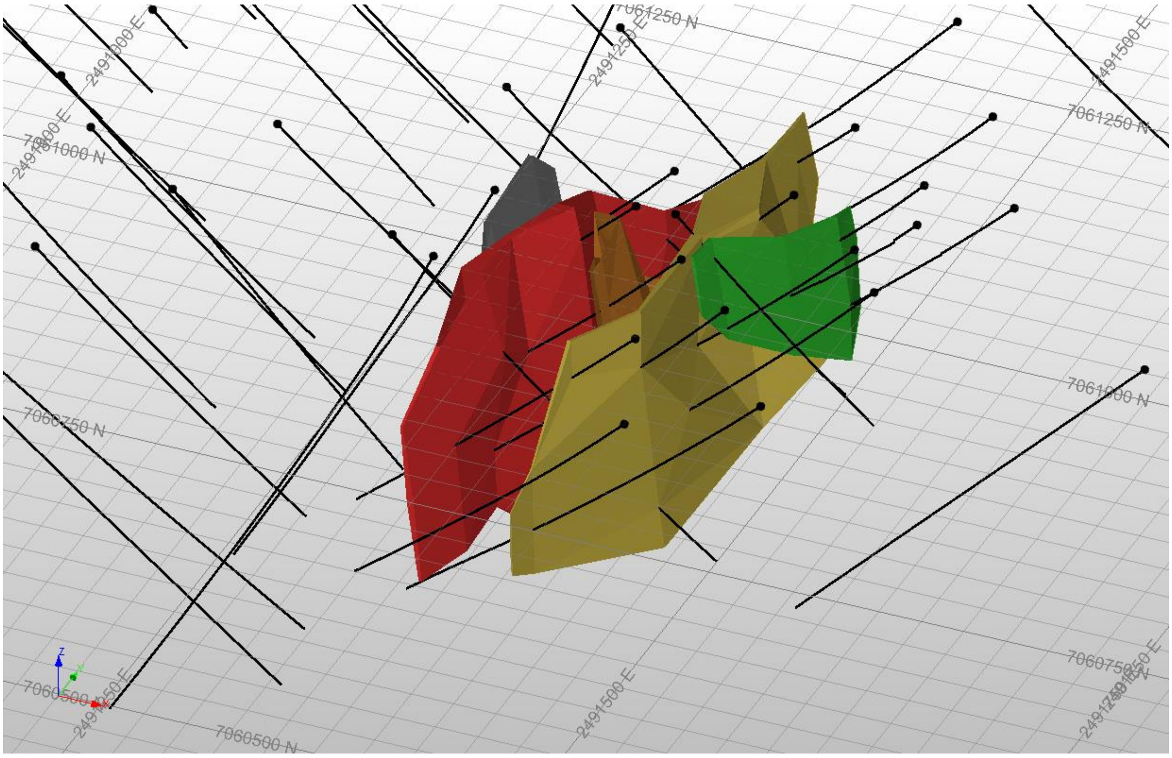
srk consulting	**SSW Keliber Lithium Project** Rapasaari main pegmatite bodies selected for variography (showing search ellipses) *(Source: Payne Geological Services, 2021)*	Project No. 592138

Figure 10.3: Rapasaari main pegmatite bodies selected for variography (showing search ellipses)

At Syväjärvi only the main pegmatite orebody (shown in yellow in Figure 10.2) has been modelled with semi-variograms. The remainder of the domains borrowed the main pegmatite semi-variogram for estimation.

At Tuoreetsaaret the semi-variograms were modelled only for Domain 2 (red wireframe in Figure 10.4) and borrowed for the estimates of the other four modelled pegmatite bodies.

The modelled semi-variogram parameters are detailed in Table 10-2.



srk consulting	**SSW Keliber Lithium Project** Tuoreetsaaret pegmatite bodies *(Source: Payne Geological Services, 2022)*	Project No. 592138

Figure 10.4: Tuoreetsaaret pegmatite bodies

Table 10-2: Modelled semi-variogram parameters for Syväjärvi, Rapasaari and Tuoreetsaaret

Deposit	Domain	Orientation			Nugget	Sill 1	Range 1			Sill 2	Range 2		
		Strike	Plunge	Dip			Plunge	Strike	Across orebody		Plunge	Strike	Across orebody
Rapasaari	Major Steep (29)	230	-48	0	0.2	0.38	30	20	3.3	0.42	90	60	10
	Minor Steep (9)	233	-56	0	0.25	0.07	75	65.2	7.5	0.68	115	100	11.5
	Southern Steep (37)	275	-75	0	0.15	0.16	60	50	10	0.69	90	75	15
	Flat/East-West (18)	100	0	-35	0.07	0.27	100	62.5	7.5	0.66	160	100	12
Syväjärvi	Main Pegmatite	335	-15	5	0.10	0.67	13	6.5	2.6	0.23	70	35	14
Tuoreetsaaret	Domain 2	10	0	-85	0.15	0.27	106	63.5	7.8	0.58	150	90	11

The semi-variograms presented by Keliber, and those modelled independently, do not show very robust structures, feature relatively short ranges, and are ambiguous to accurately model.

For Syväjärvi, Rapasaari, and Tuoreetsaaret, a kriging neighbourhood analysis was undertaken to determine the optimal search parameters, while for the remaining deposits the typical drill hole spacing was used as a guide for the first search range. The search parameters applied are summarised in Table 10-3. For the Kriged domains the search ranges listed are for the direction of longest continuity (see Table 10-2 for the orientations of rotated axes), and the intermediate and across-orebody search distances; these are between 63% to 83% and 17% to 25% of the long range listed, respectively. For the inverse distance estimates (see below) the searches are isotropic as this method does not consider anisotropy in the weightings.

Table 10-3: Search parameters for all Keliber deposits

Deposit	Minimum Comps	Maximum Comps	First Search (m)	Second Search (m)	Third Search (m)
Rapasaari	6	20	60	90	120
Syväjärvi	4	15	40	80	120
Länttä	3	15	40	80	
Outovesi	3	15	40	80	160
Emmes	3	15	40	80	
Leviäkangas	3	15	75		
Tuoreetsaaret	6	16	60	90	120

Using the above search parameters, Li_2O grades are interpolated into the block models, within the orebody wireframes. The wireframes are treated as hard domain boundaries i.e., only samples within that wireframe/domain are used to estimate the blocks within the wireframe. Where there are sufficiently robust semi-variograms modelled for the deposit, Ordinary Kriging (**OK**) has been used for the interpolation. OK was applied for all domains at Syväjärvi and Tuoreetsaaret, and the majority of domains at Rapasaari (for domains defined by four drill holes or less, inverse distance squared was used). At Länttä, Outovesi, Emmes, and Leviäkangas, inverse distance cubed weighting was applied.

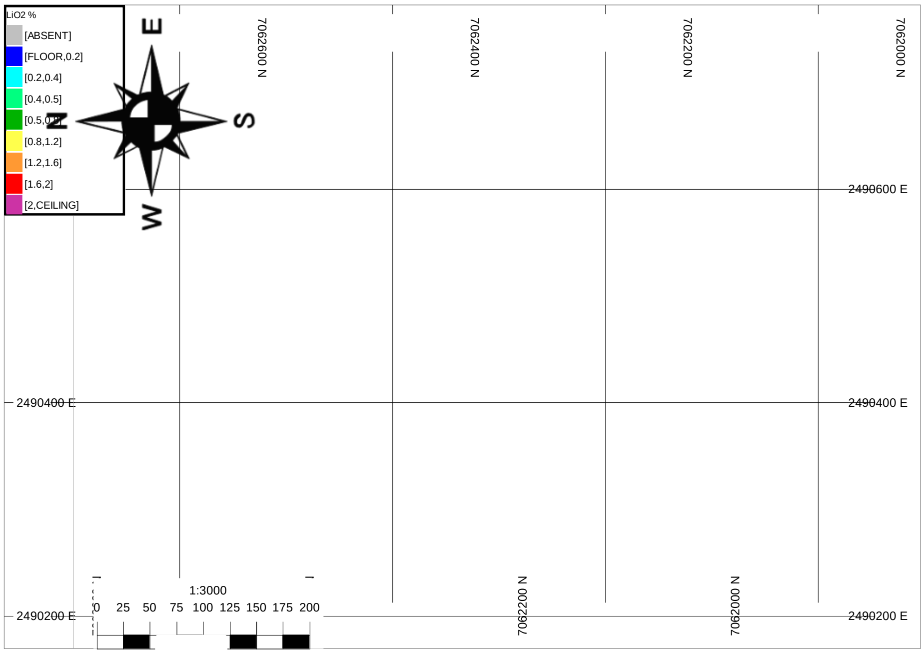
Density was not estimated into the block model as density was not routinely measured on all samples. Table 10-4 summarises the database of density measurements, and the mean values applied to each block model. The exception to this process is at Tuoreetsaaret where a relationship between density and Li_2O grade was modelled based on the data within the wireframes. A regression formula (Density = (0.0527 * Li_2O) + 2.6501) was used to assign the density based on the estimated Li_2O grade.

Table 10-4: Summary of density measurements and mean values

Deposit	Method	No Samples	Mean value
Rapasaari	Archimedes bath	456	2.70
Syväjärvi	Archimedes bath	545	2.72
Länttä	Archimedes bath	57	2.72
Outovesi	Archimedes bath	34	2.72
Emmes	Archimedes bath	107	2.71
Leviäkangas	None reported	-	2.73
Tuoreetsaaret	Archimedes bath	486	2.70

Figure 10.5 and Figure 10.6 present the Syväjärvi and Rapasaari block models, colour-coded according to the estimated Li_2O grades. The outlines of the orebodies are displayed as lines around the block models, with the drill holes shown as black lines. The orebodies typically have a higher-grade core zone with thinner and lower grade areas on the surrounding fringes.

For each deposit, Keliber consultants who generated the Mineral Resource estimates undertook a range of validations on the Mineral Resource estimates. These include independently generating composites and comparing statistics to those originally generated, visual validations comparing the grade distribution of the composites and estimates on sections, and comparisons of global statistics and swath plots between the composites and the estimates. In general, the validations show that the estimates match the composite dataset informing the estimates well and follow the spatial grade patterns of the composite dataset well. Examples of swath plots from Rapasaari for all domains estimated are shown in Figure 10.7.

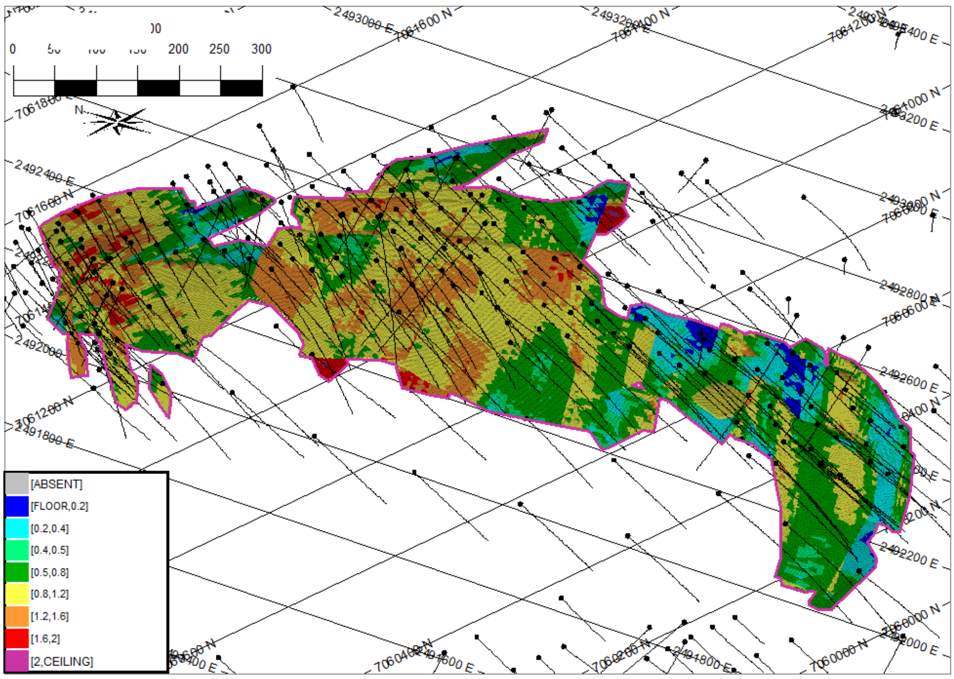


srk consulting

SSW Keliber Lithium Project
Plan view of the Syväjärvi resource model with Li_2O grades

Project No. 592138

Figure 10.5: Plan view of the Syväjärvi Mineral Resource model with Li_2O grades



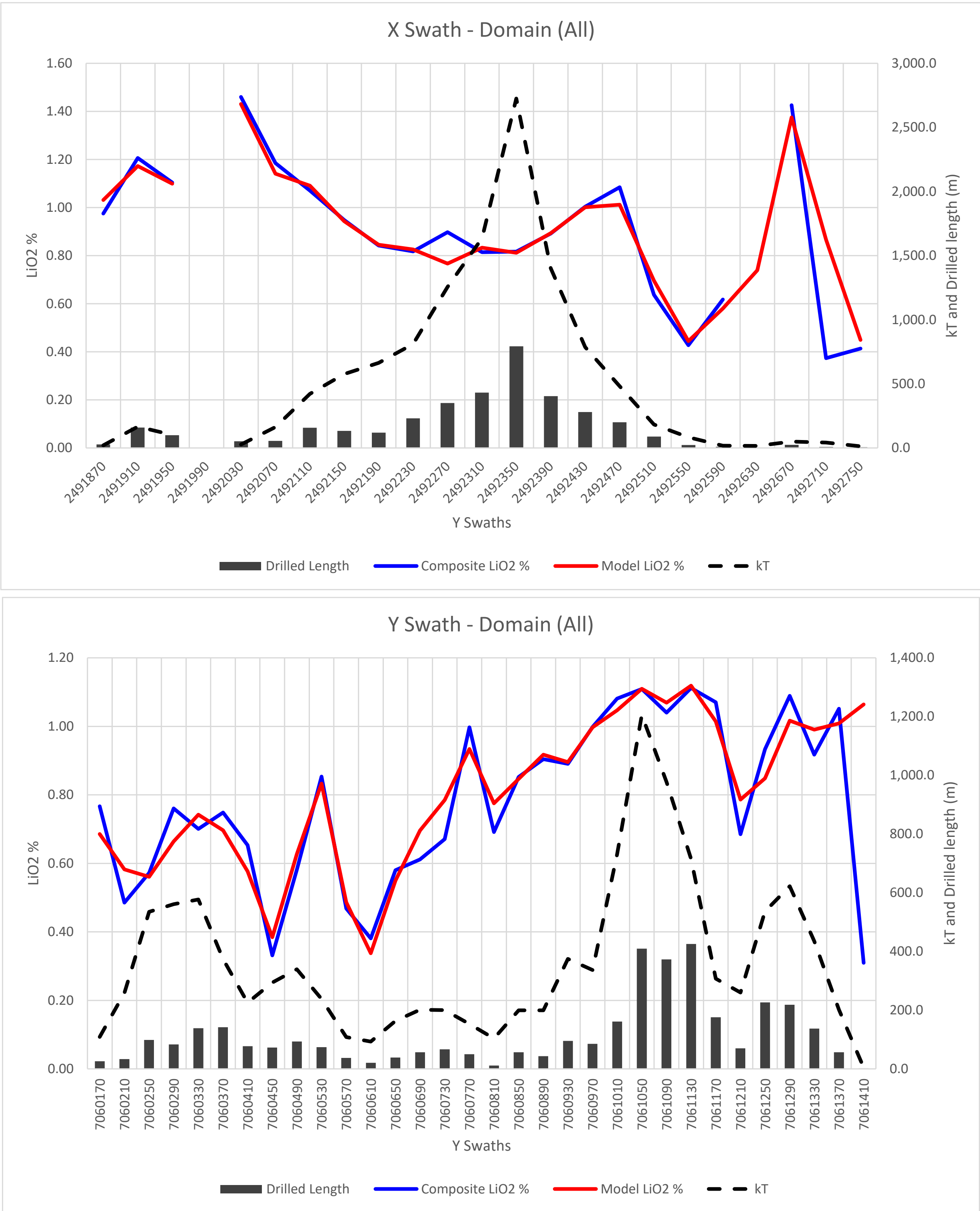
srk consulting

SSW Keliber Lithium Project
Isometric view looking northeast of the Rapasaari resource model with Li_2O grades

Project No. 592138

Figure 10.6: Isometric view looking northeast of the Rapasaari Mineral Resource model with Li_2O grades

The estimates match the composite grade trends well in both axes, and a similar concurrence can be seen in the domain statistical comparisons. In a small number of individual domains, where the estimates are informed by only a few composites (or where there are trends in the grade within a vein), some divergence is observed between the source data and the estimates; however, this is generally reflected in the classification.



srk consulting	**SSW Keliber Lithium Project** Rapasaari X and Y axis swath plots for all estimated domains	Project No. 592138

Figure 10.7: Rapasaari X and Y axis swath plots for all estimated domains

10.2 Mineral Resource estimates

[§229.601(b)(96)(iii)(B)(11)(ii)]

The Mineral Resources are reported in Table 10-5 on an attributable basis (Sibanye-Stillwater attributable ownership is 84.96%). The Mineral Resources are reported on an *in situ* basis and are reported exclusive of Mineral Reserves.

The Mineral Resources, with the exception of the Emmes and Tuoreetsaaret deposits, are reported above a cut-off of 0.5% Li_2O, with Emmes reported above a cut-off of 0.7% Li_2O and Tuoreetsaaret above 0.4% Li_2O. No geological losses are considered in the Mineral Resource reporting. Internal dilution from xenoliths and internal waste lenses has been incorporated into the estimation by dilution of the composite grades with the insertion of default low values in the unsampled un-mineralised intervals. Consideration of the potential mining constraints has been incorporated into the geological modelling, whereby intersections of the orebody less than 1.8 m to 2 m are not modelled.

Table 10-5: Mineral Resource Statement (31 December 2022) for Keliber Oy operations

Classification	Deposit	Mass (Mt)	Li content (%)	LCE mass (kt)
Measured	Syväjärvi	0.0	0.5	0.9
	Rapasaari	0.3	0.5	7.4
	Länttä	0.2	0.5	5.2
Total Measured		**0.5**	**0.5**	**13.5**
Indicated	Syväjärvi	0.4	0.5	10.7
	Rapasaari	1.1	0.4	25.4
	Länttä	0.7	0.5	16.7
	Outovesi	0.0	0.7	1.2
	Emmes	0.9	0.6	27.6
	Leviäkangas	0.2	0.5	4.6
Total Indicated		**3.3**	**0.5**	**86.1**
Inferred	Syväjärvi	0.1	0.4	2.0
	Rapasaari	1.3	0.4	29.3
	Leviäkangas	0.2	0.4	5.3
	Tuoreetsaaret	1.2	0.3	20.6
Total Inferred		**2.8**	**0.4**	**57.1**
Total Mineral Resource		**6.7**	**0.4**	**156.7**

Notes:
1. Mineral Resources are reported exclusive of Mineral Reserves derived from them.
2. The Mineral Resources are reported on an in-situ basis.
3. Mineral Resources are not Mineral Reserves and do not have demonstrated economic viability.
4. Mineral Resource are reported above an economic cut-off calculated for each deposit.
5. Note the Mineral Resource tabulation reports the % Li and not % Li_2O. Contained Lithium is reported as Lithium Carbonate Equivalent (**LCE**)
6. All figures are rounded to reflect the relative accuracy of the estimates.

10.2.1 Conversions

In line with industry practice, Li Mineral Resources and Mineral Reserves total metal content is quoted in Lithium Carbonate (Li_2CO_3) Equivalent (LCE), which is one of the final products produced in the Li mining value chain. LCE is derived from in-situ Li content by multiplying by a factor of 5.323. Li Hydroxide Monohydrate ($LiOH.H_2O$) can be derived from LCE by dividing by a factor of 0.88. Li has been derived from Lithium Oxide (Li_2O) by multiplying by a factor of 0.465. These conversion factors are shown in Table 10-6.

Table 10-6: Lithium product conversion matrix

	Li	Li_2O	Li_2CO_3
Li		2.153	5.323
Li_2O	0.464		2.473
Li_2CO_3	0.188	0.404	
$LiOH.H_2O$	0.165	0.356	0.880

10.3 Mineral Resource classification criteria and uncertainties

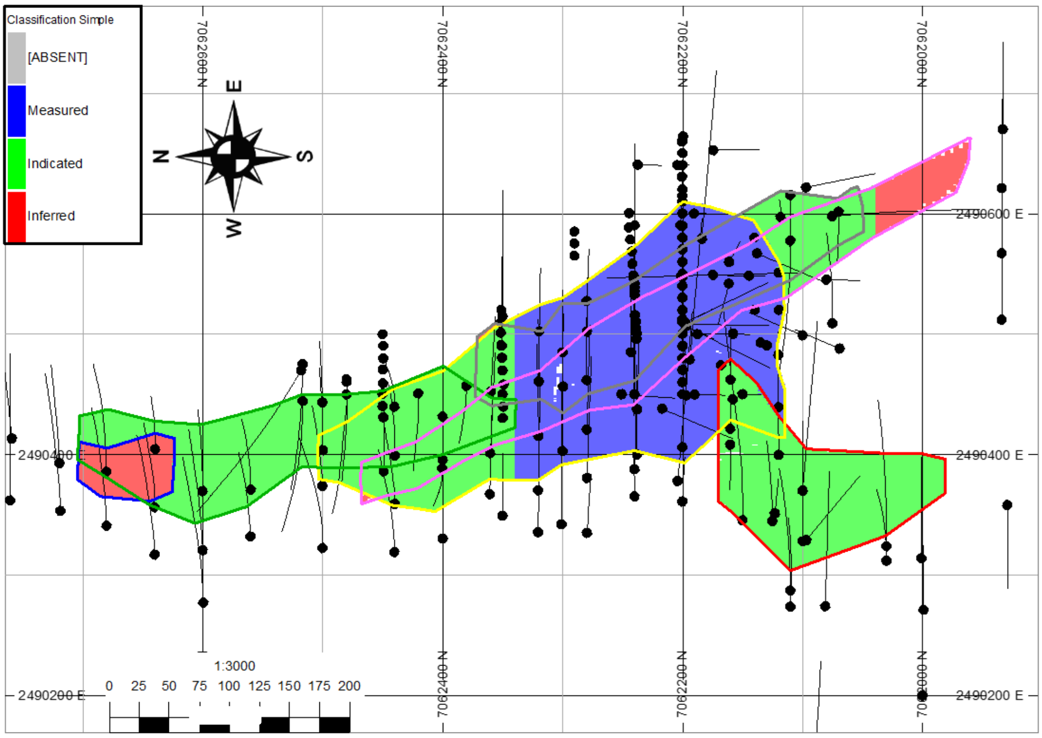
[§229.601(b)(96)(iii)(B)(11)(iv)]

The classification of the orebodies considers a combination of inputs to the confidence in the interpretation and estimates. The quality of the data is generally considered to be good, with accurate collar surveys, detailed logging and reasonable QA/QC support for the assays. For some of the deposits, supporting surface and underground mapping and geophysical surveys have also been undertaken. Where historical drilling has been undertaken by other companies in the past, Keliber has verified the data, including the re-assay of selected samples to confirm the analytical results.

The style of mineralisation is similar between the deposits, and they are all in relatively close proximity. The continuity of the larger veins in all five of the deposits is demonstrated to be good during the geological modelling, with relatively uncomplicated morphology. At Rapasaari the number of veins is greater, and orientation of the veins is more complex, as can be observed in Figure 5.4 and Figure 10.2. The mineralisation is generally relatively uniformly distributed throughout the pegmatites. The variations in grade distribution seen are often related to Ms-pegmatite (often grading ~0.3% Li_2O), and internal dilution. In addition, assessment of the variance of the Li_2O in the composite datasets shows the variance to be low. The Coefficient of Variation for the domains rarely approaches or exceeds 1 and is typically in the range of 0.4 to 0.6 for the majority of the domains. This indicates that the grade variability within the domains is low, and therefore the consistency of the feed grade during mining is expected to be good

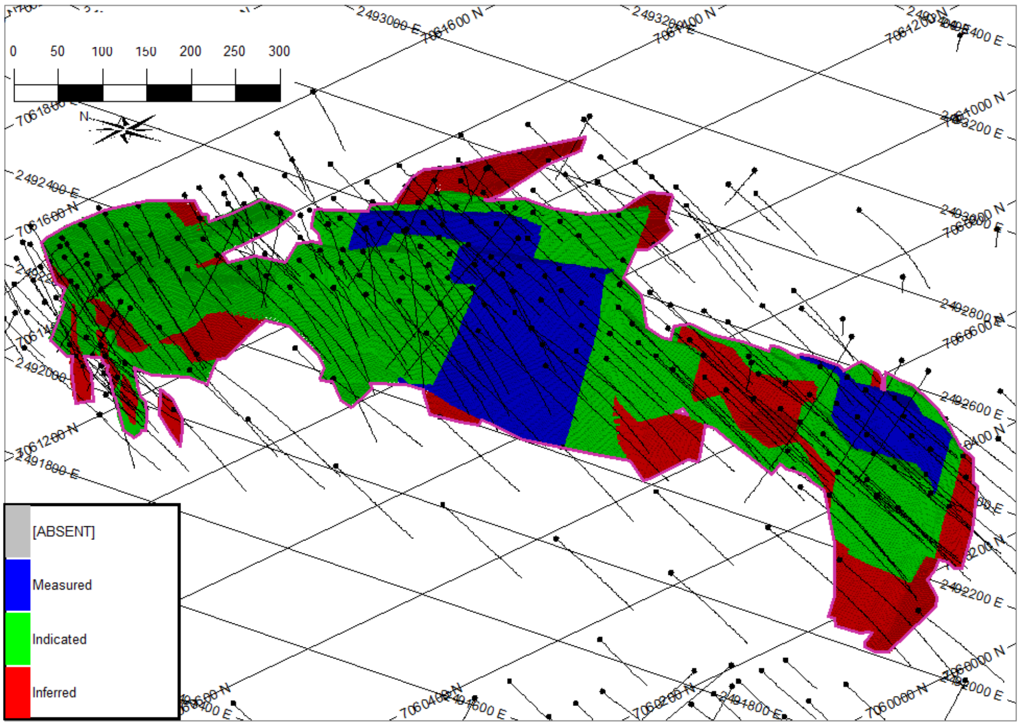
The drill hole spacing is used as one of the primary discriminators of confidence in the deposits, with drill hole spacings of 40 m where a vein shows good continuity being acceptable for a Measured classification. Where the orebodies are observed to be more complex or taper, such as the deeper portions of the main pegmatite at Syväjärvi, a 40 m grid has been classified as Indicated. At Rapasaari, where the modelled orebodies are more complex, the larger veins drilled on a 40 m grid are classified as Measured, as is the 40 m drilled portion of the primary vein at Länttä. However, the smaller veins at Rapasaari drilled on a 40 m to 60 m grid are only classified as Indicated. At Emmes and Outovesi, the drilling density and geological continuity is only considered to be sufficient for classification as Indicated.

Drilling density greater than 40 m, but less than 80 m, where there is reasonable size and continuity of the vein, is sufficient for classification as an Indicated Mineral Resource, and wider-spaced drilling, or where the modelled vein is small and intersected by only a few drill holes - therefore with less confidence in the continuity - is classified as Inferred Mineral Resources. The classification of the orebodies at Syväjärvi and Rapasaari are illustrated in Figure 10.8 and Figure 10.9, respectively. At Länttä the Measured classification is limited to the central portion of the orebodies, above an elevation of 195 m.



srk consulting	**SSW Keliber Lithium Project** Plan view of the Syväjärvi resource model with Mineral Resource classification	Project No. 592138

Figure 10.8: Plan view of the Syväjärvi resource model with Mineral Resource classification



srk consulting	**SSW Keliber Lithium Project** Isometric view looking northeast of the Rapasaari resource model with Mineral resource classification	Project No. 592138

Figure 10.9: Isometric view looking northeast of the Rapasaari resource model with Mineral Resource classification

10.4 Reasonable Prospects of Economic Extraction

[§229.601(b)(96)(iii)(B)(11)(iii) (vi) (vii)]

The consideration of Reasonable Prospects for Eventual Economic Extraction (**RPEE**) is based on the calculation of cut-off grades based both on open pit (**OP**) optimisations undertaken for assessment of the potential for OP mining, and on an underground (**UG**) mining approach, which may be applied where an OP optimisation does not indicate a sufficiently-sized OP operation, or where the UG mining is considered more appropriate for optimising the ore body utilisation.

Keliber is considering OP mining in four orebodies; Syväjärvi, Outovesi, Länttä, Rapasaari, as well as subsequent underground mining at Emmes and below some of the open pit operations. Tuoreetsaaret, and Leviäkangas have not been included in any mining studies and are thus not included in the Mineral Reserves. The engineering study work done for the proposed UG operations is to a scoping study (SS) level of accuracy, and hence excluded from the Mineral Reserves. The engineering study was completed before the declaration of Mineral Resources on the Tuoreetsaaret, and Leviäkangas deposits, and as such, these are not included in the study.

For the OP mining in four orebodies; Syväjärvi, Rapasaari, Länttä; and Outovesi, engineering study work has been done to a Pre-Feasibility study level of accuracy.

For Syväjärvi and Rapasaari, access to and from the mines has been selected on the basis of a combination of cost estimates, minimum traffic impacts on the inhabited areas and the vicinity of a Natura 2000 conservation area. The costs for improving existing roads and partly constructing new roads have been included in the cost estimates with detailed engineering in process.

For the other operations (Tuoreetsaaret, Leviäkangas, Länttä and Outovesi), no engineering designs for access have been done to date. The proposed road connections to Länttä and Leviäkangas are separate from the other mine sites. The road connection will comprise partly an existing road and partly a new road. The proposed transport route for Outovesi is to build a connection road from Outovesi to Syväjärvi. Tuoreetsaaret is located in between Syväjärvi and Rapasaari and will share the infrastructure that is developed for these operations.

The waste dumps for Syväjärvi, Outovesi, Länttä, and Rapasaari have been designed to a conceptual level with no surface water handling or access designs completed yet.

A conventional drilling, blasting, truck and shovel operation has been selected and is a suitable OP mining method for Syväjärvi, Outovesi, Länttä, Rapasaari, Tuoreetsaaret and Leviäkangas. although for the latter two deposits no detailed mining studies have yet been undertaken.

For the open pit optimisation process, which was used to determine the mineral resource pit shells, the OP mining costs vary between the mining areas and at depth. The average waste direct mining unit cost varies between USD2.67/t and USD5.31/t and the average ore direct mining unit cost varies between USD3.74/t and USD9.51/t, based on contractor quotes from the 2019 FS which has been increased by 25% and seem a reasonable assumption at this stage. The unit costs for OP mining (excluding processing) and accounting for the planned stripping ratios averages USD26/t ore mined. The processing cost varies between USD54.45/t and USD62.7/t per tonne of ore mined.

Over the Life-of-mine (LoM) the maximum processing feed is 83.7 kt per month. It is planned to supplement OP mining production with UG mining, but the UG studies are currently at SS level and will not be included in the LoM plan or Mineral Reserves at this stage.

Keliber is considering UG mining in three orebodies: two are UG extensions planned to follow the proposed OP operations in Rapasaari and Länttä; the third is a solely UG mine in Emmes.

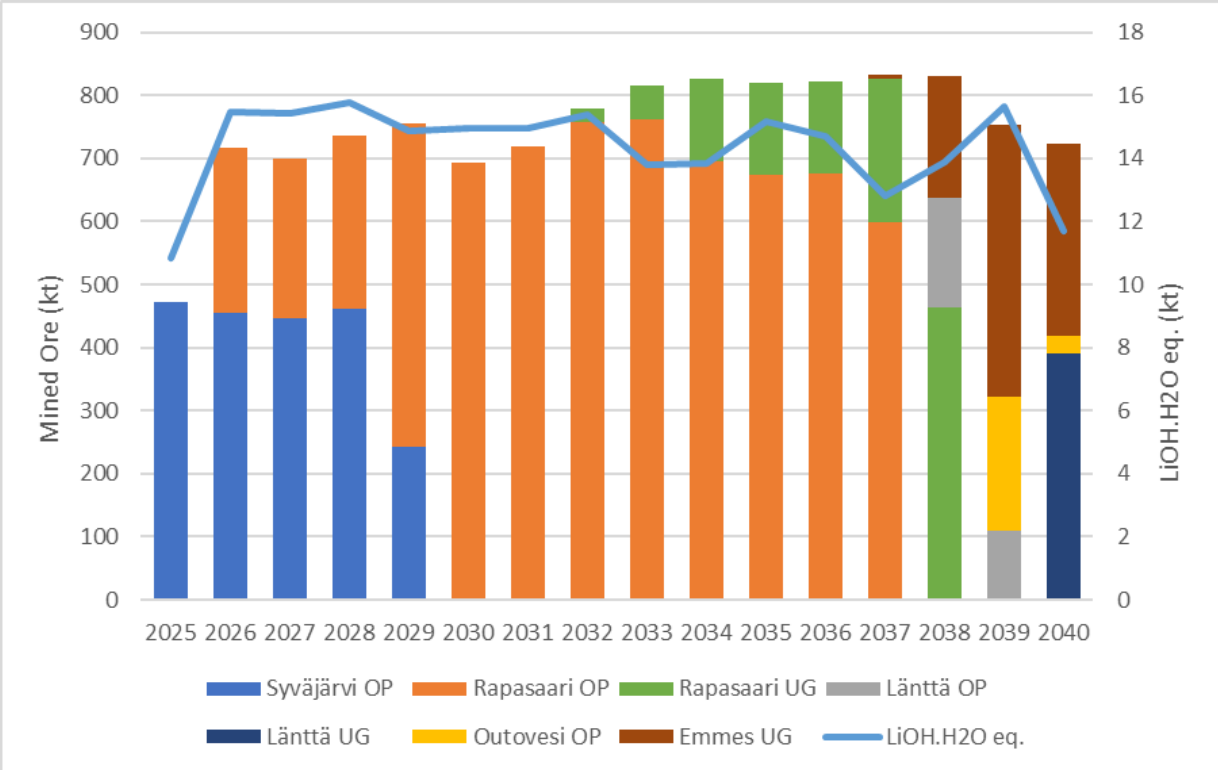
The three orebodies are similar in nature: steeply dipping and narrow and appear to have similar geotechnical characteristics. A bench-and-fill mining method has been selected to be the base-case, mined from the bottom of each orebody upwards in 20 m lifts, with fill being uncemented OP waste rock and waste development.

Rapasaari and Länttä are proposed to be accessed via declines from the respective pits and, because the Emmes orebody is partially beneath a lake, the decline planned to access Emmes is developed from dry land on Åmudsbacken, a nearby property.

The UG costs on which the Mineral Resource cut-off grade is based (USD21.2/t) are based on contractor quotes and would appear to be a reasonable assumption at this stage.

The production rate for the UG mines is based on producing 12 500 tpa of LiOH. UG mining is planned to commence with Rapasaari in 2032, followed by Emmes in 2037 and Länttä in 2039.

Figure 10.10 below shows the LoM production from the various mines.



srk consulting	**SSW Keliber Lithium Project** *Keliber_Economic_Model_v2.5.1_LoMvDFS21_SSW adjustments (ID 36372) RSa 18122022)*	Project No. 592138

Figure 10.10: LoM production

The lithium hydroxide price, mining and processing costs considered in the cut off calculations are shown in Table 10-7.

Table 10-7: Cut-off calculation parameters

Cut off parameters	Unit	Open Pit	Underground
Price of $LiOH.H_2O$	USD/t	14 634	16 570
VARP (EUR100/t)	USD/t		120
Mining	USD/t	26.32	22.4
Development	USD/t		16.3
Processing	USD/t	54.19	54
Total cost	USD/t	80.52	92.76
Cut-Off	Li_2O%	0.5	0.5

(Source: 11.08.01.04.01.03 Keliber_DFS_Volume_3_CH_13-17_February_01_2022_(final).pdf)
Note:
EUR/USD exchange rate = 1.20

The defined Mineral Resources are all close to well developed modern access and service infrastructure. Kokkola has a modern port with all the facilities for overseas shipments and it is ice-free all year, as well as an airport and rail access. There are no infrastructural impediments to the development of the project. Power is readily available in the area, supplied by Kokkolan Energiaverkot Oy, and the power requirements have been adequately planned for the open pit operations, as well as for the potential underground operations. Power and water supply have been considered in the engineering study, and all necessary logistics have been considered.

At present there do not appear to be any environmental or permitting issues that will preclude the declaration of Mineral Resources or Mineral Reserves. While the time required for the authorities to process applications is uncertain and may defer project development if these applications are delayed, there is a reasonable expectation that all the required permits can be awarded. Keliber are actively managing the permitting and tenure processes. Keliber is completing a legal due diligence exercise through their legal advisors (Hans Snellman of Stockholm and Helsinki) to understand the permitting risks. The resolution of this risk is not required for the declaration of Mineral Resources.

Metallurgical test work is at an advanced stage, and there are reasonable expectations that the selected processing route will perform within the defined parameters and achieve the expected recoveries.

Keliber undertook an update of their TEM during 2022 to reflect the impact of the atypical inflation in both opex and capex, a consequence of the inflation in the macroeconomic environment. Despite the negative impact on costs, positive price movements have more than offset the higher costs. It is noteworthy that the inclusion of lithium forecasts is relatively new. The December 2021 forecasts from UBS showed only four analysts forecasting only the lithium carbonate price. The UBS forecasts for 2022 shows a long-term price of USD 14 461 per tonne, 36% higher than the December 2021 forecast. Long-term lithium hydroxide prices are slightly higher than those for lithium carbonate with a long-term price of USD 15 195 per tonne. December 2022 included forecasts for lithium hydroxide and spodumene with between five and ten analysts forecasting each.

There is considerable uncertainty associated with the lithium market given the rapid changes in supply and demand, but the assumptions used by the project are aligned with current forecasts. Given that there is potential for higher realised prices than those assumed for the cut-off calculations, which result in a cut off value of 0.5% Li_2O, the cut off value calculated is considered reasonable for Mineral Resource reporting, and should the higher prices predicted by Standard and Poors for example be achieved, there is potential for decreasing the cut-off value. However, it is understood that there is limited upside currently to decreasing the cut-off as the lower feed grade could create technical challenges and make it difficult to meet throughput and quality targets.

10.5 Reconciliation of Mineral Resources

Sibanye-Stillwater announced its acquisition of the stake in the Keliber Lithium Project in February 2021 and declared their maiden Mineral Resource estimates for the project at 31 December 2021. No mining has taken place since the initial declaration and the only change to the total Mineral Resources is the addition of the two new deposits (Tuoreetsaaret and Leviäkangas) which were added to the declared Mineral Resource during 2022. Together these two deposits added 1.9 Mt (1.6 Mt attributable to Sibanye-Stillwater) at 0.4% Li to Keliber's total Mineral Resource base.

However, a more significant change is to the Sibanye-Stillwater attributable portion of the Mineral Resources, due to the acquisition during 2022 of a further 58.36% in the operating company, Keliber through Sibanye-Stillwater's 100% owned Keliber Lithium (Pty) Ltd taking Sibanye-Stillwater's total ownership to 84.96%. The change in attributable Mineral Resources (before the inclusion of Tuoreetsaaret and Leviäkangas) amounts to 8.8 Mt at 0.5% Li. In total, the change in Sibanye-Stillwater's attributable Mineral Resource at Keliber is 10.4 Mt at 0.5% Li. The reconciliation between the 2021 and 2022 Mineral resource estimates is shown in Table 10-8. Note that this comparison is undertaken on the Mineral Resources inclusive of Mineral Reserves. The 2021 Mineral Resource declaration is the same on an inclusive and exclusive basis as no Mineral Reserves were declare by Sibanye-Stillwater at that time, but the 2022 Mineral Resources would reflect those in Table 10-5 if reported on an exclusive basis.

Table 10-8: Keliber reconciliation between the 2022 and 2021 Mineral Resource Estimates

Classification	Mass (Mt)		Li_2O (%)		LCE (kt)	
	2022	2021	2022	2021	2022	2021
Measured	3.7	1.1	0.5	0.5	106.4	33.3
Indicated	8	2.4	0.5	0.5	202.4	62.0
Inferred	2.8	0.4	0.4	0.4	57.2	9.8
Total Mineral Resource	**14.5**	**4.0**	**0.5**	**0.5**	**366.1**	**105.1**

11 MINERAL RESERVE ESTIMATES

[§229.601(b)(96)(iii)(B)(12)]

Keliber is considering open pit mining in four orebodies at Syväjärvi, Rapasaari, Länttä and Outovesi; a fifth, Emmes, will be only mined underground. The Rapasaari and Länttä operations are intended to have underground extensions once the open pit is mined out. The orebodies are similar in nature, steeply dipping and fairly narrow and appear to have similar geotechnical characteristics.

Engineering study work has been done for the proposed open pit that SRK considers to be at PFS study level and the underground mines that SRK considers to be at SS level of accuracy. While some of the work is of sufficient detail and accuracy for a FS, the overall study accuracy is limited by the less detailed aspects, which in some cases are conceptual.

The mine sites have no existing infrastructure and before production start-up, all necessary infrastructure must be developed. Basic engineering of the mine sites infrastructure has been prepared by Sweco Finland for the Syväjärvi area, by AFRY Finland for the Rapasaari area and by Destia Finland for the Emmes, Länttä and Outovesi sites. The Syväjärvi, Rapasaari and Päiväneva is connected to the public road by an upgrade gravel road that was constructed during 2022 from gravel material mined from the Syväjärvi open pit area.

The information for this section has been sourced from:

- Keliber_DFS_Volume_1 to _ExecutiveSummary_February_01_2022_(final) in PDF format Volume_1 to _7; and
- Keliber_Economic_Model_v2.5.1_LoMvDFS21_SSW adjustments (ID 36372) RSa 18122022.xlsx

11.1 Procedure for the estimation of Mineral Reserves

[§229.601(b)(96)(iii)(B)(12)(i)]

11.1.1 Open pit optimisation

Open pit optimisation was used to evaluate the economic open pit sizes for the ore reserve statement. The resulting maximum sizes were used as a basis for the final engineering design of the open pit shapes. An additional geotechnical study was performed to evaluate the most suitable open pit overall slope angles (OSA) and design parameters.

For Syväjärvi, Länttä and Outovesi, the open pit optimisation was performed using Whittle software (Version 4.5). Whittle calculates the cash flow and net present value (**NPV**) of the open pit using the Lerchs-Grossmann algorithm to generate a series of open pit shells. The optimisations for the three open pits were re-done in 2021 with minor changes to cost mining and processing costs. For Länttä and Outovesi the product was changed from Li_2CO_3 to $LIOH.H_2O$. In both cases these adjustments did not make any significant change thus the pit designs were retained.

For the Rapasaari deposit, the open pit optimisation was achieved using the Deswik GO software (Version 2021.1). Deswik GO calculates the discounted cumulative cash flow indicating the NPV of the open pit by using the Direct Block Scheduling algorithm. Each block is analysed individually in the algorithm to define the best target period.

11.1.2 Open pit optimisation parameters

The optimisation parameters include the Mineral Resource estimation block model (Table 11-3), all necessary operational costs, time costs, selling and processing costs of the final concentrate.

The input factors used in the optimisation process include (Table 11-1):

- Overall slope angles;
- Geological block model;
- Mining costs including variation by mining bench height;
- Mineral processing costs;
- Mineral processing;
- Mining dilution and losses; and
- Product revenues.

The Mining Cost per mining bench for Syväjärvi, Länttä and Outovesi are displayed separately in Table 11-2 and was not adjusted to show the ore cost as adjusted for the closer Keliber Lithium Concentrator at Päiväneva which was previously planned to be constructed at Kaustinen.

Table 11-1: Open pit optimisation input parameters

Description	**Unit**	**Rapasaari**	**Syväjärvi**	**Länttä and Outovesi**
Optimisation Year		2021	2019	2017-2018
Exchange Rate	EUR/USD	1.21	1.1	1.1
Price (LiOH.H^2O t)	USD/t		14 128	
Price (LiOH.H^2O t)	USD/t	EUR/t		
	2022	13 450	11 116	
	2023	13 250	10 950	
	2024	15 000	12 397	
	2025	16 500	13 636	
	2026	15 300	12 645	
	2027	15 200	12 562	
	2028	15 100	12 479	
	2029	14 200	11 736	
	2030	14 800	12 231	
Price (Li^2CO^3)	EUR/t			9 918
Total Fees and Royalties	EUR/t	1.69		
Discount Rate	%	8	8	8
Modifying Factors				
Dilution (Including Internal Waste)	%	19.5	14.2	0
Mining Losses	%	95	95	95
Cut -Off Grade	%	0.4	0.5	0.5
Geotechnical				
Overall slope angle East	Degrees	37º	49º	
Overall slope angle West	Degrees		41º	
Overall slope angle East and other areas	Degrees	47º		45º to 50º
Mining Cost				
Waste Mining	EUR/t	1.85		
Ore Mining	EUR/t	3.22		
Additional Bench Costs				
Waste Mining	EUR/t	0.19	0.17	0.17
Ore Mining	EUR/t	0.11	0.17	0.17
Blasting	EUR/t			
Waste Mining	EUR/t		1.19	1.19
Ore Mining	EUR/t		1.6	1.6
Ore loading and haulage per km	EUR/t		1.54	1.54
Waste rock loading and haulage per km	EUR/t		1.43	1.43
Ore loading to Kaustinen and first haulage kilometre	EUR/t		1.25	1.25
Each additional 1 km of ore haulage to Kaustinen	EUR/t		0.15	0.15
Additional cost to mine Fe-sulphide bearing mica schist	EUR/t		3.5	0
Fixed Cost (Processing Labour)		4.8		
Processing Costs	EUR/t	45	51.5	57
Global Lithium Yield	%	74.30%	74.50%	
Länttä	%			67.10%
Outovesi	%			73.10%

Table 11-2: Mining operational costs by mining levels, 2017-2019 (processing plant then to be located in Kaustinen)

Pit	Distance to Kaustinen	Depth	Mining level	Ore mining cost EUR/t	Waste mining cost EUR/t
Syväjärvi	17	20	55	7.69	2.79
Syväjärvi	17	40	35	7.86	2.96
Syväjärvi	17	60	15	8.03	3.13
Syväjärvi	17	80	-5	8.20	3.30
Syväjärvi	17	100	-25	8.37	3.47
Syväjärvi	17	120	-45	8.54	3.64
Syväjärvi	17	140	-65	8.71	3.81
Syväjärvi	17	160	-85	8.88	3.98
Länttä	25	20	115	8.89	2.79
Länttä	25	40	95	9.06	2.96
Länttä	25	60	75	9.23	3.13
Länttä	25	80	55	9.40	3.30
Länttä	25	100	35	9.57	3.47
Länttä	25	120	15	9.74	3.64
Länttä	25	140	-5	9.91	3.81
Outovesi	17	20	70	7.69	2.79
Outovesi	17	40	50	7.86	2.96
Outovesi	17	60	30	8.03	3.13
Outovesi	17	80	10	8.20	3.30
Outovesi	17	100	-10	8.37	3.47
Outovesi	17	120	-30	8.54	3.64

Table 11-3: Summarized block model properties

Parameter	X	Y	Z
Syväjärvi			
Minimum coordinate	7061900	2490250	-90
Maximum coordinate	7062700	2490700	90
User block size	10	10	5
Minimum block size	5	5	2.5
Rotation degrees	0	0	0
Total Blocks	36458		
Rapasaari			
Minimum coordinate	7059750	2491500	-200
Maximum coordinate	7061750	2493000	300
User block size	10	5	5
Minimum block size	2.5	1.25	1.25
Rotation degrees	0	0	0
Total Blocks	4420086		
Länttä			
Minimum coordinate	7057700	2506900	-100
Maximum coordinate	7058400	2507450	125
User block size	10	5	5
Minimum block size	10	5	5
Rotation degrees	45	0	0
Total Blocks	19299		
Outovesi			
Minimum coordinate	7066600	3338350	-25
Maximum coordinate	7067350	3338650	95
User block size	10	5	5
Minimum block size	10	5	5
Rotation degrees	30	0	0
Total Blocks	4274		

11.1.3 Optimization results

This chapter describes the analysis between the previously optimised open pits and 2021 re-analysis with new processing flow sheet and $LiOH{\cdot}H_2O$ -tonne price estimate and operative cost estimates. The reason for the check analysis is that the flow sheet, prices and costs have changed since the last optimisations, and it is necessary to analyse whether the previous open pit designs still match to the updated optimisation results. The designs and pit shells were compared, and tonnes and other main results were compared between cases. Analyses are carried out in a very simplified approach to ensure reasonable accuracy between the previous and updated optimisation.

The same optimisation approach, using Whittle™ 4.5 software, has been used in the sensitivity analyses as in the previous open pit optimisations in 2017 - 2019.

Optimisation has been carried out in the following open pits:

- Syväjärvi, previously optimised in 2019;
- Länttä, previously optimised in 2017;
- Outovesi, previously optimised in 2017; and
- Rapasaari open pit was re-optimised during this DFS study in 2021.

The updated results of the Syväjärvi, Länttä and Outovesi indicated that there was no need to change the open pit designs for these thus the previous designs were used.

11.1.3.1 Syväjärvi evaluation

The Syväjärvi open pit was first optimised in 2017. The latest update to the open pit was in 2019. Also, an underground option was studied in 2019. Analysis for the underground option was to understand the economic potential of the mineralisation from underground operations below the open pit.

The Syväjärvi open pit optimisation (2019) indicated a profitable and feasible open pit mining scenario with a good project value. The Syväjärvi open pit optimisation scenario at maximum revenue factor of 1 indicates 1.8 Mt of ore reserves at a strip ratio of 6.07.

A 0.5% Li_2O cut-off grade was used for the Syväjärvi open pit optimisation. This provides an average of 1.08% Li_2O feed grade for the ore inside the optimised pit shell. 5% ore loss was used in the Syväjärvi optimisation.

The optimised final pit size was 480 m (N-S), 220 m (E-W), and 120 m deep. The haulage ramp can be placed to the west and north wall of the open pit to allow maximum steepness for the east wall that is located next to the Heinävesi Lake.

Syväjärvi 2021 re-evaluation

The Syväjärvi and Rapasaari open pits are the main ore feed sources in the mining project. Thus, the analysis of how the Syväjärvi pit design matches the optimisation with new prices and costs were considered important. The check analysis of the Syväjärvi indicates that changes in the processing flow sheet and $LiOH{\cdot}H_2O$-tonne average price estimate, processing costs and minor changes in the mining costs have no change to the open pit optimisation results. Small changes in the results are within the error margin and are explained by the open pit selection process. The NPV of the optimisation result increased by EUR14m (Table 11-4). Therefore, it is justified to use the 2019 open pit design in the mine scheduling, Ore Reserve estimation and the final cash flow analysis of this DFS Report in 2021.

In the Syväjärvi analysis the following assumptions were made:

- A cut-off grade of 0.5% Li_2O remains the same as in 2017 and in 2019. Cut-off grade has a very minimal effect on the open pit size and geometry at Syväjärvi.
- Processing cost is adjusted to 45 EUR/t of ore following re-evaluation in 2021.
- Mining costs are adjusted to correspond to 2021 cost estimates and quotes from mining contractors.

Table 11-4: Syväjärvi analysis results

Optimisation year	Tonnages to processing	Tonnages to waste	NPV (EURm)	Average ore waste opex EUR/t	Processing Opex EUR/ ore t	Li_2O-feed grade	Price EUR $LiOH.H_2O$ /t	Cut-off grade %
2019[1]	2 549 395	13 618 708	402	-4.6	51	1.08 %	12 107	0.50 %
2021	2 559 957	14 232 188	416	-4.3	45	1.07 %	12 521	0.50 %

Note:
1. Definitive Feasibility Study Report Volume 3 Chapter 13 to 17 inclusive February 28, 2019

11.1.3.2 Länttä evaluation

The Länttä open pit optimisation scenario at a revenue factor below 1 indicates 0.4 Mt ore reserves at strip ratio of 5.6. The optimal pit shape was selected based on an assessment of the underground mine profitability in a separate evaluation. As a result of that assessment, the selected scenario foresees underground mining methods being utilised for the remaining ore beneath the open pit.

The Final pit geometry is 360 m long (SE-NW), 140 m wide (NE-SW) and 84 m deep. A 0.5% Li2O cut-off grade was used for the Länttä open pit optimisation. This provides an average of 0.89% Li2O feed grade for the ore inside the optimised pit shell. A 5% ore loss was used in the Länttä optimisation.

Läntä Evaluation

The Läntä open pit was previously optimised in 2017 and the result was a combination of open pit and underground operations (Table 11-5). An open-pit only option was also considered suitable, but the waste rock amounts were considered too high regarding environmental aspects and permitting. The Läntä ore consists of two narrow parallel ore lenses. Mining of the lenses using open-pit operations only will generate high waste to ore ratio, even though the operations are considered profitable. Therefore, an open-pit and underground option were considered as the best option.

In the 2021 analysis, the same approach was used, and the optimisation aimed to match the same open-pit shape as was previously generated. Numerical results were then compared. The NPV of the optimisation result increased by EUR28m.

Based on the results it is recommended to use the 2017 open pit design for the Läntä Ore Reserve estimation.

In the Läntä analysis the following assumptions were made:

- Cut-off grade 0.5% Li_2O remains the same as in 2017.
- Processing cost is adjusted to 45 EUR/t of ore.
- Mining costs remain the same as in 2017 due to transportation from the Läntä pit to the processing plant.
- Li_2CO_3 price was used in the optimisation in 2017. There were no plans for a hydrometallurgical plant in 2017. LiOH.H_2O was the process main product in 2021. LiOH.H_2O has a different price than Li_2CO_3.

Table 11-5: Läntä analysis results

Optimisation year	Tonnages to processing	Tonnages to waste	NPV (EURm)	Average ore waste opex EUR/t	Processing Opex EUR/ ore t	Li_2O-feed grade	Price EUR LiOH.H_2O t	Price EUR Li_2CO_3 t	Cut-off grade
2017[1]	383 470	2 161 388	26.7	-4.08	57	0.89 %		9918	0.5 %
2021	385 417	2 164 222	55.1	-4.08	45	0.89 %	12521		0.5 %

Notes:
1. Definitive Feasibility Study Report Volume 3 Chapter 13 to 17 inclusive February 28, 2019

11.1.3.3 Outovesi evaluation

The Outovesi deposit is considered to be an open-pit only operation. Underground mining is not considered a viable option for the currently delineated Mineral Resource.

The Outovesi open pit optimisation scenario at a revenue factor of 1 indicates 241 kt ore reserves at strip ratio of 7.8. The final pit geometry is 370 m long (SE-NW), 120 m wide (NE-SW) and 75 m deep. A 0.5% Li_2O cut-off grade was used for the Outovesi open pit optimisation. This provides an average of 1.07% Li_2O feed grade for the ore inside the optimised pit shell. 5% ore loss was used in the Outovesi optimisation.

Outovesi re-evaluation

In the previous optimisation, the Mineral Resource was less fully utilised using open pit mining and the 2017 price range (Table 11-6). Therefore, there was no change to the open pit size in the optimisation even though the price for the end product is higher in 2021. The NPV of the optimisation result increased by EUR11m.

In the Outovesi analysis the following assumptions were made:

- Cut-off grade 0.5% Li_2O remains the same as in 2017;
- Processing cost is adjusted to 45 EUR/t of ore;
- Mining costs remain the same as in 2017 due to transportation from the Läntä pit to the processing plant; and

- Li_2CO_3 price was used in the optimisation in 2017. There were no plans for a hydrometallurgical plant in 2017. Therefore, the end product of $LiOH.H_2O$ in 2021 and the end product price is significantly different.

Table 11-6: Outovesi analysis results

Optimisation year	Tonnages to processing	Tonnages to waste	NPV (EURm)	Average ore waste opex EUR/t	Processing Opex EUR/ ore t	Li_2O-feed grade	Price EUR $LiOH.H_2O$ t	Price EUR Li_2CO_3	Cut-off grade
2017[1]	241 372	1 876 611	23	-3.62	57	1.07 %		9918	0.5%
2021	242 021	1 886 207	44.3	-3.62	45	1.07 %	12521		0.5%

11.1.3.4 Rapasaari evaluation

The Deswik.GO™ direct block scheduling optimisation process produces a series of nested pit shells based on revenue factors and cash flow expressed as production periods (years). The cash flow for each shell is calculated using the input selling prices and costs and thereafter provides an indication of the economic changes in the production schedule.

The resulted pit shells are used later on in the open pit and underground design phase.

The Direct Block Scheduling open pit optimisation is carried out in two phases:

Phase 1: Pit shell by pit shell optimisation - "Best and worst case cash flow" options are compared to pit shape and phases:

- Indicates maximum pit;
- The best cash flow case is rarely practically feasible to be mined. Therefore, intermediate option between and best and worst cash flow are selected for the pit size;
- After max pit evaluation mining phases are generated for further designs; and
- Waste and corresponding ore mined in a similar time frame - high cash flows first. Best ores mined first. Practically never functional.

Phase 2: Bench by bench optimisation - "intermediate to worst-case cash flow":

- Almost always practically feasible;
- Indicates the realistic cash flow out of the selected max pit and mining phases;
- Redefines mining schedule within and between mining pre-defined phases; and
- Some waste is mined much earlier than the ore it uncovers – Cash flow is optimised according to the mining phases. Detailed mine planning (years to months) will even the waste mining amounts and improve cash flow.

Open-pit shell selection criteria

Two open pit shells were selected for more detailed analysis and strategic evaluation. The first option was to utilize only the open-pit (OP) mining method maximising open pit Ore Reserve. The second option was for maximising Mineral Resource and to reduce the amount of waste rock, therefore an open-pit and underground option (OP + UG) was studied.

The OP + UG option was seen as a more Mineral Resource-efficient approach in previous studies of Rapasaari.

- In the OP only option, only a minimal amount of the Mineral Resource is left outside the open pit geometry. That small Mineral Resource part was considered too small to be economically extracted using underground methods and was marked as a sterilised Resource; and
- The OP + UG option was seen more Resource-efficient option as most of the Mineral Resource was able to be mined with slightly smaller open pit and technically and economically viable underground mining.

In the optimisation the revenue factors against pit sizes and the cash flow curve were analysed in order to indicate the maximum mine life and profitability. But in the combined OP + UG operation the open pit shell and cash flow selection criteria also took into consideration the underground mining plans and the possibility to minimize the waste rock mining.

Following criteria have been used for the pit shell selection for the Keliber Project:

- Rule 1. Maximise cash flow (NPV). Overruled by rule no.2 if the resulted open pit geometry is not practically feasible. The maximum allowed deduction in NPV (from maximum) is 10%.
- Rule 2. Generate practically feasible open-pit geometries.
- Rule 3. Maximise cash flow (NPV) with the selected underground mining design in combined operation.

Rapasaari optimisation results, open-pit + underground option

For the option to commence an underground mining operation alongside open pit mining a smaller optimisation shell (revenue factor=0.4-0.5) was selected. The Rapasaari open pit optimisation indicated feasible open pit mining operations and potential Ore Reserve that could be technically and economically mined:

- 0.4 % Li2O-cut-off grade was used for the Rapasaari open pit optimisation. This provides an average of 1.00 % Li2O- Insitu grade for the ore inside the optimised pit shell; and
- 5 % ore loss was used in the Rapasaari optimisation.

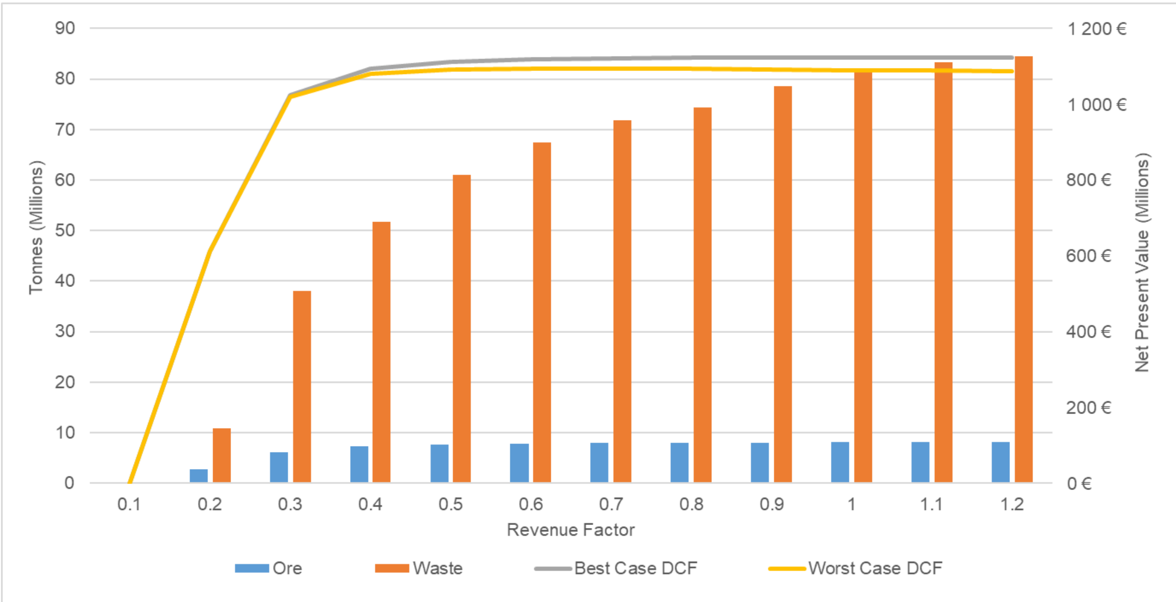
The Rapasaari open-pit and underground optimisation scenario at optimum cash flow indicates 7.8 Mt Potential Ore Reserves from the open pit at a strip ratio of 6.5 The estimated NPV at 8% discount rate is EUR1 030m after bench phase scheduling, pre TAX and no CapEx and sustaining CapEx items included Table 11-7.

The open-pit only option optimisation would allow production for 11 years, but optimal underground mine combined with open pits 11-12 years of production. This approach was selected for further design. The overall cost, revenue and the cash flow evaluation to select suitable operation period, cash flow and final open pit tonnes is seen in Figure 11.1.

Table 11-7: The Rapasaari open pit optimisation results in the bench by bench schedule according to the open pit phases and Mineral Resource categories

Phase	Mineral Resource Category	Ore (kt)	Waste (kt)	Strip Ratio	Li2O%	NPV at 8% Discount Rate (EURm)	Production Years
1	Measured	457.1	12 352.6	4.7	1.17	481	
	Indicated	2 178.2			1.07		
2	Measured	-	13 051.0	6.7	-	268	
	Indicated	1 941.8			1.06		
3	Measured	777.6	13 249.8	8.2	1.04	165	
	Indicated	839.4			0.94		
4	Measured	22.7	12 444.4	7.7	0.86	116	
	Indicated	1 594.7			0.82		
Total	**Measured**	**1 257.3**	**51 097.7**	**6.5**	**1.1**	**1 030**	**11**
	Indicated	**6 554.1**			**1.0**		

Notes:
1. The resulting ore tonnes are open pit optimisation based tonnes.
2. NPV values are based on optimisation and do not include CapEX or Sustaining CapEX values. NPV per phase are indicative.

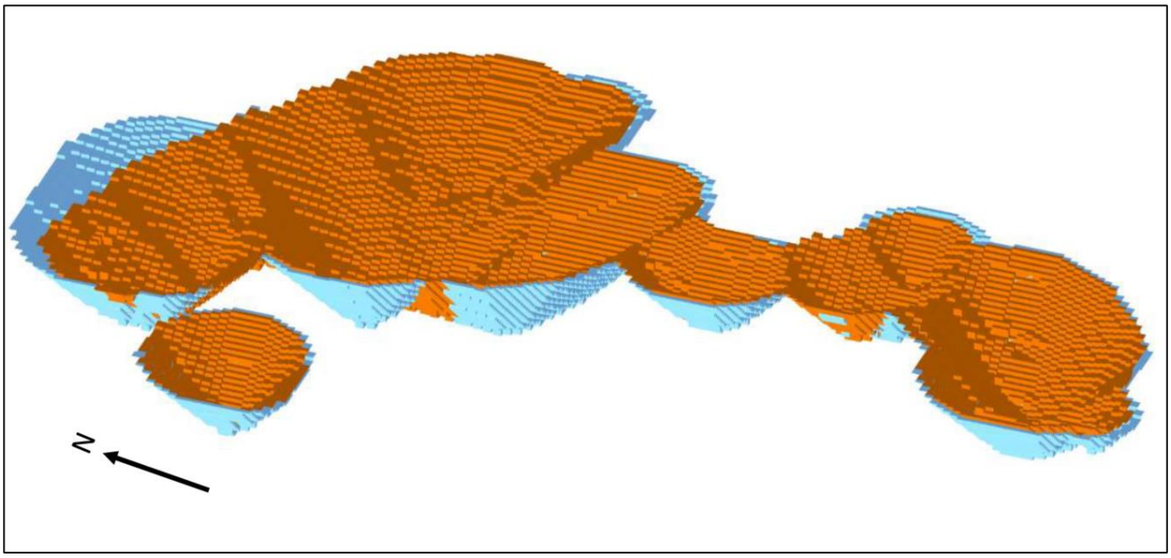


srk consulting	**SSW Keliber Lithium Project** Rapasaari pit-by-pit optimisation results	Project No. 592138

Figure 11.1: Rapasaari pit-by-pit optimisation results

The selected open-pit geometries at 0.4 and 0.5 revenue factors have minor differences. Although a small extension in the north part of the open pit was seen as a major difference between the selected pits (Figure 11.2). Based on the waste rock haulage requirements for the north part of the open pit an additional ramp was designed in the extension area.

The optimised Rapasaari final open pit shell is presented in Figure 2-6. The optimised final pit shell size was 1 310 m (N-S), 480 m (E-W widest part) in and 170 m deep. The geometry of the resulted final open pit was smooth and easily suitable for 775 kt/a ore production. The selected pit shell also enables the later underground operation at Rapasaari. The design for the underground operation will at a later stage be incorporated in the Mineral Reserves once the more exploration drilling has been completed to ensure the optimal open pit size has been determined.



srk consulting	**SSW Keliber Lithium Project** Rapasaari open pit geometry	Project No. 592138

Figure 11.2: Rapasaari open pit geometry. (blue geometry presents the 10-year production; brown the 9-year production)

11.2 Open pit design

Based on the open pit optimisation results and geotechnical guidance, the open pits were designed as shown in Figure 11.4 (Syväjärvi), Figure 11.5 (Rapasaari) Figure 11.6 (Länttä) and Figure 11.7 (Outovesi).

11.2.1 Open pit geotechnical design parameters

At Rapasaari the geotechnical conditions are most understood of all the deposits. Compared to other deposits, Rapasaari has had the most geotechnical samples tested in the laboratory to determine the mechanical properties of the rock. Rapasaari geotechnical information includes orientation data of joints, bedding planes and other structures. Overall, the rock quality in the studied areas of the deposit indicate good quality, competent rock.

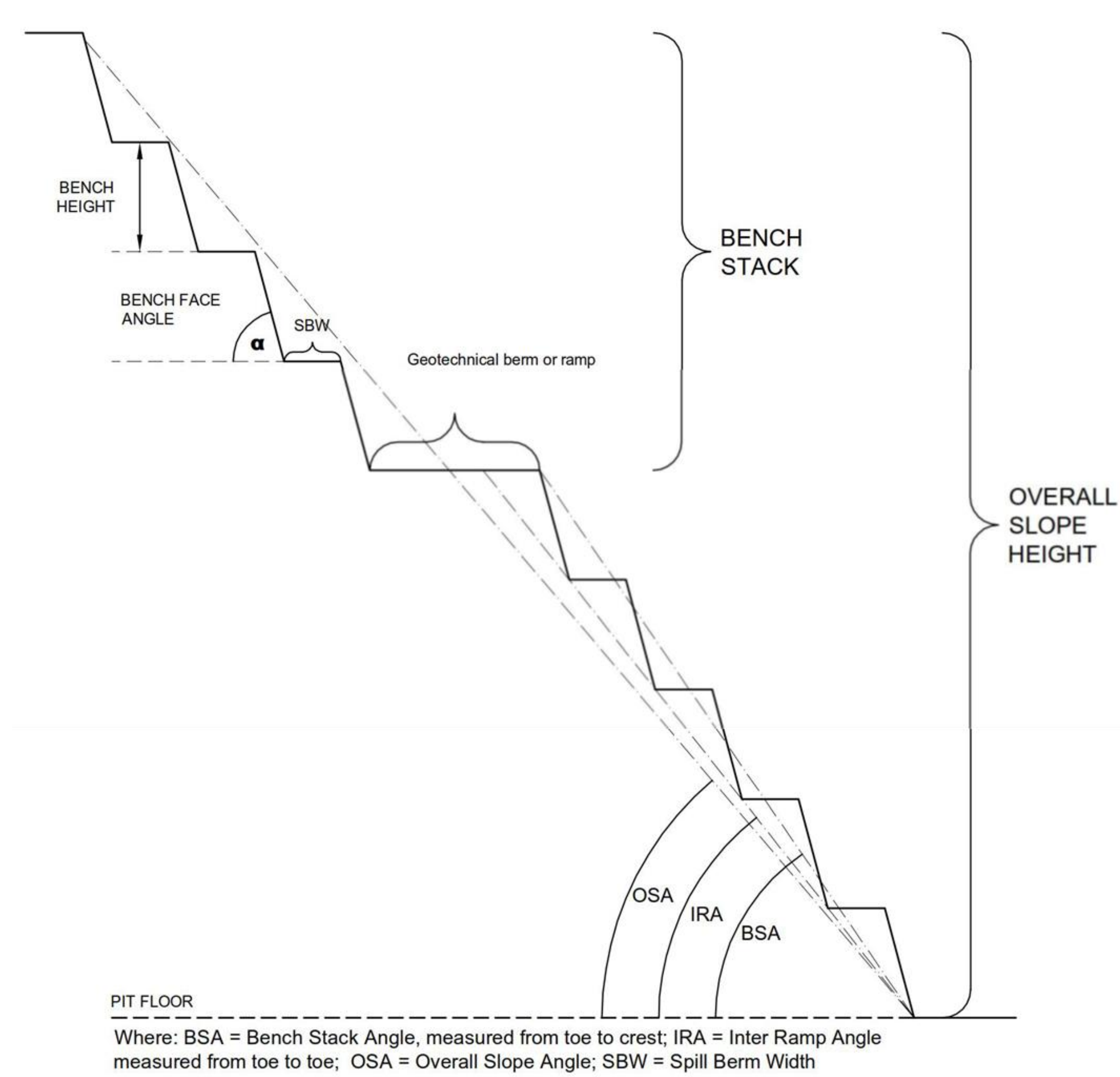
During February and March 2021 hydrogeological field measurements were carried out in Rapasaari. Hydraulic conductivity of the till layer was measured with slug tests in nine groundwater observation wells. The hydraulic conductivity of the bedrock was investigated from five drill holes. Hydrogeological conditions at Syväjärvi, Länttä, Outovesi and Emmes were studied at conceptual level.

11.2.2 Mine design criteria

This section details the parameters used in the open pit and underground mine design process for the Keliber pre-feasibility study. The Parameters were obtained by AFRY from the following sources:

- Pöyry Finland Oy 2017. Preliminary slope design study;
- of Syväjärvi, Rapasaari, Länttä and Outovesi deposits;
- Pöyry Finland Oy, 2018. Rock mechanical investigation of the Syväjärvi and Rapasaari Li-deposits;
- Pöyry Finland Oy, 2019. Rock mechanical investigation of the Länttä Li-deposit;
- Pöyry Finland Oy, 2019. Rock mechanical investigation of the Emmes and Outovesi Li-deposits;
- AFRY Finland Oy 2020. Keliber Rock mechanical simulation of Rapasaari mine 2020.pdf;
- AFRY Finland Oy 2021. DFS_LOM_2021_22.9.2021.xlsx;
- AFRY 2021 – Numerical Groundwater Flow Modelling – Rapasaari open pit and underground mine;
- AFRY 2021 - Flow Logging and Other Hydrogeological Studies at Rapasaari Project Area in Kaustinen, Finland. Flow Logging in Drillholes RA-93, RA-145, RA-155, RA-189 and RA-291);
- JK-Kaivossuunnittelu Oy Data. Sent 2021-8-23.zip; and
- PL Mineral Reserve Services 2018. Emmes_2018_surpacdata.zip.

The open pit slope parameters are tabled and illustrated in Figure 11.3 and Table 11-8.



srk consulting	**SSW Keliber Lithium Project** Open-pit slope sections and naming according to AFRY. (*Source: Keliber_DFS_Volume_3_CH_13-17_February_01_2022_(final).pdf*)	Project No. 592138

Figure 11.3: Open pit slope sections and naming according to AFRY

For this study, the ramp width was increased to between 15-30 m for all pits except for the Outovesi deposit which is anticipated to be a small scale operation and thus a narrower single lane ramp is justified. Multiple ramp widths have been used within the open pits (Table 11-8). This is to optimize the ore to waste stripping ratio. The haul truck used for the design was the Caterpillar 777G (nominal payload capacity of 90 tonnes), which has an overall operating width of 6.687 m. A 22 m ramp width allows for safe two-way traffic with a drain ditch and safety berms on both sides of the road. The final benches in the pit designs have been designed using single lane access which allows for the retrieval of extra ore at the base of the pits.

Table 11-8: Recommended parameters for open pit designs

Open-pit design parameters	Syväjärvi	Rapasaari	Läntta	Outovesi
Bottom of pit design	-15mams	-50mams	80mams	10mams
Top of pit design	76mams	90mams	117mams	80mams
Minimum mining width				
Overall slope angle (OSA)	West = 41° East= 49°	West = 42–50° East= 38–45°	West = 41° East= 49°	
Inter ramp angle (IRA)	West = 56° East= 46°	West = 48° East= 48°	West = 56° East= 46°	
Batter angle	West = 75° East= 65°	West = 75° East= 75°	West = 75° East= 75°	
Ramp gradient		1 in 10		
Ramp width	22 m	15/ 20/ 25/ 30 m	16 m	12m
Bench height		20 m (4X 5 m benches)		
Berm width	8 m	14m	8 m	8m

11.2.3 Syväjärvi

The open pit design required different bench angles for the east and west walls. The east side of the pit was adjusted according to a very linear (schistose) rock type that had a foliation plane dip of 55° - 65°. The east side bench angle was set to 65° while the west side bench angle was set to 75°. The deposit dipping at 18° means high waste rock mining in the hanging wall side of the ore. Hence, it is recommended that the waste rock extraction is advanced well before the ore extraction at the same mining level. The Syväjärvi ore consists of a single relatively thick unit that provides easy ore accessibility from three parallel ore lenses, two below the main ore lens on the south side and one above on the north.

11.2.4 Rapasaari

Open pit mine design was done by AFRY, and it is based on the optimized pit geometries and open pit phases presented in the referenced report.

Open pit production is separated into the main pit, one smaller satellite open pit at the west side of the main pit, and another to the south pit area. The ramp in the main open pit runs northwards along the eastern wall and then switches back to south at the north side of the main pit. The last part of the ramp divides the main open pit into two sections as the ramp runs down from the middle part of the open pit to the pit bottom. The west satellite pit and south open pit area are accessed by a separate ramp.

The west satellite pit was designed smaller than the optimized open pit shell as the pit shell geometry was very small, creating difficulties in designing a pit that could reach the pit shell bottom. Therefore, a shallower pit was designed, and the remaining mineralisation was considered as suitable for underground extraction.

The main ramp is designed to be 25 - 30 metres wide to enable two-way traffic. The smaller satellite pits have narrower ramps. The Rapasaari open pit design was done by using a 75° batter angle for all open pit benches. The overburden removal angle was set to 20°.

The open pit optimisation was carried out at 37º overall slope angle in the east area of the open pit. Therefore, the main ramp (south to north direction) can be adjusted to the east side (footwall) of the open pit with a switch back to the south. This will allow the design to match the optimized open pit shell.

The open pit design is accompanied by an underground design to increase the mining of known Mineral Resources with less waste rock mining.

Rapasaari Open Pit Phases

The intermediate open pit phases were designed according to the optimized open pit phases. The intermediate phases are designed in two-year intervals for production years 3, 5 and 7 respectively. The designed intermediate phases are later used in the mine scheduling work to define a more accurate LoM. The LoM for the whole mining project includes other pits included in the mining project Syväjärvi, Länttä, Outovesi and Emmes respectively.

- Rapasaari Phase 1 for 0 - 3 years production;
  - A starting point for Rapasaari operations. A starter pit to maximize cash flow with minimized waste rock mining;
  - Ore haulage is carried out using east and west ramps;
  - Waste rock haulage is carried out using the north ramp. Waste rock is hauled to the nearby north waste rock storage facility;
  - The west satellite pit will be excavated during this period;
- Expansion to the north pit area has started. Ore is accessible at the surface levels in the north area. Rapasaari Phase 2 for 3 - 5 years production;
  - Ore haulage is carried out using east and west ramps;
  - Waste rock haulage is carried out using north and west ramps. Waste rock is hauled to the nearby northeast waste rock storage facility;
- Expansion to the south pit area has started. Rapasaari Phase 3 for 5 - 7 years production;
  - Ore haulage utilises the east and west ramps;
  - Waste rock haulage utilises the north and west ramps. Waste rock is hauled to the nearby northeast waste rock storage facility;
  - The west satellite pit will be completed;
- Expansion to the south pit area has started Rapasaari Phase 4 for 7 - 10 years production; and
  - Ore haulage utilises the east and south ramps.

11.2.5 Länttä

Open pit and underground mine planning for Länttä has been done by PL Mineral Reserve Services. The Länttä open pit design was done using a 75° bench angle for the whole pit. The pit bottom level was set at +80 mamsl.

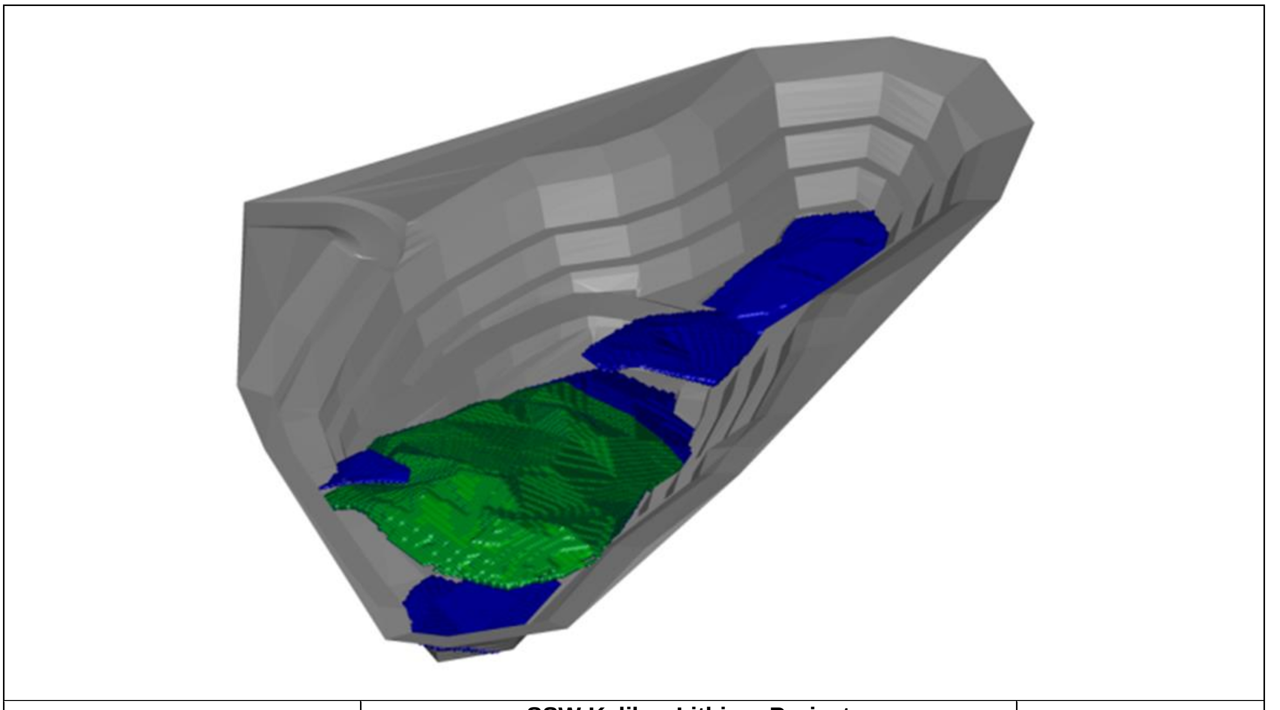
The ramp was located to circle clockwise around the open pit, starting from the southwest corner. Access to the underground mine is designed to start at the northwest corner of the open pit at elevation +93 mamsl.

At the bottom of the pit, the pit bottom access ramp width is narrowed to eight metres. The overburden slope angle was set to 20°.

11.2.6 Outovesi

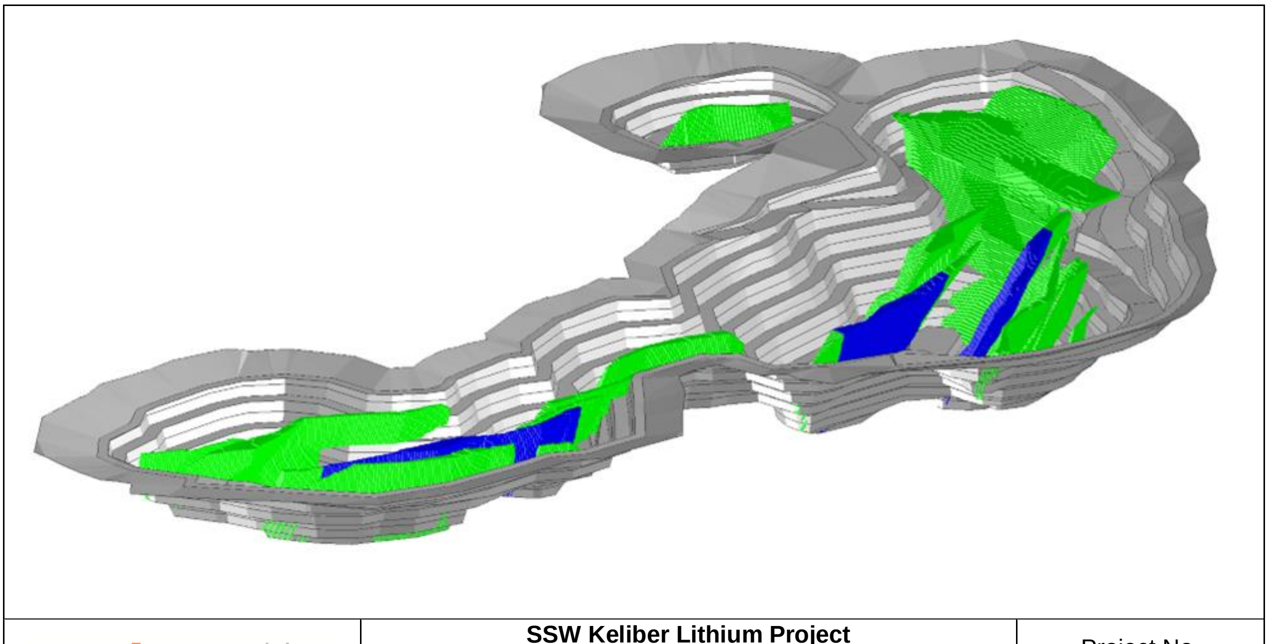
The Outovesi open pit design was done using a 75° bench angle for the whole pit.

The ramp was located to circle the open pit, starting from the east. At the bottom of the pit, the pit bottom access ramp width is narrowed to eight metres. The overburden slope angle was set to 20°.



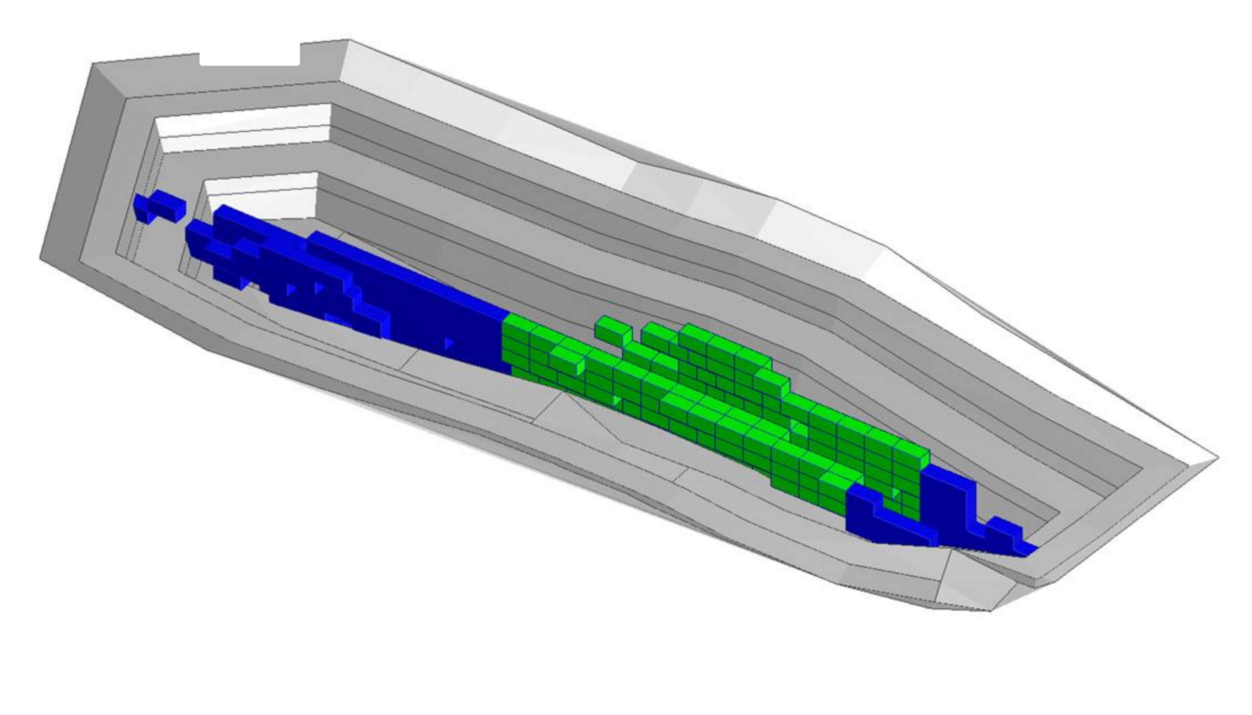
srk consulting	**SSW Keliber Lithium Project** Syväjärvi open pit mine Layout and Ore Reserves *(Source: Sibanye 2022)*	Project No. 592138

Figure 11.4: Syväjärvi open pit mine layout and Ore Reserves (blue= Proven Reserves, green = Probable Reserves)



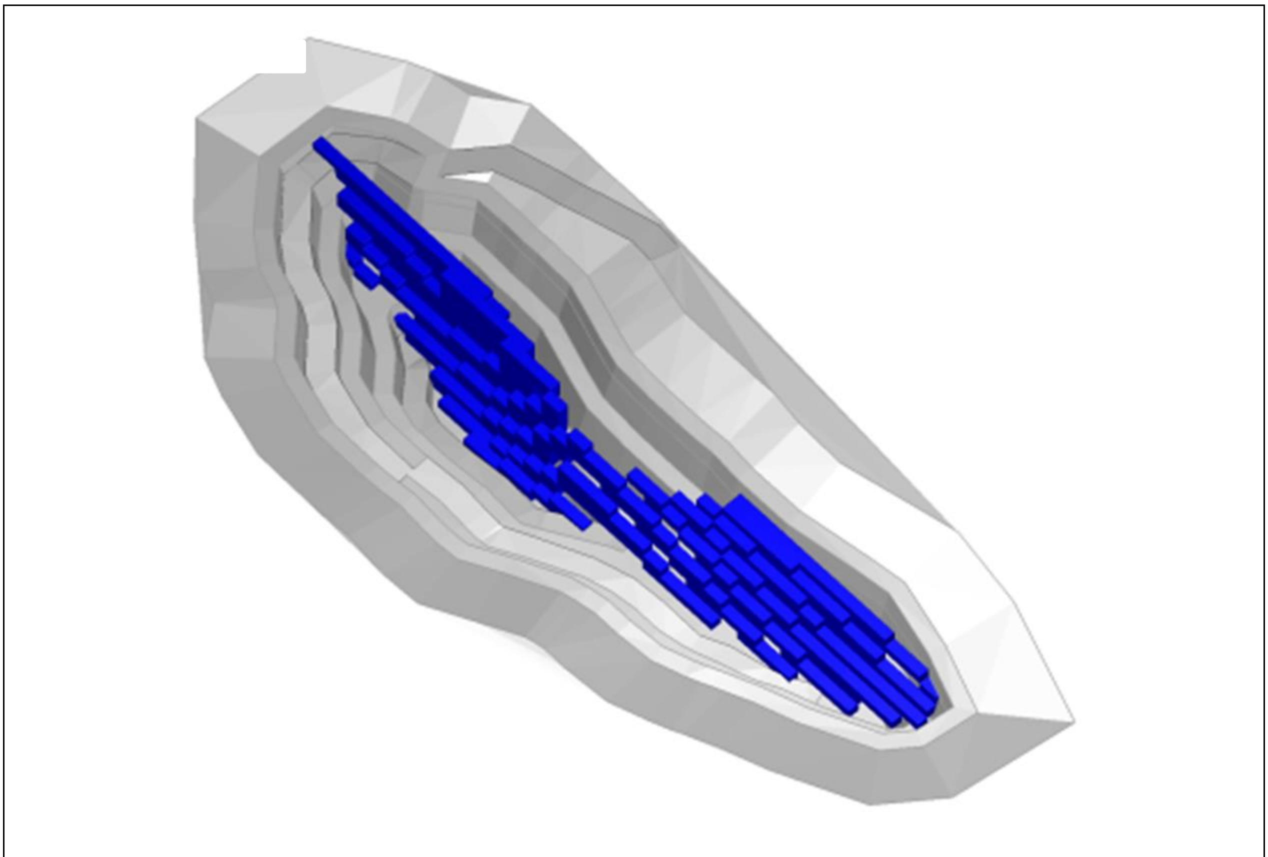
srk consulting	**SSW Keliber Lithium Project** Rapasaari open pit mine layout and Ore Reserves *(Source: Sibanye 2022)*	Project No. 592138

Figure 11.5: Rapasaari open pit mine layout and Ore Reserves (blue= Proven Reserves, green = Probable Reserves)



srk consulting	**SSW Keliber Lithium Project** Länttä open Pit mine layout and Ore Reserves *(Source: Sibanye 2022)*	Project No. 592138

Figure 11.6: Länttä open pit mine layout and Ore Reserves (blue= Proven Reserves, green = Probable Reserves)



srk consulting	**SSW Keliber Lithium Project** Outovesi open pit mine layout and Ore Reserves *(Source: Sibanye 2022)*	Project No. 592138

Figure 11.7: Outovesi open pit mine layout and Ore Reserves (blue= Proven Reserves, green = Probable Reserves)

11.2.7 Modifying Factors

[§229.601(b)(96)(iii)(B)(12)(vi)]

The mining losses account for ore that is lost (hauled to the waste rock storage facility or not mined) during selective ore mining.

Mining dilution occurs during blasting and excavation processes where ore and waste material are mixed. The additional waste rock materials are not desirable, as low-grade ore or waste material adversely affect the output of the processing system. Mining dilution increases the quantity of ROM ore to be mined and simultaneously reduces the mill feed grade.

Mining dilution is a sum of multiple factors, including:

- The selected mining method in question;
- Mining equipment type, size and minimum mining width;
- Nature, extent and geometry of the ore body; and
- Quality of managed grade control.

The geological resource block model Li_2O value includes the diluting effect of white and black waste rock inside the mining block, which is considered to be internal dilution. In the mineral resource to ore reserve conversion, external dilution was also applied. For all the open pit operations Ore losses of 5% and external dilution of 10% has been applied.

Internal black rock is calculated into the block model in the Rapasaari and Syväjärvi deposits. For Länttä and Outovesi the following proportions of internal black rock are used:

- Länttä: 17.4 %
- Outovesi: 0 %

The given percentages are estimated by Keliber, by investigating the drill core intersections. The amount of planned external dilution has been estimated by calculating the partial percentage of ore solids within the mined blocks into the block model.

In the reserve conversion, the dilution and mined ore tonnes are calculated as follows:

$$\text{Mined Ore} = \text{In-situ Tonnes x Mining Recovery x } (100 + \text{Unplanned External Dilution})$$

Black rock dilution, which can be reduced by using a sorter, is calculated with the following methodology:

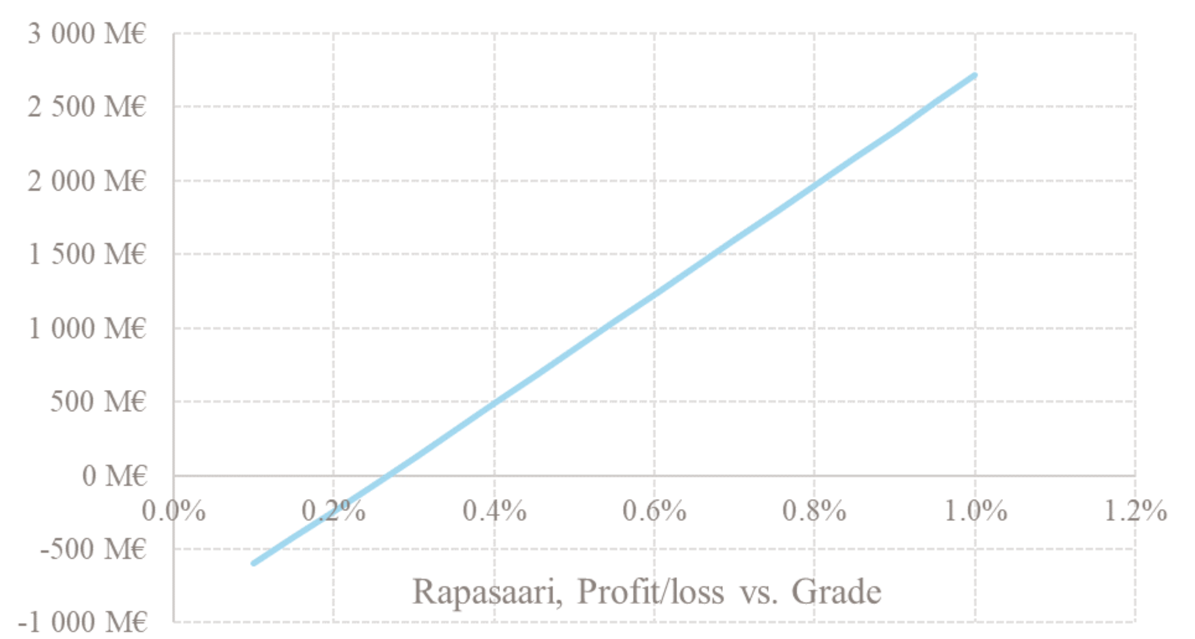
$$Black\ Rock\ Dilution = \frac{Total\ Amount\ of\ Black\ Rock}{Mine\ Ore}$$

11.2.8 Cut-off grade

[§229.601(b)(96)(iii)(B)(12)(iii)]

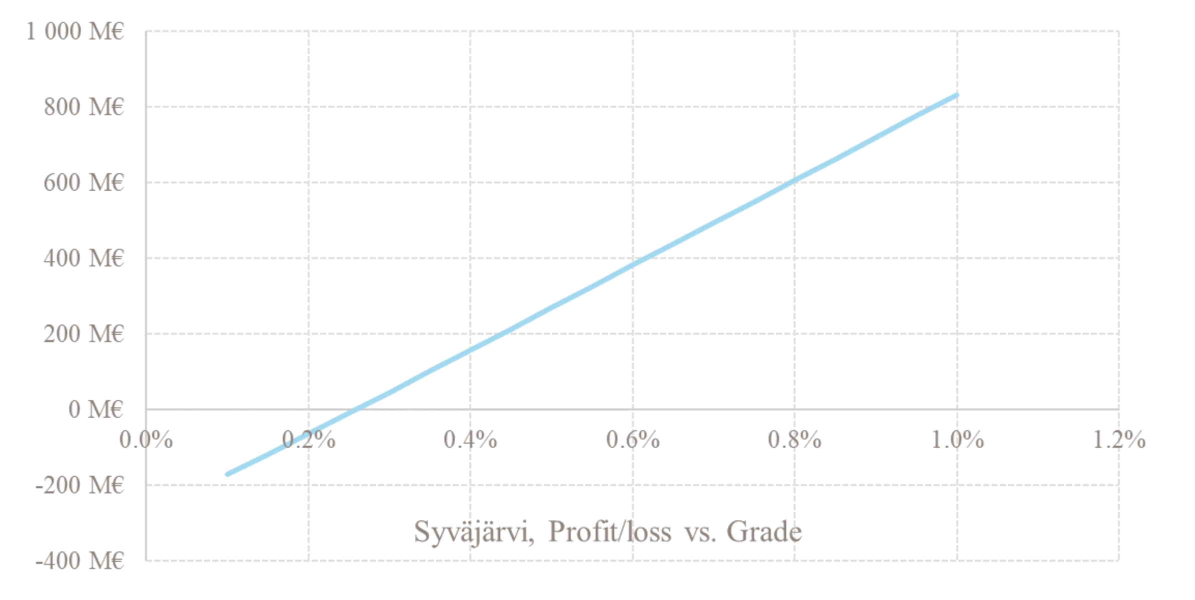
A cut-off grade of 0.5% Li2O was used in the open pit optimisation for Syväjärvi, Länttä and Outovesi and 0.4% Li_2O cut-off was applied to Rapasaari. With the selected optimisation cut-off grades, the 0.8 - 1% Li_2O-grade is reached in all optimised pit shells.

For the reserve conversion, a cut-off of 0.40 % Li_2O was used for the open-pit ores. The cut-off grade was estimated using break-even cost/profit estimation. The breakeven calculation indicated that the cut-off grade of 0.40 % is reasonable, illustrated in Figure 11.8, Figure 11.9, Figure 11.10 and Figure 11.11 for the different operations.



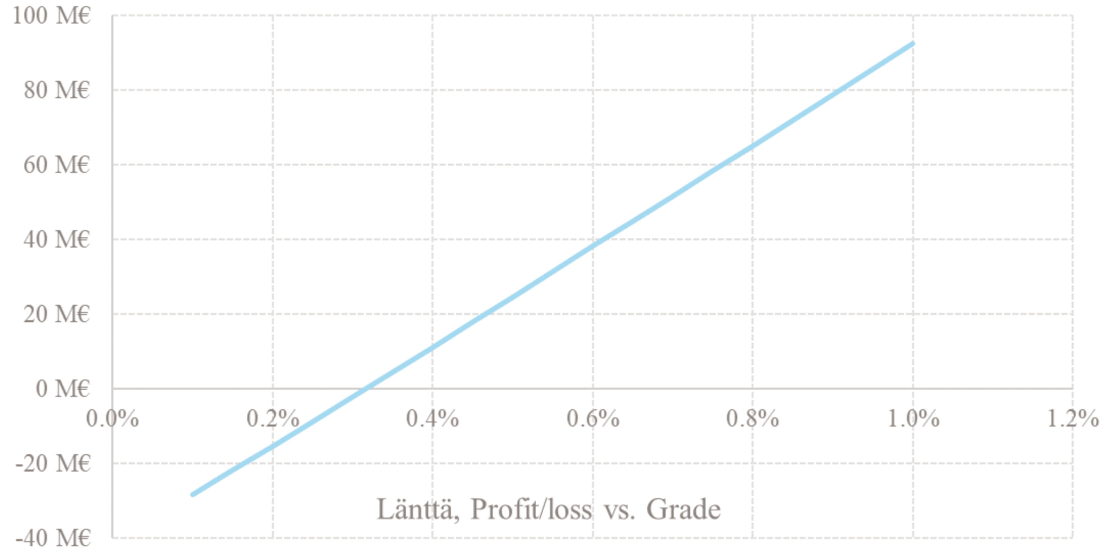
srk consulting	**SSW Keliber Lithium Project** Rapasaari - Breakeven calculation results	Project No. 592138

Figure 11.8: Rapasaari - breakeven calculation results for Rapasaari. Profit/loss are for 7.015 Mt of ore. The breakeven value is reached at 0.27 % Li2O cut-off grade



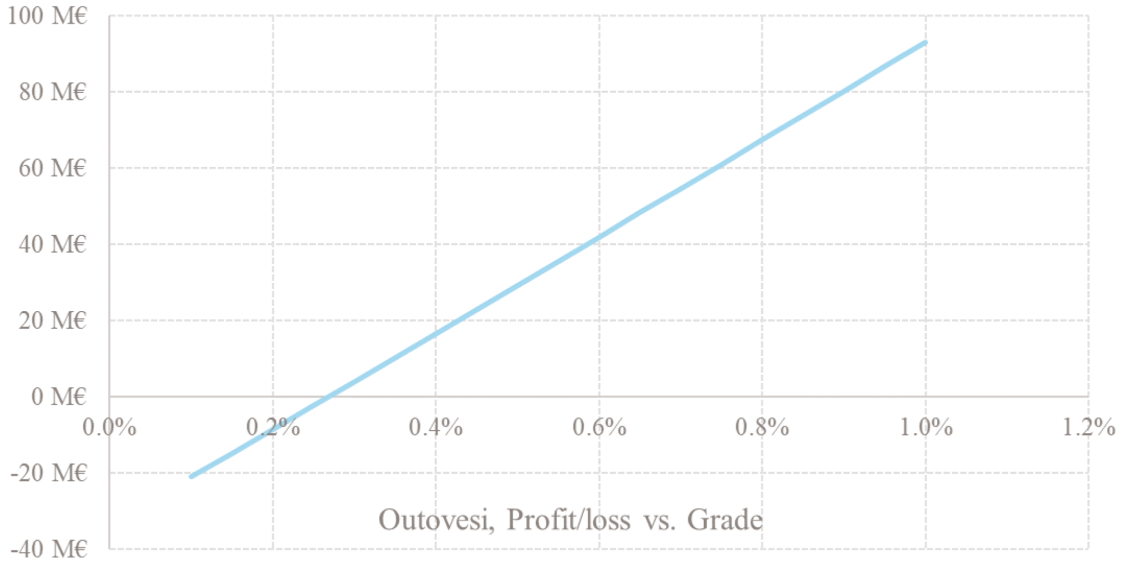
srk consulting	**SSW Keliber Lithium Project** Syväjärvi - breakeven calculation results	Project No. 592138

Figure 11.9: Syväjärvi - breakeven calculation results for Syväjärvi. Profit/loss are for 7.015 Mt of ore. The breakeven value is reached at 0.27 % Li2O cut-off grade



srk consulting	**SSW Keliber Lithium Project** Läntä - breakeven calculation results	Project No. 592138

Figure 11.10: Läntä - breakeven calculation results for Läntä. Profit/loss are for 7.015 Mt of ore. The breakeven value is reached at 0.27 % Li2O cut-off grade



srk consulting	**SSW Keliber Lithium Project** Outovesi - breakeven calculation results	Project No. 592138

Figure 11.11: Outovesi - breakeven calculation results for Outovesi. Profit/loss are for 7.015 Mt of ore. The breakeven value is reached at 0.27 % Li2O cut-off grade

11.3 Mineral Reserve estimates

[§229.601(b)(96)(iii)(B)(12)(ii)]

Sibanye-Stillwater announced on 28 November 2022, subsequent to securing an effective controlling interest of 84.96% in Keliber as announced on 3 October 2022, the approval of capital expenditure of EUR 588m for the Keliber Lithium Project, beginning with the construction of the Keliber Lithium Hydroxide Refinery at Kokkola. Based on the Project FS completed during February 2022 and updated in October 2022 confirmed the robust economics of the Keliber Lithium Project at hydroxide prices significantly lower than the average prevailing spot prices over the previous 12 months. The open pit Mineral Reserves for the Keliber operations are summarised in Table 11-9. The Mineral Reserves are reported as it mill feed, based on the modifying factors discussed in the previous sections and the attributable interest of Sibanye-Stillwater in Keliber.

Table 11-9: Mineral Reserves for Keliber open pit operations as at 31 December 2022

Classification	Deposit	Mass (Mt)	Li grade (%)	LCE content (kt)
Proven	Syväjärvi	1.34	0.52	37.18
	Rapasaari	1.82	0.46	44.06
	Länttä	0.15	0.51	4.16
Total Proven		**3.31**	**0.49**	**85.40**
Probable	Syväjärvi	0.46	0.42	10.32
	Rapasaari	4.14	0.40	89.02
	Länttä	0.09	0.47	2.12
	Outovesi	0.21	0.61	6.72
Total Probable		**4.89**	**0.42**	**108.18**
Total Mineral Reserve		**8.20**	**0.44**	**193.59**

Notes:
1. Cut-off for open pit reserves 0.40% Li_2O
2. Price EUR23 667/t $LiOH.H_2O$
3. Measured Resources converted to Proven Reserves
4. Indicated Resources converted to Probable Reserves
5. No Inferred Resources included in the Mineral Reserve
6. The Rapasaari mining permit has been granted but is under appeal

11.3.1 Conversions

In line with industry practice, Li Mineral Resources and Mineral Reserves total metal content is quoted in Lithium Carbonate (Li_2CO_3) Equivalent (LCE), which is one of the final products produced in the Li mining value chain. LCE is derived from in-situ Li content by multiplying by a factor of 5.323. Lithium Hydroxide Monohydrate ($LiOH.H_2O$) can be derived from LCE by dividing by a factor of 0.88. Li has been derived from Lithium Oxide (Li_2O) by multiplying by a factor of 0.465. These conversion factors are shown in Table 10-6.

11.3.2 Comments

Sound mine design and scheduling processes were used to convert the Mineral Resources to Mineral Reserves.

12 MINING METHOD – OPEN PIT MINING

[§229.601(b)(96)(iii)(B)(13)

AFRY has selected conventional truck and shovel operation as the most suitable open-pit mining method for Syväjärvi and Outovesi. For Länttä and Rapasaari, open-pit mining is considered to be combined with underground operations in the future. The general layout of the mine sites is shown in Figure 14.1 (Länttä), Figure 14.2 (Rapasaari), Figure 14.3 (Syväjärvi), and Figure 14.4 (Outovesi).

A truck and shovel operation refers to the use of large, generally rigid body, off-highway haul trucks being loaded with blasted rock by large shovels or excavators. This combination of mining equipment is a proven technology and is used in many open pit mines throughout the world.

The key points of a truck and shovel operation are:

- The truck and shovel combination is a known and proven mining method, capable of handling most rock types in Finland. Potential mining contractors have suitable equipment readily available;
- The haulage and loading equipment can handle both free-dig and blasted material;
- The blending of ore from multiple deposits if needed is simple compared to other mining methods; and
- The ability to produce the total annual mining rates is anticipated.

In-pit ramps and waste rock haul roads are designed for off-highway trucks with a payload of 90 t. For waste mining, the bench height can vary between 10 – 20 m. Waste rock maximum particle size is not limited.

12.1 Rock engineering

[§229.601(b)(96)(iii)(B)(13)(i)]

Geotechnical conditions vary across the different sites, with open pit reserves having higher geotechnical data confidence due to existing exposures and laboratory test work. In-fill drilling and the associated testwork should consider further focus on discontinuity strength parameters for further improved geotechnical understanding of site and project specific conditions. It is noted that geotechnical data gathering and modelling are a continuous process during project implementation and mining operations, with confidence in rock mass and structural conditions improving over time as mining continues. The geotechnical conditions at Rapasaari are the best understood of all the deposits. Compared with the other deposits, Rapasaari is the only site from where geotechnical samples were tested in the laboratory to determine the mechanical properties of the rock. Rapasaari geotechnical information includes orientation data of joints, bedding planes and other structures. Overall, the rock mass quality in the studied areas of the deposit indicates good quality, competent rock as evident from the competent drill core and from competent rock mass on the exposed excavations observed during the site visit.

12.1.1 Rock mass quality

RQD and geological strength index (**GSI**) models have been done for Rapasaari and Syväjärvi deposits. RQD and the GSI models were done for Rapasaari and Syväjärvi deposits from the geology core logging. RQD, GSI and rock quality rating number (**Q'**) values determined from logging of lithological units were then calculated.

A total of 38 resource drill holes (18 from the 21st century and 20 from 1960), that were spatially distributed within the Länttä site were geotechnically logged for Q', joint number, joint roughness, and joint alteration number, during early 2020. Thereafter, GSI and RQD values were then calculated, and models were created for utilisation in the rock mechanics studies. No structural orientation data is available.

Due to the paucity of geotechnical data at Outovesi, no detailed investigation into the potential influence of lithological structures on geotechnics/stability has been carried out.

12.1.2 Rock strength parameters

Samples that were taken for laboratory geotechnical rock strength test work for the Keliber Lithium Project were from the deposits that are planned to be mined during the first years of the operation. Sampling that was reported to have been carried out the Keliber Lithium Project area include:

- 42 samples taken from different lithologies from the Rapasaari site, (Hakala and Heine in 2016 and Hakala et al. in 2020), that were tested for uniaxial compressive strength (**UCS**);
- 35 to 45 samples from Länttä site that were tested for UCS (Tea Niiranen and Eetu Jokela, 2020); and
- 15 samples from Länttä site that were tested for Brazilian tensile strength.

These were considered in the February 2022 Definitive Feasibility Study report.

Each core sample specimen for UCS and indirect tensile tests (Brazilian) (**BR**) was prepared according to ISRM (2006) suggested methods. The suggested length was 2 - 3 drill core diameters and rock samples were split into five groups according to their rock type. Foliation parameters of recognized volcanic and sedimentary units were estimated. The location of the drill holes from where the samples that were considered for rock strength test work is confirmed for the Länttä site unlike at the Rapasaari site.

While the test work done at the Rapasaari site utilises recognised tests with standard testing techniques, no joint shear strength values were available for review. In the hard rock areas, the joint shear strength is likely to dominate slope stability, along with major and intermediate-scale geological structures.

Review of the available data and previous reports did not indicate whether laboratory test work for saprolites was carried out. Additionally, the 3D location for where the samples were collected on the Rapasaari site could not be verified; this has an influence on the slope design. There was no mention of the QA/QC procedures that were carried out on the results of laboratory test work by the CPs from previous reports.

The intact rock strength and elastic properties for the Syväjärvi site were estimated as the mean values for specific rock types, which were inferred from those determined from Rapasaari due to their proximity to each other in comparison to other mining areas.

The rock and discontinuity strength and rock mass quality parameters on the Outovesi deposit are not well defined and will require a more detailed sampling and testing campaign before commencement of operations.

No oriented geotechnical drilling was done for any of the sites. The geotechnical logging was carried out on geology drill core. No detailed Q-rating assessment and structural characterisation was carried out.

The available geotechnical data considered during the review, coupled with reported observations on exposed excavations during the site visit, determine that the level of understanding of the rock strength parameters and characterisation is regarded to be appropriate to define the geotechnical environment for the Syväjärvi and Rapasaari sites to PFS level.

12.1.3 In-situ stress measurements

The data supplied reveal that there are no in-situ stress measurements on the Keliber Lithium Project site. The current stress fields considered were simulated from data inferred from adjacent projects and operations for benchmarking purposes based on estimates from the closest measurements the team were able to access. The World Stress Map (**WSM**) and measurements taken from Pyhäsalmi Mine were used to determine the in-situ stress field of the area in question and applied to the deposits,

12.2 Hydrogeology hydrology

[§229.601(b)(96)(iii)(B)(7)(iii)]

All the deposits are located within bedrock of volcanic and metamorphosed lithological units with low hydraulic conductivity. Higher hydraulic conductivities are associated with bedrock fracturing and faulting. RQD data analysis suggest the Rapasaari, Syväjärvi and Outovesi rock mass is more intensely fractured in the upper part (above 50 mamsl) and less so at depth. Fracturing seems to be more persistent with depth and there is greater intensity at Länttä than the other deposits. The overburden at all the ore deposit sites contains till and peat of varying thickness.

Field hydraulic testing and water level observations completed thus far are concentrated on the Rapasaari and Syväjärvi mine sites. Limited water level measurements for the Outovesi and Länttä deposits were taken. Groundwater assessment for Outovesi and Länttä was only completed at a conceptual level and thus no parameters are available to inform mining. Further, site specific hydrogeological characterisation and assessment would be required for the Outovesi and Länttä deposits to meet licencing and FS requirements

Slug testing to determine the hydraulic conductivity of the overburden till layer was carried out at Rapasaari and Syväjärvi. The results from the two sites are of the same order of magnitude with an average of 6.3 to 7.7 x 10^{-7} m/s, which is a relatively low hydraulic conductivity. The RQD data was used as a proxy for hydraulic conductivity, through establishing a correlation with the hydraulic conductivity measurements. The approach followed seems reasonable, although a clearer description of the methodology and derivation of parameters from flow logging and RQD is required.

The water table is shallow and close to surface. Recharge from precipitation is assumed to be relatively high at 50% of precipitation. Most of the recharge is assumed to flow laterally in the topmost surficial overburden layer. The interaction between surface water bodies and the groundwater is unknown; however, it is clear that the overburden plays an important role in conveying recharge to local streams and lakes that are fed by groundwater.

12.2.1 Groundwater inflows

The groundwater inflows into the various mines were estimated using a numerical groundwater model for Rapasaari and Syväjärvi and analytical equations for Outovesi, and Länttä (Table 12-1). The inflows are less than 710 m^3/d (Table 12-1) and it must be considered in light of the relatively short mining durations planned for all areas besides Rapasaari. The reported relatively low rates of inflow should not pose a material challenge to mining. The estimates are, however, preliminary but seem reasonable if the hydraulic conductivity is as low as reported. These estimates, hydraulic conductivity and inflows, will need to be updated with site-specific hydrogeological data as this is obtained to meet licencing requirements.

The inflows at Rapasaari, however, are expected to peak at approximately 2 035 m^3/d for the pit and 390 m^3/d for the underground operations and may pose a risk to mining. No mention in the current water management plans is made of an active dewatering scheme to manage these inflows. Active dewatering through, for example, dewatering wells located along the pit perimeter will be required. Not adequately providing and planning for such may cause delays and have a severe impact on mining progress and safety.

For the Syväjärvi open pit a cut-off drain will limit the flow from the upstream catchment to the dewatered Syväjärvi Lake. An embankment will also be constructed to prevent flow between lakes and the water table will be maintained at a low level through active dewatering.

The pore pressure distribution behind the highwall of the Rapasaari and Syväjärvi pits has been excluded from safety factor calculations. This could be an important factor, particularly in the overburden, given the modelled tight cone of drawdown around the pits.

Table 12-1: Summary of groundwater inflows per deposit

Deposit	LoM	Open Pit Depth	Inflows (m3/d)		Drawdown
			Peak Pit	Underground	
Rapasaari	14 (yr 0 to 14)	130m (-40 mrsl)	~ 2 035 at year 2.7	~390	Limited drawdown, extends to the edge of Vionneva Natura.
Syväjärvi	4 (yr 0 to 4)	100m (-5 mrsl)	~710	No UG working	Few hundred meters from pit
Outovesi	1 (yr 13 to 14)	75m (+10 mrsl)	640	No UG working	Radius of drawdown c. 343
Länttä	3 (yr 13-16)	42m (+80 mrsl)	424	216	Radius of drawdown c. 270 for pit

12.2.2 Water quality

The below is summarised from the Keliber Water Management Plan (Afry, 2021).

Generally, the different waters at Rapasaari-Päiväneva are slightly saline and mostly also slightly alkaline. Alkali and alkaline earth metals and aluminium are the cations present in highest concentrations. Sulphate, chloride, and silicate are the main anions.

Rock dump and TSF source terms for the Rapasaari-Päiväneva area were determined through laboratory leach testing and modelling. In developing a mine-wide water management plan, loading to discharge streams was considered for the mine operation phase. Post closure, waste rock, pyrite-containing waste rock, flotation tailings (pre and post flush-off situations), pre-float tailings, and pit lake overflow loading was assessed.

Nutrient content (nitrogen and phosphorus) is a significant part of the Rapasaari-Päiväneva area water quality and load. The source of the nitrogen is ascribed to explosives and the phosphorus is believed to be from the mined rock. However, the source of phosphorus is not totally understood. Modelling of the loading associated with the mine-wide water balance reveals that iron and phosphorous may exceed environmental quality standard **(EQS**). The total salinity and nitrogen content is also a concern to the watercourse ecology. Based on the environmental impact assessment the Fe and P loading does not pose a risk to the watercourses. However, the modelling exercise suggests that treatment of the water is required to address the nitrogen levels.

The pyrite-containing waste rock will be deposited separately from the non-pyrite waste. The pyrite-containing waste is acid-generating and the seepage from the pyrite-containing waste rock is expected to contain high levels of Fe, and increased concentrations of metals and metalloids, such as Cd, Co Ni and Zn. Other key water quality parameters in Rapasaari-Päiväneva area are arsenic, copper, and selenium. In the source term assessments, arsenic and copper appear only in small concentrations because of natural sorption in the waste facilities. They are, though, released in significant extent in sulphide oxidation.

Similar water quality issues are expected for all the other mining sites, with high sulphide levels expected at the Outovesi waste rock dump and more acidity and sulphate oxidation products.

It should be noted that the Water Management Study (Afry, 2021) indicated that there is uncertainty in the Syväjärvi mine site water quality estimates, due to the methodology used for determining water quality.

12.2.3 Water balance

A detailed water balance was prepared for the Rapasaari – Päiväneva Complex as part of the water management study (Afry, 2021). The model considered groundwater and surface water and was run using several scenarios, including a climate change scenario. The model indicates that while freshwater make-up may be required for the first few years of operation, there will be a water surplus for the remaining years of the operation (i.e., there will be discharge from the site). The risk assessment in the water management plan also states that there might not be enough water to supply the process water requirements during all seasons, due to modelled data being used to quantify the Köyhäjoki River flow rate. Once mining plans are developed, the water balance should consider including active dewatering as an alternative, or in addition to, pumping from the pit.

Only a high-level water balance is available for the Syväjärvi site. The Länttä and Outovesi mine sites lack site-wide water and load balance models.

12.3 Life-of-Mine production schedule

[§229.601(b)(96)(iii)(B)(13)(ii) and (iii)]

The production schedule has been developed monthly. Production scheduling was completed using Mine Sched-software. The Syväjärvi operation was limited to a 540 ktpa production rate due to the limitations set on the environmental permit. The excess capacity of the grinding and crushing was then utilised by mining ore from the Rapasaari open pit in campaign-style mining. No blending of material from different deposits was allowed. The Rapasaari open pit is scheduled to be mined with campaign style in the first three operational years. After the Syväjärvi deposit is fully mined out the Rapasaari deposit can be mined at full capacity.

The Keliber Lithium Project operations targeted $LiOH.H_2O$ production of approximately 15ktpa in the LoM production schedule. The totals for the production schedule are summarised per operation in Table 12-2. With the contribution of Rapasaari open pit the biggest at 6.9 Mt and 0.9% Li_2O. The total LoM runs for 16 years from 2025 until 2040.

Table 12-2: Keliber Lithium Project production summary

Site	Total (Mt)	Ore Production (Mt)	Stripping Ratio	Li_2O (%)	Life-of-mine
Syväjärvi OP	12.45	2.08	5.00	1.068	Apr 2025 to July 2028
Rapasaari OP	63.49	6.88	8.23	0.901	Jun 2026 to Dec 2037
Läntta OP	2.09	0.29	6.33	0.886	Sep 2038 to Mar 2039
Outovesi OP	2.56	0.24	9.67	1.331	Apr 2039 to Feb 2040
Total	80.59	9.48	7.5	0.95	Apr 2025 to Nov 2041

The Syväjärvi OP has the lowest stripping ratio of with 10.4 Mt of waste to strip. While Rapasaari, the biggest OP has 57 Mt of waste to strip at a stripping ratio of 8.2. The Läntta and Outovesi OPs are small compared to the other two OPs with both having approximately 2 Mt of waste to strip. At this stage no Backfilling for the OPs has been scheduled.

12.3.1 Life-of-Mine scheduling

The mine production schedule for the Keliber Lithium Project incorporates the pit and stope design. The objectives of the production schedule are to:

- Achieve targeted annual production in terms of quantity and quality.
- Determine pre-stripping requirements.
- Develop a production schedule suitable for operating cost estimates for the DFS.

12.3.1.1 Scheduling parameters

The key scheduling parameters for the production schedule were to:

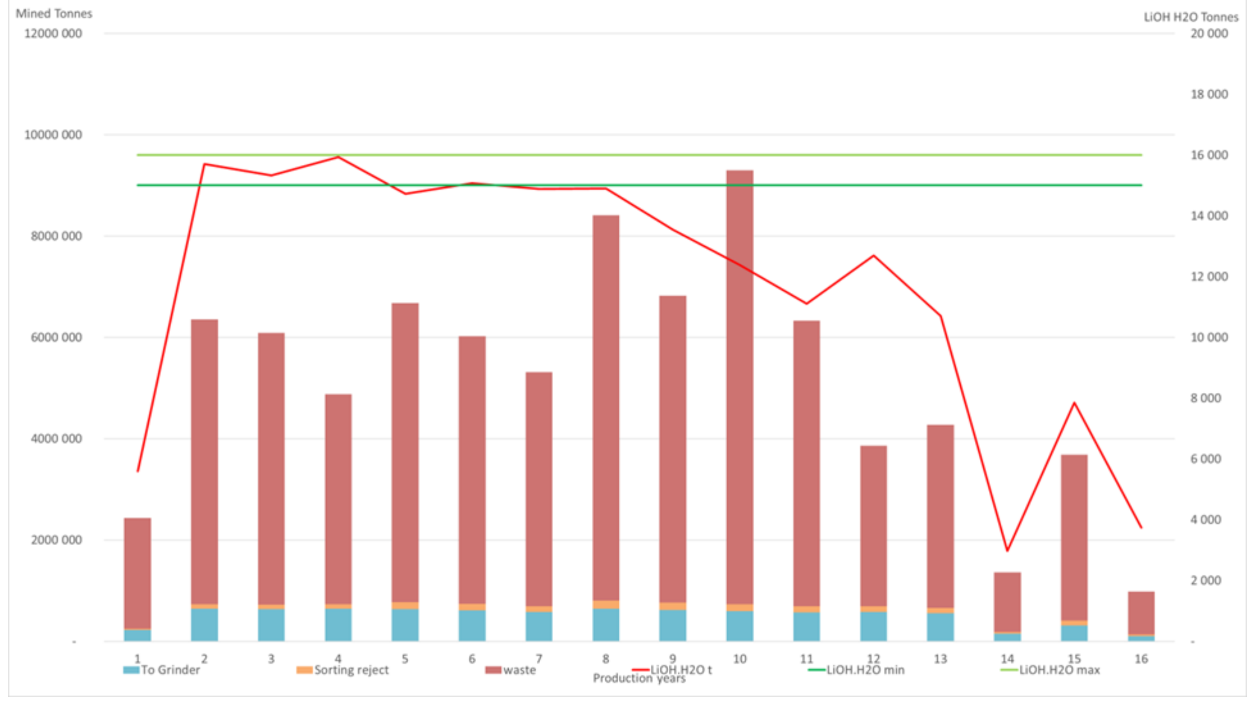
- Provide plant feed for $LiOH.H_2O$ production:
  - Minimum: 15 000 tpa; and
  - Maximum: 16 000 tpa.
- Design capacity for:
  - Crushing: 930 000 tpa; and
  - Grinding: 815 000 tpa.
- Nominal capacity for:
  - Crushing: 775 000 tpa; and
  - Grinding: 680 000 tpa.
- Limit Syväjärvi ore production to 540 000 tpa, to comply with its environmental permit.
- Provide ore for a six-month ramp-up period using crushing capacity as the limiting factor.
  - 1st month 40% capacity;
  - 2nd month 65% capacity;
  - 3rd month 80% capacity;
  - 4th month 90% capacity;
  - 5th month 95% capacity;
  - 6th month 100% capacity;
- Minimize initial waste stripping;

- No ROM stockpile has been modelled; however, it has been assumed that it will be located next to the crusher to accommodate for the short-term differences between mine deliveries to the ROM pad and crusher production rate;
- No ore stockpiles next to open pits are modelled. It was assumed that short term ore stay over in the pads does not have a meaningful effect on the annual production scenario;
- No haulage was modelled; and
- If minimum $LiOH.H_2O$ production was not reached, the scheduler could produce lower amount of end-product.

12.3.1.2 Total material movement

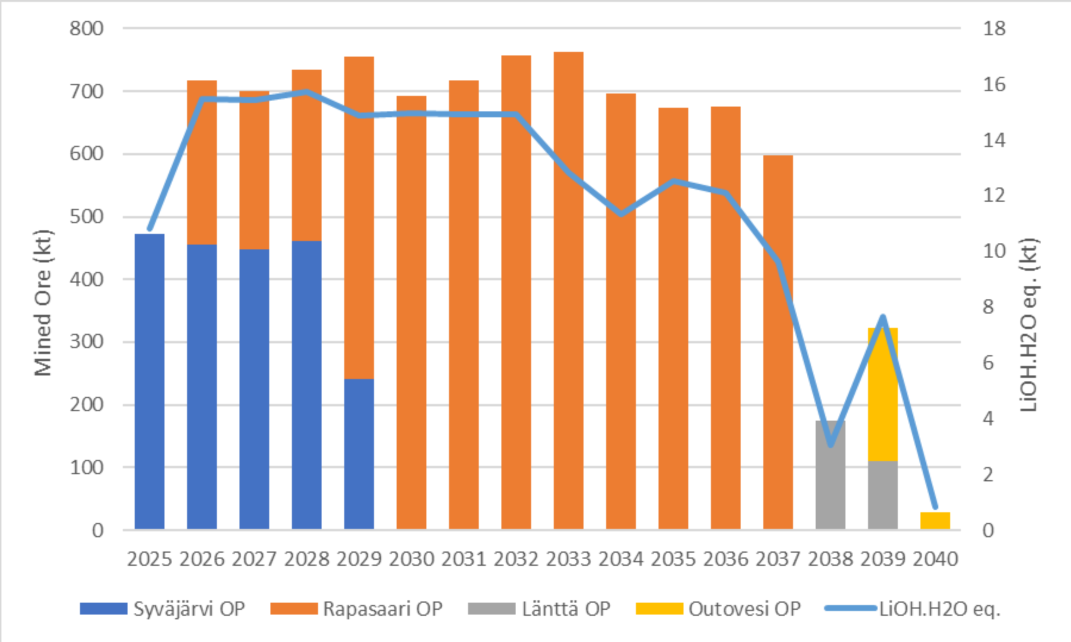
The total ore and waste material movement from the deposits is shown in Figure 12.1 Ore movements by open pit mines are shown in Figure 12.2. Major findings are:

- After ramp-up, the ore reserves are sufficient to provide 7 years of stable production.
- The first seven years of production reach the targeted minimum $LiOH.H_2O$ production.
- The limits of processing at the concentrator will influence on the $LiOH.H_2O$ production when ore grade is lower.
- Waste rock stripping varies due to the run down and ramp-up of an open pit.
- Relatively small open pit sizes exclude the use of mining pushbacks resulting in high waste stripping during start-up.



srk consulting	**SSW Keliber Lithium Project** Annual LoM feed production schedule	Project No. 592138

Figure 12.1: Annual LoM feed production schedule

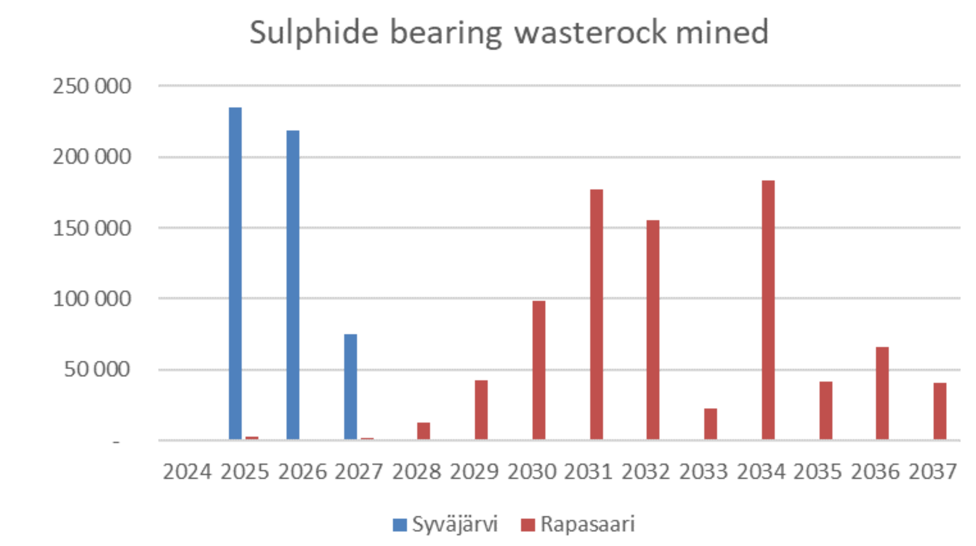


srk consulting	**SSW Keliber Lithium Project** Annual LoM feed production schedule	Project No. 592138

Figure 12.2: Annual LoM feed production schedule

12.3.1.3 Sulphide-bearing waste rock

Syväjärvi and Rapasaari deposits contain sulphide-bearing mica schist as a waste rock. These waste rocks will be deposited in a separate waste rock storage facility. Figure 12.3 illustrates the yearly amounts of excavated waste rock that contains sulphur.



srk consulting	**SSW Keliber Lithium Project** Sulphide-bearing side rock by deposit (*Source: Keliber_Economic_Model_v2.5.1_LoMvDFS21_SSW adjustments (ID 36372) RSa 18122022.xlsx)*	Project No. 592138

Figure 12.3: Sulphide-bearing side rock by deposit

12.3.2 Production parameters

12.3.2.1 Operational parameters for ore production

Key design criteria for daily ore production are presented in Table 12-3.

Table 12-3: Key design criteria for daily ore production

Ore mining	Unit	Quantity
Mining bench height	m	5
Max rock size	mm	700
Max truck payload	t	75
Ore feed		
Min. ROM-pad capacity	**days**	**3**
Jaw crusher capacity	**t/h**	**453**
Fine crusher capacity	**t/h**	**114**
Coarse ore stockpile quantity	**t**	**2 280**
Coarse ore stockpile duration	**h**	**20**
Fine ore stockpile quantity	**t**	**1 200**
Fine ore stockpile duration	**h**	**12**
Shifts per day		**2**
Working days per week		**7**
Crusher operating hours	**h/a**	**800**

12.3.2.2 Operational parameters for waste mining

In-pit ramps and waste rock haul roads are designed for off-highway trucks with a payload of 90 t. In waste mining, the bench height can vary between 10 – 20 m. Waste rock maximum particle size is not limited.

12.3.2.3 Operational concept

Keliber has decided to appoint mining contractor for open pit mining operations. The open pit contractor shall be chosen after competitive bidding during the project construction phase, approximately during Q3/2023. The key responsibilities of Keliber and the mining contractor are described below.

Keliber is responsible for the following tasks:

- Permits;
- Mine permit;
- Environmental permit;
- Planning;
- Annual and monthly production plans;
- Geological and geotechnical studies;
- Open-pit design and mine planning;
- Preparatory measures (Client can appoint mining contractor for preparatory measures and pre-strip mining in order to obtain construction material, waste rock, for construction purposes);
- Overburden removal;
- Haul road construction (external pit);
- Waste storage pads;
- ROM pad and primary crusher;
- Pad areas for social premises, maintenance, and storage areas (doesn't include special structures for chemical storage);
- Mine production;
- General lighting (external pit);
- Electricity distribution for maintenance facilities and social premises and open pit dewatering;

- Potable water distribution;
- Jaw crusher operation;
- Water management (external pit); and
- Grade control, blast hole sampling and infill drilling.

The open-pit contract includes all works of drilling, blasting, loading, hauling and all related ancillary works at the Syväjärvi and Rapasaari open pits. For Länttä and Outovesi open pits, a separate contract with a mining contractor will be made closer to their operation start-up.

Mining contractor key tasks are the following:

- Mine site environment, health, and safety (EHS) duties;
- Site mobilization and demobilization;
- All permits required by the service;
- Maintenance and personnel facilities;
- Drilling;
- Charging and blasting;
- Loading;
- Ore;
- Waste rock;
- Sulphuric waste rock;
- Hauling;
- Ore;
- Tipping to crusher feeder;
- Tipping to ROM pad;
- Waste to waste rock storage facility;
- Sulphuric waste to separate waste rock storage facility;
- Waste rock storage management, and filling according to plan;
- Pit drainage and dewatering to client's pipeline on the surface;
- Preparation of the final pit walls and ramps according to the mine plan;
- Pit wall scaling;
- Haul road maintenance and dust control;
- Handling and storage facilities including all required permits for:
    - Chemicals;
    - Explosives;
    - Fuel; and
    - Lubricants.

12.3.2.4 Operating hours

The mine operating hours have been calculated on 350 production days per year. The open pit operation will be 24 hours per day, seven days a week, working on two 12-hour shifts. It is assumed that 15 days of production will be lost per year, due to bad weather and breakdowns. Additionally, one hour per shift will be lost due to mealtimes and breaks. These are common operating hours in Finland in remote locations.

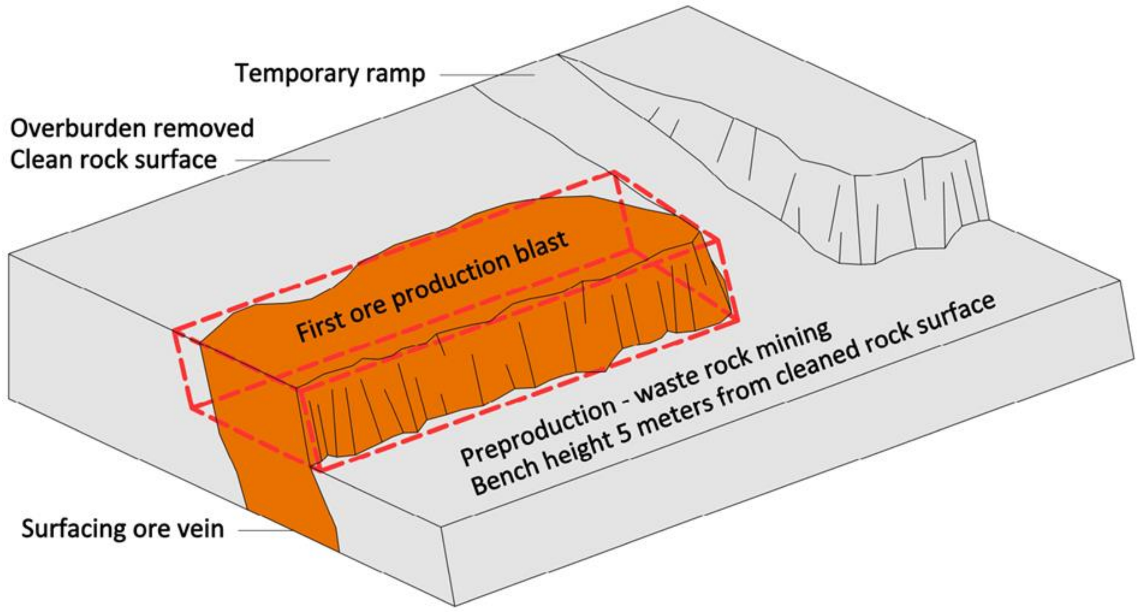
12.3.2.5 Pre-production activities

Key activities requiring completion before the start of mining are listed below.

- Engineering and procurement;

- Detailed pit and mine site design;
- The final tender process for construction work ;
- The tender process for open pit mining contract;
- Construction;
- Access roads to sites;
- Electricity distribution;
- Water management (as specified in the environmental permit application and permit decisions);
- Surface water management, perimeter drains and embankments;
- Treatment for impacted runoff (sedimentation ponds and wetlands);
- Pump stations and pipelines to the concentrator plant;
- Waste rock storage facility pad preparation;
- Haul road construction;
- Overburden removal; and
- Offices, maintenance and storage facilities (Mining contractor).

Once overburden has been removed and the rock surface has been cleaned, waste rock mining can be started. Pre-production waste rock mining enables the first ore production blasts for the outcropping ore to be mined according to the production schedule. Construction material for haul roads and storage facilities is also obtained. The general layout for pre-production waste rock mining and the first ore production blast is shown in Figure 12.4.



srk consulting	**SSW Keliber Lithium Project** **Pre-production waste rock mining and first ore production blast**	**Project No.** **592138**

Figure 12.4: Pre-production waste rock mining and first ore production blast

Overburden removal will be separately contracted and sequenced to suit the mine production plans. Initial stripping cost is based on quotations acquired from contractors.

Organic and inorganic soil materials are to be stored in separate areas to allow re-use during site rehabilitation. At Syväjärvi, lake sediments are to be stored in separate engineered storage. Moraine material is to be utilized for embankment construction during Project development and production phases. The majority of the soil materials are however used in site closure.

12.3.3 Drilling and blasting

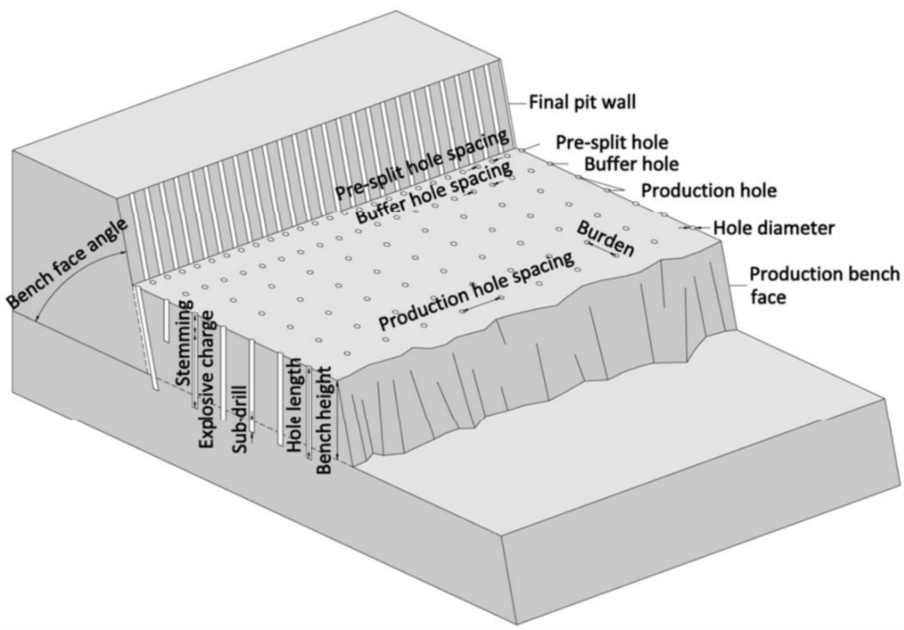
The conceptual open pit bench drill design is presented in Figure 12.5. Open pit ore mining is based on a 5 to 10 m bench height. Waste rock can be mined in 10 to 20 m benches. Proposed drilling equipment in open pit mining for both ore and waste is a hydraulic, diesel-powered, self-propelled top-hammer drill rig. The proposed drill hole diameter for ore mining is 89 mm and for waste rock 89 -180 mm. The blasting pattern for ore will be selected to best match the maximum crusher feed size of 700 mm. Fragmentation optimisation will be considered during pre-production activities. Common practice is that the explosives manufacturer provides a down the hole explosive charging service. The parameters for open pit bench drill and blast design are presented in Table 12-4. The design parameters for the ore drill design need to be optimized according to the ore vein width. For a narrow 5-more vein, the burden of 2.5 m and a spacing of 2.7 m needs to be decreased. The specific drill pattern will be evaluated in the detailed production phase design.

Table 12-4: Recommended parameters for open pit bench drill design

Parameter	Unit	Ore	Waste	Buffer	Pre-split
Hole diameter	mm	89	89-180	89	89
Burden	m	2.5	2.5-3.1	1.25-1.5	2-2.5
Spacing	m	2.7	2.7-5	1.35-2.5	1
Stemming	m	2	3	0.7-1	2-3
Bench height	m	5-10	10-20	5-10	5-11
Sub-drill	m	0.75	1.5	0	0.75-11.5
Hole length	m	5.75	11.5	2-4	5.75-11.5

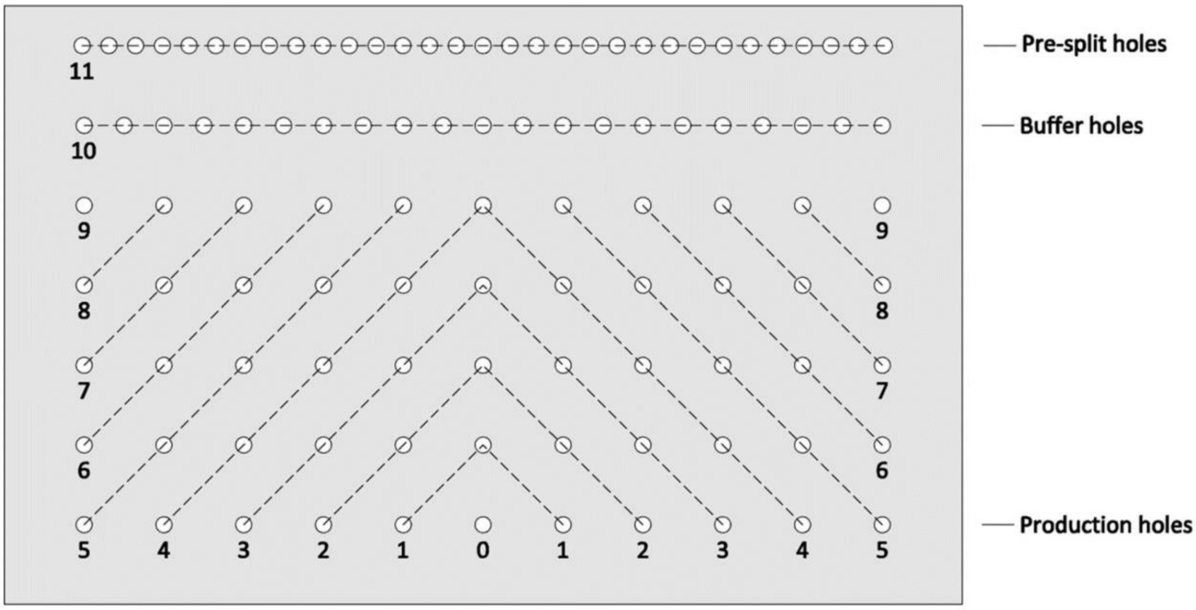
The mining contractor will be responsible for the use and storage of the explosives, primers, and detonators. The explosives can be contracted as an in-the-hole service. The mining contractor will be required to perform test blasts for the open pit to optimize rock fragmentation according to requirements.

Specific drill and blast designs will be developed by the mining contractor on site, according to local rock conditions and approved by Keliber engineers. The blasting sequence for open pit bench drill design is presented in Figure 12.6. The blasting sequence is a V-shaped sequence where the open face is at the bottom of the diagram. Presplit holes ensure a clean final pit wall with minor damage to the host rock.



srk consulting	**SSW Keliber Lithium Project** Conceptual open pit bench drill design	Project No. 592138

Figure 12.5: Conceptual open pit bench drill design



srk consulting	**SSW Keliber Lithium Project** Blasting sequence for open pit bench drill design	Project No. 592138

Figure 12.6: Blasting sequence for open pit bench drill design

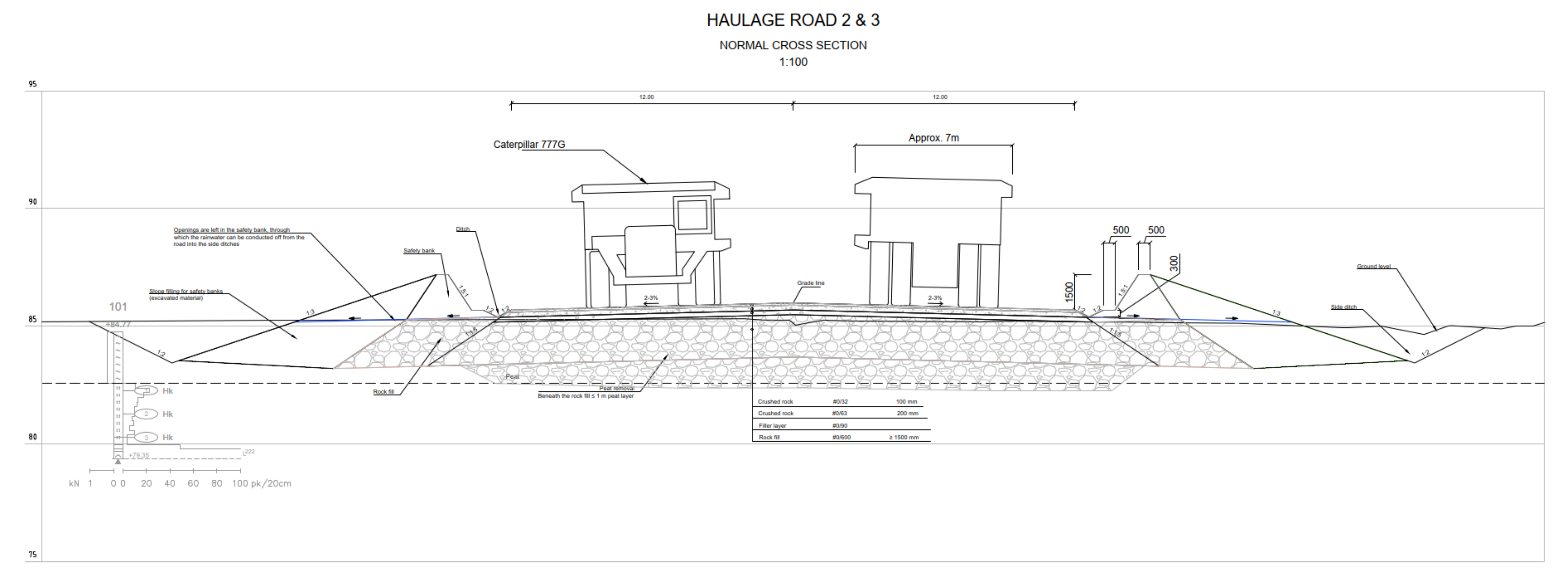
12.3.4 Loading and hauling

For open pit mining, the ore will be loaded onto off-highway trucks with a 72 t hydraulic excavator with a bucket capacity of 3.3 m^3 and waste rock will be loaded with a 140 t hydraulic excavator with a bucket capacity of 8.1 m^3. Truck size (payload) for ore is 75 t (Cat 775G) and waste rock 90 t (Cat 777G). Ore and waste can be visually identified due to the colour difference of the materials which is beneficial for selective loading and reduces waste dilution and ore loss.

12.3.4.1 Haul road design and maintenance

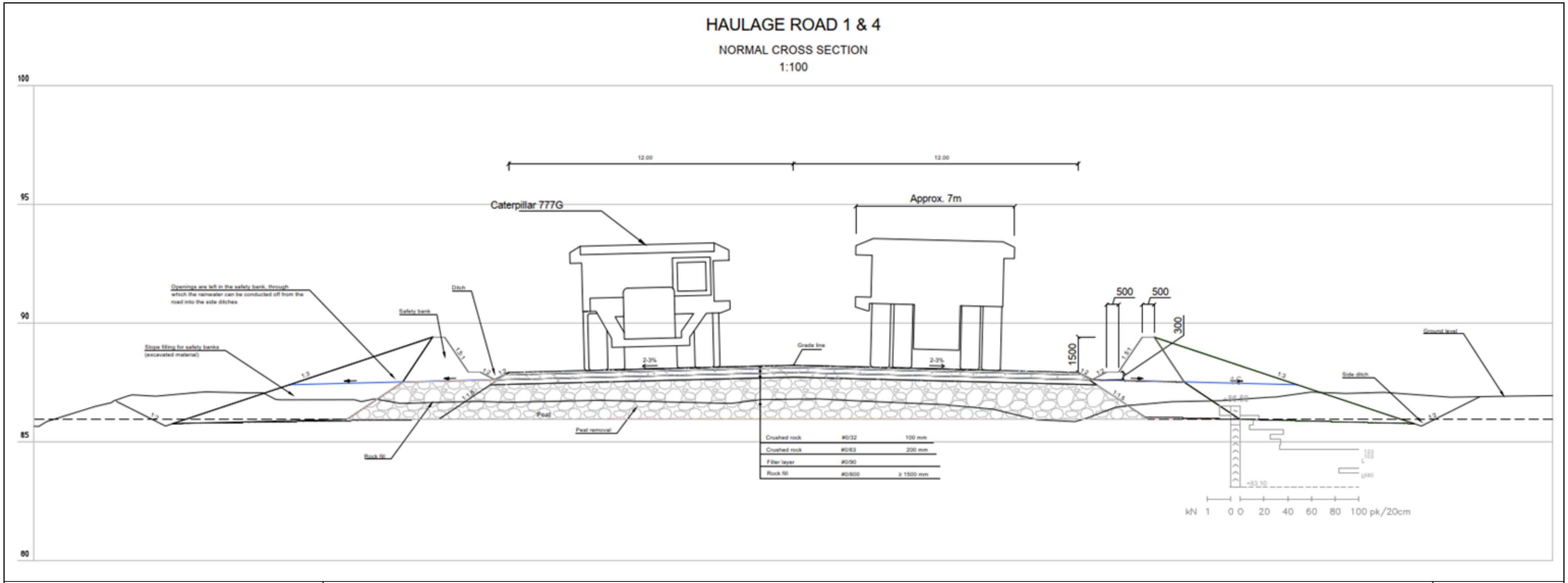
The typical cross-sections of the external pit ore and waste rock haul roads are presented in Figure 12.7. Depending on the ground conditions, e.g. thickness of peat, the haulage road design is slightly altered as shown in Figure 12.8. The designs are based on equipment supplier recommendations and include safety berms on each side of the road to increase operational safety. The external pit haulage road design is the same for hauling ore and hauling waste rock.

The typical cross-sections for the in-pit ramp designs are presented in Figure 12.9, Figure 12.10, Figure 12.11, and Figure 12.12. These designs are for 15 m, 20 m, 25 m, and 30 m ramp widths.



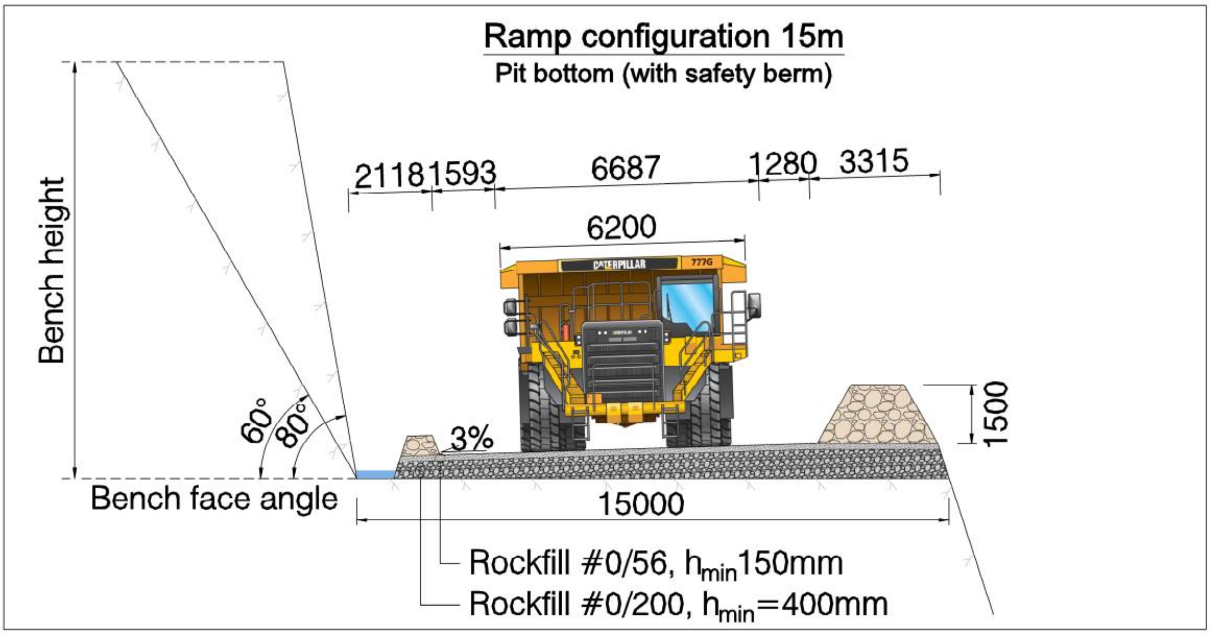
srk consulting	**SSW Keliber Lithium Project** External pit ore and waste rock haulage road design with CAT 777G space requirements (peat layer ≤1 m)	Project No. 592138

Figure 12.7: External pit ore and waste rock haulage road design with CAT 777G space requirements (peat layer ≤1 m)



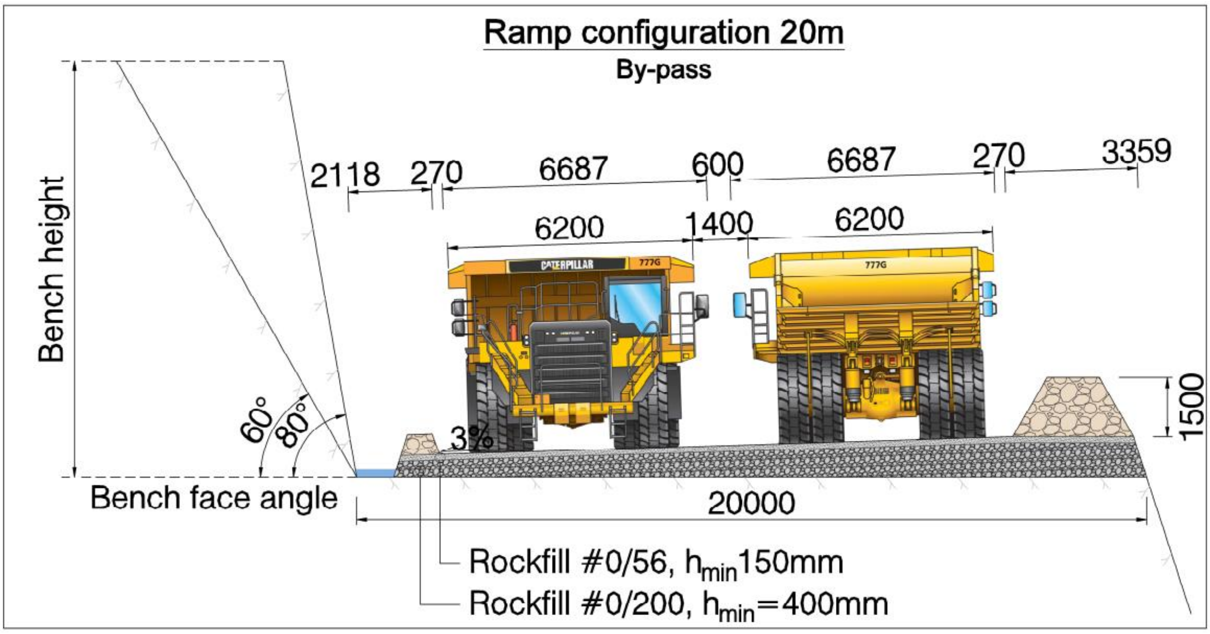
srk consulting	**SSW Keliber Lithium Project** External pit ore and waste rock haulage road design with CAT 777G space requirements (peat layer ≤1 m)	Project No. 592138

Figure 12.8: External pit ore and waste rock haulage road design with CAT 777G space requirements (peat layer >1 m)



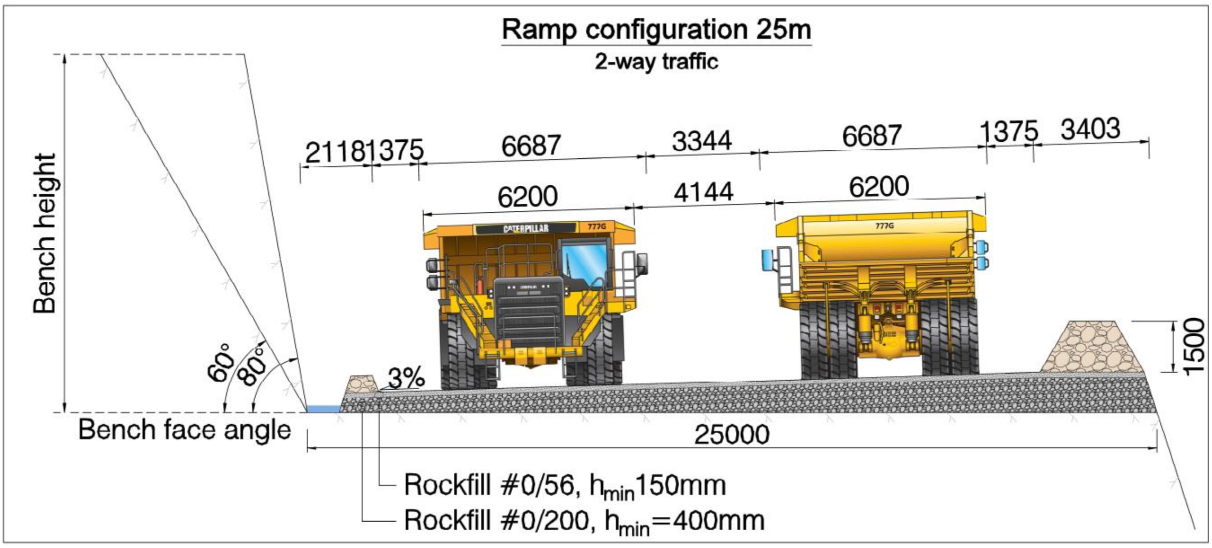
srk consulting | **SSW Keliber Lithium Project** In-pit ramp configuration for 15 m ramp width | Project No. 592138

Figure 12.9: In-pit ramp configuration for 15 m ramp width



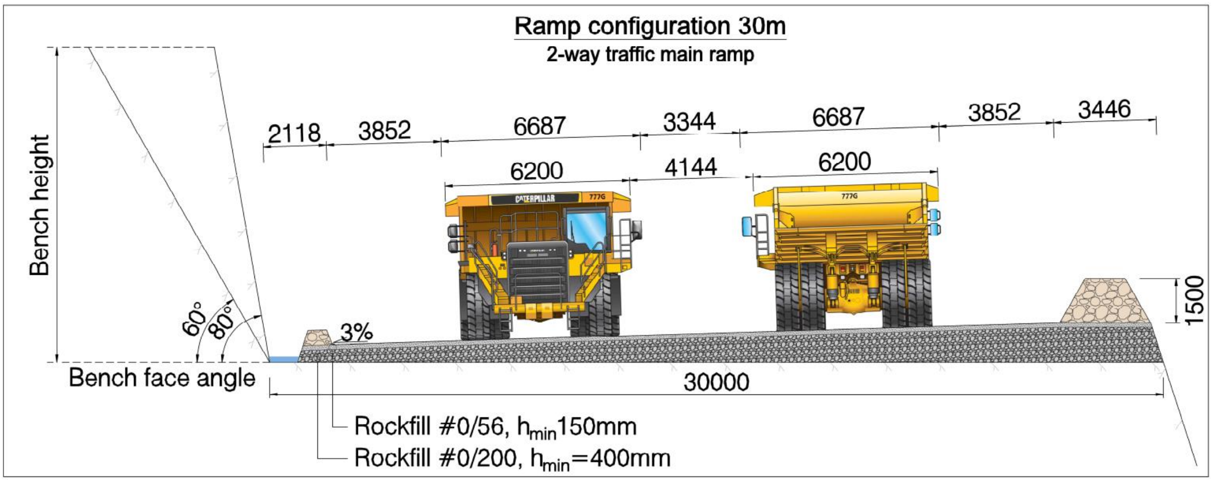
srk consulting | **SSW Keliber Lithium Project** In-pit ramp configuration for 20 m ramp width | Project No. 592138

Figure 12.10: In-pit ramp configuration for 20 m ramp width



srk consulting	**SSW Keliber Lithium Project** In-pit ramp configuration for 25 m ramp width	Project No. 592138

Figure 12.11: In-pit ramp configuration for 25 m ramp width



srk consulting	**SSW Keliber Lithium Project** In-pit ramp configuration for 30 m ramp width	Project No. 592138

Figure 12.12: In-pit ramp configuration for 30 m ramp width

Road maintenance is included in the open-pit mining contract. It includes the following:

- Addition/replacement of wearing course material including procurement;
- Removal of snow;
- Anti-skid; and
- Dusting prevention (water trucks).

12.3.5 Grade control

Successful grade control is a key factor in profitable mining operations because the mining Mineral Reserve is limited in nature. Grade control is also needed to help the processing plant work more efficiently as it is beneficial to have the feed grade to the process as close to the plan as possible.

In open pit mines, grade control is performed daily and is an integral part of the mining operation. Grade control is commonly based on samples taken from production blast holes and geological mapping of the open pit.

Grade control should be viewed as a process that consists of at least three basic aspects; data collection, grade control modelling and ore/waste boundaries; and operational procedures. Data informing the grade control model will be collected through geological mapping of the open pit and updating the geological models which are then used in production hole design. From the production holes, the drilled material is analysed, and a final decision is made on which holes are blasted as ore/waste. After blasting the bench, a grade-control geologist/mine geologist determines the boundaries of ore and waste and delivers loading instructions to the excavator operator. GPS-markers and trackers can also be utilized to monitor the movement of blasted material.

12.3.6 Primary crusher feed and ROM pad storage

Primary crusher feed is the battery limit between mining and concentrator plant departments. Jaw crusher capacity is dependent on the maximum particle size of 700 mm and therefore the crusher has approximately four times higher design capacity than the fine crushing stages. To reduce the size of the primarily crushed ore stockpile, the primary crusher will be operated in two 8-hour shifts, seven days/week.

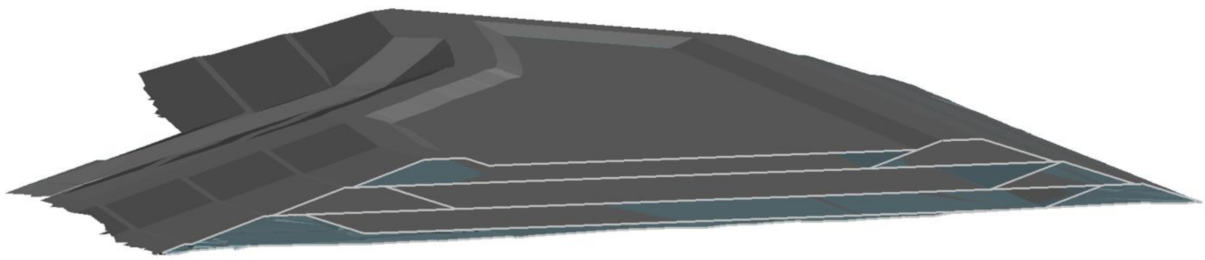
The average primary crushing flow rate of 160 tph is slightly over two truckloads per hour which does not support a continuous ore loading and hauling operation. Potential mining contractors have proposed that the most economical ore production scenario is to run the pit mining operation in an 8-hour day shift, 5 days per week with a sufficiently high capacity to meet weekly production requirements and feed the crusher from the ROM pad during the second shift and weekends.

Therefore, during the day shift, the ore is either directly tipped to the jaw crusher by haul trucks or stored on a ROM pad. During the second shift and weekends, the ore is fed to the primary crusher with a front-end loader from the ROM pad storage. ROM pad and crushed ore storage must have a minimum capacity of approximately three days ore production to cover production during weekends. The current costing basis is that 50 % of the ore will be directly tipped to primary crushing and 50 % fed with a front-end loader, which has an extra cost effect.

12.3.7 Waste rock storage facilities

The Syväjärvi open pit will be the main source of construction rock material (blasted rock and crushed aggregates) during the project development phase. Therefore, waste rock mining will commence at the beginning of project construction. Some 500 000 t of waste will be mined for construction purposes during project development. During production, small amounts of waste rock will be transported to tailings dam raises or crushed for road maintenance.

The balance of mined waste rock will be hauled to separate waste rock storage facilities (**WRSF**s) located in the vicinity of each pit. Material will be transported by off-highway trucks to a flat surface and pushed to a bench with a crawler-based dozer. This improves the safety of the work and stability of the waste rock storage. The final slope angle of the waste rock storage facilities will be 1:3 (vertical: horizontal) and the maximum height approximately 60 m to allow reasonable rehabilitation during closure. At Rapasaari, the WRSF will be divided into two to three sections which will be filled in phases and continuously rehabilitated (Figure 12.13). Due to the short mine life, this is not feasible at the other mine sites.



srk consulting	**SSW Keliber Lithium Project** Principal cross-section of the waste rock storage facility at Rapasaari	Project No. 592138

Figure 12.13: Principal cross-section of the waste rock storage facility at Rapasaari

The majority of waste rock is inert and environmentally benign, and the WRSF do not require a separate engineered liner system. Runoff from the WRSFs will be collected using natural elevation and perimeter ditches surrounding the areas.

A minor amount of waste rock contains environmentally elevated sulfur content. This material will be placed in lined WRSF's. The liner system consists of a bentonite mat and high-density polyethylene (**HDPE**) liner. The surface of the pad will be inclined towards collection ditches that are discharged to the collection pond. Water will then be pumped to the concentrator plant for treatment. All ditches and ponds are to be lined similar to the waste rock storage facility pad. Liners are protected against punctures with a geotextile or by a layer of fines and a prefill layer.

12.3.8 Mine dewatering and water management

Mine site water management is presented in detail in the Water Management Plan. Water management and treatment systems will be constructed before other construction activities to reduce suspended solid releases to natural water catchments.

During production, runoff from operational areas shall be collected and clean runoff from surrounding areas diverted around the operational areas with perimeter drains.

At Syväjärvi, runoff from waste rock and soil storages, roads, and other constructed areas as well as pit drainage will be treated in sedimentation ponds and wetlands and discharged to the environment as stipulated by the Environmental Permit. Runoff from the sulfuric waste rock storage facility will be collected and pumped to the concentrator plant. At Rapasaari, runoff from all production areas will be pumped to the concentrator plant for treatment.

Pit dewatering systems for all open pits consists of:

- Mined pump sumps at the bottom of the pit;
- Pump raft or fixed pump container;
- Pipeline to surface;
- Electricity supply; and
- All open pits will implement the same dewatering strategy.

The mining contractor will acquire and maintain the pump stations and in-pit pipelines and will be responsible for relocating the pump sump as mining advances deeper. Keliber will supply electricity cabling for the pump station and fixed pipelines on the surface.

Two natural ponds exist at the Syväjärvi open pit area. These ponds will be dewatered before production starts and the ponds will be maintained dry during the mine operation. Embankments will be constructed between the open pit and the remaining part of the ponds to control organic sediments and prevent water flow to the open pit. It should be noted that a free water table will not be allowed on the pond side during operation.

12.3.9 Explosives, fuel supply and storages

Explosives and fuel supply for mining will be included in the mining contracts.

Fuel storage tanks and refuelling stations are located at the contractor's maintenance facility area. Crawler excavators will be refueled in the open pit by a fuel truck. Fuel will be stored in double-wall above ground steel storage tanks with an emergency basin. The refueling area will be a concrete foundation with an impermeable liner. Water and potential spillages are to be collected and treated in solids and oil separation chambers. The fueling area will be constructed according to standard SFS 3352:2014/A1:2020 – Service station for flammable liquids.

Separate explosives storage areas with adequate safety distances have been reserved in each mine site layout. Explosives supply to the site and storing activities at the site are most likely part of the explosives manufacturer's service. Storages will be constructed following the best industrial practices and the following legislation:

- Act on the safe handling and storage of dangerous chemicals and explosives (390/2005);
- The government decree on safety requirements for the manufacture, handling, and storage of explosives (1101/2015); and
- The government decree on the control of the manufacture and storage of explosives (819/2015).

12.3.10 Open pit fleet

Potential mining contractors were requested to present the equipment fleet needed for mining operations at Rapasaari and Syväjärvi open pits. Table 16-23 presents the numbers for the main mining equipment by each responding contractor. Table 16-24 shows the full mining equipment list, annual schedule, and utilization rates per equipment by a typical contractor (Contractor A). The equipment requirements are for a 10-year contract period. The total quantity and yearly distribution of mining fleet proposed by contractors were cross checked against AFRY Finland's mining fleet optimization calculations. AFRYS mine fleet optimization results were similar compared to contractor estimates. AFRY's opinion is that the mining fleet requirements given by the contractors are sufficient and they are not overestimated.

Proposed drilling equipment in open pit mining for both ore and waste is the Sandvik Ranger DX800 which is a hydraulic, diesel-powered, self-propelled top-hammer drill rig.

Potential mining contractors were requested to present the equipment fleet needed for mining operations at Rapasaari and Syväjärvi open pits. Table 12-5 presents the numbers for the main mining equipment by each responding contractor. Table 12-6 shows the full mining equipment list, annual schedule, and utilisation rates per equipment by a typical contractor (Contractor A). The equipment requirements are for a 10-year contract period.

Table 12-5: Open pit mining equipment requirements according to contractor quotes

Site	Total (Mt)	Ore Production (Mt)	Stripping Ratio	Li_2O (%)	Average waste mining cost EUR/t	Average ore mining cost EUR/t
Syväjärvi OP	12.45	2.08	5.00	1.068	2.67	4.38
Rapasaari OP	63.49	6.88	8.23	0.901	2.89	3.73
Länttä OP	2.09	0.29	6.33	0.886	5.30	9.51
Outovesi OP	2.56	0.24	9.67	1.331	2.71	5.21

Table 12-6: Mining equipment requirements for Rapasaari and Syväjärvi open pits, including a schedule by Contractor A

Equipment	Model	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Drill rigs											
Ore	Sandvik DX800 (d89mm)	1	1	1	1	1	1	1	1	1	1
Waste rock	Sandvik DX800/DX900 (d89-127mm)	2	2	2	2	2	2	2	2	2	2
Spare (for maintenance and repair)	Sandvik DX800 (d89mm)	1	1	1	1	1	1	1	1	1	1
Loaders											
Ore	CAT 374 (75t)	1	1	1	1	1	1	1	1	1	1
Waste rock	CAT 6015B (150t)	1	1	1	1	1	1	1	1	1	1
Spare (for maintenance and repair)	CAT 390 (90t) / Hit 1200 (120t)	1	1	1	1	1	1	1	1	1	1
Haul trucks											
Ore	CAT 775 (65t)	4	4	4	5	3	3	4	4	4	4
Waste rock	CAT 777G (100t)	2	3	3	3	3	3	4	4	4	4
Spare (for maintenance	CAT 775 (65t)	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
and repair)	CAT 777G (100t)	1	1	1	1	1	1	1	1	1-2	1-2
Auxiliary equipment											
Receive ore to ROM pad, feeding crusher	Komatsu WA600 (55t)	1	1	1	1	1	1	1	1	1	1
Receive waste rock to WRSF	CAT D8 / D9 (30t /45t)	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2	1-2
Secondary breaking	CAT 330 + hydraulic hammer (30t)	1	1	1	1	1	1	1	1	1	1
Scaling permanent rock walls	CAT 345 + hydraulic hammer (60t)	1	1	1	1	1	1	1	1	1	1
Leading groundwater in	CAT 345 (45t)	1	1	1	1	1	1	1	1	1	1
the pit etc.	Pumps	2	2	4	4	4	4	6	6	8	8
Road maintenance	Motor grader	1	1	1	1	1	1	1	1	1	1
	Wheel loader	1	1	1	1	1	1	1	1	1	1
	Utility truck	1	1	1	1	1	1	1	1	1	1
Fuel supply	Fuel truck	1	1	1	1	1	1	1	1	1	1
Supporting machines for maintenance	Sleipners, Telehandlers etc	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5	3-5
Light vehicles	4x4	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8

12.3.11 Manpower

Although mining will be undertaken by contractors, Keliber will have its staff in the following positions to manage and monitor mining at the start of mining operations. The list below will be updated throughout the mining operations.

- 1 Mine manager;
- 1 Mine planning engineer;
- 2 Mine geologists;
- 1 Mine surveyor;
- 1 Mine supervisor;
- 1 Geo-technician; and
- 1 Technician.

12.3.12 Mining costs

[SR4.3(vii), SR5.6(iii)]

The Mining Costs for open pit mining has been based on the contractors quotes the resultant averages over the LoM are listed per operation in Table 12-7. The contractor costs have been increased form the 2019 FS by 25% to include cost escalation since then.

Table 12-7: Mining cost per open pit mining operation

Site	Total (Mt)	Ore Production (Mt)	Stripping Ratio	Li_2O (%)	Average waste mining cost EUR/t	Average ore mining cost EUR/t
Syväjärvi OP	12.45	2.08	5.00	1.068	2.67	4.38
Rapasaari OP	63.49	6.88	8.23	0.901	2.89	3.73
Länttä OP	2.09	0.29	6.33	0.886	5.30	9.51
Outovesi OP	2.56	0.24	9.67	1.331	2.71	5.21

13 PROCESSING AND RECOVERY METHODS

The lithium hydroxide production process is split between two locations. Mined ore will be beneficiated at the Päiväneva concentrator located near the Rapasaari mine. Flotation concentrate will be transported to the Keliber Lithium Hydroxide Refinery where lithium hydroxide monohydrate will be produced as final product.

The selected overall flowsheet comprises a conventional spodumene concentrator which includes crushing, ore sorting, grinding and spodumene recovery by flotation. Flotation concentrate is calcined to convert alpha-spodumene to beta-spodumene. The converted spodumene concentrate will be processed via the patented Metso-Outotec soda pressure leach to produce lithium hydroxide monohydrate.

13.1 Concentrator throughput and design specifications

[§229.601(b)(96)(iii)(B)(14)(ii)]

Concentrator process design is based on the results of the test work described in the 2022 DFS. Metso Outotec has used the test work data as a basis to provide basic engineering for the spodumene concentrator.

The concentrator is designed for a nominal ore throughput of 680 000 tpa and a design throughput of 815 000 tpa, with a head grade before ore sorting of 1.13% Li_2O and 1.2% Li_2O after ore sorting.

The design basis for the spodumene concentrator is to produce a flotation concentrate containing 4.5% Li_2O for the downstream lithium hydroxide production process. In the production phase the lithium oxide grade of the concentrate will be a process optimisation point depending on ruling economic factors. In this regard, test work and design has covered the concentrate grade range from 4.5 to 6.0% Li_2O.

Keliber test work programmes have revealed iron, arsenic and phosphate to be the main impurities of the spodumene flotation concentrate for the downstream process. The maximum levels have been indicated to be 2% for Fe_2O_3, 50 ppm for As and 0.4% for P_2O_5.

Concentrate will be dewatered and filtered to have average moisture content of 10%. The indicated moisture level is the highest allowed moisture for the concentrate preheating phase.

Gravity concentration to produce a Nb-Ta concentrate is not included in the flowsheet of the concentrator because it was found not to be economically feasible for Syväjärvi ore. However, the required space for a gravity circuit has been reserved within the concentrator building. This will allow for the production of a Nb-Ta gravity concentrate should it be economically feasible for the Länttä ore which has higher Nb and Ta head grades.

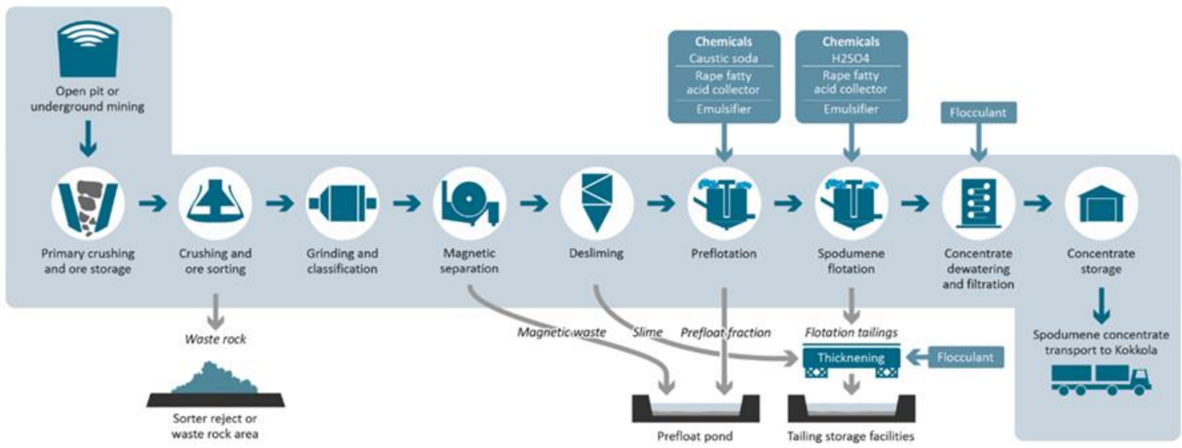
13.2 Process description - concentrator

The flowsheet of the spodumene concentrator includes the following unit process operations:

- ROM pad for short-term ore storage before feeding the primary crusher;
- Material handling equipment to feed the blasted ore to the primary crusher by ore trucks or front-end-loader;
- Primary crushed ore silo with 20 hours capacity;
- Crushing to produce a crushed product size of 80% passing (P_{80}) 12 mm;
- Ore sorting to remove black waste rock and increase the lithium oxide grade of the concentrator ore feed;
- Rod mill feed silo with 12 hours capacity at the design throughput rate of 100 tph;
- Rod milling in open circuit. The 3.0 x 4.45 m EGL rod mill will be equipped with a 470 kW motor;
- Ball milling in a closed circuit with hydrocyclones to produce P_{80} grind size of 150 µm to flotation feed. The 3.6 x 5.6 m EGL ball mill will be equipped with a 1100 kW motor;
- Low intensity magnetic separator to remove process iron and magnetic gangue minerals before desliming;
- Two-stage de-sliming before spodumene flotation. The first stage de-sliming cluster will include seven ten-inch hydrocyclones (five operating and two stand-by) and nine six-inch hydrocyclones in the second de-sliming stage (six operating and three stand-by);

- Pre-flotation to reject apatite, micas and hornblende. Pre-flotation will be operated in reverse flotation mode, where flotation overflow is rejected and pumped to tailings handling;
    - Pre-flotation includes roughing and one-stage cleaning flotation. Rougher flotation includes four 20 m^3 tank cells in series and cleaning includes two 1.5 m^3 tank cells;
- Rougher scavenger flotation (5 x 50 m^3 tank cells) to produce spodumene rougher concentrate;
- Four stage cleaning flotation (13 x 10 m^3 tank cells) to produce final spodumene flotation concentrate;
- Dewatering of final spodumene concentrate by thickening (13 m diameter) and a pressure filtration (PF 55/60 M15) to obtain final concentrate with a moisture content of 10%;
- Reagent dosing system for the concentrator;
- Tailings from the concentrator will be deposited in conventional tailing ponds; and
- Tailings from the lithium hydroxide plant (analcime).

A simplified block diagram of the concentrator is presented in Figure 12.1.



srk consulting	**SSW Keliber Lithium Project** Päiväneva concentrator – simplified block flow diagram	Project No. 592138

Figure 13.1: Päiväneva concentrator - simplified block flow diagram

13.2.1 Primary crushing and raw material storage

Ore at a top size of 700 mm is fed from the ROM pad to the feed bin by a front-end loader or ore trucks. Ore is fed to the primary jaw crusher via a scalping screen. Undersize rocks will by-pass the crusher while oversize rocks are crushed. A rock breaker will be installed next to the jaw crusher to handle blockages in the jaw crusher.

Primary crushing capacity will exceed downstream secondary crushing capacity as it is to be utilised only on day shift. Crusher feed will be measured and automatically controlled.

Crusher product particle size is approximately 70 mm. The by-pass stream and crushed ore reports to a sacrificial conveyor equipped with a tramp iron magnetic separator and metal detector. Tramp metal is collected and recycled off-site.

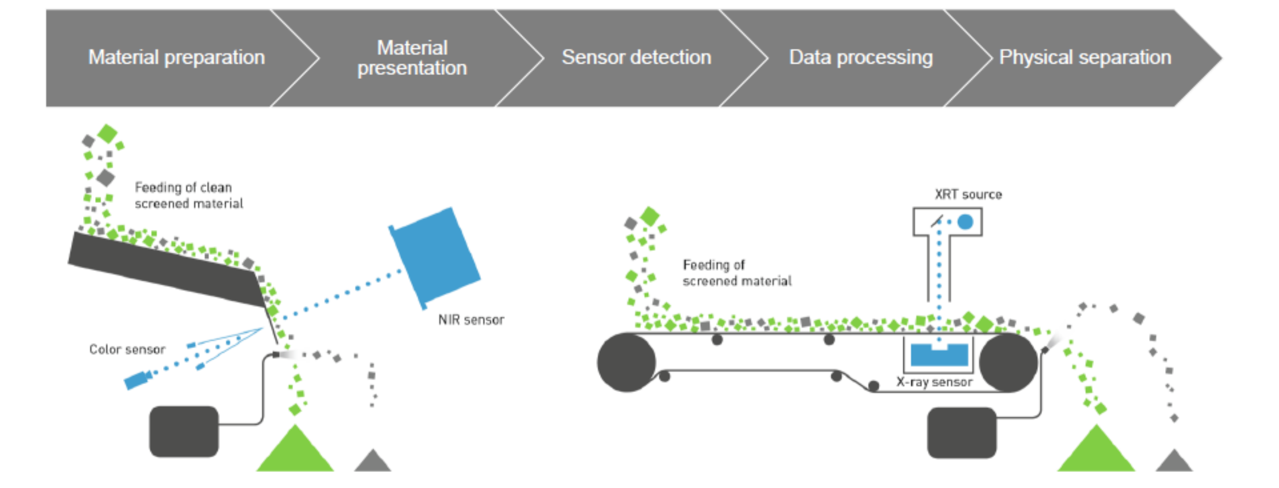
Crushed ore will report to a storage silo with 20 hours live capacity.

The primary crushing building will be equipped with a floor pump for housekeeping purposes and a bridge crane and hoist for maintenance purposes.

A centralised dedusting system will be installed for personnel safety and housekeeping purposes. Suction points will be mounted at rock transfer points. Dust laden air will be filtered, with the filter discharge being recycled to the process.

13.2.2 Ore sorting and secondary crushing

The basic principle of ore sorting is shown in Figure 13.2.



srk consulting	**SSW Keliber Lithium Project** Basic Ore Sorting Operating Principle	Project No. 592138

Figure 13.2: Basic ore sorting operating principle

Different sensor technologies can be incorporated into ore sorting including Colour (reflection, absorption, transmission), Laser (monochromatic reflection/absorption), Near infrared spectrometry (reflection, absorption), Electromagnetic (conductivity, permeability), Radiometric (radiation), X-Ray Fluoresence, X-Ray Transmission.

X-Ray Transmission (XRT) is based on relative atomic density differences and has been selected based on test results.

Primary crushed ore is fed to a double deck vibrating screen, which separates ore into three fractions. Oversize material of P_{80} approximately 80 mm is forwarded to the secondary crusher, with secondary crushed material being recycled to the double-deck screen.

Material from the second screen plate is directed to the ore sorting separation screen. Oversize reports to a washing stage ahead of the coarse ore sorter, while undersize reports to a washing stage ahead of the fine ore sorter. Each ore sorter separates waste from ore in its respective size fraction. Rejected material is fed to a stockpile for transport out of the concentrator area, while accept material is combined and forwarded to tertiary crushing.

The undersize fraction from the double-deck screen is directed to the fine bypass conveyor and is combined with tertiary crushed material.

Crushing and sorting buildings will be equipped with a floor pump for housekeeping purposes and a bridge crane and hoist for maintenance purposes.

A centralized dedusting system will be installed for personnel safety and housekeeping purposes. Suction points will be mounted at rock transfer points. Dust laden air will be filtered, with the filter discharge being recycled to the process.

13.2.3 Tertiary crushing

Secondary crushed and sorted ore reports to a vibrating screen. The oversized material, P_{80} approximately 25mm, is directed to the tertiary crusher. Tertiary crusher discharge is circulated back to the sorting accept conveyor.

Vibrating screen undersize, P_{80} 12 mm, is conveyed to the mill feed silo.

13.2.4 Grinding and classification

The grinding circuit includes a 3.0 m x 4.45 m rod mill fitted with a 470 kW motor and 3.6 m x 5.6 m ball mill fitted with 1100 kW motor. The rod mill is designed to process 83 tonnes/hour at 75% solids in open circuit ahead of secondary ball milling. The ball mill operates at 65% solids in closed circuit with cyclone and screens. Target solids content for classification is 50 wt %.

The cyclone battery comprises two operational and one stand-by cyclone. Cyclone overflow at target P_{80} particle size reports to the grinding product pump sump. Cyclone underflow is pumped to ultrafine screens (three operational and one stand-by). Screen undersize at target P_{80} of 150 µm flows by gravity to the grinding product pump sump with cyclone overflow. Oversize material from the screens reports to the ball mill.

13.2.5 Magnetic separation

Final milled product is pumped to magnetic separation using a low intensity magnetic separator (LIMS) to avoid spodumene losses. The magnetic fraction that includes process iron and magnetic minerals will be pumped to a lined tailings pond together with pre-float concentrate. The non-magnetic faction is forwarded to desliming.

13.2.6 Desliming and pre-flotation

Desliming consists of two pumps and desliming hydrocyclones installed in series. The non-magnetic stream from the magnetic separator is pumped to the first desliming hydrocyclone cluster, which consists of seven 10-inch hydrocyclones (five operational and two on stand-by).

Primary cyclone underflow is directed to a pre-flotation conditioner. Primary cyclone overflow is pumped to the second desliming hydrocyclone bank, which consists of nine 6-inch hydrocyclones (six operational and three on stand-by).

Secondary cyclone underflow is combined with primary cyclone underflow in the conditioner tank. Secondary cyclone overflow is pumped to the spodumene tailings pump sump.

The combined desliming cyclone underflow is mixed in the first conditioner tank with sodium hydroxide for pH regulation to approximately pH 10 and then it is fed to the second conditioner.

The purpose of pre-flotation is to decrease the amount of phosphorous in the final concentrate. Fatty acid is applied to the second conditioner tank. Slurry gravitates to the pre-flotation stage, with emulsifier being fed to the feed box. Pre-flotation includes rougher with four TC-20 tank cells in series and cleaner flotation with two OK- 1.5 in series.

Combined underflows from the pre-float rougher and cleaner stages are pumped to the spodumene flotation feed thickener. The overflow from the cleaner flotation is pumped to a separate lined tailings storage facility. Solid's content of the tailings is approximately 17% and the mass recovery 1% with apatite recovery 32%.

13.2.7 Flotation feed thickening

Pre-float tailings is thickened to 60% solids in an 18 m thickener ahead of spodumene rougher flotation. Thickener underflow is pumped to rougher flotation via the attrition conditioner and the overflow is pumped to the water treatment plant and there to the process water tank.

13.2.8 Spodumene flotation

Thickened spodumene flotation feed at 60% solids is pumped to an attrition conditioner. In the first conditioner pH is regulated with sulphuric acid, targeting a pH of 7. From the first conditioner, slurry is directed to the second conditioner where fatty acid is introduced to the slurry.

Emulsifier is added to the slurry from the attrition conditioner as it flows to rougher flotation, which comprises one bank of five 50m^3 rougher flotation cells. The combined concentrate from rougher flotation is pumped to the first cleaner flotation. Tailings is pumped to the tailings thickener.

Spodumene cleaner flotation includes four stages. The first stage includes five 10 m^3 cells, the second stage has three 10 m^3 cells, the third stage has three 10 m^3 cells and the fourth stage has two 10 m^3 cells.

The underflow of the first cleaner is pumped back to the flotation feed thickener. The overflow is pumped to second cleaner flotation. The concentrate from the second cleaner is pumped to the third cleaner flotation and tails flow back to the first cleaner via gravity. Concentrate from the third cleaner is pumped to the fourth cleaner flotation and tails flow back to the second cleaner via gravity. Concentrate from the fourth cleaner is pumped to the concentrate thickener and tails flow back to the third cleaner via gravity.

13.2.9 Tailings thickening

Tailings from rougher flotation and desliming cyclones are pumped to the 12 m diameter tailing's thickener. Thickener underflow at 60% solids is pumped to the tailings dam. The overflow is pumped to the water treatment plant and from there to the process water tank.

13.2.10 Concentrate thickening

The final flotation concentrate is pumped to the 13 m diameter concentrate thickener. The overflow from the thickener is pumped to the water treatment plant and from there to the process water tank. The underflow at 60% solids is pumped to the concentrate filter feed tank by an underflow pump.

13.2.11 Concentrate filtration and concentrate storage

Filter cake at 10% design moisture is dropped to cake discharge chutes after filtration and then conveyed to the concentrate stockpile. The filtrate pumped to the concentrate thickener feed box.

The concentrate storage facility will provide sufficient material for two days (48 h) operation, providing a buffer between the concentrator and the chemical conversion plant. Spodumene concentrate will be loaded by a front-end loader and transported by truck to the receiving concentrate storage at the Keliber Lithium Hydroxide Refinery in Kokkola.

13.2.12 Particle size and on-stream slurry analysers

Metso Outotec PSI 500 particle size analyser is an on-line size measurement system for mineral slurries. It is used in controlling wet mineral processes, primarily grinding, classification, re-grinding and thickening.

Samples for particle size analyses are taken from the LIMS feed, the first desliming cyclone overflow and the second desliming cyclone overflow.

Courier 8 is an on-stream slurry analyser that can measure element concentrations in slurries for up to 12 samples. It was designed for on-stream measurement of light elements and is suitable for Li measurements. Simultaneously up to 20 element concentrations and solids content can be measured from one sample.

Samples for the element analyses are taken from the sample divider, pre-float tailings, spodumene flotation tailings, spodumene rougher flotation concentrate, spodumene first cleaner flotation tailings and final concentrate. Samples from slimes, whole pre-float concentrates stream and sampler whole magnetic fraction stream report to the multiplexer. Streams from rougher concentrate, first cleaner tailings and all the analysed streams are returned to the process by pump. Samples from the final concentrate will be pumped back to the concentrate pump sump.

13.3 Process design criteria - concentrator

Key concentrator process design criteria are shown in Table 13-1.

Table 13-1: Key process design criteria - concentrator

Description	Unit	Value
Plant design capacity	tpa	815 000
	tph	100
Ore moisture	%	5
Head grade (run of mine ore)	% Li_2O	1.13
Head grade (after ore sorting)	% Li_2O	1.20
Lithium recovery	%	88
Sorting and crushing availability	%	85
Crushing circuit P_{80}	mm	12
Concentrator availability	%	93
Bond Abrasion index		0.4
Bond Crushing Work index (Syväjärvi ore)	kWh/t	12.4 ± 1.9
Bond Rod Mill Work index (Syväjärvi ore)	kWh/t	15.3
Bond Ball Mill Work index (Syväjärvi ore)	kWh/t	18.9
De-sliming 1 cut size	µm	30
De-sliming 2 cut size	µm	7
Pre-float feed P_{80}	µm	130
Pre-float slurry density	% solids	30
Spodumene flotation feed P_{80}	µm	150
Spodumene flotation slurry density	% solids	30
Final spodumene flotation mass pull	%	23.5
Final spodumene concentrate grade	% Li_2O	4.5
Final spodumene concentrate production	tph	23.5

Bond rod mill index of Länttä ore was determined as 12.6 kWh/t and ball mill work index at 17.1 kWh/t. Bond rod and ball mill indexes are 15.3 kWh/t and 15.2 kWh/t for Rapasaari ore. The geo-metallurgical study showed that the grindability only varies a little between deposits and correlates with spodumene grade (higher spodumene grade means higher resistance for grinding). As the mineralogical differences between the deposits are small it was considered that grindability would be within these ranges in untested Emmes and Outovesi.

13.4 Requirements for energy, water and consumables

[§229.601(b)(96)(iii)(B)(14)(iii)]

The following services will be provided:

- Flotation air
- Plant and instrument air
- Raw water
- Process water
- Sealing water
- Warm water
- Potable water
- Fire water

13.4.1 Power

In terms of the 2022 DFS Report, electric power to the Päiväneva concentrator will be supplied from a local distribution grid at Kaustinen owned and operated by a local utility company. At the supply end, the transmission cable will be connected to the 110 kV distribution grid through a 16 MVA main transformer. Power will be transmitted to the Päiväneva concentrator via a 33 kV underground transmission cable. At the Päiväneva site the external power supply will be connected to a 33 kV main distribution switchgear, from which the power will be further distributed to local process substations.

The Päiväneva concentrator power requirements are estimated at 11 410 kW.

13.4.2 Raw water pumping and treatment

A raw water pumping station will be constructed at the Köyhäjoki river for raw water pumping to the chemical raw water treatment plant. Raw water pump dimensioning is based on estimated flowrate of 150 m^3/h. Raw water from Köyhäjoki river will be micro filtered and preheated to 10°C before being chemically treated with a precipitation chemical and pH-adjusted with NaOH. Preheated and chemically treated water will be pumped to three DynaSand contact filters for humus removal. Sludge handling includes a Lamella clarifier, sludge thickener and drying by sludge centrifuge.

13.4.3 Process water treatment

The process water treatment plant consists of two similar, dissolved air flotation (DAF) units, which remove suspended solids and colloid material from liquid by means of air bubbles that attach to agglomerates and raise them to surface. The flotation basin is equipped with a surface sludge removal system. Sludge is removed by gravity. Clarified water will be pumped to the process water tank.

13.4.4 Pre-float water treatment

The techniques applied to remove arsenic species include oxidation, coagulation-flocculation, flotation and pressure sand filtration.

The first oxidation stage is done by a prefabricated bottom diffuser / aeration system ahead of an aerated coagulant tank. Common coagulants used for arsenic are iron salts. The precipitation of ferric arsenate is commonly done at pH 4 – 5. To ensure the stability of ferric arsenate, an excess amount of iron must be dosed compared to the amount of arsenic.

After coagulation and flocculation, the suspended solids are removed by micro-flotation followed by pressure sand filtration as a final polishing stage.

13.4.5 Excess water treatment

In the recycled water treatment plant, the equipment will be similar to the pre-float water treatment, with larger equipment sizes.

13.4.6 Potable water

Potable water will be drawn from the municipal water system.

13.4.7 Fire water

Fire water pumps will be located at the water treatment plant. Water from fresh water and process circulation ponds can be used as fire water.

13.4.8 On-line water management tool development for the concentrator

Keliber has started development work for concentrator water management. The purpose of the management tool is to provide real time concentrator-wide water balance management, control and reporting including what-if scenarios. The tool will summarize real time weather data and on-line process data from the concentrator automation system to provide visualisation and simulation as well as reporting.

13.5 Concentrator reagents and consumables

Table 13-2 summarises the reagents and consumables for the concentrator.

Table 13-2: Concentrator reagents and consumables

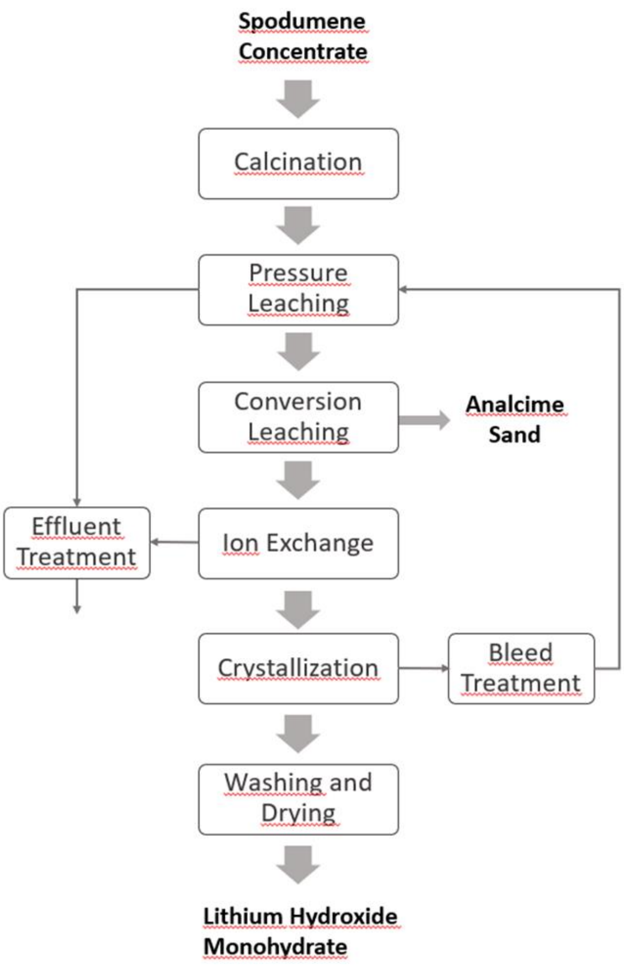
Description	Unit	Value
Rod Mill Grinding Media Consumption	g/t	593
Ball Mill Grinding Media Consumption	g/t	690
Caustic Soda Consumption (NaOH)	g/t	500
Sulphuric Acid Consumption (H_2SO_4)	g/t	50
Rape Fatty Acid Consumption	g/t	1 390
Emulsifier Consumption	g/t	155
Flocculant Consumption	g/t	80

13.6 Lithium hydroxide production plant throughput and design specifications

[§229.601(b)(96)(iii)(B)(14)(ii)] [SR5.3(iii)]

The Keliber Lithium Hydroxide Refinery at the KIP, Kokkola is designed with a feed capacity of 156 000 tpa of spodumene concentrate, which translates to an annual lithium hydroxide monohydrate production of 15 000 tonnes at 99.0% $LiOH.H_2O$ purity for the final product.

A simplified block flow diagram of the Lithium Hydroxide Plant is shown in Figure 13.3.



srk consulting	**SSW Keliber Lithium Project** Simplified block flow diagram of the lithium hydroxide production plant	Project No. 592138

Figure 13.3: Simplified block flow diagram of the lithium hydroxide production plant

Key unit processes in the production of lithium hydroxide are summarised as follows:

13.6.1 Concentrate receipt

The spodumene concentrate will be transported by truck to the Keliber Lithium Hydroxide Refinery located at the Kokkola Industrial Park (KIP) at Kokkola harbour.

The capacity of the receiving concentrate storage facility is sufficient for two weeks of operation. The storage capacity will provide the flexibility to blend different concentrate qualities and to ensure stable operation for the downstream lithium hydroxide production process. The blending and homogenisation might be required to control the lithium oxide grade and levels of impurities in the feed to the lithium hydroxide plant.

13.6.2 Spodumene calcination (conversion)

Alpha-spodumene is converted to beta-spodumene in a direct heated rotary kiln. The rotary kiln will be fired with LPG and operate at 970-1075 °C.

A rotary cooler unit is used to cool the converted beta-spodumene down to between 80 and 90 °C before pulping with the circulating liquids - filtrate and wash water from the 1st stage (autoclave) residue filtration, in two agitated tanks in series.

13.6.3 Pressure leaching of beta-spodumene

Primary leaching in soda leaching autoclave operating at a temperature of 215 °C and 20 - 22 bar gauge pressure. High pressure steam is used for maintaining the temperature. Beta-spodumene will be converted to Li_2CO_3 and analcime as a by-product according to the following equation:

$$2LiAlSi_2O_6(s) + Na_2CO_3 + 2H_2O = Li_2CO_3(s) + 2NaAlSi_2O_6\ H_2O(s)$$

Slurry from the autoclave is released by pressure difference into two-stage flashing.

13.6.4 Soda leach residue filtration

Autoclave slurry solid/liquid separation with two parallel pressure filters. Soda leach residue consists mainly of solid analcime ($NaAlSi_2O_6*H_2O$), Li_2CO_3, lithium carbonate, quartz and other gangue minerals. This is pulped with leach residue wash water and forwarded to LiOH conversion. Part of the filtrate is recycled for filter manifold flushing after the filling/filtration step. The manifold flushing stage pushes residual solids to the chambers and filtrate to the filtrate tank. Residual manifold flushing liquid is released from the pipeline to an agitation tank, from which the slurry is returned to the filter feed tank. Spent cloth wash waters are recycled to the cake wash tank.

Part of the filtrate and wash water is fed back to calcine grinding and pulping. The rest of the water is fed to effluents, to control the leach circuit water balance. The amount of process bleed to effluent is greatly dependent on the lithium grade of the calcined beta-spodumene feed. The lower the Li_2O grade, the higher the consumption of cake wash waters.

13.6.5 LiOH conversion

Pulped soda leach slurry, lime slurry and wash waters from leach residue filtration are fed to conversion reactors. Conversion is done preferably below 30 °C to minimise solubilisation of aluminium and silica.

Li_2CO_3 in soda leach solids reacts with $Ca(OH)_2$ according to following reaction:

$$Li_2CO_3(s) + Ca(OH)_2(s) = 2Li+ + 2OH^- + CaCO_3.$$

Only LiOH is water soluble, and the others are insoluble.

13.6.6 Leach residue filtration and handling

After conversion leach, the slurry is fed to leach residue filters for solids-liquid separation using two parallel pressure filters. Filter cake consisting mainly of analcime, calcium carbonate, quartz and other gangue is discharged. Filtrate is fed through polishing filtration to ion exchange. Wash water is fed to Lime slurrying and 1st stage residue pulping.

13.6.7 Polishing filtration

Feed from the secondary conversion is fed through a polishing filtration stage where suspended solids are removed from the lithium hydroxide solution. The polishing filtration is carried out in LSF type polishing filters. One will be in operation and one on stand-by.

13.6.8 Ion exchange

Ion exchange is done in three fixed-bed columns connected in series for removal of elevated multi-elements e.g. Ca and Mg from the solution before LiOH crystallisation.

The regeneration cycle starts with the pre-wash stage, where 2 M sodium hydroxide solution is fed to the column, mainly to displace most of the lithium bound to the resin with sodium ions.

After pre-wash, follows the first displacement wash with demi water. A short backwash with demi water is done after the first displacement wash to backwash the resin bed and remove any air bubbles and possible channelling.

Elution of the metals is done with excess 2 M hydrochloric acid solution. The resin functional groups are simultaneously converted to acid form. The acidic eluate stream, containing mainly calcium, sodium and potassium as chlorides is fed to effluent treatment.

After a second displacement wash with demi water neutralisation of the resin to lithium form is done with process lithium hydroxide solution.

After regeneration, the column is connected as the last column in the series.

13.6.9 Crystallisation of lithium hydroxide

Lithium hydroxide is crystallised from the lithium hydroxide solution by means of pre-evaporation in a mechanical vapour recompression (MVR) falling film evaporator, followed by an MVR crystalliser. Lithium hydroxide $LiOH*H_2O$ is crystallised according to following reaction:

$$Li+ + OH- + H_2O = LiOH*H_2O(s)$$

Lithium hydroxide slurry from the crystallisation stage is fed to a centrifuge where solids are separated from the mother liquor and washed. Moist cake is dried in a fluidised bed dryer and packed into big bags for shipment to market.

Most of the mother liquid is circulated back to conversion in order to control the soluble concentration of Al, CO_3^{2-} and Si in solution. A small portion of the mother liquor is fed to bleed treatment: carbonation and conversion.

13.6.10 Crystallisation bleed treatment

Lithium in crystallisation bleed liquor is recovered as lithium carbonate. In the carbonation step, carbon dioxide is fed pH-controlled to mother liquor bleed from crystallisation batch reactor. Lithium carbonate precipitates from the concentrated lithium hydroxide solution according to following reaction:

$$2Li^+ + 2OH^- + CO_2(g) = Li_2CO_3(aq,s) + H_2O$$

Aluminium also precipitates with the lithium as carbonate according to following reaction:

$$2Al^{3+} + 6OH^- + 3CO_2(g) = Al_2(CO_3)_2(s) + 3H_2O$$

Carbonation is done at elevated temperature to minimise lithium solubility.

13.6.11 Effluent treatment

Bleed from soda process filtrate and IX eluate acids are constantly pumped to the effluent storage tank. In the effluent pre-treatment area, lithium is recovered from the effluent liquor by precipitation as lithium phosphate with sodium phosphate solution feed. After precipitation, filtration and washing steps follow.

Filtrate is further treated in an electrochemical water treatment process in order to precipitate soluble arsenic from the effluent stream. Solids in the effluent stream are removed by dissolved air flotation and pressure sand filtration.

The treated water is discharged to a municipal wastewater treatment plant.

13.7 Process design criteria – lithium hydroxide chemical plant

Key process design criteria for the lithium hydroxide chemical plant are shown in Table 13-3.

Table 13-3: Key process design criteria – lithium hydroxide chemical plant

Parameter	Unit	Value
Concentrate Processing Rate (dry)	tpa	156 000
Concentrate Grade	% Li_2O	4.5
Concentrate Moisture	% H_2O	11
Concentrate Fineness	P_{80} microns	150
Plant Operating Time	h	7 500
Overall Plant Availability	%	85.6
LiOH * H_2O Production	tpa	15 000
Recovery from concentrate to LiOH x H_2O product (incl. calcining)	%	83.4

13.8 Requirements for energy, water and consumables

[§229.601(b)(96)(iii)(B)(14)(iii)]

13.8.1 Power

In terms of the 2022 DFS Report, electric power to the lithium chemical plant will be provided by a subsidiary of a local power utility company. To enable continuous production during planned grid maintenance works, the plant will have two independent 20 kV connections to the external grid. Both power connections will be able to supply the plant at full capacity. From the main distribution switchgear, the power will be further distributed to the plant process substations by means of 20 kV underground cables. Finally, the power will be transformed to 400 V and 690 V levels in the proximity of the consumers.

Kokkola plant power requirements are estimated at 12 450 kW.

13.8.2 Lithium chemical plant - site services

The KIP site will provide existing infrastructure to supply the required site services. All process water qualities can be purchased from the water treatment plant operated by KIP Service Oy and process steam from the power plant of Kokkolan Energia Oy.

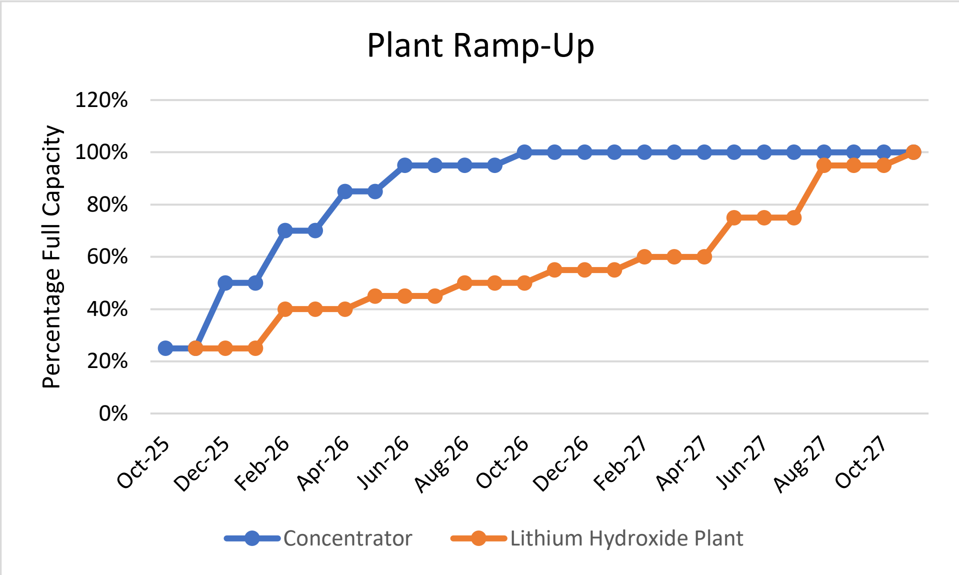
- Process water
- Demineralised water
- Cooling water
- Sealing water
- Potable water
- Fire water
- Compressed and instrument air
- Process steam

13.9 Plant commissioning and ramp-up

[§229.601(b)(96)(iii)(B)(14)(iv)]

First ore is planned to be processed through the Päiväneva Concentrator in October 2025. Twelve months has been allowed to reach design capacity as shown in Figure 13.4.

First concentrate from the Päiväneva concentrator is planned to be processed through the Kokkola Lithium Hydroxide Refinery in November 2025. Twenty-four months has been allowed to reach design capacity as shown in Figure 13.4.



srk consulting	**SSW Keliber Lithium Project** Plant ramp-up schedules	Project No. 592138

Figure 13.4: Plant ramp-up schedules

Key concentration processes include comminution, ore sorting and flotation. Variation in the grindability was shown to be relatively small between the deposits and flotation parameters are reasonably well understood following bench scale testing of all deposits and pilot scale testing of Länttä, Syväjärvi and Rapasaari. XRT ore sorting was tested at pilot scale on the Syväjärvi bulk ore sample. There is a risk that ore sorting efficiency will vary across the Syväjärvi deposit and that other deposits will not perform with the same efficiency. Subject to results of further recommended investigations confirming that ore sorting, and flotation performance of other deposits is in line with Syväjärvi test results, twelve months is considered to be a reasonable ramp-up period for a concentrator of this complexity.

Key refining processes include the conversion of α-spodumene to leachable β-spodumene, ahead of chemical processing of the converted concentrate to produce lithium hydroxide. While successful pilot trials on Syväjärvi and Rapasaari concentrates have significantly de-risked the flowsheet, a residual risk remains as it does with the first implementation of any novel technology. In mitigation of such risk, the Lithium Hydroxide Refinery will commence hot commissioning on third party concentrate approximately nine months before concentrate is received from the Päiväneva concentrator. In addition, a ramp-up period of twenty four months has been allowed to achieve design throughput of Keliber concentrate.

Importantly, it should be noted that the Mineral Reserves for Keliber have been declared on the basis that a ready market exists for the concentrate, without the need for a refinery.

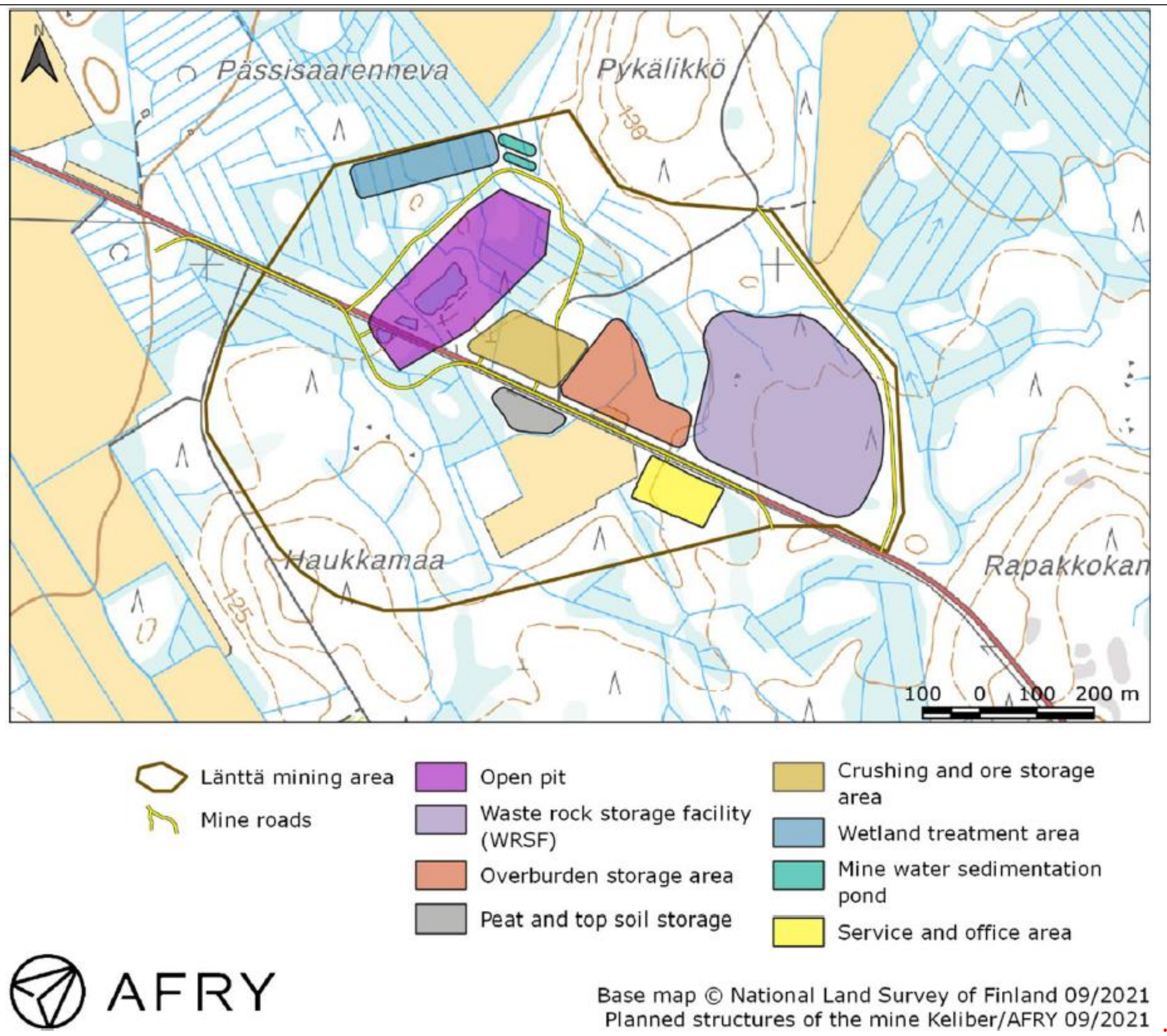
14 INFRASTRUCTURE

[§229.601(b)(96)(iii)(B)(15)]

14.1 General infrastructure

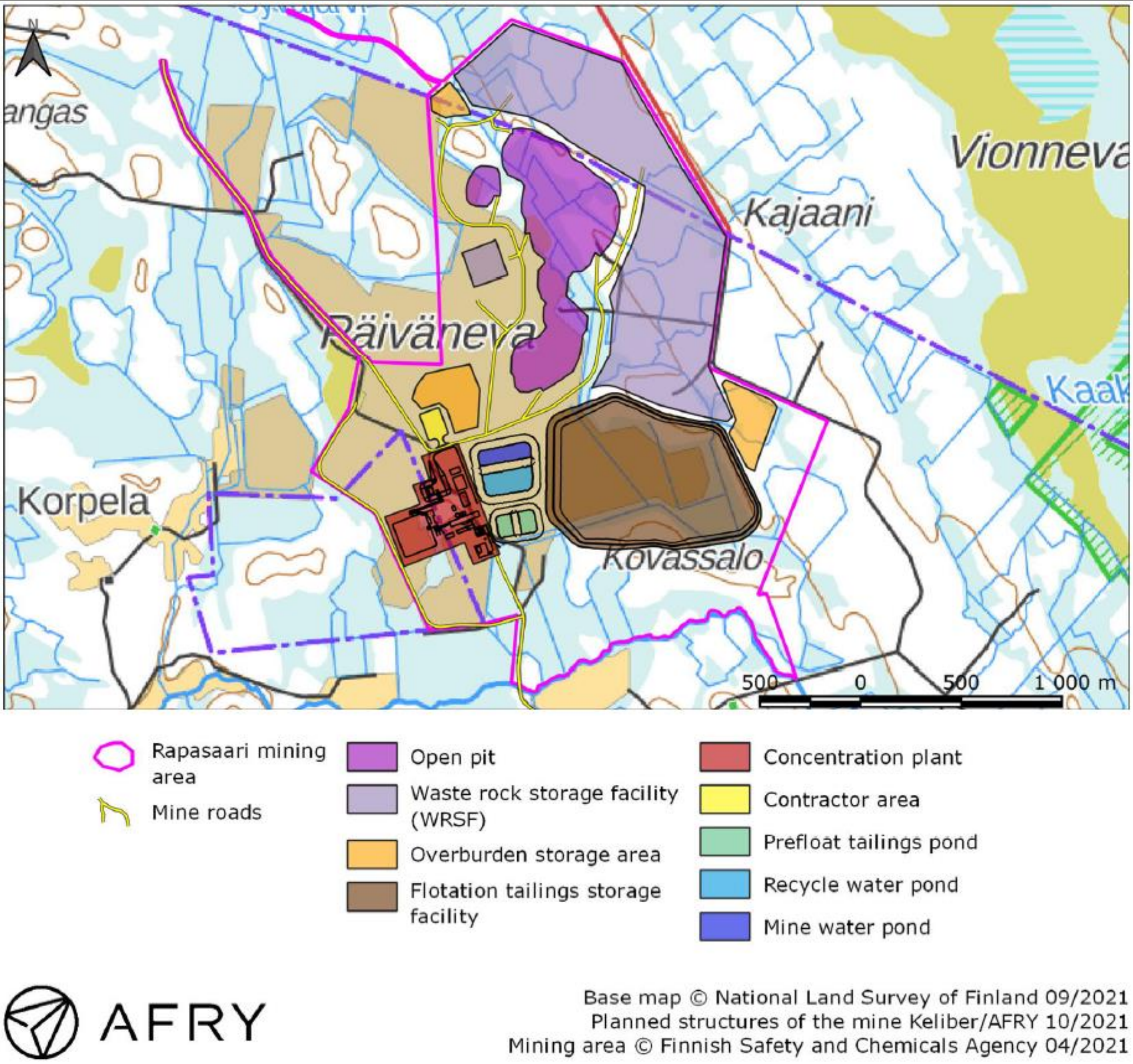
The open pit mines and concentrator are situated in Central Ostrobothnia in Western Finland (Figure 7.1). Kokkola is the largest city in the area and the port has all the facilities for overseas shipments; it is ice-free all year. The nearest airport is Kokkola-Pietarsaari, which is serviced by Finnair as well as charter flights. The major infrastructure at the open pit mines (Länttä, Rapasaari, Syväjärvi, and Outovesi) comprises access roads, power transmission lines, main electrical substations, electrical distribution, security, weighbridges, offices, laboratories, workshops, crushing units, access roads to the Päiväneva concentrator and internal roads.

The general layout of the mine sites is shown in Figure 14.1 (Länttä), Figure 14.2 (Rapasaari), Figure 14.3 (Syväjärvi), and Figure 14.4 (Outovesi).



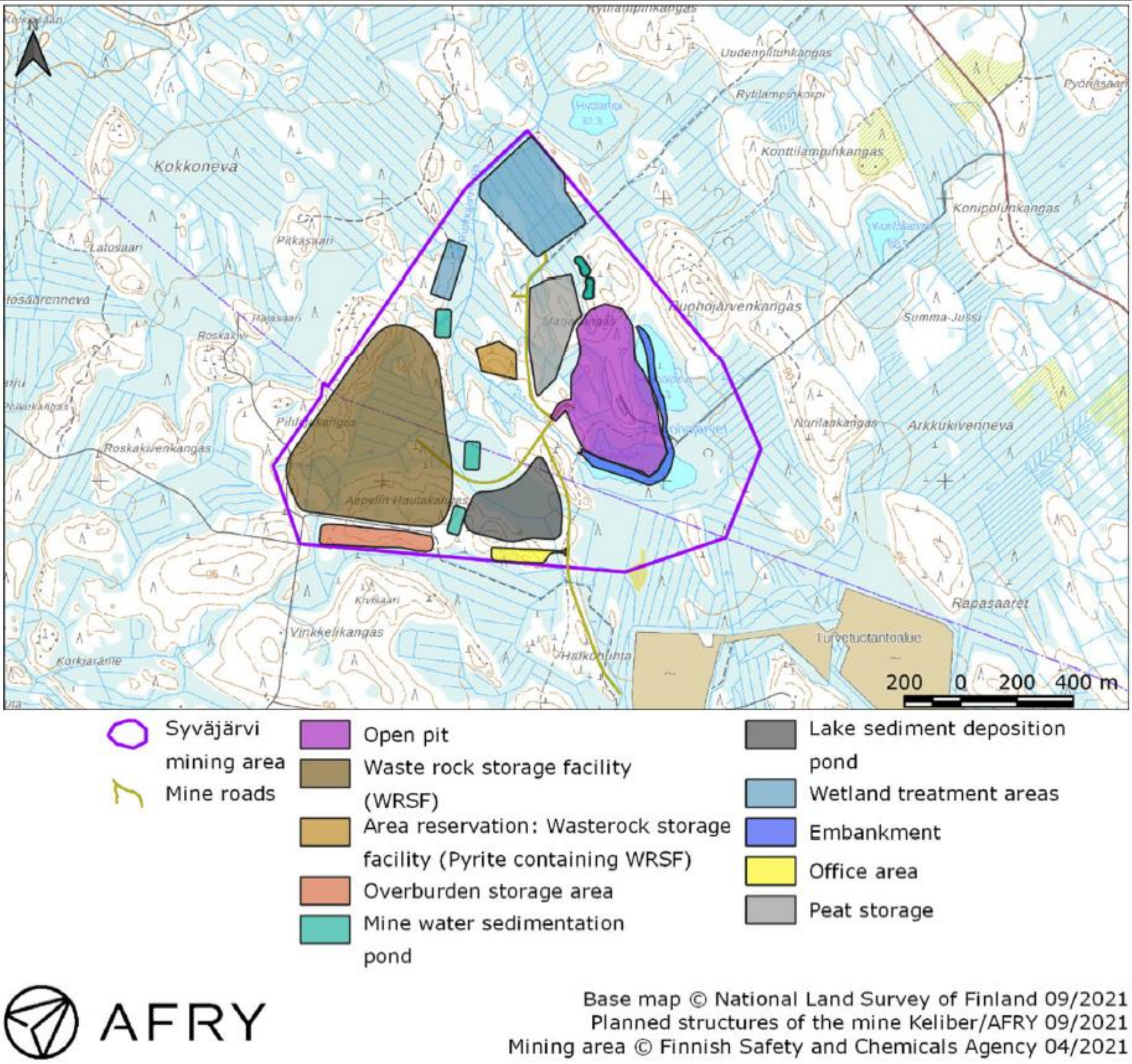
srk consulting	**SSW Keliber Lithium Project** General Layout of the Länttä Mine Site (Source: Afry Finland Oy. (2021))	Project No. 592138

Figure 14.1: General Layout of the Länttä Mine Site



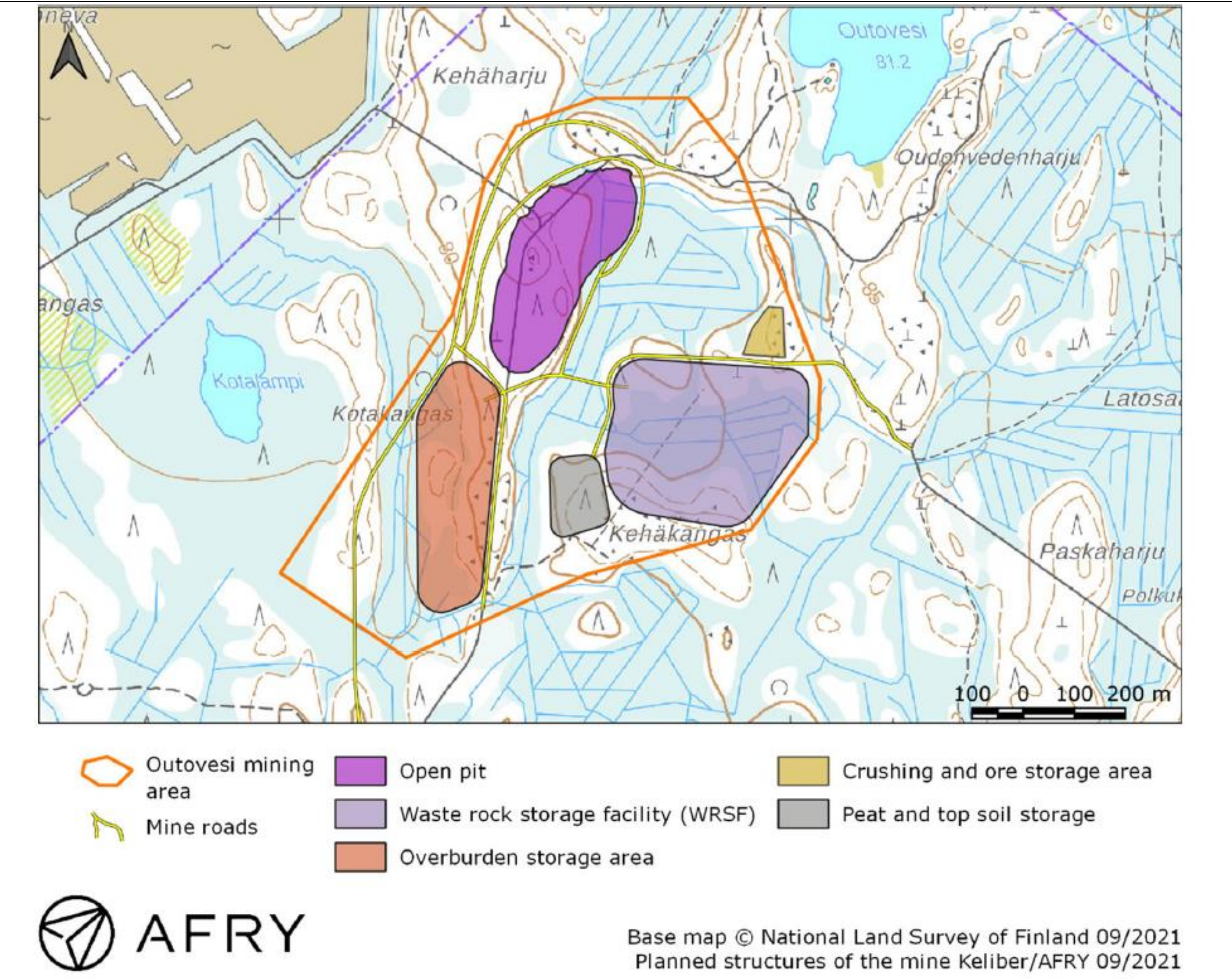
srk consulting	**SSW Keliber Lithium Project** General Layout of the Rapasaari Mine Site (*Source: Afry Finland Oy. (2021))*	Project No. 592138

Figure 14.2: General Layout of the Rapasaari Mine Site



srk consulting	**SSW Keliber Lithium Project** General layout of the Syväjärvi Mine site (*Source: Afry Finland Oy. (2021))*	Project No. 592138

Figure 14.3: General layout of the Syväjärvi Mine site



srk consulting	**SSW Keliber Lithium Project** General Layout of the Outovesi Mine Site (*Source: Afry Finland Oy. (2021)*)	Project No. 592138

Figure 14.4: General layout of the Outovesi Mine site

The Keliber Lithium Concentrator at Päiväneva is located 18 km from the municipality centre of Kaustinen in close proximity to the Rapasaari Mine Site (Figure 14.2). The major infrastructure for the Päiväneva concentrator includes:

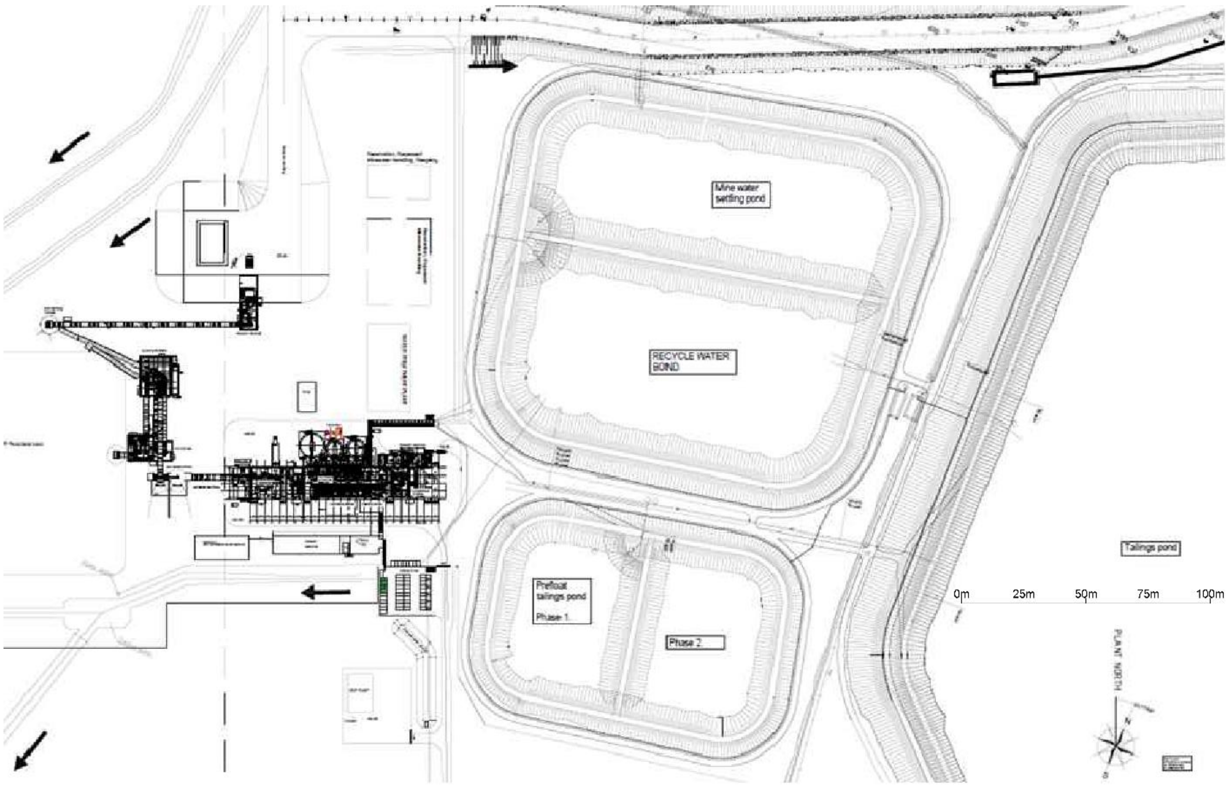
- Access road to the concentrator plant from the public road;
- Raw water pumping station at Köyhäjoki, piping and water treatment plant;
- One 19 km 33 kV power transmission line from the Keliber Lithium Project substation in Kaustinen to Päiväneva site;
- Main electrical substations, electrical distribution, offices, laboratory.

Required infrastructure for the concentrator and equipment including:

- Crushing, ore storage and ore sorting;
- Grinding and classification;
- Magnetic separation;
- Desliming;
- Pre-flotation and spodumene flotation;
- Concentrate dewatering and filtration;
- Concentrate storage;

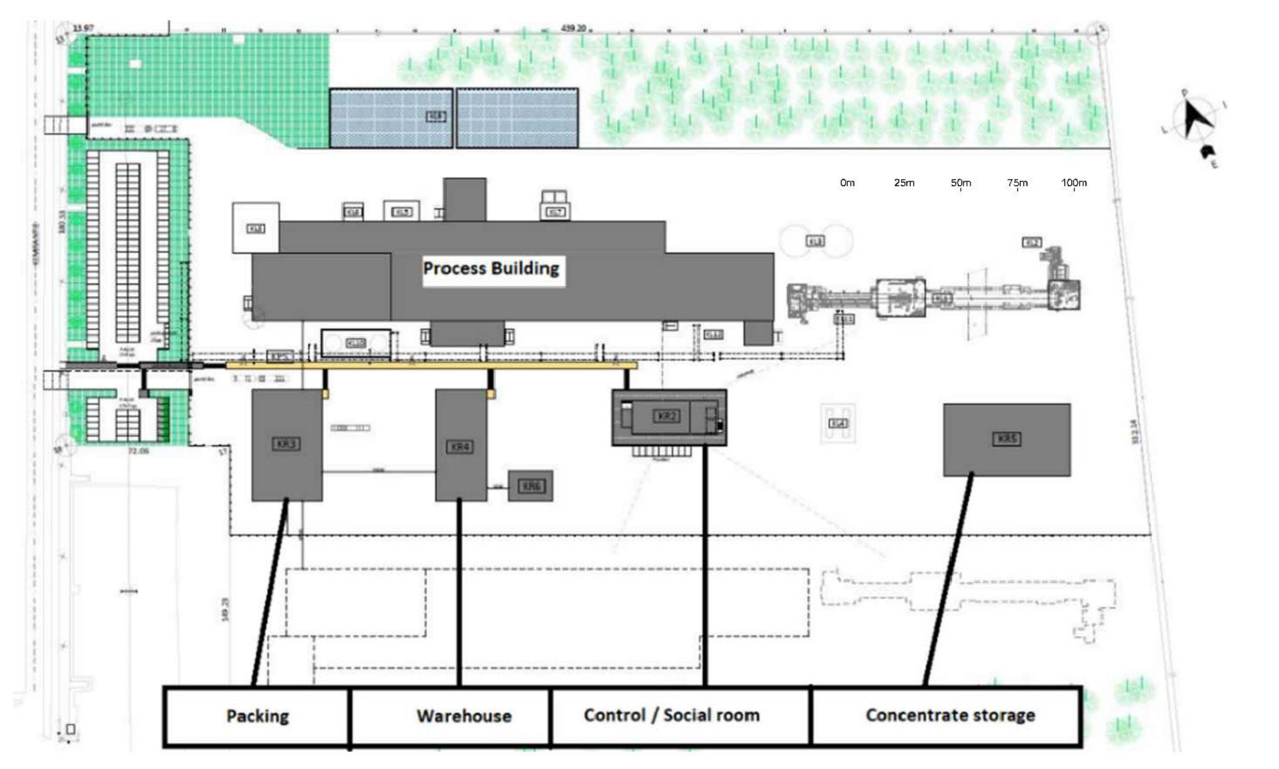
- Tailing ponds: two tailing ponds for process residues, flotation tailings and pre-flotation tailings and two water ponds for pit water and process water circuit; and
- Small thermal plant to produce heat.

Figure 14.5 shows the overall layout of the Päiväneva concentrator site: The Keliber Lithium Hydroxide Refinery is situated in the KIP at Kokkola, and an overall layout is shown in Figure 14.6.



srk consulting	**SSW Keliber Lithium Project** Overall Layout of the Päiväneva Concentrator Site (*Source: WSP, 2022)*	Project No. 581648

Figure 14.5: Overall layout of the Päiväneva Concentrator site



srk consulting	**SSW Keliber Lithium Project** Overall Layout of the LiOH Plant at the Kokkola KIP Site *(Source: WSP, 2022)*	Project No. 581648

Figure 14.6: Overall Layout of the LiOH Plant at the Kokkola KIP Site

Most of the required external site services for the operation, such as security and fire brigade, are available at the KIP. The plant has all the required infrastructure for concentrate conversion and hydrometallurgical processing including an effluent treatment plant, Liquid Petroleum Gas (LPG) storage and handling facilities, main electrical substations, electrical distribution, offices, and laboratory.

Certain road constructions and alterations were necessary, which include the following:

- A road construction to Syväjärvi and Rapasaari mines;
- A new road and intersection arrangement to access the Päiväneva Plant; and
- A new road arrangement at the location of the Kokkola Plant.

The infrastructure and engineering designs encompass the required infrastructure for the establishment of processing operations and the surface mine sites at a feasibility level of detail and all necessary logistics have been considered.

14.2 Tailings storage facility and ancillary infrastructure

As per the Keliber Lithium Project Definitive Feasibility Study Report (February 2022), a tailings storage facility (TSF) for the Keliber Lithium Project is located within the Päiväneva plant area, to the east of the main mill area and south of the site's waste rock dump. The TSF site is located directly north of ancient forest areas which are home to the Siberian flying squirrel and has necessitated a redesign of the latter stages of the previous TSF construction configuration to minimise impacts on the squirrels' habitat.

The high-level summary cost estimate for the TSF and associated water infrastructure is estimated to cost EUR7 million initial CAPEX (Stage 1) and EUR11.6 million sustaining CAPEX (Stages 2 to 4). A high-level review of the initial CAPEX and sustaining CAPEX appears realistic/sufficient in terms of the TSF developmental phase and the final footprint coverage of the facility.

Given the natural topography (i.e. the TSF is located between two natural moraine hills and within a decommissioned peat production area), the facility is to be raised in stages, with the initial stage requiring only a western embankment/starter wall (constructed to a height of 7m) to satisfy the Stage 1 deposition requirements. Following the construction of the Phase 1 starter wall and development of the first basin area, the eastern embankment will be constructed during Stage 2 to form the second main basin area, following which both embankments will be raised through the remaining Stages. The TSF has a final footprint of approximately 56.7 ha with a total airspace of 5.95 Mm3 and is to be constructed as a downstream-raised facility. Deposition throughout will be undertaken via hydrocycloning.

Whilst the facility has not been designed to incorporate an HDPE liner, the naturally occurring peat material within the basin (average permeability of 1 x 10-9 m/s) is to be used to create a basal liner of no less than 300 mm post-compaction across the entire TSF basin. Based on geochemical analyses undertaken during 2019 from a pilot enrichment test at Lake Syväjärvi, no waste materials were determined to be potentially acid generating; however, it is noted that geochemical analyses of ore from the Rapasaari pit were not undertaken.

Freeboard at the facility has been calculated using both the maximum wave height at the high water line and the depth of frost penetration, with the 1:10 year frost depth providing the final freeboard depth for the various dams at the TSF complex (based on their Class 1 and Class 2 classifications). To prevent overtopping of the tailings facility and process dams, emergency overflow pipes (ranging from 259 to 560 mm diameters dependent on the facility) are to be installed to provide for decant of process water and rainfall volumes. Stability analyses undertaken as part of the design work, including static, pseudostatic and rapid drawdown conditions, met or exceeded design criteria Factors of Safety.

A HDPE and bentonite lined containment/pre-float dam directly southwest of the TSF will receive the prefloat (classified as hazardous waste), i.e. the first stage of the hydro-cycloning process, and the magnetic separation (LIMS) fraction, as well as any process water from the mine site to allow for recirculation through the plant. This dam is to be constructed in two phases, with the first phase (i.e. the western containment basin) allowing for a storage volume of 58 000m3 (approximately 9 years of storage dependent on whether there is a need to store process water). This dam's second phase (i.e. the eastern basin) allows for an additional storage volume of 59 000 m3. However, should further capacity be required within the dam, an additional third phase raise of 1m can provide any additional required future storage capacity of 29 000 m3.

A return/process water dam, sized to store approximately 131 000 m3 of decanted water from the TSF, is located to the northwest of the TSF with an abutting mine water dam with a volume of approximately 107 000 m3 (receiving dewatering volumes from the open pits). Both dams will be constructed with a basal peat liner and additional clayey silt/peat/bentonite seal of 1 m high by 24 m wide constructed at the upstream toe of each embankment to minimise seepage through the wall.

As per the DFS report, the TSF and ancillary dams have been designed according to the Finnish Dam Safety Guide (2018) and the Swedish Guide for Mine Dames (2010). No mention is made as to whether the TSF has been designed to GISTM requirements which came into effect in August 2020. SRK was previously advised that the detailed design of the TSF was underway in 2022; however, no final detailed design report has been issued to SRK to date.

The following areas of residual risk in the designs presented in the updated DFS were identified during a 2022 audit of the facility which are not considered to represent significant issues, but should be carefully considered as the permitting progresses and detailed design phases proceed, namely these include:

- The footprint area of the Flotation Tailings Pond was modified at a relatively late stage in the design process, specifically to avoid impacts on local environmental receptors (flying squirrel habitat). Whilst the design modifications are considered to be feasible, SRK notes that the facility will be raised by 2.5 m in overall height, small volumes of additional peat have to be excavated and additional tree clearance may be required. The cumulative impacts of these effects should be checked in the context of the wider EIA;
- A more detailed water balance should be undertaken to ensure that maximum/minimum annual operating pond volume for each year of the mine life is estimated. It is currently unclear if a suitable pond offset can be maintained around all flanks of the Flotation Pond during both summer and winter deposition in the facility;
- There has been no geochemical characterisation of the Rapasaari, Länttä, Outovesi and Emmes ore types and hence there is a residual risk that this material could exhibit acid rock drainage or metals leaching characteristics;

- No tailings settling tests have been completed to confirm drained and undrained densities for all tailings types. Whilst the value of 1.4t/m3 appears to be reasonable for the flotation tailings, this should be verified, along with the other tailings streams, to ensure that each pond has been sized appropriately; and
- Limited geotechnical test work has been carried out on representative foundations samples obtained from the foundations beneath the Flotation Pond, however, this is not anticipated to have significant impact on the design, as peat depths/continuity has been extensively mapped.

14.3 Electrical infrastructure

This section of the report covers only the electrical infrastructure for the open pit mines, namely Syväjärvi Mine, Rapasaari Mine, Länttä Mine and Outovesi Mine, including the Päiväneva concentrator and the Kokkola lithium chemical plant.

Power supply to the Päiväneva Concentrator will be from the national power grid owned and operated by Herrfors Nät-Verkko Oy AB, the local power supply authority. Power supply will be from central Kaustinen via a 19 km long 33 kV underground cable. This cable will be routed alongside the main access road and highway 63, allowing for ease of access in future for any maintenance work that might be required. The underground cabling option has been selected due to an easier permitting process and tolerance against climate conditions. A 110/33 kV feeder bay equipped with a 16 MVA transformer will be constructed at the Kaustinen substation, from where power will be supplied to the concentrator main incoming 33 kV switchgear. The main incoming switchgear will in turn supply power to different sections around the concentrator, including Syväjärvi Mine and Rapasaari Mine, located about 3.4 km and 1.9 km respectively from the concentrator. Power will then be stepped down locally as required to supply low voltage equipment, lighting and small power.

The maximum connected load of the Päiväneva Concentrator, including the two mines, is estimated at 11. 4 MW. Although the 16 MVA transformer appear to be enough to cater for the power requirements of the concentrator and the two open pit mines, SRK is of the opinion that there might be a potential risk in the bulk power supply equipment being undersized, as Rapasaari will later in its LoM include underground operations. Although the capex input tab of the economic model shows some capex allowance for Phase 2, underground development, it is not clear whether this is only for underground development or whether it includes capex for the bulk power infrastructure upgrade to cater for underground loads. Should it include the latter, SRK is of the opinion that there might be some capital saving should the bulk power supply infrastructure be initially sized to include underground operations. It is therefore recommended that the load list for Rapasaari underground be compiled to ascertain that the current bulk power supply infrastructure is enough to cater for future underground operations power requirements, so some cost savings can be achieved. The 850 kW reservation made in the load list for Syväjärvi Mine is within the right ballpark, as no underground operations are anticipated at Syväjärvi Mine in future. This reservation covers infrastructure items such as the locker room, office, area lighting, break room and a 20 kW dewatering pump. Emergency diesel generator has been allowed for at the concentrator to supply power to critical equipment during grid power failures.

Länttä Mine will get its power from the existing overhead 20 kV power line, located about 200 m from the mine site. The national grid in this area is owned and operated by Verkko Korpela Oy (VKO). Power supply will be by means of a 150 m long underground cable, which will be connected between the 20 kV power line take off point and the 20/0.4 kV transformer positioned at the mine. This transformer will then supply a 400 V distribution board which will in turn supply power to all the infrastructure around the mine. Relocation of the existing power line running next to the new road will also be required, as the existing power line and the existing road are on the planned site for the open pit. It must be noted however that although it can be assumed that power requirements for Länttä open pit will also be in the region of 850 kW, no load requirements have been given in the study. Also, like Rapasaari Mine, Länttä Mine will also include underground operations later in its LoM. Although the capex input tab of the economic model shows some electrical capital cost allowance for underground development, it is not clear whether this is only for underground development or whether it includes capital for the bulk power infrastructure upgrade to cater for underground loads. Should it include the latter, SRK is of the opinion that there might be some capital saving should the bulk power supply infrastructure be initially sized to include underground operations. It is therefore recommended that the overall load list for Länttä, including underground, be compiled to ascertain that the current bulk power supply infrastructure is enough to cater for future underground operations power requirements, so some cost savings can be achieved.

Outovesi Mine will be supplied with power from the existing overhead 20 kV overhead power line, owned and operated VKO. Power supply will be by means of a 3.4 km long underground cable, which will be connected between the 20 kV power line take off point and the 20/0.4 kV transformer positioned at the mine. This transformer will then supply a 400 V distribution board which will in turn supply power to all the infrastructure around the mine. Although it can be assumed at this stage that power requirements for Outovesi will also be in the region of 850 kW, it is recommended that power requirements be given in the DFS document.

Bulk power supply to Kokkola lithium chemical plant will be from the national grid, owned and operated by Kokkolan Energiaverkot Oy. Bulk power supply to the plant allows for redundancy, whereby each supply can supply full plant capacity. The maximum connected load at the Kokkola chemical plant is estimated at 12.5 MW. These supply points are readily available at the existing substations located 100 to 200 m from site. Bulk power supply will be at 20 kV, terminating at the plant main 20kV incoming switchgear. This switchgear will in turn supply power to different sections of the plant, whereby power will be stepped down locally to either 690 V or 400 V, depending on the equipment rated voltage. 690 V will be used to supply power to larger drives to optimize cable sizing, Diesel generator has been allowed at the chemical plant to supply power to critical equipment during grid power failures.

Locally existing power lines and substations can and will be utilised for construction power requirements, in order to avoid excessive use of diesel generators during construction, thus reducing operating costs. However, a generator has been allowed for in the capex during construction, to cater for power supply during grid failures in order to try and avoid construction delays. Construction power requirements are estimated at 1.3 MVA for Päiväneva concentrator and 1.9 MVA for Kokkola lithium chemical plant. High efficiency and premium efficiency motors have been allowed in the designs for energy efficiency, including use of variable speed drives where possible.

14.4 Control and communications infrastructure

Process control at both the Kokkola lithium chemical plant and the Päiväneva concentrator will be based on the distributed control system (DCS). The DCS is made of a number of local automatic controllers or RIO panels in various sections of the plant, whereby each process element or group of process elements is controlled by a dedicated controller. These controllers are then connected via a high speed communication network to the supervisory control and data acquisition (SCADA) system located in the control room, for monitoring and control. The SCADA system can be enhanced and expanded with additional features such as maintenance operations management, production quality management system and manufacturing resource planning, which can be purchased as separate licences and implemented at once or progressively.

The DCS for both the chemical plant and the concentrator will be from a single supplier, for ease of operation and interaction. Both DCS systems will function independently from each other but can be interconnected for monitoring and data transfer over a secure network. The system will run on a redundant fibre network backbone, ensuring full availability of the system under all circumstances. Devices such as sensors and closed circuit television cameras will also be connected to the DCS through the access network interface of the RIO panels.

External communications including both industrial and information technology (IT) between the chemical plant and concentrator will be through a local public network, owned and maintained by local IT service providers. The communication systems will be connected to the local network using fibre optic for high speed communication. Sufficient bandwidth will be secured by an appropriate subscription agreement. As part of information security, access to the DCS and overall business IT networks will be limited and monitored by means of individual user accounts, whereby the user accounts will be personalised and access to the system and information shall be based on the role of the employee, thus avoiding unauthorised personnel having access to confidential information. Appropriate segmentation will be provided by means of firewalls, to ensure the integrity and cybersecurity of the main network, including up to date virus protection for software protection.

Mobile phone communications will be based on 4G/5G technology provided by local telecommunications operators. Should the network coverage in the Päiväneva area found to be inadequate, local antenna provided by the network operator can be provided to strengthen the signal. The communication network around Kokkola is well established and is considered enough to cover the communications requirements for the chemical plant.

Generally, the communications and control systems appear to be adequately designed for the feasibility level of study.

15 MARKET STUDIES

[§229.601(b)(96)(iii)(B)(16)]

The summary below is based on a 2021 Lithium Market Study conducted for Kaustinen/Kokkola DFS, by Wood Mackenzie (the Wood Mackenzie Report), as well as an independent verification lithium market study done by Fastmarkets. (2022) (the Fastmarkets Report). These market analyses cover the period up to 2031 (Wood Mackenzie) and 2033 (Fastmarkets), for which reasonably accurate market supply and demand projections were available. This period will also coincide with the bulk of the financial pay-back period for the Keliber project. Beyond 2031, market supply/demand information is scarcer and more uncertain (less reliable) but given the significant trend in electrification and the growth in use of batteries in the electric vehicle (EV) sector; coupled with the significant coinciding market deficit forecasted in 2031, it can reasonably be assumed that demand for lithium derived products will persist, supporting the commercial production of spodumene concentrate.

15.1 Context

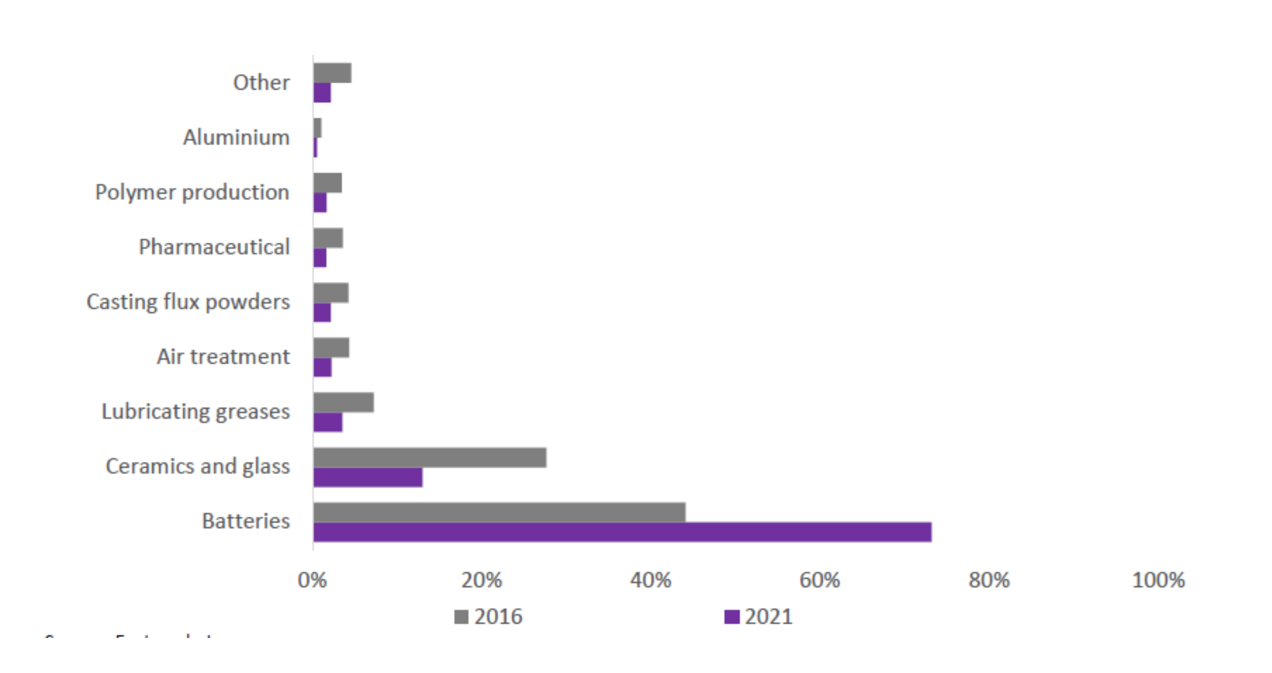
The Keliber project is a vertically integrated project that includes the mining of spodumene ore, concentrating the ore and then conversion of spodumene concentrate into battery grade lithium hydroxide. The concentrator will be sited at Paivaneva. From here the spodumene concentrate will be trucked to the Keliber owned and operated 'Cleantech' Chemical Plant at Kokkola Industrial Park, where a battery grade lithium hydroxide monohydrate (LiOH.H2O) will be produced along with analcime sand.

A series of tests were completed to determine the production parameters of lithium hydroxide from spodumene ore, including the proprietary Metso-Outotec lithium hydroxide process at pilot scale. This included a continuous hydrometallurgical pilot plant trial that was conducted at Metso-Outotec's Pori Research Centre from 7 to 24 January 2020 on converted Syväjärvi concentrate. There is sufficient evidence in the pilot plant results to give confidence that the design recovery figure can be achieved in practice, following a suitable ramp-up period.

The Keliber project is likely to be the first implementation of this specific lithium hydroxide flowsheet. While the individual unit processes are not novel, and while the Syväjärvi (2020) and Rapasaari (2022) pilot trials have significantly de-risked the flowsheet, a residual risk remains, as it does with the first example of any novel technology. Metso Outotec will also provide a process guarantee for the plant, although such a guarantee does not ultimately guarantee a process that will work so much as it defines the extent of financial compensation that will apply should it not. SEC Regulation S-K 1300 prohibits the declaration of Mineral Reserves based on novel/non-commercialized technology, and as such it should be noted that the Mineral Reserves for Keliber have been declared based on production of a 4.5% spodumene concentrate, which was tailored to suit the lithium hydroxide refinery, and that a ready market exists for the concentrate. Typical spodumene concentrates from pegmatite orebodies grades closer to 6% spodumene, and the option exist for the Keliber project to make such a product. Given the intention to refine all the concentrate at the Keliber refinery, no contracts have been entered into for the sale of the concentrate to be produced, and it is assumed that the same terms, rates or charges could be obtained had the contract been negotiated at arm's length with an unaffiliated third party.

15.2 Uses of Spodumene Concentrate

According to the Fastmarket Report, spodumene concentrate is processed into lithium carbonate and lithium hydroxide. Their main industrial use (Figure 15-1) is in the production of cathodes and electrodes for rechargeable batteries. Lithium hydroxide is preferred in the battery manufacturing industries, especially in the electric vehicles (EV) production, as it increases the performance of the battery, allowing EV to have a higher usability range before needing a recharge. It is also used as a thickener in lubricating grease as it is resistant to water and high temperatures and can sustain extreme pressures. Other uses for lithium are in mobile phones, electronic devices, laptops, and digital cameras.



srk consulting	**SSW Keliber Lithium Project** Global Lithium Usage by End-Market *(Source: Fastmarkets)*	Project No. 581648

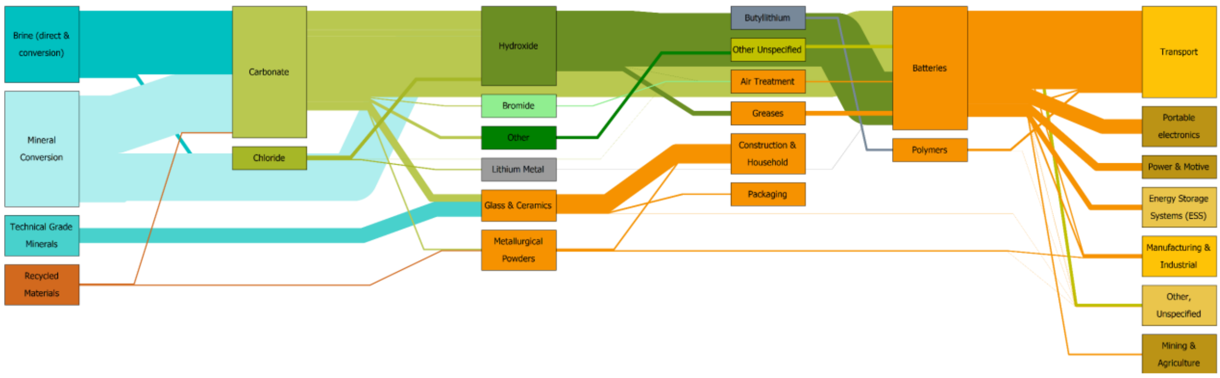
Figure 15-1: Global lithium usage by end-market – 2016, 2021 (%, LCE basis)

Looking forward, traditional applications are expected to continue to grow each year at 1-3% in line with their respective sectors, but will continue to lose market share to battery demand. According to the Fastmarkets Report, traditional sectors are expected to consume 192.5 kt of LCE in 2033 – an increase of 3.0% compound average growth rate (CAGR) each year between 2021 and 2033. This compares to 3,102.4 kt of expected LCE demand in 2033 from batteries for eMobility applications and energy storage solutions –annual increases of 22.3% CAGR over the same years.

15.3 Lithium value chain

Figure 15-2 below from the Wood Mackenzie Report, provides an overview of the lithium value chain in 2020. Raw materials are shown in blue and brown, representing the source of refined production and technical grade mineral products consumed directly in industrial applications. There are a number of refined lithium compounds, shown in green. Refined products may be processed further into specialty lithium products, such as butyllithium or lithium metal, shown in grey. Demand from major end-use applications is shown in orange with the relevant end-use sectors shown in yellow.

Of note is that spodumene concentrate, as a raw material, predominantly gets converted into lithium carbonate and lithium hydroxide, for use in making batteries to support the automotive/transport sector.



Note: The thickness of the bars relates to value in US$

srk consulting	**SSW Keliber Lithium Project** Lithium Value Chain *(Source: Wood Mackenzie, Roskill, 2021)*	Project No. 581648

Figure 15-2: The lithium value chain

Within the Li-ion battery value chain, lithium is used in manufacturing of cathode materials, electrolyte, and anode materials, with cathodes accounting for 94% of total lithium consumption in 2020. In 2020, roughly 52% of the global cathode market was divided between 15 first-tier manufacturers, including 8 manufacturers from China, while the remaining 48% market share is divided between around 100 companies globally.

15.4 Supply and demand

In the case of absence of the ‘Cleantech’ Chemical Plant at Kokkola (which is planned to use all the spodumene concentrate from the Keliber project), the spodumene concentrate will have to be sold into the international conversion market.

15.4.1 Demand

Demand for spodumene concentrate is driven by a demand for lithium in the first instance.

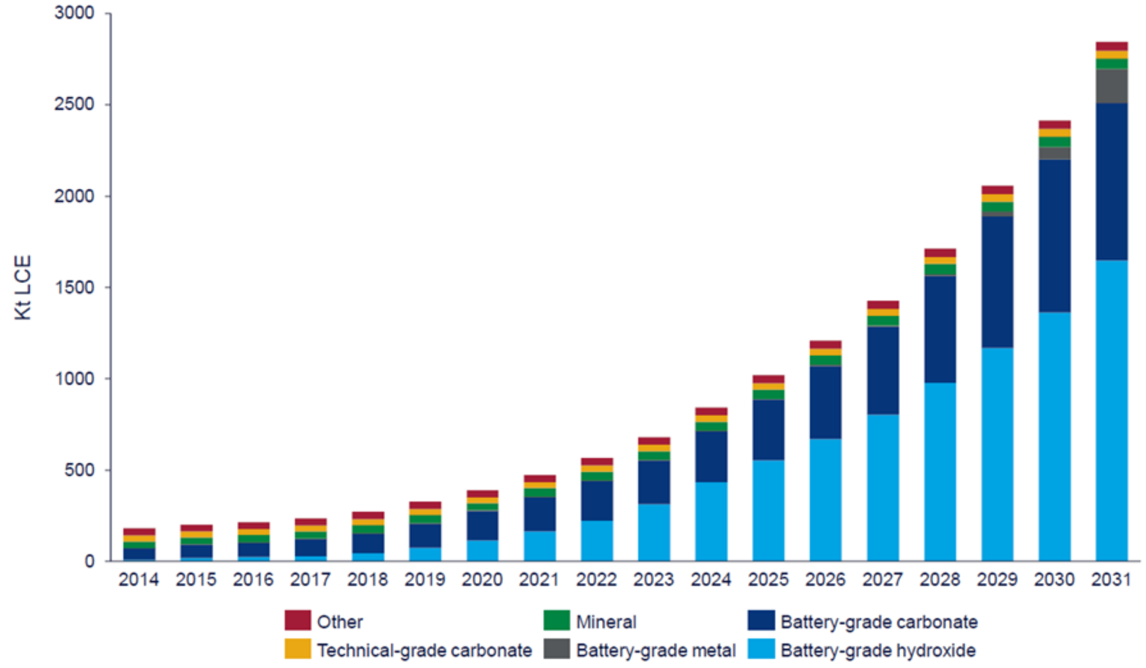
Demand growth for lithium since 2009 has been driven by the rapidly increasing use of lithium in rechargeable battery applications in the form of lithium carbonate and more recently lithium hydroxide. From 2014 to 2020, demand growth for lithium has averaged 13.7% per year. The largest first use market for lithium is rechargeable batteries, which accounted for 71% of global demand in 2020 and is expected to increase further beyond that. The next largest first use market in 2020 was ceramics (7%), followed by glass-ceramics (6%). Other smaller first uses of lithium include greases, metallurgical powders, glass, polymers, air treatment and primary batteries.

Demand growth for lithium in rechargeable batteries averaged 29.6%pa between 2014 and 2020. Rechargeable batteries have accounted for over 50% of lithium demand each year since 2017. Unlike most other major first-use applications, demand from rechargeable batteries continued to increase in 2020, despite disruption caused by the COVID-19 pandemic and related lockdowns. With the exception of air treatment, where lithium use has fallen throughout the past decade, all first-uses for lithium have also experienced growth over the period, albeit at slower rates than the rechargeable battery sector.

The Wood Mackenzie Report forecasts global lithium demand to increase by 19.8% per year in the 2020-2031 period, reaching a total of 2.84 Mt in 2031. Growth will be predominantly driven by increasing battery production, with 2,733 GWh capacity required across all end-use applications by 2031. Regulation globally pushing for stricter CO_2 emissions limits by 2030 continues to force automotive original equipment manufacturers (OEMs) to shift to hybrid and battery electric vehicles (BEV) models, a challenge which some OEMs have progressed with significantly since mid-2020, particularly in North America and Europe. The use of Li-ion batteries in EVs is embedded into the growth trend, with little risk that a significant change in technology will occur in the short to mid-term.

Longer term, the development of next-generation battery technologies has the potential to both disrupt or accelerate lithium demand growth, dependent upon the prevalent technology.

The demand for lithium, by products, as demonstrated in Figure 15-3, is dominated by lithium carbonate and lithium hydroxide, accounting for 70.9% of total demand in 2020. Battery-grade lithium carbonate and hydroxide demand is forecast to increase by 16.6% per year and 25.9% per year respectively in the period to 2031, reaching 863.2 kt LCE and 1,646.1 kt LCE respectively. The preference in the automotive sector to increase vehicle range will inevitably shift battery production toward nickel-rich chemistries, which in turn will see demand for lithium hydroxide increase faster than demand for lithium carbonate.



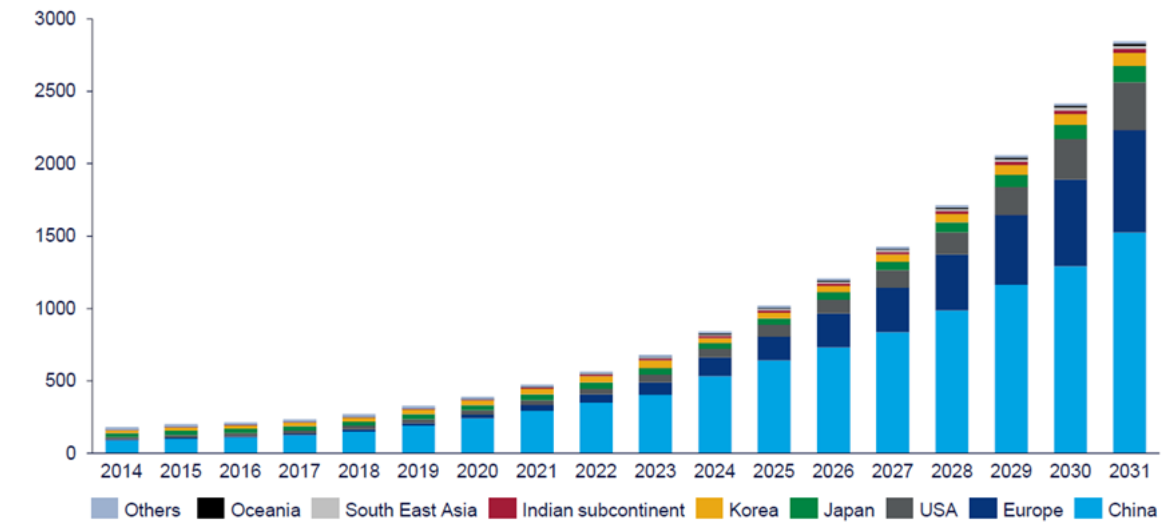
Note: Other includes technical grade hydroxide, butyllithium and bromid

srk consulting	**SSW Keliber Lithium Project** Global Demand for Lithium by Product *(Source: Wood Mackenzie, Roskill, 2021)*	Project No. 581648

Figure 15-3: Global demand for lithium by product, 2014 -2031 (Kt LCE)

In 2020, China was the largest consumer of lithium (Figure 15-4), accounting for 63% of total demand or 243.1 kt LCE. Chinese demand has increased by 15.2% per year since 2014, largely through rapid expansion of the domestic Li-ion battery sector with supplementary growth in industrial end-use markets.

European demand has also risen significantly in the period since 2014, with the majority of growth occurring in the period since 2018 with greater Li-ion battery manufacturing taking place in the region. European demand growth is strongly supported by both government legislation and private investments with several battery production facilities in Sweden, Germany, France, and the UK, amongst others, planned for commissioning over the period to 2031.



srk consulting	**SSW Keliber Lithium Project** Global Demand for Lithium by Region *(Source: Wood Mackenzie, Roskill, 2021)*	Project No. 581648

Figure 15-4: Global demand for lithium by region, 2014 -2031 (Kt LCE)

Until 2017, there was little Li-ion battery manufacturing capacity in Europe, however, in the past few years, the region has made impressive progress. In 2020, Europe had Li-ion battery manufacturing capacity of 39.9 GWh, accounting for 5.7% of the global manufacturing capacity. The Wood Mackenzie Report forecasts the European Li-ion battery manufacturing capacity could reach 1,040 GWh by 2030.

The global distribution of mineral conversion facilities (Refineries) where Spodumene Concentrate from the Keliber project can alternatively be converted to lithium carbonate and lithium hydroxide is highly concentrated in China. On a country basis, China controlled over two thirds of global refined production in 2020, with Chile and Argentina in second and third at 19% and 6% respectively. Production from Chile and Argentina is solely from brine operations and is not suitable to treat spodumene concentrates. This compares to China's diversified production from both mineral and brine sources, where it currently controls over 99% of mineral conversion production globally.

In 2021, global production of refined compounds was forecasted to total 636.3 kt LCE. Based on announced capacity expansions, output is forecast to increase at a CAGR of 7.9% to 2031. Under this scenario, production is forecast to surpass 1.0 Mt LCE in 2026 before reaching 1.2 Mt LCE by 2031. China is expected to remain the largest centre for refined lithium production – the country was forecasted to account for 71.4% of global production in 2021, with output from both mineral conversions, reprocessing and lithium brine sources.

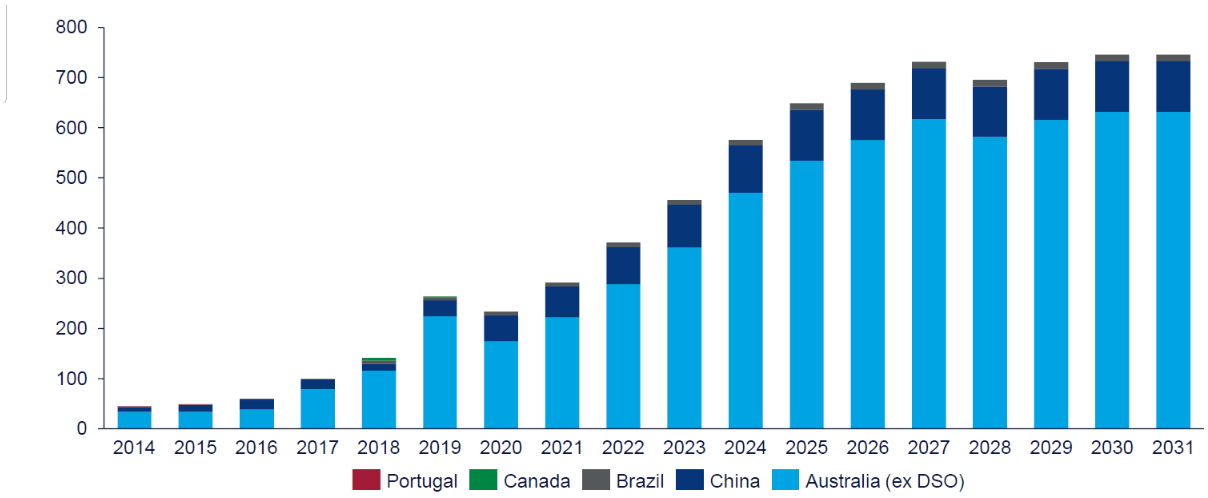
Mineral conversion companies have increasingly sought to integrate upstream, in efforts to remove supply-chain risk and additional margin between the mineral concentrate and mineral conversion stages. Despite this, the development of new production capacity reliant upon the free-market or off-take agreements with mineral concentrate producers has outpaced integrated production in terms of year-on-year growth between 2014-2020. Between 2015-2020, production from integrated refined capacity has increased at a CAGR of 19.9%. Production from independent capacity has increased at a faster rate of 43.6% per year over the same period, although the growth has occurred from a very low base. This would suggest that there will be an increasing number of refineries to which the Keliber spodumene concentrate could be sold to.

In 2020, production of lithium compounds by mineral conversion totalled 230.4kt LCE, increasing 4.8% from 219.8 kt LCE the previous year. Together, the two largest mineral converters Ganfeng Lithium and Tianqi Lithium, formed 34.8% of global production in 2020 with combined output of 80.1 kt LCE across four facilities in China. If spodumene mineral conversion is only considered, Ganfeng and Tianqi's market share jumps to over 45% of global production in 2020.

15.4.2 Supply

15.4.2.1 Mine supply

Between 2014 and 2019, growth in mine production of chemical-grade mineral concentrates averaged 43.2% per year. A peak level was reached in 2019 at 264.0 kt, before production fell to 232.9 kt in 2020 due to a slump in demand and build-up of inventories. Based on announced capacity expansions and new project schedules (Figure 15-5), production of mined chemical grade mineral concentrates is forecast to increase at a CAGR of 11.2% from 2020 to 2031, with total production reaching 745.9 kt LCE.



Note: DSO is Direct Shipped Ore

srk consulting	**SSW Keliber Lithium Project** World Mine Production of Chemical-Grade Mineral Concentrate by Country *(Source: Wood Mackenzie, Roskill, 2021)*	Project No. 581648

Figure 15-5: World mine production of chemical-grade mineral concentrate by country, 2014 -2031 (Kt LCE)

Mined chemical-grade mineral concentrate production is dominated by Australian operations, which had a combined capacity of 221.8 kt LCE in 2020, including projects on care & maintenance. This volume accounts for 85% of global mined chemical-grade production. Production growth up to 2019 was underpinned by expansions and commissioning of new capacity, particularly in 2017, when Australian chemical-grade mineral concentrate production increased by 103% year-on-year in response to high lithium compound and spodumene concentrate prices. Most of the world's large lithium mines are in Australia and their output of spodumene concentrates or DSO (Direct Shipped Ore) is destined almost entirely for mineral conversion facilities in China. As shown in Figure 15-5, from 2020 to 2031, growth in mine production of chemical-grade mineral concentrate will largely be driven by Australia, with a forecast CAGR of 12.4% over the period to 632.0 kt LCE.

Production of mined chemical-grade concentrate in China fell sharply in 2018 to 13.7 kt LCE from 20.1 kt LCE in 2017, as a result of large volumes of material from Australia being made available to Chinese consumers. This increase in supply led to prices falling and the Chinese operations becoming less competitive, resulting in lower production. The suspension of production at some Australian operations caused a resurgence in Chinese domestic production during 2019 and 2020, with mine production of chemical-grade mineral concentrate in 2020 totalling 50.8 kt LCE. Chinese production of mined chemical-grade mineral concentrate accounted for 21.8% of world production in 2020. This is forecast to grow at a CAGR of 6.5% to 2031, reaching production levels of 101.0 kt LCE. Despite this growth, China's production is forecast to decline to 13.5% of global production by 2031.

15.4.2.2 Refined lithium production

- Lithium Carbonate

The production of refined lithium compounds is derived from output from mineral conversion, brine production, low-grade compound upgrading/reprocessing and recycling refineries.

In 2020, global refined production of lithium carbonate totalled 333.5 kt LCE. Global refined production increased at a CAGR of 19.8% in the 2014-2020 period, driven by expansions to brine operations in South America and new and expanding mineral processing facilities in China. Brine-based production has been the dominant source of carbonate output, accounting for 53% of total production in 2020. Production in South America continues to dominate carbonate output from lithium brine operations.

The strong growth in demand for lithium carbonate for use in the Li-ion battery industry has led to producers targeting production of battery-grade lithium carbonate rather than production of technical-grade lithium carbonate which is simpler and cheaper to produce. Battery-grade output accounted for 53% of production in 2020, compared to 36% in 2014.

Technical-grade lithium carbonate production increased from 60.2 kt LCE in 2014 to 160.2 kt LCE in 2020, with the commissioning of new lithium brine and mineral processing facilities where production of technical-grade lithium carbonate is common ‘first product’, while the plant goes through commissioning stages towards steady-state. A number of facilities were reported to sell off-spec battery grade lithium carbonate as technical grade material, which boosted technical-grade supply.

Global refined lithium carbonate production is forecast to increase at a CAGR of 7.0% in the 2020 to 2031 period to reach 784.2 kt LCE. Refined lithium carbonate production is expected to be dominated by production from brine in the coming years.

- Lithium hydroxide

In 2020, global lithium hydroxide production totalled 140.3 kt LCE. Global production increased at a CAGR of 30.7% in the 2014 to 2020 period. Unlike carbonate, hydroxide is expressed on a final product basis as it is truest reflection of total hydroxide production. This comes as a result of lithium hydroxide being an end-user product by nature and deriving from two main sources: mineral conversion, and carbonate conversion.

Lithium hydroxide production has seen rapid and sustained growth since 2014, although production continues to lag significantly behind lithium carbonate. From a product point of view, producers have responded to end-users’ shifting demand preferences to battery-grade products for use in lithium-ion batteries. Battery-grade hydroxide production totalled 125.3 kt LCE in 2020, representing 89% of lithium hydroxide production compared to 24% in 2014.

Up to 2018, carbonate conversion was the dominant source of refined lithium hydroxide output. During 2019, production from mineral concentrates became the dominant source, accounting for 53% of production, which increased to 61% in 2020. The increase in mineral conversion production of lithium hydroxide has been led by Chinese based refineries. Chinese output increased from 43.9 kt LCE in 2018 to 112.6 kt LCE in 2020.

In the 2020 to 2031 period, lithium hydroxide production is forecast to increase at a CAGR of 14.6% to reach 627 kt LCE.

The commissioning of large-scale lithium hydroxide facilities in Australia and China in the coming years is expected to increase the dominance of mineral processing over carbonate conversion for refined lithium hydroxide production. Mineral processing is forecast to account for 82% of refined lithium hydroxide production in 2031, up from 71% in 2021.

On a country basis, China controlled over two thirds of global refined production in 2020, with Chile and Argentina in second and third at 19% and 6% respectively. Production from Chile and Argentina is solely from brine operations at Salar de Atacama, Hombre Muerto and Olaroz. This compares to China’s diversified production from both mineral and brine sources, where it currently controls over 99% of mineral conversion production globally.

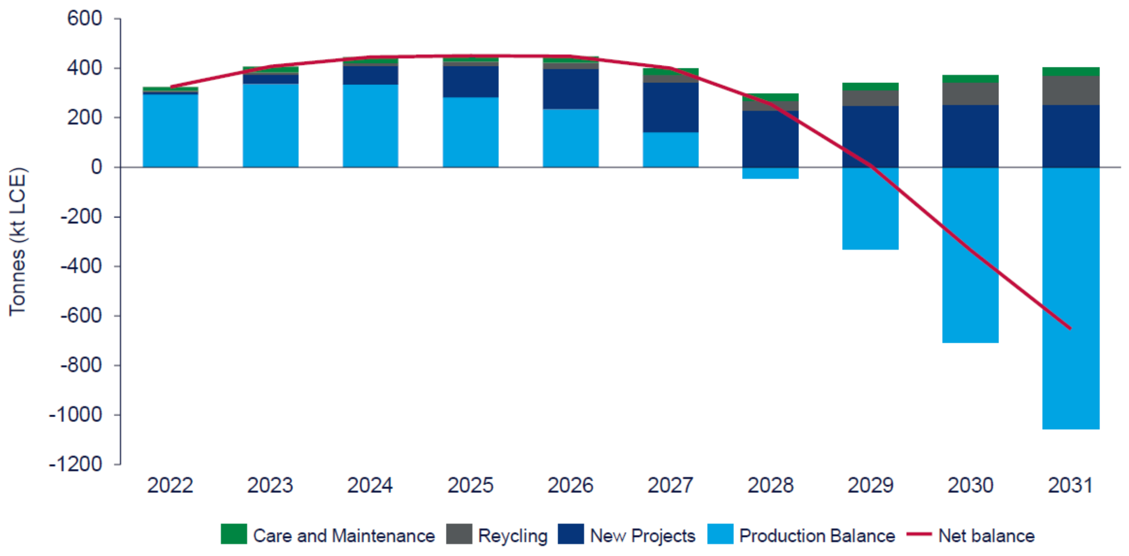
- Spodumene concentrate

There is not a secondary market for spodumene concentrate, and as such the reported price is determined by contracts between producers and offtakes (who are in this case either integrated producers or third-party refiners). Demand outlook for spodumene concentrate is directly linked to the outlook for lithium, with some bias towards lithium hydroxide demand as it involves fewer processing stages (i.e., lower refining cost) than from using brines.

A 4.5% spodumene concentrate, as opposed to a 6% spodumene concentrate is still expected to be in demand, albeit at a reduced price.

15.5 Market balance

Figure 15-6 below illustrates the forecast lithium compound (including hydroxide and carbonate) market balance for the 2022-2031 period. The Wood Mackenzie Report forecasts surpluses of total lithium chemical in the next few years. In 2024, a surplus of 446 kt LCE is forecast as significant projects are entering the market. As demand is forecast to rise in the coming years, a supply response is likely and would be provided for by increasing significant latent and dormant industry capacity utilisation. The supply surplus, however, is not even across products and grades with significant brine projects entering the market supplying lithium carbonate, while demand will be a mix of battery-grade lithium carbonate and battery-grade lithium hydroxide. As a result, prices are expected to behave differently to what would be expected by the overall lithium chemical balance.



srk consulting	**SSW Keliber Lithium Project** Global Lithium Compound Market Balance *(Source: Wood Mackenzie, Roskill, 2021)*	Project No. 581648

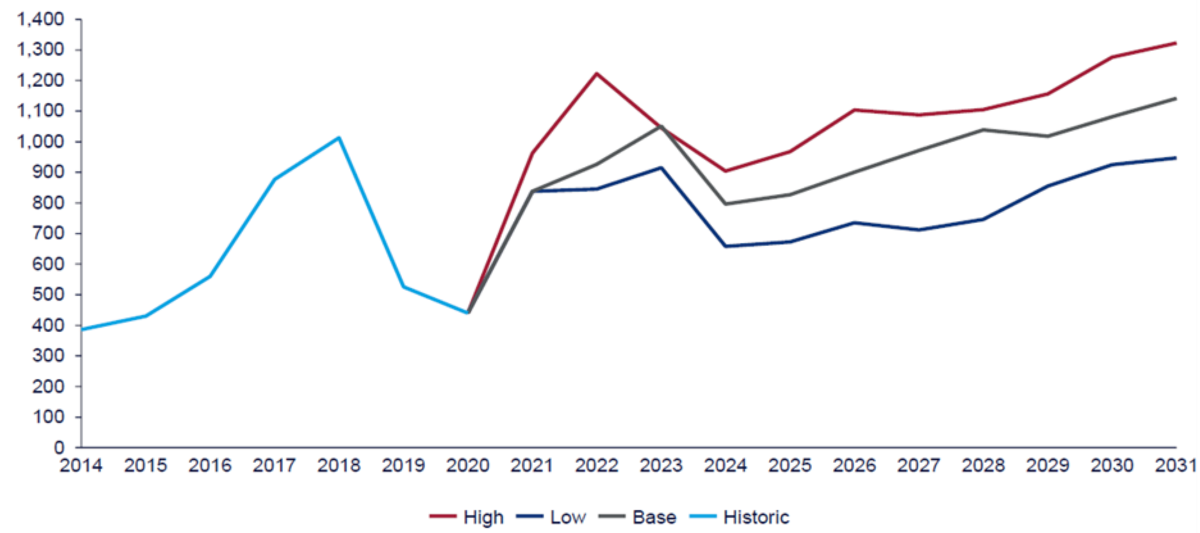
Figure 15-6: Global lithium compound market balance, 2022 -2031 (kt LCE)

Between 2023 and 2026, the market is forecast to be relatively balanced, with residual stocks and initial volume from new projects alleviating periods of tightness according to the Wood Mackenzie Report. This period of balancing is the core theme of the medium-term outlook set out in the Wood Mackenzie Report. Such a period is largely predicated on re-commissioning capacity on care and maintenance and the timely construction of additional projects. Should either fail to take place, sustained demand growth would orchestrate the beginning of structural supply deficits by 2027. Regardless, the Wood Mackenzie Report considers this period the transitional phase from relative tightness to supply deficit, though it is unclear at what stage this may eventuate.

In the long-term, however, the refined market is forecast to enter a period of supply deficit, particularly beyond 2027. Assuming all new supply in the base case of the Wood Mackenzie Report, care and maintenance and additional new projects are brought online, there is potential for the market to remain supply sufficient until 2027. Although the likeliness of this taking place according to recent track records of project financing, development and commissioning would suggest otherwise. Beyond 2027, the Wood Mackenzie Report forecasts significant structural market deficits arising. It is salient not to view this period as purely from a market deficit quantification point of view. Conversely, the Wood Mackenzie Report considers these events to reflect the 'investment requirement' of supply rather than what is suggested to transpire. This is mostly due to the higher level of uncertainty and variables to account for.

15.6 Prices

Assessing the market price of spodumene concentrate remains challenging (Figure 15-7) as no official trading index exists. International trade is carried out on a generic product code and the number of suppliers remains very limited. Historically, only Talison Lithium Pty Ltd (Talison) has been producing spodumene concentrate but with production starting at Mt Cattlin and Mt Marion in 2017 the dynamics of the market changed to include 'arm's length' or 'related' prices rather than prices for fully integrated sales. In recent years, a 'market price' approach has been taken by all producers to ensure compliance with taxation requirements in Australia, as well as to ensure the value of a dynamic lithium compound market is captured at the resource side of the market. In 2014, the price of chemical-grade spodumene concentrate averaged US$386/t CIF China, increasing to a peak of US$1 031/t in 2018 before dropping to US$440/t in 2020.



Note Forecast price are real 2021 USD. Historical prices are in nominal terms

srk consulting	**SSW Keliber Lithium Project** Average Annual Contract Price Forecast for Chemical Grade Spodumene *(Source: Wood Mackenzie, Roskill, 2021)*	Project No. 581648

Figure 15-7: Average annual contract price forecast for chemical grade spodumene (US$/t)

Sustained higher lithium carbonate and lithium hydroxide prices, as well as increasing demand for chemical grade spodumene concentrates are expected to support contract prices increasing substantially to average US$670/t CIF Asia in Q4 2021, before rising further to average US$926/t in 2022. Spot prices for chemical grade spodumene concentrate are expected to remain at current high levels as demand for limited non-contracted volume increases in line with increasing demand for lithium chemicals.

Under the base case, the Wood Mackenzie report forecasts contract prices of chemical-grade spodumene concentrate to rise to US$1 051/t in 2023, before declining to US$796/t in 2024, followed by a steady rise to US$1 142/t by 2031. For the purpose of the financial analysis of the Keliber project, a price adjustment to 75% of a 6% concentrate has been assumed, as a direct method to ensure both revenue and costs remain consistent.

16 ENVIRONMENTAL AND SOCIAL STUDIES

[§229.601(b)(96)(iii)(B)(17)]

As discussed in section 2.4.1, Keliber has completed all relevant EIA procedures to proceed with the Keliber Lithium Project.

Keliber holds a valid environmental permit for the Syväjärvi mining operations and a water permit for dewatering Syväjärvi Lake and Heinäjärvi Lake. A valid permit states that the permit decision issued by the Regional State Administrative Agency (**AVI**) was appealed and appeals were processed in the Vaasa Administrative Court, which ruled against appeals and kept AVI's permit decision in force on 16 June 2021. There were no appeals made to the Supreme Administrative Court against the Vaasa Administrative Court's decision. The Syväjärvi environmental permit became final in July 2021.

Keliber holds an environmental permit for Länttä, issued in 2006. The permit is valid for mining and operations as described in the permit application. If operations or excavation volumes increase, Keliber may need to apply for a new environmental permit. The Länttä Mine is not scheduled to commence before 2037 so detailed engineering has not yet been started.

The Rapasaari Mine environmental permit application was submitted to AVI on 30 June 2021. The Päiväneva Concentrator environmental permit was submitted to AVI on 30 June 2021. Concentrator operations require a water permit for raw water intake from the Köyhäjoki River and that permit application was also submitted to AVI on 30 June 2021. Keliber received environmental permits for the Rapasaari Mine and Päiväneva Concentrator in December 2022 (Environmental permit 208/2022 number: LSSAVI/10481/2021, LSSAVI/10484/2021).

For the Keliber Lithium Hydroxide Refinery located in Kokkola, an environmental permit application was submitted to AVI on 4 December 2020. The environmental permit decision is awaited.

Keliber received environmental permits for the Rapasaari Mine and Päiväneva Concentrator in December 2022 (Environmental permit 208/2022 number: LSSAVI/10481/2021, LSSAVI/10484/2021).

16.1 Environmental Impact Studies Results

16.1.1 Groundwater Studies

According to the EIA 2020 report Syväjärvi, Rapasaari, Outovesi and Päiväneva groundwater samples have been collected from observation wells during the years 2018 – 2020. In the EIA 2020 reports the groundwater quality sample results have been compared to the Decree of the Ministry of Social Affairs and Health (1352/2015, amendment 683/2017) chemical quality standards and objectives for drinking (potable) water. Results indicated that groundwater quality in most samples meet drinking water quality standards with the exception of the elements iron and manganese. Elevated iron and manganese are the result of higher chemical oxygen demand, and low oxygen levels. This is a result of the impact of humus-contained waters from the surrounding peat lands. Natural concentrations of ammonium also exceed recommendations for household water quality.

16.1.2 Biodiversity

Starting from 2014 several studies concerning vegetation, habitats, flora and fauna have been carried out. Based on the EIA 2020 report and information received from Keliber the list of studies which have been conducted over the years at the mine sites and surrounding areas is provided in Table 16-1.

Table 16-1: Field studies carried out at Syväjärvi, Rapasaari and Outovesi mine sites and Vionneva natura 2000 area.

Site	Study period	Executor
SYVÄJÄRVI		
Vegetation	2014 – 2015, 2020	Ahma Ympäristö 2015, Envineer Oy 2020
Habitats	2014 – 2015, 2020	Ahma Ympäristö 2015, Envineer Oy 2020
Nesting birds	2014, 2020	Ramboll Finland 2014e, Envineer Oy 2020
Moor Frog	2014 – 2021	Ramboll Finland 2014cd, Tutkimusosuuskunta Tapaus 2015-2021
Bats	2014, 2020	Ramboll Finland 2014a, Envineer Oy 2020
Siberian Flying Squirrel	2014, 2020, 2021	Ramboll Finland 2014, Envineer Oy 2020, Saarikivi, J. 2021
Predaceous diving beetles	2018, 2019	Tutkimusosuuskunta Tapaus, 2018, 2019, 2020
Dragon flies	2018 – 2020	Tutkimusosuuskunta Tapaus, 2018-2020
Fish	2014	Nab Labs 2014
Benthic invertebrate fauna	2014, 2020	Ahma 2015
Diatoms	2014	Eloranta 2014
RAPASAARI JA OUTOVESI		
Vegetation	2014 – 2015	Ahma Ympäristö 2015
Habitats	2014 – 2015	Ahma Ympäristö 2015
Nesting birds	2014	Ramboll Finland 2014e
Moor Frog	2014-2021	Ramboll Finland 2014cd, Tutkimusosuuskunta Tapaus 2015-2021
Bats	2014, 2020	Ramboll Finland 2014a, Envineer Oy
Siberian Flying Squirrel	2014, 2020, 2021	Ramboll Finland 2014, Envineer Oy, Saarikivi, J. 2021
Predaceous diving beetles	2018, 2019, 2020, 2021	Tutkimusosuuskunta Tapaus
Dragon flies	2018 – 2019	Tutkimusosuuskunta Tapaus, 2018, 2019
Fish	2014, 2020	Nab Labs 2014, AFRY Finland Oy 2020b
Benthic invertebrate fauna	2014, 2020	Ahma 2015, Vahanen Environment Oy 2020
Diatoms	2014, 2020	Eloranta 2014, Vahanen Environment Oy 2020
Otter	2020	Envineer Oy 2020
VIONNEVA NATURA AREA		
Nesting Birds	2014 – 2018, 2020	Tikkanen and Tuohimaa 2014, Ramboll 2016, 2018, Envineer Oy 2020

In the following text the directive habitat species, as identified during above studies, and Keliber's actions to protect habitats are presented.

- Moor frog
  - Keliber has built four moor frog ponds outside of the Syväjärvi mine site. The purpose of the ponds is to secure favourable conservation status and to provide moor frogs a place to breed and rest, thus improving the habitat of the moor frogs in the area.
- Siberian Flying squirrel
  - The Siberian flying squirrel (Pteromys volans) is a species classified as vulnerable (VU), and strictly protected by the Habitats Directive. Elsewhere in the EU, the Siberian flying squirrel only occurs in Estonia.
  - Keliber has designed its operations so that the ancient forest area where the flying squirrel was detected will be preserved. In response to interactions with ecologists, Keliber has, in its 2021 design engineering work, relocated the south dam wall of the tailings storage facility further away from the ancient forest area.
- Bats
  - The bat is a species listed in the Habitats Directive IV(a) of the European Union's Convention on Biological Diversity.

  - Keliber, are preserving the bat resting place at the Syväjärvi mine site by changing the infrastructure design and moving infrastructure close by.
  - Additional resting places will be added as well.
- Otter
  - In the field survey carried out during the EIA assessment in 2020, traces of otters were observed on the snow on the shores of streams Näätinkioja (also named as Kärmeoja) which is south of the Päiväneva concentrator area.
  - The 2020 field survey of otters was the first of its kind conducted in the area.
  - Keliber has decided to carry out more field surveys to have more precise information on where otters live and breed. With more precise information Keliber may help to protect and preserve otter population in the area.
- Golden eagle
  - The golden eagle (Aquila chrysaetos) is not listed in the Habitat Directive Annex IV(a) but is classified as vulnerable in Finland.
  - To protect and to improve golden eagle territory at Vionneva, Keliber has taken following actions:
    - artificial nests have been built further away from mine sites;
    - artificial feeding during wintertime has been started to improve the success of nesting; and
    - satellite tracking of the male eagle is ongoing.

16.1.3 Air Quality

AFRY Finland Oy has modelled potential dust impacts of Syväjärvi and Rapasaari mine operations and Päiväneva concentrator operations with the results reported in: Keliber Technology Oy, Rapasaaren ja Syväjärven kaivosten pölypäästöjen leviämismallinnus, AFRY Finland Oy, 4.11.2021 (Finnish). AFRY made the dust dispersion calculations by using the Breeze Aermod model tool developed by the US Environmental Protection Agency.

According to the AFRY dust model report 4.11.2021, modelled results show that respirable particulate matter (PM10) limits are not exceeded at the nearest holiday homes in any modelled situations due to the mining activities at Syväjärvi and Rapasaari and the concentrator operations in Päiväneva.

16.1.4 Noise

AFRY Finland Oy has carried out a noise model for Keliber with the results reported in Finnish in the report: Keliber Technology Oy, AFRY Finland Oy 2.11.2021. The modelling was done by using SoundPlan v8.2, noise calculation software. The report is part of the environmental permit application for Rapasaari mine and Päiväneva concentrator.

Noise model results for the Rapasaari mine and Päiväneva concentrator plant have been compared to noise limit values stated in the Syväjärvi environmental permit decision. Based on the noise modelling results reported by AFRY, the results for the average noise level LAeq are below the average noise level of the limit values for Syväjärvi.

According to the modelling, the Vionneva Natura2000 area could be affected by noise levels greater than 50 dB, especially in the early years of the Rapasaari mine operations when the waste rock area is still shallow. As the Rapasaari mine progresses, noise impacts on the Vionneva Natura area are reduced.

16.2 Water Management

Keliber has developed detailed The Site Water Management Plan which combines the project site water management data into one document, and includes subsequent modelling and assessment tasks:

- Rapasaari mine site hydrogeological modelling;
- Rapasaari – Päiväneva area source term models (water qualities and quantities for extractive waste facilities, pit, and underground mine), operational and post closure phases;
- Rapasaari – Päiväneva complex site-wide water balance modelling;
- Syväjärvi open pit hydrogeological modelling;

- Site hydrogeological assessment of the Länttä, Outovesi, and Emmes mine sites;
- Water quality summaries for Syväjärvi, Länttä, Outovesi, and Emmes mine sites (based on existing data); and
- Rapasaari-Päiväneva Complex, Conceptualization of Site Water Management Related Components.

16.2.1 Surface waters and groundwater

All planned mine sites are in the River Perhonjoki catchment area. Syväjärvi mine is in the catchment of the River Ullavanjoki while Rapasaari mine and concentrator are in the catchment of the River Köyhäjoki. River Ullavanjoki starts from Lake Ullavanjärvi which is upstream of Syväjärvi mine and therefore Syväjärvi mine has no impact on the Lake Ullavanjärvi. Länttä mine is in the catchment of Lake Ullavanjärvi. Both Outovesi and Emmes mines are also located in the catchment area of the River Ullavanjoki. The Emmes deposit is mainly located underneath Lake Emmes-Storträsket, which is one of the basins in the lake chain of the River Perhonjoki.

Syväjärvi has a valid environmental and water permit (LSSAVI/3331/2018, 20th February 2019 and administrative court decision 16th June 2021, 21/0097/3). The permit consists of permit conditions including water management principles, permit conditions for dewatering and sediment removal from the lakes Syväjärvi and Heinäjärvi, and acceptable emission levels. The Syväjärvi mine site water management system has been designed to meet the requirements of permit conditions.

All water management structures, and water quality monitoring are determined in the environmental permit. When executed accordingly the risks to environment, to water bodies or to flora or fauna are mitigated.

After the Syväjärvi mining operation has ended, the embankments at Lake Syväjärvi and Lake Heinäjärvi will be demolished and drainage pumping of open pit water stopped, allowing surface and groundwater to enter the pit. By slowing water flow through the Syväjärvi open pit, some modifications to surface watershed area can be achieved e.g., limit flow within ditches. In this way water quality can be controlled. In the early phase of post-closure, when the open pit is filling with water, any excess water is discharged in a controlled manner through a wetland to remove any solids. The open pit is estimated to take around 5-10 years to fill.

Estimation of groundwater inflow to the open pit when it is as its largest is 710 m3/d. The dewatering amount including direct precipitation into the pit is approximately 840 m3/d. In this dewatering amount, evaporation is assumed to be 50 % of the total precipitation. The radius of the drawdown cone is a few hundred metres from the pit. As explained in the AFRY report of Syväjärvi Hydromodel, Pit dewater flow is directed to sedimentation ponds and on to a wetland before flowing to Ruohojärvenoja Ditch.

Separate environmental permit applications for the Rapasaari mine and Päiväneva concentrator have been submitted to the Regional State Administrative Agency (AVI) on June 30th, 2021, approved 28 December 2022 but under appeal currently. Water management and water quality before, during, and after the operational phase of the Rapasaari – Päiväneva complex is described in detail in the Water Management Plan by AFRY Finland Oy. An ecological status assessment and assessment of impacts from mining operations on surface water quality and ecological status of surface waters from the Rapasaari – Päiväneva complex has been conducted by Vahanen Environment Oy, report in Finnish: Louhostoiminnan ja rikastamon vaikutus pintavesien ekologiseen tilaan, 8.11.2021.

Raw water needed for concentrator processes is pumped from the River Köyhäjoki at Jokineva and downstream of the water intake is also the discharge point for waste water. The surface water impact of the Rapasaari – Päiväneva complex is caused by storm run-off from the Rapasaari mine site, leachate from the waste rock, tailings, moraine, and peat deposition areas, and process water from the concentrator. The waters will be treated centrally in Päiväneva water treatment plant, where there are unit processes for the treatment of raw water, removal of solids from process water circulation and removal of solids and arsenic from wastewater as well as biological nitrogen removal from mine water.

According to Rapasaari Numerical Groundwater Flow Modelling - Rapasaari Open Pit and Underground Mine by AFRY, groundwater inflow into the Rapasaari open pit when the pit is at its largest (southern open pit extension included) will be 2,680 m3/d. The dewatering amount including precipitation into the pit at this stage will be approximately 3,100 m3/d. Mine water is pumped to the mine water pond then to the nitrogen removal process and from there to the recycle water pond from which it can be released as effluent to Köyhäjoki Stream.

According to the AFRY waste management plan for Rapasaari mine 5.11.2021 some seepage water from waste rock areas and the tailings storage facility will occur. From waste rock areas seepage flows to the open pit and from the TSF seepage enters groundwater where it dilutes. The sealed bottom structure of the pre-float tailings facility and of the pyrite-containing waste rock storage area will minimize seepage water effectively. Keliber will incorporate these features in the detailed design.

16.2.2 Effects on surface waters

During the construction phase, digging and relocation of soil could impact on water quality of the Näätinkioja Stream by temporarily increasing turbidity and concentration of suspended solids in the stream. The impact will be minimized by preparing first the sedimentation ponds to collect runoff water from the area. While this is done, it will hinder storm waters to reach Näätinkioja decreasing the surface runoff to Näätinkioja to 4 %, which is insignificant change for flora and fauna of the Näätinkioja.

During the operation phase, the effluent from the Rapasaari – Päiväneva complex is treated, collected to the recycle water pond and then discharged into the Köyhäjoki at Jokineva via pipeline. The decision on the location of discharge was made because the Köyhäjoki is a much larger river than Näätinkioja Stream and during the EIA process a trout population was found to live and spawn in the Näätinkioja. Since nitrogen load from explosives is a major concern, water treatment includes nitrogen removal. To avoid eutrophication, it is important to control nitrogen concentration since the concentration of phosphorus in the tailing storage facility waters is also significant. Nitrogen is removed until a concentration of 7.5 mg/L is achieved. Arsenic will be removed before water is circulated to the Recycle Water Pond from the Pre-float Tailings Pond. Suspended solids are removed from water to a concentration of 15 mg/L before discharge to river Köyhäjoki can occur.

The volume of effluent discharged into the Köyhäjoki will peak in the years 8 to 10 of operation at around 170-200 m3/h. The concentrations of contaminants in the water bodies during that period were modelled and compared to Finland’s national reference values. In the absence of national reference values, international values such as from European Chemicals Agency (ECHA), U.S. Environmental Protection Agency (EPA), and Canadian Council of Ministers of the Environment (CCME) were used. The studied contaminants consisted of more than 40 elements and minerals. The modelling was conducted for three spots: 1) at the discharge in the Jokineva, 2) 10 km downstream from Jokineva, and 3) just before the Köyhäjoki flows to the lake chain 20 km from Jokineva. Cobalt, zinc, and vanadium exceeded the national reference values, but for cobalt and zinc even the baseline concentrations are above the reference value. It is notable that the national reference values are for soluble concentration while the modelling was conducted for total concentrations and is therefore conservative.

Nutrient loading (P and N) from the Rapasaari – Päiväneva complex to the Köyhäjoki was compared to total annual nutrient loading based on VEMALA modelling, which is an operational, national scale nutrient loading model for Finnish watersheds operated and developed by the Finnish Environment Institute. Based on calculations by AFRY Finland Oy, the Rapasaari – Päiväneva complex is expected to release less than 10% nitrogen and less than 5% phosphorus to the Köyhäjoki during the operational years 8-10. According to VEMALA, total current annual nitrogen loading to Köyhäjoki Agriculture is the main source of both nitrogen (40 % of the annual N load) and phosphorus (54 % of the annual P Load) in the Köyhäjoki catchment area.

After mine closing, discharge to the Köyhäjoki in Jokineva will cease and the Rapasaari pit will be allowed to fill naturally with water. During and after the filling, leaching of nutrients and contaminants to the Näätinkioja Stream could occur. The modelling for water quality was conducted for three post closure phases. Phosphorus concentration increased 20-25 µg/L and nitrogen 8-68 µg/L, depending on the phase. Such a low increase in nutrient loading to Näätinkioja Stream does not adversely affect water quality, flora, and fauna of the stream. In each post-closure phase, cobalt slightly exceeds the reference value, which is 0.5 µg/L according to publication of Ministry of Environment, but the baseline value is 0.45 µg/l. Increase in concentration for other elements is negligible.

An ecological status assessment and assessment of impacts from mining operations on the ecological status of surface waters from the Rapasaari – Päiväneva complex was conducted, the full report of which is available in Finnish and is included in the environmental permit application for Rapasaari mine and Päiväneva concentrator. According to the assessment, water discharge from the Rapasaari – Päiväneva complex does not have a negative impact on the ecological status of surface waters bodies on the discharge area or further downstream. The implementation of the Päiväneva production area will not hinder the achievement of water management, marine conservation objectives or the implementation of water protection action plans. Furthermore, the recreational use of the waters downstream of the Päiväneva production area, recreational fishing and crayfishing, are not expected to be adversely affected.

The water management structures have not yet been designed for the Länttä mine. In general, the water management structures will consist of water collection and discharge structures. According to the valid environmental permit of Länttä, mine dewatering systems will pump water to sedimentation ponds.

The Outovesi mine is located in the River Ullavanjoki catchment area. Small ponds, Lake Outovesi, Lake Kotalampi and Lake Länkkyjärvi are all upstream from Outovesi mine and therefore not affected by the mine waters. The operations in Outovesi will be only short-term, and the current designs lack water management plans. The principle is, however, that Outovesi pit dewatering water and runoff water streams from deposition areas, as well as other site water streams, will be managed at their area of formation and, if necessary, treated with suitable treatment methods.

16.2.3 Potentially Sulphate Soils

The GTK conducted a sulphate soil survey in 2014 at the Rapasaari, Syväjärvi, Outovesi and Länttä mine sites. The GTK study assessed the potential risk of soil acidification due to land use or drainage. Acid sulphate soils are known to pose a risk of acidification to soil and water bodies if non-oxidized sulphide-rich soil layers below the water table are exposed to oxidation. Typically, these layers or soil masses are oxidized during drainage or excavation of the soil.

AFRY Finland Oy conducted a sulphate soil survey at the Päiväneva concentrator area in 2020 [21] . In total, 21 soil samples from four locations were taken and analysed for total sulphur content and acid-producing potential with a NAG-test. According to the AFRY report, the test results show the soil is not naturally acid producing.

16.2.4 Acid producing waste rock

At Syväjärvi, pyrite-containing mica-schist makes up 2 % of the waste rock and is potentially acid producing. At Rapasaari, pyrite-containing waste rock makes up 1 % of the waste rock and is potentially acid producing. Outovesi waste rock has some potential for acid producing. Länttä waste rocks should not be acid producing.

According to the EIA 2020 report, the acid producing and neutralizing potential for waste rock has been determined by ABA-tests.

Some of the Syväjärvi mica schist and intermediate metatuffic/meta vulcanite was classified as potentially acid producing and pyrite-containing mica schist as acid producing. At Rapasaari, only mica schist was classified as acid producing. Outovesi samples were all classified as acid producing.

Keliber will install the following structures to waste rock areas of potential acid production. To prevent acid leachate entering soil or groundwater from acid producing waste rock areas, a mineral sealing layer will be built on top of the subsoil moraine with layer thickness 1 m, a bentonite mat will be laid on top of the moraine layer and an HDPE membrane, protected by a geotextile (sizing according to the material supplier's instructions) or with a layer of sand. Pre-filling will be done with waste rock with the pre-fill layer will acting as both protection of the sealing structure and as an access and working platform for machinery. Surrounding the storage area will be a sealing base (mineral aggregate, mats, bentonite mats and HDPE membrane), from which leachate will be collected and directed to the pre-float tailings equalization pond. From the equalization pond, the leachate will be pumped to the pre-float pond at the concentrator. This applies to Syväjärvi and Rapasaari mine sites where acid producing waste rock is likely to be encountered. Detailed engineering for the Outovesi mine site has not been started yet but acid producing waste rock will be noted in the design. Handling of acid producing waste rock and waters generated in these areas is described in detail in the waste management plan by AFRY Finland Oy.

16.2.5 Waste Disposal

Government Decree 190/2013 for extractive waste applies to the preparation and implementation of an extractive waste management plan; the establishment, management, decommissioning and after-care of an extractive waste disposal site; the recovery of extractive waste in an opencast mine and the monitoring, supervision, and control of the management of extractive waste. An extractive waste management plan is mandatory in order to start mining operations and the plan is also a mandatory part of the environmental permit application.

According to Section 114 § of the Environmental Protection Act (527/2014), the operator must evaluate and, if necessary, revise the plan for the management of extractive waste at least every five years and inform the supervisory authority thereof. Under Article 114 § point 4 of the Mining Waste Management Act, the management plan for extractive waste must be amended if the quantity or quality of the extractive waste or the arrangements for the final treatment or recovery of the waste are substantially changed.

Keliber has extractive waste management plans done for Syväjärvi mine, Rapasaari mine and the Päiväneva concentrator area where the TSF is located and for Länttä mine. Reports, in the Finnish language, are:

- AFRY Finland Oy 2021: Kaivannaisjätteen jätehuoltosuunnitelma, Rapasaari ja Päiväneva, Hankeversiolle LOMP2021, 5.11.2021, Keliber Technology Oy.
- Ramboll Finland Oy 2018: Syväjärven louhoksen kaivannaisjätteen jätehuoltosuunnitelma, 11.4.2018.
- Ramboll Finland Oy 2017: Läntän louhoksen kaivannaisjätteen jätehuoltosuunnitelma, 28.11.2017.

16.2.6 Closure Aspects

In Finland, a closure plan for a mine is part of the environmental permit application and the plan must be updated as the operation progresses. The final closure plan will be presented to the authorities at the end of the operation. The overall objective of the closure works is to bring the site into as stable a state as possible, both physically and chemically, and in line with the provisions of the legislation and addressing specific requirements of the local environment.

At the end of operations, preparation of a closure plan for all activities at each mine site (open pit and underground mine, waste rock and tailings areas) will be done, describing the objectives of the closure and defining the measures to achieve them.

Keliber has a conceptual closure plan for the Rapasaari mine and Päiväneva concentrator area where the TSF is located. For Syväjärvi, the closure plan only concerns the waste rock area. Closure reports, in the Finnish language, are:

- AFRY Finland Oy 2021: Keliber Oy:n rikastamoalueen ja Rapasaaren kaivosalueen ympäristölupavaiheen sulkemissuunnitelma, Hankeversiolle LOMP2021, 5.11.2021, Keliber Technology Oy.
- Envineer Oy 2018: Syväjärven sivukivialueen sulkemissuunnitelma ja sulkemisen kustannusarvio, 19.12.2018, Keliber Oy.

On a general level, closure activities comprise the covering of waste rock areas and TSF, making open pits safer by flattening the walls and the demolition of structures unless those can be reused for some other land use activity.

The conceptual closure plan for Rapasaari – Päiväneva was developed by AFRY Finland Oy in 2021. The closure plan will be updated during operations and a final closure plan submitted before operations cease and closure commences. The closure plan addresses the impact of closure on surface waters, groundwater, soil, flora and fauna, conservation areas, air quality, landscape, traffic, and people and society.

Risks related to closure and controlling measures are listed in the AFRY plan:

- The seepage water quantities from the waste rock facilities, TSF and pre-float tailings facility may be larger than estimated and the load of harmful substances greater than anticipated and therefore the impact on soil, groundwater and nearby surface water may be greater than estimated.
- Covered waste rock facilities are exposed to erosion. If erosion occurs an increase in water flow through the facilities could mobilize harmful substances. Pyrite-containing rock oxidation may also increase;
    - Risks can be mitigated by following the precautionary principle in planning and assessment, monitoring during construction and closure, and drainage and monitoring through the quarry lake.

- Ramp distortion may damage the cover structure and thus increases risk of contaminant transport which could also pose a hazard to people and animals in the area;
  - Risks can be controlled by supervision during the construction and closure phases
- TSF dam collapse would cause water and tailings discharge into the environment. This may result in the release of contaminants to soil, groundwater, and surface water. (The amount of water in the reservoir will decrease with closure, so the environmental spillage would be less severe than during the production phase.)
  - Risks can be controlled with dam safety inspections, design and quality control and documentation of design and construction, supervision, and elevations downstream on the excavated embankment.
- Rapasaari underground mine water quality may deteriorate the water quality of the quarry lake which can eventually drift to groundwater and to surface waters;
  - Risk can be controlled by sealing the underground mine to reduce contact with the open pit.
- Possible soil contamination not cleaned after operations. Contaminated soil can impact on groundwater and surface waters;
  - Risks can be controlled during active operations by preventing spills and leakages.

Keliber plans to present security deposits of 4.6M€ for Rapasaari mine and 3.4M€ for Päiväneva concentrator. The security deposit is not lodged yet, but Keliber have made provision for it in the financial model (Sheet "Assumptions", lines 184-191).

16.2.7 Environmental Site Monitoring

In Finland the site monitoring will be regulated by the environmental permit decision. An applicant suggests a monitoring plan as part of its permit application. The plan addresses site monitoring during construction works, operations, the closure phase and after closure. The permitting authority issues environmental permit regulations on monitoring according to the plan or, if it is judged to be insufficient, additional monitoring responsibilities can be added.

Administration costs for environmental services is 240 k€/year and this is including also environmental site monitoring.

At Syväjärvi, monitoring will be done according to the monitoring plan prepared 23.4.2018 (in Finnish: Syväjärven louhosalueen ympäristölupahakemus, which forms appendix 26E2 of the Syväjärvi environmental permit application) and according to regulations issued in the environmental permit and in the Administrative Court decision.

For Rapasaari and Päiväneva, a monitoring plan has been submitted to the permitting authority as part of the environmental permit application which was approved on 28 December 2022.

When mining operations commence at Syväjärvi and Rapasaari, Keliber aims to combine the separate monitoring plans of these sites. It is common practice in Finland to combine monitoring plans of sites or operations of the same operator. Until Rapasaari and Päiväneva have environmental permits issued and enforced, Syväjärvi will be monitored according to its environmental permit regulations.

The environmental permit for Länttä issues regulations on the monitoring of noise, vibration from operations and groundwater and surface water quality

Keliber will join with other operators for the monitoring program of the Perhonjoki River area which includes water quality monitoring, diatom, sediment, and fish monitoring. Keliber has joined the air quality bioindicator monitoring program that is in place at the Kokkola and Pietarsaari area.

Biodiversity monitoring is presented in the Biodiversity Management Plan.

16.2.8 Social and Community Aspects

Residential surveys have been conducted during the years 2014 – 2018 and the latest survey took place during the EIA process for Syväjärvi, Rapasaari and Outovesi in 2020. Respondents of the 2020 survey were mostly recreational users (33 %), permanent residents (23 %) and others (23 %). A majority of the 98 respondents live within a two-kilometre radius of a project site. The majority of respondents felt that impacts of the Project are positive (43 %). Employment for the Project was perceived to be the most important effect(49 %) and secondly environmental management and sustainable development (42 %). Also, regional development was also seen as a positive impact.

On the negative side, respondents saw potential negative impacts to surface waters and possible contamination, damage to natural values and impacts on the ecosystem, dust and noise impacts and possible impacts after closure.

What respondents wished from Keliber is that the project commences soon, Keliber should work together with local entrepreneurs and youngsters, the project should stay with Keliber and not be sold to an outsider, engineering with care and caretaking of the environment.

Maintaining communication with stakeholders as per the Keliber Stakeholder Engagement Plan, meeting its regulatory commitments, ensuring that it is transparent about both its good and weak performance will all help the Project going forward and managing the social risk.

16.2.9 Recreational Use

According to the results of the 2020 residents' survey carried out in connection with the EIA-process, the Syväjärvi, Rapasaari and Outovesi mining areas are considered important for recreational purposes, in particular for hunting, berry picking and mushroom picking. Although, according to public sources, there are no official recreational areas or routes in the mining areas.

In stakeholder meetings with local people the recreational use of the areas and the limitation that comes along with mining activities has not been raised as a major issue. Although mining areas limit recreational activities and may cause nuisance in terms of noise and artificial lighting, the areas required by mining are moderate in size. Near the Rapasaari – Päiväneva complex peat production in an area of 350 hectares has been carried out for years resulting in manmade landscape, dust, and noise that already affects recreational use.

16.2.10 Land Use, Economic Activity and Population

The industrial structure of Central Ostrobothnia is characterized by the metal, wood, process, and chemical industries. Construction, services, and manufacturing sectors also have a large employment impact. Agricultural production is concentrated in the dairy, beef, and potato sectors. Peat production plays an important role in the energy supply of Central Ostrobothnia. In the hierarchy of the service network in Central Ostrobothnia, Kokkola is the commercial center of the region and Kannus and Kaustinen are sub-centers.

It is estimated that mining, concentrator, and chemical plant operations will employ directly 170 and approximately 50 contractors. Keliber will use subcontractors for excavation and transportation. Employment impact was seen as one of the most important positive impacts of the Project.

Mining activities and the concentrator plant operations are in accordance with the current regional plan and therefore the project is consistent with and supports the planned land use.

Alholmens Kraft (AK) is a significant user of peat and has its own peat production areas at Päiväneva. The Project concentrator plant location is partly on AK’s land. Keliber has purchased areas needed for its operations from AK in a mutual understanding.

Forestry at the mining areas will cease and losses have been or will be compensated to owners. Compensation will be paid after establishment of mining area process. The procedure is explained in the Land Acquisition and Livelihood Restoration framework.

Päiväneva is currently not a pristine habitat but an industrial peat production area, which production is coming to an end whereupon the area can be used as a concentrator plant site. Other areas surrounding the Project, mostly peat production and fur farming, can continue in the vicinity despite the mining activities with no adverse impacts (e.g., dust and noise impacts) from mining expected. No other economic activities are known to exist in the Project area which could be significantly affected.

The Project is seen to have a positive impact on the region. Some worries about environmental impacts of mining operations have been noted by the public but also trust has been expressed that Keliber will operate in a way that is not harmful to the environment.

16.3 Environmental and social risks

There could be potential project delays based on issues related to certain sites, which are being addressed by the project. For example, on the Rapasaari – Päiväneva facilities there were concerns about flying squirrels, which were mitigated in autumn 2021 by moving a proposed tailings facility away from an ancient forest where the squirrels are found. The Outovesi Mine is part of the EIA completed in 2020 (Dnro EPOELY/1102/2020); however, there is no specific environmental permit application underway for the Outovesi Mine. When the environmental permit application for Outovesi is prepared there may be requirements for new environmental studies to be conducted, notably related to groundwater connection between the mine and Outovesi Lake.

Keliber is committed to active collaboration and transparent communication with all its stakeholders. The company has a Stakeholder Action Plan and a Grievance Mechanism that is regularly reviewed by the Management Group. Keliber maintains regular ongoing engagement with government, local and regional authorities, landowners and inhabitants, including home and holiday home-owners around Outovesi Lake where potential noise exceedances may occur. Stakeholders are largely supportive of the Keliber Lithium Project as it is seen to have a positive impact on the region in terms of direct and indirect employment opportunities.

The ELY authority (the government authority that enforces environmental legislation) has outlined the need for particular attention to be paid to the potential nuisance to holiday homes in the vicinity of the Outovesi mine area where the noise limits may be exceeded according to noise models. Mitigating noise impacts should be well planned and presented in the environmental permit application to avoid holiday homeowners appeals against the permit. Keliber will also consider holiday homeowners in its environmental and social action plan and execution thereof.

Keliber has a Land Acquisition and Livelihood Restoration framework which explains the land acquisition process. A rental agreement has been signed for the chemical plant site. Negotiations with landowners for access to the Rapasaari-Päiväneva mining area have already commenced. Keliber is aiming to purchase all land areas of the Rapasaari mine site. All landowners at Syväjärvi mine site have provided written agreement to Keliber granting the right to use the land. The landowners at Syväjärvi who receive compensation for land use rights will also receive excavation compensation. Individual negotiations with landowners either for land use rights or purchase of the land required for the Länttä, Outovesi and Emmes areas are underway and Keliber is confident that it will reach agreement with landowners. If agreement is not reached there is a possibility of the expropriation of land according to Act 603/1977.

16.4 Environmental, social and governance summary

All EIA processes including the required statutory stakeholder consultations have been conducted and finalised in terms of the relevant Environmental Law: Environmental Protection Act (527/2014) for the Rapasaari – Päiväneva complex, Syväjärvi, Rapasaari, Länttä and Outovesi mine sites and the Keliber Lithium Hydroxide Refinery.

Keliber has met all regulatory permit requirements, except for Outovesi, where the permit is still to be applied for. When the environmental permit application for Outovesi is prepared there may be requirements for new environmental studies to be conducted. The company is in the process of negotiating with landowners for land use rights or purchase of the land for the various mining areas.

17 CAPITAL AND OPERATING COSTS

[§229.601(b)(96)(iii)(B)(18)]

SRK reviewed the DFS and classified it as a pre-feasibility study (**PFS**) in terms of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)]. This implies Capital Cost Estimate (**Capex**) and Operating Cost Estimate (**Opex**) accuracy of ±25% and overall project contingency of ≤15% could be achieved. It should be noted, however, that estimation of capital and operating costs is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macro-economic conditions, operating strategy and new data collected through future operations. Therefore, changes in forward-looking assumptions can result in capital and operating costs that deviate more than 25% from the costs forecast herein.

17.1 Capital cost

Keliber presents capital expenditure (capex) as Pre-development and Initial capex and Sustaining capex in the Keliber Lithium Project DFS Report (WSP, 2022). The capital includes the establishment of the open pits, the capital for the Päiväneva Concentrator and the Kokkola LiOH Chemical Plant. The underground mines described in the DFS are not included in the Mineral Reserve and therefore no Capital for the underground mines is reported. All data provided in this chapter is sourced from WSP, 2022 and the updated 18 December 2022 TEM (reference Keliber, 2022). Table 17-1 is a high-level summary of the capex for the project.

Table 17-1: Keliber Lithium Project Capital Summary

Item	Units	Total
Syväjärvi Mine	(EURm)	8.1
Concentrator Plant (Päiväneva Site)	(EURm)	156.6
Lithium Hydroxide Plant, Kokkola Site	(EURm)	276.3
Engineering & Construction Services	(EURm)	48.1
Site Facilities During Construction	(EURm)	5.9
Construction Equipment	(EURm)	7.2
Other Construction Services And Costs	(EURm)	0.7
Owners' Cost	(EURm)	23.5
Contingency	(EURm)	56.0
Total Initial Capex	**(EURm)**	582.5

(Source: Keliber, 2022)

Pre-development capex refers to the initial establishment of the Syväjärvi mine site, the Päiväneva concentrator site and Lithium Hydroxide plant, Kokkola site in preparation for the main construction activities.

This includes activities such as surface water management, road construction, architectural work, provision of bulk power supply for the process plants, the EPCM, and Owner's costs. Direct owner's costs include property and land acquisitions, construction permits, pre-ramp-up salaries and pre-ramp-up social costs. Indirect Owner's costs include research and development (**R&D**), legal and permits, and insurances.

Initial capex is expended for the construction of the Syväjärvi Mine, the Päiväneva Concentrator Plant and the Kokkola Lithium Hydroxide Plant. The allocation includes, for direct costs:

- Further water management, roads, and overburden removal and storage at Syväjärvi Mine;
- Mine electrical, ICT and service infrastructure;
- Office and maintenance areas;
- Fuel supply and explosive supply areas; and
- Päiväneva and Kokkola processing equipment, electrical, ICT, utilities, service infrastructure, buildings, storage facilities, offices, workshops, HVAC, water treatment, water pumping, tanks and reticulation, amongst others.

Indirect costs include:

- Engineering and construction services, temporary construction facilities, construction equipment,
- Services, such as inspections, quality control, office and ramp-up costs; and

- Owner's costs which include, Ramp-up salaries and social costs, R&D, financing, legal and permits, and insurances

The pre-development and initial capex schedule is shown in Table 17-2. This capex is due to be expended from H2 2022 until end 2024.

Table 17-2: Pre-development and initial capex schedule

Item	Units	Total	2022	2023	2024	2025
Syväjärvi Mine	EUROk	**8 088**	2 681	1 327	4 080	
Concentrator Plant (Päiväneva Site)	EUROk	**156 642**	1 805	69 184	73 580	12 073
Lithium Hydroxide Plant, Kokkola Site	EUROk	**276344**	38 386	134 454	90 619	12 886
Engineering & Construction Services	EUROk	**48 136**	3 414	17 862	26 035	825
Site Facilities During Construction	EUROk	**5 878**	199	3 541	1 952	186
Construction Equipment	EUROk	**7 184**	142	3 350	3 642	50
Other Construction Services And Costs	EUROk	**707**	(1 426)	648	1 469	16
Owners' Cost	EUROk	**23 548**	11 823	5 774	5 952	
Contingency	EUROk	**55 951**	5 000	25 733	22 294	2 923
Total Initial Capex	**EUROk**	**582 478**	**62 024**	**261 873**	**229 623**	**28 959**

(Source: Keliber, 2022)

The basis of the capital is described in detail in the WSP Keliber Definitive Feasibility Study Report (reference WSP, 2022) dated February 2022 and follow AACE recommended practice. The estimate has been subsequently revised and re-issued in the November 2022 TEM (reference Keliber, 2022). In SRK's opinion, the basis for the estimate is appropriate for a prefeasibility study.

Sustaining Capex is scheduled to start in H2 2024 and is shown in Table 17-3

Sustaining Capital is all capital from 2024 onward and includes the sustaining capital for the concentrator and the Chemical Plant, the establishment and stay-in-business capital for the open pit mines (Rapasaari, Länttä, and Outovesi), as well as closure provisions.

Table 17-3: Keliber Lithium Project sustaining capital schedule

Sustaining Capital	Units	Total	2024	2025	2026	2027	2028	2029	2030	2031 to 2047
Syväjärvi Mine	**EUROk**	**3 086**		**1 414**				**616**	**1 056**	
Overburden Removal	EUROk	1 414		1 414						
Closure	EUROk	1 672						616	1 056	
Rapasaari Mine	**EUROk**	**25 333**			**6 647**	**3 813**	**4 766**	**1 686**	**3 794**	**4 627**
Rapasaari Mine Site Area	EUROk	20 705			6 647	3 813	4 766	1 686	3 794	
Closure	EUROk	4 627								4 627
Länttä Mine	**EUROk**	**1 799**								**1 799**
Länttä Mine Site Area	EUROk	1 471								1 471
Closure	EUROk	328								328
Outovesi Mine	**EUROk**	**2 973**								**2 973**
Outovesi Mine Site Area	EUROk	2 535								2 535
Closure	EUROk	438								438
Concentrator Plant (Päiväneva Site)	**EUROk**	**42 902**		**4 994**	**17 539**	**5 591**	**320**	**291**	**3 078**	**11 090**
Päiväneva Site Area	EUROk	31 228		3 583	14 717	5 511			2 816	4 602
Concentrate Building	EUROk	8 282		1 411	2 822	80	320	291	262	3 096
Päiväneva Closure	EUROk	3 392								3 392
Lithium Hydroxide Plant, Kokkola Site	**EUROk**	**37 707**	**1 000**	**3 822**	**3 411**	**822**	**1 233**	**1 233**	**3 233**	**22 954**
Production Building LHP	EUROk	23 550		2 822	1 411	623	935	935	935	15 890
Kokkola Site Area	EUROk	8 000	1 000	1 000	2 000				2 000	2 000
Calcinating Area	EUROk	6 157				199	298	298	298	5 064
Total	**EUROk**	**110 828**	**1 000**	**10 230**	**27 597**	**10 225**	**6 318**	**3 826**	**11 160**	**40 471**

(Source: Keliber, 2022)

17.2 Operating costs

Keliber has prepared the operating cost estimates in collaboration with Afry, Sweco, FLSmidth and Metso-Outotec. The operating cost estimate is divided into seven different areas:

- Mining;
- Päiväneva Concentrator;
- Kokkola Conversion and Lithium Chemical plant;
- Other variable costs;
- Freight and Transportation;
- Fixed costs; and
- Royalties and Fees.

17.2.1 Mining cost

The OP mining costs vary between the mining areas and at depth. The average waste direct mining unit cost varies between USD2.67/t and USD5.31/t and the average ore direct mining unit cost varies between USD3.74/t and USD9.51/t, based on contractor quotes from the 2019 FS which has been increased by 25% and seem a reasonable assumption at this stage. The unit costs for OP mining (excluding processing) and accounting for the planned stripping ratios averages USD26/t ore mined. The OP mining parameters are summarized in Table 17-4.

Table 17-4: Open pit mining optimisation parameter summary

Description	Unit	Rapasaari	Syväjärvi	Länttä and Outovesi
Exchange Rate	EUR/USD	1.21	1.1	1.1
Price (LiOH.H^{2}O t)	USD/t		14 128	
Price (LiOH.H^{2}O t)	USD/t	EUR/t		
	2022	13 450	11 116	
	2023	13 250	10 950	
	2024	15 000	12 397	
	2025	16 500	13 636	
	2026	15 300	12 645	
	2027	15 200	12 562	
	2028	15 100	12 479	
	2029	14 200	11 736	
	2030	14 800	12 231	
Price (Li^{2}CO^{3})	EUR/t			9 918
Total Fees and Royalties	EUR/t	1.69		
Discount Rate	%	8	8	8
Modifying Factors				
Dilution (Including Internal Waste)	%	19.5	14.2	0
Mining Losses	%	95	95	95
Cut -Off Grade	%	0.4	0.5	0.5
Geotechnical				
Overall slope angle East	Degrees	37º	49º	
Overall slope angle West	Degrees		41º	
Overall slope angle East and other areas	Degrees	47º		45º to 50º
Mining Costs				
Waste Mining	EUR/t	1.85		
Ore Mining	EUR/t	3.22		
Additional Bench Costs				
Waste Mining	EUR/t	0.19	0.17	0.17
Ore Mining	EUR/t	0.11	0.17	0.17
Blasting	EUR/t			
Waste Mining	EUR/t		1.19	1.19
Ore Mining	EUR/t		1.6	1.6
Ore loading and haulage per km	EUR/t		1.54	1.54
Waste rock loading and haulage per km	EUR/t		1.43	1.43
Ore loading to Kaustinen and first haulage kilometre	EUR/t		1.25	1.25
Each additional 1 km of ore haulage to Kaustinen	EUR/t		0.15	0.15
Additional cost to mine Fe-sulphide bearing mica schist	EUR/t		3.5	0
Fixed Cost (Processing Labour)		4.8		
Processing Costs	EUR/t	45	51.5	57
Global Lithium Yield	%	74.30%	74.50%	
Länttä	%			67.10%
Outovesi	%			73.10%

The UG costs on which the Mineral Resource cut-off grade is based (USD21.2/t) are based on contractor quotes and would appear to be a reasonable assumption at this stage.

17.2.2 Concentration and lithium hydroxide production costs

Lithium hydroxide production of 316 287 tonnes is planned over the life of the Project. This includes 96 000 tonnes from external concentrates purchased over 6 years (Jan-42 to Dec-47) after depletion of the mine mineral reserves. Production from Keliber's own spodumene concentrate is estimated at 220 287 tonnes $LiOH.2H_2O$.

Non-mining costs for production of lithium hydroxide from Keliber's own concentrate are summarised in Table 17-5. These include 10% contingency applied to most elements.

Table 17-5: Non-mining cost summary

Section	Cost Element	LoM Cost (kEUR)	LoM Unit Cost (EUR/t $LiOH.H_2O$)
Crushing & Sorting	Crushing, Sorting & Stockpiling	6 606.86	29.99
Concentrator	Energy	31 890.93	144.77
	Reagents	66 166.66	300.36
	Consumables	31 847.25	144.57
	Maintenance	17 303.67	78.55
Concentrator Water Treatment	Energy	3 495.74	15.87
	Reagents	8 541.38	38.77
	Consumables	1 758.84	7.98
	Maintenance	1 329.30	6.03
Concentrate	Loading & Transport	22 307.23	101.26
	Concentrate Purchase	-	-
Conversion	Energy/Fuel	70 771.76	321.27
	Other Consumables / Utilities	9 228.65	41.89
Lithium Hydroxide Plant	Energy	68 526.97	311.08
	Steam	86 832.14	394.18
	Reagents	220 958.61	1 003.05
	Process Water	2 185.75	9.92
	Consumables	4 526.81	20.55
	Utilities	12 327.55	55.96
	Maintenance	16 536.49	75.07
LHP Water Treatment	Reagents	17 238.02	78.25
	Consumables	8 308.18	37.72
	Energy	1 574.56	7.15
	Other Costs	3 395.03	15.41
Other Variable Costs	Service & Handling	1 823.32	8.28
	Other Costs	550.28	2.50
Transport & Packing	Side Rock Transport	-	-
	Final Product Transport	14 725.61	66.85
Processing Labour	Labour Costs	161 365.31	732.52
Other Operating Costs	District Heat	20 748.92	94.19
Subtotal Cost of Goods Sold		**1 322 618.58**	**6 004.06**
SG&A	General & Administration	139 880.60	634.99
	Property-related Costs	8 873.53	40.28
	Others	5 588.99	25.37
Royalties & Fees	Royalties	5 944.85	26.99
	Fees	11 010.27	49.98
TOTAL		**1 493 916.81**	**6 781.67**

17.2.3 Päiväneva Concentrator (crushing, sorting and concentration)

Ore from the mine will be hauled to the primary crusher located at the Päiväneva concentrator.

Primary crushing and sorting costs are then applied to the concentrator area. The operating cost of the concentrator plant includes energy, reagents, consumables, and maintenance. The same items are covered for the water treatment plant which is considered as being part of the concentrator site area.

Energy is calculated based on the electrical load list of the equipment and the estimated power consumption. Reagents are derived from the process reagent consumption and costs are estimated from quotations provided by reagent suppliers. Consumables and maintenance costs were estimated based on recommendations derived from concentrator basic engineering work completed by Metso Outotec.

Concentrator operating cost for the life of the project is estimated at EUR168.9m or EUR 767/t LiOH.H_2O produced from Keliber Lithium Project's concentrates.

17.2.4 Keliber Lithium Hydroxide Refinery (conversion and LHP production)

Operating costs of the Kokkola Chemical Plant are estimated at EUR544.7m or EUR 2 473 /t of LiOH.H_2O produced from Keliber Lithium Project's concentrates. The main contributors to the costs are energy, steam generation and reagents.

17.2.5 Other variable costs

Other variable costs contribute EUR2.4m or EUR 11 /t of LiOH.H_2O to overall operating costs.

17.2.6 Freight and transportation

Freight and transportation costs contribute EUR14.726m or EUR 67 /t of LiOH.H_2O to overall operating costs.

17.2.7 Fixed costs

Fixed costs include labour costs, LNG connection fees, LHP connection fees, various water retainer fees, fixed operating costs for heating of buildings, laboratory running costs, property related costs, utility system and G&A costs. These fixed costs are estimated at EUR 336.5m or EUR 1 527 /t of LiOH.H_2O produced over the life of the mines, with labour and G&A costs comprising 48% and 42% respectively.

17.2.8 Royalties and fees

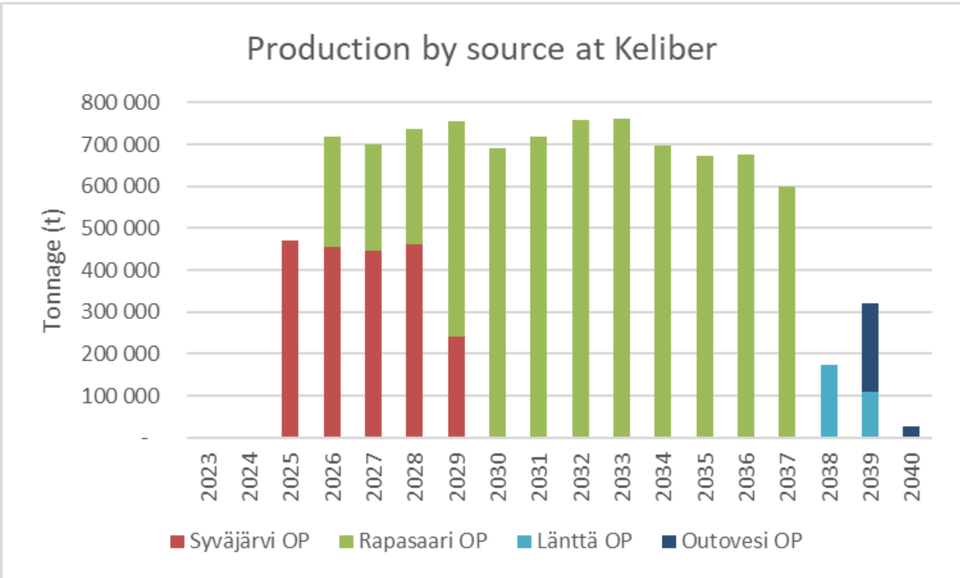
Royalties and fees contribute EUR17.0m or EUR 77/t of LiOH.H_2O produced to overall costs.

18 ECONOMIC ANALYSIS

[§229.601(b)(96)(iii)(B)(19)]

The financial model is premised on open pit production rates and processing plant performance as defined in the Keliber FS. The concentrate can be sold on the open market for which forecast prices are available. The Mineral Reserves for Keliber have been declared on the basis that a ready market exists for the concentrate and the NPV is positive, without the need for a refinery.

The feed to the concentrator is limited to the open pit ore that comprises the Mineral Reserve. The schedule is graphically illustrated in Figure 18-1. As described earlier, the company DFS planned to supplement the feed with underground ore. The schedule has not been optimised for open pit ore.



srk consulting	**Keliber Mine and Concentrator** Feed to Plant by Source	Project No. 592138

Figure 18-1: Keliber Mine and Concentrator Feed by Source

Plant recovery is a critical success factor. The factors that drive recovery are discussed in detail in the mining and processing sections and are not repeated here. The financial performance is reliant on the efficiency of the ore sorting, both through removal of waste and ensuring that there is no loss of contained lithium.

During the period when Keliber is operating as a vertically-integrated Mine, Concentrator and Refinery, the concentrate grade will be adjusted to optimise the overall economics. In this hypothetical case, a concentrate grade has been estimated to feed into the third-party concentrate market. Although a 4.5% spodumene concentrate is not a typical product, according to Wood Mackenzie (2021) and Fastmarkets March (2022), there is a demand for this product in Europe and this particular concentrate is appealing to glass manufacturers due to the low iron content. See Chapter 15 (Market Studies) for a detailed description of the commodity pricing and demand for the 4.5% spodumene concentrate. The potential premiums for the product and the low impurities are considered to offset the discount that could be applied for the lower product concentration (25% reduction).

The spodumene concentrate grade can be increased to 6% but this would introduce other uncertainties given that the detailed work has been done on the 4.5%, which is considered optimal for the integrated business.

The feed to the plant is driven by the production from the open pit sources. No changes have been made to the DFS schedules developed, the underground tonnes have just been omitted from the schedule. This is obviously not optimal but, absent a specific study to confirm new numbers, it is not possible to be certain that a new schedule would be achievable.

The concentrate production is as per the detailed DFS financial model but limited to the open pit ore. This directly drives the revenue along with the forecast price. The costs are based on the DFS but adjusted to reflect the lower tonnages for the periods where the underground tonnes are excluded.

The economic analysis is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macro-economic conditions, operating strategy and new data collected through future operations. The economic assessment described here is premised on a prefeasibility study that exploits only Mineral Reserves. There is no certainty that this economic assessment will be realized.

The final cash flows presented are summarised cash flows. Detailed analysis of the mining and processing costs are presented in the respective sections.

Table 18-1: Mine and Concentrator Only with scheduled Mineral Reserve

Description	Total	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
OP Ore to Crusher (kt)	**9 476**	**-**	**-**	**472**	**718**	**700**	**735**	**755**	**692**	**718**	**757**	**762**	**696**	**673**	**676**	**598**	**175**	**322**	**28**
Spodumene Concentrate Produced (kt)	**1 637**	-	-	**13**	**136**	**157**	**156**	**139**	135	135	134	116	102	113	109	87	28	69	8
Revenue (EURm)																			
Lithium (Spodumene)	1 531	-	-	26	198	138	137	122	118	118	118	102	90	99	96	76	24	61	7
Costs (EURm)																			
Landowner Payments (Fees)	16	0.2	0.3	0.8	1.1	1.2	1.2	1.3	1.1	1.1	1.0	1.0	1.0	1.0	1.0	1.1	0.9	0.6	0.6
Central Allocated Costs (Total SG&A)	58	1.7	2.0	3.4	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
Processing	51	-	-	0.6	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
Mining Costs	422	-	-	10.4	30.4	31.9	31.6	30.2	31.3	31.9	37.0	43.6	37.9	26.3	25.8	27.8	8.4	16.4	1.3
Lithium Spodumene Shipment to Antwerp	102	-	-	0.7	6.8	7.9	7.8	6.9	6.7	6.7	6.9	6.2	6.3	6.9	6.7	5.9	6.5	7.2	5.5
Total Working Costs (EURm)	**649**	**2**	**2**	**16**	**45**	**48**	**47**	**45**	**46**	**47**	**52**	**58**	**52**	**41**	**40**	**42**	**23**	**31**	**14**
Revenue less Total Working Costs (EURm)	882	-2	-2	10	153	91	90	77	72	72	66	44	38	58	55	35	2	30	-7
Renewals and Replacements	43	-	-	-	-	-	6.4	17.5	5.6	0.3	0.9	4.1	0.8	2.7	1.2	0.3	2.8	0.3	0.3
Allocated Capital Expenditure	228	81.7	112.3	34.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Capital Expenditure (EURm)	**272**	**82**	**112**	**34**	**-**	**-**	**6**	**18**	**6**	**0**	**1**	**4**	**1**	**3**	**1**	**0**	**3**	**0**	**0**
Revenue less Total Working Costs and Capital	610	-84	-115	-24	153	91	84	59	67	71	65	40	37	56	54	35	-1	30	-8
Total Other Expenditure (EURm)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Operating Profit before Taxes (EURm)	610	-84	-115	-24	153	91	84	59	67	71	65	40	37	56	54	35	-1	30	-8
Royalties	6.3	-	-	0.2	0.4	0.3	0.4	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Taxation	170	-	-	-	24.7	18.0	17.9	15.3	14.4	14.3	13.2	8.7	7.5	11.6	11.0	6.9	0.2	5.9	-
Free Cash Flow (EURm)	434	-84	-115	-24	128	72	65	44	52	57	52	31	29	44	43	27	-2	23	-8
NPV (EURm)	**136**																		

The taxes and royalties and payments that are required to landowners based on various agreements and legislation are incorporated into the model. A detailed breakdown is provided in an earlier chapter on the basis for the taxes, royalties and landowner payments.

A two-factor sensitivity for revenue and total operating costs was also developed. The results are shown in Table 18-4. The project NPV is most sensitive to price, as is expected. It is important to note that the same sensitivity applies to exchange rate given that the costs are in euros and the revenue in dollars. Thus, a 5% change in exchange rate will have the same impact as a 5% change in price. The sensitivity for exchange rate is not shown as it is an exact replica of the price sensitivity.

Table 18-2: Sensitivity of NPV to Revenue and Working Costs

NPV in EURm			**Long-term concentrate price (USD/t)**								
			834	886	938	990	1 042	1 094	1 146	1 198	1 250
		84.7	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%
Working Costs (EUR/t)	61.7	-10%	39	69	100	130	160	190	221	251	281
	65.1	-5%	27	58	88	118	148	179	209	239	269
	68.5	0%	15	46	76	106	**136.4**	167	197	227	257
	71.9	5%	3	34	64	94	124.5	155	185	215	245
	75.4	10%	-8	22	52	82	113	142.8	173	203	234

A further sensitivity was developed for the discount rate. The base case discount rate has been selected as 10% as per the Sibanye-Stillwater policy for projects.

Table 18-3: Sensitivity to Discount Rate

Discount Rate	**NPV**		
	(EURm)	**(USDm)**	**(ZARm)**
6.0%	223	239	4 058
8.0%	176	188	3 198
10.0%	**136.4**	**145.8**	**2 478**
12.0%	103	110	1 872
14.0%	75	80	1 358

SRK has placed reliance on Sibanye-Stillwater for the market analysis and the price and exchange rate forecasts. The company makes use of the UBS forecasts. UBS survey several analysts for their views on the spodumene concentrate and lithium hydroxide prices. The December 2022 forecasts have been used, the latest available at the Effective Date. The average of the surveyed analysts is used for the company financial models and is used in these models. The price and exchange rate forecasts used are shown in Table 18-6:

Table 18-4: Price and Exchange Rate forecasts

		Price and Exchange Rate forecasts				
		2023	**2024**	**2025**	**2026**	**LTP**
Lithium (Spodumene)	USD/t	4 971	3 638	2 297	1 730	1 042
Lithium (Hydroxide)	USD/t	55 746	41 490	30 054	23 203	15 195
EUR:USD		0.95	0.90	0.89	0.89	0.89

Note that the EUR:USD exchange rate has used the 2025 forecast for the long-term rate as there were fewer analysts who forecast the later years. The analysts who did forecast expected further weakening, which would improve the project economics by effectively increasing the dollar-based revenue without increasing the euro-based costs.

The Consensus Economics forecasts were also consulted. The Consensus Economics view is that the long-term lithium hydroxide price will be slightly higher than that used in the integrated model but that the long-term spodumene concentrate price will be slightly lower.

The average operating margin for the life of mine is 42%. The risk of a negative operating margin is considered low, and the project capital required has been funded. Additional funds are available if required. This means that the company is in a position to complete the project and that the project would operate on a cash positive basis under most foreseeable price paths, even though the NPV might vary dramatically.

The post-tax NPV of the project is forecast to be EUR136m at a 10% real discount rate and with a forecast IRR of 21.5%. The mine and concentrator are predicted to have a payback period of approximately 5 years.

19 ADJACENT PROPERTIES

[§229.601(b)(96)(iii)(B)(20)]

The Keliber Lithium Project is the most advanced lithium project in the region. It is likely that there is potential for identification and exploration of additional similar orebodies in the region, including under the current Keliber license areas, however there are no other lithium exploration licenses held by other companies surrounding the Keliber license areas.

20 OTHER RELEVANT DATA AND INFORMATION

[§229.601(b)(96)(iii)(B)(21)]

20.1 Project Implementation

A project implementation plan was prepared by Sweco Oy (**Sweco**) for the establishment of the Syväjärvi Mining site, Päiväneva concentrator site and Kokkola LiOH plant. These sites comprise the initial capital footprint. Keliber has selected Sweco as an **EPCM** (Engineering, Procurement and Construction management) contractor to supply services for the project implementation. Services of the EPCM contractor includes, in accordance with the responsibility matrix, project management, procurement services, project control, process, mechanical, piping, civil, HVAC, electrical and automation engineering and construction management.

Sweco has produced a comprehensive Project Execution Plan originally drafted in August 2021 and updated a number of times, with the latest update in Feasibility Study of January 2022. The updated milestone dates in **Table** 20**-1** below were developed from the information containing in the Keliber Financial Model dated 18 December 2022 and an update email dated 3 March 2023 with a schedule for the Kokkola LiOH Plant provided by Keliber.

The project implementation plan does not currently include the later mines. SRK assumes that detailed implementation plans for these will be developed in due course. Key milestone dates on 6 March 2023 are shown in **Table** 20**-1** with notes below.

Table 20-1: Project Milestones

Milestone	Milestone date
Kokkola LiOH Plant - start of site clearing	February 2023(2)
Kokkola LiOH Plant – Mechanical Completion	March 2025(2)
Kokkola LiOH Plant – Final Acceptance	December 2025(2))
Päiväneva Concentrator - start of earthworks	To be determined(3)(4)
Päiväneva Concentrator - cold commissioning completed	To be determined(4)
Syväjärvi Mine - start of roads, wetland treatment	To be determined(3)
Syväjärvi Mine – first ore	To be determined(3)
Start of Sustaining capex	November 2024(1)
End of Initial capex	July 2025(1)
Rapasaari Mine - start of site work - open pit	To be determined(3)(5)
Rapasaari Mine – First ore	To be determined(3)(5)

(Sources: Keliber, 2022 and Keliber, 2023a)

Notes to **Table** 20**-1** (*Source Keliber 2023a*):

1. According to the Keliber Financial Model dated 18 December 2022;
2. According to the Target Master Schedule for the Kokkola LiOH Refinery Project, (5 January 2023)
3. The Syväjärvi and Rapasaari mines, and Päiväneva concentrator plant schedule is not up to date currently, confirmed start dates are not available;
4. Duration of key milestones at Päiväneva are roughly the following:
    a. Crushing, Mechanical completion and start of hot commissioning; 22 months after construction start;
    b. Complete plant, Mechanical completion and start of hot commissioning; 24 months after construction start;
    c. Taking over, 27 months after construction start (plant is operational); and
    d. Final acceptance 33 – 34 months after construction start (full capacity).
5. Syväjärvi pit needs to be operationally ready when the Päiväneva Concentrator crushing line hot commissioning starts i.e., 22 months after construction start. In the Feasibility Study, Rapasaari production was planned to start about a year later.

20.2 Exploration Programme and Budget

[12.10(e)(i)-(iii), 12.10(h)(vi)], SR3.1(i)-(vi), SR 3.2(i)]

Currently, Keliber has an exploration budget for the next three years, 2023 - 2025. The exploration budget for 2023 is EUR 4.3 million. It is estimated that the annual exploration budget can be increased to EUR 6.7 – EUR 7.3 million in 2024 - 2025, if the exploration returns good results.

A total of 26 000 m is planned to be drilled in 2023. Drilling will be focused especially on the Rapasaari, Tuoreetsaaret, Syväjärvi and Päiväneva target areas. The Rapasaari and Syväjärvi deposits are the largest of the known deposits and the most advanced in exploration and are scheduled for first mining in the current engineering studies. Tuoreetsaaret is located between Rapasaari and Syväjärvi and represents an opportunity to extend the early production from these two deposits from a nearby source. The continued exploration in this area aims to improve the confidence in the Tuoreetsaaret deposit and to extend the Mineral Resources at Tuoreetsaaret and in the surrounding areas. Päiväneva is the most advanced of a number of targets in the region and is the initial target for expanding and extending the Mineral Resource base in the region.

Most of the planned drilling (~15 600 m) is aimed as existing deposits as described above to secure the business case and expand the life of mine, with a further ~5 200 m targeted at brownfields exploration. Exploration for new targets is planned with ~4 000 m, and approximately 1 300 m planned for sterilisation drilling under the expended footprint of the waste rock dump.

Geochemical exploration will also be conducted using percussion drilling methods to obtain samples from the bedrock surface as well as from the basal till. Additional work will include boulder mapping, surface till sampling and Mineral Resource estimations. SRK considers the budget to be appropriate.

20.3 Risk review

20.3.1 Introduction

The following section presents the key interpretations for the risk review for Keliber. The risk review considered documents provided by SSW, as well as information available in the public domain.

20.3.2 Overview of specific risk elements

The available information for the project identifies and/or points to the following risk-related issues:

20.3.2.1 Tenure

Currently, there are three mining permits in place (i.e., Länttä , Syväjärvi and Rapasaari) and a number of applications have been submitted (as well as prepared, pending submission) for exploration and mining permits. However, there is some uncertainty regarding the time required for the authorities to process the applications. It is understood that Keliber is completing a legal due diligence exercise to understand the permitting risks. The resolution of this risk is not required for the declaration of Mineral Resources.

Public perception of potential environmental impact related to mining appears to be changing. Uncertainty regarding potential objections by the public and/or authorities to the award of tenure for each of the applications exists. The relevance of the uncertainty is that the current project does not appear to have considered scenario models if some of the applications, or specific applications, are either significantly delayed or are wholly unsuccessful.

20.3.2.2 Geology

The style of mineralisation is similar between the deposits, and they are all in relatively close proximity. The continuity of the larger veins in all five of the deposits is demonstrated to be good during the geological modelling, with relatively uncomplicated morphology. Therefore, the risk that the veins as modelled are discontinuous, is considered to be low.

20.3.2.3 Water management

Significant water bodies are present at the Syväjärvi and Emmes deposits and would require careful management. Flow rate modelling parameters need to be carefully considered to accurately determine the amount of fresh water available and potential impacts on downstream water quality need to be carefully investigated.

20.3.2.4 Mineral Resource estimation

The overall Mineral Resource estimation has been conducted in line with the guidelines of international reporting codes. The classification of the individual veins reflects the uncertainty, and therefore the degree of risk, in achieving the estimated tonnes and grades from the respective ore bodies.

20.3.2.5 Rock engineering

Geotechnical conditions vary across the different sites, with open pit reserves having higher geotechnical data confidence due to existing exposures and laboratory test work. Focus is required on discontinuity strengths and structural data confidence in particular to further enhance design confidence.

It is expected that rock engineering data collection and processing will be expanded as the project develops to allow for rigorous assessment of the rock engineering risks across the respective sites.

Paucity of geotechnical data, including rock mass strength and characterisation data, as well as confidence in structural geology models, result in conservative design and risk assumptions and potential for the associated unknown ground conditions.

20.3.2.6 Metallurgical processing

Based on pilot-scale XRT ore sorting test results conducted on Syväjärvi ore samples, it was concluded that ore sorting is 73% efficient. There is a risk that ore sorting efficiency will vary across the Syväjärvi deposit. It was further assumed that the same efficiency would apply to other ore sources and ore types. There is a risk that other deposits will not perform with the same efficiency.

The feed to the ore sorting test equipment comprised an artificial blend of Syväjärvi ore and waste rock. There is a risk that performance on mined ore may be less efficient than on the artificial composite ore feed.

Ore variability flotation tests undertaken on Rapasaari samples selected from four different mineralised material types showed significant variability. There is a risk that flotation performance will vary within and across the various deposits.

Despite spodumene mineralisation being generally homogeneously distributed throughout most of the pegmatites, the contamination caused by the inclusion of host rock xenoliths and wall rock material with ore material will impact the metallurgical recovery of spodumene during flotation and metallurgical processing. This will require careful selective mining supported by ore sorting to mitigate the impacts of contamination on the recovery of spodumene.

The Keliber project is likely to be the first implementation of the Metso Outotec lithium hydroxide flowsheet. While the individual unit processes are not novel, and while the Syväjärvi (2020) and Rapasaari (2022) pilot trials have significantly de-risked the flowsheet, a residual risk remains, as it does with the first example of any novel technology.

Potential concerns were noted that the processing plant may not cope with the arsenic levels from Rapasaari material, which may lead to LiOH product falling to technical grade.

20.3.3 Potential economic impact of COVID-19

The Covid-19 global pandemic presented suddenly and with immense impact. Management measures on an international, national and local scale were developed in response by relevant authorities and varied in the potential for downstream effects (e.g., restriction of movement of people and/or materials, delays in new activities due to backlogs, etc.). There is some uncertainty of the effect from the continued, albeit modified, Covid-19 measures on developing the project (in terms of the larger context).

Similarly, an unexpected repeat incidence *or* emergence of a new global crisis could affect the development of the project.

20.3.4 Opportunities

The inclusion of Keliber into the SSW's Battery Metals assets portfolio and battery metals strategy is an important step in acquiring further downstream exposure to the battery metals value chain.

Lithium hydroxide (a chemical needed in the production of the cathode active material in modern high-nickel cathode materials, which provide higher energy density) is expected to become the dominant lithium chemical consumed in battery applications. In the future, Keliber will offer lithium hydroxide especially for the needs of the strongly growing lithium battery market. The battery-grade lithium hydroxide produced can be used for the manufacturing of batteries for increasingly electrifying transport (electric and hybrid vehicles) as well as in the production of batteries for energy storage.

21 INTERPRETATION AND CONCLUSIONS

[§229.601(b)(96)(iii)(B)(22)]

In January 2022, Keliber issued a draft Definitive Feasibility Study (DFS) (WSP Global Inc., 2022c) based on the production of 15 000 tpa of battery-grade lithium hydroxide. This DFS used the DFS issued in February 2019 as basis for most of the technical work.

The final DFS was issued on 1st February 2022. SRK reviewed this DFS and classified it as a pre-feasibility study (PFS) in terms of Table 1 to Paragraph (d) in S-K1300 [§229.1302(d)]. This implies Capital Cost Estimate (Capex) and Operating Cost Estimate (Opex) accuracy of ±25% and overall project contingency of ≤15% could be achieved. It should be noted, however, that estimation of capital and operating costs is inherently a forward-looking exercise. These estimates rely upon a range of assumptions and forecasts that are subject to change depending upon macro-economic conditions, operating strategy and new data collected through future operations. Therefore, changes in forward-looking assumptions can result in capital and operating costs that deviate more than 25% from the costs forecast herein

The major reasons for the downgrade of the DFS to PFS level by SRK are as follows:

- The mining cost for the February 2022 DFS was derived by escalating the February 2019 DFS's mining cost by 25%, The RFQ's were thus not updated for the February 2022 DFS.
- Geotechnical test work was not done to DFS level;
  - Geotechnical drilling and testwork was limited to the Rapaasari mining property; and
  - Geotechnical data from the Rapasaari deposit was used to infer geotechnical parameters for the other operations.
- The Keliber concentrator will make use of XRT ore sorting to remove waste material from mill feed;
  - This was only tested on Syväjärvi mining property ore material;
    - The characteristics across the mining property may vary which was not tested; and
    - The efficiency results from the tests were assumed for other mining properties.
- The Market for concentrate of 4.5% Lithium spodumene is unknown as the benchmark is 6% Li_2O in Europe.

21.1 Geology, exploration, sampling and Mineral Resources

All of the pegmatites that have been discovered and evaluated to date within the Kaustinen area have very similar mineralogy, and are dominated by albite, quartz, K-feldspar, spodumene and muscovite. The rare element pegmatites belonging to the Kaustinen lithium province belong to the LCT group of pegmatites. They also belong to the albite-spodumene subgroup based on the pegmatites' high spodumene and albite content. The presence of numerous granites (many being pegmatitic granites) in the Kaustinen area are thought to be the potential sources of the pegmatites, although there has been no clear or well-defined zonation observed to date to prove this.

Apart from data generated from overburden stripping at Länttä and the exploration tunnel in Syväjärvi, diamond core drilling has been the only method used to generate geological, structural and analytical data and these have been used as the basis for Mineral Resource estimation over each of the deposits defined to date.

Keliber has been following a well-defined logging, sampling and analytical procedure since 2014. The sampling and core storage facility in Kaustinen is considered a secure facility with the sample preparation and analytical methodologies considered appropriate for the commodity being evaluated (lithium). SRK concludes that the sample database is of sufficient quality and accuracy for use in Mineral Resource estimation.

Since commencement of exploration in the Kaustinen region, Keliber has completed a systematic exploration and mineral resource evaluation programme that has been successful in delineating five discrete spodumene-mineralised pegmatite deposits. The work completed to date has captured all the important variables (mineralogical, structural, lithological) required to properly define the attitude of the host pegmatite/s and importantly, the spodumene or grade distribution within the various pegmatites that host each deposit.

In SRK's opinion the exploration data that has been captured to date (consisting primarily of drilling data) is of sufficient quality to be used in Mineral Resource estimation and for the purposes used in this TRS.

The Mineral Resources have been estimated using conventional industry standard techniques, and the continuity of the modelled veins has been adequately demonstrated through the wireframe modelling, which supports the lateral and down-dip continuity of the mineralised veins. The Mineral Resources have been appropriately classified with respect to the confidence in the data, interpretation, and the vein and grade continuity.

Currently, Keliber has an exploration budget for the next three years, 2023 - 2025. The exploration budget for 2023 is EUR4.3m. It is estimated that the annual exploration budget can be increased to EUR6.7 - EUR7.3 in 2024 - 2025, if the exploration returns good results.

A total of 26 000 m is planned to be drilled in 2023. Drilling will be focused especially on the Rapasaari, Tuoreetsaaret, Syväjärvi and Päiväneva target areas.

Geochemical exploration will also be conducted using percussion drilling methods to obtain samples from the bedrock surface as well as from the basal till. Additional work will include boulder mapping, surface till sampling and Mineral Resource estimation. SRK considers the budget to be appropriate.

21.2 Geotechnical testing

Each core sample specimen for UCS and indirect tensile tests (Brazilian) (BR) was prepared according to ISRM (2006) suggested methods. The suggested length was 2 - 3 drill core diameters and rock samples were split into five groups according to their rock type. Foliation parameters of recognized volcanic and sedimentary units were estimated.

While the rock strength test work carried out aligns with standard testing techniques, joint shear strength areas analyses must still be done. Review of the previous reports did not show soil testing results, nor the testing methods carried out. Additionally, the coordinated location of where the samples were collected could not be verified. No reference to QA/QC procedures on the laboratory test work results was made in previous reports.

21.3 Metallurgical testing and mineral processing

Keliber mineral processing is complex, including conventional and novel unit processes aimed at producing a high purity product. Further complexity is added by the need to process ore from four deposits from diluted open pit operations.

21.3.1 Ore beneficiation

Ore beneficiation at the Päiväneva concentrator includes crushing, grinding, ore sorting, low intensity magnetic separation, desliming and flotation ahead of dewatering and filtration of concentrate for despatch by road to the Keliber Lithium Hydroxide Plant.

Crushing, grinding and flotation are conventional unit processes and, with certain exceptions, are reasonably well understood based on bench and pilot-scale test results. Based on pilot-scale XRT ore sorting test results conducted on Syväjärvi ore samples, it was concluded that ore sorting is 73% efficient. There is a risk that ore sorting efficiency will vary across the Syväjärvi deposit. It is accordingly recommended that ore sorting variability tests be conducted across the Syväjärvi deposit. It was further assumed that the same efficiency would apply to other ore sources and ore types. There is a risk that other deposits will not perform with the same efficiency. It is accordingly recommended that these deposits be subjected to pilot ore sorting and variability tests using XRT ore sorting technology.

The feed to the ore sorting test equipment comprised an artificial blend of Syväjärvi ore and waste rock. There is a risk that performance on mined ore may be less efficient than on the artificial composite ore feed. It is accordingly recommended that samples of mined ore from all deposits be subjected to pilot ore sorting tests using XRT ore sorting technology.

Overall, it was shown that the higher the waste rock dilution ratio the lower the Li_2O grades and flotation recovery. Ore variability flotation tests undertaken on Rapasaari samples selected from four different mineralised material types also indicated spatial variability. Further investigation would be required on all other deposits to ensure adequate understanding of spatial variability in flotation performance.

21.3.2 Chemical processing

The Keliber Lithium Hydroxide Plant includes pyrometallurgical conversion of alpha-spodumene to beta-spodumene ahead of hydrometallurgical production of lithium hydroxide.

Conversion of alpha-spodumene to beta-spodumene occurs in a direct heated rotary kiln fired with Liquified Petroleum Gas.

The hydrometallurgical process includes primary sodium carbonate leaching in an autoclave ahead of cold conversion of lithium carbonate to lithium hydroxide. Leach solution containing lithium hydroxide is fed through polishing filters ahead of ion exchange to remove elements such as calcium and magnesium. Lithium hydroxide is crystallised from the lithium hydroxide solution by means of pre-evaporation in a mechanical vapour recompression (**MVR**) falling film evaporator, followed by an MVR crystalliser. Lithium hydroxide slurry from the crystallisation stage is fed to a centrifuge where solids are separated from the mother liquor and washed. Moist cake is dried in a fluidised bed dryer and packed into big bags for shipment to market.

Spodumene conversion has been tested at bench-scale on Länttä and Syväjärvi and Rapasaari concentrates and at pilot-scale on Länttä, Syväjärvi and Rapasaari concentrates. Conversion parameters are reasonably well understood but further pilot-scale tests would be required on the other main sources of concentrate to ensure adequate understanding of variability in performance.

From 2015 to 2018, laboratory and pilot tests were undertaken on Länttä, Syväjärvi and Rapasaari concentrates from the spodumene concentrate conversion to lithium carbonate production.

Following the decision to produce lithium hydroxide rather than lithium carbonate, semi-continuous bench-scale tests were undertaken in 2019 to produce lithium hydroxide. This was followed by continuous pilot testing in 2020 using Syväjärvi beta-spodumene concentrate and in 2022 on Rapasaari beta-spodumene concentrate.

The soda leach developed by Outotec is a novel process but one that has been successfully demonstrated at pilot-scale on Syväjärvi and Rapasaari beta-spodumene concentrates. Ideally, other concentrates should also be subjected to conversion and hydrometallurgical testing.

21.4 Mining and Mineral Reserves

Open pit mining is considered appropriate for the orebody characteristics.

The modifying factors applied in the Mineral Resource to Mineral Reserve conversion are appropriate for the ore body type taking in consideration the concentrating process.

No Inferred Mineral Resources were included in the mine design.

Measured and Indicated Mineral Resources has been converted to Proven and Probable Mineral Reserves.

From the data received it has been shown that the open pit optimizations have been studied rigorously and accurately.

The practical pit designs have been prepared based on the optimum pit shells defined in the optimization. Taking in consideration the geotechnical slope design parameters and equipment sizes for the haul roads. The waste dumps has sufficient space for waste material.

21.5 Adjacent properties

Keliber is the most advanced lithium project in the region. The other exploration projects do not yet have estimated Mineral Resources declared; however, they share similar characteristics and mineralisation style to the orebodies declared by Keliber. It is likely that there is potential for identification and exploration of additional similar orebodies in the region.

21.6 Risk review and opportunities

The review identified that the key risks for Keliber are in line with those expected during early project-related phases; i.e., uncertainty regarding permitting, water-related concerns and issues related to the estimation of the Mineral Resources.

The inclusion of the battery metals assets into SSW's portfolio and battery metals strategy is a strategic step to acquire further downstream exposure to the battery metals value chain.

Lithium hydroxide (a chemical needed in the production of the cathode active material in modern high-nickel cathode materials, which provide higher energy density) is predicted by some to become the dominant lithium chemical consumed in battery applications. Keliber intends to offer lithium hydroxide to the strongly growing lithium battery market. The battery-grade lithium hydroxide produced can be used for the manufacturing of batteries for increasingly electrifying transport (electric and hybrid vehicles) as well as in the production of batteries for energy storage.

21.7 Economic Analysis

The Net Present Value (NPV) of the post-tax cash flows for Keliber Mine and Concentrator is shown for a range of discount rates in Table 21-1. The NPV is determined in the model in euros and converted to ZAR and USD at the prevailing spot rate from 30 December 2022, the closest date to the Effective Date for which data is available.

Table 21-1: Sensitivity to Discount Rate

Discount Rate	NPV		
	(EURm)	(USDm)	(ZARm)
6.0%	223	239	4 058
8.0%	176	188	3 198
10.0%	**136.4**	**145.8**	**2 478**
12.0%	103	110	1 872
14.0%	75	80	1 358

The default price assumptions used are from the UBS December 2022 price deck. The average of the surveyed analysts is used in the Economic Analysis. A two-factor sensitivity, showing the sensitivity of the NPV to the USD price for spodumene concentrate and the working costs is included in Table 21-2.

Table 21-2: Sensitivity of NPV to Changes in Price and Working Costs

NPV in EURm			Long-term concentrate price (USD/t)								
			834	886	938	990	1 042	1 094	1 146	1 198	1 250
		84.7	-20%	-15%	-10%	-5%	0%	5%	10%	15%	20%
Working Costs (EUR/t)	61.7	-10%	39	69	100	130	160	190	221	251	281
	65.1	-5%	27	58	88	118	148	179	209	239	269
	68.5	0%	15	46	76	106	**136.4**	167	197	227	257
	71.9	5%	3	34	64	94	124.5	155	185	215	245
	75.4	10%	- 8	22	52	82	113	142.8	173	203	234

The average working costs are EUR68.5/t and the forecast long-term spodumene price is USD1042/t. The price and the associated forecast is currently very volatile. However, the operating margin of the mine and concentrator is currently estimated at 42% for the scheduled life of mine (LoM). The company has funded the capital for the project and limited liquidity risk is present. The operating margin is generally healthy and although the NPV changes substantially in response to price changes the operating margin is forecast to remain positive under most foreseeable scenarios.

The post-tax NPV of the Mine and Concentrator producing spodumene concentrate for sale to a third-party is estimated at EUR136.4 million at a 10% real discount rate with an IRR of 21.5%. This is on a 100% attributable basis. Sibanye-Stillwater owns 84.96%.

The integration of the Refinery significantly improves the economics. However, the Refinery is not considered a Mineral Asset. A more detailed explanation is included in the Economic Analysis chapter along with the cash flows of the integrated business. The company intends to operate the business as an integrated business for the period where both the mine and the Refinery are operating. However, the Refinery will operate independently before and after the mine life and has the potential to expand to process third-party concentrates or produce alternate products during the mine life.

22 RECOMMENDATIONS

[§229.601(b)(96)(iii)(B)(23)

22.1 Exploration

SRK recommends that Keliber utilises an umpire/check laboratory to analyse a sub set of the previously analysed samples (~100 samples), representative of the grade range of the deposits, and to include additional commercially available CRM's as part of its QC programme going forward in order to address the possible negative bias observed after 2021. The cost of the Umpire laboratory checks is expected to be approximately EUR10k. The cost of commercially available Li CRMs for a three year time period would be approximately EUR3k.

22.2 Hydrogeological investigation

Further site-specific hydrogeological characterisation and assessment is required for the Outovesi and Länttä deposits to meet licencing and feasibility requirements. The surface water-groundwater interaction should be further understood, and the water balance further refined to include actual flows instead of modelled flows for some areas. The water quality baseline should be further refined using appropriate measurement and analysis methodologies, and further baseline data should be collected as the project progresses. The estimated cost for this are between USD250k and USD450k

22.3 Geotechnical testing

The level of understanding of rock strength parameters needs to be appraised focusing on both intact and discontinuity strength (shear strength) using further laboratory test work and regular updates of the geotechnical database should be done, with continuous mine design validation.

Further test work should be carried out during the mine design phase to appraise the available data. Additional test types that should be carried out include:

- Triaxial strength test (at appropriate confining stresses for the mining environment);
- Base friction angle tests;
- Joint shear tests; and
- Oriented geotechnical boreholes are required for detailed rock mass quality and rock strength assessment, particularly to assess the impact of geological structures and rock mass fabric.

In Syväjärvi and Rapasaari, the specific geotechnical drilling will be conducted to get more information about rock mechanical and geotechnical features of different rock types and structural zones, especially in the ramp and other critical areas of the planned open pit areas. The estimated costs of a 1 200m geotechnical drilling program are between EUR15k and EUR200k.

22.4 Mineral Resources

SRK considers there to be potential for definition of additional Mineral Resources through the planned exploration programme and through targeted extension of the already-defined orebodies. Infill drilling in the smaller vein systems will improve the confidence in the size and grade of these orebodies. The exploration program costing is detailed in section 20.2.

22.5 Metallurgical testing and mineral processing

22.5.1 Ore beneficiation

Given the possibility that ore sorting of mined ore may be less efficient than that of the artificial composite ore feed, it is recommended that samples of mined ore from all deposits be subjected to pilot ore sorting tests using the preferred sensor technology.

Flotation parameters are reasonably well understood but it is recommended that pilot-scale tests be undertaken on ores that were only tested at bench-scale.

Variability flotation tests were undertaken on Rapasaari samples selected from four different mineralised material types. It is recommended that similar variability programs be undertaken on all other deposits to ensure adequate understanding of spatial variability in flotation performance.

22.5.2 Chemical processing

Following the decision to produce lithium hydroxide rather than lithium carbonate, semi-continuous bench-scale tests were undertaken in 2019 to produce lithium hydroxide. This was followed by continuous pilot testing in 2020 using Syväjärvi beta-spodumene concentrate and in 2022 using Rapasaari beta-spodumene concentrate. Ideally, other concentrates should also be subjected to conversion and hydrometallurgical testing. However, given reported chemical and mineralogical similarities between the ore sources, it is likely that their concentrates will perform similarly to Syväjärvi and Rapasaari. Notwithstanding this, SRK recommends that the mineralogical and chemical similarity of other concentrates be assessed and that they be subjected to conversion and hydrometallurgical testing if significantly different to Syväjärvi or Rapasaari.

Keliber has been actively doing test work since 2000. Based on the historic cost the estimated cost per bulk sample are the following:

- Sourcing of material with pilot test tunnel between EUR250k and EUR350k depending on sample depth;
- XRT sorting between EUR150k and EUR200k;
- Milling and flotation pilot testwork between EUR1,2m and EUR1.5m; and
- Conversion and Lithium Hydroxide refining testwork between EUR1.0m and EUR1.5m

It is estimated as a minimum that another 2 pilot test runs will need to be done per mining property, thus at least eight bulk samples (160kg each) for the four open pit properties.

22.6 Mineral Reserve

Keliber is considering underground mining in three orebodies; two are underground extensions that are planned to follow open pit operations in Rapasaari and Länttä; the third is a solely underground mine in Emmes.

Engineering study work has been done for the proposed underground mines that SRK considers to be to a scoping study level of accuracy.

The three orebodies are similar in nature, steeply dipping and fairly narrow and appear to have similar geotechnical characteristics. A bench and fill mining method has been selected to be the base-case method, mined from the bottom of each orebody upwards in 20-m lifts, with fill being uncemented open pit waste rock and waste development. Based on the information reviewed, SRK considers the mining method to be appropriate.

Rapasaari and Länttä are proposed to be accessed via declines from the respective pits and, because the Emmes orebody is beneath a lake, the decline planned to access Emmes is developed from dry land on Åmudsbacken, a nearby property.

It is recommended to include more detailed studies in respect of:

- Hydrogeological;
  - Estimated study cost between EUR150k and EUR 250k.
- Geotechnical;
  - Estimated study cost between EUR 150k and EUR 250k.
- Backfill;
  - Estimated study cost between EUR 100k and EUR 175k.
- Ventilation;
  - Estimated study cost between EUR 100k and EUR 175k
- Underground electrics before declaration of Mineral Reserves for the underground operations.
  - Estimated study cost between EUR 150k and EUR 250k

Additional to the above will be drilling for the Hydrogeological and Geotechnical study for which the cost estimate can be anything between EUR 1.0m and EUR 2m. Further cost for test work on material for the backfilling can be estimated between EUR 200k and EUR 300k.

23 REFERENCES/DATA SOURCES

[§229.601(b)(96)(iii)(B)(24)]

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24 RELIANCE ON INFORMATION PROVIDED BY REGISTRANT

[§229.601(b)(96)(iii)(B)(25)]

SRK has relied on information provided by SSW (the registrant) and its advisors in preparing this TRS the following aspects of the modifying factors which are outside of SRK's expertise:

- Economic trends, data, assumptions and commodity price forecasts (Sections 15);
- Marketing information (Section 15);
- Legal matters, tenure and permitting/authorization status (Section 2.3).
- Agreements with local communities (Section 16).

SRK believes it is reasonable to rely upon the registrant for the above information, for the following reasons:

- Commodity prices and exchange rates – SRK does not have in-house expertise in forecasting commodity prices and exchange rates and would defer to industry experts, such as CRU, for such information which came via the Company;
- SRK has reviewed the publicly available data to confirm the data provided by the registrant and is satisfied there is acceptable agreement; and
- Legal matters – SRK does not have in-house expertise to confirm that all mineral rights and environmental authorisations/permits have been legally granted and correctly registered. SRK would defer to a written legal opinion on the validity of such rights and authorisations, which would be provided by the Company.

SSW has confirmed in writing that to its knowledge, the information provided by it to SRK was complete and not incorrect, misleading or irrelevant in any material aspect. SRK has no reason to believe that any material facts have been withheld.

25 DATE AND SIGNATURE PAGE

This TRS documents and justifies the Mineral Resource and Mineral Reserve statements for SSW's Keliber assets located in Central Ostrobothnia, Finland as prepared by SRK in accordance with the requirements of S-K1300 and the SAMREC Code. The opinions expressed in this TRS are correct at the Effective Date of 31 December 2022.

We, SRK Consulting (South Africa) (Pty) Ltd, are the Qualified Persons (as defined in S-K1300) who are responsible for authoring this Technical Report Summary in relation to the Keliber Lithium Project. We hereby consent to the following:

- the public filing and use by Sibanye Stillwater Limited ("Sibanye-Stillwater") of the Keliber Lithium Project Technical Report Summary;
- the use and reference of our name, including our status as experts or Qualified Persons (as defined in S-K1300) in connection with this Technical Report Summary for which we are responsible;
- the use of any extracts from, information derived from or summary of this Technical Report Summary for which we are responsible in the annual report of Sibanye-Stillwater on Form 20-F for the year ended 31 December 2022 ("Form 20-F"); and
- the incorporation by reference of the above items as included in the Form 20-F into Sibanye-Stillwater's registration statement on Form F-3 (File No. 333-234096) (and any amendments or supplements thereto).

This consent pertains to the Keliber Lithium Project Technical Report Summary, and we certify that we have read the 20-F and that it fairly and accurately represents the information in the Keliber Lithium Project Technical Report Summary.

SRK Consulting (South Africa) (Pty) Ltd

SRK Consulting - Certified Electronic Signature
srk consulting
592138/45271/Report
390-9619-1228-ARMS-13/12/2023
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Authorized Signatory
Date: 13 December 2023

(Report Date: 13 December 2023)
(Effective Date: 31 December 2022)

GLOSSARY OF TERMS, ABBREVIATIONS, UNITS

TERMS

Term	Description
assay	the chemical analysis of ore samples to determine their metal content.
dip	the angle of inclination from the horizontal of a geological feature.
fault	a break in the continuity of a body of rock, usually accompanied by movement on one side of the break or the other so that what were once parts of one continuous rock stratum or vein are now separated
granite	a coarse-grained intrusive igneous rock composed mostly of quartz, alkali feldspar, and plagioclase
granitoid	a generic term for a diverse category of coarse-grained igneous rocks that consist predominantly of quartz, plagioclase, and alkali feldspar
Indicated Mineral Resource	that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit. Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing which is sufficient to assume geological and grade or quality continuity between points of observation.
Inferred Mineral Resource	that part of a Mineral Resource for which quantity and grade or quality are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade or quality continuity. An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to a Mineral Reserve.
Kriging	an interpolation method that minimizes the estimation error in the determination of a mineral resource.
mafic	a silicate mineral or igneous rock rich in magnesium and iron
Measured Mineral Resource	that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation of the economic viability of the deposit. Geological evidence is derived from detailed and reliable exploration, sampling and testing which is sufficient to confirm geological and grade or quality continuity between points of observation. A Measured Mineral Resource has a higher level of confidence than that applying to either an Indicated Mineral Resource or an Inferred Mineral Resource. It may be converted to a Proven Mineral Reserve or a Probable Mineral Reserve.
metasedimentary	originally a sedimentary rock that has undergone a degree of metamorphism, but the physical characteristics of the original material have not been destroyed
Mineral Reserve	the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses, which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level as appropriate that include applications of Modifying Factors. Such studies demonstrate that, at the time of reporting, extraction could reasonably be justified. The reference point at which Mineral Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.
Mineral Resource	a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such a form, grade or quality, and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade, continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge, including sampling.
outcrop	a visible exposure of bedrock or ancient superficial deposits on the surface of the Earth
overburden	material, usually barren rock overlying a useful mineral deposit.
pegmatite	a coarsely crystalline igneous rock with crystals several centimetres in length
plagioclase feldspar	a group of feldspar minerals that forms a solid solution series ranging from pure albite $Na(AlSi_3O_8)$, to pure anorthite $Ca(Al_2Si_2O_8)$.
Probable Mineral Reserve	the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Mineral Reserve is lower than that applying to a Proven Mineral Reserve.
Proven Mineral Reserve	the economically mineable part of a Measured Mineral Resource. A Proven Mineral Reserve implies a high degree of confidence in the Modifying Factors.
pyrite	an iron sulfide mineral with the chemical formula FeS2 (iron (II) disulfide); pyrite is the most abundant sulfide mineral
pyrrhotite	an iron sulfide mineral with the formula Fe(1-x)S (x = 0 to 0.2)
reef	a thin, continuous layer of ore-bearing rock
RoM	Run-of-Mine – usually ore produced from the mine for delivery to the process plant.
serpentine	a name used for a large group of minerals that fit the generalized formula $(Mg,Fe,Ni, Mn,Zn)_{2-3}(Si,Al,Fe)_2O_5(OH)_4$
spodumene	a pyroxene mineral consisting of lithium aluminium inosilicate, $LiAl(SiO_3)_2$
stratigraphic column	a grouping of sequences of strata onto systems
stripping ratio	ratio of waste rock to ore in an open pit mining operation
sulfide	An inorganic anion of sulfur with the chemical formula S^{2-}or a compound containing one or more S^{2-} ions
tailings	refuse or dross remaining after the mineral has been removed from the ore - metallurgical plant waste product
variogram	a measure of the average variance between sample locations as a function of sample separation
volcanics	rocks formed from lava erupted from a volcano

ABBREVIATIONS

Acronym	Definition
2D	two dimensional
AAS	Atomic Absorption Spectrometry
AG	autogenous grinding
AMD	Acid Mine Drainage
AMIS	African Mineral Standards
APC	Advanced Process Control
AVI	Regional State Administrative Agency
BAP	Biodiversity Action Plan
BOQ	Bills of Quantities
BR	indirect tensile strength tests (Brazilian)
BWI	Bond Ball Mill Work Indices
Capex	Capital expenditure
CCTV	Closed Circuit Television
CoG	cut-off grade
CoP	Code of Practise
COO	Chief Operating Officer
CPI	consumer price indices
CRM	certified reference material
°C	Degrees Celsius
dB(A)	Decibel
DCS	Distributed Control System
DFS	Definitive Feasibility Study
DMS	Dense Media Separation
DPM	diesel particulate matter
DSO	Distribution System Operator
E	Young's modulus
EBIT	earnings before interest and taxes
EIA	Environmental Impact Assessment
EMI	Environmental Management Inspectors
EMP	Environmental Management Programme
EMPr	Environmental Management Programme Report
EPCM	Engineering, Procurement and Construction Management
EQS	environmental quality standard
Eurofin	Eurofin Labtium Group
EU	European Union
FAR	fresh air raise
FoG	Fall of Ground
FS	Feasibility Study
G&A	general and administration
GCMP	Ground Control Management Plan
GHG	Green House Gas
GISTM	Global Industry Standard on Tailings Management
GPS	global positioning system
GSI	geological strength index
GTK	Geological Survey of Finland
HARD	Half Absolute Relative Difference
HDPE	high-density polyethylene
HLS	Heavy liquid separation
HSE	Health, Safety and Environment
HR	Human resources
HRD	Human Resources Development
HVAC	Heating, Ventilation and Air Conditioning
ICE	internal combustion engine
ICP-MS	Inductively Coupled Plasma - Mass Spectroscopy
ICP-OES	Inductively Coupled Plasma - Optical Emission Spectroscopy
ID^2	Inverse Distance Squared
IE	International Efficiency
ISRM	International Society for Rock Mechanics
IT	Intermediate Volcanics
KEO	Kokkolan Energiaverkot Oy

Acronym	Definition
KL	Mica Schist
KSL	Sulfidic Mica Schist
LCT	Lithium-Caesium-Tantalum
LED	local economic development
LHD	load-haul-dump
LHOS	long hole open stoping
LiOH	Lithium Hydroxide
LoM	Life-of-mine
LPG	Liquid Petroleum Gas
LT	long term
LV	low voltage
M&I	Measured and Indicated (Measured and Indicated Mineral Resources)
MF2	mill-float-mill-float
MLA	Mineral Liberation Analyser
MRA	Mining Right Application
MRMR	Laubscher’s Mining Rock Mass System
MVR	mechanical vapour recompression
MWP	Mine Works Programme
N’	Stability Number
NCCRP	National Climate Change Response Policy
NDC	National Determined Contribution
NDP	National Development Plan
NIHL	Noise Induced Hearing Loss
NIR	Near Infra-Red
NPAT	net profit after tax
NPV	Net Present Value
OAD	Obstructive Airway Disease
OECD	Organisation for Economic Co-operation and Development
OEL	occupational exposure limits
OK	Ordinary Kriging
OP	open pit
Opex	Operating expenditure
PCD	Pollution Control Dam
PFS	Prefeasibility Study
PoC	proof of concept
PP	Plagioclase porphyrite
ppm	parts per million
PSA	pool-and-share arrangement
Q	Barton’s Q Rock Mass Rating System
Q’	rock quality rating number
QA/QC	Quality Assurance / Quality Control
QC	Quality Control
QP	Qualified Person
QS	Quantity Surveyor
R&D	research and development
RAR	return air raises
RAW	return airway
RBH	raise bore holes
RoM	Run of Mine
RIO	Remote Input Output
RPEE	Reasonable Prospects of Eventual Economic Extraction
RQD	Rock Quality Designation
RWD	return water dam
RWI	Bond Rod Mill Work Indices
SCADA	Supervisory Control and Data Acquisition
SD	Supplier Development
SEC	Securities and Exchange Commission
Sedar	System for Electronic Document Analysis and Retrieval
SEP	Stakeholder Engagement Plan
SHEQ	safety, health, environment and quality
S-K1300	Subpart 1300 of Regulation S-K
SLP	Social and Labour Plan

Acronym	Definition
SOP	Standard Operating Procedures
SPG	Spodumene pegmatite.
SRK	SRK Consulting (South Africa) (Pty) Ltd
SSW	Sibanye Stillwater Limited
Sweco	Sweco Oy
SWMP	Stormwater Management Plan
TB	Tuberculosis
TCR	Total Core Recovery
TEM	Technical-economic model
TEP	Technical-economic parameter
TMM	trackless mobile machinery
TRS	Technical Report Summary
TSF	tailings storage facility
TSP	tailings scavenging circuit
TUKES	Finnish Safety and Chemicals Agency
UCS	Uniaxial Compressive Strength
UG	Underground
UPS	Uninterruptable Power Supply
UV	utility vehicle
v	Poisson's ratio
VKO	Verkko Korpela Oy
VSD	variable speed drives
WACC	weighted average cost of capital
WHIMS	Wet High Intensity Magnetic Separation
WHO	World Health Organization
WRSF	Waste rock storage facility
WSM	World Stress Map
XRD	X-Ray Diffraction
XRT	X-Ray Transmission

CHEMICAL ELEMENTS and COMPUNDS

Symbol	Element
Al	aluminium
As	arsenic
Be	beryllium
Ca	calcium
Cd	cadmium
Co	cobalt
Cs	caesium
Fe	iron
HCl	hydrogen chloride
HNO_3	nitric acid
Li	lithium
Li2O	Lithium Oxide
$LiAl(SiO_3)_2$	Lithium Aluminium Inosilicate (spodumene)
Li_2CO_3	Lithium Carbonate
$LiOH.H_2O$ (LiOH)	Lithium Hydroxide Monohydrate (or more simply Lithium Hydroxide)
Mg	magnesium
Mn	manganese
Nb	niobium
Ni	nickel
O	oxygen
P	phosphorus
S	sulfur
Si	silica
Ta	tantalum
Zn	zinc

UNITS

Acronym	Definition
A	ampere
cm	a centimetre
EUR	Euro, official currency of the European Union
EURbn	one billion Euros
EURk	one thousand Euros
EURm	one million Euros
EUR/t	Euro per tonne
g	grammes
g/t	grammes per metric tonne – metal concentration
ha	a hectare
kg	one thousand grammes
Kg/h	kilograms per hour
km	a kilometre
kt	a thousand metric tonnes
ktpa	a thousand tonnes per annum
ktpm	a thousand tonnes per month
kV	one thousand volts
kVA	one thousand volt-amperes
kW	kilowatt
kWh	kilo watt hours
l	a litre
m	a metre
m^3	cubic metre
m^3/s	cubic metres per second
mg/m^3	milligrams per cubic metre
min	minute
mm	millimetre
m/s	metres per second
Ma	a million years before present
MPa	a million pascals
Mt	a million metric tonnes
Mtpa	a million tonnes per annum
MVA	a million volt-amperes
MW	a million watts
oz	ounce
t	a metric tonne
t/m^3 / tm^3	density measured as metric tonnes per cubic metre
tpa	tonnes per annum
USD	United States dollar
USDbn	One billion USD
V	volt
wt%	weight percent
ZAR	South African Rand
ZARbn	one billion ZAR
°	degrees
°C	Degrees Celsius
‘	minutes
%	percentage