Report for Zinnwald Lithium plc & Zinnwald Lithium GmbH
Pre-Feasibility Study Report - Executive Summary - Zinnwald Lithium Project, Saxony, Germany

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1 EXECUTIVE SUMMARY

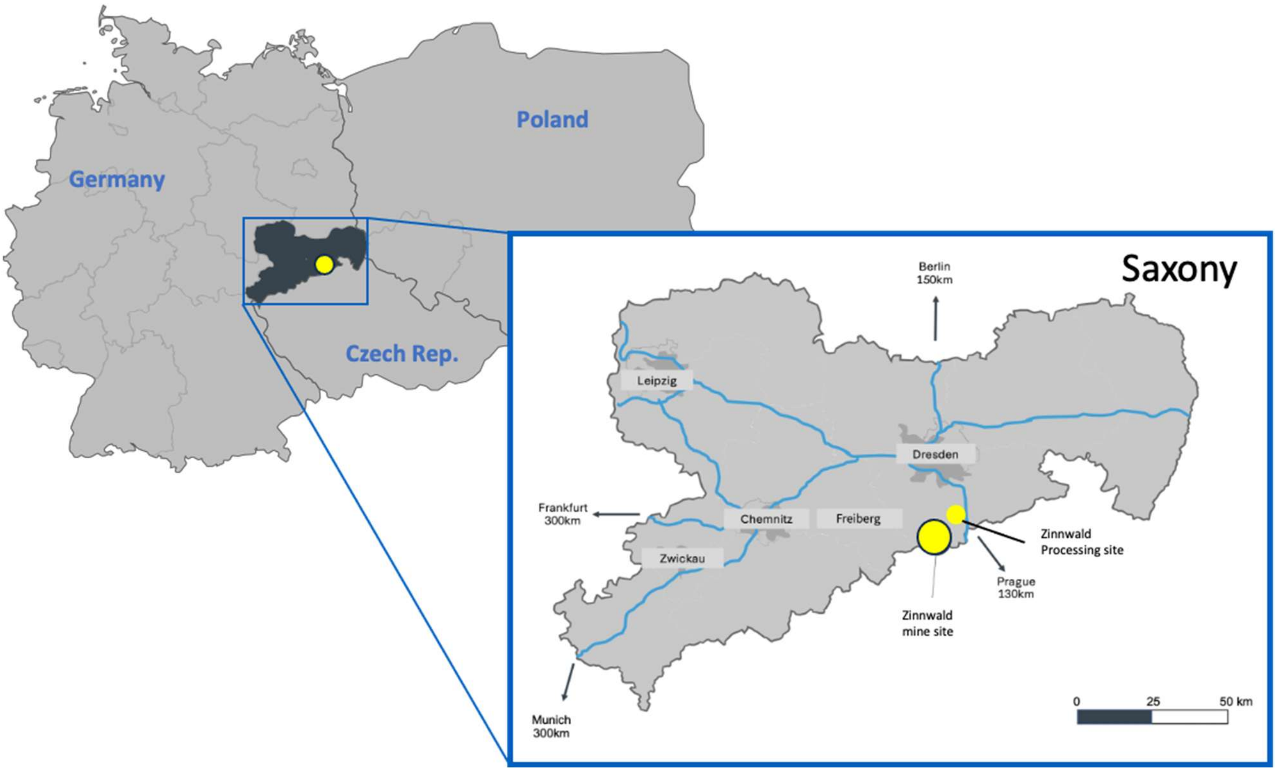
1.1 Introduction

Zinnwald Lithium GmbH (the Company or ZLG) commissioned this Pre-Feasibility Study Technical Report (the PFS or the Report) in relation to its wholly owned Zinnwald Lithium Project (the Project) in Saxony, Germany (Figure 1.1). In October 2020, Zinnwald Lithium Plc (ZLP), a public company listed on the AIM Market of the London Stock Exchange, acquired an initial 50% of the Company. Subsequently, in June 2021, ZLP acquired the remaining 50%. Since the Company is controlled, funded and ultimately wholly owned by ZLP, this report is also addressed to ZLP.

The Project is situated near to the town of Altenberg, 35 km south of Dresden and adjacent to the border with the Czech Republic and is located in a historic mining area with good infrastructure, services, facilities and access roads. Power and water supplies are available from well-established existing regional networks. The area has a history of mining having been extensively mined for tin and tungsten with the Zinnerz tin mine operating until 1991. More recently, in late 2024 a new underground tin mining project in the vicinity received its general operating permit.

ZLG has held license areas in Zinnwald since 2011 and conducted various drilling campaigns from 2011 to 2023 to delineate a Mineral Resource. The most recent Mineral Resource Estimate (MRE) update was in June 2024. ZLG holds a mining permit over its core Zinnwald license (the license) area of 2.57 km^2 valid to December 2047 (subject to receipt of operational permits).

Figure 1.1 Location map of the Project



Note: Top-left map – location of the Free State of Saxony within Germany. Central map – location of the Zinnwald Lithium Project site within the Free State of Saxony, with major towns and cities for reference.

In September 2022, a Preliminary Economic Assessment technical report (the PEA) was published. The nominal output capacity of the Project as per the PEA was targeted at approximately 12,000 t/a lithium hydroxide monohydrate (LHM).

During 2023 and 2024, ZLG undertook an extensive review of the Project's Mineral Resource including a new drill campaign. The diamond-core drilling campaign included 84 new drill holes totalling 27,000 m. This work supported the publishing of an updated Mineral Resource Estimate (MRE) in June 2024 that defined a significantly larger resource than had been contemplated in the 2018 MRE and the PEA.

The increase in Resource has the potential to support a larger, scalable project. In addition, consideration of the limitations of the previously proposed Bärenstein site in terms of overall surface space available, topography and permitting constraints has led to the revised project concept summarised in this PFS. The Company, together with Metso, has undertaken an extensive testwork programme to test the applicability of Metso's alkaline leach process (the Metso process) for the Project. Based on this testwork it was determined that the Metso process offered certain advantages in terms of energy consumption and importantly materially reduced waste production when compared to the sulphation roast process considered in the PEA. An alternative site location was identified in the vicinity of the village of Liebenau that has sufficient surface area to support expanded production as well as storage of the quartz sand produced as a by-product from the beneficiation process. The site is also well located with direct access to the A17 highway and is in close proximity to a planned solar park with the potential to supply a significant portion of the Project's electrical power needs from a renewable source.

The Project development concept has been conceived as a multi-stage approach where Phase 1 will establish the necessary infrastructure, develop the mine and deliver approximately 18,000 tonnes of LHM per annum. Phase 2 will double production capacity, and sees production peak at approximately 35,100 tonnes LHM per annum, utilising the initial mining and tunnel infrastructure and benefiting from economies of scale.

The PFS economic analysis demonstrates the financial viability of the Project. The Phase 1 production cost is estimated at 8,158 EUR/t LHM, and 8,403 EUR/t LHM over the life of mine (LOM). Based on the assumptions detailed in this report the Project supports a pre-tax net present value (NPV8) of EUR 3.3 billion and a pre-tax internal rate of return (IRR) of 23.6%. The after tax NPV8 is EUR 2.2 billion and post-tax IRR is 19.8%. The Project has a mine life of over 40 years including both Phase 1 and Phase 2 and a payback period of 5 years post commencement of production, excluding reinvestment of proceeds in Phase 2 development.

The completed PFS has informed the Technical Report undertaken on this Project. The Technical Report follows the guidelines of the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards – For Mineral Resources and Mineral Reserves (prepared by the CIM Standing Committee on Reserve Definitions), which was adopted by CIM Council on 10 May 2014 (CIM, 2014). In addition, the Technical Report follows the format prescribed by the Ontario Securities Commission (OSC) Chapter 5, NI 43-101 Standards of Disclosure for Mineral Projects, Form 43-101F1 Technical Report and Related Consequential Amendments 24 June 2011 (OSC, 2011) and the OSC's unofficial consolidation of all amendments to National Instrument 43-101 Standards of Disclosure for Mineral Projects, effective as of 9 May 2016 (OSC, 2016), collectively referred to as NI 43-101.

The report was prepared under the direction of the Qualified Persons and contributing authors named in Table 1.2 and Table 1.2.

Table 1.1 Qualified Persons

Qualified Person	Company	Qualifications	Responsible for section(s)
Mr Laurie Hassall	Snowden Optiro	MSci Geology, FIMMM, QMR, FGS	4. Geology and Mineral Resource and Mineral Resource estimate. Qualified Person: Mineral Resource.
Mr Rodrigo Pasqua	Snowden Optiro	FAusIMM, BEng (Mining)	6. Geotechnical, 7. Mining engineering, design and Mineral Reserve estimate (excluding sections 7.8, 7.12, 7.13.2 and 7.14.2 relating to backfill). Qualified Person: Mineral Reserve.

Table 1.2 Contributing authors and peer reviewers

Contributing author	Company	Qualifications	Responsible for section(s)
Mr Cherif Rifaat	Zinnwald Lithium	MA, ACA (ICAEW)	3. Background and project description, 15. Capital costs, 16. Operating costs, 17. Marketing and offtakes, 18. Project execution, 19 Economic analysis, 20. Project risk management.

Contributing author	Company	Qualifications	Responsible for section(s)
Mr Paul Heaney	ERM	MSc (HydroGeol), BSc (NatSci), PGeo	5. Hydrology and hydrogeology.
Mr Robert Quensel	K-UTEC	BEng, MSc., EUR ING	7. Mining (only sub-sections 7.8, 7.12, 7.13.2 and 7.14.2 relating to backfill).
Mr David Lunt	Stirling Process Engineering Ltd	BSc (Chem. Eng.), B.COM, FIMMM, QMR	8. Metallurgical testwork, 9. Processing.
Mr David Niggemann	Fichtner Water & Transportation	B.-Sc., Ms.-Sc. Applied Geology, EurGeol	10. Infrastructure and services (surface infrastructure – sections 10.1, 10.2, 10.3, 10.4 and 10.5).
Mr Andreas Bischoff	DMT	Dipl.-Ing., MBA, PMP	10. Infrastructure and services (underground electrical and communications – sections 10.6 and 10.7).
Mr Brian Lyons	Dr Sauer & Partners	BEng, CEng MICE	10. Infrastructure and services (Liebenau tunnel – section 10.8).
Mr Richard Elmer	Knight Piésold	BSc, MSc, CEng MIMMM, MCSM	11. Tailings and waste management.
Mrs Elizabeth van Zyl	Zylwood Consulting Ltd	MEng, CEnv, MIEMA	12. Environmental considerations, 14. Communities and social performance.
Mr Thomas Meier-Bading	Zinnwald Lithium	Solicitor	13. Legal and land tenure.
Peer reviewer	**Company**	**Qualifications**	**Reviewed section(s)**
Mr Julian Aldridge	Snowden Optiro	MSc Mining Geology (MCSM), MESci (Oxon), CGeol FGS, MIMMM	Section 4 (Geology and Mineral Resource) of the PFS.
Mrs Sarah de Vries	Snowden Optiro	MBA, BEng (Mining, First Class Honours), MAusIMM	Section 6 (Geotechnical) and 7 (Mining and Mineral Reserve) of the PFS.

1.2 Project description

The Project described in this PFS includes an underground mine with associated processing of mined ore to produce battery-grade LHM. Ore haulage from the mine to the processing facility is via a 9.1 km tunnel that will be constructed utilising a tunnel boring machine (TBM) as part of the Project. Processing including beneficiation, pyrometallurgy and hydrometallurgy will be carried out at an industrial facility to be established near the village of Liebenau.

In Phase 1 the Project will deliver approximately 1.6 million t/a run of mine (ROM), providing approximately 300,000 t/a beneficiated feed, and producing approximately 18,000 t/a LHM. Given the scale of the resource and the capacity of the planned processing site, the Project considers expansion through development of Phase 2, doubling capacity and allowing output to peak at approximately 35,100 t/a LHM after allowing for the forecast reduction in feed grade over the life of mine. The Project implementation plan envisages the permitting and build out of Phase 1 to demonstrate the viability of the Project before proceeding with Phase 2, assumed to begin operation in Year 7.

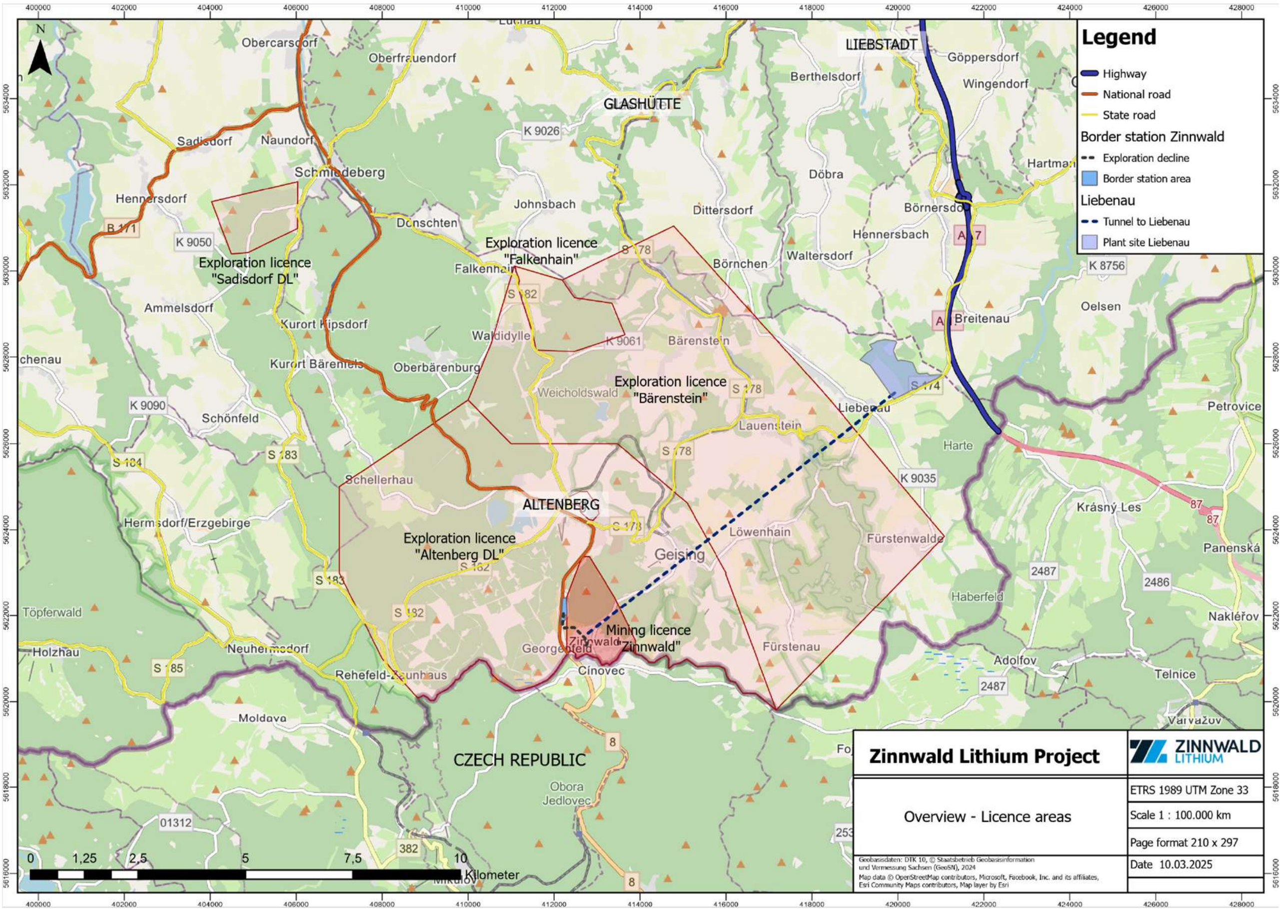
1.3 Location

The Project falls entirely within the municipality of Altenberg, which covers an area of 145.8 km^2. The municipality had a population of 7,851 as of 2023. The ore body covered by ZLG's primary license is located beneath the village of Zinnwald which is some 4 km south of the small ex-mining town of Altenberg. Altenberg is the largest town in the municipality with a population of 1,968 as of 2023.

The proposed process plant site is located to the north of the village of Liebenau. The terrain rises gradually to the south and creates a natural barrier between the village and the plant site. Liebenau is a small village, also in the municipality of Altenberg, and located approximately 7 km northeast of the town of Altenberg.

In addition to the mining license that forms the basis for the Project, ZLG holds four exploration licenses in the immediate vicinity. These collectively cover an area of 10,000 ha (100 km^2) surrounding the mining license. The Project location is shown in Figure 1.2.

Figure 1.2 Map of Zinnwald license areas, mine location and processing site location



1.4 Legal matters and land tenure

Under the German Federal Mining Act (Bundesberggesetz (BBergG)), a landowner does not own Mineral Resources underneath the surface of their land. Accordingly, due to the underground nature of the mine, possession of the properties on the surface above the underground mine workings is not required. The Project has an existing 257 hectare (2.57 km^2) mining permit for the Mineral Reserve under the mining license area, originally granted in October 2017 and valid initially to 2047 for a number of minerals, including lithium.

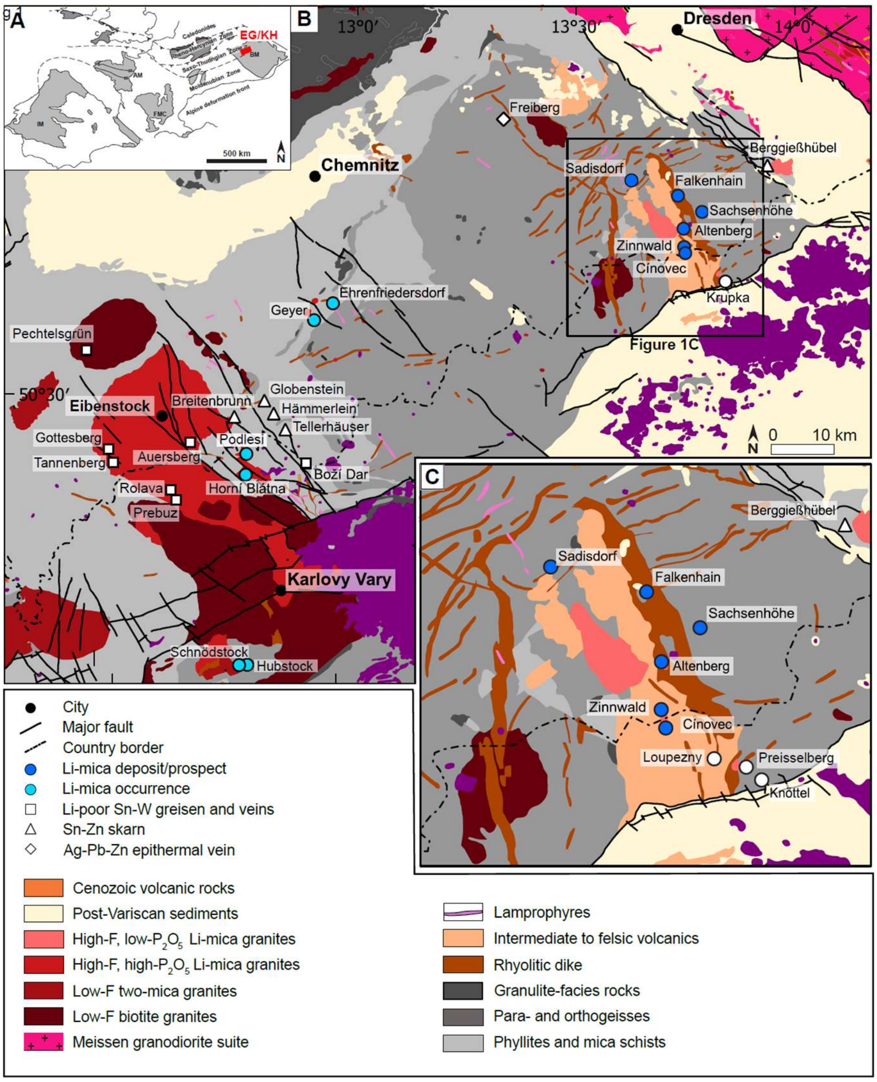
The Project will need to acquire land at both the Liebenau site and at the Zinnwald former border station. The former border station site is owned by the City of Altenberg and the Project has already commenced negotiations to secure the required area of approximately six hectares. At Liebenau, the Project has identified a site that totals 115 hectares (1.15 km^2). The site has no buildings or dwellings on it and is currently leased to a local agricultural co-operative. ZLG will engage with landowners to acquire this land and any required compensation areas on a voluntary basis and will publish its formal Land Access, Acquisition and Compensation Framework (LAACF) shortly. In the longer term, if this process is unsuccessful, and as a last resort, the Company can utilise provisions within the BBergG that allow for compulsory purchase at market rates once it has its required permits.

1.5 Geology and mineralisation

The Zinnwald deposit is typical of a greisen-related lithium deposit, whereby zinnwaldite mica is the lithium host. Greisenisation is the host of the zinnwaldite micas, with the term greisen derived from the Saxony region of Germany, and Zinnwald being the type locality of the zinnwaldite mica mineral. As such, the Zinnwald-Cínovec deposit is in fact the type locality of all greisen-hosted zinnwaldite deposits. Greisen related lithium-mica systems occur throughout the Erzgebirge province. They trend northwest–southeast, which is perpendicular to the general Erzgebirge belt (Burisch, et al., in review). The lithium-mica greisens are often associated with the G4 high F and low P_2O_5 granites, which are typically later stage, highly fractionated granites, and regularly intrude into older rhyolites or granites.

The predominant surface outcrop within the license area is the Teplice rhyolite, which is cut by a surface expression of the Zinnwald lithium-mica albite granite. The Zinnwald albite granite forms a north-south trending stock, which intrudes the rhyolite, and the contact is sharp and well defined. Dimensions of the surface outcrop of the albite granite are approximately 1.4 km x 0.3 km; however, this is reduced to 0.4 km x 0.25 km on the German side of the license. The granite dips shallowly between 10° and 30° to the north, east and south (the southern limb is cut by the national border). The western contact of the granite dips at a steeper angle, between 50° and 80° (Burisch, et al., In Review). The granite essentially forms a dome structure underlying the villages of Zinnwald and Cínovec. The regional geological setting is illustrated in Figure 1.3.

Figure 1.3 Regional geological setting



Note: A – Location of the Erzgebirge province in Europe. B – Erzgebirge province. C – Local geology around Zinnwald / Cínovec.

Source: (Burisch, et al., In Review)

Vertical fractionation and subsequent alteration within the intrusion control major and minor mineral abundances, as well as distribution of rare metals. The vertical zonation can be described as:

- Uppermost 30 m: fine grained albite granite with lepidolite mica hosting lithium, which is not necessarily observed in the Zinnwald deposit due to dip of the granite to the north. Observed at Cínovec.
- Uppermost 700 m: medium grained and porphyritic varieties of the albite granite with zinnwaldite the dominant lithium-mica. Zones of microgranite are evident. There is enrichment of zinnwaldite associated with greisenisation; and a mica transition at approximately 700 m depth. Average mineral content of 35% albite, 33% quartz, 23% alkali feldspar, 6% zinnwaldite, and 2% muscovite.
- 700 m to >1,600 m depth: medium grained albite granite with lithium annite as the dominant dark mica. Absence of greisenisation and a reduction in albitisation.

Greisenisation is the key hydrothermal alteration package and is responsible for lithium enrichment. It is a high temperature alteration suite and often associated with final cooling of felsic magmas. Key replacement minerals include quartz and muscovite, with lithium-micas, fluorite, topaz and tourmaline as additional minerals dependent on conditions.

Lithium mineralisation is hosted entirely within the albite granite and is strongly associated with greisen beds (complete replacement of original granite textures and minerals), or greisenisation of the granite (weaker alteration and generally lower grades of lithium).

Tin (cassiterite) and tungsten (wolframite) mineralisation is also associated with the greisen beds but is infrequent and grades of both tend to decrease with depth. Tin and tungsten mineralisation is zoned and occurs predominantly toward the roof zone of the albite granite and is generally hosted in quartz veins.

Low-grade greisenisation of the granite is common and can be laterally and vertically continuous over tens of metres. The intensity of greisenisation is directly proportional to increases in zinnwaldite mica content / lithium grade and this can change abruptly over short distances (Burisch, et al., In Review).

High-grade greisen alteration occurs in narrow beds or lenses. These beds are commonly 1 m to 10 m in thickness and can be laterally continuous over 10 m to 100 m. The greisen beds are flat lying or mirror the dip of the granite / rhyolite contact. Greisen beds can be hosted within the broad zone of greisenised granite, as well as within granite that is not greisenised, the former termed internal greisens and the latter termed external greisens.

Host rock alteration is considered local but commonly associated with flat lying greisen beds or vertical fault structures. Common post mineralisation alterations include kaolinisation, sericitisation and haematisation.

The predominant host of lithium is zinnwaldite mica. Alteration of the micas is not common but is present and usually occurs along grain boundaries resulting in loss of iron and lithium.

1.5.1 Exploration history

The Zinnwald license area has a longstanding history of metal mining and mineral exploration, and this is common within the Erzgebirge region of Saxony.

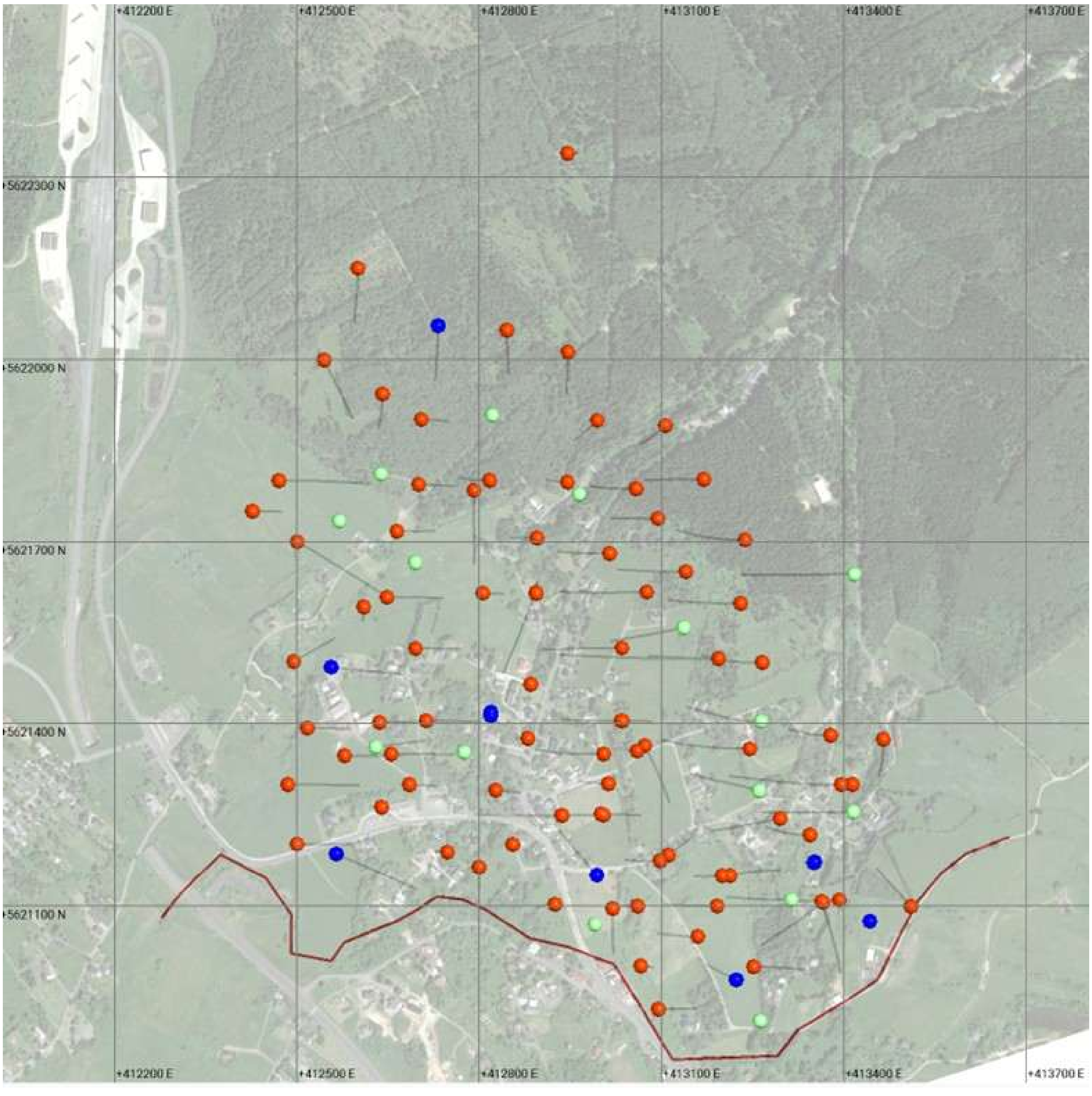
The combined Zinnwald (German side) and Cínovec (Czech Republic side) deposit has been a very important source of tin and tungsten since at least the 13th century. Focus for the first 400 years (post discovery), was solely on tin (cassiterite) production, with tungsten (wolframite) production commencing in the latter half of the 19th century (Schilka & Baumann, 1996). The first recorded production of lithium mica dates to 1890, but it was not until the Second World War that lithium from Zinnwald was produced in any economic quantity. Following the end of the Second World War, the production of lithium and all metals ceased, and no production or development has taken place since this point.

Exploration at the Zinnwald license is a result of the historical underground production of tin, tungsten and, more recently, lithium. The latter half of the 20th century focused on finding extensions to greisens and quartz veins underlying the old workings on both the Zinnwald and Cínovec sides. This was largely based on diamond drilling from surface, as well as from underground in the accessible level of the old workings. Historical drilling at the property dates between 1917 and 1989.

A hiatus in exploration activity and drilling occurred between 1989 and 2012. The property and project were secured by Solarworld Solicium GmbH (SWS) and the first drilling campaign was undertaken by the company in 2012–13. This drilling was followed up by SWS successor, Deutsche Lithium GmbH (DLG), now known as Zinnwald Lithium GmbH (ZLG). A drilling campaign was undertaken in 2017, and more recently in 2022–23.

ZLG drilled a total of 84 holes (all diamond core) over the course of 2022 and 2023. The primary aim of the drilling was to infill the previous drilling and increase Mineral Resource confidence, as well as to delineate and define the broader tract of lower grade greisenised granite, termed the mineralisation zone. Drilling in the license area totals 196 holes and 55,830 m. For resource estimation, only drillholes from 2012–23 were used, due to the inability to verify the historical (pre-2012) campaigns (Figure 1.4). This totalled 109 holes and 33,973 m. A total of 19,537 samples with lithium assay were used for grade estimation, and a total of 1,656 samples with density measurements were used for density estimation and assignment.

Figure 1.4 Plan view of all drilling at the Zinnwald license post-2012



Note: Blue = SWS 2012–13; green = DLG/ZLG 2017; red = ZLG 2022–23. Red line denotes the national border.

1.5.2 Mineral Resource Estimate

The MRE as of 5 June 2024 for the Project is shown in Table 1.3. The Mineral Resource totals 193.5 Mt at 2,220 ppm Li (429 kt contained lithium metal) in the Measured and Indicated category at a cut-off grade of 1,100 ppm Li. Reasonable prospects for eventual economic extraction (RPEEE) was applied through the constraint of a stope optimisation, with the parameters used based on factors determined through technical and financial studies.

The Snowden Optiro June 2024 MRE has included the mineralised granite (zone of broad greisenised granite) and incorporated internal greisens within a mineralised zone (Figure 1.5). Metallurgical testwork and a mining study, with a change to the mining method (sublevel stoping), have supported the incorporation of the vertically and laterally continuous mineralised albite granite. This has allowed for adoption of a higher production rate, and the result is a lower cut-off grade than used in the 2018 MRE (Bock, Kühn, & Gowans, 2019).

Figure 1.5 Oblique view of the resource block model showing Li grade (ppm)

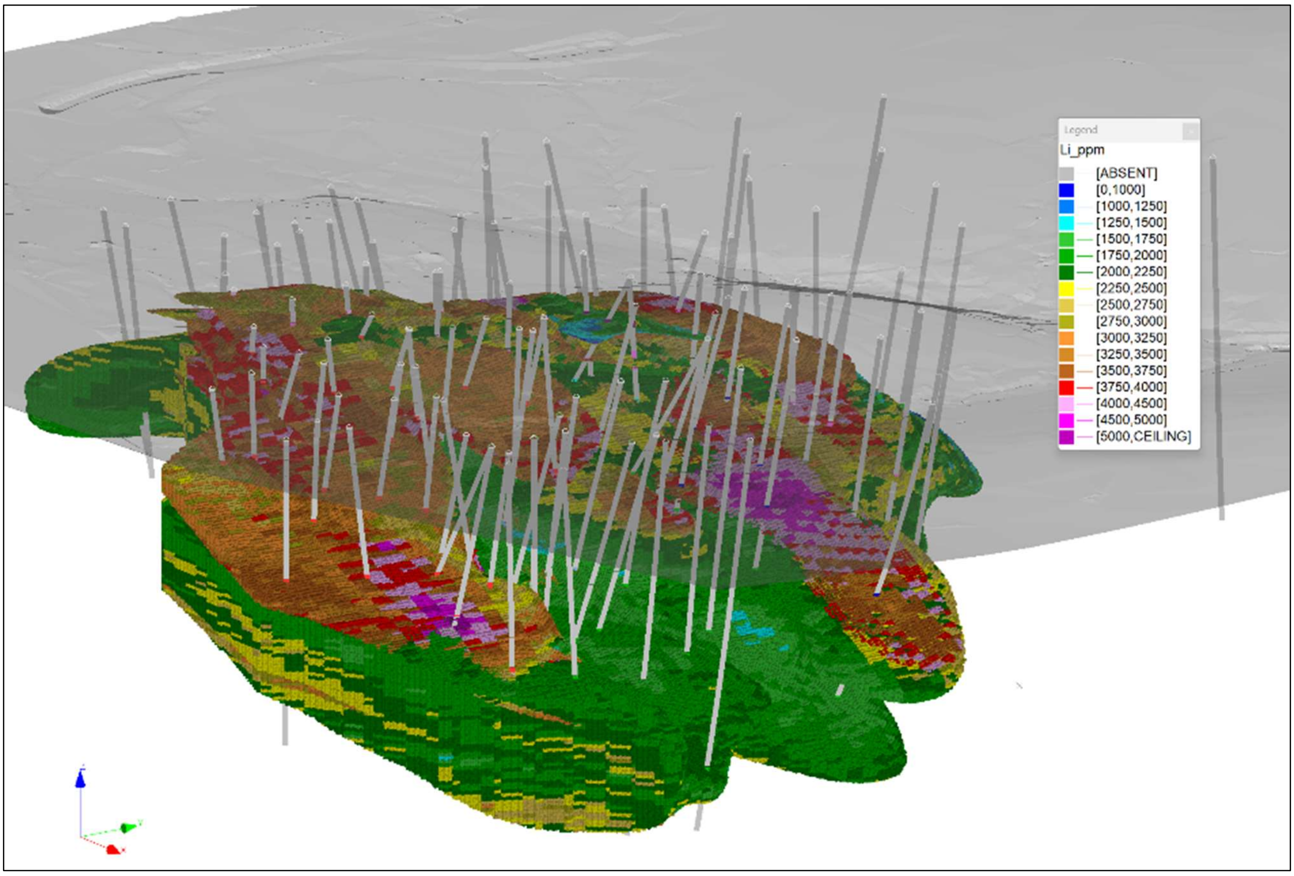


Table 1.3 Mineral Resource statement for Zinnwald Lithium Project, effective 5 June 2024

Classification	Domain	Tonnes (Mt)	Mean grade		Contained metal	
			Li (ppm)	Li_2O (ppm)	Li (kt)	LCE (kt)
Measured	**External greisen (1)**	11.3	3,420	7,360	39	206
	Mineralised zone (2)	25.0	2,090	4,490	52	277
	• Internal greisen	1.5	3,240	6,970	5	27
	• Mineralised granite	23.5	2,020	4,340	47	250
	Subtotal (1) and (2)	**36.3**	**2,500**	**5,380**	**91**	**483**
Indicated	**External greisen (1)**	2.1	3,510	7,560	7	40
	Mineralised zone (2)	155.1	2,130	4,590	331	1,762
	• Internal greisen	13.2	3,330	7,170	44	234
	• Mineralised granite	141.9	2,019	4,350	287	1,528
	Subtotal (1) and (2)	**157.2**	**2,150**	**4,630**	**338**	**1,802**
MEASURED + INDICATED TOTAL		**193.5**	**2,220**	**4,780**	**429**	**2,285**
Inferred	**External greisen (1)**	0.8	3,510	7,560	3	15
	Mineralised zone (2)	32.5	2,110	4,540	68	364
	• Internal greisen	0.6	2,880	6,200	2	9
	• Mineralised granite	31.9	2,090	4,500	67	355
	Subtotal (1) and (2)	**33.3**	**2,140**	**4,610**	**71**	**379**
INFERRED TOTAL		**33.3**	**2,140**	**4,610**	**71**	**379**

Notes:

- *Mineral Resource statement has an effective date of 5 June 2024.*
- *A Mineral Resource is reported using a cut-off grade of 1,100 ppm Li, which was calculated using the following assumptions: lithium hydroxide monohydrate price US$23,800/t, operating costs of US$121.5/t ROM; lithium recovery of 69%; mining dilution and recovery of 10%.*
- *The requirement of a reasonable prospect of eventual economic extraction is met by having a minimum modelling width for mineralised zones, a cut-off grade based on reasonable inputs and an economic binding volume that lends itself to a potential scenario of underground extraction for undiluted in-situ resources.*
- *The Mineral Resource is reported at a minimum of 20 m below historical underground mine workings (to avoid historical underground workings), and within Germany only.*
- *All tonnages reported are dry metric tonnes.*
- *Minor discrepancies may occur due to rounding and use of appropriate significant figures.*
- *LCE (lithium carbonate equivalent) calculation used – 5.323 x Li metal. LiOH*H_2O (lithium hydroxide monohydrate) calculation used – 6.045 x Li metal.*
- *Mineral Resources which are not Mineral Reserves do not have demonstrated economic viability. 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. It is reasonably expected that a majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.*
- *The results from the stope optimisation are used solely for the purpose of testing the “reasonable prospects for economic extraction” by underground methods and do not represent an attempt to estimate mineral reserves. There are no mineral reserves reported in this NI 43-101 resource update. The results are used as a guide to assist in the preparation of a Mineral Resource statement and to select an appropriate resource reporting cut-off grade. Stope optimisation does not represent an economic study.*
- *The estimate of Mineral Resources may be materially affected by environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues.*
- *The Author is not aware of any known mining, processing, metallurgical, environmental, infrastructure, economic, permitting, legal, title, taxation, socio-political, or marketing issues, or any other relevant factors, that could materially affect the current MRE.*

1.6 Mineral Reserve Estimate

The Mineral Reserve estimate presented in this section was prepared by Snowden Optiro using methodologies consistent with the guidelines outlined in the CIM Definition Standards for Mineral Resources and Mineral Reserves (CIM, 2014). The estimation was based on the Mineral Resource model. Standard industry software was utilised in the creation of the mine design, block model evaluation and scheduling.

The effective date of the Mineral Reserve Estimate is 31 March 2025.

The Mineral Reserve has been estimated using accepted industry practices for underground mines, as described in this report. The identified economic mineralisation was subjected to detailed mine design, scheduling and the development of a cash flow model incorporating technical and economic projections for the mine for the duration of the Reserves case, which is the mining base case.

The Mineral Reserve estimate is summarised in Table 1.4, and described in detail in Section 7 of the PFS report.

Table 1.4 Mineral Reserve statement for Zinnwald Lithium Project, effective 31 March 2025

Classification	Tonnes (Mt)	Grade		Contained metal	
		Li (ppm)	Li_2O (ppm)	Li (kt)	LCE (kt)
Proven	27.2	2,188	4,711	60	317
Probable	100.9	2,021	4,351	204	1,085
Total	**128.1**	**2,056**	**4,428**	**263**	**1,402**

Notes:

- *The standard adopted in respect of the reporting of Mineral Reserves for the Project, following the completion of required technical studies, is in accordance with the NI 43-101 guidelines and the 2014 CIM Definition Standards, and has an Effective Date of 31 March 2025.*
- *Mineral Reserve is reported using a cut-off grade of 1,700 ppm Li, which was calculated based on estimated mining costs, processing costs plus general and administrative costs.*
- *All tonnages reported are dry metric tonnes.*
- *Totals do not necessarily equal the sum of the components due to rounding adjustments and use of appropriate significant figures. Such a degree of rounding inherently introduces a margin of error; where these occur, the QP does not consider them to be material.*
- *LCE calculation used – 5.323 x Li metal.*
- *Snowden Optiro reasonably expects the Zinnwald underground deposit to be amenable to mining via longhole stoping.*
- *A site inspection of the deposit was completed by Mr. Rodrigo Capel Pasqua, an appropriate "independent qualified person" as defined by NI 43-101.*

The QP is not aware of any known mining, processing, metallurgical, environmental, infrastructure, economic, permitting, legal, title, taxation, socio-political, or marketing issues, or any other relevant factors, that could materially affect the current Mineral Reserve estimate.

1.7 Mining

The planned underground mine has been designed as a conventional longhole open stoping operation with paste backfill, utilising regional pillars to mitigate surface subsidence risks. Given the massive nature of the orebody, the mine plan primarily consists of transverse stopes to maximise recovery and operational efficiency. The overall ground conditions throughout the mine are very favourable, providing a high degree of stability. This positive assessment allows for an optimistic design approach in certain areas of the mine. For this PFS, a conservative maximum stope hydraulic radius of 6.5 m has been selected with the plan to potentially increase this in certain areas during the feasibility study when more localised information will be available.

Two mine accesses are planned for the underground mine; one decline access (6 m width by 5.5 m height) from surface to the top of the mine (the Zinnwald decline) and a tunnel from the lower levels of the mine towards the surface plant (the Liebenau tunnel) (Figure 1.6). The access to the top of the mine will initially be developed as an exploration decline, connecting to the 695 mRL. The Zinnwald decline development will continue from the exploration decline, connecting to a materials handling level on the 420 mRL. The infrastructure level will contain the underground paste backfill plant and underground primary crusher, connecting to the Liebenau tunnel.

Access from surface via the Zinnwald decline tunnel will be initially used for ore and waste haulage, materials transport and personnel access prior to the connection of the Liebenau tunnel and installation of the infrastructure level. Following the installation of the infrastructure level, ore and waste will be transported via bi-directional conveyor through the Liebenau tunnel with personnel access and materials transport via the Zinnwald decline. Figure 1.7 shows the relative locations of the Zinnwald decline portal, mine (where crusher will be located) and Liebenau processing plant.

Figure 1.6 Planned underground mine

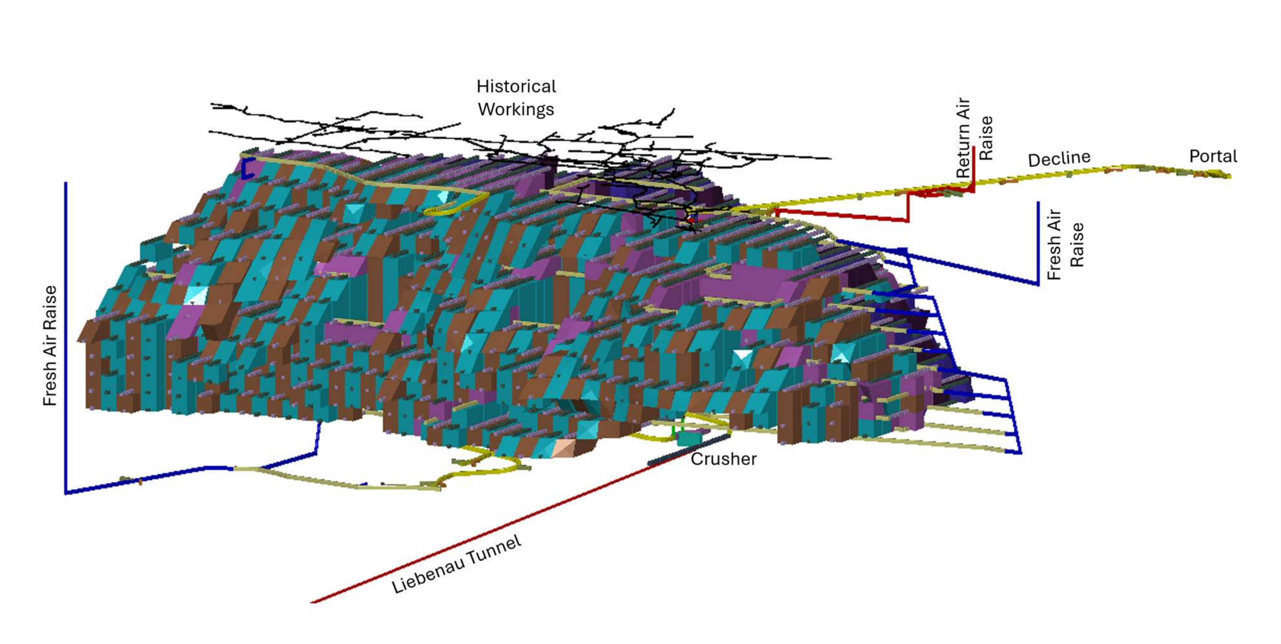
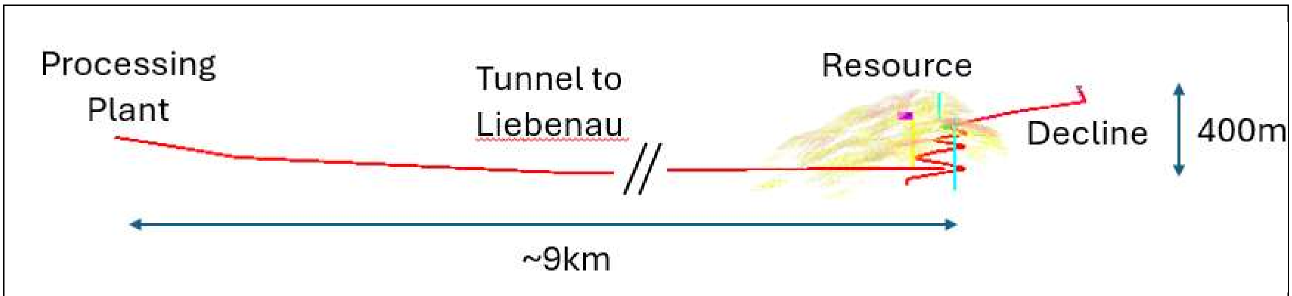


Figure 1.7 Relative location of the decline portal, mine and processing plant



The Liebenau tunnel, which will be 9.1 km in length with a diameter of 6.5 m, will be developed by TBM to connect with the lower decline. Once connected, the tunnel will act as the materials handling system with ore and waste conveyed out and non-saleable leach residues and a portion of fine beneficiation tailings conveyed into the underground paste backfill plant.

Selected underground mining equipment includes conventional jumbos for development drilling and ground support installation and longhole rigs for stope drilling. Load and haul will be undertaken using loaders and haul trucks; material will be loaded by loaders onto trucks which will transport it at each level and dump it into central ore passes, feeding into the underground crusher. Crushed ore will then be conveyed through the Liebenau tunnel to the processing plant.

The primary ventilation fans will be located underground, operating in a positive pressure system to reduce and manage radon emissions as well as eliminate surface noise pollution. The mine will include essential underground infrastructure, such as service and refuelling bays and an explosives magazine, all of which are supported by surface infrastructure.

A mine schedule has been developed to maximise high grade material in the early years of the mine's operation. The schedule has also been designed to effectively utilise plant capacities at the beneficiation, pyrometallurgical and hydrometallurgical plant. The Mineral Reserve supports a mine life in excess of 75 years assuming Phase 1 only and in excess of 40 years in the case of both Phase 1 and Phase 2.

Project Phase 2 is shown to begin in Year 7, allowing time for the Phase 1 operations to be commissioned and proven. Figure 1.8 shows the mining volumes and grades over the life of mine assuming Phase 1 and 2 and Table 1.5 provides details of the mine schedule.

Figure 1.8 Phase 1 and 2 combined mining schedule

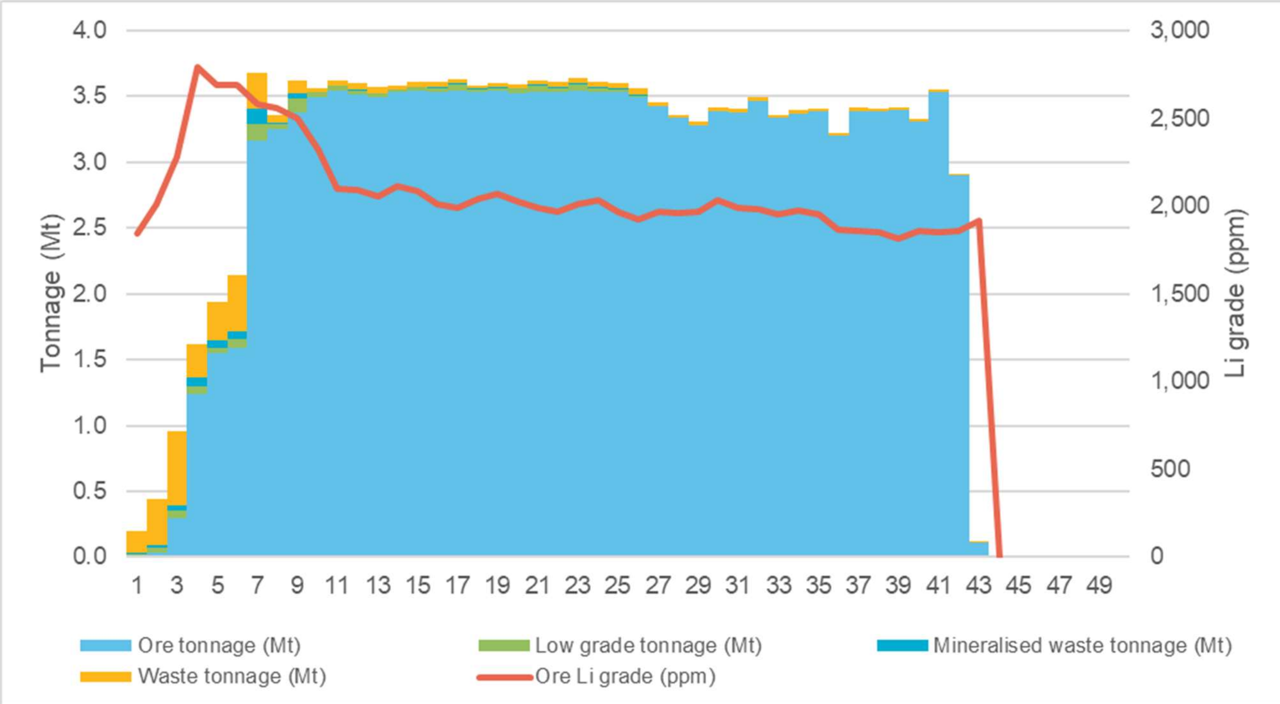


Table 1.5 Combined mining schedule for Phase 1 and 2

Description	Unit	Total	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10	Yr 11 to 15	Yr 16 to 20	Yr 21 to 25	Yr 26 to 30	Yr 31 to 35	Yr 36 to 40	Yr 41 to 45
Material movements																			
Total material	Mt	133.2	0.2	0.4	1.0	1.6	1.9	2.1	3.7	3.4	3.6	3.6	18.0	18.0	18.1	17.1	17.1	16.8	6.6
Total ore	Mt	128.1	0.0	0.0	0.3	1.2	1.6	1.6	3.2	3.2	3.4	3.5	17.6	17.7	17.7	16.9	16.9	16.7	6.5
Total ore Li grade	ppm	2,056	1,842	2,009	2,280	2,793	2,687	2,693	2,580	2,555	2,501	2,322	2,089	2,028	1,994	1,971	1,970	1,850	1,855
Total ore Li metal	t	263,388	31	62	665	3,454	4,172	4,270	8,170	8,296	8,439	8,103	36,851	35,870	35,266	33,375	33,369	30,862	12,135
Low grade	Mt	1.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Mineralised waste	Mt	0.5	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Waste	Mt	3.4	0.2	0.4	0.6	0.3	0.3	0.4	0.3	0.1	0.1	0.0	0.2	0.2	0.2	0.1	0.1	0.1	0.0
Lateral development																			
Total	km	242.4	2.1	5.3	11.4	11.5	11.4	11.2	14.0	8.3	12.4	10.8	37.0	34.9	34.4	14.8	10.8	10.0	2.3
Ore	km	100.9	0.2	0.4	3.9	5.4	5.7	3.3	4.6	4.8	6.9	7.5	20.9	18.5	16.5	2.5	0.0	0.0	0.0
Low grade	km	15.3	0.1	0.6	0.8	0.9	0.5	1.0	1.9	0.6	1.6	0.7	1.9	2.2	2.4	0.2	0.0	0.0	0.0
Mineralised waste	km	8.1	0.0	0.2	0.6	1.0	0.8	1.0	1.8	0.2	0.5	0.1	0.5	0.5	0.7	0.1	0.0	0.0	0.0
Waste	km	30.9	1.8	4.1	6.2	3.2	3.5	5.3	3.8	0.4	1.0	0.0	0.5	0.3	0.6	0.2	0.0	0.0	0.0
Slot drive	km	87.3	0.0	0.0	0.0	0.9	0.8	0.7	2.0	2.2	2.3	2.6	13.1	13.5	14.2	11.8	10.8	10.0	2.3
Material by type																			
Stope ore	Mt	121.4	0.0	0.0	0.0	0.9	1.2	1.4	2.9	2.9	2.9	3.0	16.3	16.5	16.6	16.8	16.9	16.7	6.5
Development ore	Mt	6.7	0.0	0.0	0.3	0.4	0.4	0.2	0.3	0.3	0.5	0.5	1.4	1.2	1.1	0.2	0.0	0.0	0.0
Dev LG	Mt	1.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.2	0.0	0.0	0.0	0.0
Dev min waste	Mt	0.5	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dev waste	Mt	2.5	0.2	0.4	0.6	0.3	0.3	0.4	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dev paste	Mt	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1	0.1	0.0

1.8 Processing

The plant is designed to process a mix of albite granite (AG) and quartz-mica greisen (QMG) ores, as designated by the LOM plan. The design throughput of the beneficiation plant is 1.77 Mt/a. The beneficiation circuit will produce 302 kt/a of concentrate for downstream processing at design throughput having an average grade of 1.14% Li. Lithium extraction will be achieved by calcination of the concentrate and alkaline hydrometallurgical processing to recover design output of 17.1 kt/a of battery grade LHM in Phase 1, assuming 50:50 split of AG:QMG.

A number of by-products including analcime, calcium silicate, calcium fluoride, calcium carbonate and potassium chloride will also be produced. The process plant is designed to achieve zero liquid discharge (ZLD). Therefore, facilities are provided for water treatment for recycle and total evaporation of liquid bleed streams. The design processing capacities by area and material flows are summarised in Table 1.6.

Table 1.6 Overall mass balance (based on 50:50 mix of AG and QMG, Phase 1 only)

Process stream	Volume of product (t/h)	Volume of product (t/a)	Li grade (%)	Li recovery (%)	Overall utilisation (h/a)
Beneficiation plant feed					
Design		1,770,000	NA		8,000
Beneficiation plant output	**Concentrate**				
Nominal	32.82	262,581	1.14	81.3 – 87.4%	8,000
Design	37.75	301,968			
Pyrometallurgical plant feed	**Concentrate**				
Nominal	35.01	262,581	1.14		7,500
Design	40.26	301,968			
Pyrometallurgical plant output	**Calcine**				
Nominal	34.49	258,642	1.14	100	7,500
Design	39.66	297,438			
Hydrometallurgical plant feed	**Calcine**				
Nominal	34.49	258,642	1.14		7,500
Design	39.66	297,438			
Hydrometallurgical plant output	**LHM**				
Nominal	1.99	14,905	Battery grade	83.8	7,500
Design	2.29	17,141			
Overall lithium recovery				68.1% - 73.2%	

Testwork indicates that beneficiation recoveries of 87.4% and 81.3% can be achieved from QMG and AG ores respectively. The calcination and hydrometallurgical section recoveries are relatively insensitive to variation in ore type and an average lithium recovery of 83.8% is achieved in these parts of the plant. The main determinants of lithium recovery are magnetic separation in beneficiation and leach / bicarbonation in the hydrometallurgical circuit.

The process flowsheet is illustrated schematically in Figure 1.9. The functions of the main sections of the process plant can be summarised as follows:

Beneficiation: size reduction of the ore is achieved by three-stage crushing and rod milling to a P80 of 644 µm. This is undertaken to liberate the zinnwaldite mineral. Separation of zinnwaldite from gangue minerals is achieved by a relatively simple wet high intensity magnetic separation (WHIMS) process employing roughing and scavenging. The paramagnetic zinnwaldite is recovered to concentrate. Testwork on mixed ore at the target grind size employed a SLon 100® magnetic separator with a flux of 1.0 T on the primary and 1.2 T on the scavenger. This achieved a lithium concentrate grading of 1.14% Li. However, the commercial scale design includes for SLon 3000® and 2,500 high gradient magnetic separator (HGMS) units that can potentially operate up to 1.3 T. Tailings from beneficiation are dewatered. A portion of the fine fraction is employed as underground backfill and the coarse fraction and the remaining fine fraction reporting to the stacked tailings storage facility (TSF). Dewatered concentrate is routed to calcination. A ZLD policy will be maintained; hence facilities are included to treat water for suspended solids removal and recirculation.

Pyrometallurgy: this step converts crystalline zinnwaldite to its amorphous form in order to make the mineral amenable to lithium recovery and employs alkaline leaching. Calcination is undertaken at a target temperature of 925°C and ranging to a maximum of 935°C to 950°C. A rotary kiln is used to effect the conversion; close temperature control is required to avoid gross agglomeration of the charge. This control is facilitated by employing parallel flow of solids and hot gas, thereby minimising the differential temperature between gas and solids. The off-gas system provides for dust removal and recovery and transfer of waste heat to the combustion air. Gas scrubbing is undertaken with lime slurry to convert volatilised hydrogen fluoride to insoluble calcium fluoride. Scrubbed off-gas will be discharged via a tall stack to atmosphere and will meet the requirements of the German Federal Emission Control Act (Bundesimmissionsschutzgesetz (BImSchG)). Scrubber blow-down containing CaF_2 is filtered and has value as a by-product. Cooled calcine is routed to storage ahead of the hydrometallurgical plant.

Hydrometallurgical process: this represents the core of the process and is based on Metso's proprietary technology. It includes a series of steps designed to recover lithium as battery grade LHM. The major steps include:

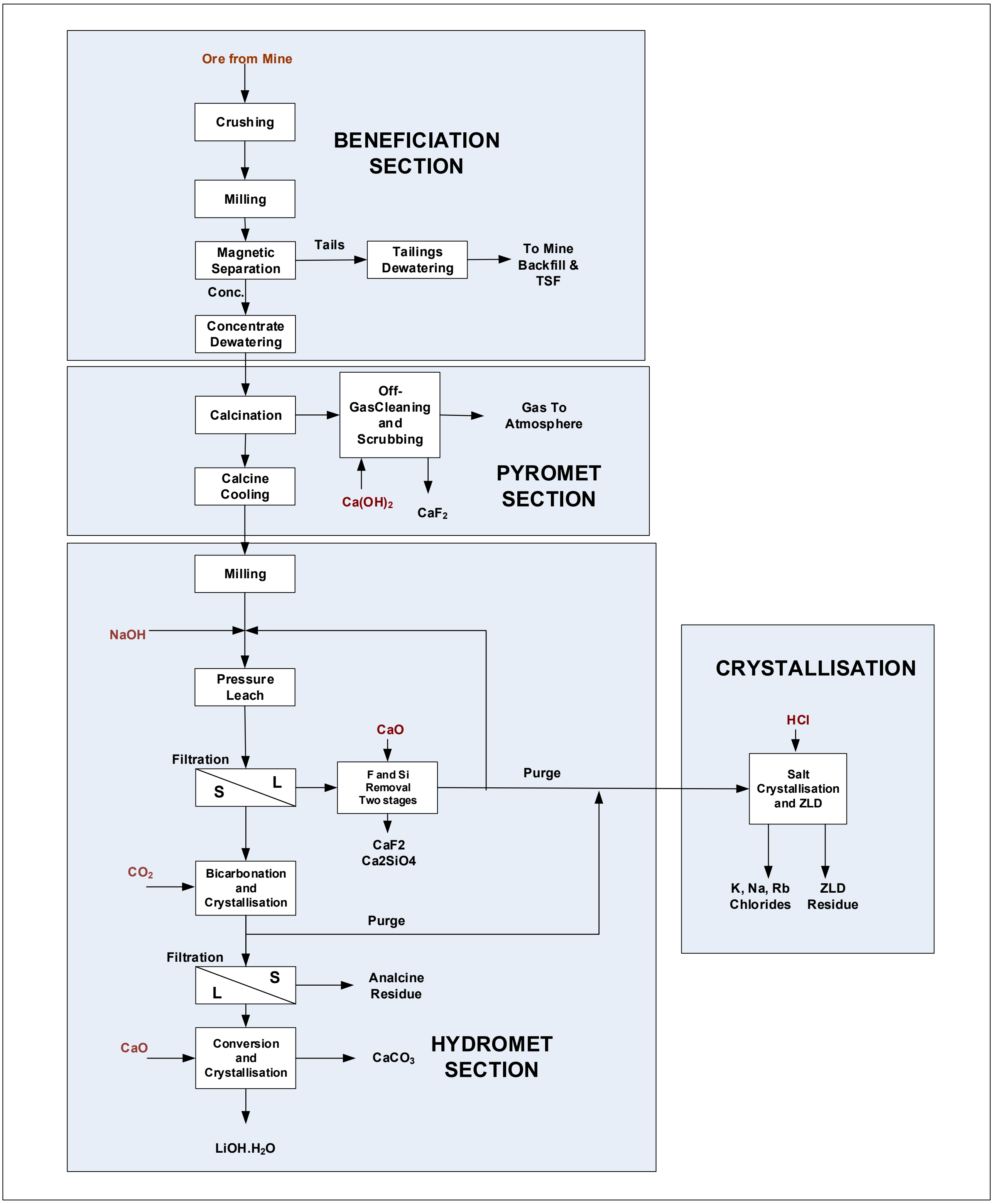
- Pressure leaching of calcine at 200°C with caustic soda to convert lithium to the metasilicate form that is amenable to bicarbonation and recovery.
- Filtration of the leach residue with solution recycled back to the leach via impurity removal to reduce caustic soda consumption.
- Bicarbonation to convert lithium metasilicate to soluble lithium bicarbonate by reaction with CO_2 gas. This is followed by filtration of the residual solids in the form of potentially saleable analcime.
- Conversion of lithium bicarbonate to carbonate by crystallisation at elevated liquor temperature. The evolved CO_2 is recycled to bicarbonation.
- Conversion of lithium carbonate to lithium hydroxide by reaction with lime.
- Further solution purification of liquor by solid ion exchange followed by crystallisation of battery grade LHM.

Evaporation and crystallisation. Bleed streams exit the hydrometallurgical process. The flowrates and compositions of these streams are determined by the need to control impurity / by-product levels and to maintain the overall water balance. The species to be bled include potassium and rubidium as by-products and residual sodium, silicate and lithium. Lithium is recovered and recirculated to process. A ZLD policy applies to the plant. The major steps in this circuit include:

- Processing of excess liquor from the lithium bicarbonate / carbonate circuit to recover and recycle lithium to the main circuit.
- Processing of the bleed stream from the main pressure leach circuit to remove silicates that could scale the evaporation equipment.
- Neutralisation of the filtrate with hydrochloric acid to generate chlorides of sodium, potassium and rubidium.
- Salt crystallisation to produce sodium chloride and a mixed potassium / rubidium salt containing > 95% KCl for sale.

- Evaporation of the final residue to produce a relatively low mass output of residual salt.

Figure 1.9 Process block flow diagram



The streams exiting the process include product LHM, tailings and residues for disposal and underground backfill and by-products that are potentially saleable. LHM produced is packaged and assumed to be sold ex-works.

1.9 Metallurgical testwork

Beneficiation testwork has involved extensive laboratory and pilot-scale programmes to develop and validate the process flowsheet for treating AG and QMG ores and mixtures thereof. The objective was to establish a viable flowsheet that maximises lithium recovery and concentrate grade while assessing the impact of varying ore compositions and operational parameters. This testwork successfully developed a process flowsheet utilising magnetic separation as the primary beneficiation method. The proposed flowsheet includes a rougher and scavenger stage. The key challenges identified include mineralogy variations and the impact of mineral liberation on metallurgical performance. Operating parameters were determined for key operational parameters including magnetic field strength, feed size distribution, pulsation and rod diameter.

The pyrometallurgical testwork aimed to establish the operating conditions for the commercial plant that generate calcines amenable to downstream lithium recovery. The main programme of work was conducted on concentrates derived from QMG ore. This was on the basis of material availability albeit that is representative of the feed that will predominate in the early years of plant operation. The initial tests established that at elevated temperatures i.e. in excess of 950°C there is a potential issue associated with increased softening of solids leading to a high degree of agglomeration as a result of the rotary action of the kiln. Table 1.7 summarises the kiln design and operating parameters for QMG concentrate. Additional testing to establish the variability by ore type and establishing the definitive design data will be undertaken in the feasibility study piloting phase.

Table 1.7 Recommended kiln design parameters

Kiln design	Parallel flow
Target temperature	925°C
Target hold time	30 min
Maximum material bed temperature	935°C
Time at temperature range	30 min
Potential Li extraction	90%

Expulsion tests have identified those species that volatilise into the kiln off-gas exceeding the TA Luft regulated (Technische Anleitung zur Reinhaltung der Luft) concentrations for stack discharge. The off-gas train capture and scrubbing systems, therefore, includes capture provisions that will meet the legislated requirements.

This hydrometallurgical programme included bench-scale and large-scale test campaigns both of which were undertaken on a batch basis. In the bench-scale tests, alkaline leaching, impurity / by-product removal, bicarbonation and lithium carbonate crystallisation were examined to determine the main operating parameters for these process stages. This established the lithium extraction efficiencies. In the large-scale tests, all of the unit operations indicated were tested. One of the objectives of the large-scale batch tests was to produce sufficient feed material (Li_2CO_3) to facilitate LiOH conversion and $LiOH.H_2O$ crystallisation. Further aims were to generate a pure $LiOH.H_2O$ product sample and to produce the required amount of by-product and residue slurry for dewatering tests. The $LiOH.H_2O$ produced was relatively pure with a Li content of 16.98%. The components exceeding the industry specification included K, Cl, CO_2 and Si. Two stage crystallisation (redissolution and recrystallisation of $LiOH.H_2O$) will reduce the impurity levels and enhance the purity of $LiOH.H_2O$ crystals. Other means of reducing impurities include modification of the leach step and increased bleed of mother liquor from crystallisation.

Alkaline earth salts report to the liquor bled from the hydrometallurgical process. Successful separation of these salts as their respective chlorides has been achieved as determined by phase deportment studies and by testwork on synthetic solutions. The chloride salts of potassium are potentially saleable.

An extensive programme of variability testing according to geometallurgical domains is planned for the next phase and this will cover all major process steps. Further piloting will generate definitive process design criteria.

1.10 Processing site layout and infrastructure

The proposed processing site is situated approximately 7 km northeast of Altenberg, east of the village of Liebenau. The area is currently used for agriculture (primarily growing feed for cattle) and is crossed by some agricultural roads. It is generally flat and dips gently towards the north. To the south, parallel to the S174 state road which borders the site, runs a green corridor (hedges and trees) that shields the proposed site from the road. The terrain rises gradually to the south and creates a natural barrier between the village of Liebenau and the plant site.

The entire Liebenau site covers an area of approximately 115 ha (1.15 km^2); approximately 42 ha (0.42 km^2) will be used for the Project infrastructure directly adjacent to the S174 state road and will include the beneficiation, pyrometallurgical and hydrometallurgical plants and associated infrastructure as well as administration facilities. The remainder of the site will be used for a TSF that will store the quartz sand tailings from the beneficiation plant.

The site is sufficient to accommodate both Phases 1 and 2. Figure 1.10 illustrates the proposed site layout showing targeted tailings storage assuming the proposed by-product sales strategy can be effected.

The Liebenau and Zinnwald sites are well-connected to regional and national road transport networks, ensuring good logistical links for the Project via road. The motorway A 17 (E 55), which connects Dresden with Prague in the Czech Republic runs about 1 km east of the Liebenau site. The nearest connection to the national railway network is at Heidenau (near Dresden) some 20 km from the processing site location. This railway represents line 22 of the Trans-European Transport Network (TEN-T).

The overall area is well developed with respect to regional electricity, sewage, water and gas networks. Electric power, gas and potable water are available in the region. Area-wide broadband internet access is being rolled out, and the area is already well covered by German and Czech mobile telephone networks.

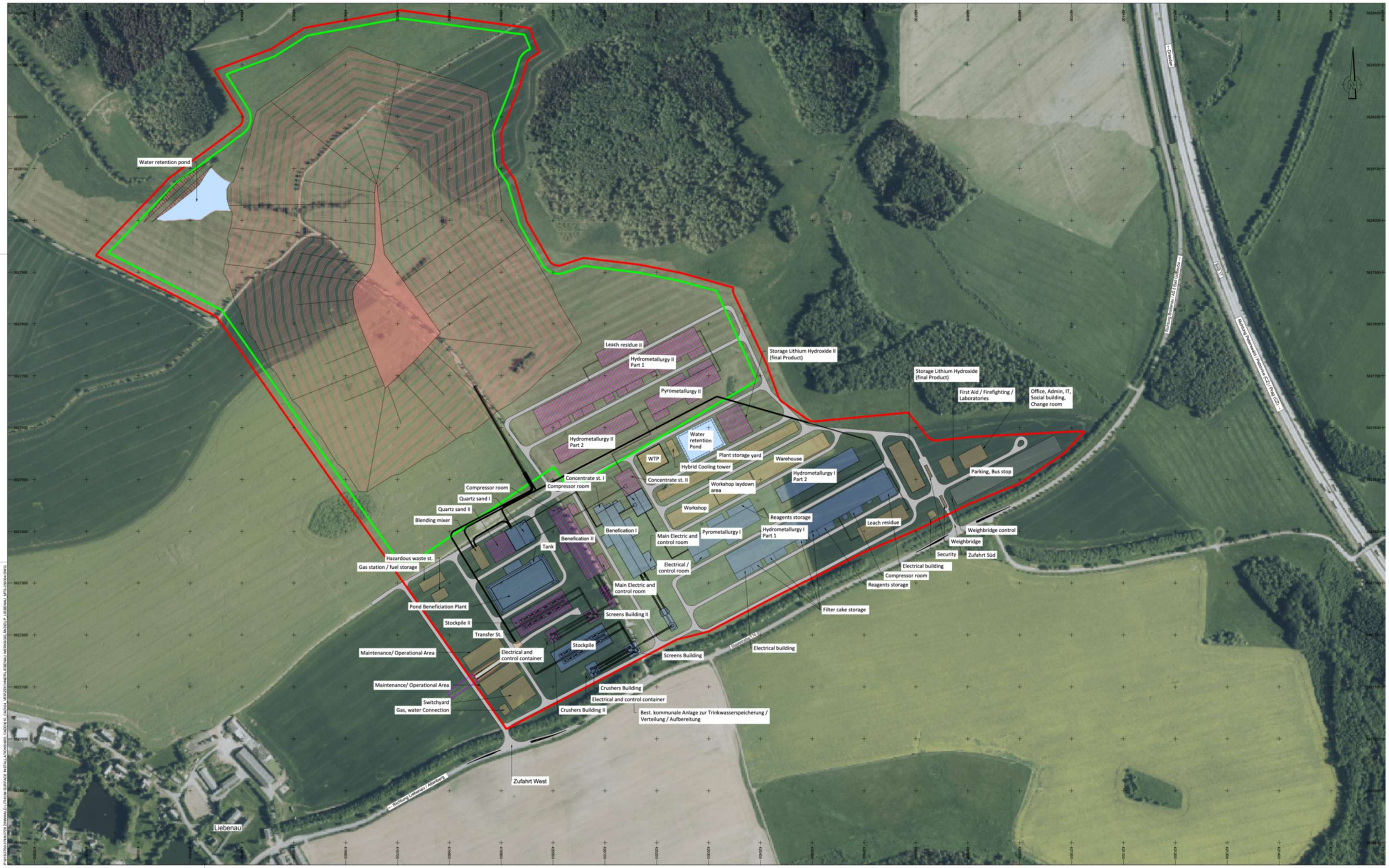
The Project currently assumes that the connection to the national power grid will be achieved with a connection to a 110 kV power line at Altenberg with a 30 kV connection to the processing site at Liebenau to be established via the mine and Liebenau tunnel. A potential alternative exists to connect to a photovoltaic (PV) plant to be established at Waltersdorf approximately 1 km from the Liebenau site and via the PV plant to the national grid. This option offers potentially significant advantages in terms of lower capex and less time to create the grid connection as well as providing a source of low carbon energy. ZLG has entered into a letter of intent with the developer of this PV plant to explore this option in more detail in the feasibility study.

The nearest major gas pipeline runs south of Dresden with the local distribution grid extending to Zinnwald and Lauenstein. The Liebenau site will be connected to the local distribution grid and the supplier will supply 65 MW gas, which is deemed sufficient for Phase 1.

Potential water supply options for the processing plant at Liebenau are being carefully assessed to ensure a sustainable and responsible water management strategy. These may include process water recycling, dewatering from the Liebenau tunnel, rainfall runoff collection from the plant area and TSF, and, if needed, carefully regulated sources such as water supply boreholes, local rivers / streams, or flood retention dams (Lauenstein and Gottleuba). The primary approach is expected to focus on mine dewatering and water recycling, minimising the need for external sources. All options will be thoroughly evaluated in compliance with environmental and regulatory requirements. The current site wide water balance suggests that, under average conditions, the process water demand can be met from process water recycling, dewatering and rainfall runoff from the Liebenau site.

In terms of wastewater disposal, the construction of a separate onsite water treatment plant (WTP) operated by ZLG is planned and is included in the capex estimate for the Project.

Figure 1.10 Proposed site layout



1.10.1 Tailings, backfill and by-products

The Project will produce a number of waste and by-product streams as a result of processing the lithium containing ore. The process plant will generate two types of residue streams: magnetic separation residue and leaching residue. The magnetic separation process produces a scavenger residue, identified as beneficiation tailings in this report, which ranges in size from 0.00 mm to 0.85 mm. These tailings are further classified into fine (0.00 mm to 0.30 mm) and coarse (0.30 to 0.85 mm) fractions. The fine particles are processed into a filter cake using a thickener and filter press, while the coarse particles are dewatered using a dewatering screen. Both fractions are managed separately.

The storage of beneficiation tailings at the Liebenau site is planned to be managed primarily through a stacked TSF, while the non-saleable leaching residue and a portion of the fine beneficiation tailings is planned to be used as backfill. The coarse fraction of the beneficiation tailings can potentially be utilised as a useful construction material and it is the Company's intention to find off-takers for this material. However, the TSF has sufficient capacity for 18 years of material in the case of Phase 1 only and 11.5 years in the case of Phase 1 and 2 should no tailings be sold. In addition the primary waste stream from the leach process is an analcime product which has the potential to be used as a clinker substitute for the cement industry. The Owner's team have had discussions with potential users of this material and will further explore this option during the next stages of the Project, but for now it is considered to be backfill.

The primary saleable by-products from the process are calcium silicate, precipitated calcium carbonate, calcium fluoride and potassium chloride. Cumulatively by-products will contribute approximately 4% of overall Project revenues.

1.11 Environmental and permitting considerations

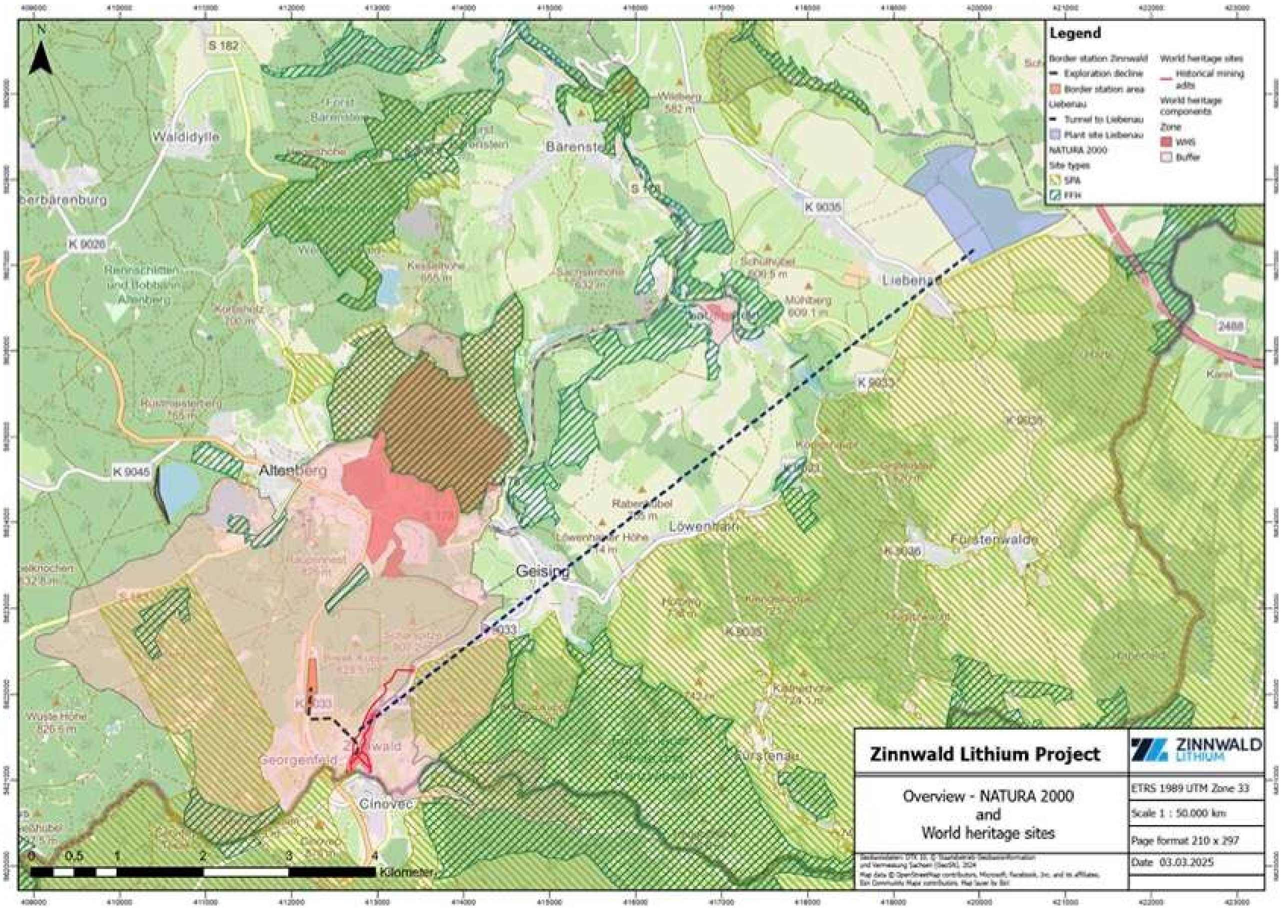
1.11.1 Potential environmental impact areas

There are various local, national and European designated sites and protected areas within the vicinity of the Project. These are identified as follows, along with the strategies to minimise impacts on them from operations:

- Nature Preservation Area (protected lanscape). The Project falls within the Oberes Erzgebirge nature preserve and requires the protection and careful use in any development within this area. The Project is proceeding with its environmental impact assessment (EIA) and environmental and social impact assessment (ESIA) work to address any specific requirements over and above the ordinary permitting work.
- Flood development area. The Project is located in the Geising-Altenberg flood development area and there is a requirement to maintain and improve the natural water infiltration and water retention capacity. The Project is developing its water usage and requirements modelling as part of its permitting process.
- Natura 2000 Network (European protected sites under the Birds Directive and the Habitats Directive). No Natura 2000 sites are directly affected by the proposed above-ground Project infrastructure. The selection of a tunnel to transport material between the mine and the processing plant near Liebenau is specifically designed to avoid direct impacts on these sites. However, an assessment of potentially affected sites in the vicinity of the Project has been coordinated with the lower nature conservation authority and local experts.
- UNESCO World Heritage Site created in recognition of the regional mining heritage for over 800 years. The above-ground facilities at the Zinnwald border station are within the buffer zone, but are limited to the use of the existing former border station in order to minimise potential impacts. The mine itself is wholly underground and the selection of a tunnel to transport material between the mine and the processing plant near Liebenau is specifically designed to further avoid impacts.

Figure 1.11 shows the Project in the context of both the Natura 2000 Network and World Heritage sites and how the Project is designed to minimise impact to both.

Figure 1.11 Project context in terms of Natura 2000 Network and World Heritage sites



1.11.2 Environmental studies

Baseline environmental studies have commenced to support permitting of the Zinnwald decline tunnel, and in anticipation of the ESIA and general operating planning process. These environmental studies have focused on flora and fauna, as well as impacts on water. Both the scoping study phase of the ESIA and the 12-month baseline flora and fauna studies at Liebenau commenced in October 2024. In 2022, the Project established eight ground water monitoring wells in the Zinnwald area and in November 2024, the Mining Authority of the State of Saxony (Sächsisches Oberbergamt (SOBA)) granted approval to commence the construction and initiation of the monitoring programme. The Project has also completed a numeric cross border hydrogeological model to support the evaluation of potential impacts of mining operations. For the Liebenau site, ERM has completed a high-level desktop study on potential water supply options that may be available for the proposed processing plant at Liebenau, which concluded that a combination of water supply sources can meet the potential water demand. This will be further supported by a hydrogeological monitoring program for the Liebenau tunnel corridor and the proposed TSF site.

1.11.3 Permitting framework

The Project's permits will be issued under a single overarching framework reporting into and managed by SOBA. Under Section 51 BBergG, ZLG will initially apply to SOBA for a general operating plan (GOP) permit which will be valid for at least 30 years of mine operation. Once the GOP is received, the Project will apply for main operating plans (MOP) and special operating plans (SOP) permits to cover specific activities. These MOP and SOP permits are valid for between two and four years with ongoing rights to renew subject to ongoing compliance with these permits. The GOP includes a complete EIA process, which will include consideration of impact on people and human health; animals, plants and biological diversity; soil, water, air, climate and landscape; cultural heritage; and interaction with protected areas. The GOP includes all necessary permits for erecting, operating and closure of the mining and processing operation – including permits for emissions, water supply and discharge, flood protection, building, biotopes, protected areas (Natura 2000) and road use. The first stage of the GOP process, being a spatial planning application, is already underway and the Project expects it to be published for comment in Q2 2025.

The initial GOP permit being applied for will cover Phase 1 of production. As the Project progresses to Phase 2, it will need to apply for further permits to allow this expansion of production including matters such as emissions and water requirements, as well as any additional land required for the TSF in the event that the insufficient sale of tailings to third parties means that the TSF cannot cater for the expanded production. The Project may also need to submit a second ESIA to cover any areas not covered under Phase 1.

The Project requires MOP permits for the establishment and operation of the mine and a lower water authority approval. The Project also requires SOP permits for specific areas of operation, such as general mining, blasting, ventilation, underground crusher, conveyor, mineral processing plant, chemical processing plant etc. The Project will also complete a detailed closure plan and waste management plan.

1.12 Communities and social performance

The Project is in the municipality of Altenberg, which has a population of 7,851 (2023). ZLG understands that its social license to operate will be an intrinsic part of the Project's success. The Project will ultimately create a significant number of local jobs and has the potential to generate material tax revenues, a large portion of which will flow directly to the Altenberg municipality. ZLG recognises that the Project will result in potential social impacts on the local community and other stakeholders and considers that meaningful engagement and information disclosure are essential to facilitate acceptance of the Project.

Accordingly, the Project will complete a full ESIA to the level required for the purposes of seeking finance from international financing institutions who are signatories to the Equator Principles. The ESIA will include the work produced from the EIA and additional studies. In particular, the social performance and stakeholder engagement requirements and guidance for ESIAs as outlined by the international financing standards require additional rigour and a wider scope than the national requirements. Where there are gaps, the Project intends to meet the more stringent requirement.

The key social performance actions currently being implemented include:

- Formal ESIA scoping study that will be presented to SOBA and distributed to other stakeholders to enable full public consultation. It will also be published on the Project's new community website for direct engagement. It will include:
  - detailed terms of reference for the full ESIA, including identifed areas of overlap with EIA regulatory process, to ensure community involvement in scoping.
  - baseline social studies and impact assessment scope will be determined, covering socio-economic conditions, human health, community health, safety and security, cultural heritage, land acquisition and displacement, gender related aspects and vulnerable groups identified in the ESIA.
  - Social management plans (SMPs) will be developed to protect workers, the local community and other stakeholders who may be affected by the Project. This will include a cultural heritage management plan to minimise and monitor impacts on areas such as the World Heritage site.
  - Assessment of applicability of other international conventions, e.g. Aarhus and Espoo conventions.
- Stakeholder engagement and community relations activities, stakeholder mapping and analysis and preparation of a stakeholder engagement plan (SEP).
- Preparation of the Land Access, Acquisition and Compensation Framework (LAACF).

1.13 Lithium market and pricing

The lithium market has grown very rapidly from being a relatively small niche market from a global perspective, to a more significant market in terms of importance and value. Partly as a consequence of this, the pricing of lithium has historically been quite volatile if reviewed over a short-term period. The price tends to overshoot in the short term on both the high and low side, as shown in the swings from 2021 to 2024. However, pricing today remains materially higher than the prices seen in the previous cyclical low of 2018-19.

Growth is anticipated to remain very strong with commentators such as Benchmark Mineral Intelligence as well as major industry participants such as Contemporary Amperex Technology Co. Limited (CATL) indicating compound annual demand growth rates higher than 20% per annum and rising deficits in terms of supply versus demand towards the end of the decade.

The Project has examined recent price assumptions used by other projects at a similar level of development, as well as discussions with finance providers and analysts in the lithium industry to determine the long-term price used in this PFS. In terms of the pricing forecasts published by integrated lithium projects currently in development (i.e. excluding concentrate producers) the table below shows the pricing assumptions for those projects that have published studies since the beginning of 2023, when prices came off their abnormal highs in 2022. The Project will produce a battery-grade LHM product, the comparator companies in the table below produce either lithium carbonate or LHM. Historically, LHM has traded at a slight premium to lithium carbonate, although this may change in coming years, and is dependent on ever-evolving battery chemistries.

The Project's finances have been evaluated assuming an achieved price of EUR 20,000/t LHM (ex-plant) for the first five years (including construction) and thereafter a long-term price of EUR 26,500/t LHM (ex-plant), consistent with market peers and other recent 2023-24 reports produced by other lithium projects.

Given the lack of homogeneity in high purity lithium products (different levels of contaminants etc) and the requirement to qualify products with specific customers, the result is that any off-take arrangements entered into too far ahead of final production are necessarily somewhat contingent and therefore do not provide material support for traditional project debt financing. As such, while the Project has held several discussions with potential off-takers in Europe the strategy has been to keep the off-take "free" for as long as possible such that the value of this strategic aspect of the Project can be maximised. The Project's goal is to find an off-take partner that will commit to a meaningful advance payment on the off-take and/or a meaningful investment in the Project which it must maintain through to production. The Project will also, as part of future phases of work, conduct continuous steady-state pilot plant test runs to demonstrate the production process and the product quality.

For the bulk by-products produced, such as beneficiation tailings and analcime residues, the Project has commenced early-stage negotiations with aggregate suppliers, particularly in the local cement industries. In regard to the analcime product in particular, the intention is to produce larger samples of this product as part of the planned future pilot plant work so that these can be assessed by these potential partners. Similarly, for the industrial chemical products the Project will be able to engage more formally with potential off-takers once larger samples of these products are available following the pilot plant stage.

1.14 Capital costs

Table 1.8 shows the main capital cost categories and identifies the contributing consultants who prepared the individual cost estimates for the Project. The estimates are based on the Association for the Advancement of Cost Engineering (AACE) standard, with Class 4 estimates completed to an accuracy range between -15% and +50% of the final project cost and Class 3 to an accuracy range between –10% and +30%.

Table 1.8 Capital cost estimate contributors

Area	Contributor	AACE level in PFS
Mining – equipment and infrastructure	Snowden Optiro	Class 3
Mining – Zinnwald decline tunnel	Fichtner / Snowden Optiro	Class 3
Mining – electrics and communication	DMT	Class 4
Mining – backfill plant	K-UTEC	Class 4
Liebenau tunnel	Dr Sauer & Partners	Class 4
Beneficiation plant	Metso	Class 3
Tailings storage facility	Knight Piesold	Class 4
Pyrometallurgical plant	Metso	Class 4
Hydrometallurgical plant	Metso	Class 4
Civils and general infrastructure	Fichtner	Class 4

The capex estimates are based on preliminary engineering for all areas of the Project and are supported by mechanical equipment lists and engineering drawings. The costs for these items have been derived from a combination of vendor quotes and factoring for quantities. The reference period for the cost estimates is Q1 2025.

The overall Project capital cost estimate is summarised in Table 1.9. The capital costs are all presented in Euros, as the majority of items are expected to be sourced directly in Euros. Phase 1 includes the initial costs to reach annual production of 18,000 t/a of LHM. Phase 2 costs comprise the initial estimates for additional capital required to double capacity and reach a peak of 35,100 t/a of LHM.

Sustaining capital costs include future mining equipment and development, tailings facility development, and an allowance of 2.5% per year of initial equipment costs contained in the capital estimate in process plant, tunnel and infrastructure areas to account for replacement of equipment to maintain production capacity. This is reflective of comparable projects and assumed to be appropriate for the type of equipment and installations used.

Table 1.9 Project capital cost estimate breakdown

Cost breakdown	Phase 1 (EUR M)	Phase 2 (EUR M)	Sustaining (EUR M)	Closure (EUR M)	LOM (EUR M)
Direct costs					
Mining	123.0	39.4	342.5	-	504.9
Tunnel	81.1	-	16.0	-	97.1
Processing	616.9	514.6	462.1	11.0	1,604.6
Sub total	821.0	554.0	820.6	11.0	2,206.6
Indirect and Owner's costs					
Indirects (EPCM, spares etc)	115.0	41.5	-	-	156.5
Land acquisition costs	12.0	-	-	-	12.0
Owner's costs	23.0	11.5	-	-	34.5
Contingency	77.0	46.8	-	-	123.8
Sub total	227.0	99.8	-	-	326.8
Total	**1,048.0**	**653.8**	**820.6**	**11.0**	**2,533.4**

The mining operation is a wholly underground operation using large scale sub-level stoping with subsequent backfill. Primary crushing will take place underground. The construction phase for the underground caverns and mine faces will proceed via an extension of the Zinnwald decline tunnel currently being permitted at the former Zinnwald border station. Mine servicing and maintenance infrastructure will be developed at the Zinnwald border station. Mine equipment will initially be a diesel driven fleet.

Approximately 266 kt ore mined during mine development before commencement of production will be stockpiled at surface and consumed during the first year of operation. The mining cost allocated to this ore, totalling approximately EUR 30 M is included in working capital and is not included in the capital costs above.

The Liebenau tunnel is to be constructed by TBM to minimise disruption to local communities both during construction and production phases. It is also a major facilitating factor in the potential to scale up production in Phase 2. The cost includes the conveyor to transport ore from mine to beneficiation plant.

Processing capex comprises beneficiation, pyrometallurgical and hydrometallurgical plants and associated infrastructure including TSF. The beneficiation plant capex includes the initial underground crusher and further above ground crushers, the wet magnetic separation plant unit, thickeners, flotation and stockpile facilities. The pyrometallurgical plant is developed around a direct fired rotary kiln with associated coolers, baghouses, scrubbers and exhaust gas stacks. The hydrometallurgical plant includes Metso's proprietary pressure alkaline leach system and various filtration and crystallisation circuits. All plant costs include the direct erection costs of each of the plants and relevant buildings.

Tailings and water management comprise the cost of the TSF at Liebenau together with the cost of a water treatment plant to optimise the recovery and management of water used in the process.

Civils and infrastructure costs include site preparation costs, site logistics, utilities and stormwater management, shell structures and foundations for the various plants, and general site buildings for support and warehouse services. The primary assumption is that the kiln in the pyrometallurgical plant will be gas powered and the mine, beneficiation plant and hydrometallurgical plant will be electrically powered. The gas connection is to be via a 3 km gas pipeline from the local distribution network. The electrical connection is based on a connection to the high voltage line in Altenberg via the Liebenau tunnel. The Project has recently signed a letter of intent for a local, planned solar PV farm in the area as a potential alternate power source.

The capex reflects an engineering, procurement and construction management (EPCM) execution strategy wherein an EPCM contractor will provide design and construction management services for all elements of scope pertaining to the process and related infrastructure as well as procurement activities for parts of the Project, with substantial engineering, construction and commissioning support for vendor packages. For the cost estimate, procurement costs are shown within direct costs. Across the process plant, engineering and construction management represent approximately 11% of the direct capital cost.

Land acquisition costs relate to the land required at Liebenau and an initial estimate of compensation land required by law for this type of acquisition. The ultimate price will be linked to market price and any multiple determined following engagement with landowners.

Owner's team costs comprise primarily the project management team that is directly responsible for execution of the Project and includes project management, operational readiness, commissioning and performance testing teams. It includes communication, health and safety, insurance, pre-operation expenses and ongoing environmental and community engagement.

A capital cost contingency of 5-10% has been applied by project area dependent on the level of confidence.

The closure costs of EUR 11 M include expenditure necessary to decommission the Project's facilities at the end of the LOM and to rehabilitate the land back to a natural state. The mine plan itself incorporates bulk underground mining with paste backfill, so the Project will in-fill the ore body area as it proceeds and has no direct waste rock areas at surface to rehabilitate. The TSF will be constructed in phases as the Project progresses and therefore rehabilitation and coverage costs will be included as part of ongoing costs. The plants will be decommissioned, dismantled and equipment and buildings removed; and the site will be scarified and re-vegetated as part of the mine closure process.

1.15 Operating costs

The operating cost estimates are based on the engineering and design work undertaken on the Project by various consultants. The primary assumption is that the Project will be owner-operated and all labour will be employed directly by the Project. In the next phase of the Project, further evaluation will be undertaken specifically in regard to the option of contract mining. No contingency nor allowance has been applied to opex. It is assumed that variable opex will broadly increase in a linear fashion as production increases in Phase 2. Fixed processing costs are assumed to increase by a factor of 75% in Phase 2. The reference period for the cost estimates is Q1 2025.

The overall operating cost estimate is summarized in Table 1.9, both before and after by-product credits.

Table 1.10 Opex by main operational areas

Description	Phase 1		Phase 2		LOM		
	EUR M/a	EUR/t LHM	EUR M/a	EUR/t LHM	EUR M/a	EUR/t LHM	%
Mining	58.0	3,219	78.3	2,750	75.7	2,798	29
Beneficiation	16.4	910	32.0	1,122	30.1	1,115	12
Processing	90.2	5,008	156.9	5,507	148.6	5,494	58
G&A	2.6	144	2.6	93	2.6	98	1
Sub-total	**167.2**	**9,281**	**269.8**	**9,472**	**257.0**	**9,505**	
By-product credits	(20.2)	(1,123)	(31.3)	(1,101)	(29.8)	(1,102)	
Net operating costs	**147.0**	**8,158**	**238.5**	**8,371**	**227.2**	**8,403**	
per t mined		93.7		71.5		72.7	
per t concentrate		486.8		443.8		447.9	
per tonne LHM		8,158		8,371		8,403	

Mining opex assumes an owner-operated mining model, rather than contract mining. It includes all costs to deliver the crushed ore to the beneficiation plant as well as back-filling the mined-out areas.

Beneficiation opex includes all costs to deliver the concentrate to the pyrometallurgical plant as well as transfer the beneficiation tailings that will not be backfilled to the TSF.

Processing opex comprises the pyrometallurgical and hydrometallurgical plants. It includes all costs to calcine the zinnwaldite concentrate, the alkaline leach process and the crystallisation phase to produce LHM, as well as the backfill costs for the leached roast product residue. It also includes provision for maintenance, consumables and spare parts.

The shared G&A opex estimate has been developed by the Project's Owner's team. It includes all materials, services and headcount costs associated with site administration.

The overall direct costs per by cost category are shown in Table 1.11 and Table 1.12.

Table 1.11 Opex by cost category per annum

Cost category	Phase 1 (EUR M/a)	Phase 2 (EUR M/a)	LOM (EUR M/a)	%
Labour	30.1	42.9	41.4	16
Electricity	30.2	53.0	50.1	20
Diesel	4.7	5.9	5.7	2
Gas	14.1	25.1	23.7	9
Reagents	40.4	76.4	71.9	28
Maintenance	24.0	37.9	36.3	14
Consumables/ stores	20.1	23.0	22.5	9
Overheads	3.6	5.6	5.4	2
Total	**167.2**	**269.8**	**257.0**	

Table 1.12 Opex by cost category per tonne LHM produced

Cost category	Phase 1 (EUR/t LHM)	Phase 2 (EUR/t LHM)	LOM (EUR/t LHM)	%
Labour	1,673	1,508	1,532	16
Electricity	1,677	1,861	1,853	20
Diesel	261	206	211	2
Gas	782	881	876	9
Reagents	2,240	2,683	2,659	28
Maintenance	1,329	1,330	1,341	14
Consumables/ stores	1,117	807	834	9
Overheads	202	196	199	2
Total	**9,281**	**9,472**	**9,505**	

Table 1.13 summarises the total headcount for the Project.

Table 1.13 Overall labour headcount and costs

Category	Units	Phase 1	Phase 2	LOM
Mining	#	303	344	339
Processing	#	255	446	424
General and administration	#	15	15	15
Total	**#**	**573**	**805**	**778**
Labour cost	EUR M/a	30.1	42.9	41.4

1.16 Financial / economic analysis

The Project has developed a financial model that includes the capex and opex estimates previously described. The financial model is denominated in Euros, as the majority of its costs will be in that currency and its products will be sold in Euros. The start period for the financial model is not time dated, as it is dependent on the Project receiving all relevant operational permits, which cannot be definitively determined at this stage.

Table 1.14 shows the key inputs in the financial model under the base case scenario that comprises an initial two year construction period and 41 years of production. The financial model assumes a ramp up of Phase 1 to average steady state output of 18,000 t/a LHM.

Phase 2 will benefit from engineering, construction management, commissioning and operation learnings from Phase 1. Phase 2 incremental mine development and process plant construction are assumed in Year 5 and 6, achieving nameplate capacity from Year 7, with peak production of 35,100 t/a LHM and average 28,900 t/a LHM. The model assumes mining of and beneficiation of a total of 128.1 Mt ore over mine life at average grade of 2,060 ppm Li.

Table 1.14 Key inputs to the financial model

Category	Units	Phase 1		Phase 2		LOM	
		Total	Annual	Total	Annual	Total	Annual
Beneficiation feed	kt	3,138	1,569	123,375	3,334	128,089	3,124
	ppm	2,693		2,036		2,060	
Pyrometallurgy feed	kt	603.9	302.0	19,881.7	537.3	20,797.4	507.3
	%	1.18		1.05		1.05	
LHM production	kt	36.0	18.0	1,054.0	28.5	1,108.5	27.0

Annual and total for Phase 1 and Phase 2 shown excluding ramp up period.

1.16.1 Production and revenue

Table 1.15 shows the mining and production ramp-up over the first ten years of operation, including the transition from Phase 1 to Phase 2. All concentrate is converted into LHM at the metallurgical processing plant.

Table 1.15 Mining and production ramp up (kt/a)

Description	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	Yr 9	Yr 10
Mined ore	17.0	30.8	291.4	1,236.7	1,552.8	1,585.3	3,166.4	3,246.7	3,374.4	3,489.5
Concentrate	0.0	0.0	55.9	255.8	302.0	302.0	603.9	603.9	603.9	603.9
LHM	0.0	0.0	3.2	15.2	17.8	18.2	34.7	34.6	35.0	34.3

Table 1.16 shows the annualised revenue assumed in the financial model across the main production streams under Phase 1, Phase 2 and across the LOM.

Table 1.16 Annualised revenue in the financial model

Description	Phase 1 (EUR/a)	Phase 2 (EUR/a)	LOM (EUR/a)
Lithium hydroxide	419.7	754.9	710.7
By-products	20.2	31.3	29.8
Total revenue	**439.9**	**786.2**	**740.5**

1.16.2 Taxation

The main taxes applicable to the Project relate to corporate income tax and are split between federal Corporate Income Tax (CIT) of 15.825% payable to the Federal Bund and local Trade Tax (TT) of 13.65%, which is paid direct to the Altenberg Municipality.

The Project may be required to pay an annual royalty for the mineral resources mined within the year up to 10% of market value of those mined resources. The actual rate applied is solely determined by the local state and the Project has commenced engagement with the Saxony authorities. For the purposes of this financial model, the Company considers it would be premature to assign a value to any royalty at this time.

The total tax paid over the LOM before interest deduction is estimated at EUR 5.3 billion, split between corporation tax payments to the Federal Authorities of EUR 2.8 billion, and local trade taxes to the municipality of Altenberg of EUR 2.4 billion.

1.16.3 Net present value and internal rate of return

The economic analysis has been calculated using a real terms discount rate of 8% applied to before- and after- tax pre-financing cashflows. The Company considers that this is an appropriate discount rate and comparable to that applied to similar lithium projects in Europe. The financial model has been calculated on a real basis. The model excludes debt and financing costs, corporate head office costs and sunk Project development costs.

The financial model indicates that the project has a payback period of 5 years from start of production. The economic analysis indicates a real, pre-tax NPV of EUR 3,328 M with an IRR of 23.6%. The post-tax NPV is EUR 2,187 M and the post-tax IRR is 19.8%.

Table 1.17 Project economics by phase

Description	Unit	Phase 1	Phase 2	LOM
Lithium hydroxide	kt	581	527	1,108
Total revenue	EUR M	15,815	14,545	30,361
Total opex	EUR M	(5,545)	(4,992)	(10,536)
EBITDA	EUR M	10,271	9,554	19,825
Initial capex	EUR M	(1,048)	(654)	(1,702)
Sustaining capex	EUR M	(458)	(374)	(832)
Working capital	EUR M	(3)	3	-
Pre-tax cashflow	EUR M	8,762	8,529	17,291
Tax paid	EUR M	(2,588)	(2,560)	(5,148)
Post-tax cashflow	EUR M	6,174	5,969	12,144

1.16.4 Summary financial model

Table 1.18 shows a summary of key financial model metrics.

Table 1.18 Primary financial model metrics

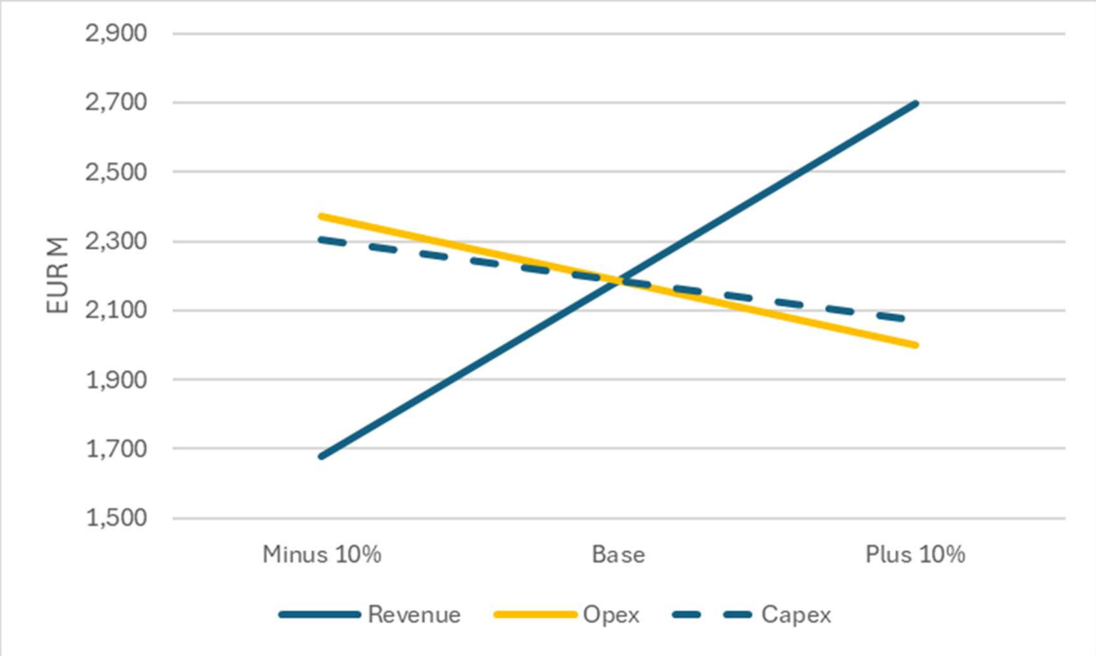
Description	Unit	Value
Pre-tax NPV (at 8% discount)	EUR M	3,328
Pre-tax IRR	%	23.6
Post-tax NPV (at 8% discount)	EUR M	2,187
Post-tax IRR	%	19.8
Simple payback*	Years	4.6
Initial construction capex	EUR M	1,048
Average LOM opex (pre by-product credits)	EUR/t LHM	9,505
Average LOM opex (post by-product credits)	EUR/t LHM	8,403
Average LOM revenue	EUR M pa	741
Average annual EBITDA (post by-products credits)	EUR M pa	484
Annual average LHM production	kt/a	27
Average LHM price achieved	EUR/t LHM	26,288

1.16.5 Sensitivity analysis

The financial model was used to prepare sensitivity analysis for the pre and post-tax NPV of the Project. The sensitivity analysis determines how the NPV is affected with changes to one variable at a time while holding the other variables constant. The sensitivity analysis was completed on the price of lithium hydroxide, capital expenditure and operating costs. Variations from +10% to -10% for each have been used in modelling. The analysis shows the Project is more sensitive to the lithium hydroxide price than it is to capex or opex.

As shown in Figure 1.12 an increase of 10% in the average achieved lithium hydroxide price, from 26,288 EUR/t to 28,916 EUR/t, increases the post-tax NPV from EUR 2,187 M to EUR 2,697 M and a decrease of 10% to 23,659 EUR/t decreases the post-tax NPV to EUR 1,677 M.

Figure 1.12 Sensitivity analysis for the Project



1.17 Project execution

To manage risk and optimise resource allocation, the Project will be developed in five stages following this PFS:

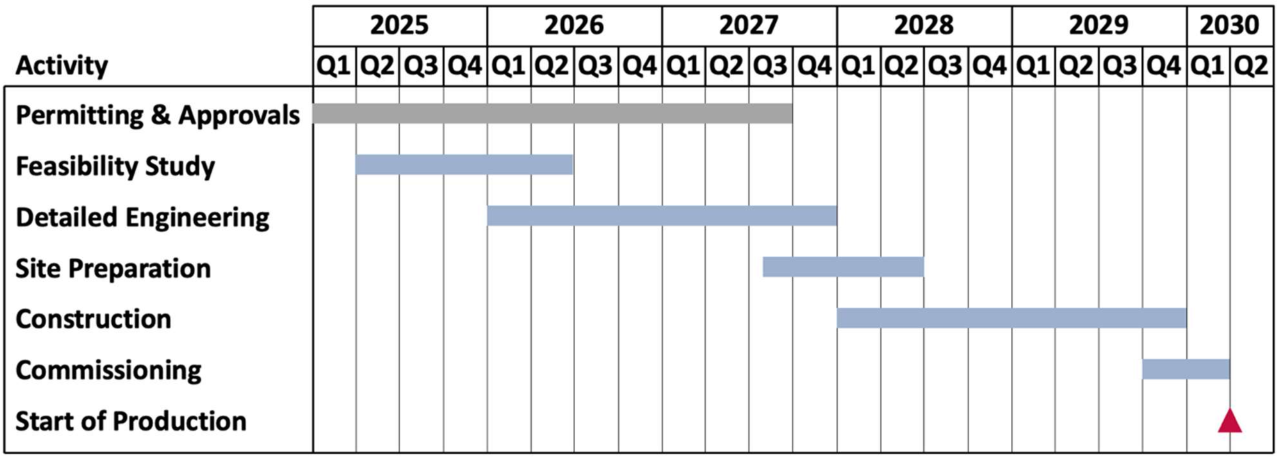
- Stage 1: feasibility study stage including basic engineering.
- Stage 2: detailed engineering.
- Stage 3: initial site preparation, infrastructure establishment and construction.
- Stage 4: commissioning and start-up of the processing plants and mining operation. Pre-production.
- Stage 5: ramp up to full-scale mining operations and production to continuous volume production.

Stage1 (feasibility study) will focus on detailed gap analysis, extended data collection especially for more detailed modelling and domaining, pilot scale test works, continuous process piloting and risk assessment in all areas considered in the PFS. The results will ensure fulfillment of NI 43-101 criteria and AACE Class 3 standards as well as supporting a robust economic model.

The Project will adopt an EPCM model from Stage 2 onwards ensuring expert oversight during all critical phases. This approach provides flexibility, transparency and scalability as the Project progresses. The EPCM contractor will manage the engineering, procurement, construction and contract management of the Project.

A high-level project schedule has been developed, focusing on key activities yielding a start of production in Q1 2030 as shown in Figure 1.13.

Figure 1.13 High level project schedule



1.18 Risks

The Project, in conjunction with Snowden Optiro and the contributing consultants, have detailed the perceived and real risks pertaining to technical, operational and cost risks for the Project and applied a severity rating and probability rating to them. Setting aside inherent risks to all mining and processing projects, such as health and safety and employee recruitment and retention; or risks outside the control of the Project such as the macro-economic supply and demand factors in the lithium industry and their resultant impact on the lithium price, or alternative battery source development, broadly speaking the key identified risks are as follows:

- Technical development of the Project. The contributors have identified specific risks and provided development plans and further design and testwork required, which will be completed by the Project as part of the feasibility study and the planned pilot plant.
- Permitting and communities. Delays to permitting or significant opposition to the Project from the local communities and stakeholders could materially jeopardise the Project. To mitigate this risk, the Company has pro-active early and regular engagement with the relevant authorities and with the local community. The Company has started an ESIA process that will go above and beyond the regulatory permitting requirements (that include an EIA) and should ensure local stakeholders concerns are addressed.
- Financial and funding. The risk that the initial capital costs or the ongoing operating costs make the Project economically unviable or unfinanceable. In mitigation, the Project will ensure that all study assumptions are based on quotes from multiple vendors / suppliers to the relevant level of accuracy as the Project progresses. The Project will endeavor to be in the bottom half of the global cost curve. The Group will continue to engage with existing and potential investors and other types of funders, such as banks, off-takers and royalty funders.

1.19 Conclusions and recommendations

The MRE published in June 2024 established the Project as one of the largest lithium Resources in Europe. The PFS engineering studies are based on testwork carried out in internationally recognised facilities using commonly accepted practices. The capital and operating cost estimates developed for the project are in line with AACE Class 3 and 4, with an order of accuracy of -10% to +30% for Class 3 and -15% to +50% for Class 4.

Permitting and environmental aspects of the project have been evaluated and there is a road map in place developed by recognised consultants working with the Owner's team to deliver the key permits. The Project has also been optimised to minimise the environmental and social impacts.

The results of this PFS confirms that the Project can support the development of an underground mine with an extraction rate in excess of 3 Mt/a with a mine life of over 40 years. Ground conditions will support bulk underground mining techniques, specifically longhole open stoping, which is typically lower cost than the room and pillar techniques considered in previous iterations of the Project.

Processing of the ore will take place at a single site located near the village of Liebenau. Ore transfer will be via a new 9.1 km tunnel to be established linking the mine with the proposed process site location. The cost of establishing the tunnel is significant but represents less than 5% of the combined capex for the Project assuming both Phase 1 and Phase 2 are executed. Additionally the tunnel allows efficient, low impact ore transport via electric conveyor and minimises disruption to local communities by allowing a significant reduction in road transport and overland infrastructure. The tunnel also allows efficient transport of backfill material, primarily waste from the processing operation, back to the mine. The tunnel connection is deemed to be an essential enabling factor allowing the Project to be scaled up while limiting the impact of this on local communities.

Processing includes concentration of the ore by wet magnetic separation followed by pyrometallurgical and hydrometallurgical processing to produce a battery grade LHM. The processing route selected is Metso’s alkaline pressure leach process. Testwork undertaken by the Project has demonstrated the applicability of this processing route to zinnwaldite ore.

ZLG will continue to develop the technology planned to take the alkaline pressure leach process through to feasibility level. Further testwork is required to confirm the impact of variability in run of mine material and a continuous pilot test will be required to demonstrate product quality and provide a basis for detailed engineering and performance guarantees. Further work will also be applied to the by-product aspects of the flowsheet to test the potential to generate saleable products from side streams currently treated as waste. ZLG will also test alternative technologies in areas of the flowsheet such as calcination where there may be an opportunity for more efficient and lower cost options such as tunnel kilns versus the current design utilising the rotary kiln.

The PFS represents a significant change from previous versions of the Project and ZLG considers that there is scope for optimisation of the plans set out herein. This optimisation in areas such as additional staged development of the plant, streamlining the process flowsheet, reductions in redundancy, utilisation of cleaner and lower cost energy sources and competitive equipment sourcing are all expected to have the potential to yield significant savings in terms of capex and opex as well as the possibility of reducing the CO_2 per tonne of final product.

The Company has already commenced its EIA, general permitting application processes (including baseline studies) and its ESIA. This will be a high priority area over the coming quarters.

As the Project moves through the coming stages of further testwork, developing a feasibility study and then on to detailed engineering and project development the Owner’s team will need to be significantly expanded. This is an area that is a high priority for ZLG and is receiving ongoing attention.

1.20 Future work

1.20.1 Geology

The Company has submitted a permit application to construct an exploration tunnel to access the ore body from the currently unused border control station at Zinnwald. The purpose of this tunnel is to provide direct access to the ore body allowing the extraction of a representative sample to enable further metallurgical testwork. It will also generate data on ground conditions that will feed into the geotechnical models allowing further refinement of the mine design.

In addition, ZLG intends to undertake further geotechnical and hydrogeological drilling at the proposed Liebenau plant site location as well as along the planned tunnel corridor to provide information required for detailed engineering.

The Project has an inventory of representative ore from previous drill campaigns. Should further material be required for testwork campaigns a limited large diameter core drill campaign may be required to provide further ore samples.

- Additional work required on ore variability to determine how the different ore types behave through the flowsheet and what affect it may have on overall lithium recoveries.
- Additional work is recommended to look at continuity of the different ore types and ore boundaries in order to help design the optimal grade control programme.

1.20.2 Mining

Optimisation of the mining schedule to optimise process plant utilisation via a comprehensive mine-to-plant strategy.

Refinement of mine design would include:

- Based on further mapping and information on the resource and in particular fault properties being available, further refinement of mine design parameters.
- Where operationally possible, merge stopes vertically to create double-lift stopes which could provide further schedule flexibility and cost reductions.
- Reassess and confirm stope dimensions after completion of additional in situ stress testing, detailed numerical modelling and paste backfill testwork.
- Test different regional pillar configurations to minimise the grade and contained metal in them. Also run alternative geotechnical modelling scenarios to study the impacts of extracting the pillars last in the LOM.
- Optimisation in areas such as dewatering, ventilation and equipment supply.
- For the ore reserve additional work should be undertaken on the modifying factors, with the biggest driver being the lithium hydroxide price.

1.20.3 Processing

Various testwork programmes are required to optimise and refine the processing flowsheet ahead of embarking on the engineering design required for the feasibility study.

- Beneficiation: an opportunity exists to improve the recovery in the beneficiation circuit by increasing the field strength of the magnetic separator which will require testing.
- Pyrometallurgy: further variability testing is required to confirm performance across a range of ore blends (QMG vs AG ratios). Other kiln options (for example tunnel kilns) should also be explored to test potential to reduce operational risk and improve efficiencies.
- Hydrometallurgy: trade off studies required to assess and optimise by-product streams including the potential for the primary leach residue (analcime) to be marketed as a saleable product.
- Continuous pilot: a continuous pilot test will be required to finalise the inputs required for engineering design, provide quantities of sample product and provide the basis for performance guarantees.
- Optimisation: explore opportunities to optimise heat and energy recovery throughout the process.

1.20.4 Site and infrastructure

Work related to site and infrastructure will include the following:

- Engagement with landowners and users of the selected site locations.
- Carry out geotechnical studies at the site locations as a basis for more detailed design and to understand the overall cut and fill quantities linked to site design.
- Advance negotiations for service contracts for electric power and natural gas with local power companies as well as supply contracts for required reagents and materials.
- Advance assessment of the potential for power supply from solar PV plants in the immediate vicinity of the process plant site location.
- Undertake detailed hydrogeological programme to assist with the overall site wide water management plan.
- Optimise the overall infrastructure plan to look at a reduced plant footprint and material quantities.

1.20.5 Permitting, environmental and community engagement

Permitting, environmental and community engagement matters of the Project are a critical aspect of the Project's progress. The following aspects should be advanced / improved in the further development of the Project:

- Complete the EIA as part of the wider GOP permit application. This will include the various required environmental baseline surveys for the areas under consideration.
- Complete a comprehensive ESIA study that will quantify the potential impacts of the Project and to design mitigation or enhancement measures to reduce, minimise, avoid or remediate negative impacts to the environment and communities, with special regard to:
  - biological environment, to include assessment of potential effects on the Natura 2000 network and other protected areas
  - cultural heritage, to include avoidance of impacts on UNESCO World Heritage Site
  - physical environment, such as impacts on water resources, air quality, noise and vibration, landscape etc.
  - socio-economic and health impacts on local communities.
- To continue and intensify efforts of local stakeholder engagement, including public consultation on the scope of the ESIA . These must be carried out with the goal of better local understanding of the Project and its potential benefits and risks.

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