LITHIUM IONIC

BANDEIRA LITHIUM PROJECT ARAÇUAÍ–ITINGA

NI 43-101 Feasibility Study Technical Report
Minas Gerais, Brazil

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ABBREVIATIONS, ACRONYMS, AND UNITS OF MEASURE

2-D	two dimensional
3-D	three-dimensional
AACE	American Association Cost Estimation
AAS	atomic absorption spectrometry
ACT	Avaliação de conformidade técnica
ADA	Directly Affected Area
AMG	Advanced Metallurgical Group
ANM	Agência Nacional de Mineração
ANM	National Mining Agency
APP	Área de Preservação Permanente
AvgD	average Euclidean distance to sample
Bandeira	Alvo Bandeira Lithium
BEV	battery-electric vehicles
BRP	room-and-pillar
BSL	sublevel open stope
BWi	Bond ball mill work index
C$	Canadian dollar
CAGR	compound annual growth rate
CAPEX	capital cost
CAR	Cadastro Ambiental Rural
CBL	Companhia Brasileira do Lítio
CEMIG	Centrais Elétricas de Minas Gerais
CETEM	Centro de Tecnologia Mineral
CFEM	Contribuição Financeira para Extração Mineral
CIF	cost, insurance, and freight
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
EIA	Environmental Impact Study and Environmental Impact Report
CONAMA	Conselho Nacional do Meio Ambiente
COPAM	State Council for Environmental Policy
CSS	closed-side setting
CWi	Bond crushing (impact) work index
DDH	diamond drill hole
Definition Standards	CIM Definition Standards for Mineral Resources & Mineral Reserves
DLS	dense-liquid separation
DMS	dense media separation
DSO	direct-shipped ore
EB	Emergency Brigade
EBITDA	earnings before interest, taxes, depreciation, and amortization

EBPP	Eastern Brazilian Pegmatite Province
ESG	environmental, social and governance
ESS	not spelled out
EV	electric vehicle
Falcon Metais	Falcon Metais Ltda.
FED	Floresta Estacional Decidual
FTIR	Fourier-transform infrared spectroscopy
FW	footwall
G&A	general and administration
GE21	GE21 Consultoria Mineral
Guidelines	CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines
HLS	heavy-liquid separation
HSE	Health, Safety, and Environment
HW	hanging wall
ICE	internal-combustion engine
ICMS	Imposto sobre Circulação de Mercadorias e Serviços
ICP-OES	inductively coupled plasma–optical emission spectroscopy
IDW	inverse distance weighting
IEF	Instituto Estadual de Florestas
IFNMG	Instituto Federal de Educação, Ciência e Tecnologia do Norte de Minas Gerais
impact work index	Bond crushing
IP	induced polarization
IP/IT	intermediate-low P and T
IRA	Inflation Reduction Act
IRR	internal rate of return
ITEP	Instituto Educacional Técnico Polivalente
L&M	L&M Advisory
LCE	lithium carbonate equivalent
LCT	lithium–cesium–tantalum
LHD	not spelled out
LI	implementation license
LI	Licença de Instalação
LO	Licença de Operação
LOM	life-of-mine
LP	Licença Prévia
LP	preliminary license
LP/HT	low-P/high-T
M&I	Measured and Indicated
MGLIT	MGLIT Empreendimentos Ltda.

MME	Ministério de Minas e Energia
MP/MT	medium-pressure and medium-temperature
MRMR	mining rock mass rating
MSO	Mineable Stope Optimization
MTO	materials take-off
NN	nearest neighbour
NPV	net present value
NYF	niobium–yttrium–fluorine
OK	ordinary kriging
OPEX	operating cost
P	pressure
P–T	pressure–temperature
P100	% passing
PAE	Plano de Aproveitamento Econômico
PCA	Environmental Control Plan
PCA	Plano de Controle Ambiental
PEC	Engenharia e Consultoria Ltda
PRA	price reporting agency
PSA	particle-size analysis
PSER	Plan of Safety and Emergency Response
QA/QC	quality assurance and quality control
QP	Qualified Person
R$	Brazilian Real
RAIPA	Relatório de Avaliação de Impacto ao Patrimônio Arqueológico
RAIPI	Relatório de Avaliação de Impacto ao Patrimônio Imaterial
RCA	Relatório de Controle Ambiental
RES	resistivity
RL	Legal Reserve
RL	Reserva Legal
RMR	rock mass rating
ROM	run of mine
RQD	rock-quality designation
S1	northwest-dipping schistosity
SEM-EDS	scanning electron microscopy–energy-dispersive X-ray spectroscopy
SG&A	general and administrative sales
SGS	SGS Geological Services
SGS	SGS Geosol
SOP	standard operating procedure
SPO	spodumene concentrate

SQUI	spodumene–quartz intergrowth
SRP	spodumene-rich pegmatites
SUDENE	Superintendência do Desenvolvimento do Nordeste
T	temperature
TAH	Taxa Anual por Hectare
TEC	Tarifa Externa Comum
TFRM	Taxa de Controle, Monitoramento e Fiscalização das Atividades de Pesquisa, Lavra, Exploração e Aproveitamento de Recursos Minerários
TIPI	Tabela de incidência do Imposto sobre produtos industrializados
URA	Unidades Regionais de Regularização Ambiental
US$	United States dollar
Valitar	Valitar Participações S.A.
WBS	work breakdown structure
WWTP	wastewater treatment plant
XRD	X-ray diffraction
XRT	X-ray transmission

1.0 EXECUTIVE SUMMARY

1.1 Project Introduction

The Bandeira Project is a hard-rock spodumene concentrate-producing lithium operation near Araçuaí in the state of Minas Gerais, Brazil. The Project scope is a 1.23 Mt/a underground mining operation supporting a simple crushing and dense-media separation (DMS) concentrator facility. The average life-of-mine (LOM) production is 178 kt/a of 5.5% Li_2O spodumene to be shipped to downstream third-party lithium compound conversion facilities in the global market.

Lithium Ionic (LTH-V) is a Canadian-domiciled company and the parent company of the wholly owned subsidiary, MGLIT Empreendimentos Ltda (MGLIT), the developer of the Project.

MGLIT holds lithium mining rights in the Jequitinhonha Valley in Minas Gerais, and in April 2022 started mineral exploration activities under the Mining Right 832439/2009 called the Bandeira Project. This Project is on a small portion of the total land package held by LTH and does not include resources from other satellite and exploration deposits.

GE21 was commissioned to generate an updated Mineral Resource estimate for this Project. The Mineral Resource was classified per the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) *CIM Definition Standards for Mineral Resources & Mineral Reserves* (Definition Standards) (CIM, 2014), following *CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines* (CIM, 2019) (Guidelines), geostatistical and classical methods, and economic and mining-appropriate parameters relevant to the deposit type.

MGLIT commissioned SNC-Lavalin (now AtkinsRéalis) to perform engineering and generate the capital cost (CAPEX) estimate for the Bandeira Project feasibility study, with Qualified Persons (QP) in the area of mineral processing, CAPEX development, and infrastructure design.

NeoAgro Ambiental prepared the environmental studies that were part of this Technical Report and the consolidation of the report that was filed for the Project's licensing request with the Minas Gerais Department of Environment.

This Technical Report supports Lithium Ionic in publishing the Mineral Resources found in Bandeira, the studies for the development and mining, processing of the ore, and the economic and financial results calculated for Project implementation.

This Technical Report comprises the results of a study to determine the feasibility of mining spodumene-rich pegmatites. The QPs who signed this Technical Report do not foresee significant aspects or associated risks for the operation of the mine and the industrial processing facility that is the subject of this feasibility study.

1.2 Property Description and Location

The Bandeira Project, Agência Nacional de Mineração (ANM) Mining Right No. 832439/2009, comprising 156.77 ha, is in northeast Minas Gerais, near the municipalities of Araçuaí and Itinga, approximately 15 km from Araçuaí and about 620 km from the state capital, Belo Horizonte.

The site is accessed through an established network of paved highways servicing the region. The Piauí River divides the municipalities of Araçuaí and Itinga, and the mineral asset is near the community of Barreiro, near the left bank of this watercourse.

The Project is in a prolific lithium mining and exploration district otherwise known as Brazil's "Lithium Valley." The Project site is on rural land, adjacent to active hard-rock lithium mines operated by Companhia Brasileira de Lítio (CBL) and Sigma Resources.

The spodumene concentrate produced will be exported through the port of Ilhéus in the south of the state of Bahia, to regions with lithium-compound conversion facilities, such as Asia, North America, and Europe.

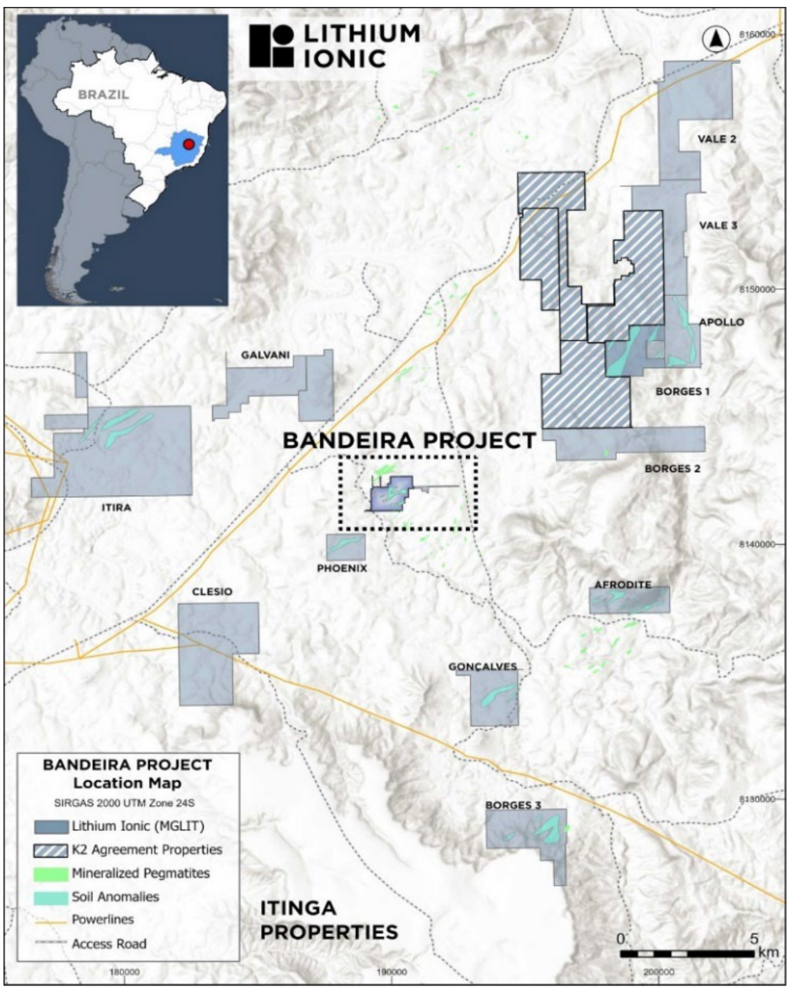


Figure 1-1: Location of the Bandeira Project in the State of Minas Gerais, Brazil

1.3 Accessibility, Climate, Local Resources, Infrastructure, and Physiography

The Project is easily accessed 3 km from the BR367 Federal highway, which connects the city of Gouveia in Minas Gerais with the city of Porto Seguro in Bahia, passing through the cities of Araçuaí and Itinga. It is an asphalt road that recently received an asphalt cover and is in excellent condition on the stretch between Diamantina and Araçuaí.

Araçuaí is served by a municipal airport with a 1,120 m-long asphalt runway, which is used by small private aircraft. The regional airports with regular flights are Vitória da Conquista, Bahia, 275 km from the Project; Montes Claros, Minas Gerais, 330 km from the Project; and Salinas, Minas Gerais, 120 km from the Project.

The region is characterized by a hot, dry, semi-arid climate. The average temperature is 24.5°C, with an average rainfall of 750 mm. The driest period of the year is June, and the rainiest period is December. There is no harsh cold season. Geological exploration activities can take place year-round, with minor interruptions for a short period of heavy rains. The topography of the region where the Project will be implemented presents hills and valleys with elevation differences of less than 100 m. The Piauí River borders the western side of the operational area. Site administrative facilities will be west of the river, and mining and processing operations will be east of the river. A bridge constructed early in the Project timeline will span the river and provide easy access to the full Project area from the nearby highway.

The site staffing plan comprises a local workforce supported by regional cities and communities. Staff members are to be bussed into site from accommodations in nearby Aracuaí and Itinga. The Araçuaí Campus of the Instituto Federal de Educação, Ciência e Tecnologia do Norte de Minas Gerais (IFNMG) (Federal Institute of Education, Science and Technology of North Minas Gerais) and the Araçuaí Instituto Educacional Técnico Polivalente (ITEP) (Polyvalent Technical Educational Institute) can train technicians in surveying, mining, environment, informatics, and occupational safety. In addition, higher education courses in administration; systems analysis and development; agricultural and environmental engineering; and health management can prepare residents for wok with MGLIT.

A 138 kV Centrais Elétricas de Minas Gerais (CEMIG) (Minas Gerais Power Plants local power utility) transmission line that is supplied by the Irapé hydroelectric plant passes within 3 km of the Project area and will supply 7 MW of low-carbon power to the site. The cities of Araçuaí and Itinga and surrounding region will supply the Bandeira Project with various services, such as food, transportation, logistics, labour, and accommodation.

1.4 History

MGLIT started its activities in November 2021, with seven mining rights in the municipalities of Araçuaí and Itinga, totalling about 1,300 ha. In May 2022, Lithium Ionic was listed on the Toronto Venture Stock Exchange under the symbol LTH-V.

The area to the north of the Bandeira Project has been actively mined by CBL since 1991 using similar underground mining and DMS processing methods. In 2023, Sigma Resources, directly northeast of the Project, began open pit operations and commissioned its Xuxa DMS concentration plant. Several other exploration companies remain active in the Lithium Valley area.

The Bandeira Project area was unexplored until initial drilling began with LTH and MGLIT in 2022. By March 2023, there were sufficient geological data to reasonably support an industrial spodumene-concentration operation. As a result, AtkinsRéalis, an engineering company, was engaged to carry out an economic feasibility study for the Project. In parallel to this, GE21 completed a preliminary economic analysis on an earlier resource statement, published in November 2023.

In June 2023, SGS published an initial NI 43-101-compliant Mineral Resource estimate on the Bandeira Project. Using this information, GE21 published a Mineral Resource update in August 2023. Additional drill data up to November 2023 further added to the geological database, and form the basis used by GE21 to generate the Mineral Resource estimate used in this report.

1.5 Geological Setting and Mineralization

The Bandeira Project lies in the Middle Jequitinhonha River valley, northeastern Minas Gerais—the Lithium Valley. The region is part of the Eastern Brazilian Pegmatite Province (EBPP), one of the largest pegmatite provinces in the world, with about 150,000 km^2 (see synthesis and references in Pedrosa-Soares et al., 2011, 2023). The EBPP resulted from the magmatic and tectono-metamorphic events that formed the Araçuaí Orogen from the Early Ediacaran (ca. 630 Ma) to the Late Cambrian (ca. 490 Ma). The major EBPP pegmatite populations found within the Araçuaí Orogen have been grouped into twelve pegmatite districts that include residual pegmatites (representing late silicate melts released by fractional crystallization of parent granites) or anatectic pegmatites (formed directly from partial melting of country rocks). Among them, the Araçuaí Pegmatite District includes hundreds of residual pegmatites of distinct subclasses, types, and sub-types of the rare-element class (B, Be, Cs, Li, Sn, Ta). They comprise two main groups of rare-element pegmatites:

- The generally thick (up to 100 m), zoned, complex lithium–cesium–tantalum (LCT) pegmatites with several lithium minerals (e.g., elbaite, lepidolite, Li-phosphates, petalite, or spodumene) and other rare-element minerals (e.g., beryl, Bi-minerals, cassiterite, pollucite, schorlite, Ta-minerals), displaying roughly concentric to irregularly shaped primary zones (marginal, graphic or wall, and intermediate zones, and quartz cores) cut by albite-bearing replacement bodies and fracture fillings with gem-bearing pockets.
- The relatively thinner, non-zoned to poorly zoned, spodumene-rich pegmatites (SRP) with rather simple mineralogical assemblages that include spodumene (up to 35 vol%), albite, perthite, quartz, and muscovite (together forming up to 90 vol%–95 vol%), and accessory minerals, such as cookeite, Li-phosphates, petalite, cassiterite, Nb-Ta oxides, graphite, Fe-Mn oxides, and zabuyelita.

Both LCT pegmatites and SRP bodies commonly show unidirectional solidification textures outlined by minerals (e.g., mica, spodumene, tourmaline) oriented roughly orthogonal to the contacts with the host rocks (or to any other lower-temperature surface inside the pegmatite, such as host rock xenoliths). The rare-element pegmatites of the Araçuaí District are related to granitic intrusions, mostly composed of peraluminous (S-type), sub-alkaline to alkaline, muscovite-bearing leucogranites with pegmatoid cupolas, of the Cambrian (535–500 Ma) post-collisional (post-tectonic) G4 supersuite of the Araçuaí Orogen.

The Itinga Pegmatite Field, in the central part of the Araçuaí Pegmatite District, contains the most important discoveries of lithium deposits in Brazil since the 1950s, both in terms of economic resources and geological potential. As with other lithium-rich pegmatite populations worldwide, the favourable geological conditions for the outstanding abundance of both SRP and LCT pegmatites in the Itinga Field are due to:

- The relatively low-pressure and high-temperature regimes of the regional and contact metamorphisms, recorded by the dominant country rocks (quartz-mica schists with andalusite or cordierite or sillimanite).
- The profusion of two-mica granite intrusions with pegmatoid cupolas emplaced in relatively shallow crustal levels.

The Itinga Pegmatite Field includes the spodumene mines and deposits of CBL and Sigma Lithium, as well as MGLIT´s properties of its Bandeira Project. The lithium ore bodies exploited since the early 1990s in CBL's underground mine display a closely spaced swarm of relatively narrow (6 m thick on average) but long (up to 700 m along strike) non-zoned SRPs. In the Sigma Lithium properties, where several large SRPs are found (e.g., Barreiro, Murial, and Xuxa), an open pit mine is being developed on the Xuxa SRP deposit (15 m thick x 1,800 m long x 500 m). Regardless of their sizes, most pegmatites of the Itinga Field are (sub-)parallel to the prominent northeast–southwest structural trend outlined by the regional ductile foliation (the schistosity S1: NE strike/NW dip) and late-spaced cleavage (S2: NE strike/SE dip). However, flat-lying, or high-angle dip joint systems can also host some lithium-mineralized pegmatites.

Also following the regional northeast–southwest structural trend, the Bandeira deposit comprises northeast-striking swarms of SRPs, including concordant SRP bodies, hosted by the northwest-dipping schistosity (S1), and discordant SRP bodies, emplaced along a southeast-dipping fracture system (the S2 spaced cleavage), as well as a few mineralized pegmatites hosted by late, flat-lying joints. They show sharp contacts with a cordierite–quartz–mica schist that may be enriched in decussate micas, tourmaline, and cordierite porphyroblasts, recrystallized along narrow (cm to dm) fringes of contact metamorphism which may also be anomalous in lithium content. The Bandeira pegmatites are tabular bodies with convex, lens-shaped terminations, arranged in tight and staggered (en-echellon) swarms, locally with branched connections linking ore bodies. Single SRP bodies normally reach hundreds of metres along strike, ranging in thickness from a few decameters to decimeters, with the discordant SRP bodies tending to be thicker than the concordant ones. With known downdip-width up to 800 m, several Bandeira SRP bodies remain open in depth. The Bandeira ore bodies show a rather simple mineralogical assemblage, consisting of medium (3 cm–10 cm) to very coarse-grained (>30 cm) spodumene crystals (up to 30 vol%) within a fine- to medium-grained matrix composed of albite, perthitic microcline, quartz, and muscovite, with generally scarce (<5 vol% in total) accessory (montebrasite, Nb-Sn-Ta oxides) and secondary minerals (cookeite, sericite, zabuyelita, Fe-Mn oxides, clay minerals). Petalite has been found in some drill cores and thin sections, mostly occurring in the SRP matrix as very fine- to fine-grained (sub-millimetre to 1 cm) crystals and, more rarely, in coarse-grained crystals locally found in a few core intervals. The thicker SRP bodies generally show a barren external zone rich in albite (which can be rather discontinuous), followed inwards by an internal zone rich in disseminated spodumene (although spodumene may also be more concentrated in some domains than others along the internal zone). The thinner SRP bodies generally lack the external lithium-barren zone, showing disseminated spodumene along the whole ore body. Unidirectional solidification textures outlined by tabular to telescope-shaped spodumene crystals are common in the Bandeira SRP ore bodies. Thin albite-rich pegmatites, barren to poor in lithium, are also found in the Bandeira SRP swarms. The exploration drilling work revealed two main SRP swarms in the Bandeira deposit: the northern swarm, with thicker and longer SRP bodies; and the southern swarm, with smaller SRP bodies.

1.6 Exploration

Since 2022, MGLIT has completed a trench sampling program, rock-chip sampling programs, structural mapping, and geophysical surveys on the Project property. In all, 26 trenches totalling 1,731 m were completed in 2023 at the Bandeira target.

Some basic field data, such as outcrop attitude (strike and dip), foliation, and cleavage were used to locate several occurrences of spodumene previously unknown or unreported. Since this initial discovery, MGLIT rapidly advanced the Project with diamond drill testing of the targets and the pegmatite system.

1.7 Drilling

All drilling activities conducted within the Bandeira Project until November 2023 have been incorporated into the Mineral Resource estimation process (Table 1-1). It is important to note that any drill holes completed after this date, as well as pending sample assay results, have not been considered for the Bandeira Project in the drill summary shown in Table 1-1.

Table 1-1: Bandeira Diamond Drill-Hole Summary

Year	Drill Holes	Length (m)
2022	52	5,930
2023	130	42,230
Total	**242**	**48,160**

1.8 Sample Preparation, Analysis, and Security

Sample intervals in the mineralized zones are defined based on a 1.0 m support. Mineralized samples must have a minimum length of 1.0 m and a maximum length of 1.5 m. In some specific situations, samples shorter than 1.0 m can be generated.

Drill-core samples are prepared and analyzed by an independent commercial laboratory—SGS Geosol. The SGS Geosol facility is certified in ISO 9001, ISO 14001, and ISO 17025. The sample shipment was delivered to the SGS Geosol facility in Vespasiano, Minas Gerais, Brazil, via a parcel transport company.

All samples received at SGS Geosol were inventoried and weighed before processing. Samples were dried at 105°C, crushed to 75% passing (P_{75}) a 3 mm sieve, homogenized, split (Jones Riffle Splitter), and pulverized (250 g to 300 g of sample) in a steel mill to P_{95} 150 mesh.

Samples are prepared from HQ- and NQ-diameter drill cores (63.5 mm and 47.6 mm core diameter, respectively). The sampling procedures described in this section reflect MGLIT's current standard operating procedures (SOP).

The sample batch composition includes five quality control samples for every 30 regular samples. The quality control composition of the batches is:

- Coarse (preparation) and fine (analytical) blanks: 6% of the batch, or two blanks per batch—one of each type.
- Standards: 6% of the batch, or two standards per batch.
- Crushed duplicates: 3% of the batch, or 1 sample per batch.
- Pulverized duplicates: 3% of the batch, or 1 sample per batch.

MGLIT has submitted check assay batches for analysis at the ALS Laboratory in Vancouver, British Columbia. This procedure is used to verify the reliability of the primary laboratory results by crosschecking it with a secondary reference laboratory.

The QP believes that the sampling, sample preparation, security, and analysis performed by MGLIT and hired companies are suitable for a feasibility study-level Mineral Resource estimate. Quality assurance procedures follow industry best practices, and quality control results are within industry standards, attesting to the quality of the database information.

1.9 Data Verification

Mr. Carlos José Evangelista Silva, an independent QP for geology exploration and mineral resource estimates, conducted a site visit at the Bandeira Project on September 13 and 14, and December 13, 2023. MGLIT allowed unlimited access to the Company's facilities during this time.

All verified procedures related to sampling management, storage, logging, sample preparation, and assay were checked, and they are considered to be within acceptable limits and in compliance with mineral-industry practices. Rock-type descriptions fit with the checked mineralization style.

1.10 Metallurgical Testing and Mineral Processing

The coarse mineralization exhibited by the Bandeira deposit allows for a simple processing flowsheet featuring dense-media separation (DMS). No flotation or fines-recovery circuits are included in the process design. The selected flowsheet is consistent with the region and is used at both CBL and Sigma operations. Based on this, a comprehensive testing program was developed to prove that the DMS process would be suitable for ores originating from the Bandeira Project.

Metallurgical samples and composites were prepared to represent the bulk ore body and perform variability studies to ensure geo-metallurgical performance is well understood. A variability study was completed to understand mineralogy and validate the process design criteria. All metallurgical samples were sourced from diamond drill-core samples.

Process characterization benchtop testwork was completed at SGS Geosol in Vespasiano, using heavy-liquid separation (HLS) to determine dense-media separation (DMS) as a viable solution to producing a marketable concentrate. This testwork generated target DMS densities for subsequent rougher and scavenger stage testwork. Initial ore sorting tests were completed using Tomra which demonstrated value in a crushing stage gangue removal process to manage mine dilution.

Follow-up pilot plant operation was completed at Steinert (ore-sorting) and SGS in Belo Horizonte (DMS). This work processed bulk and specific variability samples to determine ideal operating parameters to support generating a 5.5% Li_2O concentrate. The results of this testwork indicated that an overall plant recovery of 68.9% can be achieved with ore-sorting and 2-stage DMS (rougher and scavenger step) to produce 5.5% Li_2O concentrate, with an iron content substantially lower than the target 1% threshold limit in concentrate.

1.11 Mineral Resources Estimate

This feasibility study is based on an updated Mineral Resource estimate for the Bandeira Project, which is summarized in Table 1-2.

Table 1-2: Bandeira Mineral Resource Estimate (Base-Case Cut-off Grade of 0.5% Li_2O)

Category	Resource (Mt)	Grade (% Li_2O)	Contained LCE (kt)
Measured	3.42	1.39	117.61
Indicated	17.52	1.34	578.92
Measured + Indicated	20.95	1.35	696.52
Inferred	16.91	1.40	583.53
Total	**37.85**	**1.37**	**1,280.06**

Notes:

1. *The spodumene pegmatite domains were modelled using composites with Li_2O grades greater than 0.3%.*
2. *The Mineral Resource estimates were prepared using CIM Definition Standards and CIM Guidelines, using geostatistical and classical methods, plus economic and mining parameters appropriate to the deposit.*
3. *Mineral Resources are not ore reserves or demonstrably economically recoverable.*
4. *Grades reported use dry density.*
5. *The effective date of the Mineral Resource estimate was November 13, 2023.*
6. *Geologist Carlos José Evangelista da Silva (MAIG #7868) is the QP responsible for the Mineral Resource estimates.*
7. *The Mineral Resource estimate numbers provided have been rounded up to estimate relative precision. Values cannot be added accurately due to rounding.*
8. *The Mineral Resource estimate is delimited by Lithium Ionic Bandeira target claims (ANM).*
9. *The Mineral Resource estimate was estimated using ordinary kriging in 12 m x 12 m x 4 m blocks.*
10. *The Mineral Resource estimate report table was produced using Leapfrog Geo software.*
11. *The reported Mineral Resource estimate contains only fresh-rock domains.*
12. *The Mineral Resource estimate was restricted by RPE3 with grade shell using 0.5% Li_2O cut-off.*
13. *To convert percentage lithium (Li) to percentage lithium oxide (Li_2O), multiply by 2.153; to convert Li to lithium carbonate (Li_2CO_3), multiply by 5.323. To convert a percentage of Li_2O to Li_2CO_3, multiply by 2.472.*

The Bandeira Mineral Resource estimate contains Measured and Indicated (M&I) Mineral Resources of 20.95 Mt grading 1.35% Li_2O, containing 696,525 tonnes of lithium carbonate equivalent (LCE), the benchmark-equivalent raw material used in the lithium industry, in addition to Inferred Mineral Resources of 16.91 Mt grading 1.40% Li_2O, or 583,534 tonnes of LCE.

The Mineral Resource estimate used for the Bandeira Project study is based on 182 diamond drill holes conducted on the Bandeira property before November 13, 2023.

1.12 Mineral Reserve Estimate

Table *1-3* shows the Mineral Reserve estimates for the Bandeira Project.

Table 1-3: Bandeira Underground Project Mineral Reserve Estimate, dated February 20, 2024

Category	Mass (dry Mt)	Grade (diluted) (% Li_2O)	Contained LCE (kt)
Proven	2.30	1.17	66.38
Probable	14.90	1.15	422.66
Total	**17.20**	**1.16**	**492.15**

Notes:

1. *The Mineral Resource estimate dated November 13, 2023, is the basis for the Mineral Reserve estimate.*
2. *Only the Measured and Indicated Mineral Resources for the Project have been considered as potentially economic for the mining study.*
3. *Conventional sublevel stoping and room-and-pillar mining methods and equipment have been proposed.*
4. *Ore reserve grades are diluted along lithological boundaries and assume a selective mining operation.*
5. *For the sublevel stoping mining method, ore reserve volumes and tonnages assume 90% mine recovery, 14% planned dilution, and 0% operational dilution since the stopes are being cabled.*
6. *For the room-and-pillar mining method ore reserve volumes and tonnages assume 100% mine recovery, 9% of planned dilution and 10% of operational dilution due to over-breaking.*
7. *For the ore from development works, ore reserve volumes and tonnages assume 100% mine recovery, 46% of planned dilution and 10% of operational dilution due to over-breaking.*
8. *Considering all three variations of extraction methods adopted in this Project, the average dilution rate is 17%.*
9. *An original assumed set of optimization parameters was used in the derivation of the current LOM plan, which was issued before the completion of the feasibility study.*
10. *The Mineral Reserve estimate has been reported within an optimized and engineered underground mining project with a total of 3.27 Mt of waste materials originated from the development works, determined assuming a long-term Li_2O price of US$1,900/t of concentrate with 5.5% Li_2O content.*
11. *The processing plant is expected to consume at a maximum feed rate of 1.3 Mt/a (dry basis).*

1.13 Mining Methods

The mining design of the Bandeira Project encompasses two underground mining methods. Primary mineral bodies or the main ore bodies, representing 16.2 Mt of the deposit, are extracted using a sublevel open-stope method, from bottom up the panel. Simultaneously, the southeast secondary mineral body, comprising 1.0 Mt of ore, will be mined using the room-and-pillar method. The selection of the mining method takes into account the dip of the ore lenses, with the room-and-pillar portion of the mine being horizontally oriented and the sub-level stope portion being more vertically oriented.

Three geomechanical domains were established through geotechnical characterization based on drill-core samples. This process involved identifying main lithotypes, determining fracture patterns, rock mass rating (RQD) indices, degree of alteration, and spacing of the discontinuities associated with the intervals. The information obtained was sufficient for defining rock resistance properties, supporting geotechnical parameters, and providing the necessary data for the development of mine project work during the feasibility study stage.

The average run-of-mine (ROM) ore production over the LOM is scheduled for 1.23 Mt/a on a dry basis. A gradual increase in ore production will occur over the initial years until reaching the nominal Project capacity in the second year following plant commissioning.

The mine operation schedule will consist of three six-hour shifts per day, with a two-hour interval between shifts for mining ventilation to dissipate blasting gases. The mine will operate 360 days per year, totalling 6,480 hours of planned production per year.

Access to the underground mine of the Bandeira Project will be through two main ramps at the ore body's footwall, with one of them dividing into two supporting the room-and-pillar and sub-level stope portions of the mine.

The optimization process resulted in a diluted ROM mass of 0.97 Mt 1.05% Li_2O for the portion mined by the room-and-pillar method, a mass of 14.27 Mt 1.19% Li_2O for the portion mined by the sublevel open-stope method, and a mass of 1.96 Mt at 0.97% Li_2O for the ore originating from development works.

The mine will be supported with a mechanical ventilation system consisting of fans and exhausts. Clean-air supply to the underground mine will be obtained through the ramps, two air-intake raises, and four exhaust raises.

1.14 Recovery Methods

1.23 Mt/a (average LOM) of ROM containing 1.16% Li_2O from the underground mine will be processed to produce 178 kt/a of concentrate containing 5.5% Li_2O with no penalty elements. The simplified process diagram is shown in Figure 1-2.

ROM will be comminuted through a primary jaw crusher, a secondary cone crusher, followed by classification screens. Two pre-concentration ore-sorters integrated into the crushing circuit will remove non-lithium bearing material from the process prior to DMS processing. As a product of the comminution, classification, and pre-concentration circuits, three flows with different particle-size fractions will be generated: −19.1 +7.5 mm, −7.5 +0.50 mm, and −0.50 mm.

The coarse fraction (−19.1 +7.5 mm) will feed the coarse DMS circuit. The medium fraction (−7.5 +0.50 mm) will feed the medium DMS circuit. Each DMS circuit will consist of protective screens, dense medium cyclones, magnetic separators, degaussing coils, dense-media recovery system, tanks, boxes, pipes, and pumps for handling.

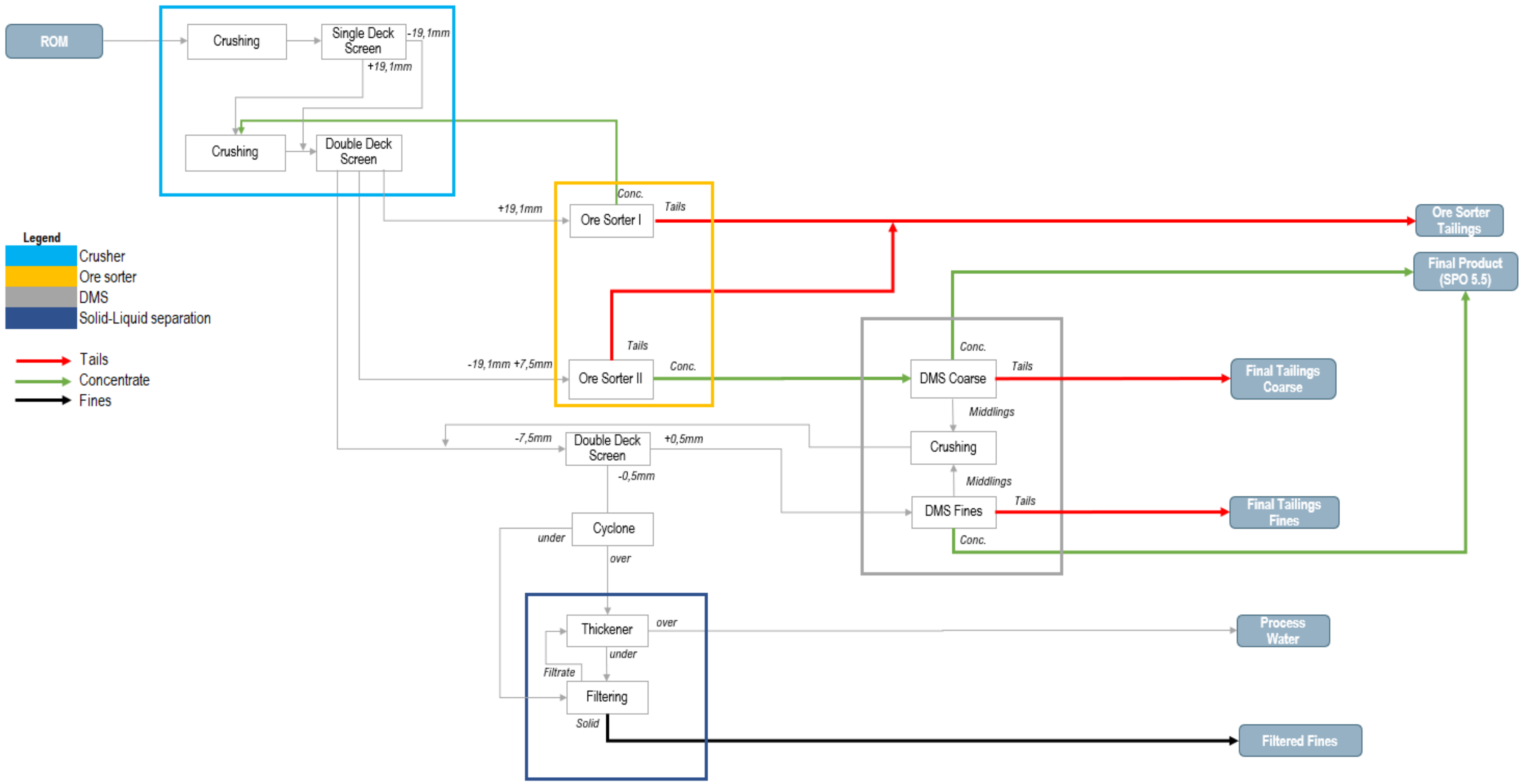


Figure 1-2: Simplified Process Diagram

The fine material (−0.50 mm) will be classified by cyclone when the overflow is dewatered in the thickener, while cyclone underflow is dewatered in a belt filter. The filtered fines will be treated as reject material; however, it will be stockpiled separately for concentration applications to be studied in the future.

Equipment for storing, preparing, and dosing plant consumables are provided to support thickener flocculant and DMS ferrosilicon (FeSi). Crushing, sorting, pre-concentration, thickening, and filtration circuits will have an operating time of 70% of calendar hours. The DMS circuits will have an operating time of 85% of the calendar hours.

1.15 Project Infrastrucutre

The existing regional infrastructure, with easy highway access, readily available low-carbon power, established road and air transportation, and proximity to ports and logistics hubs, provide a good basis for Project development with minimal off-site CAPEX required.

The on-site infrastructure design features all the requirements necessary for supporting the Project. A full complement of semi-modular office, administration, mess hall, medical, fire, warehousing, and maintenance buildings are provided in the Project CAPEX. The site operating philosophy does not incorporate a camp—employees will be bussed to the site.

The plant will be supported with compressed-air facilities, reagent and consumables storage, and supporting maintenance facilities. The plant construction is a lean design, typical of warm climate operations, using minimal enclosures. Mobile cranes are used in lieu of overhead gantry cranes for routine and shutdown maintenance.

The mine is supported by an explosives magazine and batch plant, guarded by a security checkpoint. A ventilation system is designed to support the underground operation. Ancillary services are provided, including a mine dispatch and the standard underground mining safety requirements, such as refuge areas. Two portals are at surface to service access to the two underground ramps.

Tailings (DMS rejects and filtered fines) are to be stored in a dry stack, suitable for the very coarse nature of the DMS plant rejects. Since there will be no fine grinding and flotation, a fine-slurry tailings storage facility is not required. Waste stockpiles have been designed in accordance with geotechnical design criteria provided by external consultants.

Fresh or raw water is primarily sourced from the Piauí River, with the Jequitinhonha River an alternative source. Plant process water is reclaimed from thickener and filter operations, and reused as dilution water. Waste dumps and site run-off water is collected via drainage-capture ditches. Potable water and sewage treatment plants are provided and sized to support the on-site workforce. Oil-water separators and effluent treatment are provided to manage mobile equipment wash bays and general maintenance areas.

Site power will be provided by a new 3 km 138 kV transmission line. A new main substation will be built on site to lower the voltage from 138 kV to 13.8 kV. The 13.8 kV will be distributed to the secondary substations in the e-house through overhead distribution networks.

The scope of instrumentation, control, and automation consists of a process control system that enables plant operation. Telecommunications systems will enable the implementation and management of the information technology (IT) services required for the plant and supporting site.

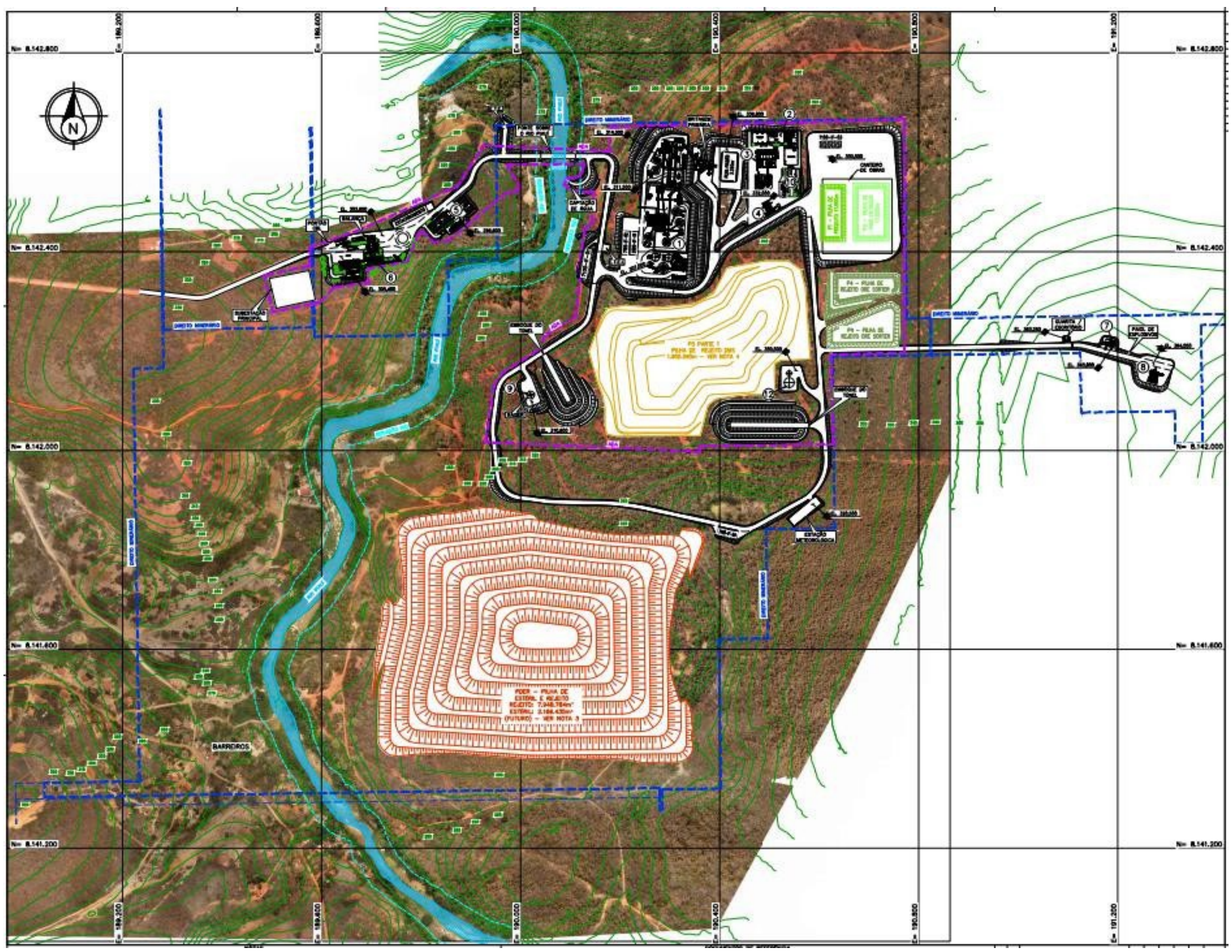


Figure 1-3: Master Plan

1.16 Market Studies

Fastmarkets, an international lithium product supply consultancy, was engaged to study the viability of marketing 5.5% Li_2O concentrate and provide a benchmark pricing project to be used in the economic model. Fastmarkets forecasts of lithium and its compounds related to the consumption, supply, and prices of spodumene, carbonate, and lithium hydroxide chemicals (LCE).

Fastmarkets' macroeconomic outlook, which was updated in April 2024, predicts global economic growth (measured by real GDP, purchase power parity) reaching 2.6% in 2023 before rising to 3.2% in 2024 and 3.3% in 2025. The expected higher overall global economic growth has the potential to boost consumer demand for batteries, especially for non-EV products such as energy storage systems (ESS) and power tools. This higher demand could pose a positive risk to the demand side.

Fastmarkets forecast demand from battery-electric vehicles (BEV) to increase at a compound annual growth rate (CAGR) of 10% to 1.35 Mt of LCE in 2034 from 498,000 tonnes of LCE in 2024. Demand for lithium-ion batteries from battery-swapping terminals, energy-storage systems, consumer electronics, power tools, and telecoms and data are expected to add an additional 754,000 tonnes of LCE demand by 2034. Lithium-ion batteries are forecast to contribute 97% of total lithium demand by 2030.

Fastmarkets forecasts that hydroxide, carbonate, and spodumene prices will average $18.9/kg, $18.30/kg, and $1,450/t, respectively, between 2024 and 2030.

Fastmarkets still expects ongoing volatility in the global lithium market, driven by restocking and destocking cycles, as well as periods of surplus supply followed by supply disruptions and supply deficits later in the decade. The results of this study are shown in Figure 1-4.

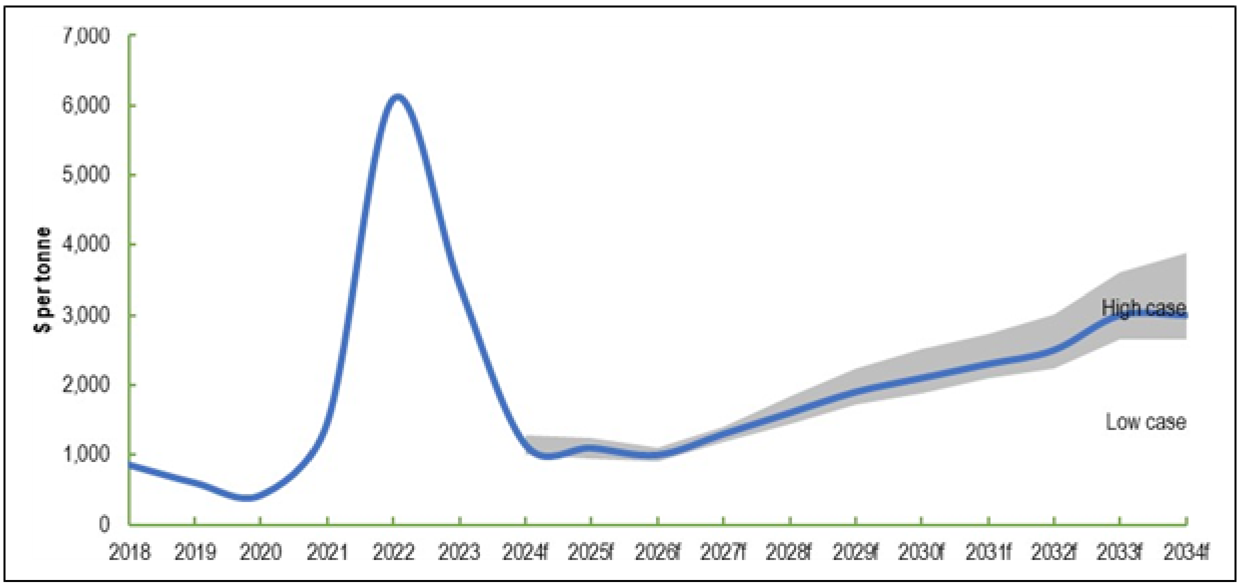


Figure 1-4: Fastmarkets Spodumene 6%Li_2O content, CIF China

1.17 Environmental and Social Impact Studies

MGLIT engaged NeoAgro Ambiental to carry out socio-environmental studies for environmental licensing purposes. The Project includes the development and operation of an underground mine for ore extraction and the construction of a unit for the treatment and concentration of spodumene, a lithium-bearing mineral.

The Concomitant Environmental Licensing process (LAC 2) was adopted and contemplates obtaining the preliminary (LP) and Implementation (LI) licenses at the same time. The documents that are part of the licensing application are the Environmental Control Report (RCA) and the Environmental Control Plan (PCA).

The Directly Affected Area (ADA) of the Bandeira Project is a region in the Atlantic Forest biome, in the Jequitinhonha River Valley in northeast Minas Gerais.

1.17.1 Environmental Licensing

The environmental licensing process in Minas Gerais is carried out in accordance with the normative deliberation of the State Council for Environmental Policy (COPAM) No. 217, signed on December 6, 2017, and published on December 8, 2017. This resolution establishes the criteria for classification, according to size and polluting potential, as well as the locational criteria to be used to define the modalities of environmental licensing of enterprises and activities that use environmental resources in Minas Gerais, and other measures.

The concomitant license process (LAC 2) was filed on November 20, 2023, with the number 2023.07.01.003.0000498, comprising the RCA and the PCA. Grants were also requested for the bridge over the Piauí River under No. 2090.01.0008237/2023-90, and surface water uptake under No. 2090.01.0008240/2023-09.

MGLIT submitted to the environmental agency the Location Statement, in accordance with Article 27 of State Law No. 21,972/2016, which states that the Project does not cause a social impact on Indigenous land, on Quilombola land, on cultural property safeguarded in a municipal environmental protection area, in a conservation unit and its buffer zone, or in any area where there is a need relocate existing populations.

1.17.2 Authorizations

MGLIT is the current holder of mining right number ANM 832.439/2009, whose permit No. 3785/2014 was published in the Federal Official Gazette on 05/06/2014. The expiration of the research permit was changed from April 28, 2023, to September 30, 2024, by ANM Resolution No. 76/2021, which determined the suspension of material and procedural deadlines due to the state of public calamity resulting from the Covid-19 pandemic. The transfer of the right by full assignment to MGLIT was confirmed by ANM on February 2, 2021.

Within the LAC2 licensing process, a request was made for the granting of water capture in the Piauí River, at a maximum volume of 110 m^3/h, for use in the mine and Project plant. This request is directed to the Institute of Water Management of the State of Minas Gerais (IGAM). The water capture request has already been granted.

1.17.3 Reclamation and Closure

The Conceptual Mine Closure Plan outlines activities aimed at minimizing impacts during the Project's closure phase. Its primary goal is establishing guidelines and corporate criteria for closure activities approved by the ANM and the Minas Gerais Department of Environment and Sustainable Development (SEMAD). These activities ensure technical and financial conditions for mine closure, transitioning to post-closure status and determining future land use. NeoAgro Ambiental's (2023) Conceptual Mine Closure Plan for the Bandeira Project incorporates final pile configurations with properly sloped sides to ensure the effective execution of the closure strategy. The plan includes a meticulously designed drainage network to control surface water and promote vegetation growth on slope faces. These measures mitigate the visual impact of mining activities and significantly reduce erosive effects.

1.17.4 Community and Government Relations

The Jequitinhonha Valley boasts profound cultural significance for the people of Minas Gerais, renowned for its biodiversity and community dynamics. Moreover, in recent years, the valley has emerged as a significant contributor to the energy transition, with abundant mineral resources such as lithium, cesium, rubidium, tantalum, niobium, rare earth elements, and graphite. This natural wealth holds unique potential to catalyze rapid development within the municipalities, underscoring its pivotal role in regional advancement. The Bandeira Project was designated as a state priority for social and economic development through a memorandum of understanding (MOU) signed on July 17, 2023, by His Excellency Governor Romeu Zema and MGLIT President Mr. Helio Diniz. This agreement grants the Bandeira Project priority status in internal state agency assessments aimed at expediting the licensing process for its implementation.

1.18 Capital and Operating Costs

The capital cost (CAPEX) estimate includes all the direct and indirect costs, along with the appropriate project estimating contingencies for all the facilities required to bring the Project into production, as defined by this feasibility study. The labour rate build-up is based on the statutory laws governing benefits to workers in effect in Brazil at the time of the estimate. Brazilian import tariffs have been applied. The estimate does not include any allowances for scope changes, escalation, and exchange-rate fluctuations.

The CAPEX estimate has the level of accuracy for an AACE Class 3 estimate that is –20% on the low side and +30% on the high side. Contingency is 15% of Project cost before contingency. All costs are in Q2 2024 U.S. dollars.

Table 1-4: AACE Class 3 Capital Cost Estimate

Area	Cost (US$)
Mine	50.5
Plant	102.7
Engineering Services	26.6
General Infrastructure & Others	41.9
Pre-operacional	10.8
Contingency (15%)	33.7
Total	**266.1**

1.18.1 Operational Costs

The operating cost (OPEX) includes the mine, process plant, and general administrative costs (G&A). The LOM overall unit OPEX for the Project is US$64.33/t of ore processed (Table *1-5*). Royalty payments are not included in OPEX but are included in the Economic Analysis in Section 22. All costs are in Q2 2024 U.S. dollars.

Table 1-5: Operational Costs

Description	ROM (US$/t)	SPO (US$/t)
Underground Mine	36.70	253.50
Plant and Tailing Handling	24.63	170.01
G&A	3.00	20.70
Total	**64.33**	**444.21**

1.19 Economic Analysis

L&M Advisory wrote the economic analysis, and AtkinsRéalis edited it for consistency with the format of the report, but the information and opinions contained herein are L&M Advisory's.

L&M Advisory's work was based on information provided by AtkinsRéalis, and responsible for the mine and processing plant design, production schedule, CAPEX and OPEX for the mine and processing plant, infrastructure, logistics, and the information from the market study and product price forecast for spodumene concentrate (SPO) was provided by Fastmarkets.

The base date of the estimates is Q2 2024, with reference exchange rate 1 USD = 5.07 BRL. No escalation was included in the economic analysis, as the discounted cash-flow model was developed using a real dollar basis. The economic model projections exclude any Project debt financing, but include equipment financing. The Project funding is assumed to be through equity for the purpose of this Technical Report. The economic results are calculated as of the start of the pre-production CAPEX phase at the beginning of Year −2.

Table *1-6* summarizes the key elements of the feasibility study financial analysis for the Project, detailed in Section 22. The Project's estimated post-tax, unlevered net present value (NPV) is US$1,308.8 million using a discount rate of 8.0%. The post-tax, unlevered internal rate of return (IRR) is 40.3%, and the average annual earnings before interest, taxes, depreciation, and amortization (EBITDA) is US$304.6 million. The total undiscounted free cash flow generated over the life of the Project is US$3,223.4 million, and the payback period after the startup of the operations is 3.4 years (41 months).

Table 1-6: Financial Results Summary

Financial Analysis	Unit	Post-Tax
NPV @ 8%	(US$ M)	1,308.8
Payback[1]	(years)	3.4
IRR	(%)	40.3
Profitability Ratio	(%)	544.7
EBITDA[2]	(US$ M)	304.6
Total Cash Flow	**(US$ M)**	**3,223.4**

Notes: [1] Undiscounted, after start-up.
[2] Annual average.

Based on the assumptions and parameters used in this Technical Report, the Project is economically viable, given the significantly positive NPV and IRR as compared to the discount rate adopted.

A sensitivity analysis was performed for ±20% variations for SPO concentrate 5.5% Li_2O price, exchange rate, initial CAPEX and OPEX as shown in Figure 1-5 and Table 1-7.

The Project is most sensitive to SPO concentrate 5.5% price followed by exchange rate, initial capital expenditures, and OPEX.

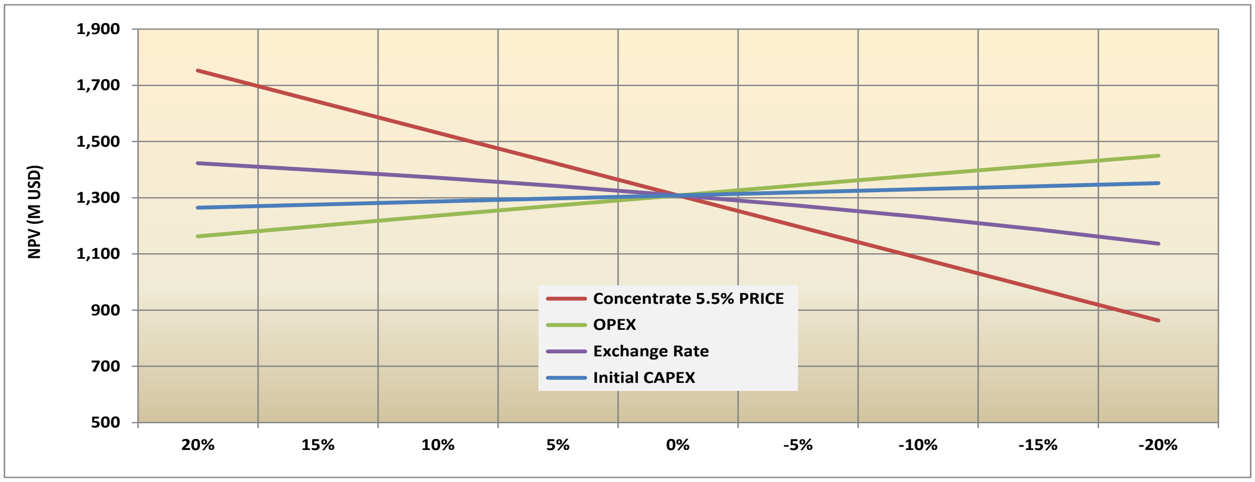


Figure 1-5: Sensitivity for Post-Tax NPV @ 8%

Table 1-7: Sensitivity for Post-Tax NPV @ 8% (US$ M)

Δ (%)	SPO Conc. 5.5% Price	Exchange Rate BRL/US$	Initial CAPEX	OPEX
20	1,752.6	1,422.9	1,265.3	1,163.0
15	1,641.7	1,398.1	1,276.2	1,200.0
10	1,530.8	1,371.1	1,287.0	1,236.5
5	1,419.9	1,341.5	1,297.9	1,272.8
0	1,308.8	1,308.8	1,308.8	1,308.8
−5	1,197.7	1,272.7	1,319.7	1,344.6
−10	1,086.5	1,232.5	1,330.5	1,379.9
−15	975.1	1,187.6	1,341.3	1,415.0
−20	863.7	1,136.8	1,352.1	1,449.9

1.20 Adjacent Properties

The Bandeira deposit is adjacent to the Cachoeira mine, owned by CBL, and the Barreiro, Murial, Nezinho do Chicão, and Lavra do Meio deposits, owned by Sigma Lithium Corporation.

1.21 Interpretation and Conclusions

The technical work performed by MGLIT, its consultants, and key experts, has resulted in the following conclusions:

- Mineral Resources were estimated and limited to the areas outlined using CIM Guidelines and the Mining Rights polygon that comprises the Bandeira Property and the Reasonable Prospect for Eventual Economic Extraction—RPE3.
- The Bandeira Project contains 20.95 Mt of 1.35% Li_2O in the Measured and Indicated category and 16.91 Mt of 1.40% Li_2O in the Inferred category. This Mineral Resource estimate is based on a November 2023 cut-off and does not include more-recent Mineral Resource estimates produced in 2024, or surrounding satellite deposits held by MGLIT.
- The Mineral Reserve estimate for the deposit demonstrates 2.30 Mt of 1.17% Li_2O and 14.90 Mt of 1.15% Li_2O of proven and probable reserves on a diluted basis, respectively.
- The selected underground mining methods of room-and-pillar and sub-level stoping supports the orientation of the deposit and the ability to produce an average of 1.23 Mt/a of ROM for processing. The geotechnical characteristics of the ore body support these mining methods.
- The selected crushing, ore-sorting, and DMS processing methods are suitable for producing a 5.5% Li_2O spodumene concentrate with no perceived penalty elements at a global recovery of 68.9%. This process is demonstrated by adjacent properties and aligns with the deposit’s natural coarse mineralogy.
- The site infrastructure design has all the required components to support the abovementioned operations and respective workforce, and is aligned with typical global mining operations. A primary and backup source of water is readily available.
- The Project CAPEX has been produced at an AACE Class 3 level estimate and encompasses all scope required from start of development in Year −2 through to production. The CAPEX estimate has an appropriate contingency of 15% applied to total Project costs. The CAPEX is estimated at US$266 million net of mobile equipment financing. All customary taxes for Brazil and Minas Gerais have been applied.
- The OPEX estimate has been generated using a first principles buildup using inputs from local labour costs, maintenance, power, consumables, and other standard OPEXs. The on-site cost of US$444/t is achievable for a low-complexity, coarsely mineralized, spodumene deposit such as the Bandeira Project.
- The Project economics show an NPV of US$1.309 million, with a payback of 3.4 years, demonstrating the viability of the Project using an externally generated spodumene concentrate benchmark that accounts for near-term conservative pricing from US$917/t in 2026 to US$1,742/t in 2029. The low CAPEX to NPV ratio of the Project suggests that the largest Project sensitivity is concentrate pricing.
- The Project has completed the necessary social and environmental impact studies to build management plans allowing for compliant operation of the Project. The Project area has a low environmental risk, being outside of ecological reserves and areas of environmental sensitivity. MGLIT has actively engaged government agencies and local communities and has filed the required permits to commence construction and commissioning of the Project.

The above statements indicate that the Bandeira Project has completed a sufficient level of technical study to progress to the next phase of Project engineering and development, targeting a near-term operational strategy.

1.22 Recommendations

The following recommendations are suggested for consideration for further Project improvements:

- Perform infill drilling to test the extent of the current resource and upgrade the classification of near-surface inferred resources for conversion to the 2P reserve.
- Update the Project Mineral Resource estimate to include drilling results through to April 2024.
- Optimize the mine plan and reserve to include the above points and determine the full LOM.
- Conduct a dilution study in the mine to determine the optimal block size and confirm the value of diluted content in the model. Analyze operational strategies to support minimizing dilution of ROM from the underground mine.
- Perform additional geotechnical drilling to further strengthen geotechnical assumptions, and study hydrogeological aspects of the deposit.
- Perform metallurgical testwork to find a suitable processing method for generating a 5.5% concentrate from −0.5 mm fines rejected from the processing circuit.
- Optimize the overall Project CAPEX to improve economics. Review planned equipment rental costs against capital leases. Assess plant design and layout opportunities through the consolidation of parallel screening-unit operations, labour-intensive re-handling of middlings, and cut-and-fill optimizations of plant equipment.
- Permit and design the necessary infrastructure to support the Jequitinhonha River water supply as a backup to the Piauí River raw water source.
- Once permits are received, commence engineering and schedule pre-works of a bridge structure over the Piauí River to support site development and construction. With receipt of the LAC permit, follow up with the subsequent submission of the EIA/RIMA to support with permitting of all future site structures.

2.0 INTRODUCTION

MGLIT Empreendimentos Ltda (MGLIT) embarked on a successful exploration for lithium minerals at the Bandeira Lithium (Bandeira) project in April 2022, under a service agreement with GE21 Consultoria Mineral (GE21). In September 2022, MGLIT assumed full control of the exploration operations. Since then, the project has seen significant growth, with an expanded team and increased rig count, leading to a promising projection of Mineral Resources in the Bandeira project.

The Bandeira ore body has proven to be a highly productive target from the outset, with minimal setbacks and consistent discovery of substantial intersections and promising lithium oxide content. In line with Lithium Ionic strategic vision, MGLIT made the pivotal decision to pursue a lithium mining project in March 2023 and engaged AtkinsRéalis to conduct an economic feasibility study of the Project.

AtkinsRéalis was entrusted with the task of defining the production processes of the spodumene mine and concentration unit. Their involvement, which commenced in May 2023, underscores MGLIT’s commitment to sound project management and the rigorous approach being taken.

The decision of whether extraction should be carried out in an open pit or an underground mine has been guided by a range of factors, including environmental and social considerations, the proximity to the Piauí River, the size of the mine's waste piles, and the local legacy we aim to leave. These factors, in line with MGLIT's guiding environmental, social, and governance (ESG) principles, led us to the strategic choice of an underground mine, particularly for the deeper bodies.

Despite deciding on an underground mine, two studies were commissioned to provide guidance on the best method for ore extraction. The first evaluation, led by underground mine specialist Mr. Fabio Neto of Engenharia e Consultoria Ltda (PEC), drew from his extensive experience at the Morro Velho mine, currently AngloGold Ashanti. GE21 conducted the second study and arrived at similar conclusions, aligning with the strategic direction of MGLIT’s concept and reinforcing the soundness of the project's approach.

SGS Canada of Montréal was contracted for the Bandeira project's mineral resources certification. SGS Canada had already certified Sigma Lithium and Latin Resources, which we believe was an important credential to back up our case. Preliminary Mineral Resources estimates were released on June 27, 2023, indicating a total volume (mass) of 16 Mt of ore with an average lithium oxide content of 1.41% by weight.

2.1 Terms of Reference

Mineral Resources for the Bandeira Deposit are reported using the 2014 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) CIM Definition Standards for Mineral Resources & Mineral Reserves (Definition Standards) (CIM 2014). This feasibility study is based, in whole or in part, on internal reports and references listed in Section 27 of this report.

The quality of information, conclusions, and estimates contained here in are consistent with the level of effort based on:

- Information available at the time of preparation.
- Data supplied by outside sources.
- Assumptions, conditions, and qualifications outlined in this Technical Report.

2.2 Site Visits

In accordance with NI 43-101 guidelines, the following Qualified Persons (QP) from AtkinsRéalis, GE21, and L&M Advisory visited the project on several occasions (Table 2-1).

Table 2-1: List of Qualified Person, Professional Designations and Site Visit Dates

Name of Qualified Person	Designation	Company	Date of Site Visit
Branca Horta	M.Env	GE21	No site visit
Brian Levich	M.A	Fastmarkets	No site visit
Carlos Silva	M.Sc	GE21	September 13 and 14, December 13, 2023
Ignacy Antoni Lipiec	P. Eng.	AtkinsRéalis	March 13 and 14, 2024
João Augusto Hilário	B.A.Sc	L&M	January 17 to 19, 2024
Porfírio Cabaleiro	B.A.Sc	GE21	No site visit
Rubens Mendonça	B.A.Sc	Planminas	March 13 and 14, 2024

Glayson William Vitor de Oliveira from the AtkinsRéalis mechanical discipline and Marcelo Henrique de Souza Zerlotini from the AtkinsRéalis infrastructure discipline visited the Bandeira project from April 25 to 28, 2023, to evaluate the location options for the project mine and plant structures, to develop the project's master layout and plan.

Fernanda Cunha and Tony Freitas, from the AtkinsRéalis, visited the Bandeira project on March 13 and 14, 2024, to gain an understanding of the project area and the main structures that comprise the layout. At that time, they also visited the facilities (mine and plant) of Companhia Brasileira do Lítio (CBL), which has been in continuous operation since 1991, producing spodumene concentrate.

2.3 Araçuaí—Itinga Lithium Province

Bandeira Project is in the Araçuaí Pegmatitic District, northeast of Minas Gerais (Figure 2.1). This important litiniferous district, belonging to the Eastern Pegmatite Province of Brazil, has been known for well over a century for its uninterrupted production of gemstones (e.g., tourmalines, aquamarine, morganite), followed by cassiterite, columbite-tantalite, ceramics, and chemical industries (e.g., muscovite, industrial beryl, potassium feldspar, albite, and lithium minerals). The extraction of lithium minerals in pegmatites began in the 1950s in the Piauí River valley, between the cities of Araçuaí and Itinga. The first lithium minerals extracted were amblygonite and lepidolite, followed by petalite and spodumene from the 1960s. The set of litiniferous pegmatites of the Piauí Valley is part of the Itinga Pegmatite Field, a very special subdivision of the Araçuaí District due to the great abundance of spodumene-rich pegmatites that have been mined by CBL and Sigma Lithium.

Lithium began to arouse great interest in the first decade of this millennium due to its large-scale use in lithium-ion batteries for electric vehicles and solar energy storage. The increase in the supply of lithium concentrates from pegmatite minerals (hard-rock ores) and related chemicals (lithium carbonate and hydroxide) began in Australia in 2008 and continued in Argentina and Chile as a result of the production of lithium brine deposits.

In Brazil, as early as 2011, international companies began to organize themselves in the search for opportunities for mining rights that would contain occurrences of litiniferous pegmatites, focusing on the region that had produced lithium until then. This region is in the northeastern part of the state of Minas Gerais and involves several municipalities, including Araçuaí, Itinga, Coronel Murta, Rubelita, Virgem da Lapa, Salinas. The focus of attention was, therefore, the Araçuaí Pegmatitic District, particularly the Itinga Pegmatitic Field, where spodumene had already been produced at Companhia Brasileira de Litio since 1993 and, previously, at Companhia Arqueana de Minérios e Metais Ltda (now Sigma Lithium). The MGLIT Bandeira ore body is in an area adjacent to these two companies (Figure 2-1).

Figure 2-1: Location of the MGLIT Bandeira Target in the State of Minas Gerais, Brazil

2.4 Qualified Persons

AtkinsRéalis prepared this technical report with contributions from MGLIT and Lithium Ionic. The QPs who sign the technical sections are shown in Table 2-2.

Table 2-2: Qualified Person Areas of Responsibility

Section	Section Name	Qualified Person	Description of Responsibility	Subsections
1	Executive Summary	All QPs	-	-
2	Introduction	Ignacy Antoni Lipiec	-	-
3	Reliance on Other Experts	Ignacy Antoni Lipiec	-	-
4	Property Description and Location	Carlos Silva	-	-
5	Accessibility, Climate, Local Resources, Infrastructure, and Physiography	Ignacy Antoni Lipiec	-	-
6	History	Carlos Silva	-	-
7	Geology and Mineralization	Carlos Silva	-	-
8	Deposit Types	Carlos Silva	-	-
9	Exploration	Carlos Silva	-	-
10	Drilling	Carlos Silva	-	-
11	Sample Preparation, Analysis and Quality	Carlos Silva	-	-
12	Data Verification	Carlos Silva	-	-
13	Mineral Processing and Metallurgical Testing	Ignacy Antoni Lipiec	-	-
14	Mineral Resource Estimates	Carlos Silva	-	-
15	Mineral Reserves Estimate	Rubens Mendonça	-	-
16	Mining Methods	Rubens Mendonça	-	-
17	Recovery Methods	Ignacy Antoni Lipiec	-	-
18	Project Infrastructure	Ignacy Antoni Lipiec	General infrastructure	All except 18.14
		Porfírio Cabaleiro	Waste rock and tailings disposal	18.14
19	Market Studies and Contracts	Brian Levich	-	-
20	Environmental, Studies, Permitting, and Social or Community Impacts	Branca Horta	-	-
21	Capital and Operating Costs	Ignacy Antoni Lipiec	Plant and infrastructure costs	All except 21.4.2, 21.4.5, 21.4.7, 21.5.7 and 21.5.8
		Rubens Mendonça	Mining costs	21.4 and 21.5 except 21.4.2, 21.4.5, 21.4.7, 21.5.7 and 21.5.8
22	Economy Analysis	João Augusto Hilário	-	-
23	Adjacent Properties	Carlos Silva	-	-
24	Other Relevant Information	Ignacy Antoni Lipiec	-	-
25	Interpretation and Conclusions	All QPs	-	-
26	Recommendations	All QPs	-	-
27	References	N/A	-	-

2.5 Effective Date

This Technical Report’s effective date is November 13, 2023.

2.6 Units of Measure and Currency

The units of measurement used in this report conform to the International System of Units (metric system). All currency is United States dollars ($) unless otherwise noted.

3.0 RELIANCE ON OTHER EXPERTS

3.1 Marketing

MGLIT has contracted Fastmarkets to prepare a market analysis for spodumene concentrate and lithium compounds for the next 10 years. This market intelligence document served as the basis for defining the spodumene concentrate price curve for the Bandeira project and was used in Section 19—Market Studies, and Section 22—Economic Analysis of this Technical Report.

Qualified Person (QP) João Augusto Hilario de Souza carried out the financial analysis in Section 22, in line with the supply and demand expectations of lithium compounds.

3.2 Environmental Licensing

NeoAgro Ambiental prepared the Project's environmental licensing, and the QP, Branca Horta from GE21, is aware of the whole process. Section 20 of this Technical Report describes all components of the environmental licensing and is being used as technical support for the Mineral Resources estimation in Section 14, Mineral Reserves in Section 15, and economic analysis in Section 22.

A report, *Relatório de Controle Ambiental, Projeto Bandeira, Araçuaí MG, Novembro 2023* (NeoAgro Ambiental, 2023), was filed for the environmental licensing.

3.3 Taxation

The financial analysis QP, L&M Advisory's (L&M) João Augusto Hilario Souza is responsible for the assumptions adopted for taxes and fees used in this Technical Report. L&M implemented all taxes considered—Financial Compensation for Mineral Exploration (CFEM), Fee for the Control, Monitoring and Inspection of research Mining, Exploration and Utilization of Mining Resources Activities (TFRM), Social Integration Program (PIS), Social Security Financing Contribution (COFINS), Social Contribution on Net Profit (CSLL), and income tax—as well as the investment incentive due to the project for its location in Superintendência do Desenvolvimento do Nordeste (SUDENE) areas. All of this information was also used to prepare Section 22.

3.4 Mineral Rights

The QPs did not make any assessment of the legal situation of the mining rights of this Project.

William Freire Advogados Associados issued Legal Opinion No. 47/2023—Interested Party: MGLIT Empreendimentos Ltda regarding the mineral right number ANM 832.439/2009, expressing that the mineral rights is active, allowing MGLIT to perform geological research for lithium ore.

4.0 PROPERTY DESCRIPTION AND LOCATION

The Bandeira Project (Mining rights No. 832.439/2009) is on the border of the municipalities of Araçuaí and Itinga, in the Piauí River valley. This mining right was requested from the Agência Nacional de Mineração (ANM) (national mining agency) in 2016. The Piauí River, which cuts through the western portion of the Bandeira Project, serves as the border between the municipalities of Araçuaí and Itinga (Figure 4-1).

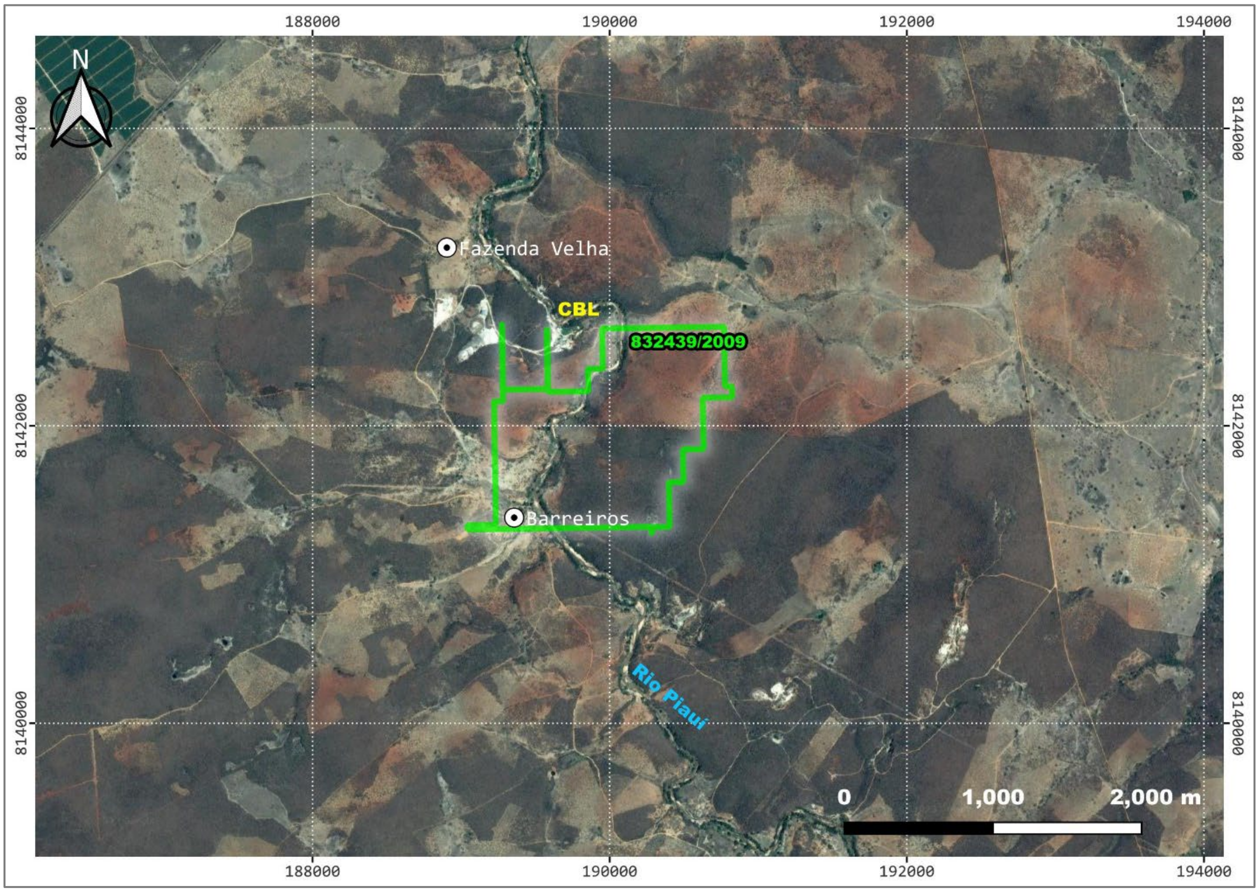


Figure 4-1: Mining Rights of the Bandeira Project

4.1 History of the Process and Legal Status of Agência Nacional de Mineração (ANM) Case No. 832.439/2009

Falcon Metais Ltda (Falcon Metals) requested the lithium ore exploration rights to the area covered by ANM process No. 832.439/2009 on October 22, 2009.

On September 29, 2011, Falcon Metais, the Applicant, filed a letter requesting the study of the area's priority because it disagreed with the ANM's withdrawal of interference.

After the study was rectified on May 6, 2014, Permit No. 3785/2014 was granted, authorizing the applicant to explore the area searching for lithium deposits for three years. The start of the research was communicated in a timely manner on May 7, 2014. The annual fees per hectare, referring to the first period of validity of the permit, were duly paid.

On March 3, 2017, Falcon Metais submitted a Partial Research Report with a request for a license extension. The approval was published on April 28, 2020, extending the license's validity for three years. The holder again communicated the start of the research work and requested the installment payment of the Taxa Anual por Hectare (TAH) (annual tariff per hectare) due in July 2020. This was granted by the ANM.

On December 28, 2020, a request for the Total Assignment of Mining Rights from Falcon Metais to MGLIT was filed. Due to the assignment now in effect, a requirement was published for the assignee and current holder of the process. MGLIT presented a Term of Assumption of Debt referring to the two current installments of TAH. The requirement was fulfilled on May 04, 2021.

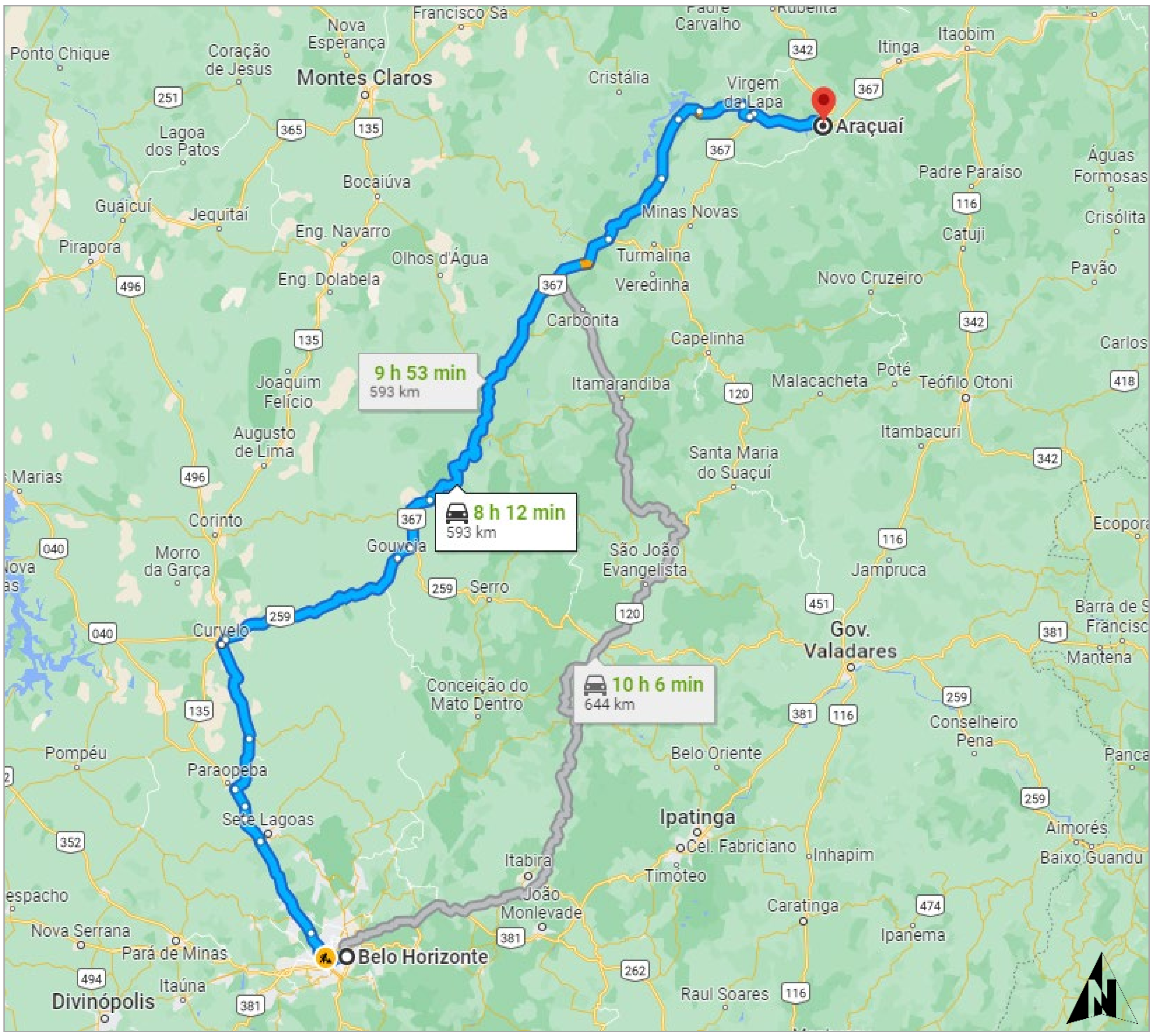
Subsequently, the TAHs of July 2021 and 2022 were paid, and the installments were considered paid on February 2, 2022.

ANM resolution No. 76/2021 changed the expiration date of the research permit from April 28, 2023, to September 30, 2024.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE, AND PHYSIOGRAPHY

5.1 Accessibility

The Bandeira Project is in northeast Minas Gerais, between the municipalities of Itinga and Araçuaí; approximately 15 km from the city of Araçuaí and 620 km northeast of Belo Horizonte (Figure 5-1).

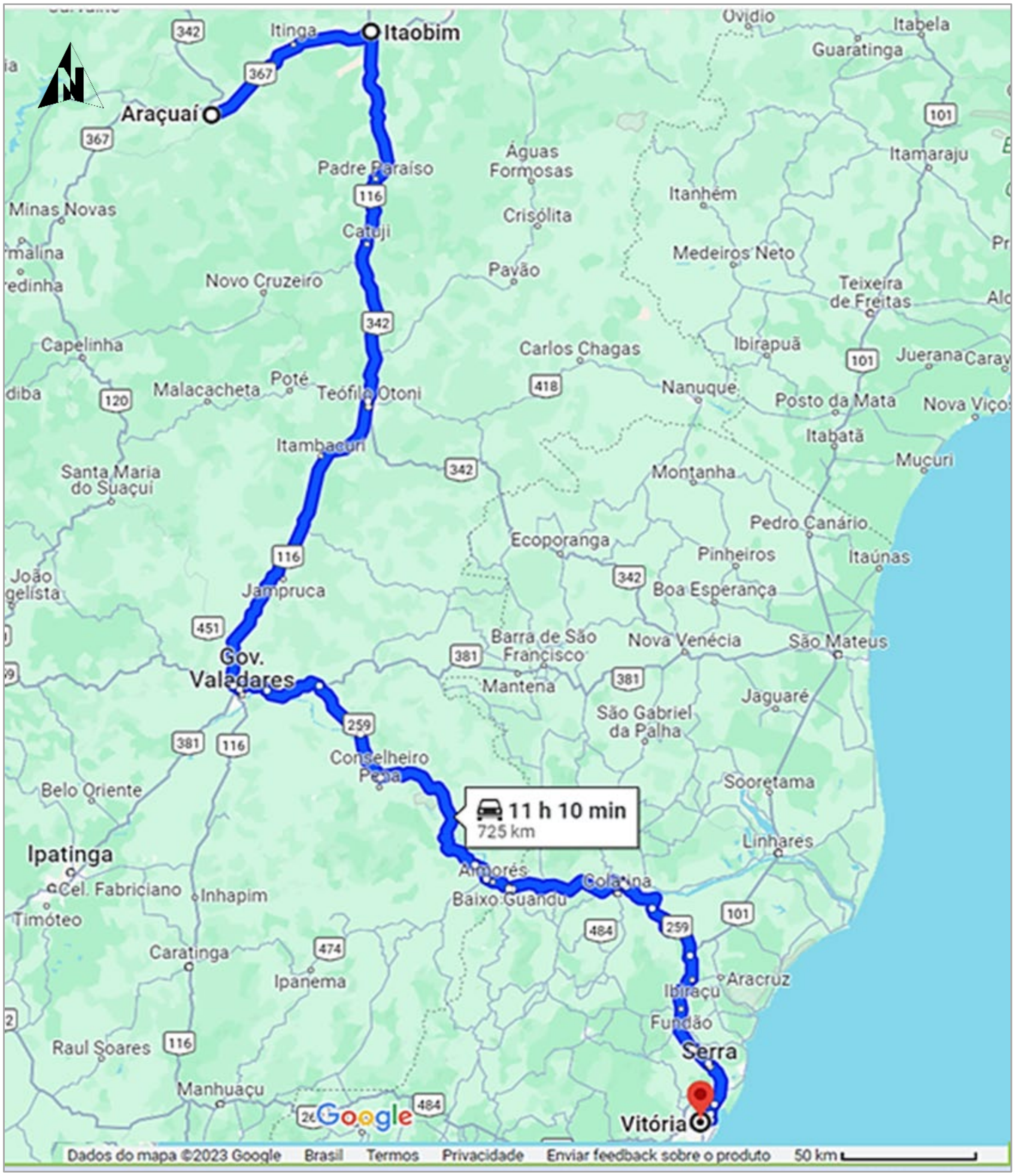


Source: Google Maps (2023)

Figure 5-1: Access from Belo Horizonte to Araçuaí

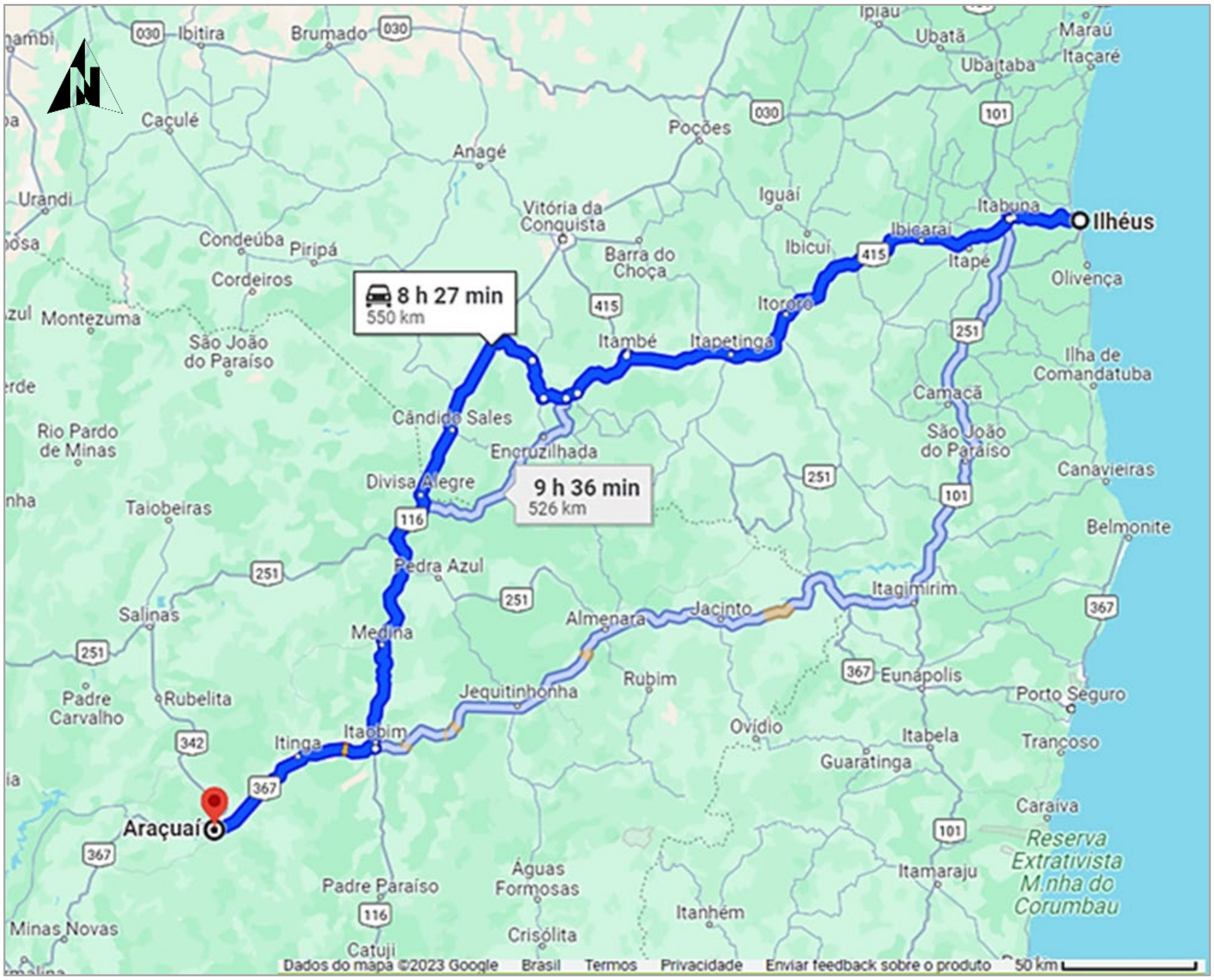
Due to its proximity to the BR-367 national highway, the Project is well-served by a road network. The site is accessible year-round by a good network of highways and airports.

The project's spodumene production would be exported from the Port of Vitória, in the state of Espírito Santo, 725 km from the Project along federal highways BR-367, BR-116 (or 342), and BR-259. Via federal highways BR-367, BR-116 and BR-415, or BR-367, BR-101 and BR-415, the Port of Ilhéus, which is approximately 550 km from the Project, is another option for exporting the product.



Source: Google Maps (accessed November 22, 2023).

Figure 5-2: Access from Araçuaí to the Port of Vitória

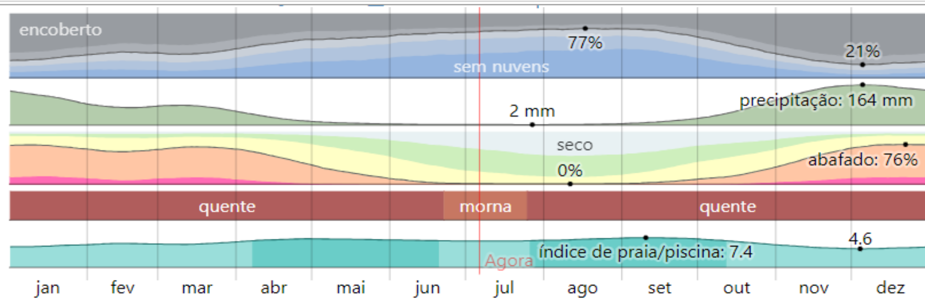


Source: Google Maps (accessed November 22, 2023).

Figure 5-3: Access from Araçuaí to the Port of Ilhéus

5.2 Climate

The region is characterized by a hot, dry, semi-arid climate. The annual average temperature is 24.5 °C with an average annual rainfall of 750 mm. The driest period of the year is June, and the wettest period is November. There is no harsh cold season. Exploration and mining activities can take place throughout the year. Detailed weather conditions in Araçuaí are given in Figure 5-4 and Figure 5-5.



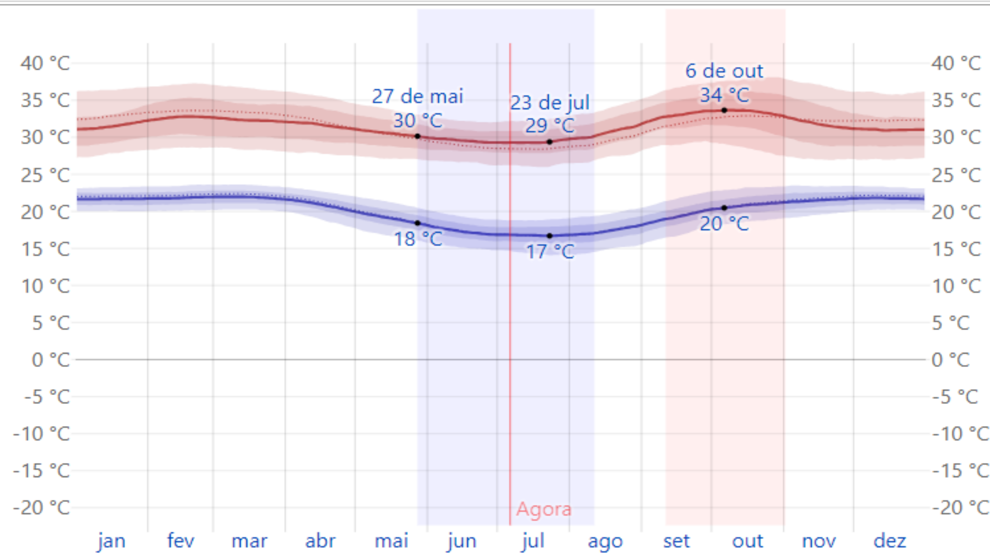
Condições meteorológicas por mês de Araçuaí. Clique em cada gráfico para obter mais informações.

Temperatura média em Araçuaí

A estação quente permanece por 1,7 mês, de 11 de setembro a 1 de novembro, com temperatura máxima média diária acima de 33 °C. O mês mais quente do ano em Araçuaí é fevereiro, com a máxima de 33 °C e mínima de 22 °C, em média.

A estação fresca permanece por 2,5 meses, de 27 de maio a 11 de agosto, com temperatura máxima diária em média abaixo de 30 °C. O mês mais frio do ano em Araçuaí é julho, com a máxima de 17 °C e mínima de 29 °C, em média.

Figure 5-4: Meteorological Conditions in Araçuaí



Temperatura máxima (linha vermelha) e mínima (linha azul) médias, com faixas do 25º ao 75º e do 10º ao 90º percentil. As linhas finas pontilhadas são as temperaturas médias percebidas correspondentes.

Média	jan	fev	mar	abr	mai	jun	jul	ago	set	out	nov	dez
Alta	32 °C	33 °C	32 °C	32 °C	30 °C	30 °C	29 °C	31 °C	33 °C	33 °C	32 °C	31 °C
Temp.	26 °C	27 °C	27 °C	26 °C	24 °C	23 °C	22 °C	23 °C	25 °C	27 °C	26 °C	26 °C
Baixa	22 °C	22 °C	22 °C	21 °C	19 °C	17 °C	17 °C	17 °C	19 °C	21 °C	22 °C	22 °C

Figure 5-5: Maximum and Minimum Temperatures in Araçuaí

5.3 Local Resources and Infrastructure

Itinga and Araçuaí are the large cities nearest to the Bandeira Project, with populations of 14,000 and 40,000 inhabitants, respectively. Araçuaí is served by a small airport and large commercial mobile phone networks.

In 2021, the average monthly wage in Araçuaí was 1.7 times the minimum wage, and the proportion of unemployed persons was 12.5%.

In Araçuaí 38.3% of households have adequate sanitary sewage; 53.6% of urban households face public roads with trees, and 5.3% of urban households are on public roads with culverts, sidewalks, paving, and curbs.

The nearest medium-sized airport with regular commercial flights is Vitória da Conquista (Bahia), about 297 km north of Araçuaí via BR-367 and BR-116. Another medium-sized airport is Montes Claros, 322 km from Araçuaí, accessed via federal highways BR-342 and BR-251. The nearest small airport, with regular commercial flights since December 2023, is in Salinas, around 110 km north of Araçuaí via BR-342.

5.4 Physiography

The topography of the Project area comprises low hills, ravines, and wide valleys, whose elevation differences are less than 100 m. The project occupies areas on both banks of the Piauí River, which will provide raw water to meet the demands of the mine, processing, and concentration plants, and mining facilities (Figure 5-6 and Figure 5-7).

Figure 5-6: Aerial View of Bandeira Project Area

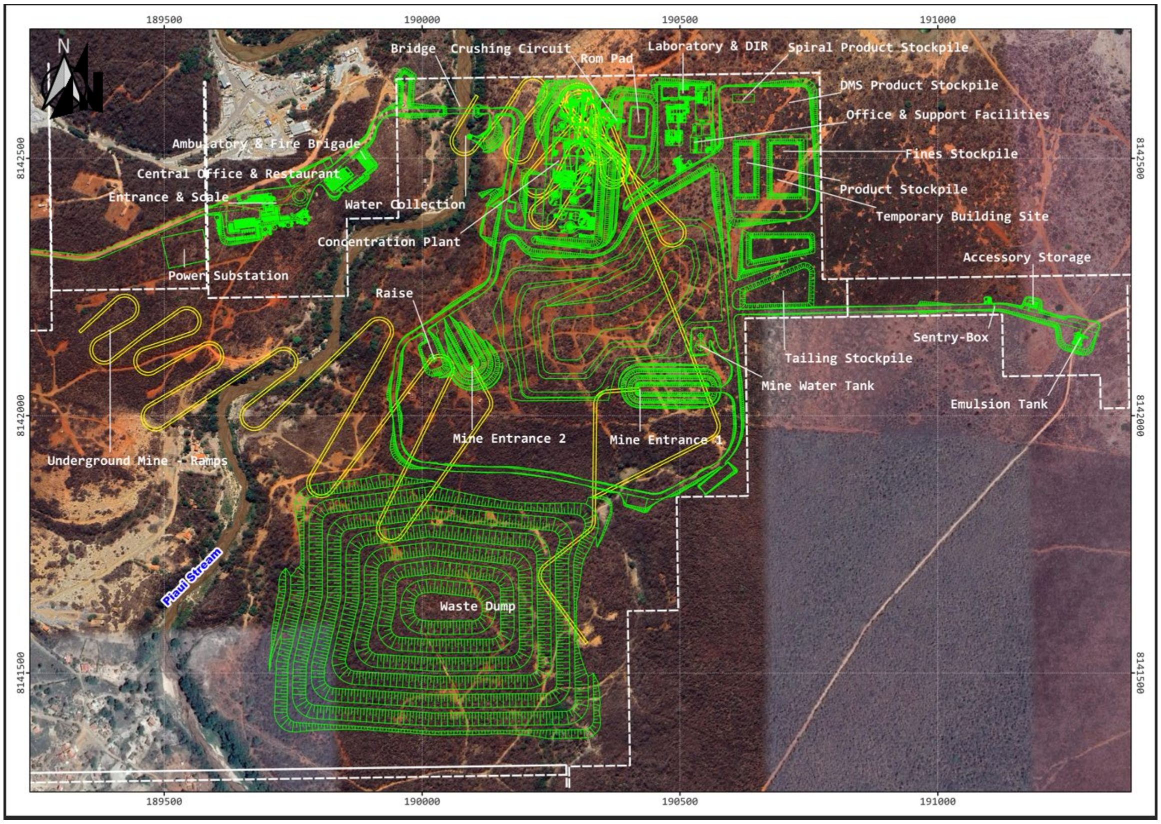


Figure 5-7: Preliminary Master Plan

6.0 HISTORY

6.1 Lithium History

The history of lithium has an important relationship with Brazil. Between 1790 and 1800, José Bonifácio de Andrada e Silva, a native of the city of Santos, state of São Paulo, and a Brazilian naturalist, politician, and scientist, first characterized and named spodumene and petalite contained in samples from Sweden, both anhydrous aluminum and lithium silicates.

Most likely, prospectors already knew about the existence of lithium minerals in the Middle Jequitinhonha since the 18th century, although they did not know how to identify them or value them. The settlement of the region was based on the discoveries of rock salt in the region of Salinas, and of gold in the Araçuaí River Valley from 1727 onwards, reaching the outskirts of Araçuaí in 1728. Since the early days of the mining of "chrysolite" (chrysoberyl) in the Piauí River valley, spodumene crystals have earned the nickname "rotten chrysolite" and "cambalacho," due to their similarity to chrysoberyl (cf. Sá, 1977), which can still be heard today in conversations in the mines.

In 1823, Spix & Martius arrived at the headwaters of the Calhauzinho and Piauí Rivers in search of the sources of semi-precious stones, particularly chrysoberyl (chrysolite), which were already mined there, and described a "white granite with little mica, but with a lot of black tourmaline" (i.e., pegmatite).

In 1882, Costa Sena first reported the occurrence of "trifana" (spodumene) in the Middle Jequitinhonha. He identified "Andalusite, cymophane (chrysoberyl) and Triana, with sharp edges, in sands and gravel of the stream in the valley of the Piauí River, concluding that the primary deposits of these minerals would be located there."

Occurrences of spodumene were mentioned in the "Compendium of the Minerals of Brazil" (Ferraz, 1928), among other pegmatite minerals. During the Second World War until the end of the Cold War, industrial beryl was widely exploited, starting in the region of Salinas and extending to the valleys of the Piauí and Jenipapo rivers (cf. Sá, 1977).

In Brazil, the production of lithium minerals began in the 1940s with the exploration of amblygonite (lithium phosphate) in the states of Ceará, Paraíba, and Minas Gerais, to supply the chemical processing unit of Orquima (later Nuclemon), in the neighbourhood of Santo Amaro, city of São Paulo. This lithium-compound production unit operated until the late 1980s, when it ceased operations due to difficulties with the supply of raw materials, and financial and environmental issues.

On pegmatites and the production of lithium minerals in the Jequitinhonha Valley, Sá (1977) described the following:

- "In 1950, the farmer Avelar Pereira, who was exploiting beryl in the Jenipapo Mine, found in the place called Fumal, to the right of the Middle Piauí, a very dark and very heavy material, which was analyzed by Mr. Khalil Afgouni and found that it was cassiterite. At the same time, it was also known that amblygonite had existed in some pegmatites in the Piauí valley."
- "The cassiterite found near the Piauí stream attracted the attention of the companies Estanífera do Brasil and Produco (a subsidiary of Orquima) that settled in the region around

1952, and then began research and exploitation work on an industrial scale. At that time, the most important pegmatite bodies were the Fumal, Urubu and Generosa mines, the first two producing cassiterite and the last producing amblygonite."

- "Glycon de Paiva, in 1957, identified lepidolite in the Urubu and Generosa mines, and the first tons of this ore were exported to Japan in 1959."
- "At the Cachoeira mine (which is currently under CBL's mining right) spodumene production began in the late 1960s, to supply the demand of the domestic market."
- "Petalite, abundant in the region, was called "white slag" by the miners and was often confused with feldspar. Its correct identification took place at the end of the 1960s, and it soon went into production for export purposes."
- "Companhia Produco withdrew from the region in 1958, while Companhia Estanífera do Brasil maintained its activities until 1972, being succeeded by Companhia Arqueana de Minérios e Metais Ltda, which holds the mining and research rights in most of the area that comprises the valleys of the Piauí River, Jenipapo River and Tesouras River. This Company has today (i.e., in 1977) more than twenty pegmatite bodies producing petalite, spodumene, amblygonite, lepidolite, beryl, cassiterite and reduced quantities of tantalite-columbite, employing about a hundred workers. The mines are semi-mechanized and some of them have mechanized development." (cf. Sá, 1977.)

Afgouni and Sá state that “Another new use is in lithium batteries for electric cars and, if this application becomes a reality, Brazil will be a big consumer, ranking at the same level as the most developed countries in the world with the advantage of being one of the few countries capable of producing its own raw material.”

Correia-Neves, Pedrosa-Soares, and Marciano applied, for the first time, petrological and metallogenetic concepts still current in the approach to litiniferous pegmatites, with particular emphasis on the metallogenetic specialization of the Itinga Pegmatite Field for the production of spodumene and petalite.

In 1985, Companhia Brasileira de Litio (CBL) acquired from Companhia Arqueana de Minérios e Metais Ltda the mining rights and assets of the areas that include the Cachoeira Mine and its surroundings, having started producing spodumene concentrate in the early 1990s. In 1991, CBL acquired Nuclemon's chemical unit, which was on care and maintenance, and transferred it to Divisa Alegre, Minas Gerais, for processing spodumene concentrate.

In 2012, Sigma Lithium acquired several mining rights from Arqueana de Minérios e Metais Ltda, starting exploration work to produce spodumene concentrate for export. In the second quarter of 2023, the concentration unit began commercial operation to produce 270,000 tpa of spodumene, treating approximately 1.8 Mtpa of ore from the Xuxa mine.

In 1992 the Brazilian government issued the Lithium Decree, which was in force from until 2022, to encourage development of the lithium production chain.

In Brazil, there are now three producers of spodumene concentrate: CBL, Advanced Metallurgical Group (AMG) and Sigma Lithium, all Minas Gerais. CBL is the only one that produces lithium compounds, such as carbonate and hydroxide.

6.2 History of Lithium Ionic—MGLIT

Lithium Ionic is a Canadian company founded in 2022 with an office in Toronto. It is the controlling shareholder of 100% of MGLIT's assets, which pursues lithium mineral exploration in Brazil.

MGLIT started its activities in November 2021, with seven mining rights in the municipalities of Araçuaí and Itinga, totalling about 1,300 ha. Until April 2022, there were only two rock analyses for lithium in the area now called Bandeira. An open trench close to these two results, an intersected 8.80 m of lithium mineralization at an average content of 1.46% Li_2O.

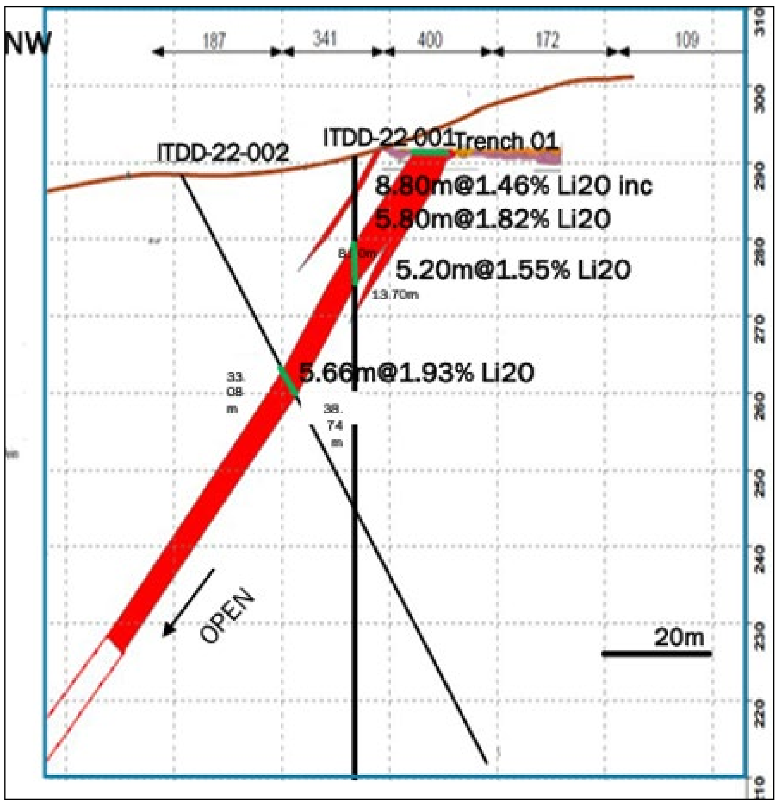


Figure 6-1: Cross-Section Showing the First Trench with Two Holes Intersecting the Pegmatite

In May 2022, the company was listed on the Toronto Stock Exchange under the ticker LTH-V.

With ongoing geological research and exploration work in the area, as of July 2023, approximately 170 diamond drill holes had been completed, totalling 30,000 m. Results based on this drilling program enabled the June 2023 publication of Indicated and Inferred Mineral Resource estimates totalling 16.04 Mt, with an average content of 1.41% Li_2O (Table 6-1).

Table 6-1: Mineral Resource Estimate Certified by SGS Canada—June 27, 2023

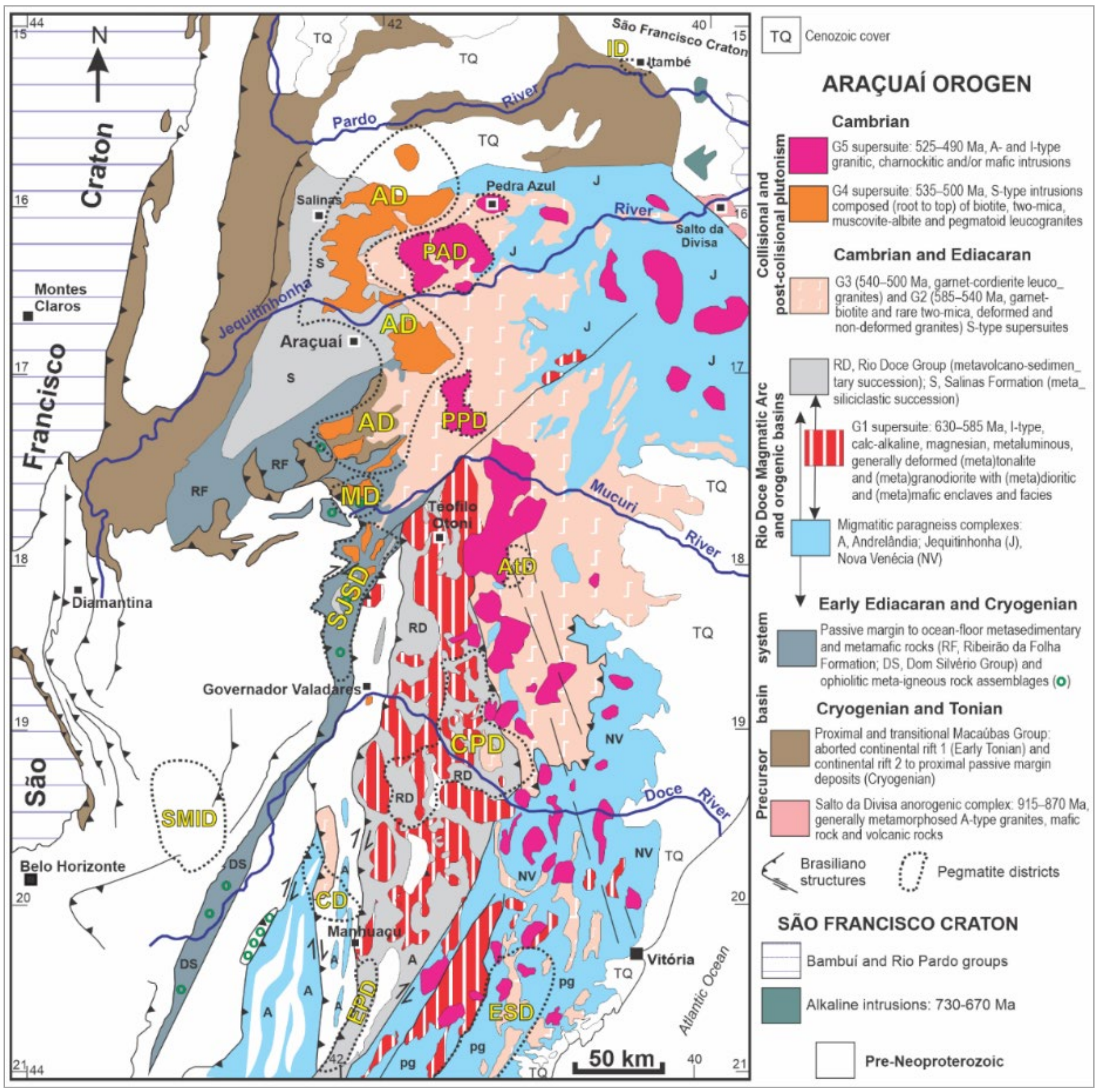
Bandeira Resources	Li_2O Cut-Off Grade (%)	Classification	Tonnage (Mt)	Li_2O (%)
Open Pit	0.5	Measured + Indicated	4.24	1.36
Open Pit	0.5	Inferred	5.91	1.40
Underground	0.8	Measured + Indicated	0.36	1.26
Underground	0.8	Inferred	5.53	1.47
Total			**16.04**	**1.41**

Since the beginning of MGLIT's activities, new areas of research have been evaluated to expand the volume of Mineral Resources. During this period, MGLIT entered into five call option agreements and acquired NeoLit, with assets in Salinas and Itinga. As a result, MGLIT increased its geological prospecting areas to 13,932 ha.

7.0 GEOLOGY AND MINERALIZATION

7.1 Regional Geology

The Project lies in the Eastern Brazilian Pegmatite Province (EBPP), located in terranes of the Araçuaí Orogen (Figure 7-1 and Figure 7-3). The EBPP, one of the largest pegmatitic populations in the world with c. 150,000 km^2, contains pegmatite districts located in eastern Minas Gerais (c. 90% of the whole province), southeastern Bahia, and Espírito Santo States of Brazil.



Notes: A Simplified geologic map of the Araçuaí Orogen (modified from Pedrosa-Soares et al., 2020), highlighting the granite supersuites and pegmatite districts of the Eastern Brazilian Pegmatite Province (cf. Pedrosa-Soares et al., 2011, 2023): AD, Araçuaí; AtD, Ataléia; CD, Caratinga; CPD, Conselheiro Pena; ESD, Espírito Santo; ID, Itambé; MD, Malacacheta; PAD, Pedra Azul; PPD, Padre Paraíso; SJSD, São José da Safira; SMID, Santa Maria de Itabira. (Figure from Pedrosa-Soares et al., 2023).

Figure 7-1: Simplified Geology of the Araçuaí Orogen

The Eastern Brazilian Pegmatite Province is the most important region in the history of pegmatite studies and the development of lithium deposits in Brazil. Pegmatite gemstones have been officially known in Brazil since the last decades of the 17th century, when green tourmalines, initially mistaken for emeralds, were found by the explorer Fernão Dias Paes Leme in the region of São José da Safira, a pegmatite district very rich in gem-quality elbaite (Li-bearing tourmaline).

Long after, in the first decades of the 19th century, pioneer naturalists and geologists, such as Eschwege, Spix, Martius, and Saint-Hilaire, described pegmatite gem deposits located in the Jequitinhonha and Doce river valleys. In 1818, Spix and Martius reached the headwaters of the Calhauzinho and Piauí rivers in the Araçuaí region (Figure 7-4), searching for the gemstones primary sources, particularly chrysoberyl (then called “chrysolite” locally) that was already mined there. They found a “white granite with little mica, but rich in black tourmaline” (i.e., pegmatite).

At that time, spodumene (discovered and named by the Brazilian mineralogist José Bonifácio de Andrada in a volume of the Journal der Chemie, 1800) was already called “rotten chrysolite” by pioneer prospectors and gemstone diggers (*garimpeiros* in Brazilian Portuguese) of the Jequitinhonha Valley. In 1866, Charles Hartt described the N45E-trending structure of the mica schists hosting very coarse-grained “granite” veins between Araçuaí and Itinga. In 1882, Costa Sena published the first paper directly referring to spodumene (also called “triphane” at that time) in the Middle Jequitinhonha region, after identifying “andalusite, cymophane (chrysoberyl) and triphane with sharp edges, in sands and gravels from streams of the Piauí river valley” and suggested that the primary deposits would also be located there. Several spodumene occurrences, among other pegmatite minerals, of the Middle Jequitinhonha Valley are described by Luiz Caetano Ferraz in his “Compendio dos Mineraes do Brasil,” published in 1928.

The importance of pegmatites as economic mineral deposits greatly increased in Brazil from the Second World War, due to the large production of mica, beryl, and quartz to supply the military industry of allied countries, to the end of the Cold War in early 1990s. Just aftehear the Second World War, in 1946, the largest pegmatitic populations of Brazil were grouped into provinces by Glaycon de Paiva. Among them the Eastern Brazilian Pegmatite Province was first defined. Since then, more than one thousand pegmatites have been mined there for gemstones, cassiterite, Li and Be ores, Nb-Ta oxides, industrial minerals (K-feldspar, muscovite, albite, quartz), collection and rare minerals, dimension stone, and minerals for esoteric purposes.

Historical milestones in the discoveries and mining of lithium deposits in the Araçuaí-Itinga region were reported by Haroldo de Sá in his PhD thesis (1977). According to him:

“The discoveries and production of cassiterite, lepidolite, and amblygonite in pegmatites of the Piauí river valley (e.g., Fumal, Generosa, Jenipapo, and Urubu) by the Estanífera do Brasil and Produco companies dated back to the early 1950s. Although spodumene has been known for a long time by gem diggers (“garimpeiros”), who called it “cambalacho” or “crisólita podre” (i.e., rotten chrysolite in reference to its similarity to chrysoberyl), its commercial production only started at the end of the 1960s at the Cachoeira mine (then owned by Companhia Estanífera do Brasil) to supply the increasing demand of the national market. Petalite, formerly called “escória branca” (white scoria) and very often mistaken for feldspar, was correctly identified at the end of the 1960s and immediately mined for exportation by the Companhia Estanífera do Brasil until 1972, followed by Companhia Arqueana de Minérios e Metais Ltda. Around 1977, this mining company has more than twenty distinct pegmatite bodies producing petalite, spodumene, amblygonite, lepidolite, beryl, cassiterite and columbite-tantalite."

For his PhD thesis (1977), Haroldo de Sá compiled map, sections and other data from the archives of the Companhia Arqueana de Minérios e Metais Ltda, and produced the first geochronological data for the local granites and pegmatites (whose similar ages, around 500 Ma, is evidence of a genetic link between them). He also produced the first geochemical data (K, Rb, Cs) for minerals of non-economic and pegmatites with mineralization of petalite, spodumene, lepidolite and/or pollucite. His spatial interpretation of the distribution and zoning of different Li-rich pegmatites, even with present-day knowledge, remains realistic.

Khalil Afgouni, an outstanding pioneer of lithium mining in Brazil and the owner of Companhia Arqueana de Minérios e Metais Ltda, together with Haroldo de Sá, published a farseeing article entitled "Lithium Ore in Brazil" in the prestigious magazine Energy in 1978 (vol. 3, pp. 247-253). In the article, they predict that "another new use (for that metal) is in lithium batteries for electric cars and, if this application becomes reality, Brazil will be a big consumer, ranking at the same level as the most developed countries in the world, with the advantage of being one of few countries producing its own raw material." Although this is not yet a full reality, the remarkable increase in lithium ore production in the Jequitinhonha Lithium Valley is a result of the invaluable heritage of Arqueana's discoveries of world-class lithium deposits. The assets were later bought by CBL (Cachoeira mine) in the early 1990s and, more recently, by Sigma Lithium (Xuxa mine, and other spodumene and petalite deposits such as Barreiro, Maxixe, Murial, and others). That heritage continues to drive new companies to the region, whose exploration efforts have led to the discovery of subsurface spodumene deposits in areas lacking outcrops, such as the Bandeira deposit of Lithium Ionic.

Since the early 1980s, the region encompassing the Eastern Brazilian Pegmatite Province (EBPP) has been completely covered by systematic geological mapping (in 1:100,000 scale) and experienced an outstanding increasing in scientific studies supported by robust analytical data. That allowed genetic and metallogenetic links between pegmatite populations and the tectono-magmatic events of the regional geological evolution to be established. In fact, the EBPP is the result of the magmatic and tectono-metamorphic events that formed the Araçuaí Orogen from the Early Ediacaran (ca. 630 Ma) to the Late Cambrian (ca. 490 Ma). These events comprise the regional deformation, metamorphism and partial melting of sedimentary and volcanic successions deposited in the Tonian-Cryogenian precursor (rift to passive margin) basin system and the Ediacaran orogenic (arc-related) basins (Figure 7-2), as well as of the continental basement. The melting events resulted in the production of huge volumes of orogenic granitic rocks and thousands of pegmatites grouped into five supersuites (G1 to G5; Figure 7-1, Table 7-1).

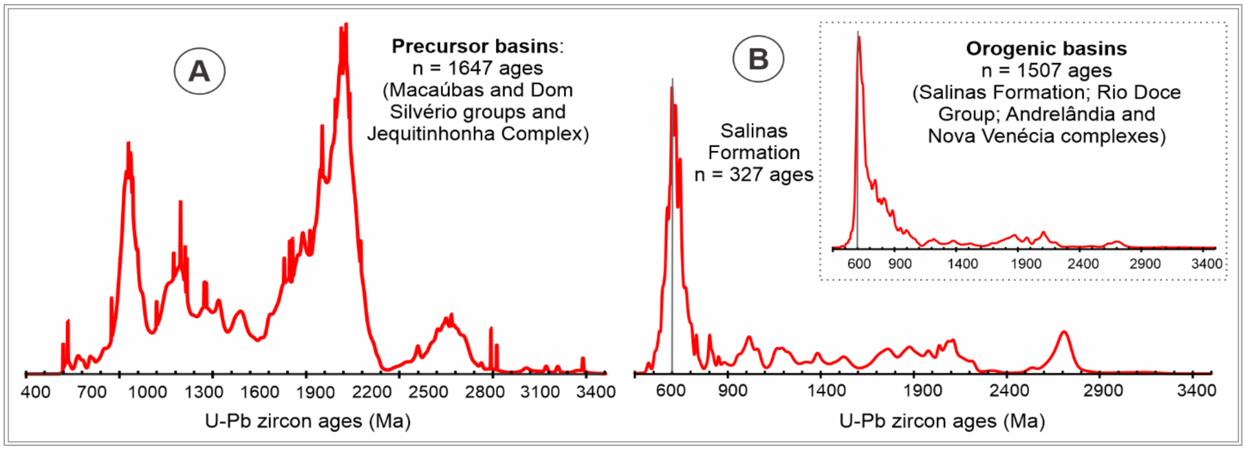
The sedimentary and volcano-sedimentary successions involved in the tectono-metamorphic-anatectic processes that generated granites and pegmatites show two contrasting distributions of U-Pb ages for detrital grains of zircon (Figure 7-2). One is a classic multimodal age spectrum of a basin system evolved from continental rift to passive margin, represented by the Macaúbas Group and Jequitinhonha Complex. The other age distribution shows an unimodal spectrum typical of orogenic basins largely filled by material from a rather dominant zircon source (e.g., an active magmatic arc), representing the Salinas Formation and Rio Doce Group that host most Li-bearing pegmatites in the EBPP (Figure 7-1). The Salinas Formation, comprising quartz-mica schist (metapelite) with lenses of calc-silicate rock (metamarl), metawacke (metasandstone) and meta conglomerate, is the main host unit of Li-rich pegmatites in the whole EBPP, including the spodumene-rich pegmatites of the Bandeira deposit of MGLIT.

Tectono-metamorphic events and the G1 to G5 granitic supersuites of the Araçuaí Orogen play distinct roles in relation to pegmatite abundance, distribution, genesis, and metallogenetic specialization, imposing important prospecting constraints with regards to metallic potential of distinct pegmatite populations along the EBPP (Figure 7-2).

The G4 is the most important granitic supersuite related to Li-rich pegmatites, followed by the G2 supersuite, while the G5 and G1 supersuites are related to Be-rich pegmatites generally free of or poor in Li-minerals. Tourmaline-bearing pegmatites are widespread in the EBPP, except in some clusters of Be-rich and Li-rich pegmatites. The G4 intrusions and batholiths show the classical distribution of granitic facies, from pluton root to top, found in other Li-rich pegmatite districts around the world, comprising biotite leucogranite, two-mica leucogranite, muscovite leucogranite, albite leucogranite and pegmatoid granite. Apatite, beryl, tourmaline, and garnet occur in the pegmatoid granites, and muscovite-albite leucogranites. The Salinas Formation is also the main host unit of G4 intrusions associated with Li-rich pegmatites (Figure 7-1).

7.1.1 Pegmatites

Granitic pegmatites represent silica-saturated magmas variably rich in H_2O- and F-bearing fluids, as well as in other hyperfusible (fluxing) components (e.g., Li, Na), crystallized in rather closed chemical systems (cf. Cerný, 1991; London, 2008). The EBPP comprises the two known genetic types of pegmatites, both formed during the evolution of the Araçuaí Orogen: i) the anatectic pegmatites generated directly from the partial melting of country rocks; and ii) the residual pegmatites, representing late silicate melts released by fractional crystallization of parental granites. Genetic affiliation and other criteria allow pegmatite districts to be distinguished in the EBPP (Figure 7-2; Table 7-1).



Source: Figure from Pedrosa-Soares et al., 2023.

Notes: (A) precursor basins (e.g., Macaúbas Group and Jequitinhonha Complex), and (B) orogenic basins (e.g., Salinas Formation, Rio Doce Group) of the Araçuaí Orogen within the Eastern Brazilian Pegmatite Province.

Figure 7-2: Distributions of U-Pb Ages for Detrital Zircon Grains from Metamorphosed Sedimentary and Volcanic Rocks

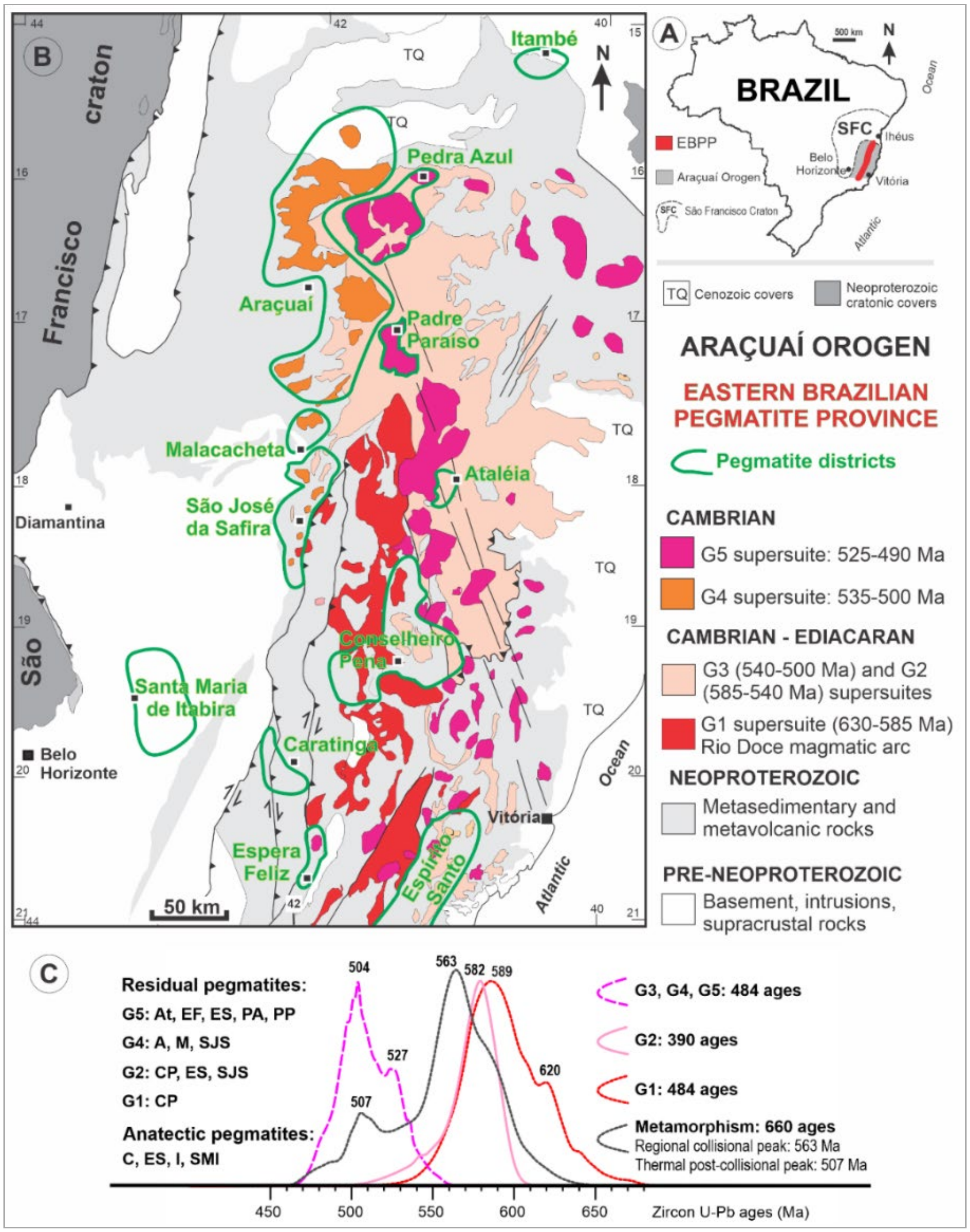
Table 7-1: Main Features of the Orogenic Igneous Supersuites of the Araçuaí Orogen

Supersuites	G1	G2	G3	G4	G5
Ages (Ma)	630 – 585	585 – 540	540 – 500	535 – 500	525 – 490
Lithotypes	Mostly tonalite and granodiorite, minor diorite to gabbronorite, with biotite, amphibole and/or pyroxenes; poor in pegmatites	Mostly biotite-garnet syenogranite to alkali feldspar granite, garnet-rich monzogranite to tonalite, and garnet-two-mica granite, locally with sillimanite; associated with external rare element pegmatites	Alkali feldspar granite to syenogranite with cordierite and/or garnet and/or sillimanite, free of or poor in biotite; poor in pegmatites	From pluton root to top: biotite granite, two-mica leucogranite, muscovite and/or albite and/or schorlite granite, pegmatoid granite; associated with external rare element pegmatites	Alkali feldspar granite to granodiorite, orthopyroxene-bearing charnockitic rocks, basic (norite) to ultrabasic rocks, and beryl-topaz pegmatites
Field relations	Batholiths and stocks, generally rich in dioritic to mafic enclaves and facies, showing solid-state deformation and migmatization, local well-preserved igneous fabrics, associated with the arc-related metavolcano-sedimentary Rio Doce Group	Batholiths, stocks and stratoid bodies, showing solid-state deformation, metamorphism and migmatization, with common restites and xenoliths of metasedimentary rocks, and localized well-preserved igneous fabrics	Mostly autochthonous, non-deformed patches, veins, and lodes of G3 leucosome, and minor stocks, free of the regional foliation, hosted by migmatites with G2 paleosome	Balloon- to stratoid-shaped intrusions, post-kinematic in relation to the regional ductile foliation, locally imposing late deformation on the regional structural trend (circumscribed intrusions)	Balloon-shaped plutons and multiple intrusions, locally rich in mafic and/or microgranular enclaves with magma mixing features, and norite-rich bodies, post-kinematic in relation to the regional ductile foliation

Supersuites	G1	G2	G3	G4	G5
Geochemical signatures	Metaluminous to slightly peraluminous, magnesian, calcic to alkali-calcic, medium- to high-K, expanded calc-alkaline series	Strongly to weakly peraluminous, calc-alkalic to sub-alkalic (K > Na)	Peraluminous, sub-alkalic (K > Na)	Peraluminous, sub-alkalic (K > Na) to alkalic (Na > K)	Metaluminous to slightly peraluminous, ferroan, high-K calc-alkalic, minor tholeiite
Petrogenetic type	Metaluminous I-type, locally peraluminous I-type	Peraluminous S-type, locally peraluminous I-type	S-type	S-type	A-type and I-type
Tectonic stage	Pre-collisional to early collisional magmatic arc	Late pre-collisional to late collisional	Late collisional to post-collisional	Post-collisional	Post-collisional

Source: Simplificado por Pedrosa-Soares et al. 2023.

The anatectic pegmatites are coarse-grained quartz-feldspathic bodies (i.e., granitic leucosomes) hosted by migmatitic gneisses and micaschists, mostly formed in the collisional tectono-metamorphic event (585–540 Ma) and in the post-collisional thermal event (540–490 Ma). Therefore, their spatial distribution, and genetic and metallogenetic features are directly related to the melted country rocks. Conversely, the residual pegmatites, especially those enriched in rare elements, have restricted spatial distributions and genetic links directly related to the distinct granite types from which they ultimately inherited their geochemical characteristics and metallogenetic specializations (Figure 7-3; Table 7-2). Therefore, residual pegmatites released from peraluminous, subalkalic to alkalic, hydrous, S-type, two-mica leucogranites formed from the partial melting of metasedimentary rocks might have a rather distinct metallogenetic specialization (e.g., richer in Li, Cs, Ta, Sn, and P) in relation to residual pegmatites (e.g., richer in Be, F, and Fe) from metaluminous, high-K calc-alkalic, ferroan, relatively anhydrous, A-type, amphibole-biotite granites formed from the partial melting of mainly igneous rocks. The first case (S-type granites) refers to Li-bearing pegmatites associated with the G4 and G2 supersuites, while the second (A-type granites) stands for the Be-bearing (but Li-free) pegmatites comprised by the G5 supersuite (Figure 7-3; Table 7-2).



Source: Figure from Pedrosa-Soares et al., 2023.

Notes: A) Location of Eastern Brazilian Pegmatite Province (EBPP).
B) Simplified geological map highlighting the granite supersuites (G1 to G5) and EBPP pegmatite districts: A, Araçuaí; At, Ataléia; C, Caratinga; CP, Conselheiro Pena; EF, Espera Feliz; ES, Espírito Santo; I, Itambé; M, Malacacheta; PA, Pedra Azul; PP, Padre Paraíso; SMI, Santa Maria de Itabira; SJS, São José da Safira. C) Distribution of zircon U-Pb ages from orogenic granite supersuites (G1 to G5), regional metamorphism and post-collisional thermal events, correlated to pegmatite districts.

Figure 7-3: Simplified Geologic Map of Araçuaí Orogen

Table 7-2: Features of the Main Pegmatite Districts of the Eastern Brazilian Pegmatite Province

District Names and Ages (Ma)	Historical and Present-Day Mineral Production, and Rare Minerals	Genetic Affiliation; Class, Subclass, Type, Subtype, and Family (*)	Parent and Host Rocks
Itambé 508 Ma	K-feldspar, quartz crystals, mica, beryl, columbite, monazite	anatectic; muscovite-rare element, REE, allanite-monazite, NYF	biotite-hornblende gneisses, sillimanite-feldspar-mica schists
Pedra Azul 501 Ma	quartz, beryl (aquamarine), topaz	residual; REE, beryl-topaz, NYF	A-type G5 granites
Padre Paraíso 519 Ma	quartz, beryl (aquamarine), topaz, quartz crystals, goshenite, chrysoberyl	residual; REE, beryl-topaz, NYF	A- and I-types G5 granites and charnockites
Araçuaí 535–500 Ma	Greenish to pinkish spodumene, petalite, lepidolite, Li-phosphates, cookeite, cassiterite, columbite-tantalite, industrial minerals (perthitic K-feldspar, albite, muscovite), tourmalines (elbaite, schorlite), beryl ore and gems (aquamarine, morganite), pollucite, quartz crystals, cleavelandite, herderite and other rare phosphates, topaz, bismuthinite	residual; mostly rare element and minor muscovite-rare element, Li, beryl, complex (spodumene, petalite, lepidolite, elbaite, amblygonite), albite-spodumene (SRP), albite, LCT	S-type G4 leucogranites; low-P/high-T (andalusite, cordierite, sillimanite) to medium-PT (garnet, staurolite, kyanite, sillimanite) mica schists to paragneisses, metasandstones, calc-silicate rocks, meta-ultramafic rocks
Ataléia 502 Ma	quartz crystals, beryl (aquamarine), topaz, chrysoberyl	residual; REE, beryl-topaz, NYF	A- and I-types G5 granites and charnockites
São José da Safira 545–490 Ma	tourmalines (elbaite, schorlite), industrial minerals (perthitic K-feldspar, albite, muscovite), beryl ore and gems (aquamarine, heliodor, morganite), lepidolite, Li-phosphates, spodumene, garnet, cleavelandite, columbite-tantalite, cassiterite, bertrandite, microlite, zircon, rare phosphates	residual; muscovite-rare element and rare element, Li, beryl, complex (elbaite, lepidolite, Li-phosphates, spodumene), LCT	S-type G4 and G2 leucogranites; medium-PT (garnet, staurolite, kyanite, sillimanite) mica schists to paragneisses, metasandstones, calc-silicate rocks, meta-ultramafic rocks
District names and ages (Ma)	Historical and present-day mineral production, and rare minerals	Genetic affiliation; class, subclass, type, subtype, and family (*)	Parent and host rocks
Conselheiro Pena 570–545 Ma	industrial minerals (perthitic K-feldspar, albite, muscovite), tourmalines (elbaite, schorlite), beryl ore and gem, spodumene (kunzite), lepidolite, Li-phosphates, quartz crystals, cleavelandite, columbite-tantalite, cassiterite, rare phosphates (arrojadite, barbosalite, brasilianite, childrenite, correianevesite, eosphorite, roscherite, vivianite, etc.)	residual; muscovite-rare element and rare element; Li, beryl, complex (elbaite, Li-phosphates, lepidolite, spodumene), LCT	S-type G2 (and I-type G1?) granites; medium-PT to intermediate low-P (garnet, staurolite, cordierite, kyanite, sillimanite), mica schists to paragneisses, metasandstones, calc-silicate rocks, meta-ultramafic rocks
Malacacheta 535–500 Ma	muscovite, beryl, chrysoberyl; alexandrite, sapphire	residual; muscovite-rare element, beryl, LCT; and anatectic to hydrothermal processes	S-type G4 leucogranites; mica schists, meta-ultramafic rocks, migmatites
Santa Maria de Itabira, 545–500 Ma	emerald, alexandrite, aquamarine, amazonite	quartz-feldspathic hydrothermal deposits, and pegmatites	ultramafic schists, banded iron formations, migmatites
Caratinga, 570 Ma	kaolin, corundum (sapphire, ruby), beryl	anatectic; abyssal, ceramic	migmatitic paragneisses
Espera Feliz, 500	quartz crystals, beryl (aquamarine), topaz	residual; REE, beryl-topaz; NYF	G5 granites
Espírito Santo 570–500 Ma	kaolin, quartz, beryl (aquamarine), topaz, tourmalines (and spodumene?)	anatectic; ceramic; and residual; REE, beryl-topaz, NYF (and LCT?)	migmatitic paragneisses, G5 (and G2?) granites

Source: (Pedrosa-Soares et al., 2023, updated after Pedrosa-Soares et al., 2011.
(*) Cerný et al. (1991, 2012). LCT, Lithium-Cesium-Tantalum; and NYF, Niobium-Yttrium-Fluorine pegmatites)

The EBPP was subdivided into twelve pegmatite districts based on the mineral production, genetic and metallogenetic affiliation and classification, parental granite type, host rocks and metamorphic regime, and crystallization ages of a relatively large and clustered pegmatite population (Figure 7-3; Table 7-2). Most of them are districts of residual pegmatites of the rare element class, distinguished by their affinities with the LCT (Lithium-Cesium-Tantalum) or NYF (Niobium-Yttrium-Fluorine) geochemical-metallogenetic families that, in turn, are related to distinct types of parental granites. Beryl-topaz (NYF) pegmatites cluster in districts almost completely circumscribed or very close to A-type and I-type G5 intrusions, encompassing granitic and igneous charnockitic (orthopyroxene-bearing) rocks with features of magma mingling-mixing involving mafic melts.

Contrastingly, complex LCT pegmatites and albite-spodumene-rich pegmatites (SRP) are found in the external aureoles of S-type intrusions mostly composed of two-mica leucogranites with pegmatoid cupolas, generally hosted by metasedimentary rocks of the greenschist to amphibolite facies. Among the EBPP Li-bearing districts, the Araçuaí Pegmatite District stands out by having the largest historical and current production of lithium ore and the only world-class spodumene deposits of Brazil. Those deposits include the CBL, Sigma, and the newly discovered deposits by other companies, such as the Bandeira and other spodumene-rich deposits of Lithium Ionic Corporation.

The Araçuaí Pegmatite District includes several LCT pegmatite fields distinguished by their mineral production, pegmatite types and subtypes, and pressure-temperature (P-T) conditions of both the regional and contact metamorphisms (Figure 7-4). Besides complex LCT pegmatites, spodumene-rich pegmatites (SRP) are known in the Curralinho, Itinga, Neves-Tesouras and Salinas pegmatite fields. However, the Itinga Pegmatite Field remains the most important for spodumene production and prospecting, owing to the outstanding abundance of non-zoned to poorly zoned SRP ranging from a few to dozens of meters thick, hundreds to a few thousand meters in length along strike, and dozens to hundreds of meters in downdip width. Many spodumene orebodies mined by Arqueana, CBL and Sigma, as well as those discovered by Lithium Ionic at Bandeira and other targets, belong to the SRP (or albite-spodumene) type.

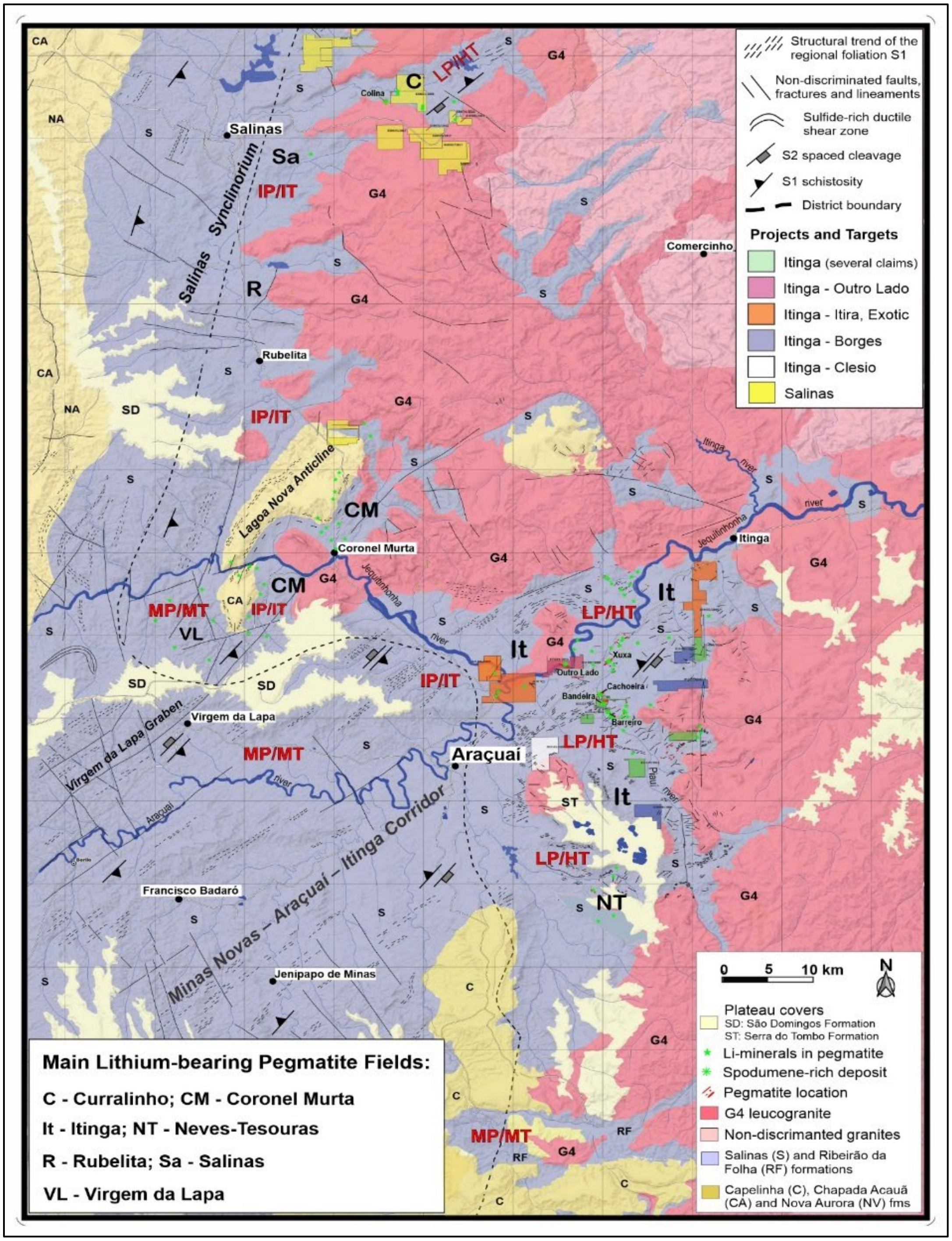
7.2 Structural Geology

In the Araçuaí Pegmatite District (Figure 7-4), the present-day structural framework was established after four deformation events (D1, D2, DG, and DNt). Two of them (D1, D2) are directly related to the regional tectono-metamorphic evolution of the Araçuaí Orogen in the Ediacaran-Cambrian. The third deformation event (DG) was caused by the widespread and voluminous intrusions of Cambrian G4 granites that caused thermal metamorphism and significant structural disturbance on the regional fabrics along areas relatively close to granitic stocks and batholiths (Pedrosa-Soares et al. 1987, 1993, 2011; Alkmim et al., 2006; Santos et al., 2009; Peixoto et al., 2017). Much later, the last deformation event (DNt) resulted from neotectonics reactivation in the Late Tertiary (Saadi & Pedrosa-Soares, 1989).

The Ediacaran-Cambrian deformation events (D1, D2, and DG) formed the structural framework that passively hosts the rare element pegmatites in the Araçuaí District (Figure 7-4). The much younger neotectonic deformation (DNt) reworked prior structures in upper crustal levels in the Late Tertiary (Miocene), forming normal faults and graben basins (e.g., the Virgem da Lapa Graben, Figure 7-4) filled by the fluvial to lacustrine sandstone-mudstone piles of the São Domingos Formation that reach more than 100 m in thickness (Saadi & Pedrosa-Soares, 1989; Pedrosa-Soares, 1997). Locally, neotectonic faults may cut and displace blocks with pegmatite deposits.

The D1 deformation results from regional tectono-metamorphic processes imposed by compressive stresses during the collisional stage (580–540 Ma) of the Araçuaí Orogen. Megascopic to macroscopic D1 structures are asymmetric tight folds with long limbs and short hinges, parasitic folds, and ductile shear zones related to thrust ramps and oblique to transcurrent strike-slip domains. The macroscopic to microscopic D1 structures include the main regional planar structure that evolved from a cleavage to the schistosity S1 (Figure 7-5) that contains the L1 mineral/stretching lineation. S1 is generally (sub)parallel to the layering (S0) along D1 fold limbs, becoming an axial-plane surface in fold hinges (Figure 7-5). Anastomosed and S-C foliations characterizes higher strain shear zones syn-kinematic to S1. Although it generally is a very penetrative structure, the S1 foliation also provides host surfaces for pegmatites.

Distinct metamorphic regimes related to the D1 deformation of schists and gneisses rich in micas have been recognized in the region encompassing the Araçuaí Pegmatite District (Pedrosa-Soares et al., 1984, 1993, 1996; Costa et al., 1984; Costa, 1989; Santos et al., 2009; Peixoto et al., 2017). In the western and southwestern sectors of the region (Figure 7-4), the S1 schistosity shows syn-kinematic (syn-S1) assemblages with Fe-rich garnet almandine), staurolite, kyanite and/or sillimanite. Such index-minerals series is typical of a medium pressure and medium temperature (MP/MT) metamorphic regime (Figure 7-4). This, together with quantitative geothermobarometric data, characterize the M1 metamorphic event as a syn-collisional (syn-D1) Barrovian-type (MP/MT) metamorphism dating between 575–550 Ma. P and T increase from c. 3.5 kbar at 450°C in the garnet zone at the southwest of Francisco Badaró, passing northeastwards through the staurolite, kyanite and sillimanite zones, and reaching up to 8.5 kbar at 650°C at the southeast of Coronel Murta (Figure 7-4).



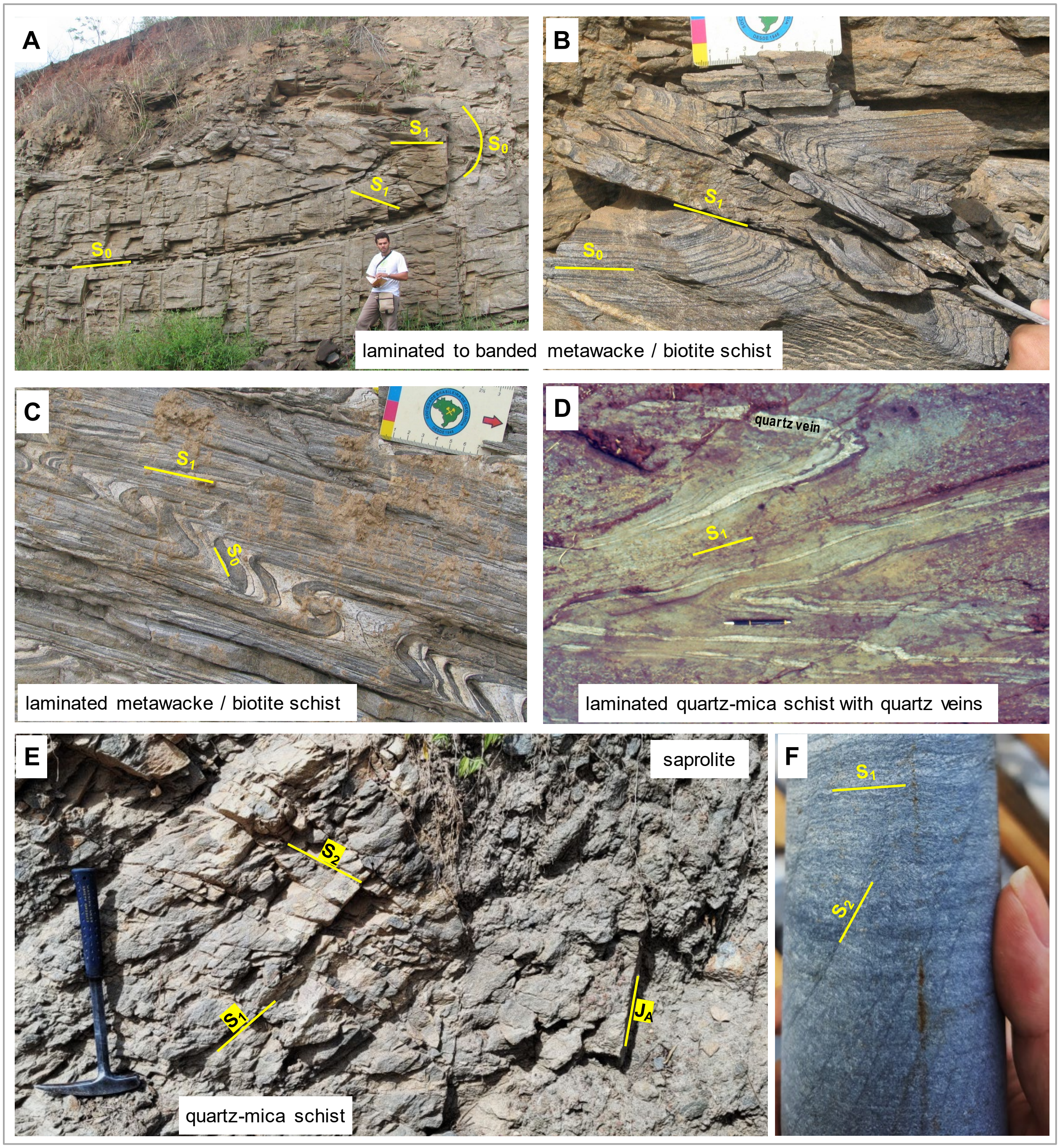
Notes: Highlighting lithium-bearing pegmatite fields (see inbox), major tectonic domains (names in italics on map), metamorphic regimes according to relative pressure (P) and temperature (T) conditions (LP/HT, low-P/high-T; IP/IT, intermediate-low P and T; and MP/MT, medium P and T), spodumene active mines (Cachoeira, Xuxa) and main spodumene deposits: Bandeira and Outro Lado (Lithium Ionic), Barreiro (Sigma), and Colina (Latin Resources). Map modified and updated by Pedrosa-Soares et al. (2023) based on the district map by Paes et al. (2016).

Figure 7-4: Geology of the Araçuaí Pegmatite District

In the northeastern and northern sectors of the region, the S1 schistosity shows syn-kinematic (syn-S1) assemblages with biotite, Mn-rich garnet (spessartine), andalusite, cordierite and/or sillimanite. Such index-minerals series is typical of a low pressure and high temperature (LP/HT) metamorphic regime (Figure 7-4). From the most northeastern andalusite zone to the southwest of Itinga, quartz-feldspathic leucosomes with aplitic to pegmatitic textures formed from the breakdown of muscovite along the S1 foliation of cordierite-quartz-mica schists. Northeastwards, through the andalusite-cordierite, cordierite-sillimanite, sillimanite, and K-feldspar zones, increasing metamorphism and partial melting of quartz-mica schists formed migmatitic paragneisses in the eastern tip of the Itinga Pegmatite Field (Figure 7-4).

Regionally, the metamorphic event (M2) records a low-P/high-T metamorphism with pressures from 2 kbar to 5.5 kbar under temperatures from 400 °C to 700 °C, at around 540–530 Ma. The M2 metamorphism reached partial melting conditions on quartz-mica schists of the Salinas Formation with increasing anatexis rates that formed leucosome-rich migmatites (diatexites) in the easternmost sector of the Araçuaí Pegmatite District. This implies that, in deeper crustal levels, the widespread anatexis on the Salinas Formation could have produced large volumes of S-type granitic magmas in the late collisional to post-collisional stages of the Araçuaí Orogen. Indeed, the time interval of the M2 metamorphism (540–530 Ma) fits well with the oldest ages of G4 granites (535–525 Ma). This, together with the fact that the M2 metamorphism culminated in partial melting of quartz-mica schists and paragneisses in the easternmost Araçuaí Pegmatite District, indicate that the S-type G4 magmas were formed from the anatexis of thick metasedimentary packages in deep levels of the Salinas Formation.

Along the boundary between the M1 and M2 metamorphic domains (Figure 7-4), the syn-S1 mineral assemblages include almandine and/or staurolite and andalusite and/or cordierite, characterizing an intermediate-low pressure (Buchan-type) metamorphic regime (IP/IT, Figure 7-4) transitional between the M1 Barrovian-type (MP/HT) and the M2 low-P/high-T (LP/HT) metamorphic regimes found in the Araçuaí Pegmatite Districts. Bearing in mind the relations between distinct pegmatite populations, their metallogenetic specializations and metamorphic regimes (Cerný, 1991; Cerný et al., 2012), such metamorphic characterization is of great importance for prospecting different rare element pegmatites, as Li-rich pegmatites are typically found in terranes with relatively low-P/high-T metamorphism.



Notes: (A and B) Large tight fold (A) with a hinge (B) showing the sedimentary layering (S0) cut by the low-angle dip to flat axial-plane S1 cleavage. C) Tight folds with limbs transposed by S1 foliation. D) Hinges of tight folds with metamorphic quartz veins in quartz-mica schist. E) Spaced cleavage S2 cutting the schistosity S1, and sub-vertical joints (JA) cutting across both S1 and S2 in the Bandeira area. F) S2 spaced foliation marked by recrystallized mica, cutting the S1 schistosity in a drill core sample from the Bandeira deposit.

Figure 7-5: Photos from outcrops and a drill core showing structures of the deformation events D1 and D2 on the Salinas Formation in the Araçuaí Pegmatite District.

The D2 deformation developed from the late collisional to the post-collisional stages of the Araçuaí Orogen, when increasing decompression conditions, imposed by the orogen gravitational collapse, gradually replaced the tangential D1 compressive stresses. In the Araçuaí Pegmatite District, the D2 deformation comprises mostly brittle structures, such as the S2 spaced cleavage, joint families, and normal faults, as well as large open folds (flexures). The spacing between surfaces of the S2 cleavage ranges from less than 1 cm to decimeters (Figure 7-5). Locally, S2 may be very well developed in micaschists, becoming a tight crenulation cleavage to schistosity. The S2 spaced cleavage and other brittle structures, as being more open surfaces than the S1 schistosity, provided host surfaces for Li-rich pegmatites, generally the thicker ones, in the Itinga Pegmatite Field.

The latest Cambrian deformation event (DG) was caused by the intrusion of large volumes of S-type magmas that formed the G4 granites and cut across and disturbed the regional framework imprinted by the D1 and D2 deformations. The DG event deformed the regional structural trend of the host rocks around granitic plutons, forming radial fractures irradiating from the granitic plutons, and imprinting ring-shaped fracture systems that reworked regional structures around the intrusions. All these DG structures can host late orogenic rare element pegmatites.

During emplacement and cooling, the G4 plutons caused contact metamorphism on their country rocks and released residual silicate melts that formed pegmatites that either crystallized within the parental granite or migrated outwards and were hosted by D1, D2 and DG structures of the Salinas Formation and other metasedimentary units. While barren and beryl-bearing pegmatites are found both within parental G4 granites and country rocks, the Li-bearing pegmatites have been only found in places rather far from (>1 km) granite massifs, emplaced in the Salinas Formation and other metasedimentary units. The G4 batholith emplaced along the whole eastern boundary of the Araçuaí Pegmatite District is formed by multiple coalescent plutons and places an eastern limit for the occurrence of Li-bearing pegmatites.

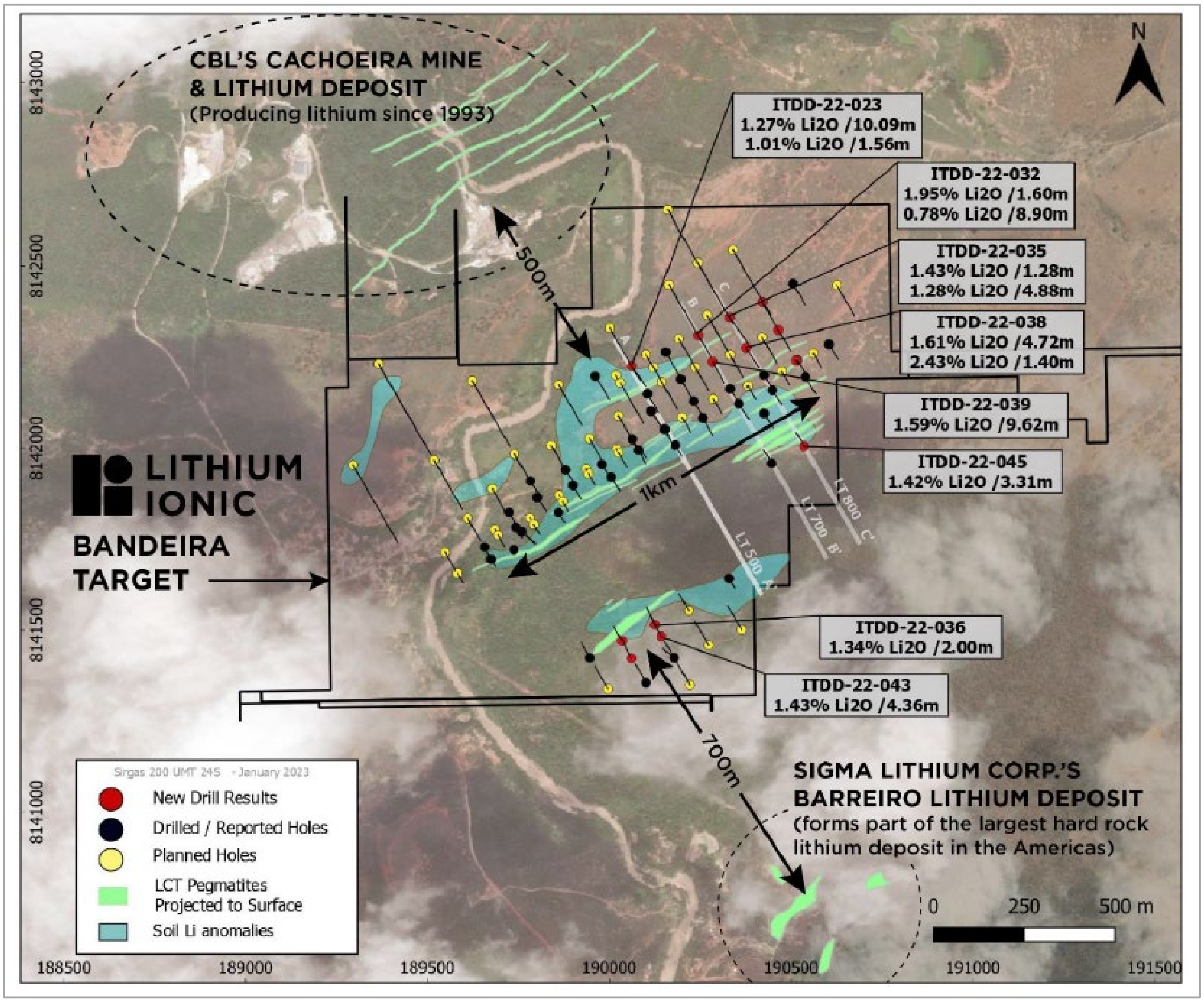
Regionally, the deformational events formed large structures with distinct implications for the occurrence and structural control of pegmatites in the Araçuaí District, such as the Salinas Synclinorium, the Lagoa Nova Anticline, and the Minas Novas–Araçuaí–Itinga Corridor (Figure 7-4). The axial zone of the Salinas Synclinorium shows the best-preserved section of the Salinas Formation, comprising non-deformed to weakly deformed metawacke, metapelite and metaconglomerate, metamorphosed in the biotite and garnet zones of the low greenschist facies. This low-grade metasedimentary section reaches up to 2 km in thickness, with no evidence of pegmatite along the synclinorium keel. However, a Li-rich pegmatite cluster, including SRP bodies, was recently found to the east of the Salinas Synclinorium, along the andalusite-cordierite-bearing, low-pressure/high-temperature metamorphic zone of the Curralinho Pegmatite Field (Figure 7-4). In the case of the Lagoa Nova Anticline, although there are LCT pegmatites emplaced along its structural surfaces, no SRP was yet found there, much probably due to the rather unfavorable pressure-temperature conditions of the regional and contact metamorphisms (between the medium PT (MP/MT) and intermediate PT (IP/IT) regimes). The Minas Novas–Araçuaí–Itinga Corridor, in turn, plays a special role in the understanding of the structural control and the most favourable pressure-temperature conditions for the SRP occurrence in the Araçuaí Pegmatite District. That corridor has been characterized as a flower-shaped transpressive (during D1) to transtensive (during D2) structure (Pedrosa-Soares et al., 1993, 1996; Alkmim et al., 2006) with the S1 foliation dipping to SE in the NW flank, and to NW in the SE flank (Figure 7-4). In the Itinga Pegmatite Field, the S1 schistosity and S2 spaced cleavage show NE-trending strikes, with the S1 schistosity dipping to NW and the S2 cleavage dipping to SE (if they have not been disturbed by later deformations, i.e., DG and DNt). The S1 foliation, as well as the S2 spaced cleavage and other brittle surfaces (i.e., the flat-lying and subvertical joints) host many Li-rich pegmatites, with the thicker SRP bodies generally emplaced in more open surfaces of brittle structures.

The regional metamorphism associated with the S1 schistosity gradually increases from southwest to northeast along the corridor, reaching c. 3.5 kbar at c. 550 ºC at the andalusite-cordierite zone in the Piauí river valley, where the contact metamorphism was imposed by G4 granitic intrusions also under relatively low-pressure conditions. All those tectono-metamorphic and magmatic features favourable to SRP occurrence characterize the Itinga Pegmatite Field where several of the most important spodumene deposits already found in Brazil are located, such as those of the CBL and Sigma, and the SRP deposits of MGLIT.

7.3 Mineralization Model

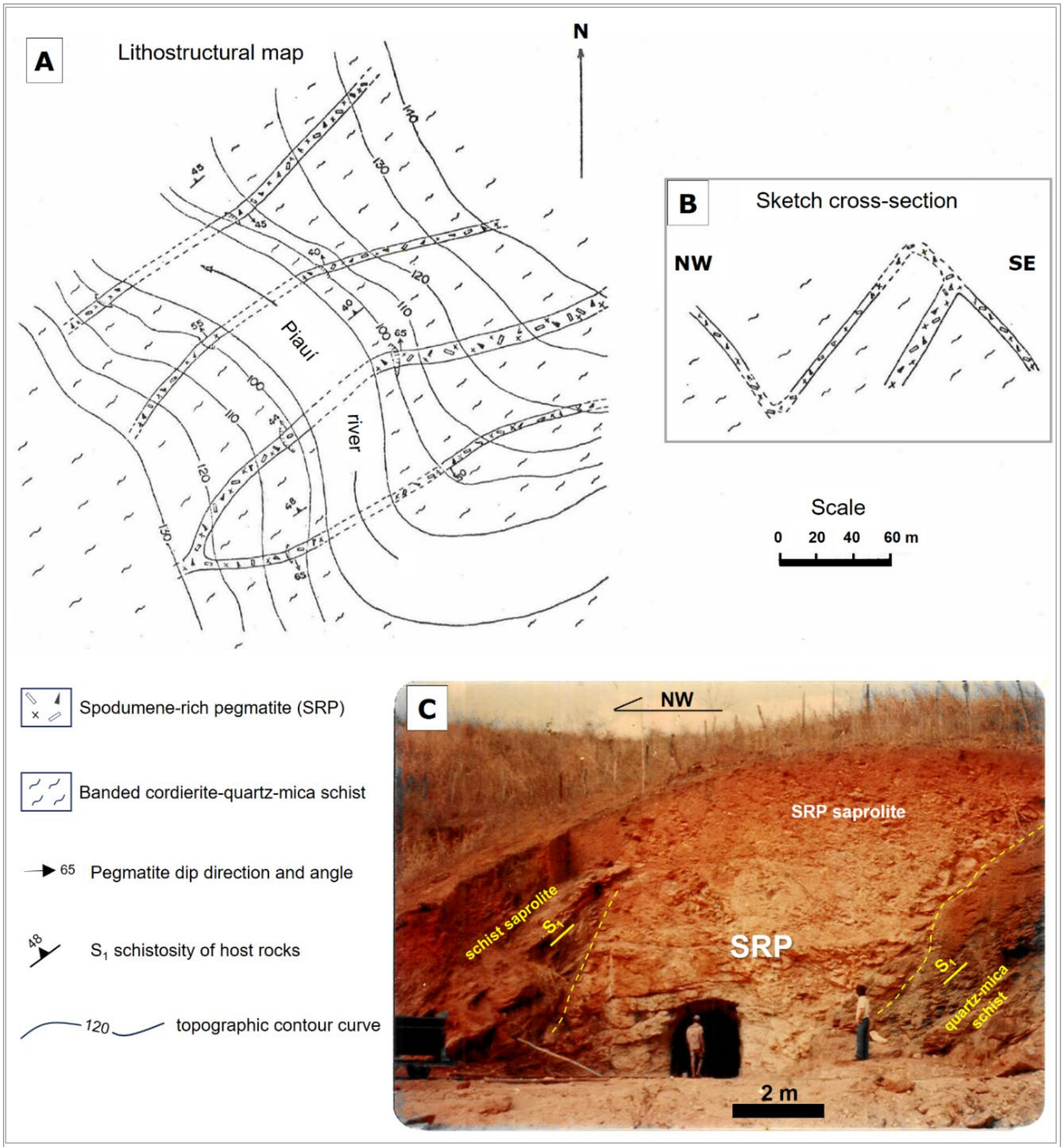
The Bandeira spodumene deposit is located immediately to the southeast of the CBL's Cachoeira mine (Figure 7-6). This mine has played a major role in the understanding of the mineralogical, petrographic, geochemical, and structural features of spodumene-rich pegmatites (SRP) through the scientific and technical studies carried out on the Cachoeira Pegmatite Group, a specific pegmatitic population of the Itinga Pegmatite Field (e.g., Sá, 1977; Afgouni and Sá, 1978; Correia-Neves et al., 1986; Afgouni and Marques, 1997; Pedrosa-Soares et al., 2009, 2011, 2023; Romeiro, 1998; Quéméneur and Lagache, 1999; Romeiro and Pedrosa-Soares, 2005; Dias, 2015; Chaves et al., 2018; Luiz, 2023). The Cachoeira Pegmatite Group comprises a SRP swarm that has been mined at least since the 1970's by the Arqueana Company (Figure 7-7), followed by the production of spodumene ore in industrial scale by CBL since 1993 (Figure 7-8). It is yet the best characterized spodumene deposit in Brazil, providing solid information to support the mineralization model that was applied to the exploration work on the Bandeira deposit (Figure 7-4).

The typical SRP orebodies of the Cachoeira Pegmatite Group are non-zoned but rather inequigranular pegmatites composed of spodumene (on average 23 vol%), perthitic microcline, albite, quartz, and muscovite, generally totalizing more than 95% of the whole orebody volume. Montebrasite, beryl, cassiterite, columbite-tantalite, cookeite, zabuyelite and petalite are scarce accessory minerals. The Cachoeira SRP cluster forms a pegmatite swarm characterized by a staggered (en-échelon) spatial distribution of parallel to subparallel, locally branched orebodies showing lateral and vertical offsets among them (Figure 7-8 and Figure 7-9). They are roughly tabular bodies with lens-shaped terminations, ranging from decimetres up to 30 m in thickness orthogonal to dip, from a few meters to many hundreds of meters in length along strike, and up to many hundreds of meters downdip. The Cachoeira pegmatites were emplaced in the Salinas Formation that consists of banded cordierite-quartz-mica schist with intercalations of calcsilicate rock, recording P-T conditions suitable for SRP occurrence. In the Salinas Formation, the main host surfaces for pegmatites are the regional foliation (schistosity) S1 and the S2 spaced cleavage, although late joint surfaces can also host SRP bodies (Figure 7-7, Figure 7-8, and Figure 7-9).



Source: cf. Corporate Presentation da Lithium Ionic, March 2023, https://www.lithiumionic.com/projects/itinga-project/

Figure 7-6: Location of the Bandeira Deposit in Relation to the CBL's Cachoeira Mine and the Sigma's Barreiro Deposit

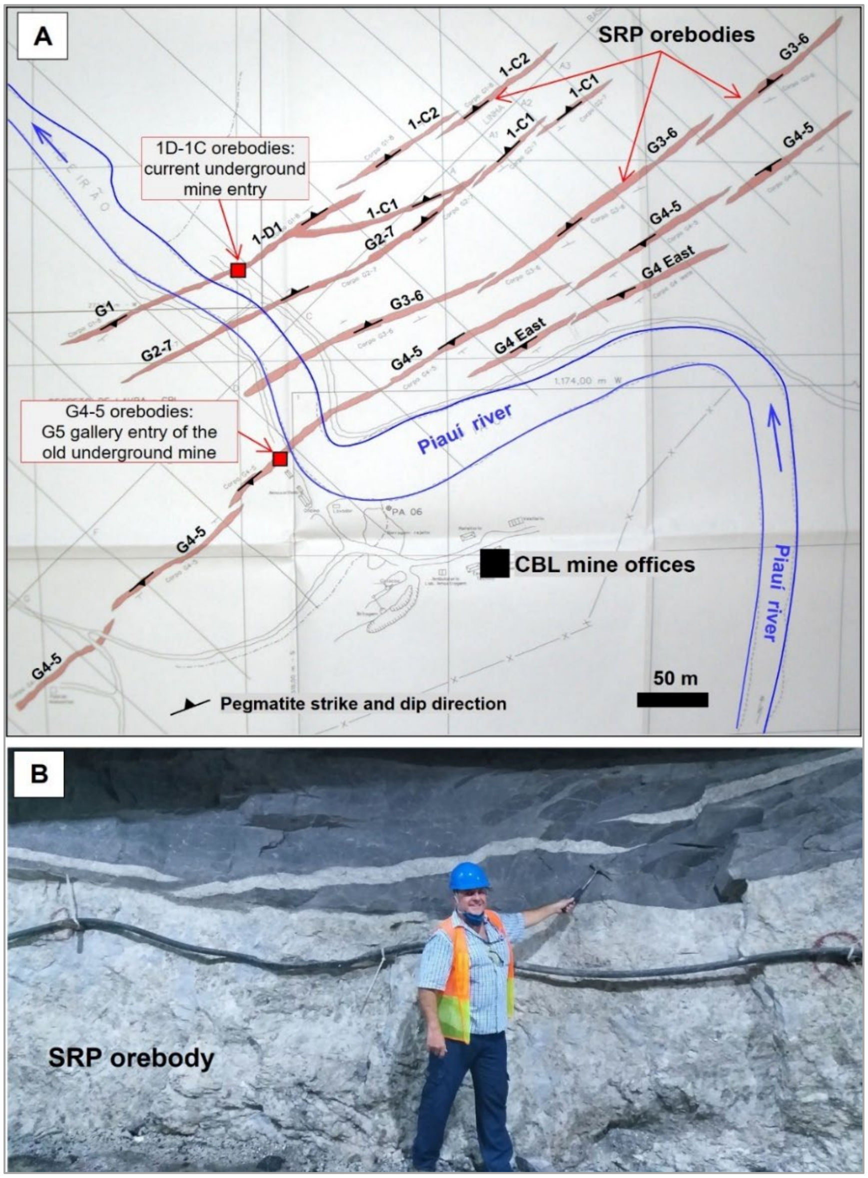


Source: Map, cross-section, and photo adapted from Sá, 1977.

Notes: A (map) and B (section) showing four NE-trending, parallel to sub-parallel, branched, tabular-shaped, spodumene-rich pegmatites (SRP) both concordant with the NW-dipping S1 schistosity of host rocks and discordant with S1, (i.e., emplaced in the SE-dipping S2 spaced cleavage). B (photo) shows a concordant, c. 7 m thick SRP hosted by cordierite-quartz-mica schist, with both rocks increasingly weathered (saprolites to soils) towards the topographic surface.

Figure 7-7: The Cachoeira Mine in the mid 1970s

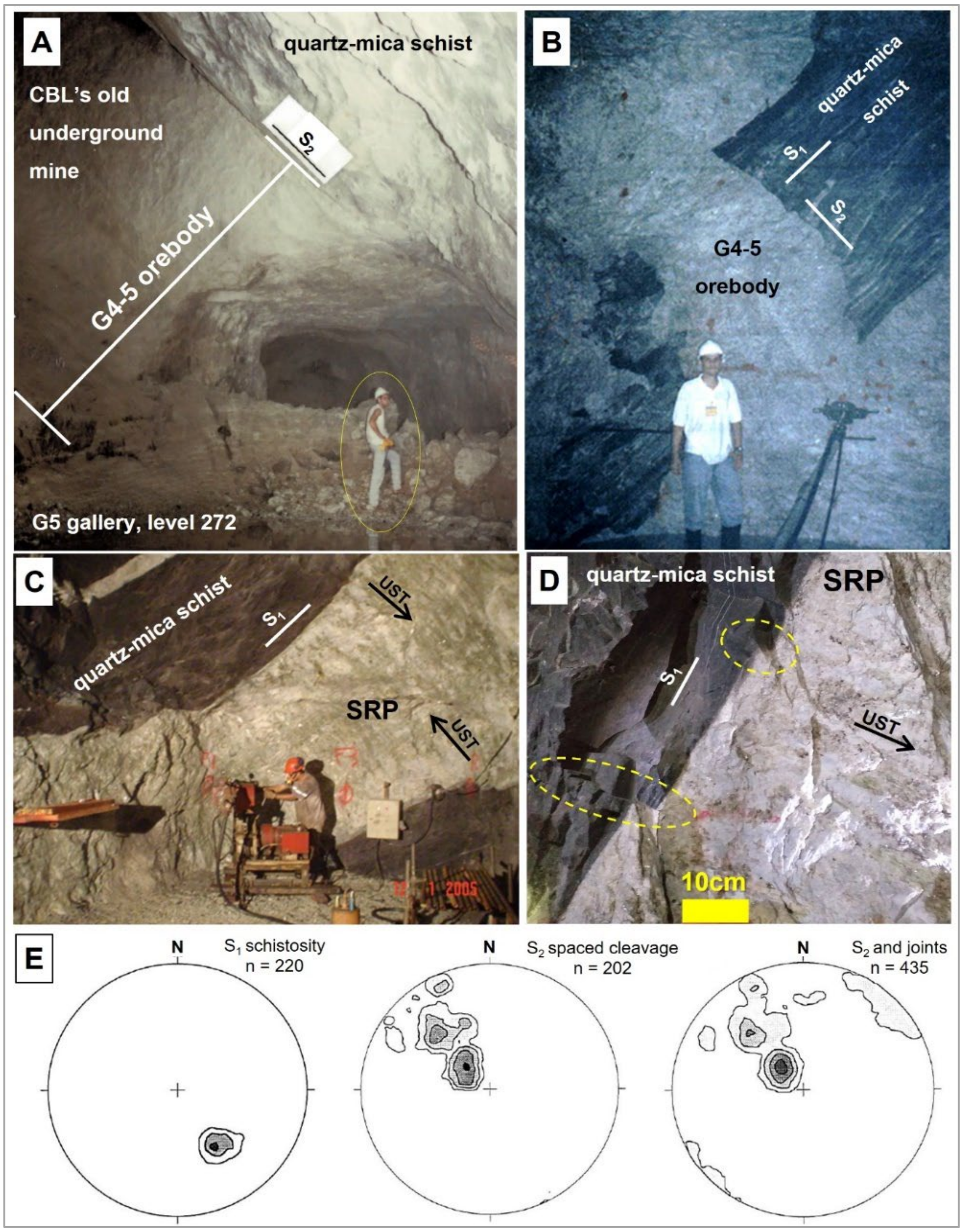
The tectonic structure of the Salinas Formation behaved passively during the intrusion of Li-rich magmas that crystallized as spodumene-rich pegmatites, which in turn do not record any evidence of ductile or brittle deformations (Figure 7-8 and Figure 7-9), except for small faults that locally cut pegmatite contacts and may be related to the latest D2 or DG deformations (Figure 7-9; see also Section 7-2).



Source: Photo by A.C. Pedrosa Soares, August 2022.

Notes: A) Map of the Cachoeira Pegmatite Group in CBL's Mine Area (adapted and updated from Romeiro, 1998), showing the staggered (en-échelon) spatial pattern of parallel to subparallel, locally branched, NE-trending orebodies of spodumene-rich pegmatites (SRP, in light brown) with indications of mapped strike and dip directions of the pegmatite bodies. SRP concordant bodies, emplaced along the S1 schistosity, dip to NW. SRP discordant bodies, hosted by the S2 spaced cleavage, dip to SE. B) A fractal example of the en-échelon distribution pattern of SRP bodies shown by three smaller veins (above the main SRP orebody) in CBL's Cachoeira mine).

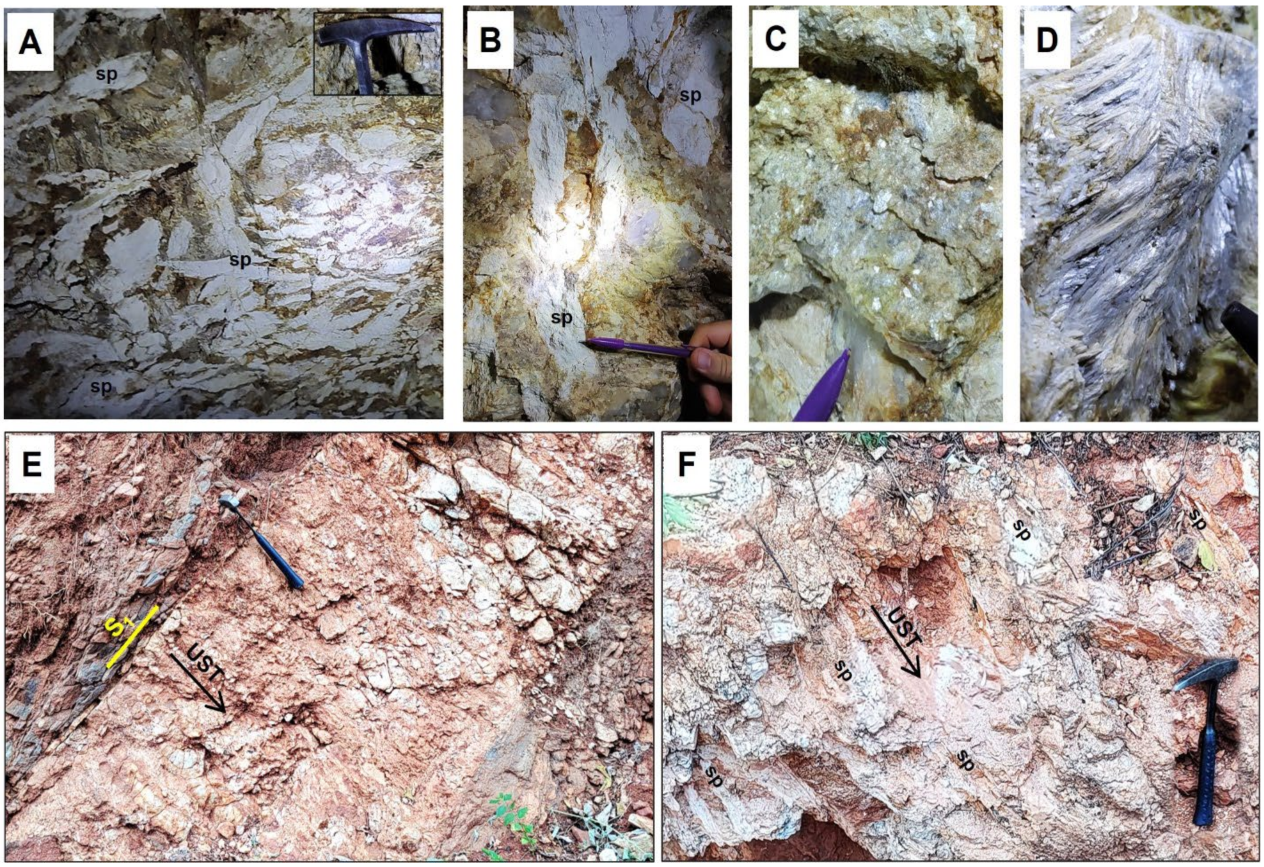
Figure 7-8: Cachoeira Pegmatite Group in CBL's Mine Area



Notes: A) The G4-5 SRP in the G5 gallery, level 272, showing a discordant orebody (c. 7 m thick) hosted by the S2 spaced cleavage (photo from Romeiro, 1998). B) A closing edge of the main G4-5 orebody, showing SRP branches cutting across the host quartz-mica schist (photo from Romeiro, 1998). C) Mining front showing a concordant SRP orebody (1D/1C gallery) ranging from c. 3 m to more than 4 m thick, hosted by the S1 foliation dipping to NW, with unidirectional solidification texture (UST, black arrows) outlined by orientated greenish spodumene crystals orthogonal to the contacts (photo from Romeiro and Pedrosa-Soares, 2005). D) Sharp lithological contact, concordant with S1, between SRP and the host schist, showing small offsets along short brittle surfaces (yellow ellipses) and unidirectional solidification texture (UST, black arrow) outlined by oriented spodumene and feldspar (photo by Pedrosa-Soares, August 2022). E) Stereograms (Schmidt projection, lower hemisphere) for the SRP host structures in the Cachoeira underground mine and surface outcrops showing that both S1 and S2 are Ne-trending but dip to opposite directions: S1 to NW and S2 to SE (stereograms adapted from Romeiro, 1998).

Figure 7-9: Photos from Spodumene-Rich Pegmatites (SRP) in the Cachoeira Underground Mine (CBL)

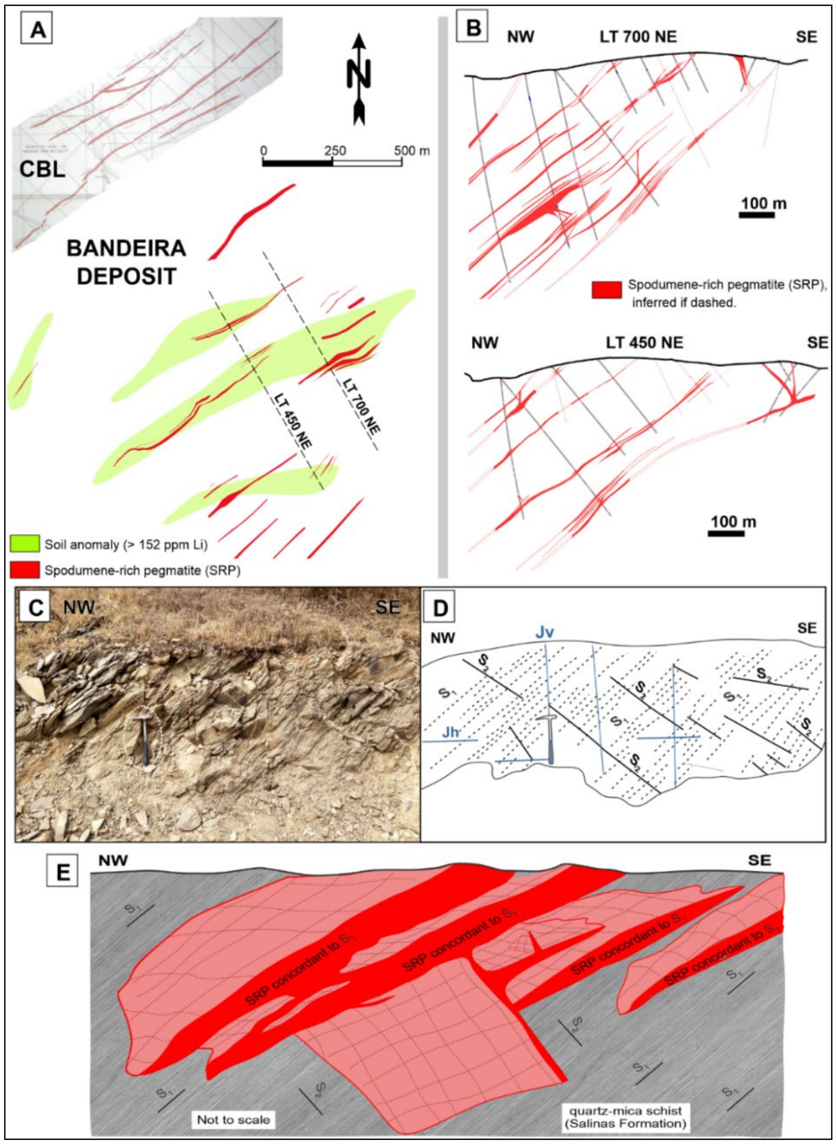
Based on available information from the Cachoeira Pegmatite Group and CBL's underground mine (Figure 7-7 to Figure 7-9), a mineralization model for spodumene-rich pegmatites (SRP) was conceived to assist in the exploration work on the Bandeira target. After a soil geochemistry campaign, Li anomalies roughly parallel to the Cachoeira SRP swarm were revealed and, together with lithological and structural data from a few outcrops, old diggings, and new exploration trenches (Figure 7-10) provided the basis for a very successful drilling campaign that discovered dozens of new SRP bodies rather close to each other from the near-surface to more than 800 m in depth. The newly discovered Bandeira deposit comprises spodumene-rich orebodies, arranged along the same structural trend of Cachoeira's SRP swarm (Figure 7-11).



Notes: Prospecting (garimpo in Brazilian Portuguese), showing a rather weathered pegmatite very rich in pseudomorphs of spodumene (sp) replaced by white clay (A and B), with local mica-rich metasomatic bodies, small miarolitic cavities and rare lepidolite books (D) at the pegmatite top. A new trench (E) revealed another rather weathered pegmatitic body concordant with the S1 foliation of the host quartz-mica schist, showing pseudomorphs of tabular-shaped spodumene (sp) replaced by white clay (F), depicting unidirectional solidification texture (UST) orthogonal to the pegmatite/schist contact.

Figure 7-10: Photos from Underground Galleries of an Old Digging for Gem

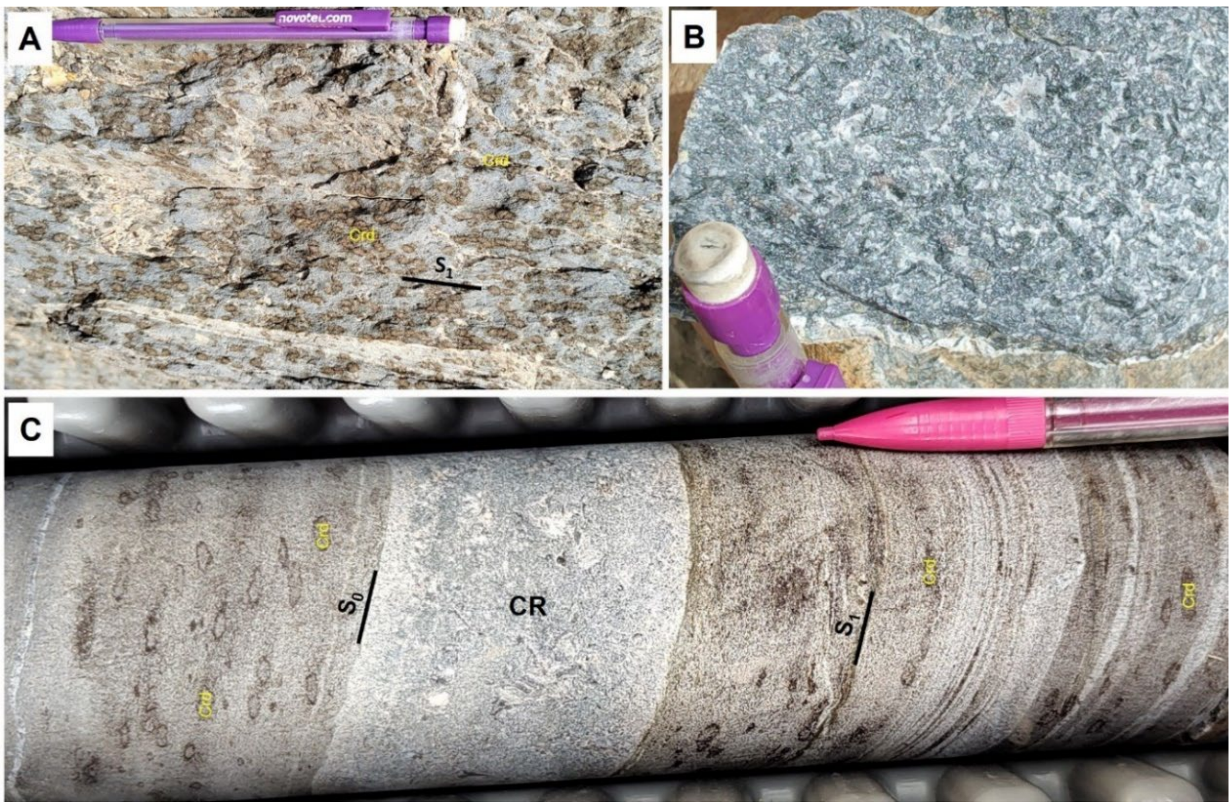
Following the regional NE–SW structural trend, the Bandeira deposit comprises SRP swarms of NE-striking orebodies mostly hosted by and concordant with the NW-dipping schistosity (S1), but also some discordant SRP emplaced along the SE-dipping fracture system (S2 spaced cleavage), as well as a few SRP bodies hosted by late flat-lying joints (Figure 7-11). The Bandeira pegmatites are tabular bodies with convex lens-shaped terminations, arranged in tight and staggered (en-echellon) swarms, locally with branched connections linking ore bodies. Single SRP bodies normally reach hundreds of meters in length along the strike, ranging in thickness from a few decameters to decimeters, with the discordant SRP bodies tending to be thicker than the concordant ones. With known downdip-width up to 800 m, several Bandeira SRP bodies remain open in depth. The exploration drilling work revealed two main SRP swarms in the Bandeira deposit: i) the northern swarm, with thicker, longer, and wider SRP bodies concordant to the S1 foliation of host rocks; and ii) the southern swarm, with somewhat smaller SRP bodies (Figure 7-11).



Notes: Anomalies in soil and drilled SRP bodies projected to surface in the Bandeira deposit, and CBL's SRP swarm (see Fig. H). B) Simplified cross-sections showing the SRP swarm discovered in depth by Lithium Ionic after exploration work. C and D) Outcrop and structural sketch illustrating the tectonic surfaces of the country rocks (Salinas Formation) that host pegmatites in the Bandeira deposit: S1, regional ductile foliation (schistosity); S2, post-S1 spaced cleavage; Jh, late horizontal joints; and Jv, late vertical joints. E) Cartoon illustrating a model for the spatial distribution and lateral relations of SRP orebodies in the Bandeira deposit. (Map and sections for A and B from Lithium Ionic reports, and CBL map from Romeiro, 1998. C, D, and E by Geologist Anderson Victoria).

Figure 7-11: Simplified Map Showing the Distributions of Li

The host rocks of SRP orebodies in the Bandeira deposit are banded to laminated cordierite-quartz-mica schists, locally containing disseminated sulfide and/or graphite-rich bands, with intercalations of massive calcsilicate rocks (Figure 7-12 and Figure 7-13). Most cordierite forms ellipsoidal (egg-shaped) stretched poikiloblasts syn-kinematic to the regional S1 schistosity (Figure 7-12). The banded to laminated quartz-mica schists represent metamorphosed sand-mud sediments, and the calcsilicate rocks are metamorphosed Ca-rich carbonate-mud sediments (marls). They show sharp contacts with the SRP orebodies that generally are concordant to the regional S1 foliation (often parallel to the compositional layering S0) but are also hosted by the S2 cleavage or foliation (Figure 7-3). The host schists may be enriched in decussate muscovite and/or biotite, black to green tourmaline, and recrystallized cordierite along narrow (cm to dm) fringes of contact metamorphism imposed by pegmatites (Figure 7-14). Although the host schists may be anomalous in lithium content close to pegmatites, they show no Li-ore mineral.

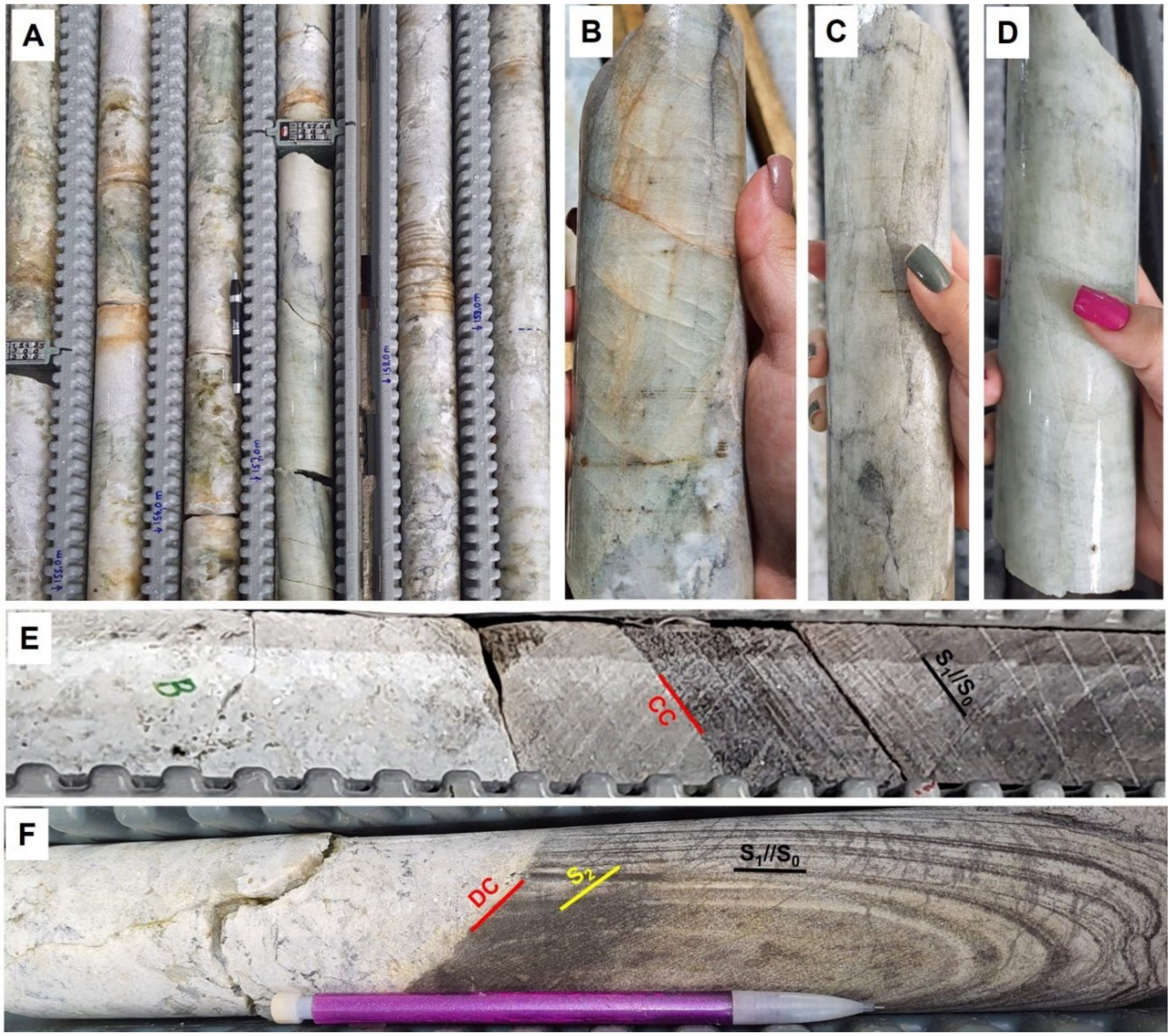


Notes: Partially weathered cordierite-quartz-mica schist rich in poikiloblasts (dark spots) of egg-shaped (ellipsoidal) cordierite (Crd) crowded of biotite and/or quartz inclusions and coronated by biotite. B) Calcsilicate rock with porphyroblasts of amphibole (dark green) and grossular garnet (light pink) within a massive matrix (greenish gray) mostly composed of quartz and plagioclase. C) Drill core segment showing the banded to laminated cordierite-quartz-mica schist with ellipsoidal cordierite (Crd; light spots coronated by biotite), light-coloured quartz-rich laminae, and intercalation of calcsilicate rock (CR).

Figure 7-12: Host Rocks of Spodumene-Rich Orebodies in the Bandeira Deposit

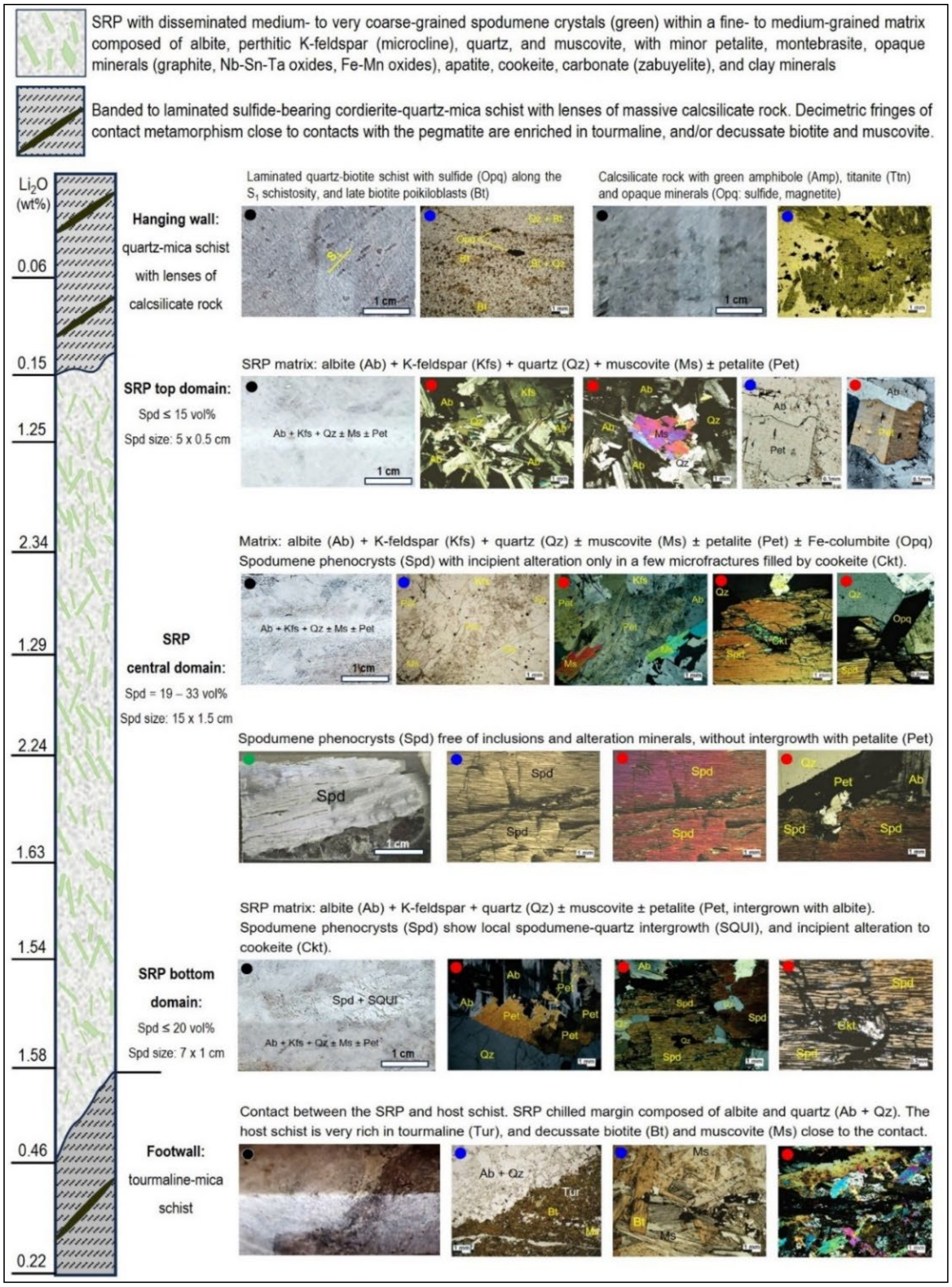
The Bandeira spodumene orebodies show a rather simple mineralogical assemblage (Figure 7-13 and Figure 7-14), consisting of medium- to very coarse-grained spodumene phenocrysts, reaching up to 35 vol% on average, within a fine- to medium-grained matrix mostly composed of albite, perthitic K-feldspar (microcline), quartz, muscovite, and petalite, summing up to 95 vol% of the total matrix. The scarce accessory (mainly montebrasite, and Nb-Sn-Ta oxides) and secondary minerals (cookeite, sericite, zabuyelita, Fe-Mn oxides, clay minerals) generally comprise less than 5 vol% in total. In drill cores, the spodumene crystals are mostly free of hydrothermal and weathering alterations and very poor in mineral inclusions (Figure 7-13 and Figure 7-14). Conversely, surface outcrops, shallow diggings and exploration trenches cutting SRP bodies generally show weathered spodumene (Figure 7-10), forming pseudomorphs composed of white clay (kaolinite and montmorillonite). Rare spodumene-quartz intergrowth (SQUI) may be found associated with spodumene crystals (Figure 7-14). Petalite has been found in SRP's drill cores and thin sections, mostly occurring in the matrix as very fine- to fine-grained (sub-millimetric to 1 cm) crystals (Figure 7-14) and, more rarely, as coarser crystals locally found in rather restricted intervals.

The thicker SRP bodies may show a lithium-barren and thin marginal zone rich in albite, generally rather discontinuous, followed inwards by a thick internal zone rich in disseminated spodumene (although spodumene may also be more concentrated in some domains than others along the internal zone). Owing to the upward migration of H20-rich fluids, flat-lying SRP sections close to the hanging-wall contact, as well as the top termination (“head”) of high-angle dip bodies, may show metasomatic units with miarolitic cavities that partially replaced the primary mineral assemblage. Many SRP bodies lack the external lithium-barren zone, showing disseminated spodumene along virtually the whole orebody (Figure 7-13 and Figure 7-14). Unidirectional solidification textures outlined by tabular to telescope-shaped spodumene crystals are common in Bandeira’s SRP orebodies. Thin albite-rich pegmatites, barren to poor in lithium, are also found in the Bandeira pegmatite swarms.



Notes: A) Segment of a non-zoned SRP body with medium- to coarse-grained greenish spodumene disseminated in the quartz-albite-microcline-muscovite matrix; black minerals in spots and fracture fillings are Nb-Sn-Ta oxides and graphite. B to D) Features of roughly tabular, greenish to white spodumene crystals free of or poor in inclusions. E) Concordant contact (CC) between albite-rich pegmatite border and laminated quartz-mica schist; the host surface is the regional schistosity S1 parallel to the compositional (sedimentary) layering S0. F) Discordant contact (DC) between albite-rich pegmatite border and laminated cordierite-quartz-mica schist; the host surface is the S2 cleavage/foliation. (photos by Geologist Fabiana Guimarães).

Figure 7-13: Drill Core Samples from Spodumene-Rich Orebodies and their Host Rocks in the Bandeira Deposit



Source: From Pedrosa-Soares et al. (2023).

Notes: Based on intercept with 6,75 m thick and 1.99 wt% Li_2O Pegmatitic textures based on average grain size (cm): fine <2.5; medium = 2.5–10; coarse = 10–30; and very coarse >30. Spd size (e.g., 15 x 1.5 cm) based on the average length and thickness of spodumene crystals. Photo types indicated by dots: black, photo from unpolished sample; blue, photomicrography under parallel polarizers light; green, photo from polished thin section; red: photomicrography under crossed polarizers light. Drill core and thin sections described by Geologists Fabiana Guimarães and Laura Wisniowscki, respectively.

Figure 7-14: Characterization Illustrated Summary for a Typical Spodumene-Rich Pegmatite (SRP) of the Bandeira Deposit

8.0 DEPOSIT TYPES

According to the most accepted petrologic-metallogenetic classification of pegmatites (Cerný, 1991; Cerný & Ercit, 2005; Cerný et al., 2012), all the spodumene-rich pegmatites found within the Bandeira deposit, as well as in the whole Cachoeira Pegmatite Group, belong to the rare element class, lithium subclass, and albite-spodumene type (Figure 7-7 to Figure 7-14).

Although generally included in the lithium–cesium–tantalum (LCT) family, the non-zoned to poorly zoned SRPs found in the Bandeira deposit, as well as all the ore bodies mined in CBL's Cachoeira Mine since the 1990s (Figure 7-7 to Figure 7-14), the Xuxa and other spodumene-rich deposits of Sigma Lithium (Delboni et al., 2023; Sá, 1977), and the Outro Lado deposit of Lithium Ionic, are rather poor both in tantalum and cesium when compared with the complex zoned LCT pegmatites (e.g., Generosa, Jenipapo, Murundu, Urubu—local pegmatites names for traditional artisanal mines found in the Itinga Pegmatite Field (cf. Dias, 2015; Quéméneur & Lagache, 1999; Romeiro, 1998; Sá, 1977) and elsewhere (e.g., Cerný 1991; Cerný et al., 2012; London, 2008).

The SRP deposits consist of non-zoned to poorly zoned spodumene-rich pegmatites with spodumene reaching up to 35 vol% on average, and the total modal content of spodumene, albite, K-feldspar, quartz, and white mica (muscovite and/or lithium-rich mica) summing up more than 90 vol% of the whole body. Therefore, SRP bodies are very poor in accessory minerals, which are generally represented by lithium-micas, lithium-phosphates, niobium–tin–tantalum oxides, cookeite, carbonate, and graphite. They are also poor in secondary (metasomatic) units due to their rather fluid-poor (anhydrous) nature (Figure 7-9, Figure 7-13, and Figure 7-14). As a corollary, the scarcity of rare elements, except for lithium, imposes constraints on the geochemical prospecting methods to be applied in searching for spodumene-rich deposits. Conversely, the high lithium content (1.4 wt% Li_2O on average) in SRP-type magmas promotes a significant decrease in the crystallization temperature and viscosity of the silicate melt, leading to the high mobility that allows such lithium-rich magmas to crystallize as very large, but relatively narrow, SRP bodies, with hundreds to thousands of meters long and wide, but only decimeters to a few decameters thick.

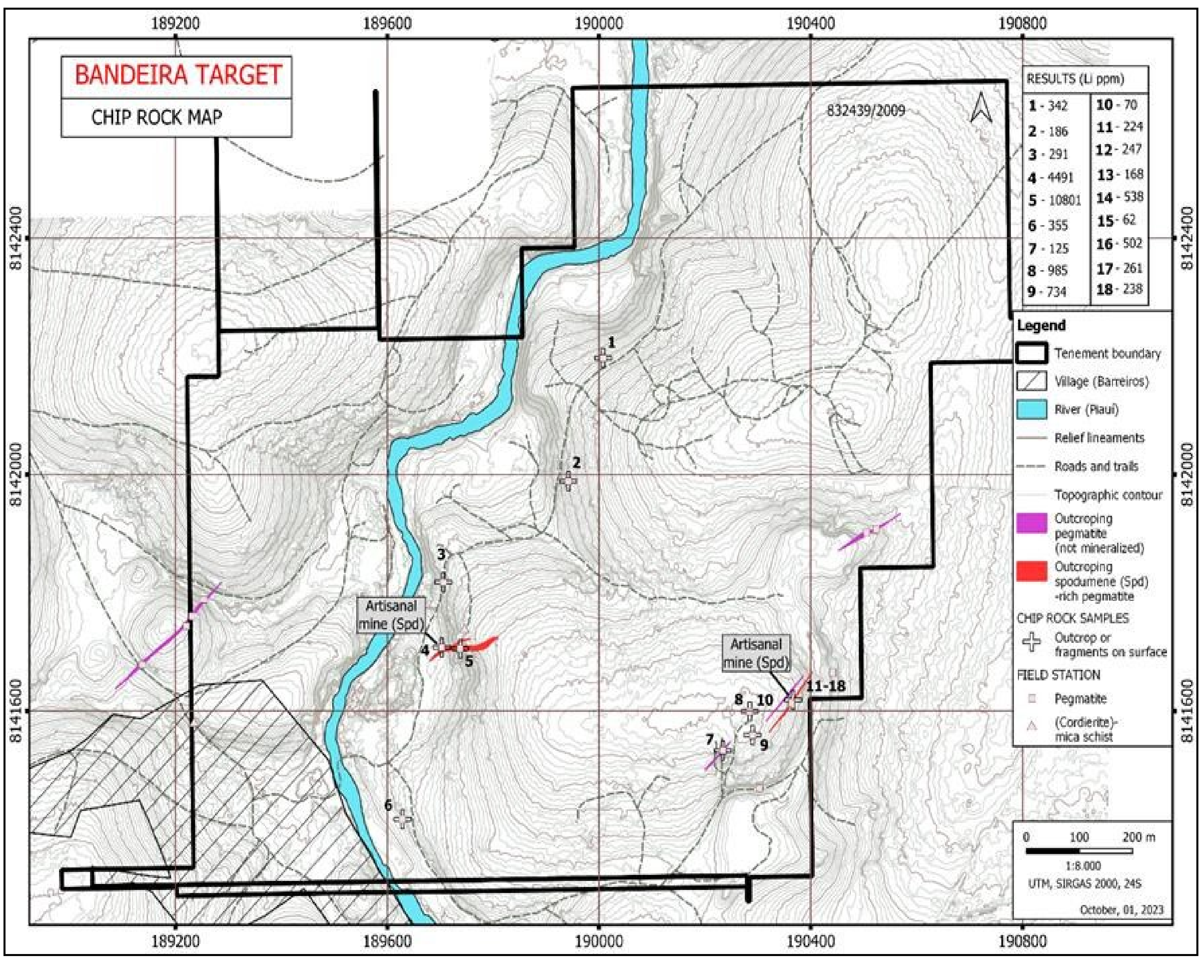
Therefore, for prospection and exploration work related to spodumene-rich deposits, it is very important to distinguish between the non-zoned and poorly zoned SRPs (i.e., pegmatites of the albite-spodumene type) and the complex zoned LCT pegmatites.

9.0 EXPLORATION

Significant fieldwork has been carried out in the Bandeira deposit, employing a comprehensive approach that included rock chip sampling, soil sampling, a trench program, structural analysis, and a drilling program (see Section 10). These activities were instrumental in deepening our understanding of the local geology and identifying potential SRPs, a crucial step in the exploration process.

9.1 Chip Rock Sampling

Despite the extensive residual soil cover, field mapping led to the recognition of pegmatites in artisanal mines (garimpos), in situ outcrops, or as fragments dispersed on the surface. Spodumene crystals were identified only in pegmatites founded in artisanal mines and surrounding areas. Figure 9-1 shows the location of each collected sample and its lithium content (ppm), and the location of outcropping pegmatites, mineralized in spodumene or not.



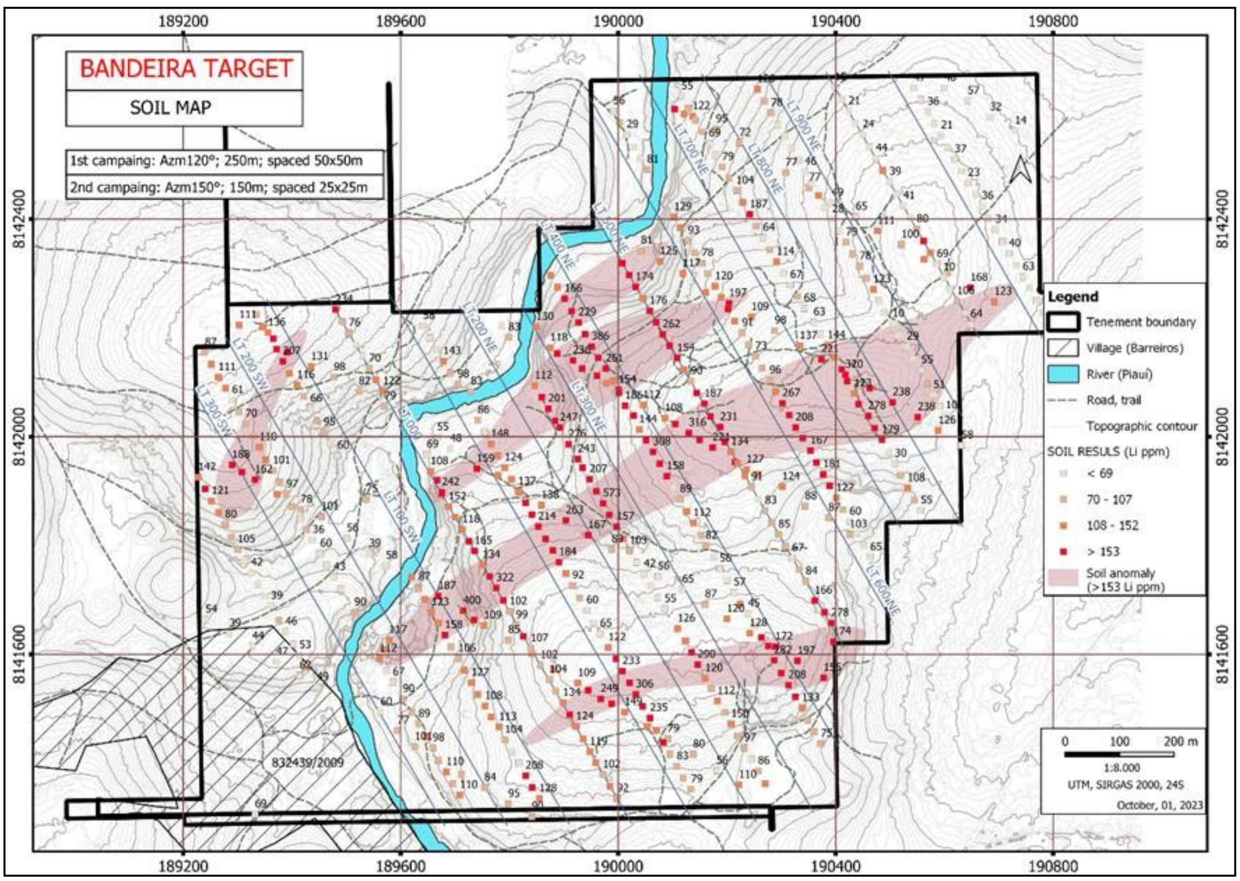
Note: Map Showing the Location of Each Sample and its Lithium Yield (ppm), and the Areas where Pegmatites are Exposed on the Surface.

Figure 9-1: Bandeira Deposit—Chip Rock Sample

9.2 Soil Sampling Program

The soil sampling program in the Bandeira area was conducted in two campaigns. In the first, sample transects were on azimuth 120° and spaced at 250 m apart. Samples were collected every 50 m along each transect. In the second campaign, the transects were oriented to azimuth 150°, spaced 150 m apart, with samples collected every 25 m along the transects.

In all, 537 samples were collected in the Bandeira area, and the lithium content in the soil varied from 10 ppm to 573 ppm. Calculations based on the results distribution indicated a subdivision of the lithium content as low grade (<69 Li ppm); low to moderate grade (70–107 Li ppm); moderate to high grade (108–152 Li ppm); and high grade (>153 Li ppm). Based on the distribution of the results, it was possible to identify at least five high-grade anomalous zones that represent more favourable spots to prospect SRPs (Figure 9-2). These anomalous regions are strongly oriented in a northeast–southwest direction, which is the same strike as the regional foliation and the mapped pegmatites in the Bandeira area and adjacent region.



Note: The Northeast–Southwest Trend Coincides with the Direction of the SRPs.

Figure 9-2: Bandeira Deposit—Soil Geochemical

9.3 Trenching Program

After the soil geochemistry survey, a trenching program was devised to investigate the anomalous lithium-content areas. A total of 26 trenches was executed, totalling 1,733 m of trench (Table 9-1). The trenches were preferentially positioned above the soil anomalies, and the majority intercepted pegmatite (Figure 9-3). Due to the degree of weathering, the exposed pegmatites in some trenches are very decomposed, exhibiting a characteristic whitish colour, a significant contrast with the horst schist (see an example of trench ITTRE-22-006 in Figure 9-4 A and B). The decomposed pegmatites are friable, and it was possible to diagnose only quartz, kaolin, and flake muscovite. However, in other trenches it was possible to observe more preserved pegmatites, with visible spodumene centimetric crystals (see trench example ITTRE-22-001 in Figure 9-4 C and D). Independent of the conservation state, as part of the procedure, every pegmatite higher than 30 cm of thickness were mapped in the trench was sampled to verify the lithium content (see channel sampling line on the pegmatite excavated in trench ITTRE-22-001 shown in the scheme of Figure 9-4 E).

Table 9-1: Summary of Trenches Executed in the Bandeira Deposit (Coordinates UTM X, Y, Z in metres, Datum Sirgas 2000 Zone 24 S)

Trench	X	Y	Z	Azimuth (°)	Dip (°)	Length (m)
ITTRE-22-001	189772	8141689	296	308	0	43
ITTRE-22-002	190395	8141705	304	155	0	67
ITTRE-22-003	190156	8142046	336	150	0	41
ITTRE-22-003B	190158	8142055	336	146	0	11
ITTRE-22-004	189960	8141898	298	155	0	45
ITTRE-22-005	190401	8142141	343	151	0	47
ITTRE-22-006	190451	8142056	343	150	0	52
ITTRE-22-007	190292	8142082	340	149	0	50
ITTRE-22-008	190055	8141994	324	150	0	79
ITTRE-22-009	189941	8142179	325	150	0	74
ITTRE-22-010	189888	8142019	279	150	0	91
ITTRE-22-011	190001	8141581	324	150	0	140
ITTRE-22-012	190077	8142201	311	149	0	51
ITTRE-22-014	190280	8141600	325	150	0	53
ITTRE-22-015	190480	8141902	317	150	0	8
ITTRE-22-016	190124	8141624	353	150	0	66
ITTRE-22-017	190319	8142037	335	150	0	109
ITTRE-22-018	190189	8141789	339	150	0	102
ITTRE-22-020	190543	8142143	340	150	0	51
ITTRE-23-013	189710	8141979	278	150	0	78
ITTRE-23-014A	190244	8141651	324	150	0	53
ITTRE-23-019	190174	8141686	321	150	0	95
ITTRE-23-021	189819	8141408	350	150	0	98
ITTRE-23-023	189335	8141926	350	330	0	70
ITTRE-23-024	189978	8142317	275	150	0	67
ITTRE-23-025	190214	8142105	336	150	0	92
Total						**1,733**

In addition to confirming the presence of pegmatites and studying their mineral composition, the trenches played an important role in determining the strike and dip of the orebodies. This provided a higher level of confidence when planning the borehole locations for the drilling campaign.

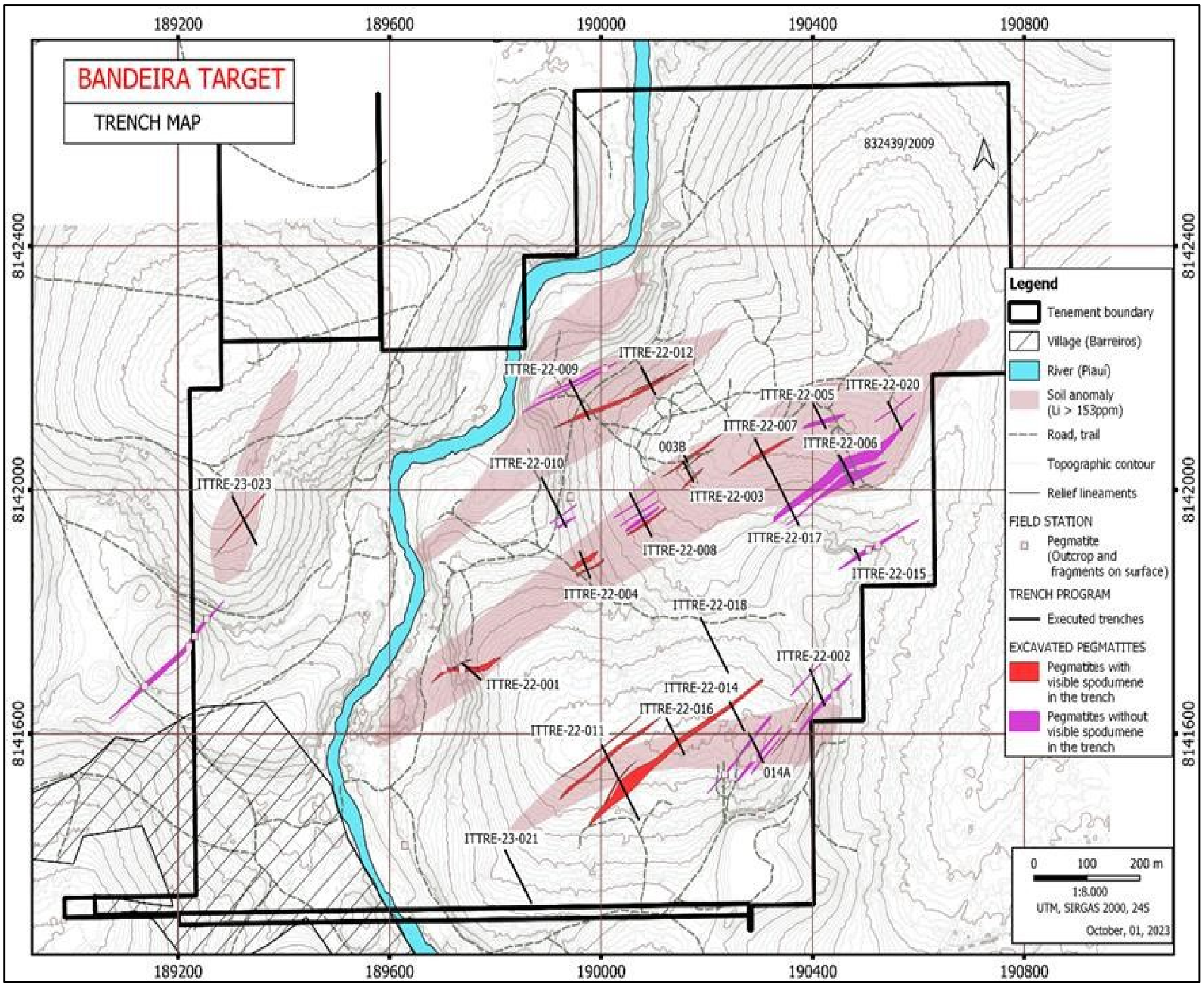
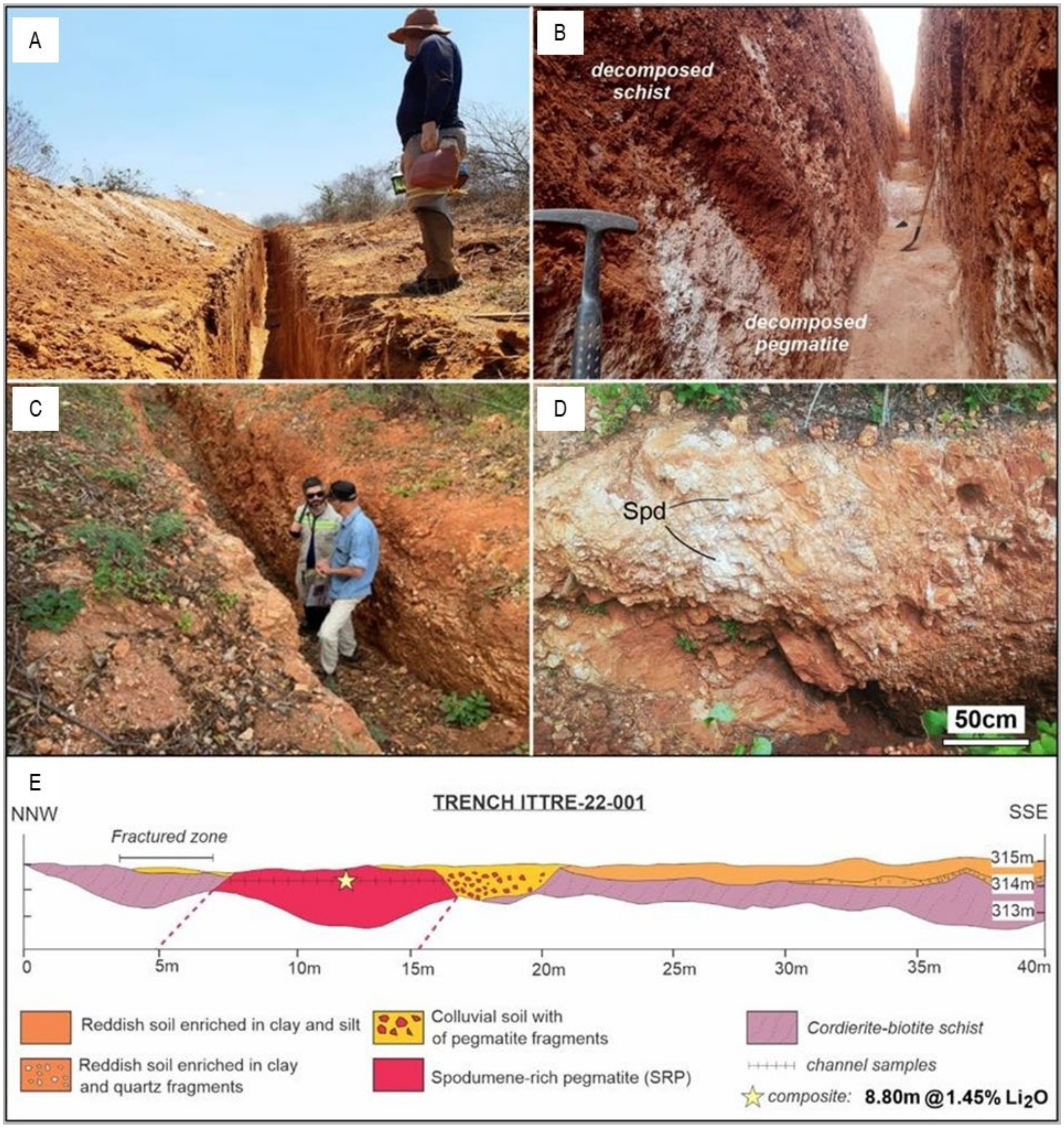


Figure 9-3: Bandeira Deposit Trench Sample Map—22 Trenches Sited Preferentially in Soil Anomalies, Most of Which Intercepted Pegmatites

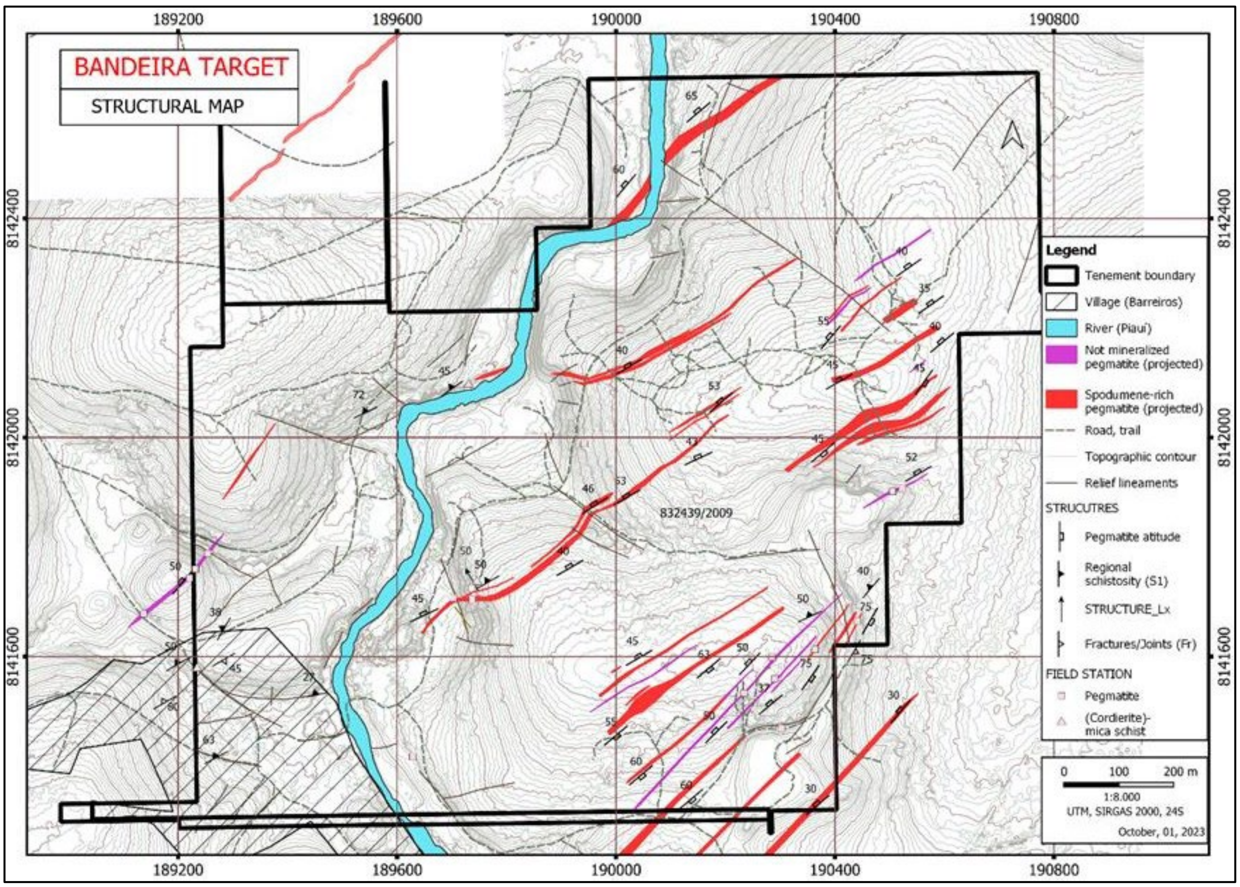


Notes: A and B) Trench ITTRE-22-006 and Detail of the Highly Decomposed Excavated Whitish Pegmatite Contrasting with the Host Reddish Decomposed Schist; C and D) General View of Trench ITTRE-22-001 and Detail of the Spodumene Crystals in the Excavated Pegmatite; E) Cross-Section of Trench ITTRE-22-001 Emphasizing the Mapped Units in the Trench and the Channel Samples Collected on the Spodumene-Rich Pegmatite.

Figure 9-4: Bandeira Project Sample Trenches

9.4 Structural Analysis

Although lacking outcrops, the few exposures of mica schists from the Salinas Formation are very relevant and helpful to understanding the structures in the Bandeira deposit. Ductile and brittle structures are recognized. The ductile structures were produced during the progressive metamorphism related to the syn-collisional phase of the Araçuaí orogen. In contrast, the brittle structures are younger and are interpreted as related to the gravitational collapse of the orogen during the post-collisional phase. The structural map of the Bandeira target (Figure 9-5) shows the distribution of the structures and the projection of the non-exposed pegmatites. In that case, the attitude of each body was measured considering the interpreted geological model.



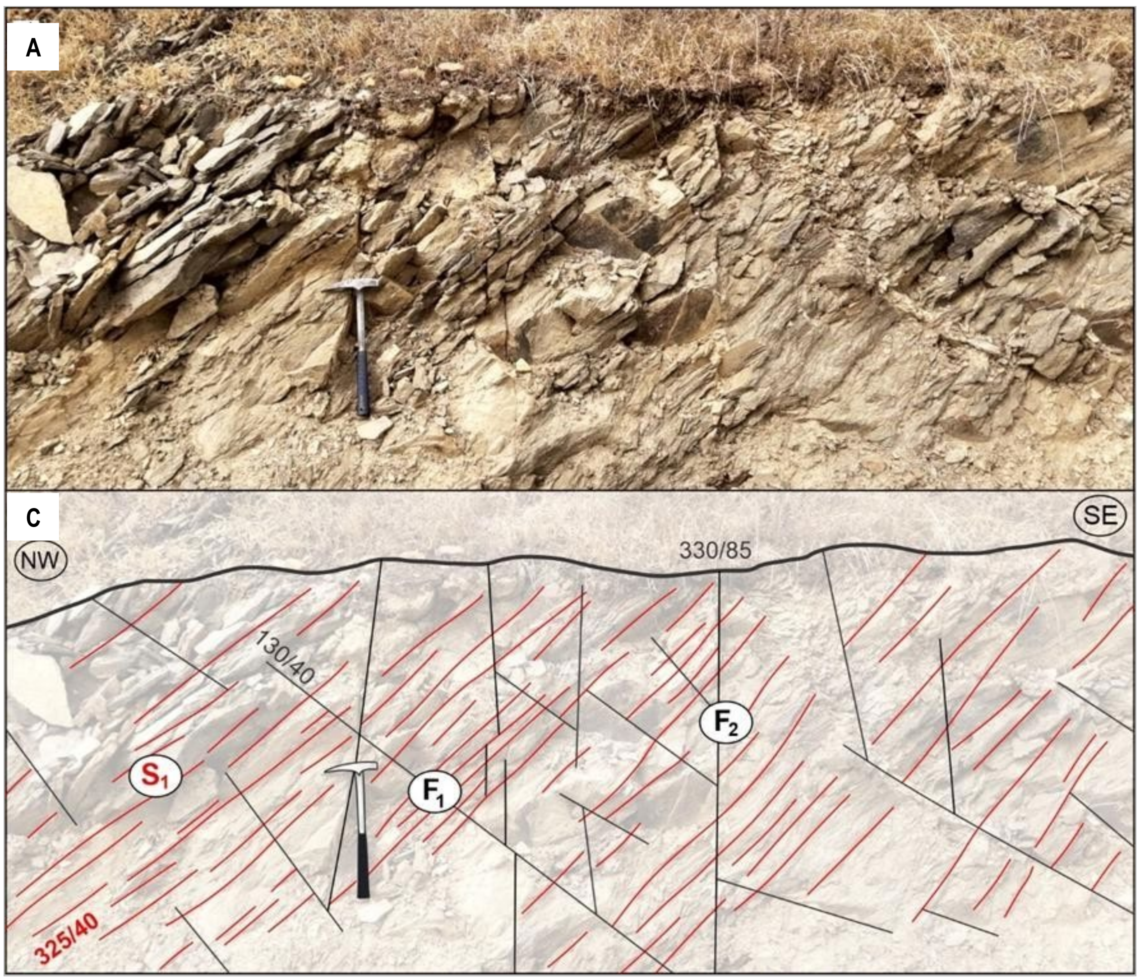
Note: The pegmatite veins are projections of the known intrusions based on the intercepts in drill holes. The attitude of each vein is based on the modelled veins.

Figure 9-5: Bandeira Target Structural Map Emphasizing the Distribution of Mapped Structures

The dominant ductile structural feature is the pervasive regional schistosity (S_1), which exhibits a consistent orientation in both strike and dip across the entire area (modal: N50E/45NW). The stretched lineation (Lx) complements the ductile structural framework, often manifested as elongated micas or ellipsoidal cordierite porphyroblasts crystalized along S_1. This lineation is down-dip and indicates tectonic transport along the northwest–southeast direction.

The brittle structures are represented by a series of fractures, occasionally joints, that intersect the S_1 schistosity and seem part of a conjugate system (Figure 9-6). Each structure was denoted as either F_1 (fractures with a moderate dip to the southeast) or F_2 (sub-vertical fractures), and their presence and prevalence may vary depending on the outcrop. The F_1 structure seems more pervasive in the entire region, which also allows the interpretation of these structures as related to the development of a cleavage fracture system (secondary foliation S_2). All these planar structures in the Bandeira area (S_1, F_1, and F_2) consistently display a standard orientation along the northeast–southwest strike, with variations only in their dip angles.

Understanding the structural patterns in the host rocks is crucial for prospecting pegmatites, since these structures serve as the surfaces that guide the migration of the silicate magmatic residues. Consequently, they profoundly influence the shape and continuity of the pegmatite bodies enriched in spodumene in the Bandeira area.



Notes: A) Fractured Biotite-Schist in the Bandeira Area (UTM: E-189,232 , N-8,141,577)
B) Scheme Emphasizing the Interpreted Structures in the Same Outcrop (a): Regional Ductile foliation (schistosity S_1) and Spaced Brittle Structures Possibly Related to Conjugated System (F_1, with Moderate Dip to Southeast, and F_2, Subvertical

Figure 9-6: Fractured Biotite-Schist in the Bandeira Area and Scheme Emphasizing the Interpreted Structures in the Same Outcrop

9.5 Geophysical Surveys

A small-scale induced polarization (IP) geophysical survey was conducted in 2022.

Induced polarization (IP) and resistivity (RES) are commonly used to delineate the resistive or conductive portions of pegmatites subsurface. The inverted data are not always helpful or productive in the very early stages of exploration; however, in Lithium Ionic's case, there were sufficient outcrops to measure some attitude data, so the general trend of the pegmatites could be extrapolated using the subsurface IP anomalies. Energy-induced data were acquired through the dipole–dipole arrangement in two distinct areas: Bandeira involved six lines totalling 5,150 min March and April 2022.

The principle for IP prospecting is based on the injection of current through several electrodes into the ground. Data acquired depend on the resistivity values at each point, terrain geometry, and the electrodes' geometric arrangement (array). For an uninterrupted current flow, the IP depends on the terrain's impedance and the current frequency. The IP can be measured in the time and frequency domains. Once processed, the raw data can be viewed in two dimensions (2-D) or, if available, in a 3-D environment. Resistivity and induced polarization data were acquired in Bandeira with the dipole–dipole arrangement (AB = MN = 25 m). Figure 9-7 shows the location of the lines and measuring stations of the chargeability and resistivity data. Some pseudo-sections of apparent chargeability and apparent resistivity 2-D models of the processed data are shown in Figure 9-7.

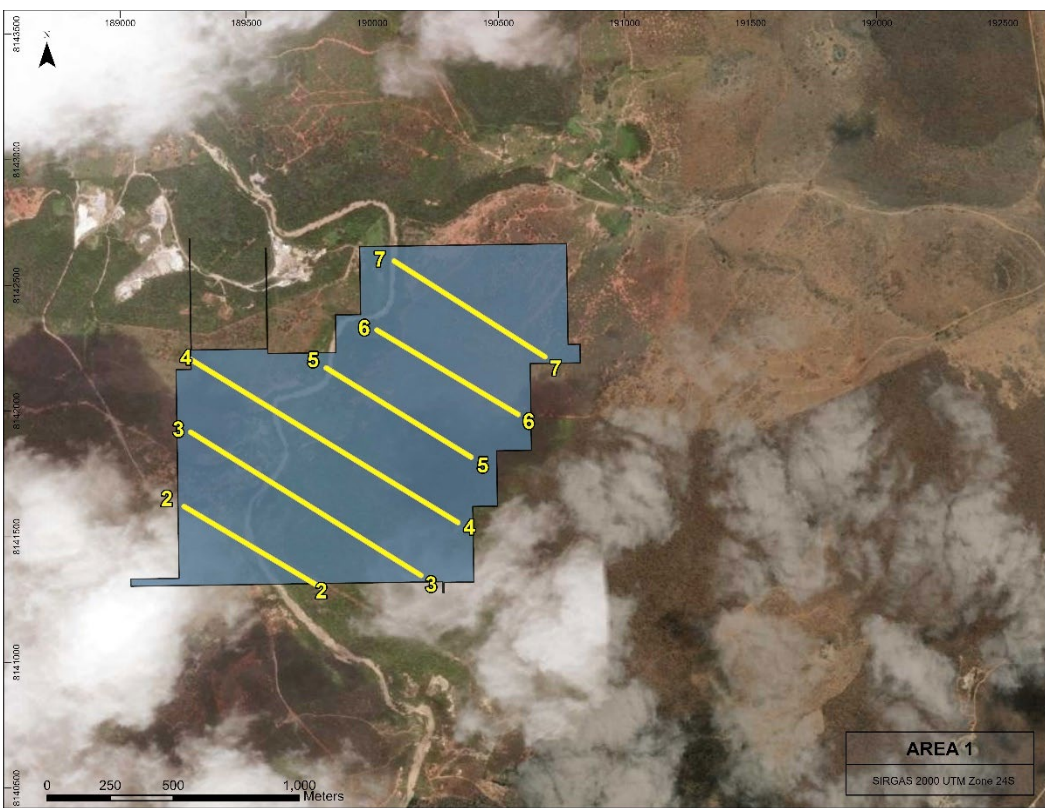
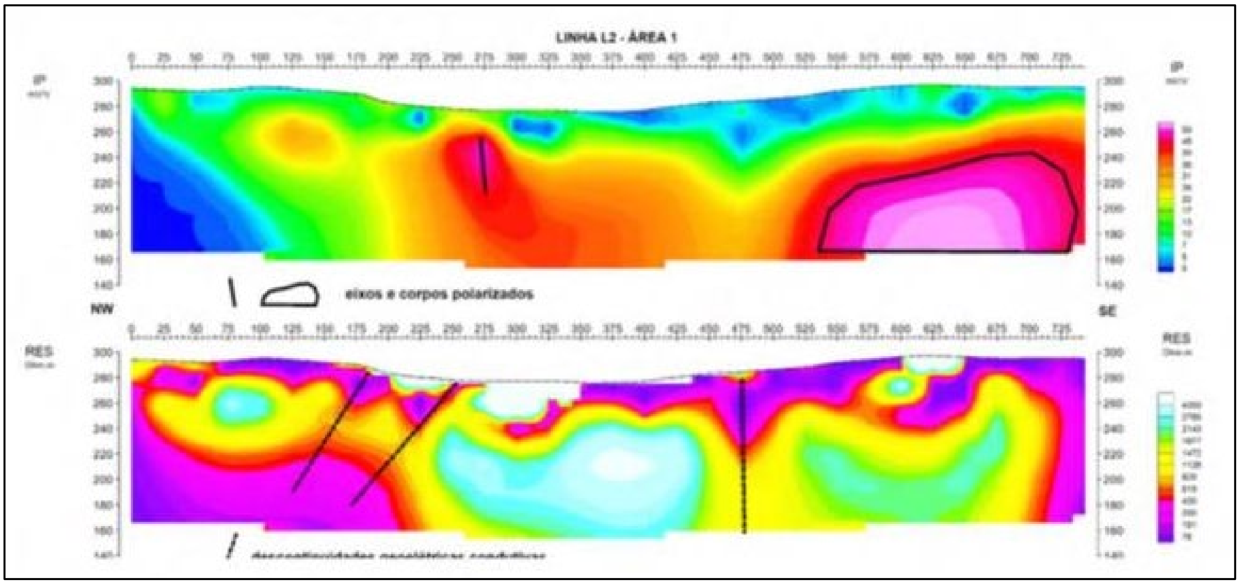


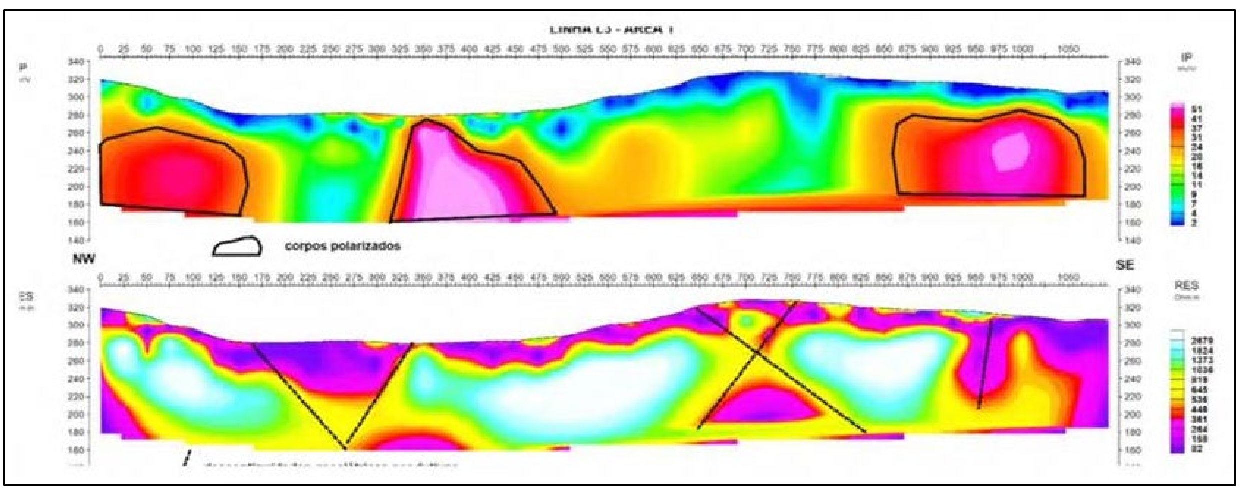
Figure 9-7: Location of the Lines and Measuring Stations of the Chargeability and Resistivity Data for Bandeira (Area 1)

The top panels of Figure 9-8 to Figure 9-11 show some examples of the actual chargeability sections and the lower panels the real resistivity sections of some of the lines, are shown below.



Source: Stevanato (2022).

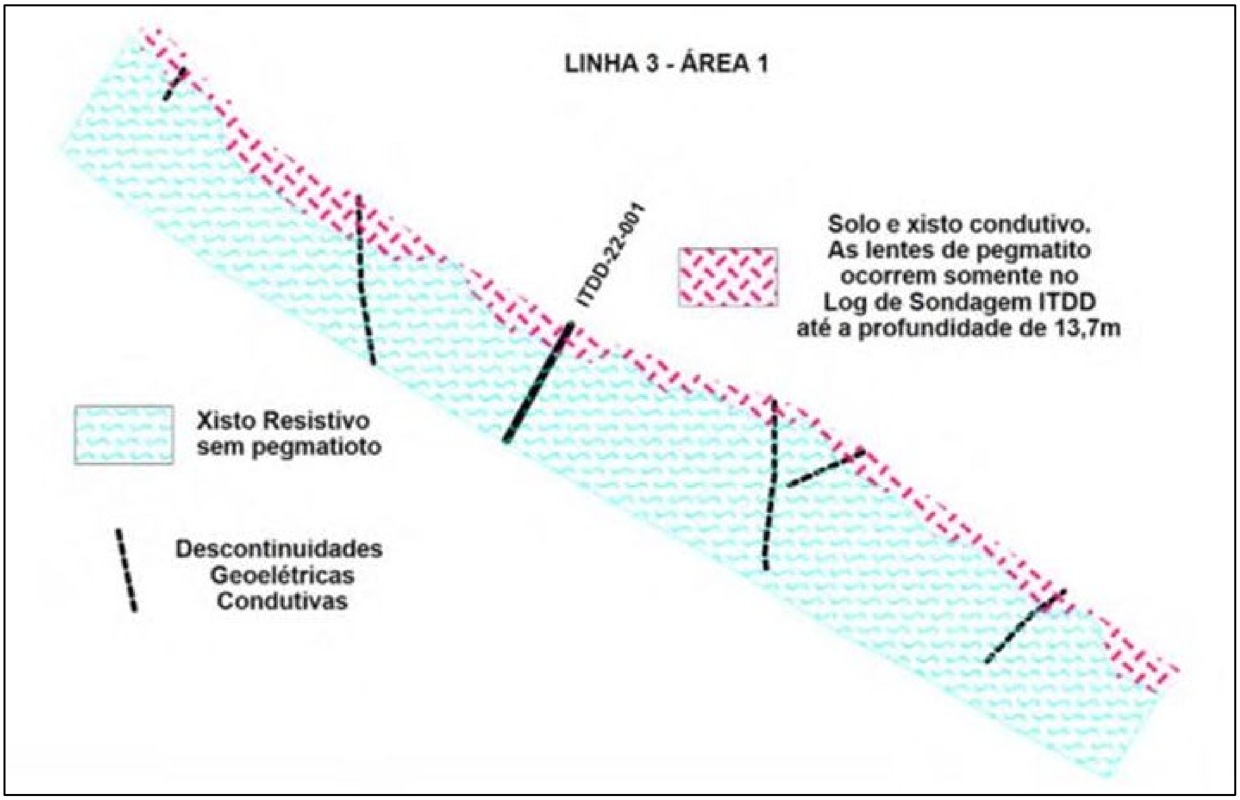
Figure 9-8: Depth Model of the Chargeability (Top Panel) and the Actual Resistivity (Bottom Panel) of Line 2 of Bandeira



Source: Stevanato (2022).

Figure 9-9: Depth Model of the Actual Chargeability (Top Panel) and the Actual Resistivity (Bottom Panel) of Line 3 of Bandeira

The geophysical-geological model was designed from the resistivity data of Line 3 of Bandeira. This model was parameterized from the log data of the ITDD-22-001 rotary drilling and is composed of a unit of shales throughout the length measured by geophysics. Superimposed on this geological homogeneous unit is another consisting of soil and conductive shale that, in the probing carried out, intercepted the pegmatite lenses to a depth of 13.7 m. Other interpretations suggest the presence of conductive geoelectric discontinuities that probably correspond to fault or fracture systems.



Source: Stevanato (2022).

Figure 9-10: Conceptual Geological Model from Geophysics Data

Lithium Ionic geoscientists reviewed the inverted data to determine some baseline information to choose a general attitude of the pegmatitic dikes and, if possible, to assist in designing some drill-hole targets.

10.0 DRILLING

10.1 MGLIT Drilling Campaigns

As of November 13, 2023, Lithium Ionic has successfully executed 186 diamond drill holes within the Bandeira Deposit, as detailed in Table 10-1 to Table 10-3 and Figure 10-1.

All diamond drilling activities conducted within the Bandeira Deposit until November 2023 have been incorporated into the Mineral Resource estimation process. It is important to note that any drill holes completed in 2023 after this date, as well as pending sample assay results, have not been considered in the present Mineral Resource statement.

Table 10-1: Bandeira Diamond Drill-Hole Summary

Year	Drill Hole Count	Total Length (m)
2022	52	5,930
2023	134	35,901
Total	**186**	**41,831**

10.2 Drill Type

All drilling operations were conducted using HQ and NQ core sizes, 63.5 mm and 47.6 mm diameter, respectively. This approach was chosen to ensure the retrieval of pristine and representative core samples, which are essential for accurate geological logging, adequate sample support, and to secure a material supply for future metallurgical testing purposes.

10.3 MGLIT Drilling Campaigns

Three Brazilian-based companies undertook the 2022–2023 drill program at Bandeira:

- Servdrill Perfuração e Sondagens Ltda (http://servdrill.com.br).
- Servitec Foraco Sondagem AS (https://www.foraco.com.br/).
- GEOSOL Ltda (https://www.geosol.com.br).

10.4 Drill Collar Monuments

All drill collar monuments were surveyed by a differential GPS, and the driller placed the monuments once the hole had been completed.

10.5 Drill Hole Surveying

Drill holes were drilled with a plunge between 50° and 90°. Core holes are generally oriented at azimuth 340° and 152°, perpendicular to the pegmatite intrusions' orientations.

MGLIT used REFLEX GYRO SPRINT IQ EQ0394 to obtain all downhole survey data.

According to the REFLEX GYRO SPRINT IQ website, the tool can maintain high survey accuracy. The device is connected to a cloud-based data hub with a secure chain of custody and a QA/QC application with real-time access to drilling survey data. Data transfer from field to office ensures minimum clerical errors related to processing and interpretation.

MGLIT rented the REFLEX GYRO SPRINT IQ downhole Reflex tool and completed all hole surveys in real time. MGLIT staff had quick access to results through the cloud-based data hub. The design of the high-speed survey allowed Lithium Ionic field staff (including geologists and drillers) to obtain the following:

- Survey speeds of more than 150 m per minute.
- There were no significant issues with the accuracy of results, which was confirmed once holes were plotted on a 3D modelling software.
- Continuous survey data comes from the tool's north-seeking sensors assisted with GPS.

The QPs have no way to verify the accuracy of the survey method; hence, the authors will rely on the statements and information that MGLIT provided.

10.6 Core Orientation

MGLIT began implementing REFLEX ACT III to establish core orientation for drill holes within the Bandeira Project after July 2023. As of the effective date, November 13, 2023, core orientation has been determined for four drill holes. Lithium Ionic has consistently integrated core orientation into its drilling program and will now prioritize its application in strategically significant sections of the geological model moving forward.

The Reflex core orientation system is based on recovering the core barrel orientation after a run. The Reflex orientation tool begins the orientation process by inserting the device in the core barrel using a specially-made shoe. The tool records core barrel orientation each minute during a core run. The Reflex sleeve that attaches to the upper drill rod measures the direction of the top-of-hole using built-in accelerometers. Upon completion of a run, the drill string is left undisturbed while the communication tool, which is on the surface counts down the time to the next reading; after this, the barrel can be withdrawn. On the surface, the tool is inserted into the end of the barrel, and the barrel is rotated until it indicates that the barrel is in the same up–down position as it was in the hole. The core, barrel, and shoe are then marked using a level to confirm vertical upward position. After the line is split, the top of the core marks is transferred along the length of the recovered core.

The QPs could not verify the orientation method's accuracy and instead relied on the statements and information that MGLIT provided.

10.7 Drill Core Chain of Custody

The drill cores are primarily stored in plastic or wooden boxes. The drilling companies always transport the core directly from the drilling site to the MGLIT core sheds in Araçuaí. MGLIT's staff receives all core boxes delivered.

10.8 Core Logging Procedures

Lithium Ionic adheres to a core logging methodology carried out by geologists and technicians.

The following procedures are conducted:

- Preparing drilling site
- Locating drill collars
- Field-verifying and validating metreage and quality of drill cores
- Core survey drilling
- Photographing the core box
- Logging detailed petrographic and geological structural of core
- Geotechnical logging (RQD, weathering types)
- Sample geochemistry logging programming and QA/QC procedures
- Determining drill-core density for each programmed sample
- Preparing core samples for geochemistry analysis
- Sending samples to the laboratory according to logistics protocols.

Each procedure has its respective spreadsheet and is stored in digital form within Lithium Ionic's customized database.

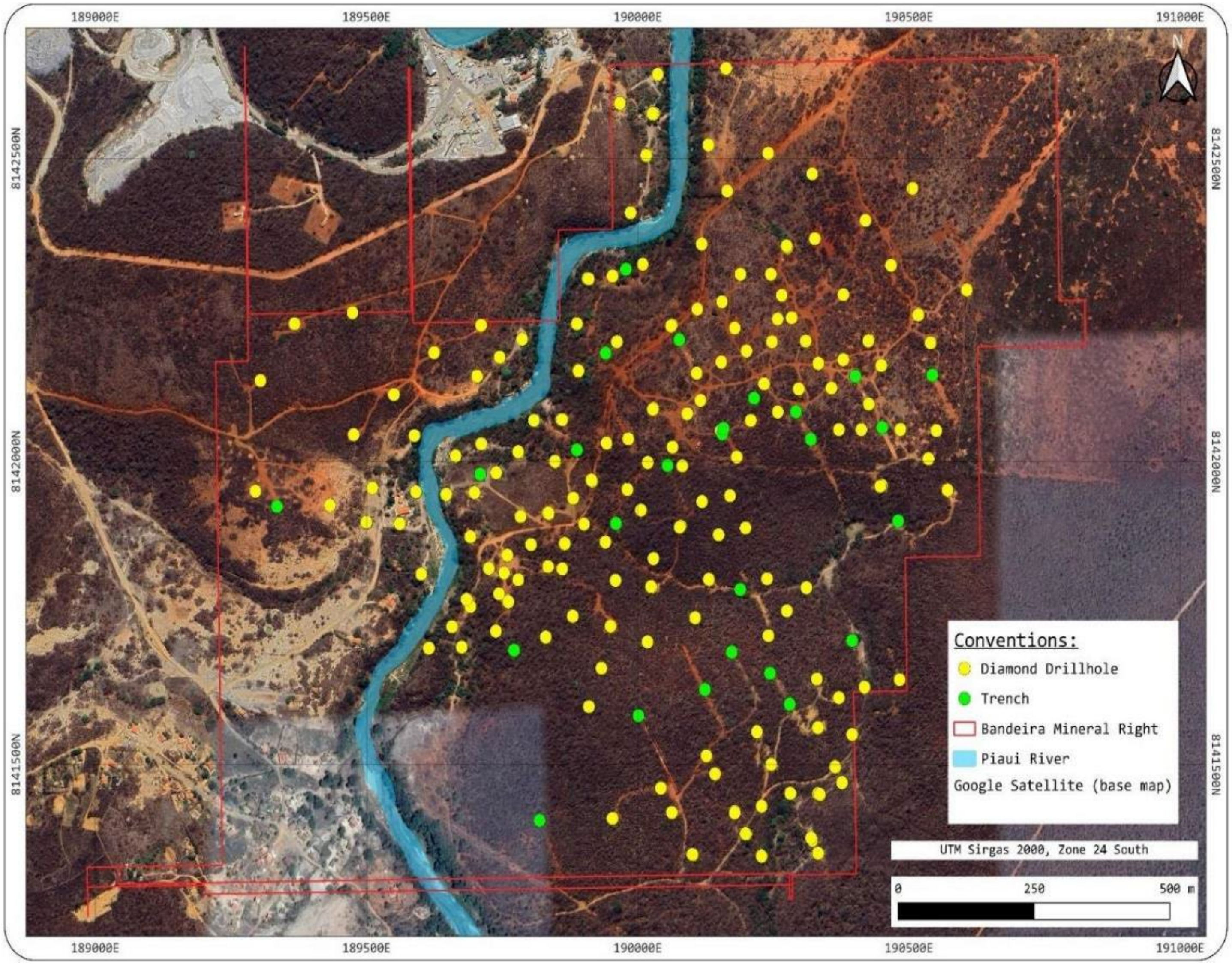


Figure 10-1: MGLIT Drill Holes and Trenches

Table 10-2: Bandeira Project Drill-Hole Location, Depth, and Year Drilled

HOLE-ID	LOCATION-X	LOCATION-Y	LOCATION-Z	DEPTH	YEAR
ITDD-22-001	189738	8141720	296	101	2022
ITDD-22-002	189760	8141770	302	96	2022
ITDD-22-002T	189761	8141769	302	45	2023
ITDD-22-003	190330	8141641	323	60	2022
ITDD-22-004	190153	8142051	336	76	2022
ITDD-22-004B	190153	8142051	336	40	2022
ITDD-22-005	190183	8142008	336	68	2022
ITDD-22-006	190116	8142101	331	125	2022
ITDD-22-007	189861	8141823	302	71	2022
ITDD-22-008	189744	8141782	299	75	2022
ITDD-22-009	190426	8142095	345	110	2022
ITDD-22-010	190379	8142168	341	4	2022
ITDD-22-011	189803	8141864	292	100	2022
ITDD-22-012	189901	8141897	288	100	2022
ITDD-22-013	189881	8141940	284	100	2022
ITDD-22-014	189784	8141910	285	103	2022
ITDD-22-015	189675	8141694	275	51	2022
ITDD-22-016	189980	8141955	308	103	2022
ITDD-22-017	189725	8141824	293	100	2022
ITDD-22-018	190064	8142024	326	154	2022
ITDD-22-019	189658	8141728	276	102	2022
ITDD-22-020	190082	8141993	327	91	2022
ITDD-22-021	190258	8142082	339	131	2022
ITDD-22-022	190006	8141920	311	100	2022
ITDD-22-023	190063	8142225	304	149	2022
ITDD-22-023T	190061	8142224	304	49	2023
ITDD-22-024	190156	8142264	313	180	2022
ITDD-22-025	190233	8142129	335	130	2022
ITDD-22-026	190357	8142121	342	121	2022
ITDD-22-027	190449	8142159	342	109	2022
ITDD-22-028	190333	8142162	339	112	2022
ITDD-22-029	189962	8142198	299	171	2022
ITDD-22-030	190426	8142200	337	110	2022
ITDD-22-030T	190425	8142199	337	61	2023
ITDD-22-031	190540	8142196	339	130	2022
ITDD-22-032	190245	8142309	320	163	2022
ITDD-22-033	190516	8142242	339	100	2022
ITDD-22-033A	190517	8142242	339	22	2022

HOLE-ID	LOCATION-X	LOCATION-Y	LOCATION-Z	DEPTH	YEAR
ITDD-22-037	189954	8141411	305	122	2022
ITDD-22-038	190379	8142276	327	150	2022
ITDD-22-039	190284	8142238	331	150	2022
ITDD-22-040	190063	8141421	306	151	2022
ITDD-22-041	190467	8142324	338	151	2022
ITDD-22-042	190606	8142283	341	110	2022
ITDD-22-043	190143	8141485	314	151	2022
ITDD-22-044	190420	8142398	334	202	2022
ITDD-22-045	190536	8142005	333	101	2022
ITDD-22-046	190179	8141423	305	120	2022
ITDD-22-047	190507	8142451	340	157	2022
ITDD-22-048	190448	8141960	326	99	2022
ITDD-22-048T	190450	8141961	326	84	2023
ITDD-22-049	190179	8141421	305	97	2022
ITDD-22-050	190200	8142183	327	151	2022
ITDD-23-051	190101	8141351	298	91	2023
ITDD-23-052	190166	8142446	294	481	2023
ITDD-23-053	190109	8142146	325	141	2023
ITDD-23-054	189739	8141981	275	145	2023
ITDD-23-055	190101	8141352	298	130	2023
ITDD-23-056	190228	8141350	299	76	2023
ITDD-23-058	189739	8141982	275	156	2023
ITDD-23-059	190229	8141349	299	57	2023
ITDD-23-060	190165	8142447	292	490	2023
ITDD-23-061	190281	8141453	297	105	2023
ITDD-23-062	190163	8142649	278	433	2023
ITDD-23-063	190281	8141452	297	121	2023
ITDD-23-065	190130	8142523	283	505	2023
ITDD-23-066	190332	8141354	297	151	2023
ITDD-23-067	190364	8141497	301	130	2023
ITDD-23-068	189692	8141876	287	136	2023
ITDD-23-069	190364	8141496	302	220	2023
ITDD-23-070	190163	8142649	280	423	2023
ITDD-23-071	190332	8141561	320	153	2023
ITDD-23-072	189691	8141876	287	140	2023
ITDD-23-073	190016	8142507	275	480	2023
ITDD-23-074	189848	8142000	276	121	2023
ITDD-23-075	190395	8141550	303	169	2023

HOLE-ID	LOCATION-X	LOCATION-Y	LOCATION-Z	DEPTH	YEAR
ITDD-23-079	190483	8141640	320	171	2023
ITDD-23-080	190241	8142509	305	310	2023
ITDD-23-081	190418	8141628	304	172	2023
ITDD-23-082	190009	8142326	275	298	2023
ITDD-23-083	190017	8142506	275	420	2023
ITDD-23-083T	190016	8142505	275	74	2023
ITDD-23-084	189625	8142181	306	305	2023
ITDD-23-085	190246	8141501	315	115	2023
ITDD-23-086	190241	8142509	305	341	2023
ITDD-23-087	190322	8141375	296	90	2023
ITDD-23-087T	190320	8141379	296	76	2023
ITDD-23-088	190118	8142359	300	304	2023
ITDD-23-089	190371	8141611	317	184	2023
ITDD-23-090	190037	8142639	276	589	2023
ITDD-23-091	189367	8142228	335	544	2023
ITDD-23-092	189847	8142001	277	130	2023
ITDD-23-093	190200	8141385	302	75	2023
ITDD-23-093T	190199	8141386	302	60	2023
ITDD-23-094	189943	8142030	300	109	2023
ITDD-23-095	189746	8142172	277	250	2023
ITDD-23-096	189942	8142031	300	118	2023
ITDD-23-097	189780	8141805	299	49	2023
ITDD-23-098	189760	8141845	294	350	2023
ITDD-23-099	189836	8141914	284	79	2023
ITDD-23-100	189691	8141761	278	50	2023
ITDD-23-101	189835	8141915	284	100	2023
ITDD-23-102	189745	8142173	277	262	2023
ITDD-23-103	189511	8141957	273	221	2023
ITDD-23-104	189684	8141773	278	67	2023
ITDD-23-105	189907	8142302	277	421	2023
ITDD-23-106	189700	8141948	279	142	2023
ITDD-23-107	189588	8142044	273	241	2023
ITDD-23-108	189760	8141846	294	95	2023
ITDD-23-109	189780	8142016	275	316	2023
ITDD-23-110	189915	8141968	288	72	2023
ITDD-23-111	189834	8141827	299	41	2023
ITDD-23-112	189699	8141949	279	320	2023
ITDD-23-113	189601	8141814	273	109	2023

Table 10-3: Bandeira Drill Collars

10.9 Ore Drilling Intercepts

Drill spacing typically ranged from 50 m to 150 m, with narrower spacing observed in the central portion of the drill-hole array and wider spacing towards the margins. The ore intercepts vary in thickness, ranging from approximately 85% of the true width to nearly the true width of the mineralization.

The average pegmatite intersection ranges from 0.3 m to 25 m, with an average true thickness of about 5 m. In total, 257 mineralized DDH intercepts were used for modelling the 23 mineralized solids within the Bandeira Project. Each solid was assigned a numerical code in the tag column.

Table 10-4 to Table 10-7 list the mineralized intervals from Bandeira Project drill holes that were incorporated into the 3-D modelling of the mineralized solids (Figure 10-2 and Figure 12-12).

Table 10-4: Bandeira Project Drill Holes with Mineralized Intercepts

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-22-001	8.50	13.70	5.20	1.53	1
ITDD-22-001	19.00	19.45	0.45	1.37	01B-SW
ITDD-22-002	33.08	38.74	5.66	2.02	1
ITDD-22-004B	37.45	38.13	0.68	0.44	1
ITDD-22-006	54.90	57.60	2.70	2.23	1
ITDD-22-007	18.20	18.75	0.55	0.50	01A-SW
ITDD-22-007	21.62	27.58	5.96	1.33	1
ITDD-22-011	53.14	59.89	6.75	1.99	1
ITDD-22-012	33.70	34.45	0.75	0.74	01A-SW
ITDD-22-012	36.23	36.71	0.48	2.16	1
ITDD-22-012	37.03	42.03	5.00	1.70	1
ITDD-22-013	53.18	57.08	3.90	1.56	01A-SW
ITDD-22-013	62.90	65.66	2.76	1.66	1
ITDD-22-014	77.10	82.80	5.70	1.14	1
ITDD-22-015	6.16	8.74	2.58	1.04	1
ITDD-22-015	10.97	11.70	0.73	0.66	01B-SW
ITDD-22-016	39.50	45.35	5.85	1.27	1
ITDD-22-017	62.21	67.15	4.94	1.06	1
ITDD-22-018	44.96	45.96	1.00	0.52	1
ITDD-22-019	29.83	33.57	3.74	1.97	1
ITDD-22-021	23.50	24.19	0.69	0.74	1
ITDD-22-021	31.90	34.73	2.83	1.29	04-NE
ITDD-22-021	36.53	37.33	0.80	0.31	04-NE
ITDD-22-022	14.31	18.31	4.00	0.55	1
ITDD-22-023	33.50	34.26	0.76	0.96	02-NE
ITDD-22-023	38.53	43.59	5.06	2.13	02A-NE
ITDD-22-023	114.34	115.90	1.56	1.01	1
ITDD-22-024	28.14	31.00	2.86	2.04	02-NE
ITDD-22-024	32.22	33.86	1.64	2.34	02-NE
ITDD-22-024	36.35	37.35	1.00	1.07	02A-NE
ITDD-22-024	117.39	118.76	1.37	0.07	1
ITDD-22-024	159.72	161.72	2.00	2.46	04-NE
ITDD-22-025	57.47	58.08	0.61	0.33	1
ITDD-22-025	67.62	71.31	3.69	2.22	04-NE
ITDD-22-027	22.78	29.09	6.31	0.43	04-NE
ITDD-22-028	34.30	35.35	1.05	2.17	04B-NE
ITDD-22-028	38.64	40.25	1.61	1.95	1
ITDD-22-028	51.39	53.39	2.00	0.67	04-NE
ITDD-22-029	41.46	42.25	0.79	1.56	02-NE
ITDD-22-029	44.28	46.93	2.65	1.29	02A-NE
ITDD-22-029	145.91	149.08	3.17	1.21	1

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-22-030	46.60	53.30	6.70	1.49	04-NE
ITDD-22-032	13.18	14.33	1.15	0.29	02-NE
ITDD-22-032	18.35	19.95	1.60	1.95	02A-NE
ITDD-22-032	130.30	133.92	3.62	0.71	1
ITDD-22-032	134.34	136.25	1.91	0.39	1
ITDD-22-032	137.40	139.20	1.80	1.58	04-NE
ITDD-22-033	4.10	13.17	9.07	0.00	04B-NE
ITDD-22-033A	6.05	10.05	4.00	0.41	04B-NE
ITDD-22-035	103.27	105.17	1.90	1.04	04A-NE
ITDD-22-035	111.93	113.21	1.28	1.43	04B-NE
ITDD-22-035	128.48	129.24	0.76	0.56	1
ITDD-22-035	171.62	176.50	4.88	1.28	04-NE
ITDD-22-035	179.30	181.02	1.72	0.56	04C-NE
ITDD-22-036	39.10	45.10	6.00	0.90	SE-A
ITDD-22-038	43.26	44.66	1.40	2.43	04A-NE
ITDD-22-038	55.73	56.81	1.08	0.39	04B-NE
ITDD-22-038	67.32	71.32	4.00	1.04	1
ITDD-22-038	98.13	104.85	6.72	1.24	04-NE
ITDD-22-039	86.24	91.95	5.71	2.13	1
ITDD-22-039	94.19	95.86	1.67	1.71	04-NE
ITDD-22-041	37.16	37.97	0.81	0.60	04A-NE
ITDD-22-043	38.05	42.41	4.36	1.43	SE-A
ITDD-22-045	20.65	25.60	4.95	0.22	10-NE
ITDD-22-045	41.57	44.88	3.31	1.42	09-NE
ITDD-22-046	63.00	68.00	5.00	1.17	SE-A
ITDD-22-048	57.50	60.11	2.61	0.70	10-NE
ITDD-22-048	69.39	74.20	4.81	1.08	09-NE
ITTRE-22-001	25.00	34.00	9.00	1.46	1
ITTRE-22-004	12.80	15.80	3.00	0.70	01A-SW
ITTRE-22-012	33.20	38.30	5.10	0.28	02-NE
ITTRE-22-012	42.00	46.00	4.00	0.50	02A-NE
ITDD-22-050	96.60	99.31	2.71	0.81	04-NE
ITDD-22-049	64.87	67.87	3.00	0.86	SE-A
ITDD-23-051	56.98	59.68	2.70	0.64	SE-A
ITDD-23-052	99.96	100.73	0.77	0.87	02-NE
ITDD-23-052	108.25	109.28	1.03	1.32	02A-NE
ITDD-23-052	110.98	111.94	0.96	0.60	02A-NE
ITDD-23-052	205.44	209.44	4.00	1.79	1
ITDD-23-052	223.63	225.63	2.00	2.33	04-NE
ITDD-23-052	255.36	256.10	0.74	1.62	04C-NE
ITDD-23-052	256.39	257.46	1.07	0.56	04C-NE

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-23-052	279.04	280.00	0.96	0.74	05A-NE
ITDD-23-052	308.20	310.33	2.13	1.32	05-NE
ITDD-23-052	311.08	312.46	1.38	0.80	05-NE
ITDD-23-052	381.30	386.00	4.70	1.11	06-NE
ITDD-23-052	392.20	398.52	6.32	1.37	06A-NE
ITDD-23-052	415.48	417.30	1.82	1.20	06B-NE
ITDD-23-052	433.13	435.39	2.26	2.16	07-NE
ITDD-23-052	436.36	438.74	2.38	2.14	07-NE
ITDD-23-052	439.79	440.30	0.51	0.65	07-NE
ITDD-23-053	74.65	77.19	2.54	1.95	1
ITDD-23-054	118.00	123.00	5.00	1.66	1
ITDD-23-055	35.97	40.95	4.98	0.24	SE-A
ITDD-23-056	37.75	49.02	11.27	0.88	SE-A
ITDD-23-058	122.55	128.55	6.00	1.96	1
ITDD-23-059	28.72	32.96	4.24	1.32	SE-A
ITDD-23-060	111.44	112.13	0.69	2.00	02-NE
ITDD-23-060	170.03	171.08	1.05	1.34	02B-NE
ITDD-23-060	171.85	172.38	0.53	0.47	02B-NE
ITDD-23-060	173.29	174.36	1.07	1.10	02B-NE
ITDD-23-060	225.23	229.50	4.27	2.03	1
ITDD-23-060	252.75	254.57	1.82	0.04	04-NE
ITDD-23-060	283.30	284.48	1.18	2.16	04C-NE
ITDD-23-060	315.98	316.93	0.95	2.25	05A-NE
ITDD-23-060	319.40	321.20	1.80	0.99	05A-NE
ITDD-23-060	332.62	334.55	1.93	1.49	05-NE
ITDD-23-060	399.67	402.45	2.78	1.79	06-NE
ITDD-23-060	405.94	408.44	2.50	0.81	06A-NE
ITDD-23-060	444.29	449.43	5.14	1.44	07-NE
ITDD-23-061	61.50	78.58	17.08	1.43	SE-A
ITDD-23-061	78.58	79.27	0.69	0.07	SE-A
ITDD-23-061	79.52	80.19	0.67	0.34	SE-A
ITDD-23-062	104.43	108.43	4.00	1.93	03-NE
ITDD-23-062	108.43	109.43	1.00	0.17	03-NE
ITDD-23-062	109.43	124.43	15.00	1.63	03-NE
ITDD-23-062	349.55	353.47	3.92	1.05	04-NE
ITDD-23-062	384.50	385.60	1.10	0.67	04C-NE
ITDD-23-062	386.68	388.67	1.99	1.67	04C-NE
ITDD-23-063	41.67	55.24	13.57	1.73	SE-A
ITDD-23-065	159.62	164.60	4.98	1.12	02-NE
ITDD-23-065	203.93	208.16	4.23	1.53	02B-NE
ITDD-23-065	271.20	277.29	6.09	2.53	1

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-23-065	321.20	324.22	3.02	1.24	04-NE
ITDD-23-065	336.67	339.41	2.74	1.32	04C-NE
ITDD-23-065	354.23	378.23	24.00	1.32	05A-NE
ITDD-23-065	390.10	397.82	7.72	1.88	05-NE
ITDD-23-065	400.74	403.08	2.34	1.30	05B-NE
ITDD-23-065	431.25	434.45	3.20	0.67	06-NE
ITDD-23-065	441.88	445.37	3.49	2.04	06A-NE
ITDD-23-065	458.05	459.74	1.69	1.01	07-NE
ITDD-23-065	460.29	461.88	1.59	1.17	07-NE
ITDD-23-065	463.95	465.95	2.00	0.38	07-NE
ITDD-23-065	484.11	485.10	0.99	1.12	08-NE
ITDD-23-066	28.16	37.16	9.00	0.73	SE-A
ITDD-23-067	86.96	98.96	12.00	1.08	SE-A
ITDD-23-067	98.96	99.96	1.00	0.16	SE-A
ITDD-23-067	99.96	103.96	4.00	1.87	SE-A
ITDD-23-068	92.23	93.97	1.74	1.03	1
ITDD-23-068	112.79	114.45	1.66	0.38	01B-SW
ITDD-23-069	57.55	60.55	3.00	0.18	SE-A
ITDD-23-069	60.55	75.48	14.93	1.44	SE-A
ITDD-23-070	78.30	84.30	6.00	1.06	03-NE
ITDD-23-070	84.30	89.30	5.00	0.04	03-NE
ITDD-23-070	89.30	97.30	8.00	1.32	03-NE
ITDD-23-070	152.73	156.40	3.67	1.83	02D-NE
ITDD-23-070	332.74	336.36	3.62	2.15	04-NE
ITDD-23-070	339.94	341.09	1.15	0.72	04C-NE
ITDD-23-070	341.39	343.42	2.03	1.41	04C-NE
ITDD-23-071	86.49	90.49	4.00	0.90	SE-A
ITDD-23-072	99.14	100.94	1.80	1.37	1
ITDD-23-072	113.69	117.69	4.00	1.38	01B-SW
ITDD-23-073	77.82	83.66	5.84	1.99	03-NE
ITDD-23-073	206.62	213.30	6.68	1.99	02-NE
ITDD-23-073	243.54	245.10	1.56	1.43	02B-NE
ITDD-23-073	246.82	247.63	0.81	0.79	02B-NE
ITDD-23-073	298.08	299.41	1.33	0.81	1
ITDD-23-073	352.92	360.92	8.00	1.66	04-NE
ITDD-23-073	408.21	411.86	3.65	1.83	05A-NE
ITDD-23-073	412.04	412.34	0.30	0.76	05A-NE
ITDD-23-073	413.90	423.97	10.07	1.30	05A-NE
ITDD-23-073	425.10	426.35	1.25	1.25	05A-NE
ITDD-23-073	443.07	447.07	4.00	2.10	05-NE
ITDD-23-074	85.77	89.55	3.78	1.58	01A-SW

Table 10-5: Mineralized Intercepts by Bandeira Drill Holes

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL	HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL	HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL	HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-23-074	89.55	89.96	0.41	0.25	01A-SW	ITDD-23-087	53.24	56.07	2.83	0.70	SE-A	ITDD-23-100	27.85	29.25	1.40	0.26	1	ITDD-23-120	109.66	114.98	5.32	1.33	01A-SW
ITDD-23-074	90.06	90.40	0.34	0.63	01A-SW	ITDD-23-087	56.92	58.73	1.81	1.90	SE-A	ITDD-23-100	32.49	34.04	1.55	0.40	01B-SW	ITDD-23-120	115.28	115.92	0.64	0.84	01A-SW
ITDD-23-074	95.31	95.91	0.60	1.98	1	ITDD-23-087	60.20	64.85	4.65	1.38	SE-A	ITDD-23-101	76.74	81.74	5.00	1.55	1	ITDD-23-120	126.06	127.18	1.12	0.52	1
ITDD-23-074	96.52	96.75	0.23	0.00	1	ITDD-23-087	65.45	66.15	0.70	0.85	SE-A	ITDD-23-102	52.60	56.09	3.49	1.16	02C-NE	ITDD-23-120	253.93	259.63	5.70	1.86	05-NE
ITDD-23-074	96.84	100.25	3.41	1.98	1	ITDD-23-087	67.79	69.96	2.17	1.88	SE-A	ITDD-23-102	202.45	204.35	1.90	0.99	01A-SW	ITDD-23-112	124.79	131.18	6.39	1.74	1
ITDD-23-075	109.00	112.38	3.38	1.44	SE-A	ITDD-23-088	83.32	86.32	3.00	0.96	02-NE	ITDD-23-102	228.55	233.36	4.81	1.63	1	ITDD-23-112	142.43	144.36	1.93	1.20	01B-SW
ITDD-23-075	112.38	113.03	0.65	0.07	SE-A	ITDD-23-088	206.00	210.19	4.19	1.87	04-NE	ITDD-23-103	197.00	200.00	3.00	1.33	1	ITDD-23-119	118.90	119.42	0.52	0.31	01A-SW
ITDD-23-075	113.57	115.18	1.61	0.09	SE-A	ITDD-23-088	272.46	274.62	2.16	2.21	05-NE	ITDD-23-105	97.01	99.52	2.51	1.47	02C-NE	ITDD-23-119	124.13	130.85	6.72	1.57	1
ITDD-23-075	115.18	119.43	4.25	0.98	SE-A	ITDD-23-088	287.18	287.96	0.78	0.74	05C-NE	ITDD-23-105	110.73	116.40	5.67	1.49	02-NE	ITDD-23-121	36.85	37.50	0.65	0.31	02-NE
ITDD-23-075	130.10	141.90	11.80	1.00	08-NE	ITDD-23-088	294.83	295.63	0.80	0.48	05B-NE	ITDD-23-105	214.09	215.79	1.70	0.96	01A-SW	ITDD-23-121	38.85	40.85	2.00	0.80	02-NE
ITDD-23-076	82.64	84.05	1.41	2.03	02-NE	ITDD-23-089	63.26	72.02	8.76	1.37	SE-A	ITDD-23-105	220.44	229.59	9.15	1.32	1	ITDD-23-121	44.74	45.12	0.38	0.73	02A-NE
ITDD-23-076	85.55	86.84	1.29	2.24	02A-NE	ITDD-23-089	155.53	161.53	6.00	1.22	08-NE	ITDD-23-105	370.38	372.70	2.32	1.46	05-NE	ITDD-23-121	163.40	164.25	0.85	2.07	01A-SW
ITDD-23-076	165.53	166.49	0.96	2.05	1	ITDD-23-090	161.74	169.95	8.21	1.03	03-NE	ITDD-23-105	373.42	375.38	1.96	1.19	05-NE	ITDD-23-121	165.12	169.82	4.70	2.15	01A-SW
ITDD-23-076	167.12	168.98	1.86	1.43	1	ITDD-23-090	259.50	263.50	4.00	1.80	02-NE	ITDD-23-106	133.08	135.23	2.15	0.95	01B-SW	ITDD-23-121	182.04	183.59	1.55	2.59	1
ITDD-23-078	313.14	314.34	1.20	0.62	01A-SW	ITDD-23-090	386.98	389.98	3.00	1.62	1	ITDD-23-107	194.35	195.83	1.48	0.46	01A-SW	ITDD-23-121	331.55	337.47	5.92	1.83	05-NE
ITDD-23-078	315.48	315.94	0.46	0.04	01A-SW	ITDD-23-090	442.90	445.66	2.76	1.79	04-NE	ITDD-23-107	197.74	199.94	2.20	1.37	1	ITDD-23-122	157.52	158.16	0.64	0.73	01A-SW
ITDD-23-078	316.38	317.90	1.52	1.54	01A-SW	ITDD-23-090	465.61	466.26	0.65	1.05	04C-NE	ITDD-23-107	209.54	213.54	4.00	1.81	01B-SW	ITDD-23-122	164.11	168.11	4.00	1.49	1
ITDD-23-078	321.95	323.43	1.48	0.86	1	ITDD-23-090	466.85	471.85	5.00	1.72	04C-NE	ITDD-23-108	75.26	81.26	6.00	1.59	1	ITDD-23-123	151.75	159.40	7.65	2.39	1
ITDD-23-078	324.44	337.78	13.34	1.56	1	ITDD-23-090	564.45	567.45	3.00	1.56	06-NE	ITDD-23-108	81.26	81.89	0.63	0.10	1	ITDD-23-124	80.04	81.57	1.53	0.70	1
ITDD-23-080	255.45	256.94	1.49	2.87	04-NE	ITDD-23-090	580.60	581.94	1.34	0.47	07-NE	ITDD-23-108	86.52	88.52	2.00	1.73	01B-SW	ITDD-23-125	144.94	147.92	2.98	1.44	01B-SW
ITDD-23-080	258.05	258.77	0.72	3.00	04-NE	ITDD-23-091	426.04	427.97	1.93	0.89	01D-SW	ITDD-23-109	120.09	126.07	5.98	1.34	1	ITDD-23-126	105.80	108.37	2.57	1.02	1
ITDD-23-080	260.45	261.66	1.21	1.99	04-NE	ITDD-23-091	479.83	482.00	2.17	2.04	1	ITDD-23-109	126.60	127.08	0.48	1.34	1	ITDD-23-127	81.91	82.66	0.75	1.11	1
ITDD-23-080	274.70	276.54	1.84	0.53	04C-NE	ITDD-23-091	486.04	489.24	3.20	0.82	1	ITDD-23-109	127.30	127.60	0.30	0.32	1	ITDD-23-128	178.46	178.94	0.48	1.38	1
ITDD-23-081	120.07	129.07	9.00	1.49	08-NE	ITDD-23-092	92.81	95.83	3.02	1.57	01A-SW	ITDD-23-109	247.87	255.66	7.79	1.69	05-NE	ITDD-23-128	179.31	183.31	4.00	2.43	1
ITDD-23-082	50.63	56.40	5.77	2.17	02C-NE	ITDD-23-092	103.81	109.42	5.61	1.23	1	ITDD-23-110	55.33	56.10	0.77	1.35	01A-SW	ITDD-23-129	153.61	155.00	1.39	0.83	01A-SW
ITDD-23-082	99.92	102.23	2.31	1.04	02-NE	ITDD-23-093	43.65	51.65	8.00	1.47	SE-A	ITDD-23-110	58.58	62.84	4.26	2.15	1	ITDD-23-129	157.10	162.60	5.50	1.40	1
ITDD-23-082	196.20	201.00	4.80	1.48	1	ITDD-23-094	80.58	81.72	1.14	1.25	1	ITDD-23-111	27.80	34.40	6.60	1.51	1	ITDD-23-130	88.49	91.08	2.59	1.15	1
ITDD-23-083	59.09	66.12	7.03	1.37	03-NE	ITDD-23-094	82.97	83.37	0.40	1.73	1	ITDD-23-113	97.33	99.89	2.56	1.75	1	ITDD-23-130	201.33	203.33	2.00	0.60	05-NE
ITDD-23-083	171.31	177.15	5.84	1.90	02-NE	ITDD-23-094	83.88	88.26	4.38	2.17	1	ITDD-23-114	66.26	67.83	1.57	0.38	01A-SW	ITDD-23-130	240.32	242.41	2.09	1.46	05B-NE
ITDD-23-083	225.68	226.38	0.70	0.71	02B-NE	ITDD-23-095	46.35	48.48	2.13	0.70	02C-NE	ITDD-23-114	71.78	78.15	6.37	0.96	1	ITDD-23-131	99.48	101.48	2.00	1.98	1
ITDD-23-083	310.73	314.78	4.05	1.11	04-NE	ITDD-23-095	202.91	203.63	0.72	0.54	01A-SW	ITDD-23-115	34.08	41.00	6.92	1.26	1	ITDD-23-131	272.94	278.00	5.06	0.96	05-NE
ITDD-23-083	371.44	372.42	0.98	0.43	05-NE	ITDD-23-095	205.40	206.91	1.51	1.13	01A-SW	ITDD-23-116	112.82	117.36	4.54	2.18	01A-SW	ITDD-23-132	69.51	72.73	3.22	1.66	01C-SW
ITDD-23-083	372.67	379.76	7.09	2.29	05-NE	ITDD-23-095	216.19	217.88	1.69	1.98	1	ITDD-23-116	132.52	132.78	0.26	0.49	1	ITDD-23-132	166.14	167.86	1.72	1.75	01A-SW
ITDD-23-084	273.30	274.06	0.76	0.92	01A-SW	ITDD-23-095	218.84	223.07	4.23	1.38	1	ITDD-23-116	133.12	134.17	1.05	1.32	1	ITDD-23-132	168.98	169.88	0.90	1.31	01A-SW
ITDD-23-084	275.42	278.93	3.51	1.60	1	ITDD-23-096	88.95	90.40	1.45	1.03	1	ITDD-23-117	33.73	36.69	2.96	0.21	02A-NE	ITDD-23-132	172.68	178.59	5.91	1.59	1
ITDD-23-084	279.20	284.87	5.67	1.16	1	ITDD-23-096	91.20	97.18	5.98	1.91	1	ITDD-23-117	151.89	153.46	1.57	0.79	01A-SW	ITDD-23-133	150.20	154.79	4.59	1.20	1
ITDD-23-086	69.92	72.11	2.19	1.48	02D-NE	ITDD-23-097	38.70	44.12	5.42	1.48	1	ITDD-23-117	153.60	154.19	0.59	0.38	01A-SW	ITDD-23-134	32.45	34.95	2.50	2.43	01C-SW
ITDD-23-086	272.46	274.84	2.38	1.52	04-NE	ITDD-23-098	62.59	67.59	5.00	1.64	1	ITDD-23-117	166.63	169.18	2.55	0.74	1	ITDD-23-134	135.63	137.16	1.53	0.50	01A-SW
ITDD-23-086	276.00	282.45	6.45	1.07	04-NE	ITDD-23-098	194.04	196.69	2.65	1.02	05-NE	ITDD-23-118	155.35	156.56	1.21	1.76	01A-SW	ITDD-23-134	138.85	141.96	3.11	2.24	1
ITDD-23-086	282.97	283.27	0.30	0.60	04-NE	ITDD-23-099	63.04	65.04	2.00	1.91	01A-SW	ITDD-23-118	160.13	160.82	0.69	0.40	1	ITDD-23-135	111.38	112.27	0.89	0.13	1
ITDD-23-086	293.70	299.86	6.16	1.33	04C-NE	ITDD-23-099	67.96	72.49	4.53	1.10	1	ITDD-23-118	161.16	164.07	2.91	1.12	1	ITDD-23-135	136.02	137.59	1.57	2.96	04-NE

Table 10-6: Mineralized Intercepts by Bandeira Drill Holes

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL	HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL	HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL	HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-23-135	204.63	207.12	2.49	0.35	05-NE	ITDD-23-145	290.15	290.59	0.44	2.33	1	ITDD-23-152	291.98	295.53	3.55	2.02	05B-NE	ITDD-23-161	25.12	25.77	0.65	1.41	02A-NE
ITDD-23-135	247.22	248.46	1.24	0.31	05B-NE	ITDD-23-145	290.95	302.05	11.10	1.38	1	ITDD-23-154	108.52	113.42	4.90	1.57	1	ITDD-23-161	129.12	133.12	4.00	1.27	1
ITDD-23-136	75.02	75.76	0.74	0.43	1	ITDD-23-146	132.78	134.82	2.04	0.34	01A-SW	ITDD-23-154	116.50	118.26	1.76	0.56	04-NE	ITDD-23-161	174.56	177.56	3.00	2.57	04C-NE
ITDD-23-136	85.97	89.97	4.00	1.73	04-NE	ITDD-23-146	142.88	147.88	5.00	1.29	1	ITDD-23-154	119.76	121.15	1.39	1.46	04-NE	ITDD-23-161	313.74	315.43	1.69	2.10	06-NE
ITDD-23-136	283.33	286.76	3.43	0.19	06-NE	ITDD-23-146	267.31	276.18	8.87	1.57	05-NE	ITDD-23-154	296.12	298.14	2.02	1.58	06-NE	ITDD-23-161	322.93	324.22	1.29	0.95	06A-NE
ITDD-23-136	318.38	320.10	1.72	0.28	07-NE	ITDD-23-147	41.30	44.43	3.13	1.96	02-NE	ITDD-23-154	302.70	303.78	1.08	2.80	06A-NE	ITDD-23-161	326.51	327.94	1.43	1.10	06A-NE
ITDD-23-136	328.82	329.29	0.47	1.26	07A-NE	ITDD-23-147	45.04	47.62	2.58	1.35	02A-NE	ITDD-23-154	305.07	306.29	1.22	2.38	06A-NE	ITDD-23-161	351.41	354.37	2.96	1.16	06B-NE
ITDD-23-137	81.68	85.18	3.50	1.48	01C-SW	ITDD-23-147	138.02	140.27	2.25	1.11	1	ITDD-23-154	308.01	308.78	0.77	1.09	06A-NE	ITDD-23-161	377.01	378.76	1.75	0.16	07-NE
ITDD-23-137	182.18	183.70	1.52	0.92	01A-SW	ITDD-23-147	268.30	271.03	2.73	1.63	05-NE	ITDD-23-154	310.17	310.99	0.82	0.77	06A-NE	ITDD-23-162	53.69	56.49	2.80	1.10	01E-SW
ITDD-23-137	185.16	185.66	0.50	1.81	01A-SW	ITDD-23-147	285.15	287.81	2.66	1.57	05C-NE	ITDD-23-154	332.07	335.08	3.01	1.80	06B-NE	ITDD-23-162	395.57	398.57	3.00	1.56	01D-SW
ITDD-23-137	186.06	187.39	1.33	1.38	01A-SW	ITDD-23-147	307.66	310.36	2.70	2.16	05B-NE	ITDD-23-154	336.32	337.38	1.06	0.68	06B-NE	ITDD-23-162	458.62	462.24	3.62	1.22	1
ITDD-23-137	189.80	196.65	6.85	1.44	1	ITDD-23-147	391.75	392.34	0.59	1.87	07-NE	ITDD-23-154	337.82	338.28	0.46	0.90	06B-NE	ITDD-23-163	204.32	206.32	2.00	0.87	02-NE
ITDD-23-138	289.52	291.29	1.77	1.56	1	ITDD-23-147	393.84	395.03	1.19	0.75	07-NE	ITDD-23-154	359.89	361.12	1.23	2.19	07-NE	ITDD-23-163	245.30	245.81	0.51	0.20	02B-NE
ITDD-23-138	292.62	296.62	4.00	0.97	1	ITDD-23-147	395.79	396.24	0.45	0.47	07-NE	ITDD-23-154	361.50	363.56	2.06	1.89	07-NE	ITDD-23-163	298.22	299.76	1.54	0.66	1
ITDD-23-140	27.30	28.08	0.78	0.57	1	ITDD-23-147	396.66	398.68	2.02	1.30	07-NE	ITDD-23-154	369.23	370.37	1.14	1.24	07A-NE	ITDD-23-163	354.35	359.42	5.07	0.72	04C-NE
ITDD-23-140	28.83	30.62	1.79	1.22	1	ITDD-23-147	399.92	401.23	1.31	0.63	07-NE	ITDD-23-155	44.50	50.49	5.99	1.71	02-NE	ITDD-23-163	382.72	385.73	3.01	1.03	05A-NE
ITDD-23-141	39.98	44.45	4.47	1.32	1	ITDD-23-147	404.20	405.27	1.07	1.00	07A-NE	ITDD-23-155	149.36	151.36	2.00	1.67	1	ITDD-23-163	387.92	389.09	1.17	1.51	05A-NE
ITDD-23-141	47.25	49.25	2.00	0.52	04-NE	ITDD-23-147	406.79	409.13	2.34	1.12	07A-NE	ITDD-23-156	63.03	67.36	4.33	1.30	02A-NE	ITDD-23-163	392.27	394.69	2.42	1.26	05A-NE
ITDD-23-141	49.58	51.61	2.03	0.69	04-NE	ITDD-23-147	430.72	436.67	5.95	2.01	08-NE	ITDD-23-156	209.37	211.94	2.57	0.90	04-NE	ITDD-23-163	395.05	397.65	2.60	0.96	05A-NE
ITDD-23-142	36.36	41.36	5.00	1.39	02-NE	ITDD-23-148	60.55	61.40	0.85	1.07	04B-NE	ITDD-23-156	213.86	218.63	4.77	2.02	04-NE	ITDD-23-163	404.30	410.30	6.00	0.75	05-NE
ITDD-23-142	126.70	128.70	2.00	2.05	1	ITDD-23-148	62.30	64.65	2.35	0.50	1	ITDD-23-156	290.10	292.08	1.98	0.94	05A-NE	ITDD-23-163	425.03	434.90	9.87	2.11	05B-NE
ITDD-23-144	82.50	82.98	0.48	2.34	1	ITDD-23-148	73.61	77.87	4.26	1.17	04-NE	ITDD-23-156	299.55	301.20	1.65	1.11	05-NE	ITDD-23-163	469.10	473.67	4.57	1.75	06-NE
ITDD-23-144	94.46	99.42	4.96	1.85	04-NE	ITDD-23-148	257.50	260.54	3.04	3.18	06-NE	ITDD-23-156	301.70	302.52	0.82	1.30	05-NE	ITDD-23-163	474.65	477.57	2.92	1.79	06A-NE
ITDD-23-139	304.00	315.16	11.16	1.63	1	ITDD-23-148	262.83	266.60	3.77	1.39	06A-NE	ITDD-23-156	305.01	306.31	1.30	1.41	05-NE	ITDD-23-163	511.31	517.88	6.57	1.62	07-NE
ITDD-23-143	48.05	49.46	1.41	1.18	02-NE	ITDD-23-148	317.40	320.17	2.77	2.11	07-NE	ITDD-23-156	313.78	317.61	3.83	1.78	05B-NE	ITDD-23-164	63.08	65.36	2.28	1.46	02C-NE
ITDD-23-143	49.87	52.40	2.53	2.21	02A-NE	ITDD-23-148	326.16	328.99	2.83	1.44	07A-NE	ITDD-23-157	78.37	79.17	0.80	0.77	02-NE	ITDD-23-164	80.29	83.39	3.10	1.22	02-NE
ITDD-23-143	156.45	158.76	2.31	0.71	1	ITDD-23-149	46.51	48.45	1.94	1.52	01E-SW	ITDD-23-157	87.20	89.20	2.00	0.93	02A-NE	ITDD-23-164	87.48	100.06	12.58	1.50	02A-NE
ITDD-23-143	164.12	167.19	3.07	1.34	04-NE	ITDD-23-149	434.80	438.60	3.80	1.94	1	ITDD-23-157	190.25	194.07	3.82	0.61	01A-SW	ITDD-23-164	170.49	173.30	2.81	1.73	1
ITDD-23-143	168.75	169.75	1.00	1.43	04-NE	ITDD-23-149	439.41	440.56	1.15	1.61	1	ITDD-23-157	203.54	205.60	2.06	1.78	1	ITDD-23-164	328.68	333.75	5.07	0.74	05-NE
ITDD-23-143	187.65	188.03	0.38	2.99	04C-NE	ITDD-23-150	123.60	129.60	6.00	1.74	01A-SW	ITDD-23-157	354.35	359.35	5.00	1.53	05-NE	ITDD-23-164	414.18	417.35	3.17	0.86	07-NE
ITDD-23-143	189.75	190.05	0.30	0.32	04C-NE	ITDD-23-150	142.44	146.34	3.90	2.15	1	ITDD-23-158	13.30	14.55	1.25	1.44	01E-SW	ITDD-23-164	418.75	419.65	0.90	0.54	07-NE
ITDD-23-143	190.45	191.02	0.57	0.65	04C-NE	ITDD-23-150	293.11	301.75	8.64	1.45	05-NE	ITDD-23-158	393.02	396.02	3.00	1.09	01D-SW	ITDD-23-164	424.78	427.02	2.24	0.84	07A-NE
ITDD-23-143	231.53	233.40	1.87	0.64	05-NE	ITDD-23-151	8.66	10.35	1.69	0.68	01E-SW	ITDD-23-158	444.60	445.03	0.43	1.22	01A-SW	ITDD-23-164	434.58	437.39	2.81	0.78	08-NE
ITDD-23-143	251.16	251.77	0.61	0.94	05C-NE	ITDD-23-151	348.98	351.05	2.07	1.17	01D-SW	ITDD-23-158	445.93	446.80	0.87	0.86	01A-SW	ITDD-23-164	438.59	443.52	4.93	2.06	08-NE
ITDD-23-143	341.86	344.37	2.51	1.52	06-NE	ITDD-23-151	411.87	421.66	9.79	1.84	1	ITDD-23-158	453.28	453.59	0.31	0.39	1	ITDD-23-165	79.48	80.70	1.22	0.20	02C-NE
ITDD-23-143	347.82	349.48	1.66	0.73	06A-NE	ITDD-23-152	53.19	55.35	2.16	0.44	02-NE	ITDD-23-158	453.97	455.14	1.17	2.92	1	ITDD-23-165	195.00	202.00	7.00	2.08	1
ITDD-23-143	359.64	361.75	2.11	0.42	06B-NE	ITDD-23-152	56.15	58.31	2.16	1.29	02A-NE	ITDD-23-158	456.50	468.92	12.42	2.02	1	ITDD-23-165	202.64	202.99	0.35	0.72	1
ITDD-23-143	383.35	384.95	1.60	1.79	07-NE	ITDD-23-152	164.09	166.95	2.86	0.42	1	ITDD-23-160	66.94	67.50	0.56	0.50	1	ITDD-23-165	338.94	342.77	3.83	1.42	05-NE
ITDD-23-143	385.37	388.72	3.35	1.89	07-NE	ITDD-23-152	182.78	185.86	3.08	0.30	04-NE	ITDD-23-160	230.18	230.77	0.59	1.51	05-NE	ITDD-23-166	89.68	90.72	1.04	1.58	05-NE
ITDD-23-143	398.90	400.75	1.85	2.40	07A-NE	ITDD-23-152	250.73	252.51	1.78	0.92	05A-NE	ITDD-23-160	234.27	237.37	3.10	1.18	05-NE	ITDD-23-166	97.55	99.71	2.16	2.03	05-NE
ITDD-23-145	283.58	284.05	0.47	1.70	01A-SW	ITDD-23-152	272.95	274.60	1.65	1.52	05-NE	ITDD-23-161	13.66	14.34	0.68	1.77	02-NE	ITDD-23-167	228.46	229.56	1.10	0.81	01A-SW

Table 10-7: Mineralized Intercepts by Bandeira Drill Holes

HOLE-ID	FROM	TO	LENGTH	Li_2O%	MODEL
ITDD-23-167	230.45	238.50	8.05	1.93	1
ITDD-23-167	345.55	351.27	5.72	1.86	05-NE
ITDD-23-168	88.20	88.79	0.59	1.07	05-NE
ITDD-23-168	93.83	94.14	0.31	0.05	05-NE
ITDD-23-168	116.69	120.59	3.90	0.88	05-NE
ITDD-23-169	32.29	33.27	0.98	1.71	02D-NE
ITDD-23-169	241.60	243.89	2.29	1.27	04-NE
ITDD-23-169	359.01	360.46	1.45	2.26	06-NE
ITDD-23-170	101.62	106.04	4.42	1.46	05-NE
ITDD-23-171	51.37	52.05	0.68	1.22	1
ITDD-23-171	52.69	54.96	2.27	0.64	1
ITDD-23-171	208.35	208.77	0.42	1.74	05-NE
ITDD-23-171	222.89	228.56	5.67	1.95	05-NE
ITDD-23-172	15.84	16.93	1.09	1.89	02-NE
ITDD-23-172	26.83	27.74	0.91	1.11	02A-NE
ITDD-23-172	136.38	140.13	3.75	1.78	1
ITDD-23-172	180.94	185.33	4.39	1.58	04C-NE
ITDD-23-172	317.72	320.13	2.41	2.05	06-NE
ITDD-23-172	331.69	332.79	1.10	2.92	06A-NE
ITDD-23-172	350.08	352.13	2.05	0.52	06B-NE
ITDD-23-172	353.90	354.98	1.08	2.18	06B-NE
ITDD-23-172	368.65	368.95	0.30	1.89	07-NE
ITDD-23-172	369.88	371.88	2.00	1.84	07-NE
ITDD-23-173	122.48	129.13	6.65	1.50	05-NE
ITDD-23-174	211.36	212.40	1.04	0.72	01A-SW
ITDD-23-174	213.11	214.99	1.88	2.09	1
ITDD-23-174	216.09	221.72	5.63	1.58	1
ITDD-23-174	342.54	346.82	4.28	1.65	05-NE
ITDD-23-175	214.57	216.09	1.52	0.64	02-NE
ITDD-23-175	323.64	325.56	1.92	1.85	1
ITDD-23-175	383.34	385.19	1.85	1.02	04C-NE
ITDD-23-175	398.59	402.11	3.52	1.63	05A-NE
ITDD-23-175	404.49	407.49	3.00	1.50	05A-NE
ITDD-23-175	479.11	480.55	1.44	0.60	06-NE
ITDD-23-175	484.82	488.20	3.38	1.86	06A-NE
ITDD-23-175	488.20	488.80	0.60	0.27	06A-NE
ITDD-23-175	489.59	492.19	2.60	2.58	06A-NE
ITDD-23-175	502.82	503.65	0.83	1.52	07-NE
ITDD-23-175	524.36	525.90	1.54	1.43	08-NE
ITDD-23-175	526.83	528.21	1.38	1.78	08-NE
ITDD-23-175	529.05	529.94	0.89	1.38	08-NE
ITDD-23-176	56.11	57.66	1.55	1.54	1
ITDD-23-176	60.09	61.88	1.79	1.24	1
ITDD-23-176	230.14	235.14	5.00	1.57	05-NE
ITDD-23-177	110.89	113.89	3.00	1.12	02-NE
ITDD-23-177	199.14	200.30	1.16	1.03	01A-SW
ITDD-23-177	204.16	209.98	5.82	2.18	1
ITDD-23-177	354.96	355.75	0.79	1.86	05-NE
ITDD-23-177	356.86	359.59	2.73	1.35	05-NE
ITDD-23-177	362.09	363.55	1.46	1.54	05-NE
ITDD-23-178	171.00	173.18	2.18	0.67	1
ITDD-23-180	171.59	177.38	5.79	1.78	02-NE
ITDD-23-180	264.35	269.85	5.50	1.15	1
ITDD-23-180	390.61	393.13	2.52	1.41	05-NE
ITDD-23-180	393.51	401.35	7.84	2.06	05-NE
ITDD-23-181	203.14	205.32	2.18	1.26	01A-SW
ITDD-23-181	223.00	229.00	6.00	1.02	1
ITDD-23-182	30.47	31.47	1.00	0.40	02D-NE
ITDD-23-182	226.06	228.07	2.01	1.33	04-NE
ITDD-23-182	228.72	231.25	2.53	1.49	04-NE
ITDD-23-183	177.37	178.64	1.27	3.40	1
ITDD-23-184	156.12	159.73	3.61	1.03	1
ITDD-23-184	201.67	203.01	1.34	0.99	04C-NE
ITDD-23-184	203.67	205.70	2.03	2.91	04C-NE
ITDD-23-184	207.71	210.57	2.86	1.21	04C-NE
ITDD-23-184	337.76	338.67	0.91	0.38	06-NE
ITDD-23-184	339.45	341.69	2.24	1.87	06-NE
ITDD-23-184	348.01	349.42	1.41	1.94	06A-NE
ITDD-23-184	384.79	385.63	0.84	0.44	07-NE
ITDD-23-184	386.31	387.52	1.21	0.93	07-NE
ITDD-23-185	240.77	244.06	3.29	1.84	02-NE
ITDD-23-185	360.36	365.03	4.67	1.54	1
ITDD-23-185	417.41	420.23	2.82	0.98	04-NE
ITDD-23-185	434.34	437.34	3.00	1.22	04C-NE
ITDD-23-185	443.78	447.25	3.47	1.10	05A-NE
ITDD-23-185	520.91	521.41	0.50	0.04	06-NE
ITDD-23-185	529.52	531.92	2.40	3.57	06A-NE
ITDD-23-185	539.78	540.32	0.54	0.59	07-NE
ITDD-23-185	567.15	569.57	2.42	2.00	08-NE
ITDD-23-187	196.58	198.86	2.28	1.85	1
ITDD-23-189	70.07	72.93	2.86	0.97	1
ITDD-23-188	130.48	139.59	9.11	2.45	03-NE
ITDD-23-188	272.46	275.86	3.40	2.07	02-NE
ITDD-23-188	463.82	465.66	1.84	1.05	04-NE
ITDD-23-188	466.64	471.60	4.96	1.71	04-NE
ITDD-23-188	581.89	582.23	0.34	0.03	06-NE
ITDD-23-188	630.52	633.20	2.68	1.86	08-NE
ITDD-23-188	634.37	643.24	8.87	1.59	08-NE
ITDD-23-194	96.22	96.94	0.72	1.02	05-NE
ITDD-23-194	114.65	115.58	0.93	1.34	05-NE
ITDD-23-194	117.31	119.50	2.19	1.83	05-NE
ITDD-23-196	110.73	111.46	0.73	1.41	05-NE
ITDD-23-196	113.06	113.82	0.76	2.01	05-NE
ITDD-23-196	120.57	121.80	1.23	0.17	05-NE
ITDD-23-196	137.13	138.60	1.47	1.88	05-NE
ITDD-23-196	140.15	146.05	5.90	1.61	05-NE
ITDD-23-199	127.38	129.42	2.04	2.03	02C-NE
ITDD-23-199	270.33	272.10	1.77	0.93	01A-SW
ITDD-23-199	288.91	294.47	5.56	1.59	1

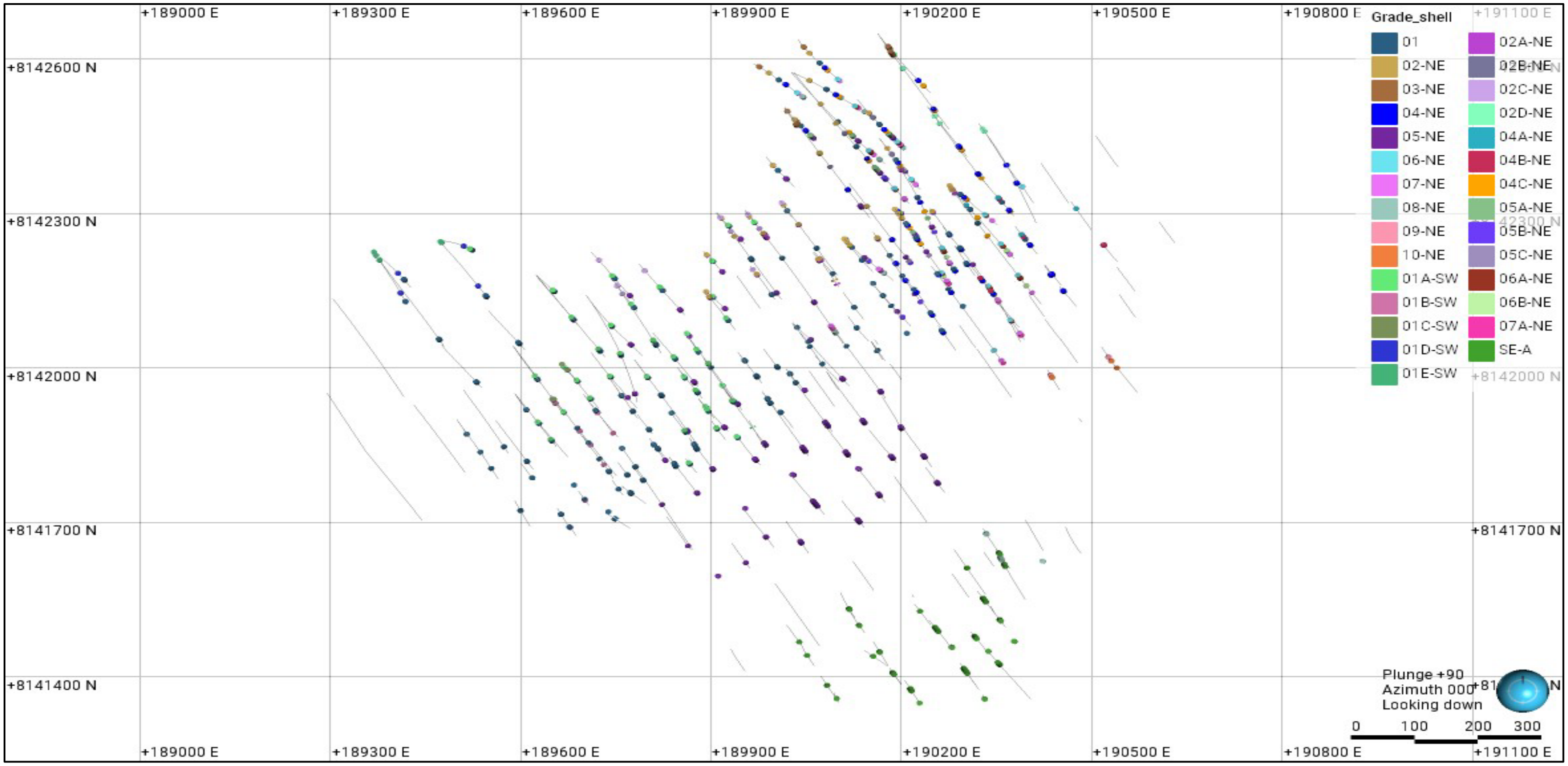


Figure 10-2: Horizontal Projection of All Bandeira Project Drill Holes with Mineralized Intercepts (scale in meters)

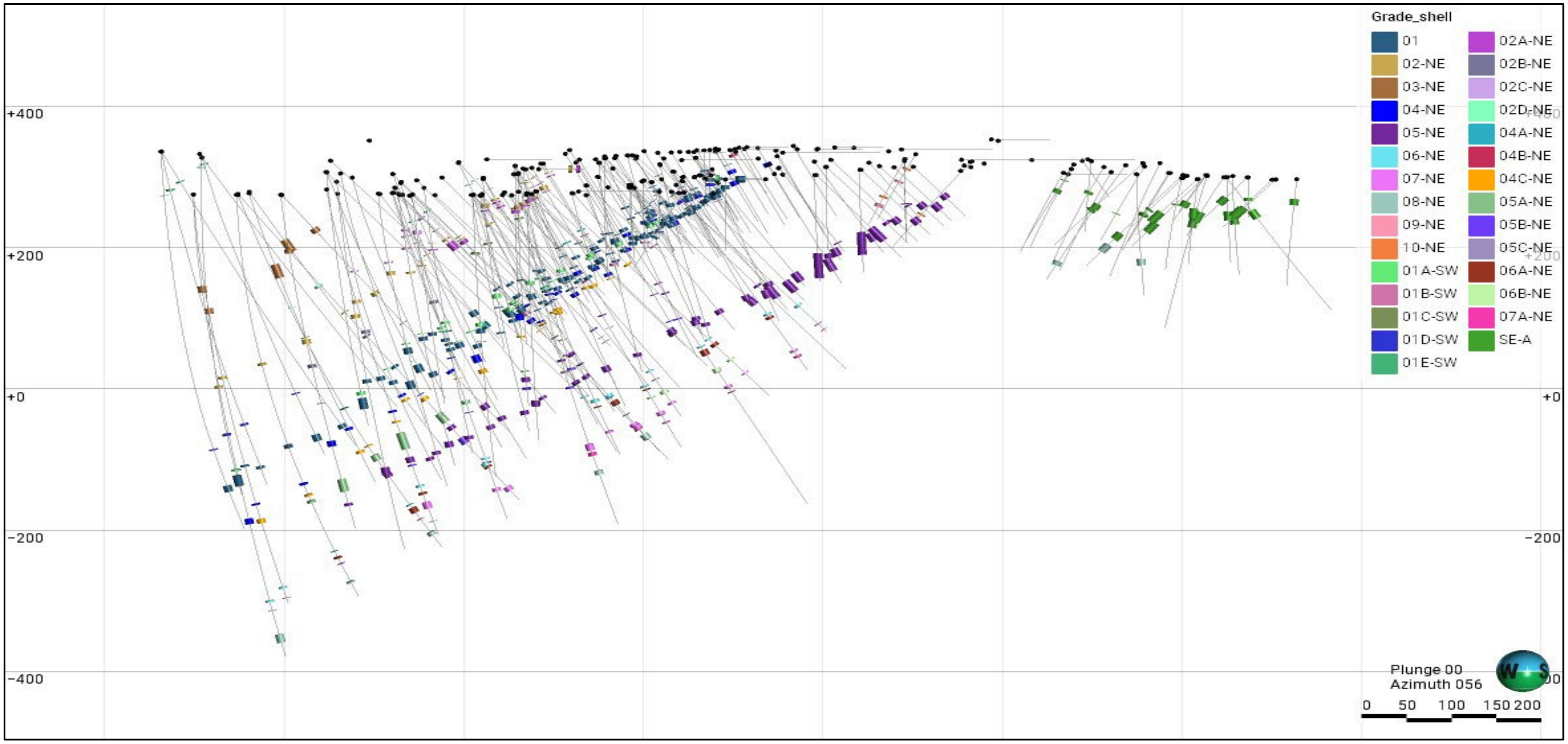


Figure 10-3: Oblique View Vertical section of All Bandeira Project Drill Holes with Mineralized Intercepts (scale in meters)

10.10 Qualified Person's Comments

No significant drilling, sampling, or recovery factors would impact the outcome of the drilling results and the Mineral Resource estimate (Section 14).

The QP's opinion, based on a review of all possible information, is that the drilling procedures MGLIT put in place meet acceptable industry standards, and the data can be and have been used for geological and resource modelling.

11.0 SAMPLE PREPARATION, ANALYSIS, AND SECURITY

11.1 Sampling

Samples are prepared from HQ and NQ diameter drill cores (63.5 mm and 47.6 mm core diameter). The sampling procedures described in this section reflect MGLIT's current Standard Operating Procedures (SOP).

Sample intervals in the mineralized zones are defined based on one metre. Mineralized samples must have a minimum length of 1.00 m and a maximum length of 1.50 m. In some specific situations, samples shorter than 1.00 m can be selected. The SOP describes these situations in detail.

Outside the mineralized domains, the sampling definition is 1.50 m, and samples can range from 1.00 m to 3.00 m.

The visual indicators for sample interval definition include lithological contacts, mineral structures, and mineralization.

Lithium Ionic's sample collection and sample definition procedures are described below:

- The drilling contractor team brings drill core from the drill rig to a drill logging and sampling area one or more times per shift.
- The disposition and orientation of boxes are checked, and the depth are marked.
- Groups of three core boxes are photographed and logged.
- Sample intervals are marked on the core box.
- A line is drawn along the drill core at high angles to the foliation to orient the saw cut before sampling. The right half of the core is selected as a sample, and the other half is retained for future reference.
- Sample tags are attached to the core box at the end of each sample.
- Sample bags are numbered before sampling.
- Sample tags are inserted in the bags only after samples are bagged.
- After the samples are tagged and bagged, they are weighed.
- The core is cut lengthwise along the core axis. A geologist defines the position of the cut, and a geology technician performs the cutting.
- For weathered material, a spatula or a machete is used to split the sample into two subsamples along the drilling direction.
- Fresh rock cores are cut in half using a diamond saw and flushed with water between cuts.
- After bagging, the samples are weighed, and the weight is registered; sample batches are assembled and sent to the laboratory. The standard batch size is 35 samples, consisting of 29 core samples and six QC samples.

11.2 Sample Preparation, Control, and Custody

Sample is selected and marked with a tag. After logging it is inserted into the project database. Cores are split in half using a diamond saw. Half of the core is left in the core box, while the other half is stored in plastic bags, accompanied by a printed sample tag, and sent to the lab.

Drill core samples are prepared and analyzed by SGS Geosol (SGS), an independent commercial laboratory. The SGS facility is certified to ISO 9001, ISO 14001, and ISO 17025. The sample shipment is delivered to the SGS facility in Vespasiano, Minas Gerais, via a parcel transport company. At all times, samples are in the custody and control of the transportation company representatives until delivery to the laboratory, where samples are held in a secure enclosure until processing. SGS sends a confirmation email with details of samples received upon delivery. The chain of custody of each batch is carefully maintained from collection at the drill rig to delivery at the laboratory to prevent accidental contamination or mixing of samples and render active tampering as difficult as possible.

All samples received at SGS are inventoried and weighed before processing. Samples are dried at 105°C, crushed to 75% passing (P_{75}) a 3 mm sieve, homogenized, split (jones riffle splitter), and pulverized (250 g to 300 g of sample) in a steel mill to P_{95} 150 mesh.

11.3 Density Measurements

Lithium Ionic’s current density SOP states that density measurements should be taken for every geochemical sample generated. When the drill core quality does not allow for a density assay, this should be registered in the density sampling plan with a specified tag. The high frequency of density sampling aims to acquire a statistically robust database.

Three samples should be taken for the geochemical samples with more heterogeneity: one aliquot from the top of the sample (considering the drill hole—top down), the other in the middle and one further in the base. The responsible technician must guarantee a homogenous geochemical sample for density determination. Density samples must have a minimum length of 10 cm and a maximum of 25 cm. Density is commonly measured in the unsampled half-cores. All density data is stored in a database.

The following list summarizes the procedures described in the density SOP:

- Sample selection and registration in the density format spreadsheet.
- Weight of the sample.
- Weight of the sample while submerged into water a scaler.

Density values are acquired from the following formula:

$$D = PA / (PA - PB) \qquad (1)$$

Where **D** = density; **PA** = sample weight (in the air); **PB** = sample weight (submerged in water).

The density assay procedures do not include drying or sample sealing with paraffin. Considering the deposit's climate and lithological characteristics, not implementing these procedures it can be acceptable.

11.4 Sample Analysis

After preparation, SGS analyzes the core samples. The chemical assays are performed using SGS's analytical method ICP90A, a multi-element analysis using fusion by sodium peroxide (Na_2O_2) and an inductively coupled plasma–optical emission spectroscopy (ICP-OES) analysis. If lithium results are above 15,000 ppm, SGS reanalyzes for lithium through the ICP90Q_Li method, similar to the ICP90A but with higher detection limits.

All the chemical analyses SGS conducts are reported to Lithium Ionic on PDF certificates, accompanied by an MS Excel digital file.

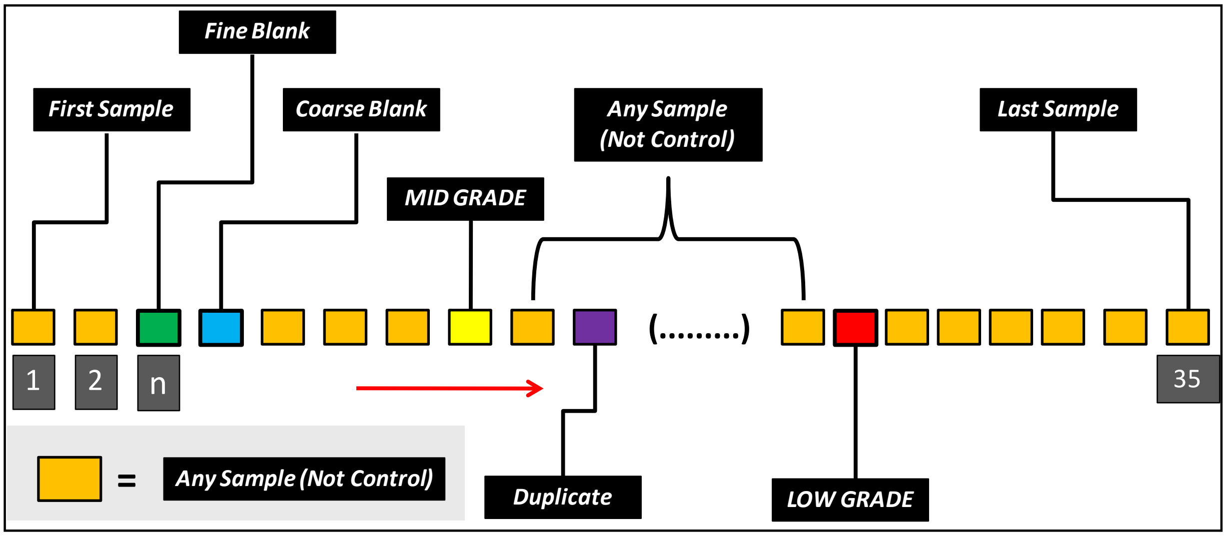
11.5 Quality Assurance and Quality Control

The implementation of the QA/QC program was proposed by the independent company, GE21. The sample batch composition includes five QC samples for every 30 regular samples. The QC composition of the batches is described below:

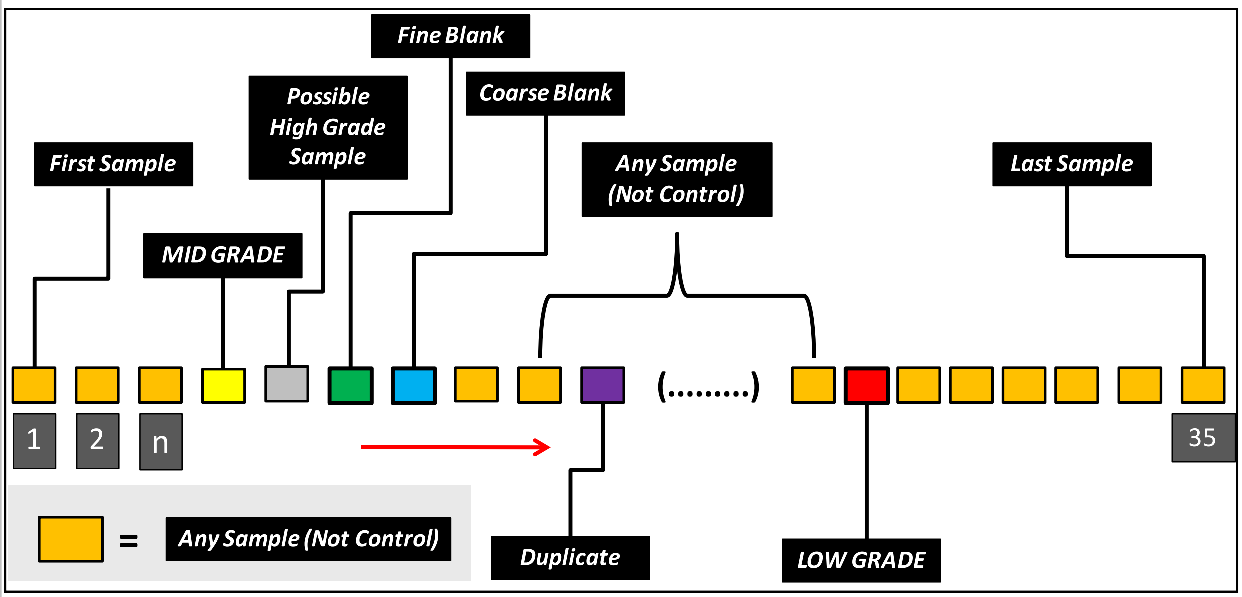
- Coarse (preparation) and fine (analytical) blanks: 6% of the batch or two blanks per batch—one of each type.
- Standards: 6% of the batch or two standards per batch.
- Crushed duplicates: 3% of the batch, or one sample per batch.
- Pulverized duplicates: 3% of the batch, or one sample per batch.

Additionally, one sample is selected for the check assay procedure for every sample batch, representing 3% of the batch. Check samples are chosen from the pulverized material of a regular sample reserved by the primary laboratory. These samples are sent to a secondary laboratory, ALS Vancouver, British Columbia, Canada, monthly. ALS Vancouver is ISO 17025 accredited.

The same control sample proportion criteria should be respected on check assay batches: two standards, two blanks, and two duplicates. Particle-size analysis (PSA) is also performed on the check assay samples. Figure 11-1 presents the batch composition scheme for batches with mineralized samples or zones and unmineralized batches. Table 11-1 shows the proportion of Quality Control samples in the MGLIT geochemical database.



Without Mineralized zone



In Mineralized zone

Figure 11-1: QA/QC Program

Table 11-1: QA/QC Program Summary

CRM/SRM	Crushed Duplicates	Pulverized Duplicates	Preparation Blanks	Analytical Blanks	Check Assay	Total QA/QC Samples	Total Database
478	231	231	237	178	72	1,427	7,351
6.5%	3.1%	3.1%	3.2%	2.4%	1.0%	19.4%	100.0%

Note: CRM = certified reference material; SRM = standardized reference material

11.5.1 Preparation Blank—Coarse Blank

Preparation blank samples are inserted in the sample batch before the physical preparation of the samples. This measure helps to track any contamination problems that might occur in the granulometric reduction or sample-splitting processes. Blank samples are inserted at the beginning of the possibly mineralized intervals, following the sequence:

- Mineralized sample.
- Analytical/fine blank.
- Preparation/coarse blank.
- If an unmineralized batch is assembled, blank samples must be inserted at the beginning of the batch.
- MGLIT uses a commercial blank, ITAK-QG-01, as its coarse blank material. More than 95% of the coarse blank samples are below the 5x detection limit threshold, indicating no major contamination. Figure 11-2 presents the preparation blank control chart for lithium.

Type of Control	Blank
Reference	ITAK-QG-01
Variable	Li ppm
Number of analysis	237

Pattern Code	ITAK-QG-01	Minimum	10
Detection Limit	10	Maximum	129
Standard Deviation	12.573	Average	15.135
Upper Limit	50	Median	10
Lower Limit	0	Bias	14.339

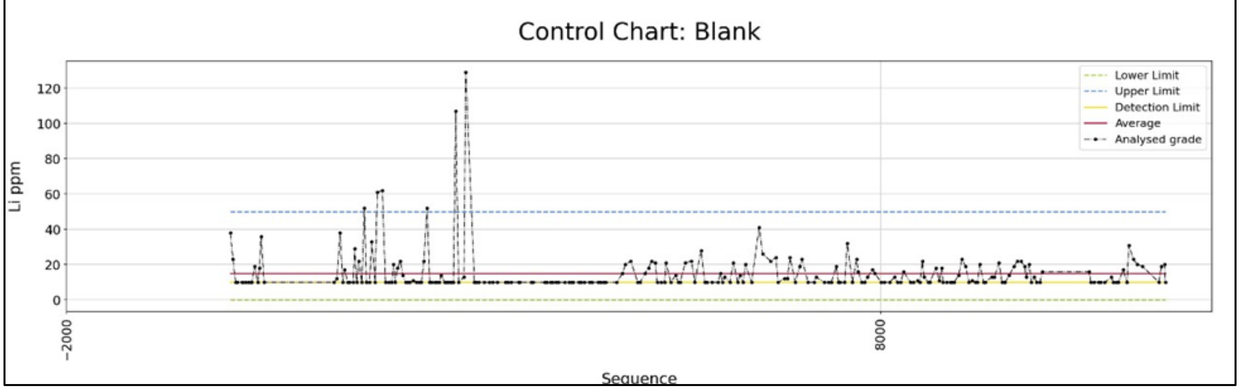


Figure 11-2: Blank Control Chart—ITAK QG-01

11.5.2 Analytical Blank—Fine Blank

Analytical or fine blank samples are inserted in the analytical batches after the sample's physical preparation. This blank sample is used to assess contamination problems that might occur in the sample digestion or sample fusion processes, and to evaluate analytical equipment (i.e., ICP-OES) miscalibrations. Blank samples are inserted at the beginning of the possibly mineralized intervals, following the sequence:

- Mineralized sample.
- Analytical/fine blank.
- Preparation/coarse blank.

If an unmineralized batch is assembled, blank samples must be inserted at the beginning of the batch.

For its QA/QC program, Lithium Ionic uses two commercial fine blank samples: ITAK-QF-15 and ITAK-QF-16. Only two of the 178 samples of this control have returned grades higher than the 5x detection limit threshold, indicating low contamination or calibration problems in the final stages of the geochemical analysis. Figure 11-3 and Figure 11-4 present the analytical blanks control charts for lithium:

Type of Control	Blank
Reference	ITAK QF-15
Variable	Li ppm
Number of analysis	38

Pattern Code	ITAK QF-15	Minimum	10
Certificate Value	18.7	Maximum	62
Standard Deviation	13.096	Average	17.737
Upper Limit	50	Median	12.0
Lower Limit	0	Bias	16.71

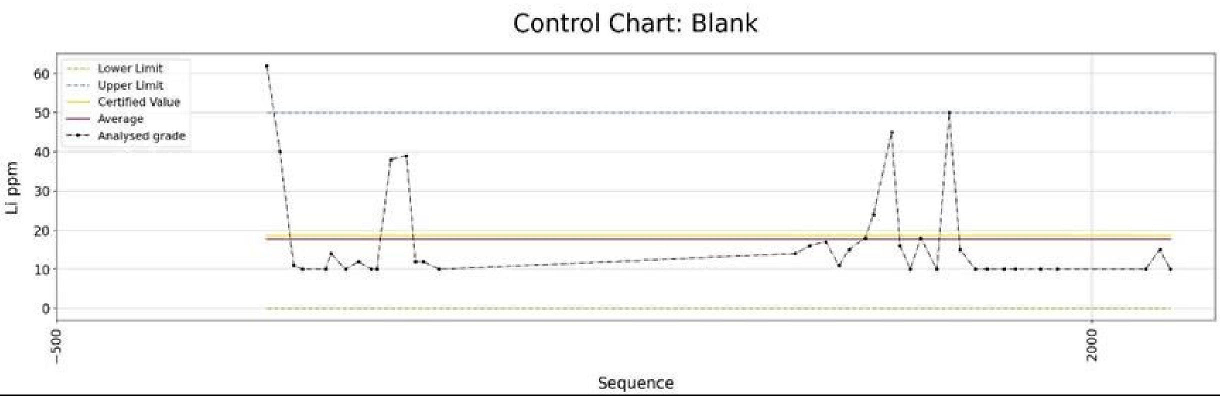


Figure 11-3: Blank Control Chart—ITAK QF-15

Type of Control	Blank
Reference	ITAK-QF-16
Variable	Li ppm
Number of analysis	140

Pattern Code	ITAK-QF-16	Minimum	10
Certificate Value	36.6	Maximum	74
Standard Deviation	6.781	Average	13.193
Upper Limit	50	Median	10.0
Lower Limit	0	Bias	11.723

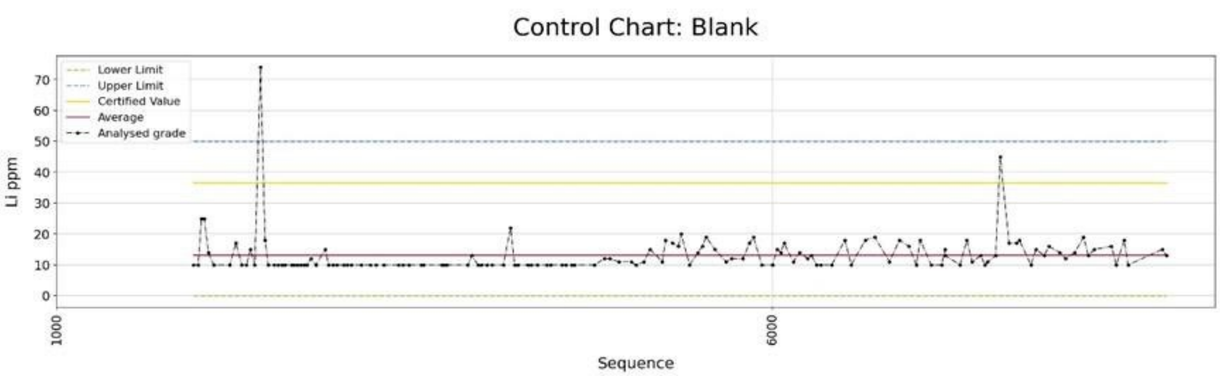


Figure 11-4: Blank Control Chart—ITAK QF-16

11.5.3 Certified or Standard Reference Material—CRM/SRM

Certified or standard reference materials are materials for which one or more parameters have been certified by a technically valid and recognized procedure. A certifying body has issued a certificate or other accurate documentation. These materials are used as QC samples to evaluate the accuracy of the analytical methods and procedures.

Lithium Ionic uses four CRMs or SRMs: ITAK – 1100, ITAK – 1101, OREAS 750, and OREAS 752.

These reference materials evaluate high-, medium-, and low-grade assay results.

Medium-grade or high-grade reference materials are inserted at the beginning of the possible mineralized zones. The insertion can occur immediately or a few samples before the mineralized zone. The low-grade materials are inserted at the end of the zone where the geologist interprets mineralization. The insertion can be immediately after or a few samples after the mineralized zone. The order of the reference materials can be changed based on geological features or mineralization characteristics.

Figure 11-5 to Figure 11-8 present Lithium's CRM/SRM control charts. More than 80% of the samples are constrained within the two standard deviation limits.

Type of Control	Standard
Reference	ITAK-1100
Variable	Li ppm
Number of analysis	140

Pattern Code	ITAK-1100	Minimum	2256
Certificate Value	2430	Maximum	2680
Standard Deviation	76.4	Average	2476.729
Upper Limit	2526	Median	2481.0
Lower Limit	2334	Bias (%)	1.92

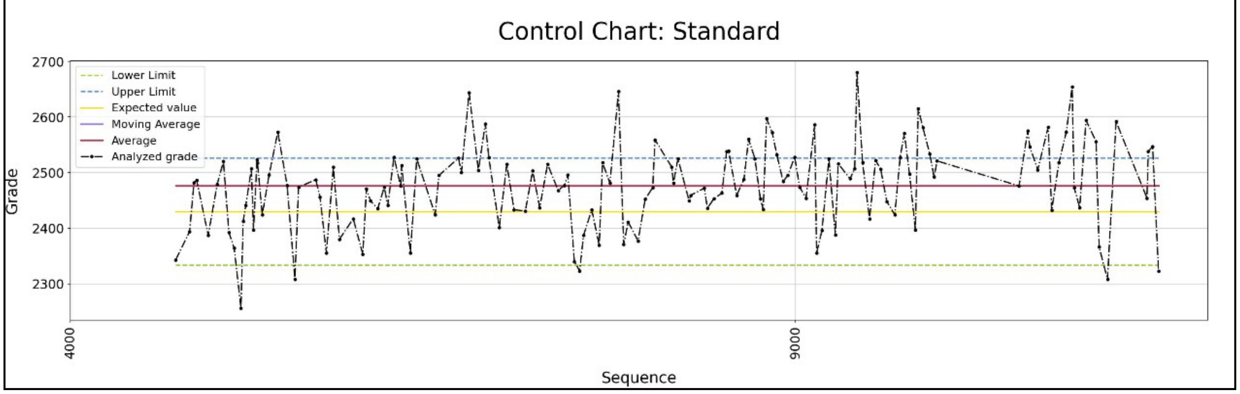


Figure 11-5: Standard Reference Material Chart—ITAK 1100

Type of Control	Standard
Reference	ITAK-1101
Variable	Li ppm
Number of analysis	134

Pattern Code	ITAK-1101	Minimum	6436
Certificate Value	6710	Maximum	7201
Standard Deviation	157.7	Average	6825.097
Upper Limit	6950	Median	6824.0
Lower Limit	6470	Bias (%)	1.72

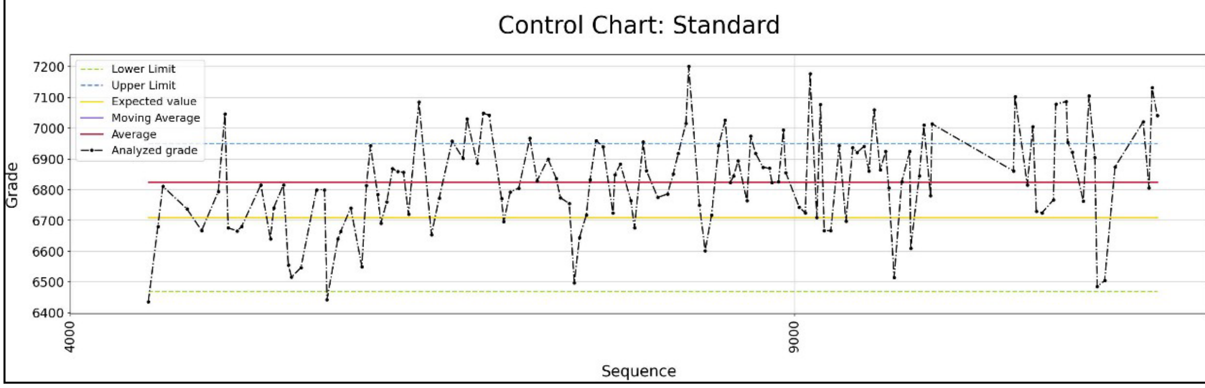


Figure 11-6: Standard Reference Material Chart—ITAK 1101

Type of Control	Standard
Reference	OREAS 750
Variable	Li ppm
Number of analysis	100

Pattern Code	OREAS 750	Minimum	2093
Certificate Value	2300	Maximum	2515
Standard Deviation	91.9	Average	2284.8
Upper Limit	2500	Median	2300.0
Lower Limit	2100	Bias (%)	-0.66

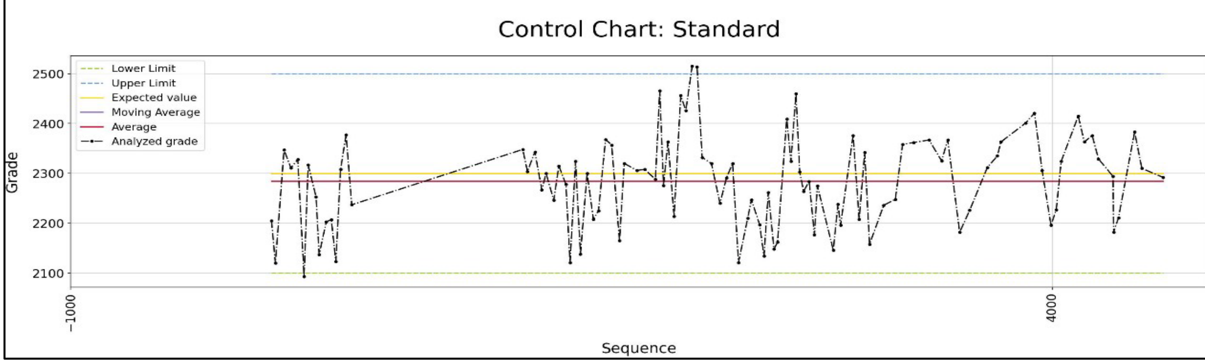


Figure 11-7: Standard Reference Material Chart—OREAS 750

Type of Control	Standard
Reference	OREAS 752
Variable	Li ppm
Number of analysis	104

Pattern Code	OREAS 752	Minimum	6347
Certificate Value	7070	Maximum	7394
Standard Deviation	158.0	Average	7016.221
Upper Limit	7490	Median	7020.5
Lower Limit	6650	Bias (%)	-0.76

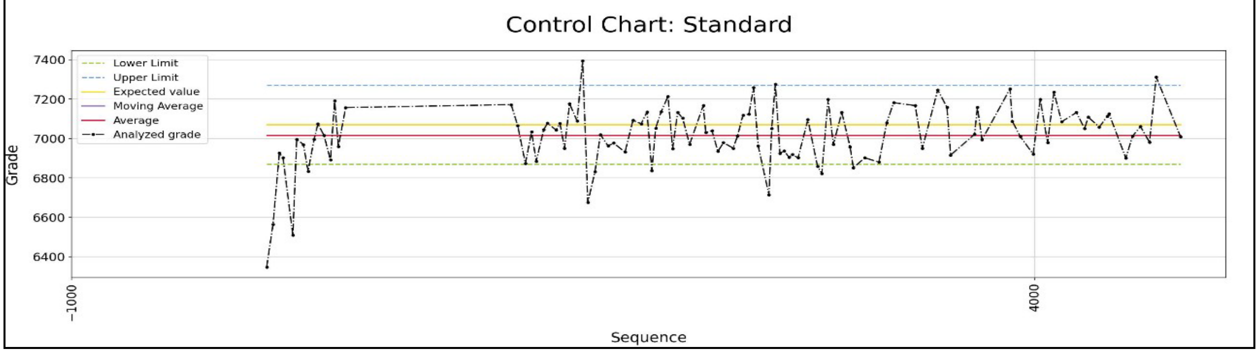


Figure 11-8: Standard Reference Material Chart—OREAS 752

11.5.4 Crushed Duplicates

Duplicates are used in the QC program to evaluate the precision of the geochemical analysis. Insertion of blind duplicates of crushed material is used to test the laboratory's reproducibility and determine if the crushing process generates bias or imprecision in the results.

In all, 231 crushed duplicates were evaluated. Control charts for this control type show high correlations and good reproducibility, with over 90% of the samples falling below the 20% HARD limit (Figure 11-9).

Target	Bandeira
Reference	Duplicatas
Variable	Li_ppm
Accuracy limit	10%
Number of pairs	231

	Sample	Duplicate
Minimum	10	17
Maximum	18020	17130
Average	5506.208	5517.247
Median	5496	5400
HARD median		4.8
Mean Bias (%)		-0.0%

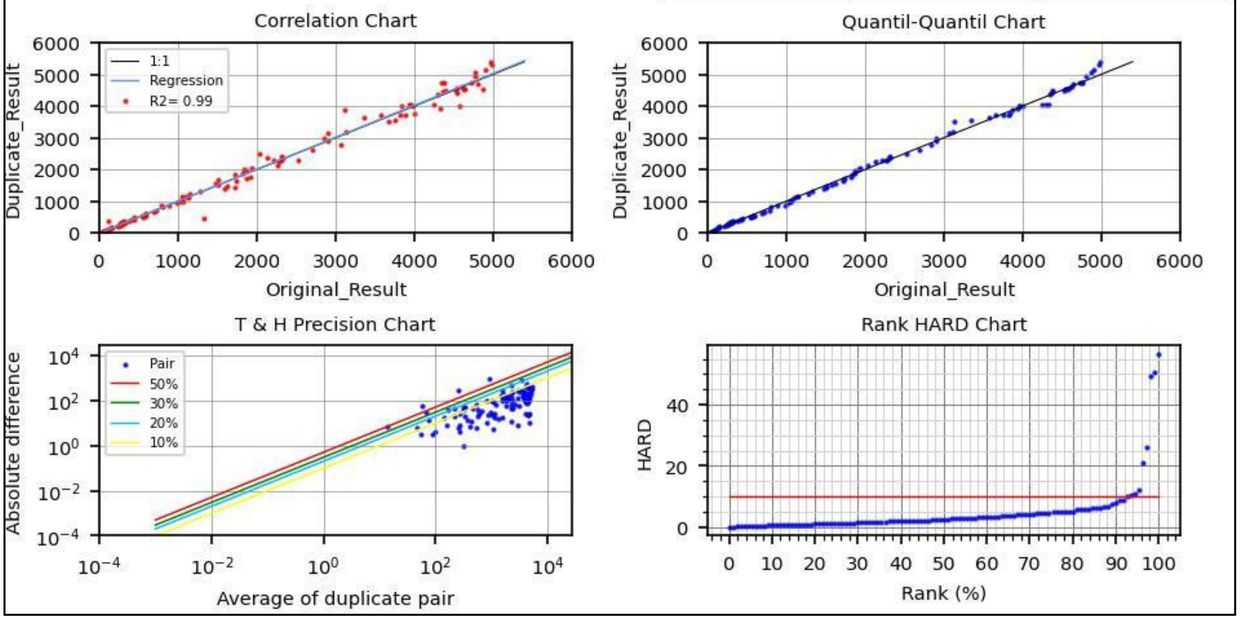


Figure 11-9: Crushed Duplicates Control Chart

11.5.5 Pulverized Duplicates

Duplicates are used in the quality control program to evaluate the precision of the geochemical analysis. The insertion of blind duplicates of pulverized material is used to test the laboratory's reproducibility and determine if the milling process is not generating bias or imprecision in the results.

A total of 231 pulverized duplicates were evaluated. Control charts for this control type show high correlations and good reproducibility, with approximately 80% of the samples falling below the 10% HARD limit (Figure 11-10).

Target	Bandeira
Reference	Duplicatas
Variable	Li_ppm
Accuracy limit	5%
Number of pairs	231

	Sample	Duplicate
Minimum	19	32
Maximum	22900	23330
Average	7069.307	7091.268
Median	6855	6936
HARD median		4.3
Mean Bias (%)		0.5%

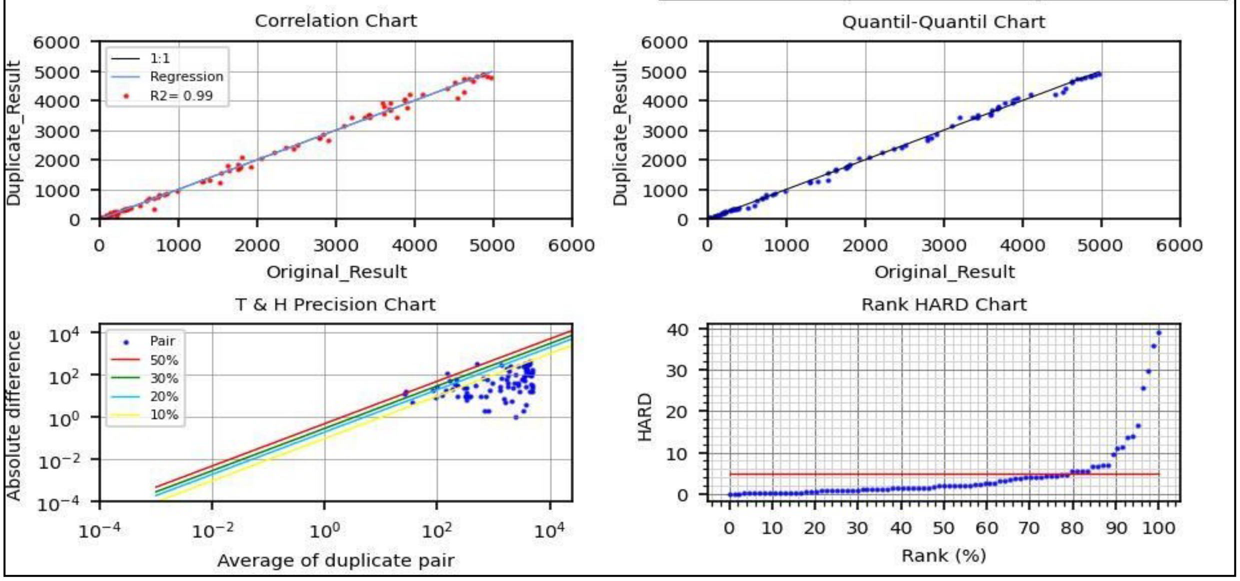


Figure 11-10: Pulverized Duplicates Control Chart

11.5.6 Check Assay

MGLIT has submitted check assay batches for analysis at the ALS Laboratory in Vancouver. This procedure is used to verify the reliability of the primary laboratory results by crosschecking them with a secondary reference laboratory. Check assay results are presented in the control chart (Figure 11-11). Only one sample of 72 has returned a pair above the 30% HARD limit, representing 1.4% of the total check assays.

Target	Bandeira
Reference	Check Assay
Variable	Li ppm
Accuracy limit	15%
Number of pairs	72

	Sample	Duplicate
Minimum	58	50
Maximum	19060	19920
Average	4705.5	4744.722
Median	4248.5	4080.0
HARD median		2.7
Mean Bias (%)		0.8%

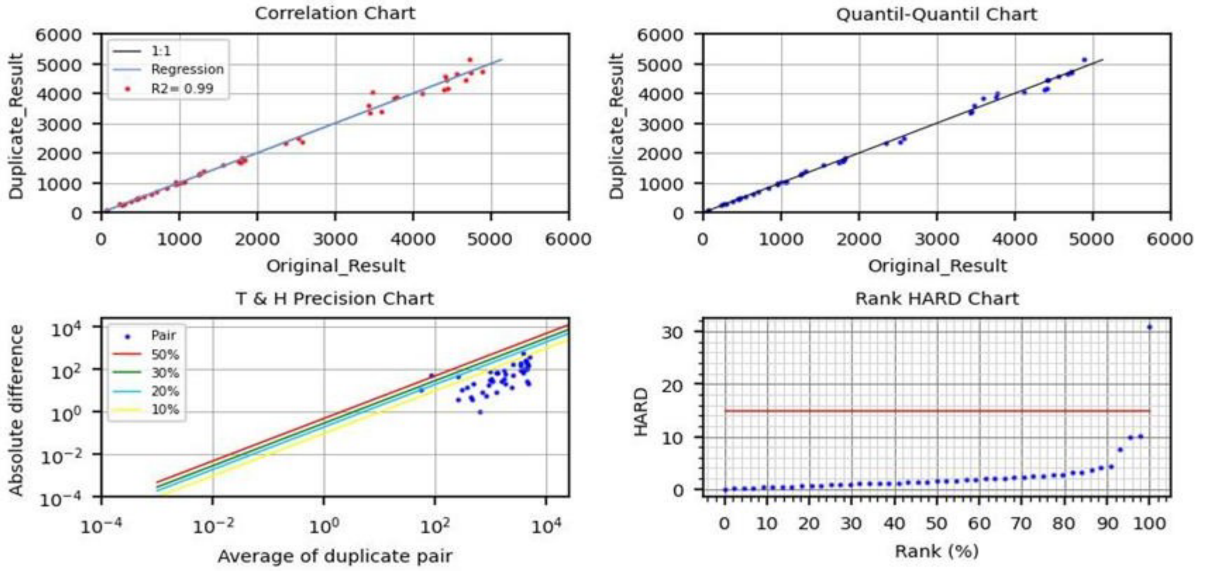


Figure 11-11: Check the Assay Control Chart

11.6 Qualified Person's Opinion

The QP believes that the sampling, sample preparation, security, and analysis performed by Lithium Ionic and hired companies are suitable for estimating Mineral Resources as part of the feasibility study. QA procedures follow industry best practices, and QC results are within industry standards, attesting to the quality of the database information.

12.0 DATA VERIFICATION

12.1 Qualified Person's Verification

Since 2022, GE21 team members have conducted several field visits at the Bandeira Project in Araçuaí to verify the company's infrastructure, procedures, and the results obtained by MGLIT staff.

Independent QP for Section 9 and Section 14, Mr. Carlos José Evangelista Silva, visited the Bandeira Project on September 13 and 14 and December 12, 2023. MGLIT allowed unlimited access to the facilities during this time.

The QP inspected the following points:

- Drilling sites and trenches (Figure 12-1 to Figure 12-4):
  - Collar landmarks
  - Trenches
  - Drill rigs
- Drill-core shed (Figure 12-5 to Figure 12-12), including:
  - Installations and overall core shed procedures flowchart
  - Core box archive and drill-hole landmark checking
  - Drill-core saw and drill-core sample bags
  - Batches of sample bags
  - Pulverized and crushed samples returned from labs
  - Density test procedures by water displacement method
  - Physical file storage for drill-hole logging and bulletins
  - Mineralization style and sampling procedures.
- The assay data were cross-checked within the drill-sample database. Digital assay records were randomly selected and compared with the available laboratory assay certificate reports.

Additionally, a comprehensive review of the assay database was conducted to identify errors, including overlaps, interval gaps, and typographical errors in assay values. The database generally exhibited high accuracy, requiring no adjustments to the assay values it contained.

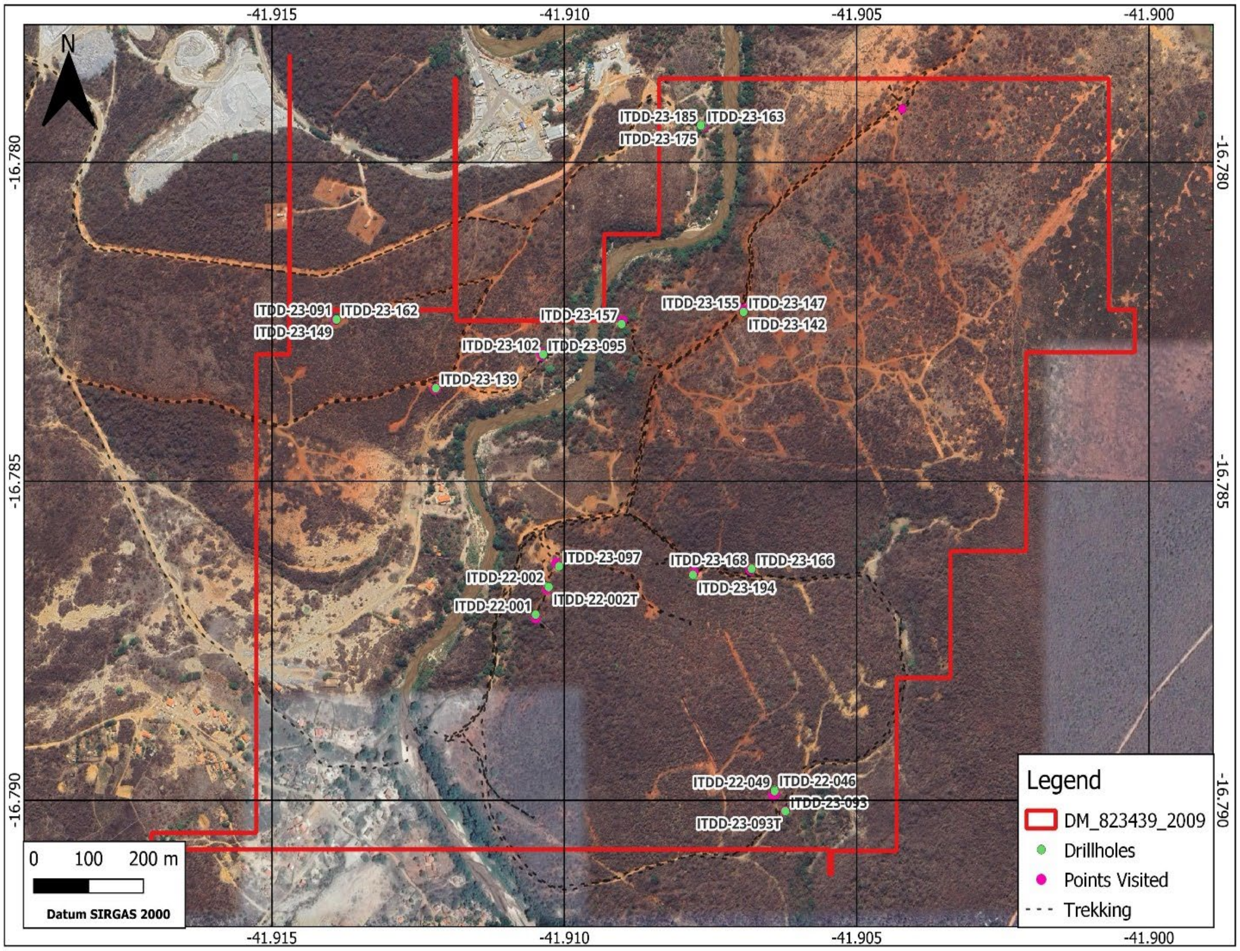


Figure 12-1: Points QP Visited on MGLIT Bandeira Property

Pegmatite vein with spodumene outcrop

Pegmatite Vein with spodumene outcrop

Trench ITTRE-22-001—pegmatite vein with spodumene outcrop

Trench ITTRE-22-001—spodumene pegmatite vein outcrop

Figure 12-2: Spodumene Pegmatites Outcrops and Trench on MGLIT Bandeira property

Collar landmarks—Drilling Site ITDD-23-196

Drilling Site ITDD-23-196

Collar landmarks—Drilling Site ITDD-23-162

Drilling Site ITDD-23-162

Collar landmarks—Drilling Site ITDD-23-093

Drilling Site ITDD-23-093

Figure 12-3: Collar Monuments on MGLIT Bandeira Property

Drill rig on site of the Bandeira, drilling on Sep 13, 2023—DDH ITDD-23-192—azimuth 140°; dip ~70°

Drill rig on site of the Bandeira, drilling on Sep 13, 2023—DDH ITDD-23-192—Technicians recovering the cores and using the REFLEX ACT III for core orientation

Drill rig on Bandeira site, drilling on Sep. 9, 2023—DDH ITDD-23-192—spodumene in pegmatite veins cores recovered from drilling–depth 355 m

Drill rig on Bandeira site, drilling in Sep. 9, 2023—DDH ITDD-23-192—REFLEX GYRO IQ used by MGLITsStaff to do the survey measurement

Figure 12-4: Drilling Rig and Survey Equipment on MGLIT Bandeira Property

MGLIT office and Core Shed 1 in Araçuaí

Interior of MGLIT office and Core Shed 1 in Araçuaí

MGLIT Core Shed 2 in Araçuaí

Interior of MGLIT Core Shed 2 in Araçuaí

MGLIT Core Shed 3 in Araçuaí

Interior of MGLIT Core Shed 3 in Araçuaí

Figure 12-5: MGLIT Core Sheds in Araçuaí

Core box storage—House 2

Core box storage—House 3

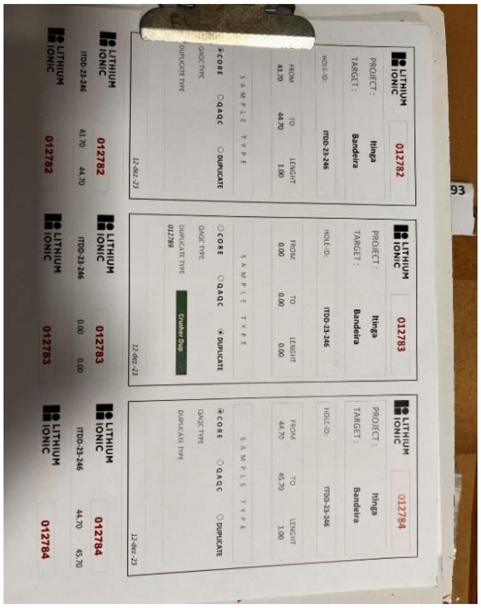
Stored pulverized and crushed samples after return from labs

Stored pulverized and crushed samples after return from labs

Core box storage

Cores sampled and identified to send to labs

Figure 12-6: MGLIT Logs and Sampling Procedures



DDH standardized sample identification

DDH batch of samples ready to be sent to the laboratory

Stock of standards used in QA/QC procedures

Stock of blanks used in QA/QC procedures

Figure 12-7: Lithium QA/QC Standards Stock and Sampling Standards

Density measurement—dry core weight

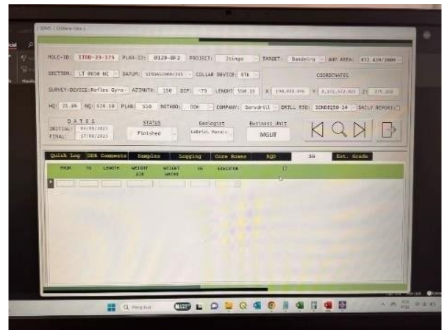
Density measurement—core weight under water

Drill-core saw

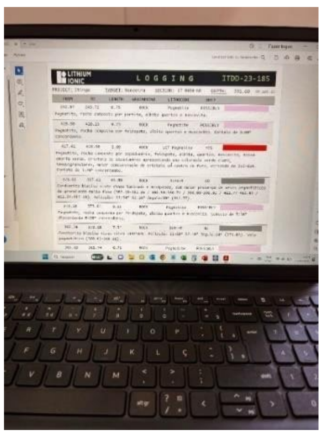
Drill-core saw sediment settling tank

Figure 12-8: MGLIT Density Procedures and Drill Core Cutting Saw

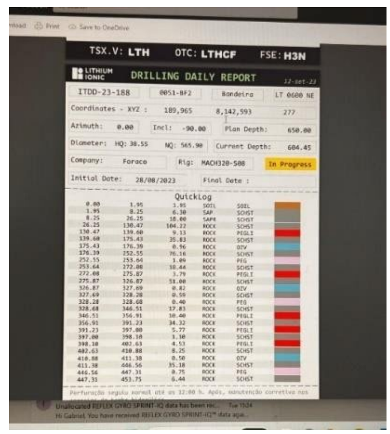
MGLIT's customized database management system for mineral research



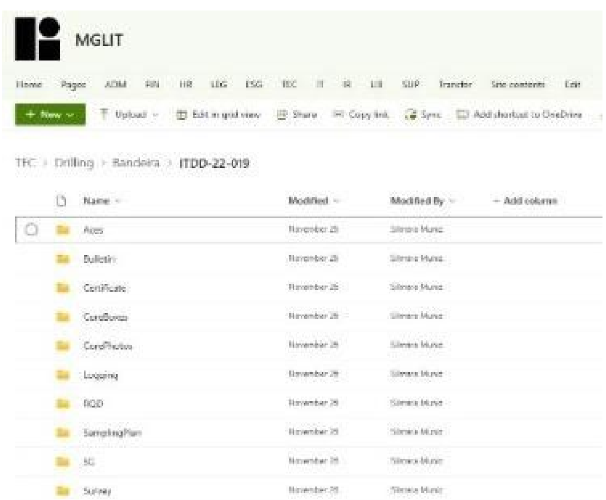
MGLIT's customized database management system for mineral research—registration of collar drilling



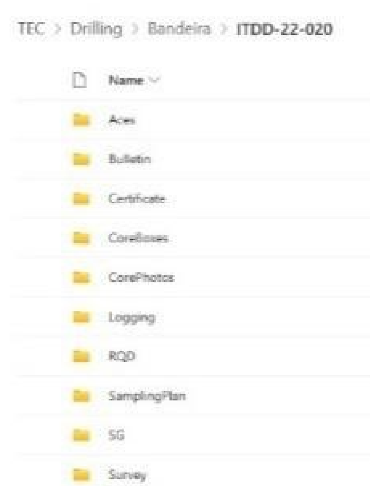
MGLIT's customized database management system for mineral research —registration of the geological log



MGLIT's customized database management system for mineral research —registration of the drilling daily report



MGLIT cloud data center



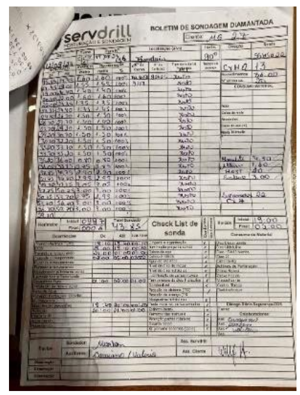
MGLIT cloud data center—DDH folders

Figure 12-9: MGLIT Database System Interface and Cloud Data Center

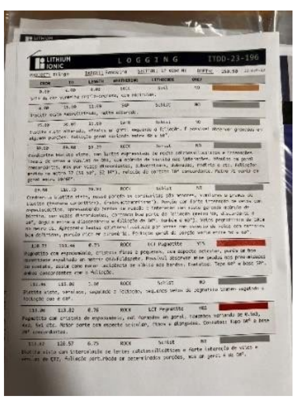
Physical drill-hole file storage

Folders with drill-hole documents

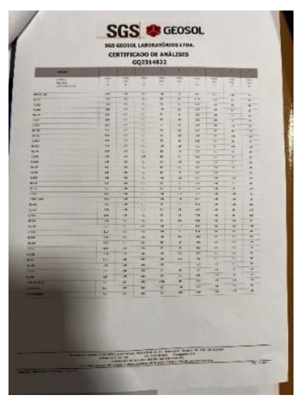
Folder of the DDH ITDD-23-196—with drill-hole documents



Log of the DDH ITDD-23-196—daily drilling bulletin



Log of the DDH ITDD-23-196—geological log



Log of the DDH ITDD-23-196—assay result certificates

Figure 12-10: MGLIT Physical Drill-Hole Files Storage

Core boxes of the modelled mineralized spodumene zone ITDD-23-147—207,80 m depth, detail of the spodumene crystal

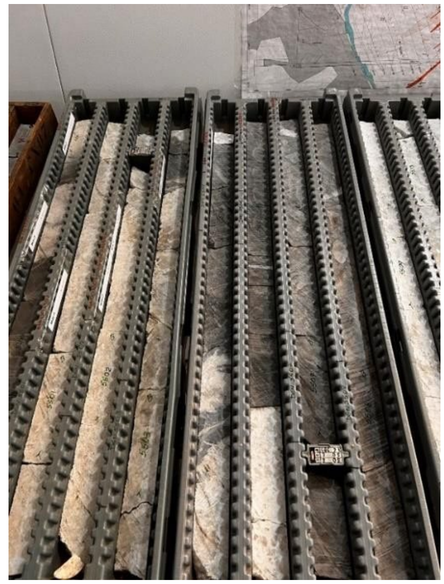
Core boxes of the modelled mineralized spodumene zone ITDD-23-139—305 m depth, detail of the spodumene crystal

Core boxes of the modelled mineralized spodumene zone ITDD-23-162—460,5 m depth, detail of the spodumene crystal

Core boxes of the modelled mineralized spodumene zone ITDD-23-163—146 m depth, detail of the spodumene crystal

Figure 12-11: MGLIT Bandeira Property Spodumene Pegmatite Intercepts

Core boxes of the modelled mineralized spodumene zone ITDD-23-120—109 m to 115 m



Core boxes of the modelled mineralized spodumene zone ITDD-23-091—479 m to 489 m

Core boxes of the modelled mineralized spodumene zone ITDD-23-091—479 m to 489 m samples identification

Core boxes of the modelled mineralized spodumene zone ITDD-23-120—111 m depth, detail of the spodumene crystal

Figure 12-12: MGLIT Bandeira Property Spodumene Pegmatite Intercepts

12.2 Qualified Person's Opinion

The QP believes the exploration data are adequate for the Mineral Resource estimate. Below are some observations recorded during visits as they relate to the generation, collection, control, and storage of on-site exploration data at Araçuaí:

- The site visits included reviewing the QA/QC, field tours of the core shed, drilling in progress, reviewing density procedures, and discussions on the current geological interpretations with MGLIT geologists.
- Drill-hole collars have a physical identification marker. The markers comprise a concrete pad with a metal plate designating the drilling contractor, drill-hole number, drilling area, orientation, coordinate location, start and end date drilled, and total depth. A PVC pipe protruding from the marker provides a physical record of the drill-hole orientation.
- All core boxes are labelled and adequately stored in a core shed. Sample tags were present in the boxes, and it was possible to validate sample numbers and confirm the presence of mineralization in witness half-core samples from the mineralized zone.
- The QP considers drill-hole logging to align with standard industry-practice logging procedures, which MGLIT has standardized. The QPs reviewed logging procedures for randomly selected drill cores and verified the completeness of the logs.
- MGLIT has its database software. Data storage procedures at MGLIT are in line with standard industry practice. As part of the validation process, 12 holes were verified. Database validation was conducted with the Lithium Ionic staff according to standard validation procedures, including a review of collar locations, drill-hole deviations and database check-assay review. The QP found no inconsistencies in the database.
- An extensive database of density information collected during the exploration phase is considered to be in line with standard industry practice.
- The QP checked the Lithium Ionic procedures for sampling management, storage, logging, sample preparation, and assay. They are considered to be within accepted limits and in compliance with mineral-industry practices.
- Rock-type descriptions fit with the checked mineralization style. MGLIT has demonstrated that it understands pegmatite geology.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

The underground mine ore body at Bandeira Project is SRP-type spodumene-rich pegmatites (cf. Pedrosa-Soares et al., 2023), characterized by non-zoned to poorly zoned pegmatites, rich in spodumene crystals (average size 5 cm to 30 cm) disseminated in a matrix composed of albite, quartz, perthitic microcline (i.e., potassium feldspar with exsolved albite lamellae), muscovite, and petalite, totalling over 90% volume, with subordinate amounts (up to 10% volume) of accessory and alteration minerals, such as lithium minerals (cookeite, montebrasite, triphylite, and zabuyelite), apatite, niobium–tin–tantalum and iron–manganese oxides, graphite, and clay minerals (kaolinite and montmorillonite).

The mineral processing and metallurgical testing are comprehensive, encompassing chemical and mineralogical analyses, physical tests for hardness, particle size distribution in crushing assays, abrasiveness, and spodumene concentration tests. These tests are specifically designed to understand spodumene's behaviour when subjected to simulations of the industrial process of ore mineral concentration. This information is indispensable for devising an efficient and cost-effective processing method.

13.1 Ore Mineralogical Characterization

The lithium minerals present in the Bandeira Deposit pegmatites are meticulously characterized visually through systematic logging of drilling cores and the selection of samples from core intervals. Following macroscopic determination, samples are described in more detail after examining polished thin sections under an optical microscope. Macroscopic and microscopic observations are accompanied by a modal evaluation (in vol%) of spodumene relative to other matrix contents, particularly those that may significantly interfere with ore processing. This approach allows relevant information to be gathered, providing a foundation for further analysis and decision-making. In addition to the lithium minerals listed in Table 13-1, the spodumene ore from the Bandeira Deposit contains the gangue minerals albite, quartz, perthitic potassium feldspar, and muscovite.

Other accessory minerals besides those listed in Table 13-1, typically present in amounts less than 1% volume, including apatite, beryl, cassiterite, columbite-tantalite (including iron-columbite determined by scanning electron microscopy (SEM)–energy-dispersive X-ray spectroscopy (EDS)), and graphite.

Table 13-1: Lithium Minerals Identified at Bandeira Deposit

Mineral	Formula	Specific Density (g/cm^3)	Hardness Mohs	Li_2O %weight	Li_2O[1] %weight
Montebrasite	$LiAl(PO_4)(OH)$	3.0–3.1	5.5–6.0	10.21	9.0
Cookeite	$(Al, Li)_3Al_2(Si, Al)_4O10(OH)_8$	2.6–2.7	2.5 –3.5	2.86	2.5
Elbaíte	$Na(Li,Al)_3Al_6(BO_3)_3Si_6O_{18}(OH)_4$	2.9–3.1	7.5	4.07	4.0
Spodumene	$LiAlSi_2O_6$	3.1–3.2	6.5–7.0	8.03	7.4
Spodumene Partially Altered	-	<3.1	<6.5	-	<7.4
Lepidolite (Polilitionite–Trilitionite)	$KLi_2\ Al(Si_4\ O_{10}\ )(F, OH_2)$ $K(Li_{1.5}\ \ Al_{1.5})(AlSi_3\ O_{10})(F,OH_2)$	2.8–2.9	2.5–3.5	6.46–7.70	7.1

Mineral	Formula	Specific Density (g/cm^3)	Hardness Mohs	Li_2O %weight	Li_2O[1] %weight
Litiofilite–Trifilite	$LiMn(PO_4)–LiFe(PO_4)$	3.4–3.6	4	9.53–9.47	9.0
Petalite (Cristal)	$LiAlSi_4O_{10}$	2.4	6.5	4.90	4.7
Petalite Altered (*Mass*)	-	<2.4	<6.5	<4.90	3.0
Zabuyelite	Li_2CO_3	2.09	3	40.44	40.0

Source: www.mindat.org; Pöllmann & König (2021).
Note: [1] Actual lithium oxide grade is usually determined.

The mineralogical characterization of the Bandeira ore was conducted using X-ray diffraction (XRD) analysis with a Bruker-AXS D8 Advance ECO instrument, using CuKα radiation (40 kV/25 mA) with a nickel filter, a step size of 0.02° 2ϴ, and an accumulated counting time of 192 seconds per step, with a position-sensitive linear detector of the silicon drift type, LynxEye XE, collected from 5° to 105° 2ϴ in θ-2θ geometry on the goniometer. Quantitative analysis was calculated using the total multi-phase spectrum refinement method (Rietveld method), by fundamental parameters, with Bruker-AXS Diffract Topas software, Version 6.

The average mineralogical analysis is presented in Table 13-2.

Table 13-2: Average Mineralogical Composition for Seven Metallurgical Drill Holes (X-Ray Diffraction, RietveldMethod)

Mineral	%Weight
Albite	31.70
Quartz	26.50
Microcline	15.00
Spodumene	14.30
Moscovite	6.10
Montebrasite	3.30
Petalite	1.10
Others (Polilitionite, Elbaíte,Cookeite, and Pyrite)	2.00

Thin section microscopy and visual modal analyses also revealed some accessory minerals with total contents of less than 1% in volume: sphalerite, blue tourmaline, beryl, cassiterite, columbite/tantalite, iron columbite, lithiophilite/triphylite, apatite, zabuyelite, and graphite.

13.2 Ore Chemical Analysis

The average chemical analyses for the Bandeira Deposit, considering samples from drill holes used for metallurgical tests and the mean values from the geological exploration database (7,516 chemical analysis, cut-off grade of Li_2O >0.5%), are presented in Table 13-3.

Table 13-3: Average Chemical Composition for Seven Metallurgical Drill Holes

Metal Oxides	Metallurgical Drill Holes	Geological Database
Li_2O (% weight)	1.40	1.37

Metal Oxides	Metallurgical Drill Holes	Geological Database
Fe_2O_3 (% weight)	0.69	0.70
Al_2O_3 (% weight)	15.40	14.40
K_2O (% weight)	2.30	2.58
P_2O_5 (% weight)	0.87	0.85
CaO (% weight)	0.41	0.45
SnO_2 (ppm)	437.00	280.00
Ta_2O_5 (ppm)	82.00	80.00
Nb_2O_5 (ppm)	160.00	130.00

13.3 Metallurgical Testing

SGS Geosol conducted preliminary metallurgical tests using heavy liquid separation (HLS). TOMRA carried out ore-sorting tests in Germany and at Steinert in Brazil. Ore variability testwork campaigns were developed at research centers and laboratories such as SGS Geosol, SGS Chile, Centro de Tecnologia Mineral (CETEM), and Metso Outotec. These tests were aimed at understanding the behaviour of the ore under different processing conditions, which is crucial for optimizing the processing method and ensuring the production of high-quality lithium concentrate

13.3.1 Preliminary Heavy Liquid Separation Test at SGS Geosol

Samples from drill holes ITDD-22-001, -002, and -007 were combined to generate a composite and sent to SGS Geosol. Before the HLS test, the composite sample was prepared according to the procedure shown in Figure 13-1, to proceed with the HLS test. This test aims to evaluate the performance of dense media separation in obtaining lithium concentrate for the Bandeira Project, according to market specifications, by varying the dense media's particle size distribution and density.

A 20 kg sample was dried and crushed in a jaw crusher with openings of 31.5 mm, 25.4 mm, and 12.7 mm to obtain material with 100% passing (P_{100}) 12.7 mm. After this, particle size analysis was conducted using a sequence of 12.7 mm, 6.3 mm, 1.7 mm, and 0.5 mm sieves. For each size fraction, a representative sample was collected for chemical analysis. HLS tests were conducted at 3.0 g/cm³, 2.9 g/cm³, 2.8 g/cm³, and 2.7 g/cm³ densities for the size fractions −12.7+6.3 mm, −6.3+1.7 mm, and −1.7+0.5 mm.

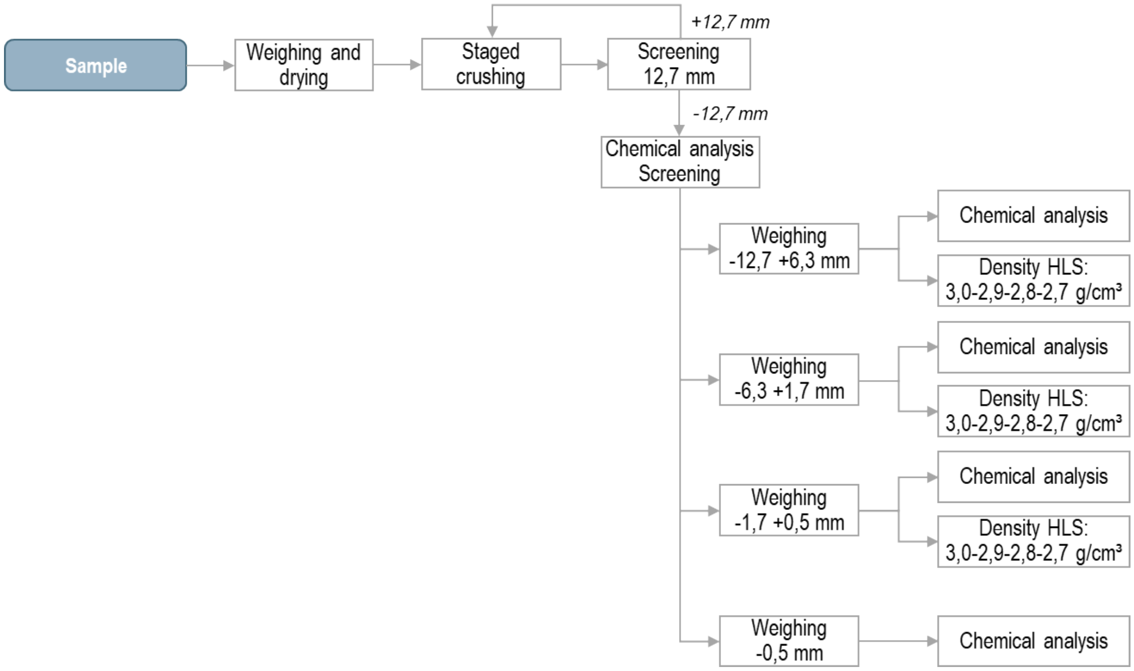
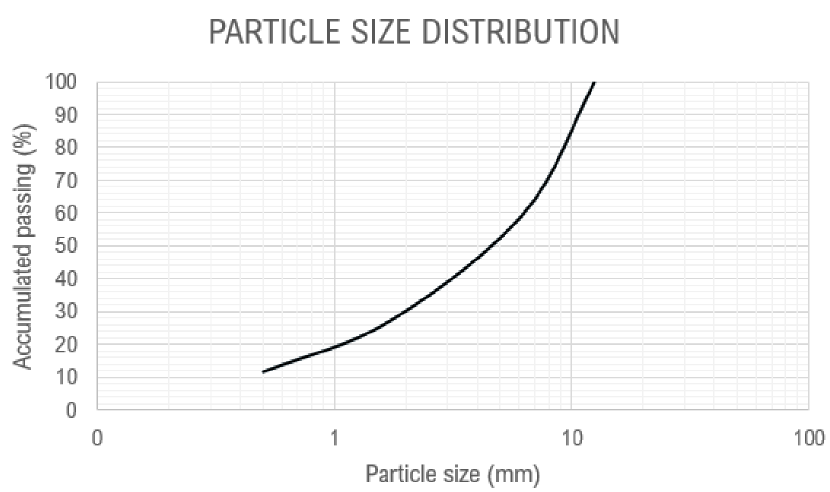


Figure 13-1: Bandeira Composite Sample Preparation Procedure

The particle-size distribution of the P_{100} 12.7 mm material is presented in Figure 13-2. Approximately 12% of the mass does not have a suitable particle size for the dense-media separation stage, meaning it is smaller than 0.5 mm. However, the Bandeira Project sees this as an opportunity for future study and potential improvement—that is, concentrating the −0.5 mm fraction using gravity equipment or flotation.



Range	Retained (%)
-12.5 +6.3 mm	39.97
-6.3 +1.7 mm	33.04
-1.7 +0.5 mm	15.36
-0.5 mm	11.63

Figure 13-2: Product Size Distribution After Crushing to P_{100} 12.7 mm

Chemical analysis identified the predominance of aluminum oxide (17.10%), potassium oxide (2.39%), and lithium oxide (1.63%) (Figure 13-3). The presence of aluminum can be mainly attributed to albite, K-feldspar, and spodumene. Potassium is predominant in K-feldspar, while lithium is predominant in spodumene. With respect to iron oxide, which is the primary contaminant for market specifications, the concentration in the ore is 0.23%. The mineral origin of iron is mainly schists (biotite). In addition to the presence of iron, there is concern regarding schist density, which can vary between 2.40 g/cm³ and 3.05 g/cm³, similar to the cut-off density used for dense-media separation commonly employed for spodumene concentration, considering the density of the mineral of interest varies between 3.15 g/cm³ and 3.20 g/cm³ (Peixoto et al., 2016).

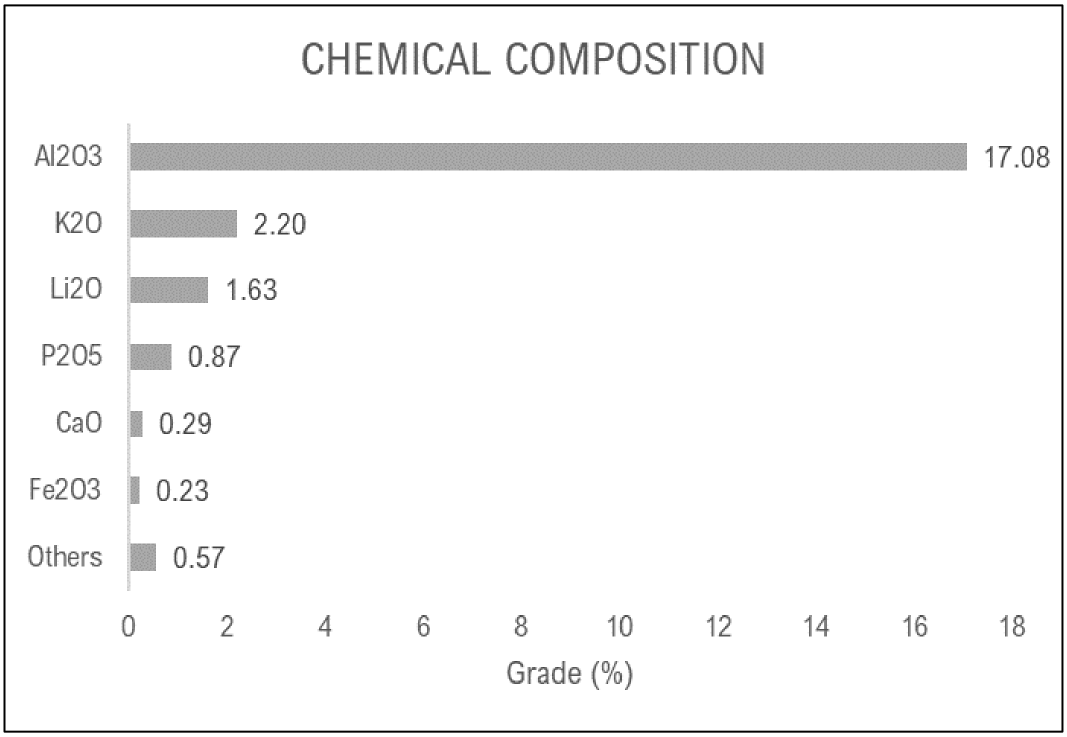


Figure 13-3: Bandeira Composite Sample Chemical Analysis

The heavy liquid separation tests were conducted for each particle size fraction: −12.7 +6.3 mm, −6.3 +1.7 mm, and −1.7 +0.5 mm—using organic liquid to evaluate the optimal density to achieve the market specification of lithium concentrate (i.e., a minimum of 5.5% Li_2O and a maximum of 1% Fe_2O_3). The densities evaluated were 2.7 g/cm³, 2.8 g/cm³, 2.9 g/cm³, and 3.0 g/cm³, for which solutions with different proportions of methylene iodide (3.29 g/cm³) and acetone (0.79 g/cm³) were prepared.

The tests for the particle size fractions of −12.7 +6.3 mm and −6.3 +1.7 mm were conducted in beakers, while the test for the finer particle size fraction (−1.7 +0.5 mm) was carried out using a separating funnel. The test involves mixing the ore and the dense-media solution in the reactor (beaker or separating funnel) and waiting for separation. Afterward, the sunken material, the dense media, and the floated material are collected separately. Densities were evaluated sequentially as shown in Figure 13-4, and for each stage, chemical composition and mass partition were assessed.

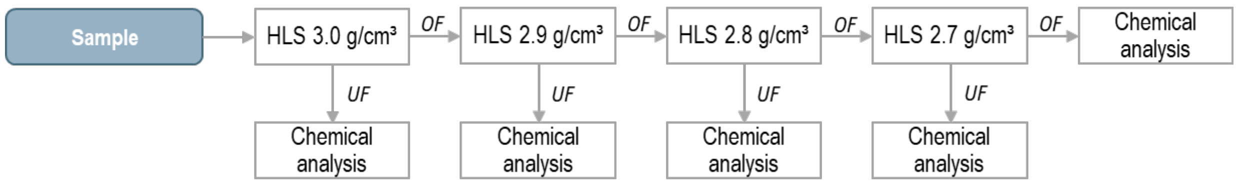


Figure 13-4: HLS Test Flowsheet

Figure 13-5 presents the cumulative content of lithium oxide and ferric oxide for each density of the three particle size fractions evaluated. The content was calculated based on the individual content of each sample and the mass partition.

It can be noted that the cut-off density increases with particle size. For finer particles, obtaining a concentrate meeting the specification is possible using a cut-off density of 2.7 g/cm^3. However, for the intermediate particle size range, the cut-off should be performed at 2.8 g/cm^3, and for the coarser material, at 2.9 g/cm^3.

The lithium oxide content in the floated material for the coarser particles is approximately three times higher than that in the floated material for the finer particles. This indicates lower liberation of spodumene in the coarser particle size range.

Regarding iron oxide, it was found that the maximum content limit was met for all tested densities.

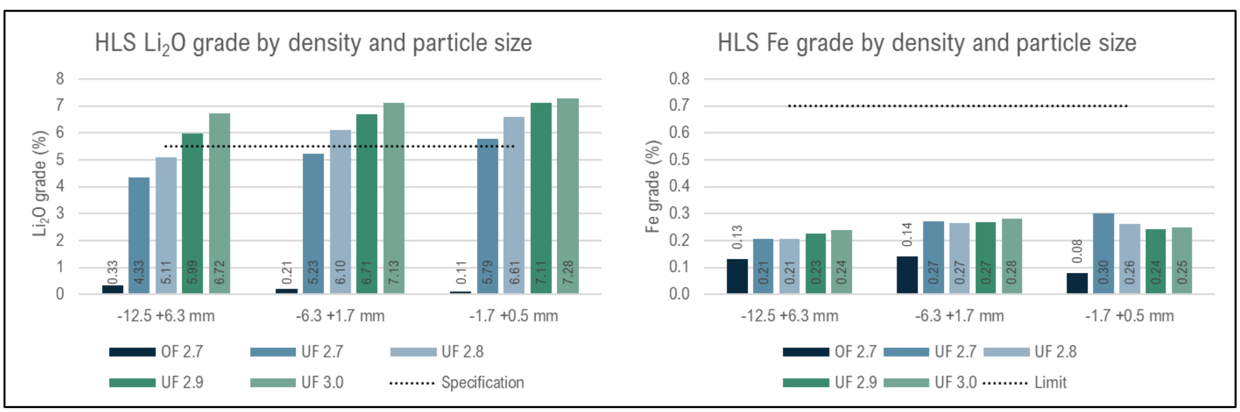


Figure 13-5: Li_2O and Fe Chemical Analysis Results for each HLS Step

The recovery results by particle-size range and the overall recovery of the HLS are presented in Figure 13-6, along with the lithium oxide content in the concentrate. For the particle size range −12.7 +6.3 mm, the cut density was 2.84 g/cm³, representing a recovery of 70.5%. These values were obtained by interpolation. The density of the −6.3 +0.5 mm range was 2.71 g/cm³, and the recovery was 90.1%. However, the HLS recovery was 74.8% taking into account the loss of fines (i.e., fractions smaller than 0.5 mm) representing 12% of the mass and 11% of the lithium.

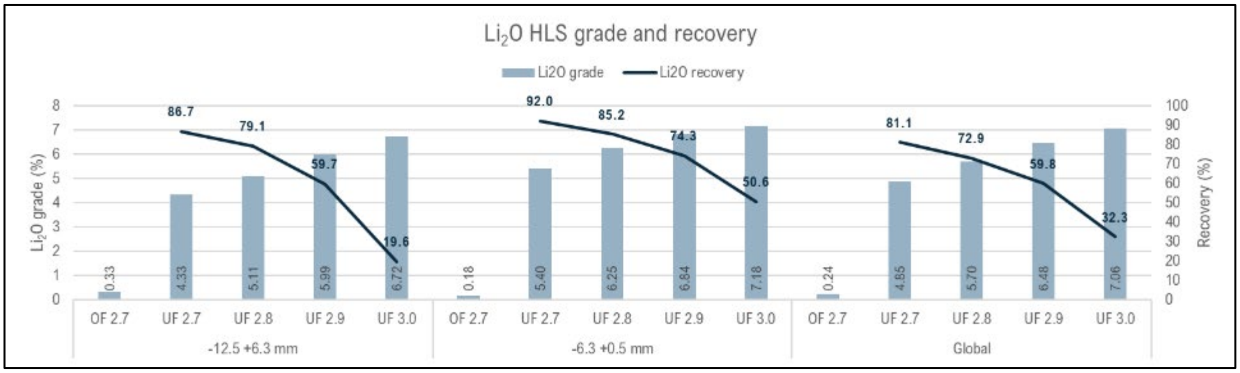


Figure 13-6: ***Li_2O Recovery and Grade per HLS Step***

13.3.2 Vendor Tests

Testwork conducted by vendors comprises:

- Ore sorter
- Bond crushing (impact) work index (CWi)
- Crushing equipment to determine Bond ball mill work index (BWi), ore abrasiveness, and equipment working capacity.

13.3.3 Ore Sorter at TOMRA

A composite sample from six drill holes (ITDD-22-013, -015, -029, -032, -035, and 036) with lithium oxide content ranging from 1.31% to 1.52% was sent to TOMRA in Germany to evaluate the applicability of the ore sorter in the pre-concentration stage. The material was crushed to achieve P_{100} 31.5 mm and separated into three particle size ranges (−31.5 +19.1 mm, −19.1 +9.5 mm, and −9.5 mm). Tests were conducted on two particle size ranges, −31.5 +19.1 mm and −19.1 +9.5 mm, while the −9.5 mm material was weighed, and its content determined to complete the mass and metal content balance of the test. A preliminary sample analysis indicated the use of an X-ray transmission (XRT) sensor for conducting the test.

The XRT sensor is based on the atomic density of the material, where higher transmitted X-ray-intensity corresponds to lower absorption and lower atomic density. Electromagnetic radiation, between 90 keV and 200 keV, is directed onto the sample, and the transmitted radiation is detected and converted into an electrical signal to generate a grayscale image pixel by pixel. Hence, a lighter shade indicates lower absorption and, thus, lower atomic density. Two sensors are used to distinguish thickness and atomic density, with each sensor acquiring a different energy band (Veras, 2018; Wotruba & Harbeck, 2012).

The ore sorter tests were conducted using the principle of cascade classification (Figure 13-7). The sample was fed via a vibratory feeder onto a conveyor belt and analyzed by a DUOLINE X-ray sensor. The initial configuration of the equipment was programmed to eliminate all particles with at least 30% high atomic-density. Subsequently, the previously classified low-density material was reclassified, removing all particles with at least 80% of high and medium atomic-density. Lastly, the particles not rejected in the intermediate stage underwent further classification, where particles with at least 50%

of high- and medium-density were eliminated, while those with low atomic-density pixels were retained, constituting the ore sorter concentrate.

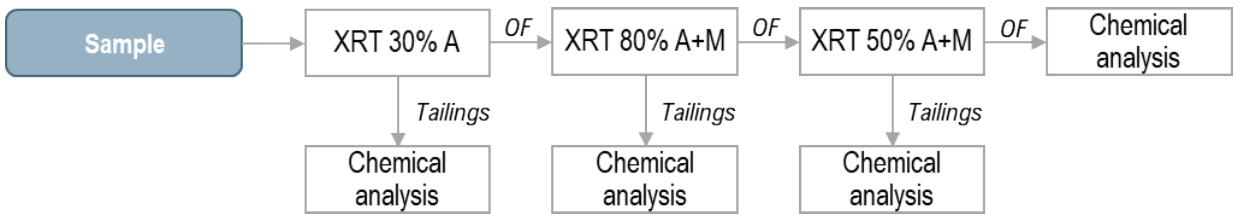


Figure 13-7: Ore Sorter Test Procedure Using XRT Sensor

The results obtained for the particle-size range of −31.5 +19.1 mm and −19.1 +9.5 mm are presented in Table 13-4 and Table 13-5, respectively. The fraction −9.5 mm accounted for 16.9% of the mass, which will be sent to the dense-medium concentration stage. From the results, it is possible to observe that with the decrease in the ore sorter's average atomic density cut-off, the concentrate grade increases, and the metallurgical recovery decreases for both particle size ranges. Therefore, Configuration 2 was selected as the most promising, as it could enrich the feed grade by 25% to 26%, recovering 91% to 94% of the lithium.

Table 13-4: Ore Sorter Results for the −31.5 +19.1 mm Size Fraction

Configuration	Mass Reduction (%)	Conc. Li_2O Grade (%)	Reject Li_2O Grade (%)	Li_2O Recovery (%)	Enrichment (%)
1	17.15	1.46	0.23	96.85	17
2	24.81	1.56	0.30	93.97	25
3	48.43	1.74	0.73	71.69	39

Table 13-5: Ore Sorter Results for the −19.1 + 9.5 mm Size Fraction

Configuration	Mass Reduction (%)	Conc. Li_2O Grade (%)	Reject Li_2O Grade (%)	Li_2O Recovery (%)	Enrichment (%)
1	16.49	1.52	0.29	96.37	16
2	26.86	1.65	0.43	91.26	26
3	55.01	1.95	0.80	66.51	50

Subsequently, tests were conducted at TOMRA to evaluate the effect of dilution with shale on the equipment's performance. For this purpose, two drill holes were selected, ITDD-22-054 and ITDD-22-098, with 10% dilution at the intersection with the pegmatite. The samples were crushed to achieve P_{100} 31.5 mm and separated into four particle size ranges (−31.5 +19.1 mm, −19.1 +9.5 mm, −9.5 mm +0.85 mm, and −0.85 mm). Tests were conducted for two particle-size ranges, −31.5 +19.1 mm and −19.1 +9.5 mm, while the material from the other size ranges was weighed, and its content was determined to complete the metallurgical balance.

The tests used the same cascade classification principle previously applied (Figure 13-7). Table 13-6 and Table 13-7 present the results of the ore sorter test for the particle size range −19.1 +9.5 mm for the two drill holes. It is possible to observe that the results obtained for both samples were similar and indicate that Configuration 1 is the most suitable. This is because, in this set-up, enrichment between 19% and 20% was achieved with 94% to 96% recovery.

Table 13-6: Ore Sorter Results for the −19.1 + 9.5 mm Size Fraction (ITDD-22-054)

Configuration	Mass Reduction (%)	Conc. Li_2O Grade (%)	Reject Li_2O Grade (%)	Li_2O Recovery (%)	Enrichment (%)
1	20.81	1.77	0.43	94.00	19
2	27.15	1.83	0.56	89.83	23
3	50.68	2.29	0.70	76.09	54

Table 13-7: Ore Sorter Results for the Size Fraction of −19.1 +9.5 mm (ITDD-22-098)

Configuration	Mass Reduction (%)	Conc. Li_2O Grade (%)	Reject Li_2OGrade (%)	Li_2O Recovery (%)	Enrichment (%)
1	19.90	1.61	0.26	96.19	20
2	30.89	1.72	0.48	88.94	29
3	54.45	1.98	0.80	67.28	48

The results for the particle-size range −31.5 +19.1 mm are presented in Table 13-8 and Table 13-9 for drill holes ITDD-22-054 and ITDD-22-098, respectively. There were discrepancies in the results between the two samples for the coarse particle size range despite the difference in lithium oxide content in the test feed being less than 5% (1.31% for ITDD-22-054 and 1.26% for ITDD-22-098). Since a) no significant variation was observed in the results of the tests with and without dilution for the particle size range of −19.1 +9.5 mm, and b) no relevant effect of particle size on the undiluted test was observed, the result of drill hole ITDD-22-054 for coarse particle size was not considered in the ore sorter application analysis, as it differs from the other results obtained. Therefore, the second configuration is the most interesting, as it recovered almost 93% of lithium, with an enrichment of 17%.

Table 13-8: Ore Sorter Results for the −31.5 +19.1 mm Size Fraction (ITDD-22-054)

Configuration	Mass Reduction (%)	Conc. Li_2O Grade (%)	Reject Li_2OGrade (%)	Li_2O Recovery (%)	Enrichment (%)
1	21.35	1.47	0.74	87.97	12
2	30.63	1.62	0.62	85.54	23
3	48.03	1.93	0.65	76.32	47

Table 13-9: Ore Sorter Results for the −31.5 +19 mm Size Fraction (ITDD-22-098)

Configuration	Mass Reduction (%)	Conc. Li_2O Grade (%)	Reject Li_2OGrade (%)	Li_2O Recovery (%)	Enrichment (%)
1	14.90	1.39	0.49	94.17	11
2	20.71	1.47	0.43	92.84	17
3	42.17	1.70	0.65	78.24	35

SGS Chile—Crushability Work Index

The Bond low-energy impact test was conducted at SGS Chile to determine the CWi, a factor indicating the power required for crushing. For the assay, 20 pieces cut to a thickness of 51 mm were sent. Each specimen was subjected to the impact of two hammers mounted on a pendulum. The test was repeated, increasing the pendulum angle and, therefore, increasing the impact until the sample fractured. CWi results vary from 4.1 kWh/t to 10.2 kWh/t. The average result was 7.0 kWh/t, characterizing a medium CWi. Table 13-10 and Table 13-11 give the results obtained for this test.

Table 13-10: Average CWi Results for the Bond Low-Energy Impact Tests

Specimen No	Impact Energy (Joules)	Work Index (kWh/t)
1	14.9	5.9
2	10.4	4.1
3	14.9	5.9
4	10.4	4.1
5	14.9	5.9
6	26	10.2
7	26	10.2
8	20.1	7.9
9	10.4	4.1
10	26	10.2
11	10.4	4.1
12	14.9	5.9
13	26	10.2
14	26	10.2
15	20.1	7.9
16	14.9	5.9
17	14.9	5.9
18	20.1	7.9
19	20.1	7.9
20	14.9	5.9

Table 13-11: Bond Low-Energy Impact Testwork Statistics

Parameter	kWh/t
Maximum Impact Work Index	10.2
Minimum Impact Work Index	4.1
Average Impact Work Index	7
Standard Deviation	2.3

The specific gravity of the specimens was 2.68 g/cm^3.

Metso Outotec Crushability Tests

Metso Outotec performed crushability tests to define crushing size with three composite samples of a minimum of 50 kg. The material was classified as abrasive and very easy to crush (Table 13-12). In general, the results did not vary between the composite samples.

Table 13-12: Crushability Tests Results

	Composite 1	Composite 2	Composite 3
Samples	ITDD-22-023T/030T and ITDD-23-083T	ITDD-22-048T	ITDD-23-093T/087T
Abrasion Index(Bond)	Average (0.295 g)	Average (0.300 g)	Average (0.212 g)
Abrasion Index(Macon)	Abrasive (1,698 g/t)	Abrasive (1,602 g/t)	Abrasive (1,600 g/t)
Crushability(Macon)	69.0 % (very easy)	68.8% (very easy)	79.0 % (very easy)
Work index (Bond)	Average (12.25 kWh/st)	Average (11.35 kWh/st)	Average (10.50 kWh/st)
Bulk Density	1.56 t/m³	1.61 t/m³	1.60 t/m³
Specific Gravity	2.66 t/m³	2.71 t/m³	2.70 t/m³
Jaw CrusherCrushability	Crusher 75 x 50 mm - Smooth Jaw Plates. CSS=4.5 mm - Load Cell on Toggle	Crusher 75 x 50 mm - Smooth Jaw Plates. CSS=4.5 mm - Load Cell on Toggle	Crusher 75 x 5 0 mm - Smooth Jaw Plates. CSS=4.5 mm - Load Cell on Toggle
Volumetric Capacity Index	Standard methods (107.84%)	Standard methods (107.40%)	Maximum value (116.47%)
Strength Index	Smallest leaflet setting (96.21%)	Smallest leaflet setting (106.96%)	Minimum setting reduced 20% (88.57%)
Product FlakinessIndex	Cubical material (13.29 %)	Cubical material (5.45%)	Cubical material (4.91%)

13.3.4 Ore Variability

A variability study was conducted to understand the geological and metallurgical ore variability. First, seven drill holes without schists were selected for use in evaluating the HLS performance for different samples and one for determine crushability work index (Phase 1). Then, fifteen new samples from eleven drill holes were selected to evaluate the ore sorter and HLS performance in other areas and depths with schist dilution (Phase 2).

Chemical and Mineralogical Characterization for the Seven Drill Holes

The seven metallurgical drill holes were prepared for chemical and mineralogical analysis (Table 13-13 and Table 13-14). In addition, two composite samples were prepared to evaluate the combined behaviour of the samples.

Table 13-13: Chemical Analysis for the Seven Drill Holes and Two Composites

	Al (%)	Be (ppm)	Ca (%)	Cr (ppm)	Fe_2O_3 (%)	K_2O (%)	Li_2O (%)	Nb (ppm)	P (%)	Sn (ppm)	Ta (ppm)
ITDD-22-048T	8.1	170	0.18	864	0.83	2.34	1.14	175	0.28	275	99
ITDD-23-093T	8.58	155	0.22	102	0.57	2.02	1.12	84	0.24	348	45
ITDD-23-087T	7.86	188	0.12	37	0.70	1.98	1.78	90	0.25	353	61
ITDD-22-023T	8.09	142	0.23	31	0.56	2.34	1.59	106	0.39	174	46
ITDD-22-002T	8.04	193	0.9	1008	0.76	2.82	1.21	127	0.49	299	72
ITDD-23-083T	8.7	138	0.3	144	0.56	2.39	1.62	110	0.37	293	112
ITDD-22-030T	7.95	297	<0.1	19	0.74	2.37	1.46	109	0.63	644	49
COMPOSITE1	7.89	175	0.32	14	0.83	2.18	1.26	92	0.38	365	54
COMPOSITE2	8.23	148	0.38	18	0.84	2.16	1.58	99	0.47	268	44

Table 13-14: Mineralogical Analysis by DRX (Rietveld) for the Seven Drill Holes (Wt%)

	Albite	Chlorite	Elbaite	Microcline	Montebrasite	Muscovite	Petalite	Polylithionite	Pyrite	Quartz	Spodumene
ITDD-22-002	32.5	0.3	1.1	20.8	5.1	4.0	1.2	0.2	0.1	23.3	11.4
ITDD-22-023	32.1	0.3	0.9	16.1	1.9	4.2	1.2	0.4	0.0	25.6	17.2
ITDD-22-030	25.2	1.1	1.3	15.7	3.1	7.0	1.1	0.4	0.,0	34.3	10.7
ITDD-22-048	32.8	0.3	0.3	12.8	3.3	8.4	1.3	0.6	0.1	27.8	12.2
ITDD-23-083	35.6	0.4	0.7	16.1	3.6	3.7	1.6	1.8	0.1	19.3	17.2
ITDD-23-087	28.9	0.4	0.4	12.4	2.2	6.4	0.7	0.4	0.0	28.2	20.0
ITDD-23-093	34.5	0.6	0.7	11.4	3.8	9.2	0.9	0.4	0.1	26.8	11.6

Undiluted Samples—Heavy Liquid Separation Tests

Figure 13-8 shows the location of the selected eight drill holes, those with a maximum 100 m depth and minimum 5 m interception, except ITDD-23-134T, which was used only for the Bond Low-Energy Impact Test. A total of 906 kg was sent to SGS Geosol to be prepared, which includes crushing, screening, and sampling. The HLS was performed in duplicate at two particle size ranges −12.7 +6.3 mm and −6.3 +0.85 mm for three densities 2.8 g/cm³, 2.7 g/cm³ and 2.4 g/cm³, simulating a rougher–scavenger circuit and a polishing step for petalite recovery.

HLS rougher-scavenger results are presented in Table 13-15 and Figure 13-16 for each particle size range. The 2.4 g/cm³ step did not present significative mass for all samples, which indicates a minor presence of petalite. In general, rougher concentrate presented a lithium oxide grade above 5.5% with an average global recovery of 84% for the coarse and 89% for the medium fraction.

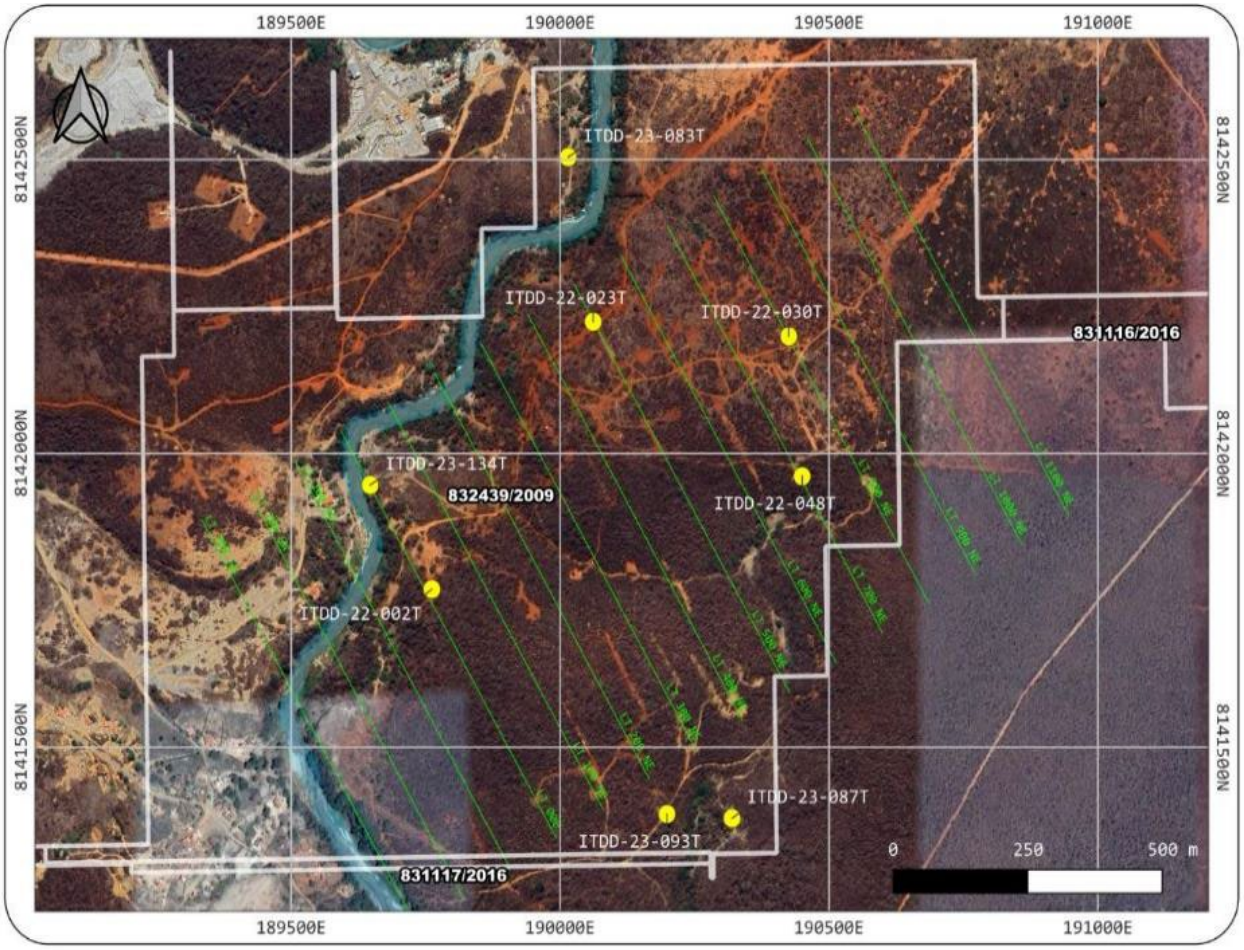


Figure 13-8: Variability Study Drill Holes

Table 13-15: HLS Results for Coarse Fraction (−12.7 +6.35 mm)

Drill Hole	Li_2O Feed Grade (%)			Li_2O Float Grade (%)			Li_2O Sink Grade (%)			Li_2O HLS Recovery (%)		
	T1	T2	$\bar{x}$	T1	T2	$\bar{x}$	T1	T2	$\bar{x}$	T1	T2	$\bar{x}$
ITDD-22-002T	1.10	1.40	1.25	0.33	0.26	0.29	4.18	3.95	4.06	76.80	88.18	82.50
ITDD-22-023T	1.60	1.48	1.54	0.22	0.23	0.23	5.82	5.55	5.68	89.90	89.30	89.61
ITDD-22-030T	0.83	1.63	1.23	0.38	0.35	0.36	7.13	7.65	7.39	60.40	84.49	72.42
ITDD-22-048T	1.26	0.95	1.10	0.26	0.28	0.27	5.40	5.43	5.41	86.20	78.00	82.08
ITDD-23-083T	1.61	2.14	1.88	0.10	0.14	0.12	6.76	6.33	6.55	95.30	95.93	95.61
ITDD-23-087T	1.53	2.12	1.83	0.38	0.21	0.30	4.96	5.57	5.27	83.20	94.43	88.81
ITDD-23-093T	0.60	0.59	0.60	0.19	0.13	0.16	6.75	6.15	6.45	72.30	81.80	77.06
Composite 1	1.40	-	-	0.27	-	-	4.52	-	-	87.20	-	-
Composite 2	1.33	-	-	0.29	-	-	5.50	-	-	84.40	-	-

Table 13-16: HLS Results for Fine Fraction (−6.35 +0.85 mm)

Drill Hole	Li_2O Feed Grade (%)			Li_2O Float Grade(%)			Li_2O Sink Grade(%)			Li_2O HLS Recovery (%)		
	T1	T2	$\bar{x}$	T1	T2	$\bar{x}$	T1	T2	$\bar{x}$	T1	T2	$\bar{x}$
ITDD-22-002T	1.14	1.07	1.10	0.17	0.17	0.17	5.59	4.98	5.29	88.32	87.71	88.01
ITDD-22-023T	1.59	1.33	1.46	0.22	0.17	0.19	6.75	6.01	6.38	89.57	90.25	89.91
ITDD-22-030T	1.44	1.36	1.40	0.31	0.27	0.29	7.37	6.56	6.96	82.64	84.37	83.51
ITDD-22-048T	0.96	1.00	0.98	0.18	0.13	0.16	6.25	6.83	6.54	85.33	89.91	87.62
ITDD-23-083T	1.45	1.48	1.46	0.12	0.12	0.12	7.15	7.25	7.20	93.48	93.89	93.69
ITDD-23-087T	1.51	1.58	1.54	0.19	0.21	0.20	6.55	6.37	6.46	91.25	90.26	90.76
ITDD-23-093T	1.04	1.19	1.12	0.16	0.15	0.15	6.99	6.74	6.87	87.67	90.48	89.08
Composite 1	1.34	-	-	0.19	-	-	6.74	-	-	89.1	-	-
Composite 2	1.42	-	-	0.18	-	-	6.54	-	-	90.8	-	-

Composite samples were tested to evaluate the combined behaviour of seven drill holes. The composite results fit the polynomial adjustment (Figure 13-9 and Figure 13-10).

The metallurgical recovery polynomial adjustment adherence with the composite results is shown Figure 13-11 with an $R^2 = 0.89$.

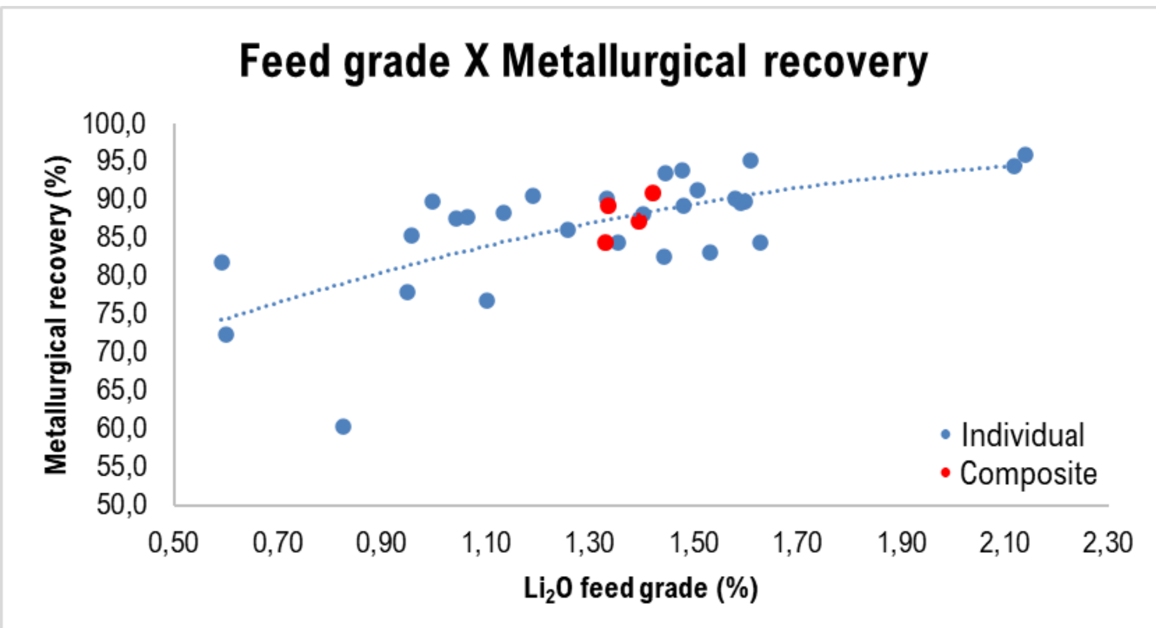


Figure 13-9: HLS Metallurgical Recovery as a Function of Feed Grade

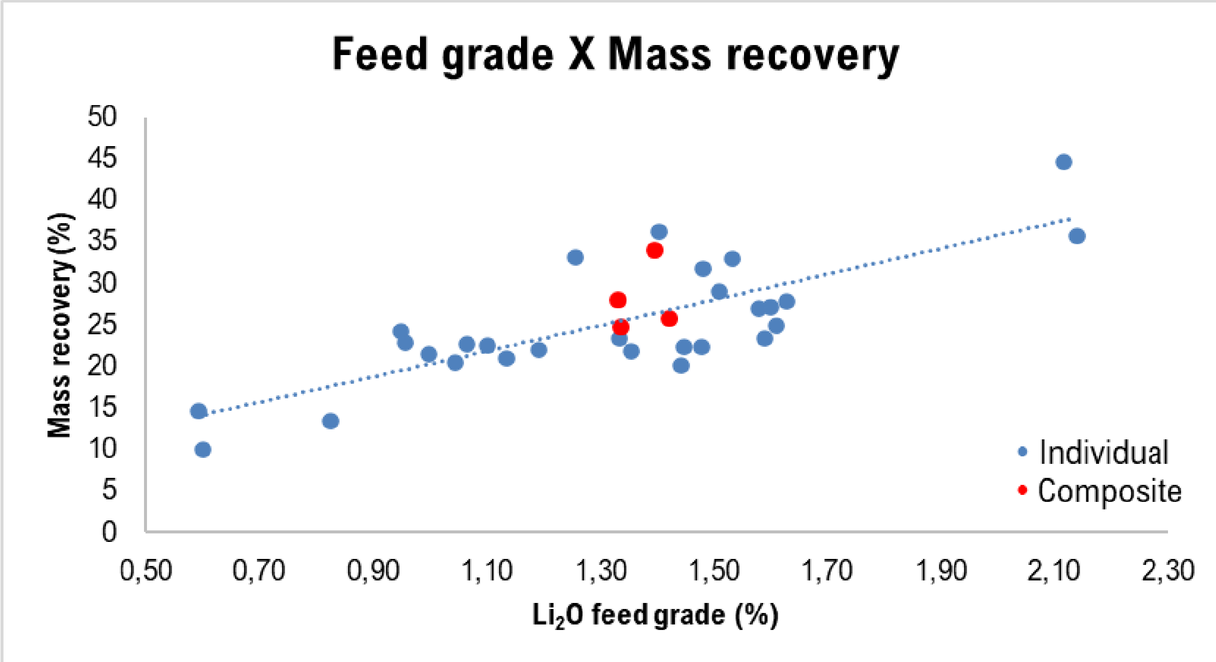


Figure 13-10: HLS Mass Recovery as a Function of Feed Grade

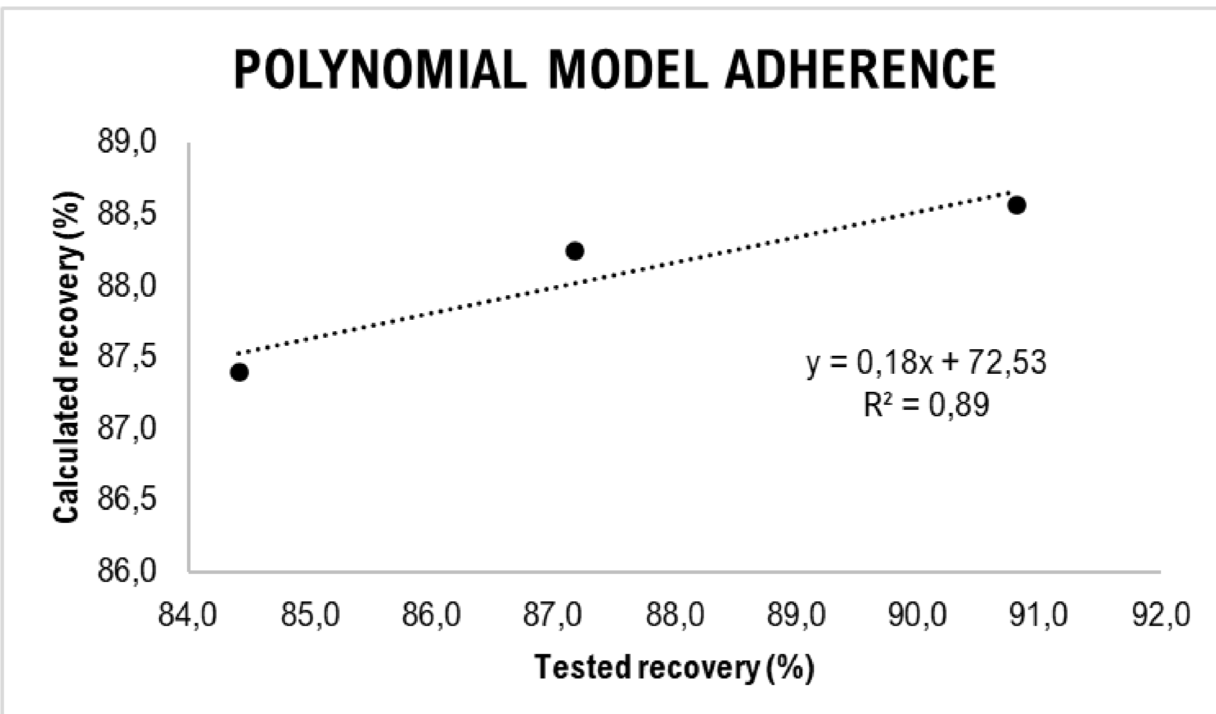


Figure 13-11: Metallurgical Polynomial Model Adherence

All HLS samples were analyzed using X-ray diffraction to understand the mineralogical behaviour of HLS. The main lithium-bearing minerals found were spodumene, montebrasite, petalite, and elbaite.

As shown in Figure 13-12 and Figure 13-13, spodumene is mainly in the concentrate for both particle-size distributions. Montebrasite distribution is presented in Figure 13-14 and Figure 13-15, reported mainly in the tailings fraction. The same behaviour applies to petalite distribution (Figure 13-16 and Figure 13-17). Elbaite distribution has no concentration preference following the mass distribution (Figure 13-18 and Figure 13-19).

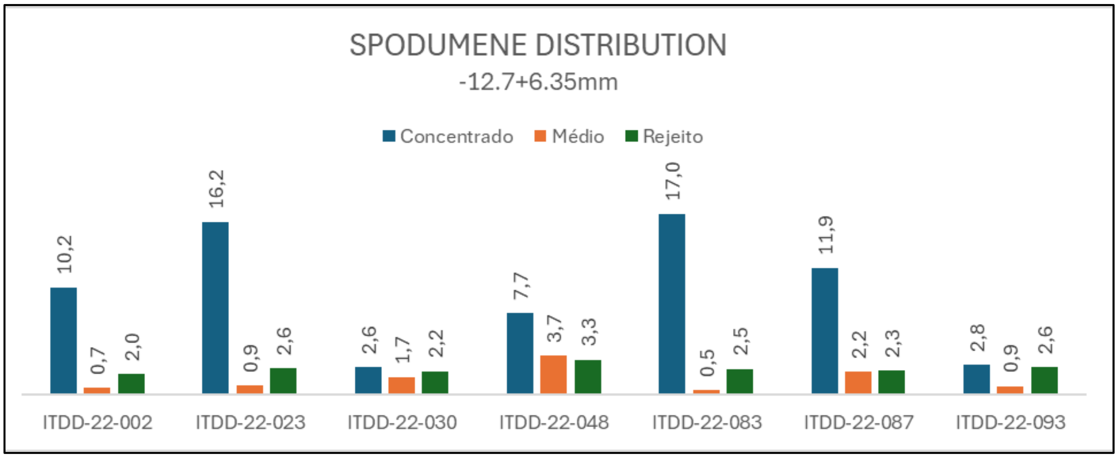


Figure 13-12: Spodumene Mass Distribution in HLS Test for Coarse Material (−12.7 +6.35 mm)

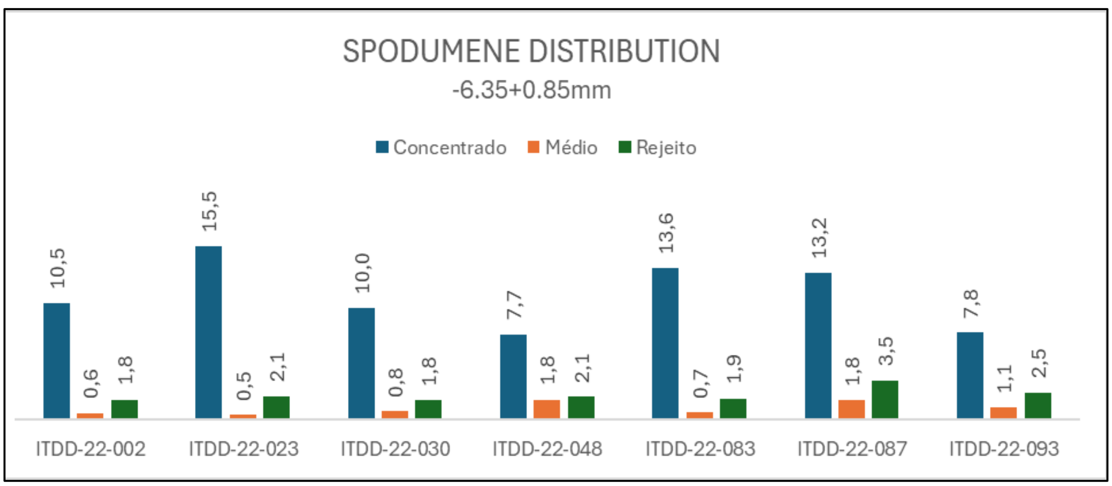


Figure 13-13: Spodumene Mass Distribution in HLS Test for Fine Material (−6.35 +0.85 mm)

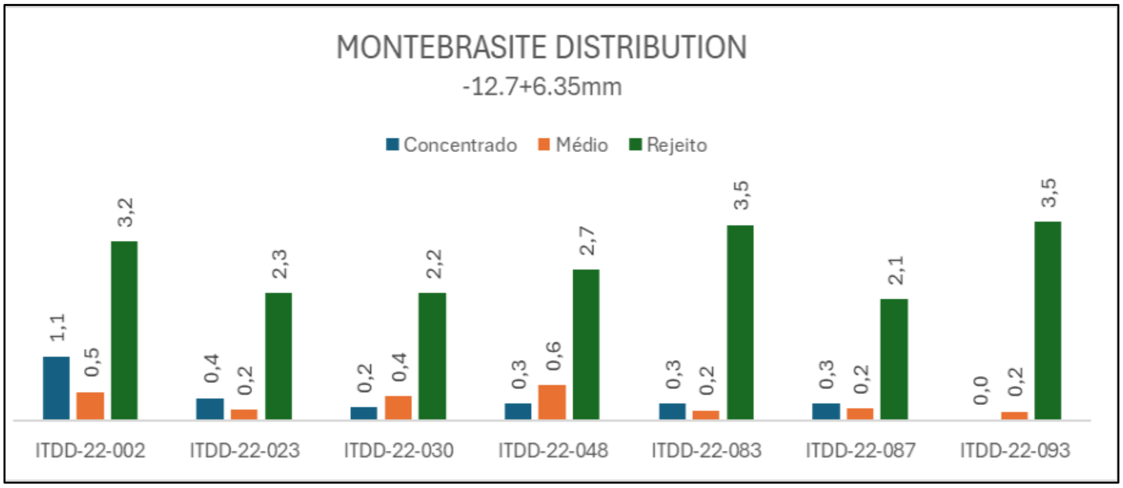


Figure 13-14: Montebrasite Mass Distribution in HLS Test for Coarse Material (−12.7 +6.35 mm)

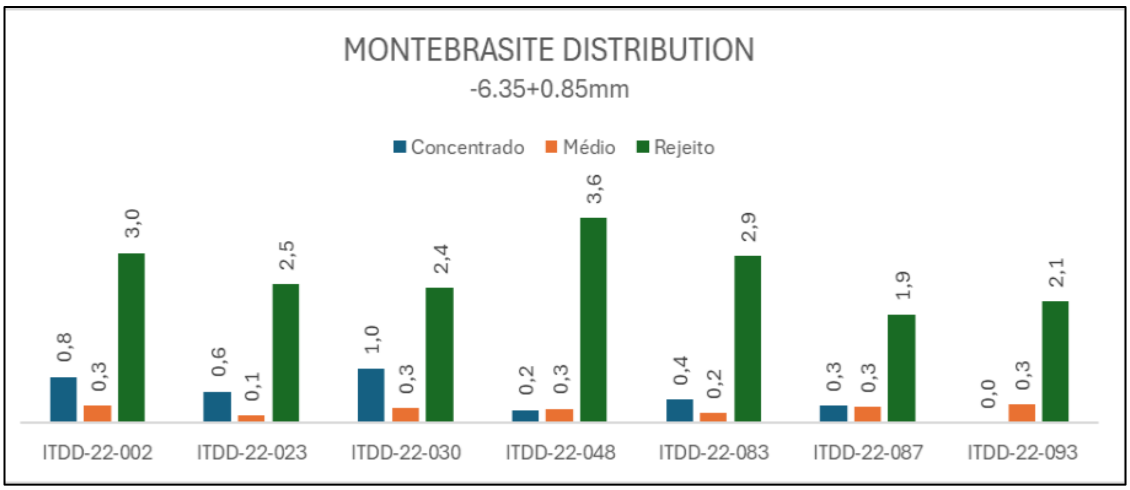


Figure 13-15: Montebrasite Mass Distribution in HLS Test for Fine Material (−6.35 +0.85 mm)

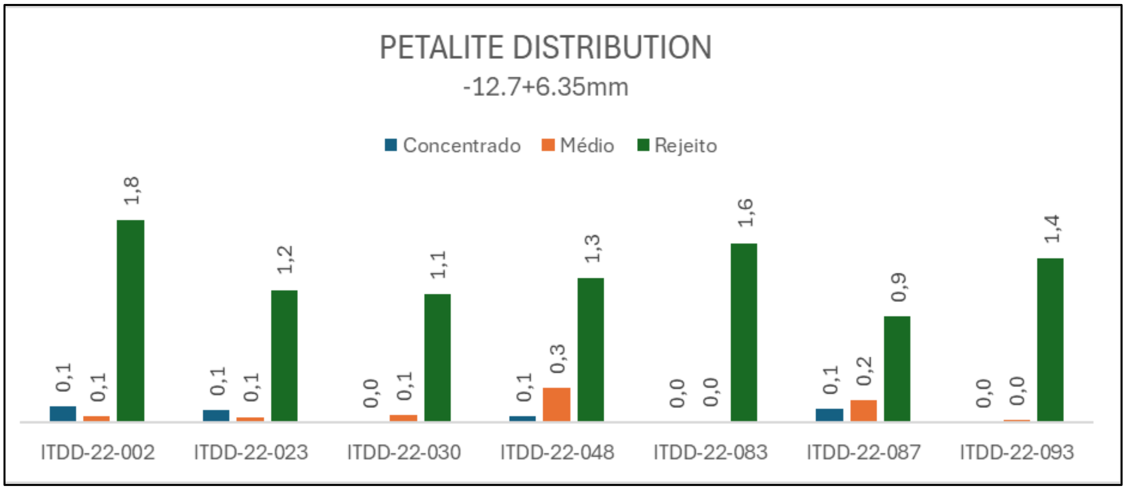


Figure 13-16: Petalite Mass Distribution in HLS Test for Coarse Material (−12.7 +6.35 mm)

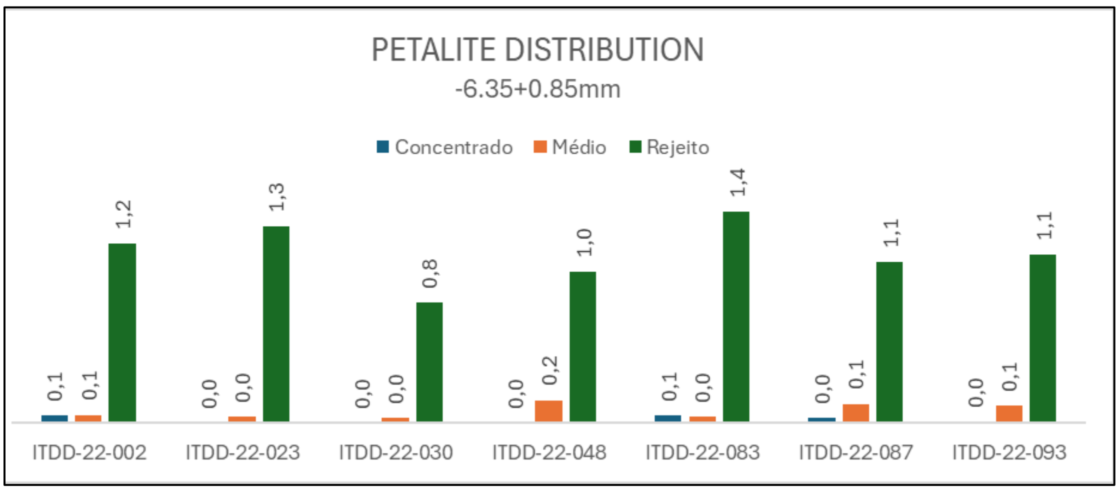


Figure 13-17: Petalite Mass Distribution in HLS TEST for Fine Material (−6.35 +0.85 mm)

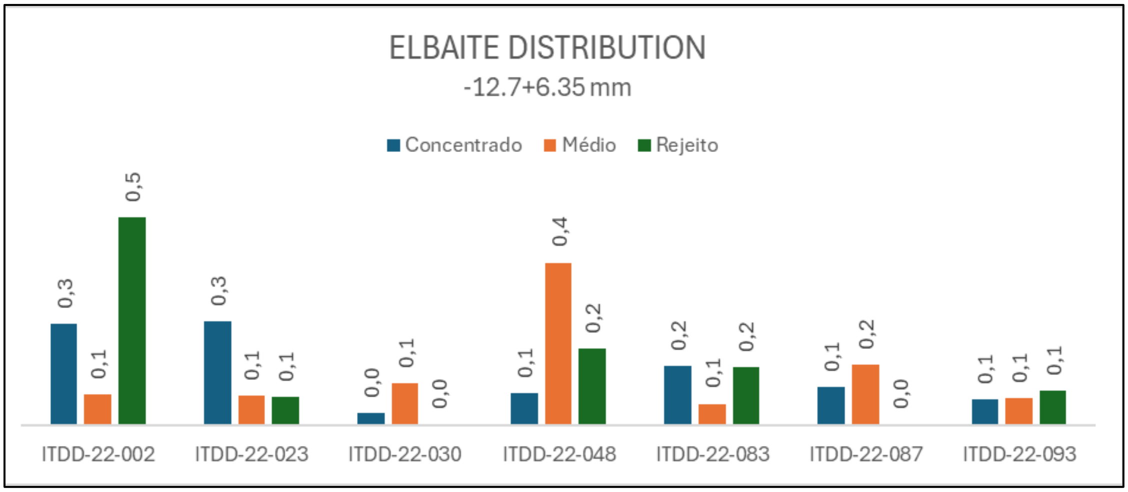


Figure 13-18: Elbaite Mass Distribution in HLS Test for Coarse Material (−12.7 +6.35 mm)

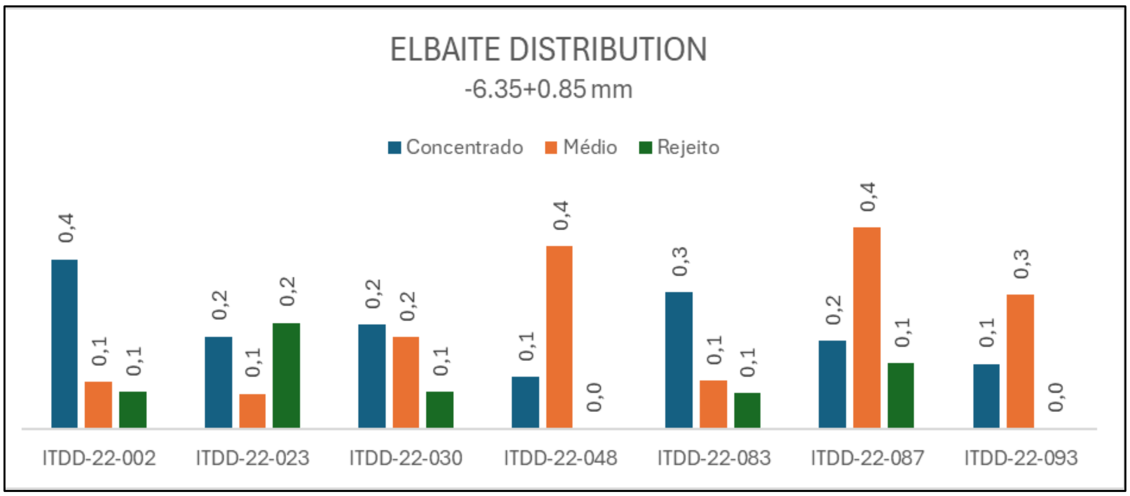


Figure 13-19: Elbaite Mass Distribution in HLS Test for Fine Material (−6.35 +0.85 mm)

Diluted Variability Samples—Ore Sorter and HLS Tests

Figure 13-20 shows the location of the 11 new drill holes (Phase 2 in blue) among those only for two drill holes (ITDD-23-065 and ITDD-23-073) were selected three samples in different depths, to evaluate the metallurgical response over the life-of-mine (LOM). Ore sorter tests and HLS were performed for the 15 samples.

Ore sorter tests were done in two particle-size ranges: 31.5 + 19.1 mm and 19.1 + 7.5 mm. Then, both composites were combined with a fraction size below 7.5 mm that did not pass through the ore sorter concentration. These composite samples were used to perform HLS tests in two particle-size ranges: 12.7 + 6.35 mm and −6.35 +0.5 mm in three densities (2.8 g/cm³, 2.7 g/cm³, and 2.45 g/cm³). Ore sorter results are presented in Figure 13-21. Lithium average recovery for the coarse and fine fractions was 93.6% and 92.6%, respectively.

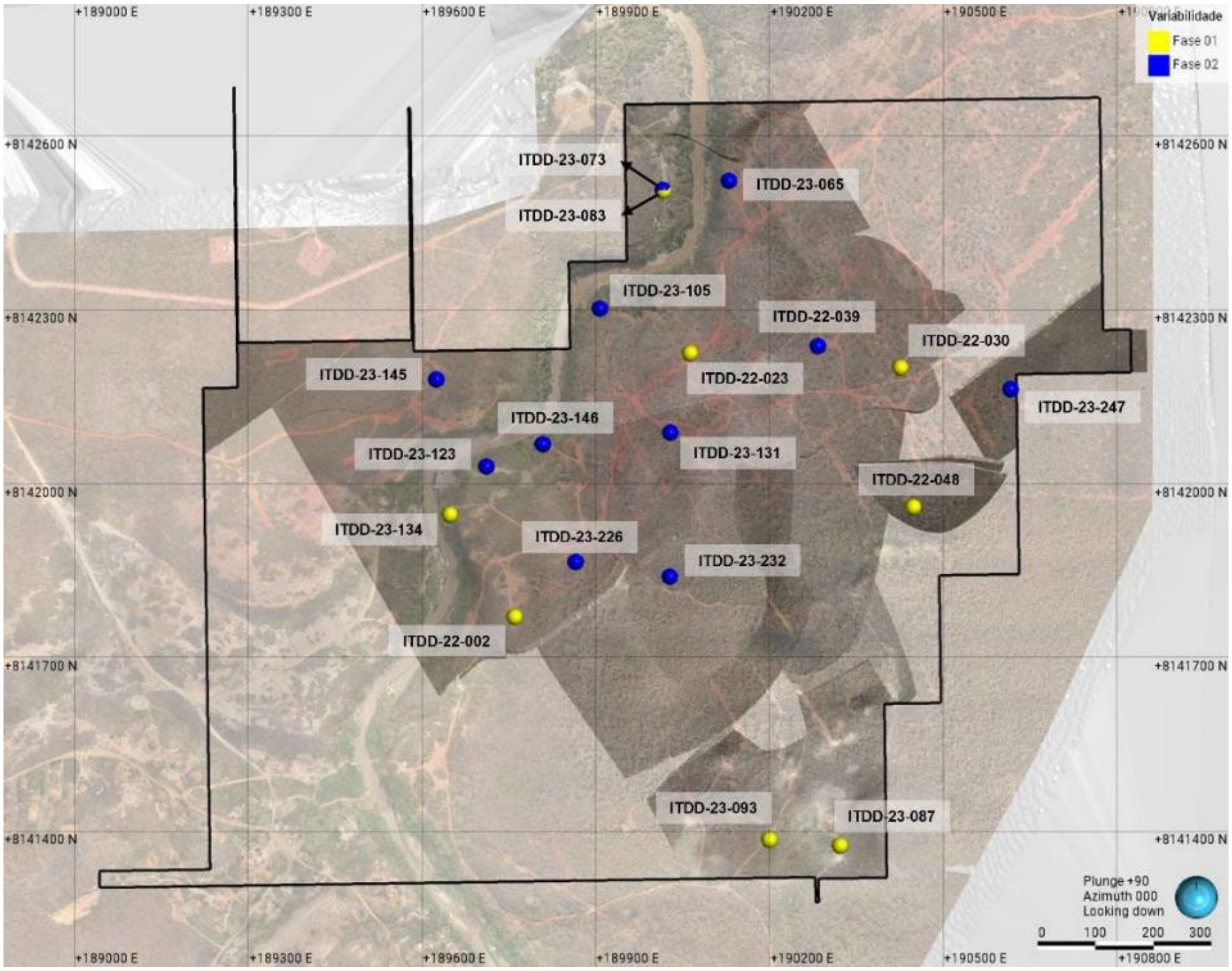


Figure 13-20: Variability Additional Drill-Hole Locations (Phase 2 in Blue)

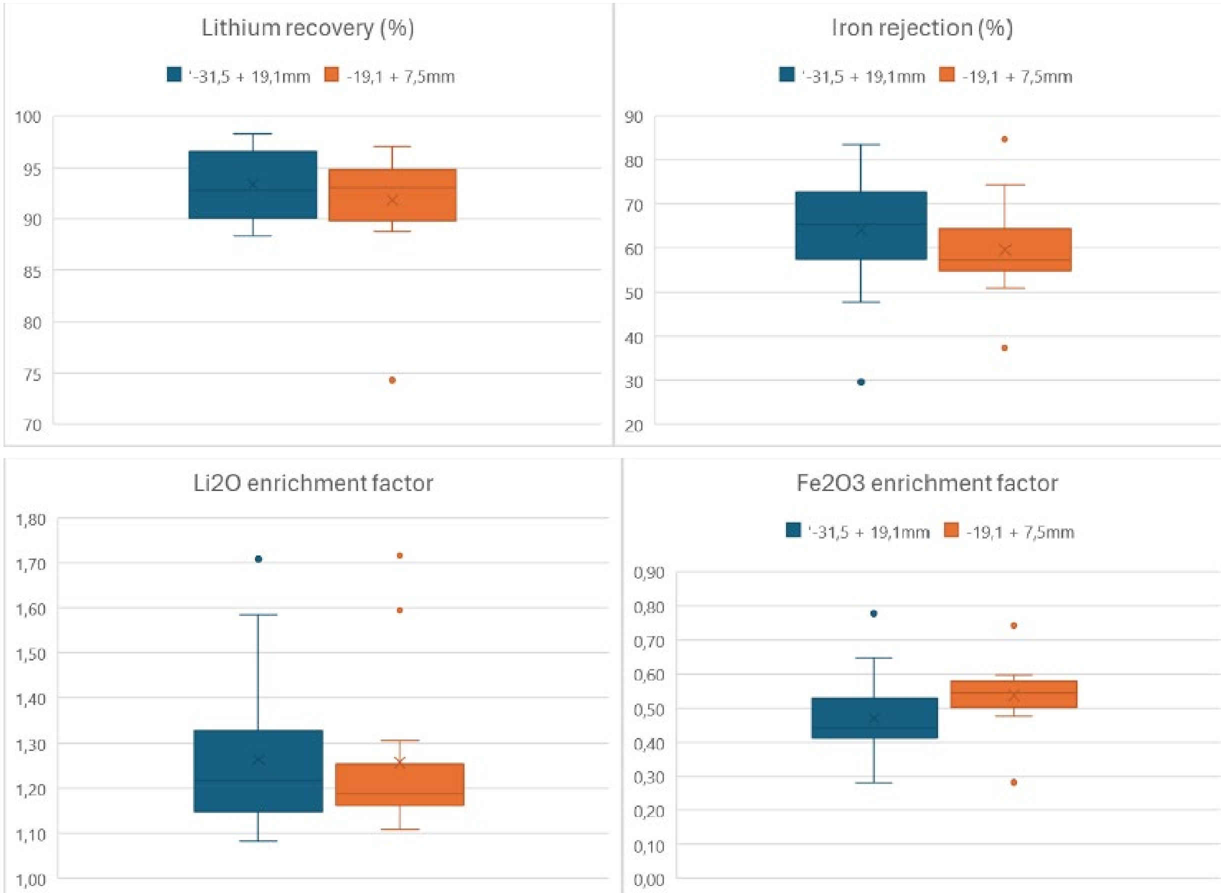


Figure 13-21: Ore Sorter Results for Lithium and Iron

Coarse and fine ore sorter concentrate was combined with the −7.5 + 0.5 mm fine fraction to perform HLS tests. The particle sizes used in HLS were −12.7 +6.35 mm and −6.35 +0.5 mm. A 3-stage circuit was simulated by the HLS test using 2.80 g/cm³, 2.70 g/cm³, and 2.45 g/cm³ fluid density targets. Table 13-17, Table 13-18, and Table 13-19 present the HLS results. Rougher average metallurgical recovery was 77.8%, with 22.1% mass recovery. The scavenger step increases the metallurgical recovery to 86.1% with 34.0% mass recovery. The polishing step uses 2.45 g/cm³ increases average metallurgical recovery to 88.2% and average mass recovery to 34.7%. Figure 13-22 indicates the polishing effect.

Table 13-17: HLS Rougher Step Results

Sample	Size	Cut-Point (g/cm^3)	Recov. Mas (%)	Recov. Met (%)	Li_2O Feed (%)	Li_2O Conc. (%)	Li_2O Tailings (%)
ITDD-23-065 270,2 a 277,97	−6.35 +0.5 mm	2.80	28.7	85.1	2.22	6.57	0.46
ITDD-23-065 351,23 a 380,7	−6.35 +0.5 mm	2.80	8.7	47.4	0.97	5.27	0.56
ITDD-23-065 455,28 a 462,88	−6.35 +0.5 mm	2.80	12.4	81.0	0.7	4.59	0.15
ITDD-23-073 76,82 a 84,66	−6.35 +0.5 mm	2.80	25.1	90.0	1.83	6.55	0.24
ITDD-23-073 205,62 a 214,3	−6.35 +0.5 mm	2.80	24.4	88.2	2.01	7.25	0.31
ITDD-23-073 406,21 a 428,35	−6.35 +0.5 mm	2.80	15.0	71.9	1.17	5.60	0.39
ITDD-23-146 266,31 a 277,18	−6.35 +0.5 mm	2.80	19.1	81.7	1.53	6.56	0.35
ITDD-23-145 289,82 a 303,05	−6.35 +0.5 mm	2.80	19.1	82.0	1.59	6.84	0.35
ITDD-23-226 170,61 a 180,57	−6.35 +0.5 mm	2.80	16.4	73.1	1.53	6.83	0.49
ITDD-22-039 85,24 a 96,86	−6.35 +0.5 mm	2.80	25.7	85.4	1.59	5.29	0.31
ITDD-23-247 84,62 a 99,58	−6.35 +0.5 mm	2.80	12.0	79.1	0.81	5.36	0.19
ITDD-23-232 137,7 a 146,95	−6.35 +0.5 mm	2.80	20.6	80.6	1.53	6.00	0.38
ITDD-23-105 219,44 a 230,59	−6.35 +0.5 mm	2.80	14.3	80.4	1.16	6.54	0.27
ITDD-23-123 148,16 a 160,4	−6.35 +0.5 mm	2.80	14.2	81.2	1.08	6.19	0.24
ITDD-23-131 97,48 a 103,88	−6.35 +0.5 mm	2.80	25.4	88.9	1.36	4.76	0.20
ITDD-23-065 270,2 a 277,97	−12.7 +6.35 mm	2.80	44.6	89.7	3.30	6.63	0.61
ITDD-23-065 351,23 a 380,7	−12.7 +6.35 mm	2.80	7.8	37.0	1.07	5.04	0.73
ITDD-23-065 455,28 a 462,88	−12.7 +6.35 mm	2.80	23.5	74.7	0.90	2.85	0.30
ITDD-23-073 76,82 a 84,66	−12.7 +6.35 mm	2.80	30.3	82.9	2.10	5.75	0.51
ITDD-23-073 205,62 a 214,3	−12.7 +6.35 mm	2.80	31.0	85.7	2.25	6.23	0.47
ITDD-23-073 406,21 a 428,35	−12.7 +6.35 mm	2.80	25.2	68.6	1.99	5.41	0.84
ITDD-23-146 266,31 a 277,18	−12.7 +6.35 mm	2.80	29.4	83.9	2.19	6.27	0.50
ITDD-23-145 289,82 a 303,05	−12.7 +6.35 mm	2.80	34.2	83.7	2.03	4.95	0.50
ITDD-23-226 170,61 a 180,57	−12.7 +6.35 mm	2.80	25.1	69.3	2.08	5.73	0.85
ITDD-22-039 85,24 a 96,86	−12.7 +6.35 mm	2.80	31.5	84.7	2.14	5.74	0.48
ITDD-23-247 84,62 a 99,58	−12.7 +6.35 mm	2.80	13.0	64.9	0.87	4.32	0.35
ITDD-23-232 137,7 a 146,95	−12.7 +6.35 mm	2.80	25.8	71.6	1.59	4.42	0.61
ITDD-23-105 219,44 a 230,59	−12.7 +6.35 mm	2.80	14.0	71.0	1.25	6.33	0.42
ITDD-23-123 148,16 a 160,4	−12.7 +6.35 mm	2.80	20.3	84.8	1.65	6.90	0.32
ITDD-23-131 97,48 a 103,88	−12.7 +6.35 mm	2.80	27.2	86.4	1.60	5.07	0.30

Table 13-18: HLS Scavenger Step Results

Sample	Size	Cut-Point (g/cm^3)	Recov. Mas (%)	Recov. Met (%)	Li_2O Feed (%)	Li_2O Conc. (%)	Li_2O Tailings (%)
ITDD-23-065 270,2 a 277,97	6.35 +0.5 mm	2.70	13.4	32.7	0.46	1.13	0.36
ITDD-23-065 351,23 a 380,7	6.35 +0.5 mm	2.70	5.6	6.2	0.56	0.62	0.55
ITDD-23-065 455,28 a 462,88	6.35 +0.5 mm	2.70	10.9	38.4	0.15	0.53	0.11
ITDD-23-073 76,82 a 84,66	6.35 +0.5 mm	2.70	13.8	44.9	0.24	0.79	0.16
ITDD-23-073 205,62 a 214,3	6.35 +0.5 mm	2.70	8.2	23.5	0.31	0.89	0.26
ITDD-23-073 406,21 a 428,35	6.35 +0.5 mm	2.70	15.5	25.8	0.39	0.64	0.34
ITDD-23-146 266,31 a 277,18	6.35 +0.5 mm	2.70	9.2	25.9	0.35	0.98	0.28
ITDD-23-145 289,82 a 303,05	6.35 +0.5 mm	2.70	15.1	46.5	0.35	1.09	0.22
ITDD-23-226 170,61 a 180,57	6.35 +0.5 mm	2.70	6.5	24.9	0.49	1.89	0.40
ITDD-22-039 85,24 a 96,86	6.35 +0.5 mm	2.70	12.2	48.4	0.31	1.24	0.18
ITDD-23-247 84,62 a 99,58	6.35 +0.5 mm	2.70	9.5	47.7	0.19	0.97	0.11
ITDD-23-232 137,7 a 146,95	6.35 +0.5 mm	2.70	14.7	62.8	0.38	1.60	0.16
ITDD-23-105 219,44 a 230,59	6.35 +0.5 mm	2.70	14.6	47.7	0.27	0.87	0.16
ITDD-23-123 148,16 a 160,4	6.35 +0.5 mm	2.70	13.5	43.9	0.24	0.77	0.15
ITDD-23-131 97,48 a 103,88	6.35 +0.5 mm	2.70	38.7	75.3	0.20	0.39	0.08
ITDD-23-065 270,2 a 277,97	-12.7 +6.35 mm	2.70	18.1	50.7	0.61	1.72	0.37
ITDD-23-065 351,23 a 380,7	-12.7 +6.35 mm	2.70	6.4	12.4	0.73	1.41	0.68
ITDD-23-065 455,28 a 462,88	-12.7 +6.35 mm	2.70	20.9	71.9	0.30	1.02	0.11
ITDD-23-073 76,82 a 84,66	-12.7 +6.35 mm	2.70	11.4	18.4	0.51	0.83	0.47
ITDD-23-073 205,62 a 214,3	-12.7 +6.35 mm	2.70	8.7	27.9	0.47	1.49	0.37
ITDD-23-073 406,21 a 428,35	-12.7 +6.35 mm	2.70	28.9	45.2	0.84	1.31	0.65
ITDD-23-146 266,31 a 277,18	-12.7 +6.35 mm	2.70	13.7	45.2	0.50	1.64	0.32
ITDD-23-145 289,82 a 303,05	-12.7 +6.35 mm	2.70	17.4	36.8	0.50	1.06	0.38
ITDD-23-226 170,61 a 180,57	-12.7 +6.35 mm	2.70	13.5	49.5	0.85	3.12	0.50
ITDD-22-039 85,24 a 96,86	-12.7 +6.35 mm	2.70	10.4	46.9	0.48	2.17	0.28
ITDD-23-247 84,62 a 99,58	-12.7 +6.35 mm	2.70	11.3	52.8	0.35	1.64	0.19
ITDD-23-232 137,7 a 146,95	-12.7 +6.35 mm	2.70	19.7	57.8	0.61	1.79	0.32
ITDD-23-105 219,44 a 230,59	-12.7 +6.35 mm	2.70	19.1	46.9	0.42	1.04	0.28
ITDD-23-123 148,16 a 160,4	-12.7 +6.35 mm	2.70	19.8	29.5	0.32	0.47	0.28
ITDD-23-131 97,48 a 103,88	-12.7 +6.35 mm	2.70	45.9	12.7	0.30	0.08	0.48

Table 13-19: Polishing HLS Results

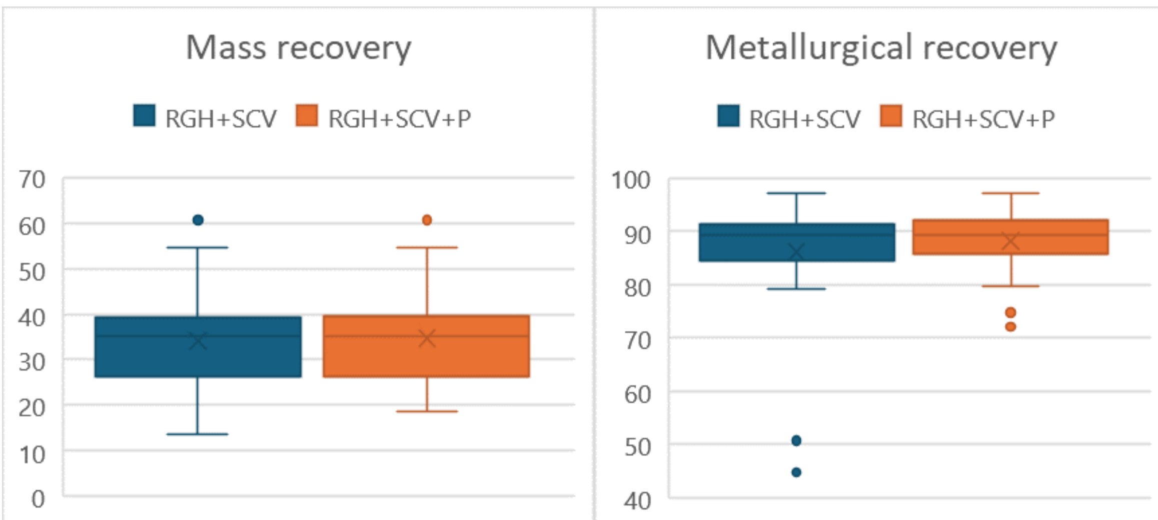


Figure 13-22: Comparative Recovery for 2-Stage and 3-Stage Circuits (−12.7 mm +0.5 mm)

13.4 Pilot Plant—Ore Sorter (Steinert) and Dense Media Separation (SGS Geosol)

After completion of the variability study from seven drill holes, a bulk reserve of the composite was tested using ore sorter equipment and the SGS Geosol DMS pilot plant Figure 13-23). In addition, an additional composite sample was used to perform HLS tests by size to evaluate spodumene liberation.

13.4.1 Ore Sorter Pilot Plant and HLS

Ore sorter tests were performed using the flowsheet shown in Figure 13-23. For the coarse material (−25.4 +6.35 mm), each sample had a mass of around 7 kg. Two samples were tested individually, and the other five samples were compiled into one bulk sample to improve test representativeness. The material −12.7 +6.35 mm was tested individually.

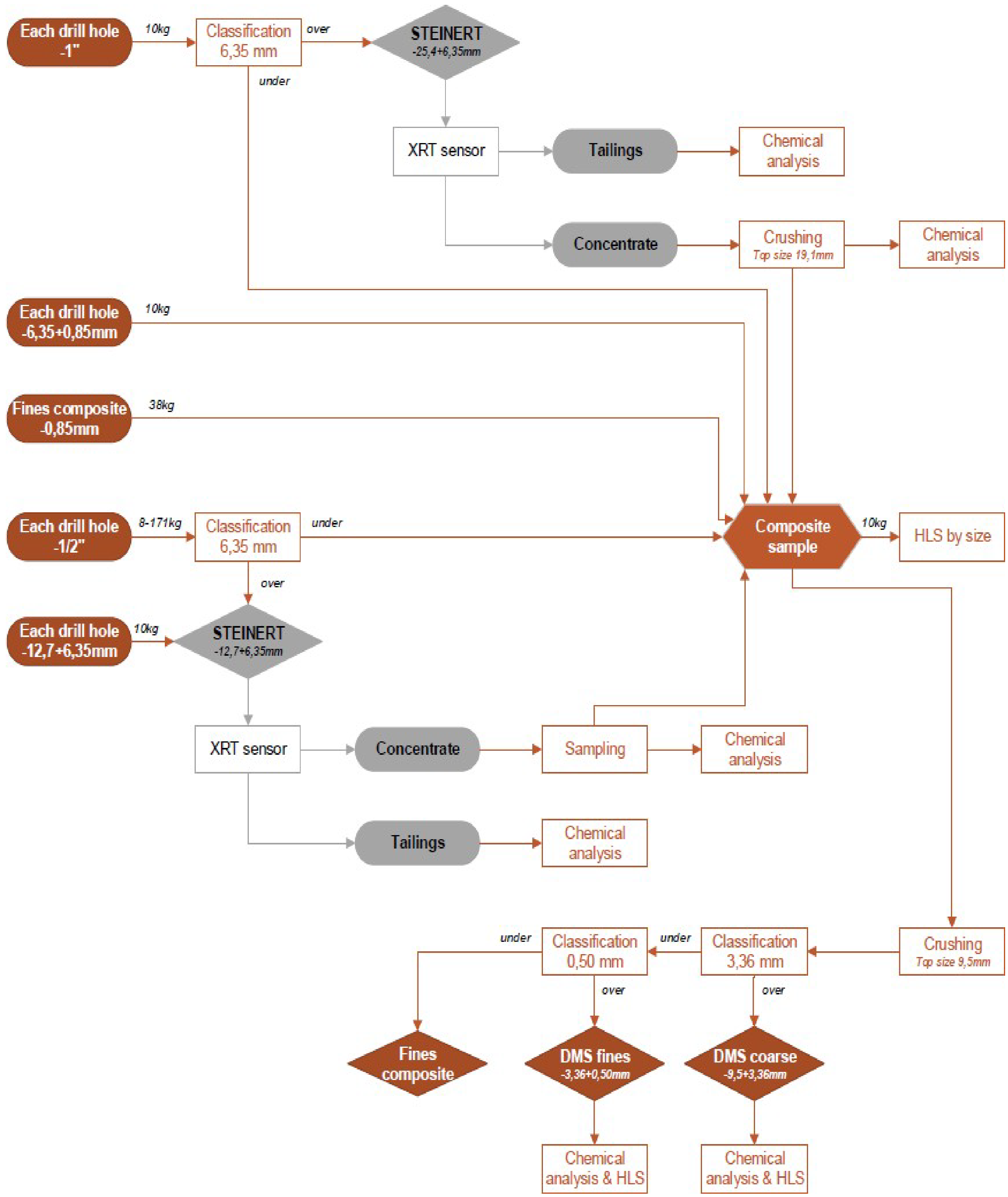


Figure 13-23: Pilot Plant Flowsheet

Ore sorter results are shown in Table 13-20. Lithium recovery ranged from 88.1% to 96.1%, with an average mass loss of 18.1% and an enrichment factor of 1.12. Mass recovery to the concentrate should be lower to increase lithium recovery once undiluted samples are used. New tests using diluted samples were completed to validate the ore sorter results. Regarding iron and potassium, the tailings enrichment factor was 1.37 and 2.34, respectively, with good results of discharging schist and feldspar to tailings.

The degree of liberation was evaluated by performing an HLS test in seven particle-size ranges, from a top size of 19.1 mm down to 0.5 mm. To avoid sampling error, all the mass retained in a 15.9 mm sieve was used in the coarser HLS test. For the HLS test with a particle size between 1.7 mm and 15.9 mm, 500 g was sampled from the total mass retained in each sieve, and for the finer samples, 150 g was used. SGS Geosol recommends this procedure as best practice.

The tests used two densities, 2.8 g/cm³ and 2.7 g/cm³, simulating rougher and scavenger stages. The results for each particle-size range are shown in Table 13-21. The results generally indicated that the recovery decreases as the particle-size increases. Similarly, the lithium oxide grade decreases as the particle-size increases.

Table 13-22 presents the grade and recovery results accumulated by mass distribution. Figure 13-24 shows the ore sorter pilot plant. Figure 13-25 shows the results of each HLS particle-size range.

Figure 13-24: Ore Sorter Pilot Plant

Table 13-20: Ore Sorter Pilot Plant Results

Sample	Particle Size	Feed			Concentrate			Tailing			Recovery			
		Li_2O (%)	Fe (%)	K (%)	Li_2O (%)	Fe (%)	K (%)	Li_2O (%)	Fe (%)	K (%)	Mass (%)	Li_2O (%)	Fe (%)	K (%)
ITDD-23-087T	−25.4 +6.35 mm	1.36	0.51	1.62	1.43	0.45	1.37	0.61	1.08	4.19	91.3	96.1	81.3	77.4
ITTD-22-002T	−25.4 +6.35 mm	0.96	0.68	1.90	1.07	0.48	1.47	0.53	1.51	3.74	80.9	89.5	57.4	62.4
Composite	−25.4 +6.35 mm	1.21	0.54	1.74	1.29	0.51	1.27	0.46	0.75	5.77	89.5	96.0	85.3	65.3
ITTD-22-048T	−12.7 +6.35 mm	1.03	0.73	1.83	1.11	0.67	1.34	0.67	1.01	4.00	81.6	88.1	74.6	59.8
ITDD-23-087T	−12.7 +6.35 mm	1.59	0.65	1.79	1.76	0.63	1.29	0.82	0.72	4.03	81.6	90.5	79.6	58.7
ITTD-23-083T	−12.7 +6.35 mm	1.80	0.48	1.84	2.02	0.48	1.15	0.90	0.47	4.60	79.9	89.9	80.3	49.9
ITTD-22-002T	−12.7 +6.35 mm	1.23	0.88	2.16	1.59	0.53	1.56	0.31	1.79	3.71	72.1	93.0	43.3	52.1
ITTD-23-093T	−12.7 +6.35 mm	0.66	0.51	1.82	0.72	0.54	1.37	0.35	0.36	3.82	81.7	90.2	87.0	61.5
ITTD-22-030T	−12.7 +6.35 mm	1.19	0.46	1.83	1.33	0.50	1.14	0.63	0.32	4.56	79.8	89.3	86.0	49.6
ITTD-22-023T	−12.7 +6.35 mm	1.53	0.40	2.07	1.72	0.39	1.42	0.73	0.42	4.79	80.8	90.8	79.6	55.5

Table 13-21: HLS Results for Each Particle-size Range for Spodumene Liberation

	−19.1 +15.9 mm		−15.9 +12.7 mm		−12.7 +9.5 mm		−9.5 +6.3 mm		−6.3 +3.4 mm		−3.4 +1.7 mm		−1.7 +0.5 mm	
	Li_2O Assay (%)	Li_2O Dist. (%)	Li_2O Assay (%)	Li_2O Dist. (%)	Li_2O Assay (%)	Li_2O Dist. (%)	Li_2O Assay (%)	Li_2O Dist. (%)	Li_2O Assay (%)	Li_2O Dist. (%)	Li_2O Assay (%)	Li_2O Dist. (%)	Li_2O Assay (%)	Li_2O Dist. (%)
Feed	1.25	100.0	1.36	100.0	1.54	100.0	1.51	100.0	1.40	100.0	1.34	100.0	1.30	100.0
Sink 2.8 (g/cm^3)	4.13	59.0	4.97	77.9	5.32	74.1	5.87	75.4	6.02	82.3	6.75	84.2	6.48	89.4
Sink 2.7 (g/cm^3)	1.76	25.1	2.48	10.9	2.09	11.7	1.83	16.2	1.43	8.5	1.22	7.3	0.80	3.2
Float 2.7 (g/cm^3)	0.31	15.9	0.21	11.1	0.31	14.1	0.19	8.4	0.18	9.2	0.15	8.6	0.13	7.4

Table 13-22: Accumulated HLS Results by Particle Size

	−19.1 +15.9 mm	−15.9 +12.7 mm	−12.7 +9.5 mm	−9.5 +6.3 mm	−6.3 +3.4 mm	−3.4 +1.7 mm	−1.7 +0.5 mm
Mass retained (%)	1.53	7.96	12.03	12.72	15.58	12.05	13.28
Li_2O grade by size (%)	4.13	4.97	5.32	5.87	6.02	6.75	6.48
Li_2O recovery bysize (%)	84.1	88.9	85.9	91.6	90.8	91.4	92.6
	−19.1 +0.5 mm	**−15.9 +0.5 mm**	**−12.7 +0.5 mm**	**−9.5 +0.5 mm**	**−6.3 +0.5 mm**	**−3.4 +0.5 mm**	**−1.7 +0.5 mm**
Li_2O grade accumulated (%)	5.93	5.97	6.09	6.26	6.39	6.61	6.48
Li_2O recoveryaccumulated (%)	90.2	90.3	90.5	91.6	91.6	92.0	92.6

−19.1 +15.9 mm

−15.9 +12.7 mm

−12.7 +9.5 mm

−9.5 +6.3 mm

−6.3 +3.3 mm

−3.3 +1.7 mm

−1.7 +0.5 mm

Figure 13-25: HLS Separation for Rougher Stage

13.4.2 DMS Pilot Plant (SGS Geosol) Results

DMS Pilot Plant Samples

The tests at the DMS pilot plant were conducted using composite samples from the seven drill holes of the variability tests. These samples underwent testing in an ore sorter at Steinert to remove schist and feldspar, followed by particle size adjustment to meet the specification of the DMS pilot plant. The DMS tests were conducted in two–size fractions. The coarser fraction was prepared at 9.5 mm +3.55 mm, and the finer fraction was prepared at -3.55 mm +0.5 mm. Following is a list of drill holes from which the samples were composed:

- ITDD-22-048T
- ITDD-23-093T
- ITDD-23-087T
- ITDD-22-023T
- ITDD-22-002T
- ITDD-23-083T
- ITDD-23-030T.

Dense Media Separation Pilot Plant Overview

Figure 13-26 presents a flowchart reproducing the unit operations in the SGS Geosol DMS pilot plant. Twenty-five DMS pilot plant tests were performed (21 rougher and 4 scavenger) to obtain supporting information for the Bandeira Project process development. Figure 13-27 to Figure 13-29 show the DMS pilot plant flowsheet and equipment.

The circuit includes a hopper, manually fed with ore, connected to a vibrating feeder responsible for feeding ore into the static mixer. The solid, dense media (iron silicon) is fed directly into the agitated tank. This dense media undergoes dilution and subsequent pulp density adjustment by injecting water into the tank or the first section of the screen's chute.

The prepared media of appropriate density feeds by gravity into the chute of the first section of the screen. From this point, the dense media is pumped through a demagnetizing coil and a flow divider with manual valves. The flow divider directs part of the dense media to the screen, and the rest recirculates to the agitated tank. The screen's function is to protect the system and retain undesirable or inadequately sized materials. The screen underflow feeds the static mixer positioned just above the DMS cyclone. This static mixer promotes mixing of the ore from the vibrating feeder with the dense media from the screen underflow. The gravity feed of the DMS cyclone establishes a cyclone feed-pressure based on the height of the liquid column relative to the vertical distance between the DMS cyclone feed flange and the pulp level in the static mixer.

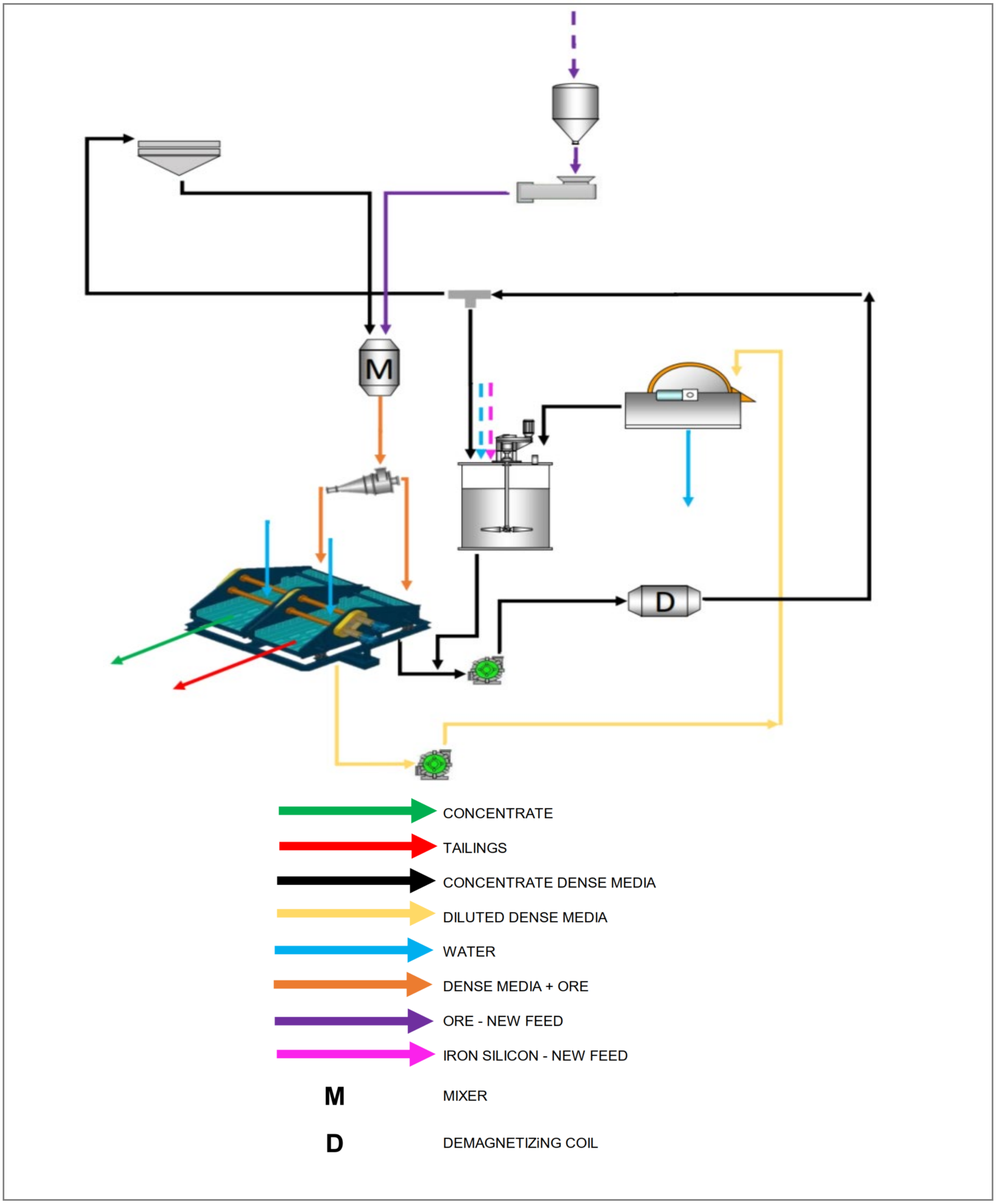


Figure 13-26: DMS Pilot Plant Flowchart

Figure 13-27: DMS Pilot Plant 2nd floor 1/2

Figure 13-28: DMS Pilot Plant 1st floor 2/2

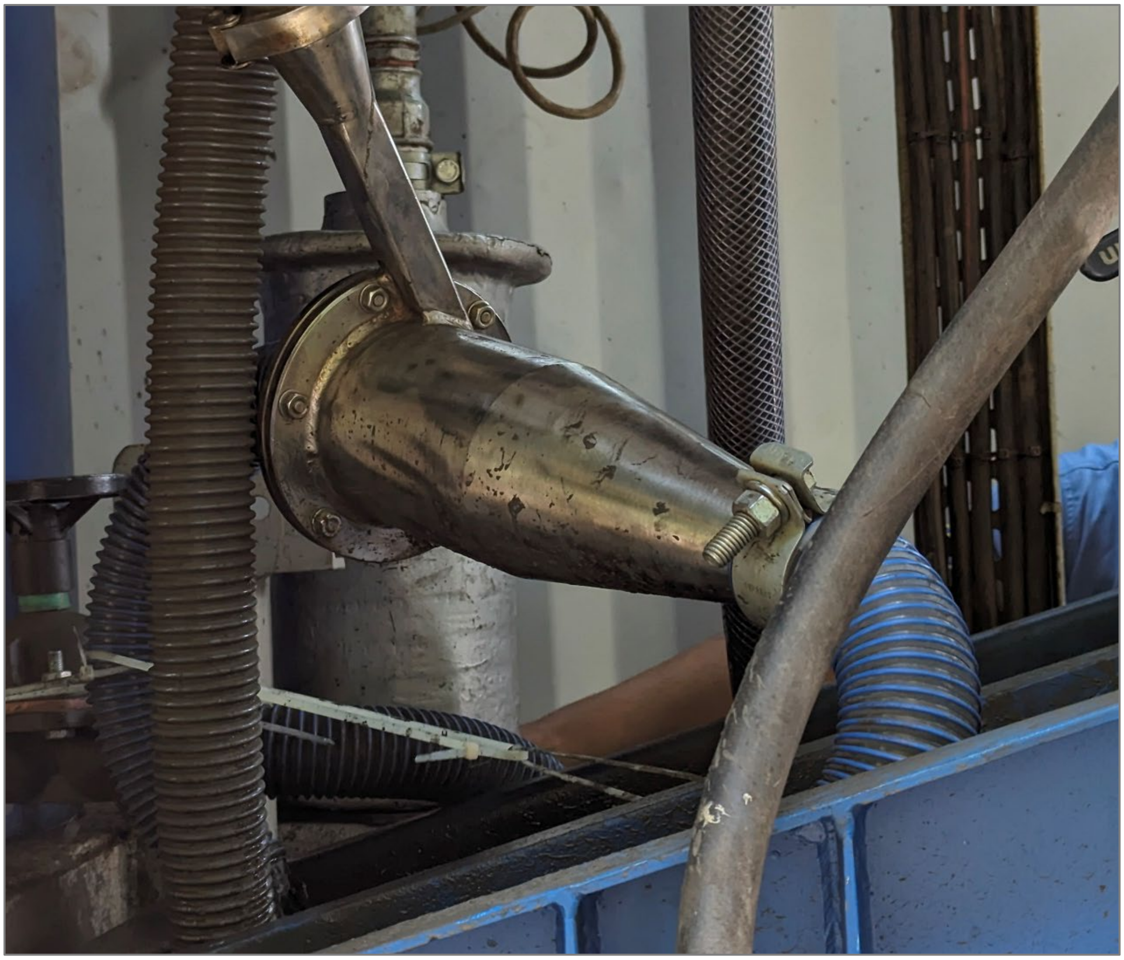


Figure 13-29: DMS Cyclone

The DMS cyclone, positioned at a 20° incline relative to its centerline, separates the mixture by density, partitioning it into sink (underflow) and float (overflow). In this process, the concentrate is directed to the sink flow, and the reject is directed to the float flow. The dewatering screen is partitioned into two parallel sections and two underflow chutes. Each chute receives drainage from half of the parallel sections' area. The cyclone sink is directed to the first section of the screen, and the float is directed to the second section. In the first screen chute, the dense-media concentrate is drained. From the second chute, wash water is injected to remove residual dense media and drain the diluted flow. The diluted dense media is then pumped to the magnetic separator, which retains iron silicon particles and removes excess water, concentrating the dense-media mixture. The concentrated dense media is then recirculated to the agitated tank while the water is discarded. The DMS concentrate is equivalent to the oversize from the first section of the dewatering screen, and the DMS reject is equivalent to the oversize from the second section of the screen.

The scavenger stage test is repeated by refeeding the reject obtained in the rougher stage.

DMS Pilot Plant Rougher Stage Results

The results of the pilot tests were presented graphically to define trend lines and points of coherence for a comprehensive analysis.

The initial rougher tests for the coarse fraction were discarded, as they were part of the pilot plant's calibration period. The results of the tests considered for the rougher stage indicated the trend curve for the −9.5 mm +3.35 mm fraction shown in Figure 13-30.

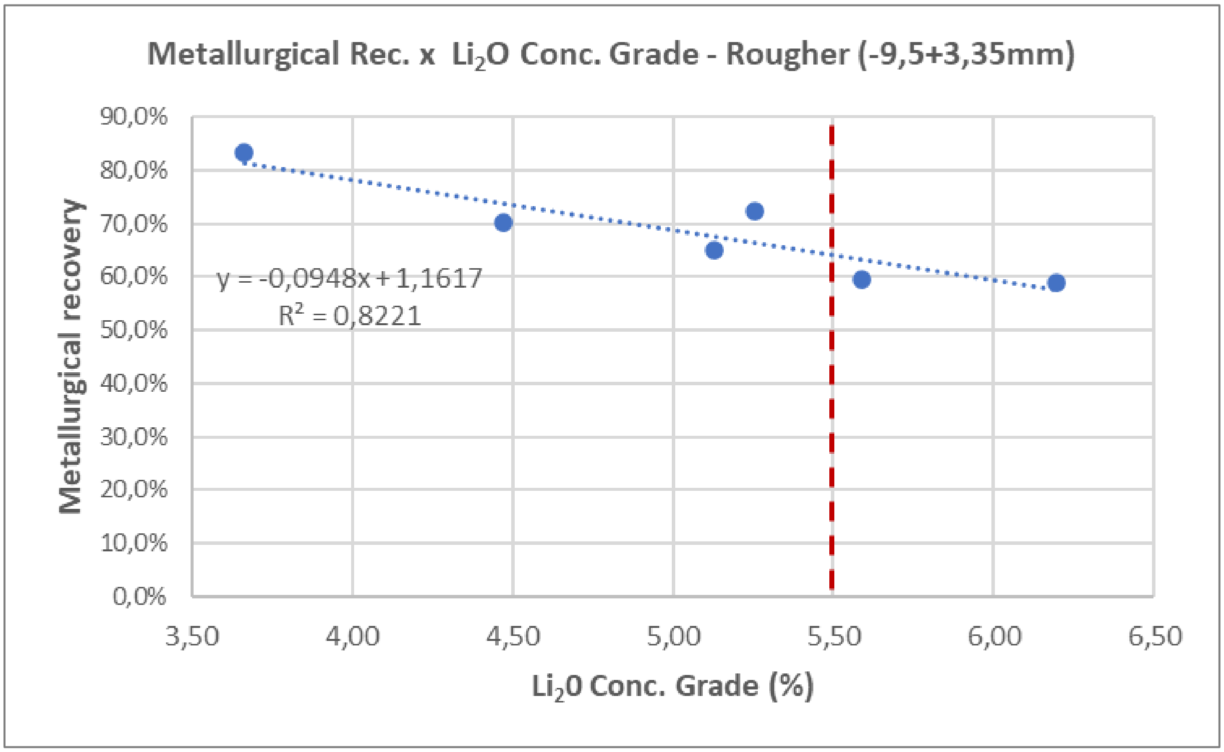


Figure 13-30: Rougher Coarse Metallurgical Recovery x Li_2O Grade in Concentrate

The analysis of these data converges to achieve a metallurgical recovery of about 64.0% to obtain a concentrate with a lithium oxide grade of 5.50% in the −9.5 mm +3.35 mm fraction.

The initial rougher tests for the medium fraction were discarded, as they were part of the pilot plant's calibration period. The results of the tests considered for the rougher stage indicated the trend curve for the −3.35 mm +0.5 mm fraction shown in Figure 13-31.

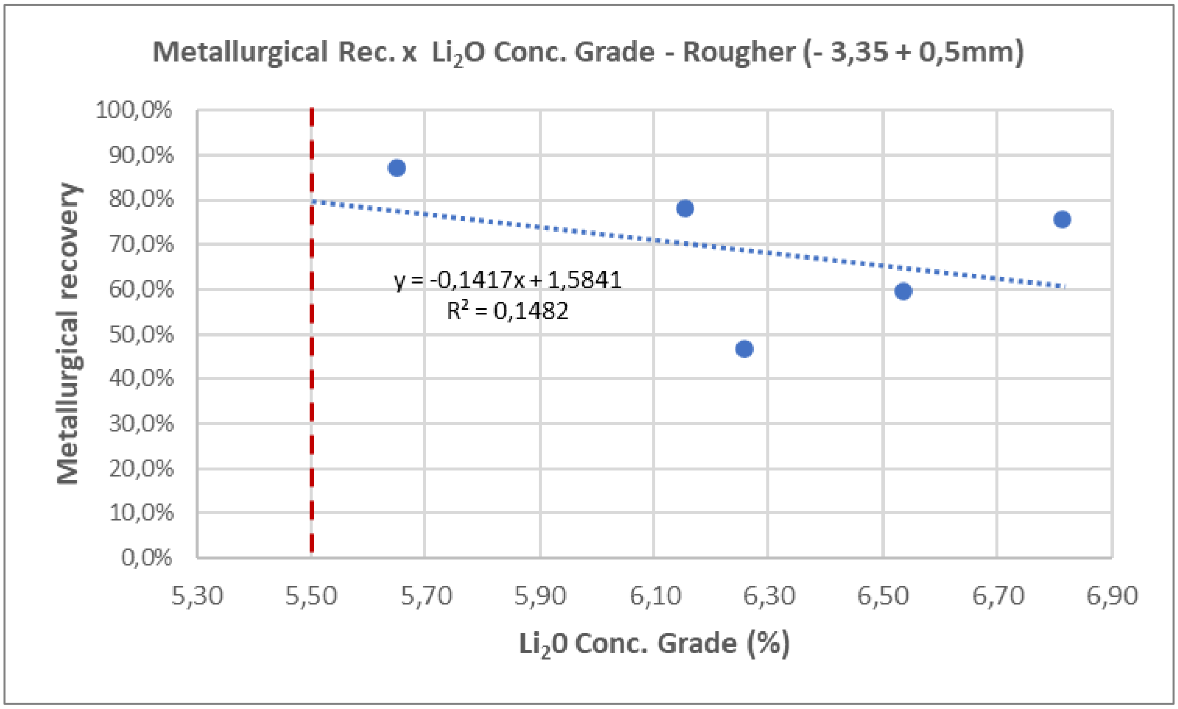


Figure 13-31: Rougher Medium Metallurgical Recovery x Li_2O Grade in Concentrate

Although this trend line does not fit the points as well as in that for the coarse fraction, the analysis of these data converges to achieve a metallurgical recovery of about 80.5%, obtaining a concentrate with a lithium oxide grade of 5.50% in the −3.35 mm +0.5 mm fraction.

The combination of the most coherent result points obtained in the two fractions, −9.5 mm +3.35 mm and −3.35 mm +0.5 mm, presented the trend curve shown in Figure 13-32.

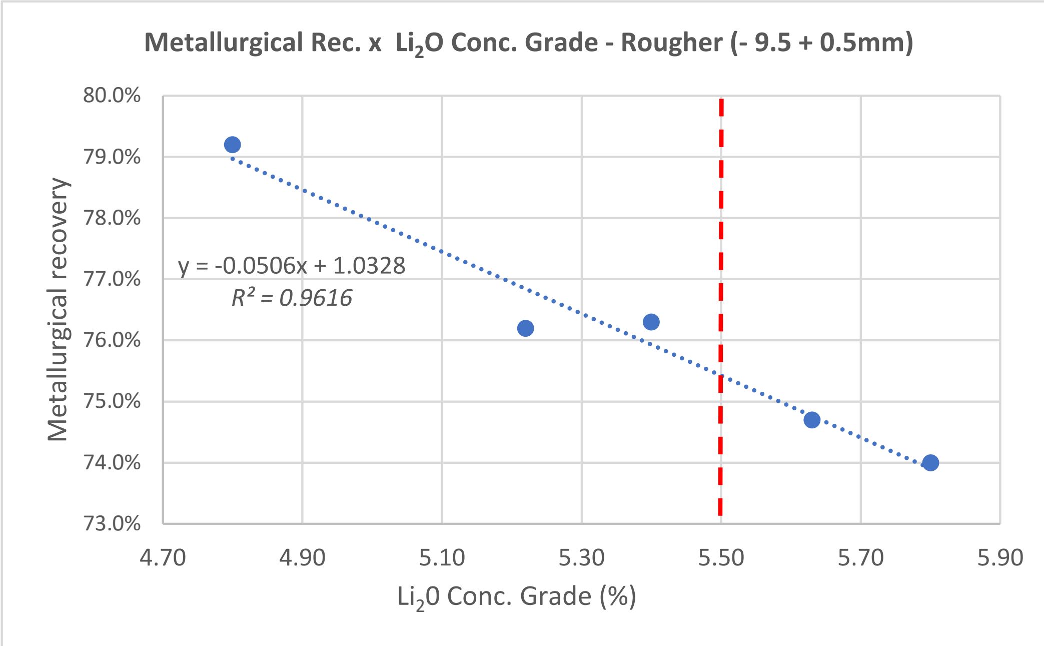


Figure 13-32: Rougher Composite Metallurgical Recovery x Li_2O Grade in Concentrate

The analysis of these data converges to achieve a metallurgical recovery of about 75.42%, to obtain a concentrate with a lithium oxide grade of 5.50% in the rougher stage, considering the combination of the two tested size-fractions. To achieve this metallurgical recovery, the results of Tests 16 and 17 were adopted as references. Since both produced concentrates with lithium oxide grades higher than 5.50%, it was necessary to recalculate the metallurgical recoveries. Table 13-23 presents the results of Tests 16 and 17, as well as the adjusted metallurgical recoveries to obtain a 5.50% concentrate and an overall rougher stage metallurgical recovery of 75.42%.

Table 13-23: Rougher Testwork Results and Metallurgical Recovery

Testwork No.	Li_2O Grade Conc. (%)	Metall. Rec. (%)
Test 16	5.65	87.06
Test 17	5.59	59.48
Rougher Mass Balance		
-9.5 +3.35 mm	5.50	60.41
-3.35 +0.5 mm	5.5	88.42
-9.5 +0.5 mm	5.50%	75.42

Therefore, the rougher stage of the DMS plant considered the following recoveries:

- Coarse fraction DMS rougher metallurgical recovery: 60.41%
- Medium fraction DMS rougher metallurgical recovery: 88.42%
- Composite DMS rougher metallurgical recovery: 75.42%.

13.5 Bandeira Project Simplified Mass Balance—Global Recovery on Rougher Stage

The metallurgical recoveries mentioned previously and applied to a macro mass balance of the Project indicate the mass distribution given in Table 13-24.

Thus, the test results analysis suggests that the rougher stage of the DMS circuit can establish an overall metallurgical recovery of 63.15%.

Table 13-24: Rougher Stage Mass Balance

Material	Mass Production (t/a)	Mass Distribution (%)	Li_2O Grade (%)	Li_2O Production (t/a)	Li_2O Distribution (%)
Run of Mine	1,300,000	100.0	1.16	15,080	100.00
Coarse DMS Feed	407,655	31.4	1.44	5,862	38.87
Medium DMS Feed	436,476	33.6	1.55	6,765	44.86
DMS Total Feed	844,131	64.9	1.50	12,627	83.73
Coarse DMS Concentrate (Rougher)	64,383	5.0	5.50	3,541	23.48
Medium DMS Concentrate (Rougher)	108,767	8.4	5.50	5,982	39.67
DMS Total Concentrate (Rougher)	173,149	13.3	5.50	9,523	63.15
Schist	193,508	14.9	0.35	683	4.53
Coarse DMS Tailings	238,966	18.4	0.36	850	5.64
Medium DMS Tailings	256,916	19.8	0.14	366	2.42
Coarse DMS Concentrate (Scavenger)	104,307	8.0	1.41	1,471	9.75
Medium DMS Concentrate (Scavenger)	70,793	5.4	0.59	418	2.77
Fines Material (−0.5 mm)	262,361	20.2	0.67	1,770	11.74

13.6 DMS Scavenger Stage Potential Gains—Global Recovery

For the scavenger stage, the results of the same tests adopted as references in the rougher stage (Tests 16 and 17) were considered. Table 13-25 presents the metallurgical recoveries and grades of the scavenger concentrates.

Table 13-25: Scavenger Testwork Results and Metallurgical Recovery

Testwork nº	Li_2O Grade Conc. (%)	Metall. Rec. (%)
Test 16	0.59	53.33
Test 17	1.41	63.38

With regard to the scavenger concentrate, there is a possibility of increasing the overall metallurgical recovery; to achieve this, this material needs to undergo a new crushing stage to increase ore liberation and then be re-fed into the DMS circuit. This reprocessing was not tested in the pilot plant. However, considering similar operations and the rougher–scavenger testwork results, it is estimated that a potential gain of up to 5.71% in the overall plant metallurgical recovery could be achieved through reprocessing. Thus, obtaining an overall metallurgical recovery of 68.86% would be possible.

14.0 MINERAL RESOURCE ESTIMATES

GE21 conducted comprehensive three-dimensional (3-D) geological modelling, statistical and geostatistical studies, and grade estimation for the MGLIT Bandeira Project. This estimation considered various factors, such as the quantity and distribution of available data, as well as interpreted controls on mineralization, mineralization style, and the quality of the sampling data.

The geological modelling and estimation processes were executed using Leapfrog 2023.2 software. The UTM Projection - Zone 23 South in SIRGAS 2000 Datum was adopted as the Project database geographic coordinate system.

14.1 Drilling Database

The drilling database underwent a comprehensive visual validation, considering the interrelation of tables, identifying gaps and overlaps, and ensuring it included crucial information. Using Leapfrog Geo software, GE21 also conducted validation checks on the collar, survey, assay, and lithology tables. This stage of the work did not reveal any significant inconsistencies, as these had already been verified during the data verification stage.

Mineral Resource estimates were based on data derived from drill-hole and trench databases, incorporating lithology logs and assay results from HQ-diameter drill-core samples. The topographic surface bounds the extent of these estimates. Figure 14-1 illustrates the spatial distribution of the drill holes used.

Lithium Ionic provided the original data set, encompassing data from 186 surface diamond drill holes (totalling 41,831 m) and 26 trench channels (total length 1,417 m) MGLIT executed from 2022 until November 13, 2023.

The Bandeira Project database also contains:

- 7,351 trench assay intervals drawn from 6,895 m of trench, from which 166 assays were drawn, representing 160 m of trench material.
- 7,185 drill-hole assay intervals drawn from 6,725 m of core.

The database assay table includes data for various elements, including lithium (ppm), lithium oxide (%), aluminum (%), arsenic (ppm), boron (%), barium (ppm), beryllium (ppm), calcium (%), cadmium (ppm), cobalt (ppm), chromium (ppm), copper (ppm), iron (%), potassium (%), lanthanum (ppm), magnesium (%), manganese (ppm), molybdenum (ppm), niobium (ppm), nickel (ppm), phosphorus (%), lead (ppm), antimony (ppm), scandium (ppm), tin (ppm), strontium (ppm), tantalum (ppm), titanium (%), vanadium (ppm), tungsten (ppm), yttrium (ppm), and zinc (ppm). Following a thorough review of the database, the Li_2O (%) data were extracted explicitly for subsequent statistical analysis, block modelling, and resource estimation.

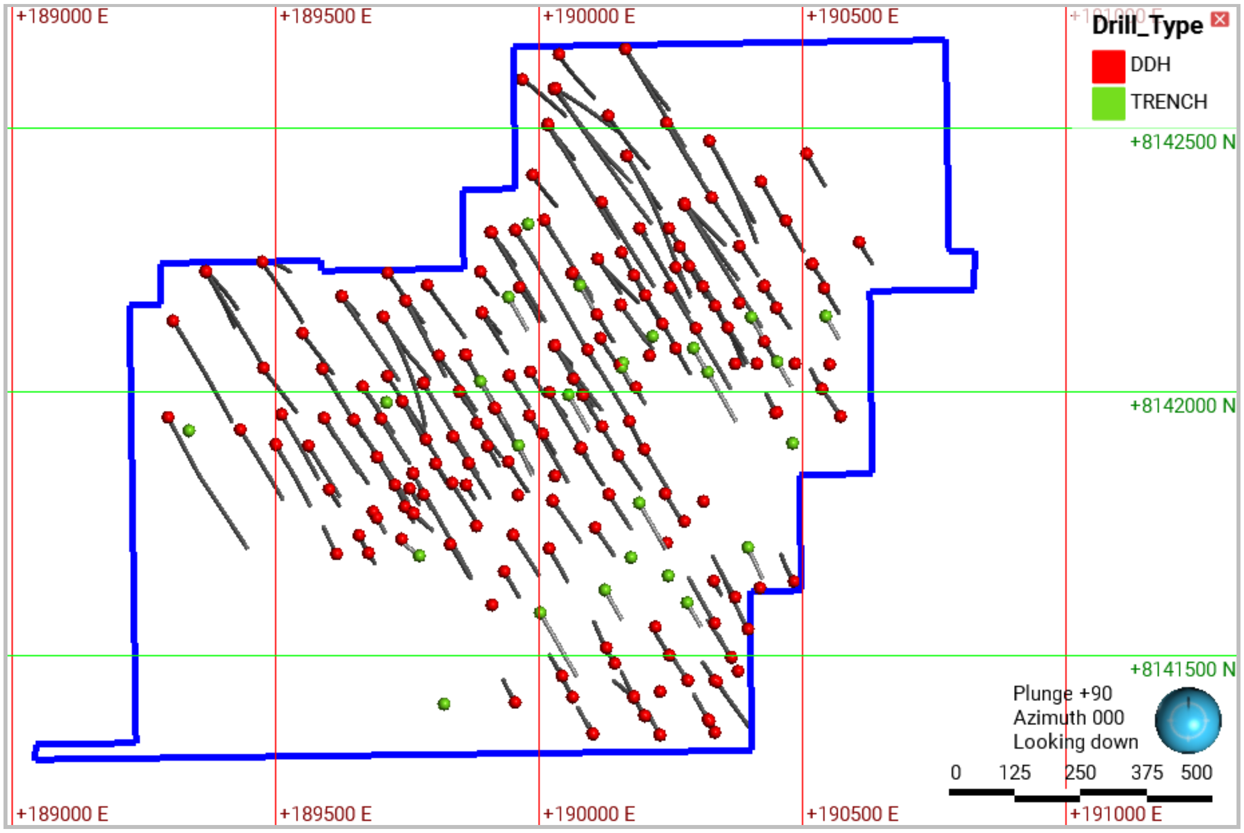


Figure 14-1: Drill-hole Location Map

14.2 Geological Modelling

Lithium Ionic undertook a geological interpretation encompassing all documented pegmatite intervals within the Bandeira Project deposits. Initially, cross-sectional interpretations were crafted using traditional manual techniques and advanced cartographic software platforms such as QGIS, ArcGIS, and Leapfrog. These initial steps laid the groundwork for a robust modelling process.

The Lithium Ionic team interpreted a set of grade shell sections, with an envelope delimiting a zone with a cut-off grade of 0.3% Li_2O (%) (Figure 14-2 and Figure 14-3). The resulting interpretations were developed into a series of implicit 3-D models aligned with two prevailing strike directions: 235° and 140° (Figure 14- 4 and Figure 14-5).

Lithium Ionic also conducted weathering modelling, based on analysis of the descriptions provided in the logs (Figure 14-6).

The QP thinks the geological interpretations and modelling suit a Mineral Resource estimation. Quality assurance procedures follow industry best practice, and the model honours the mineralized pegmatite intervals and has adequate continuity of the modelled bodies.

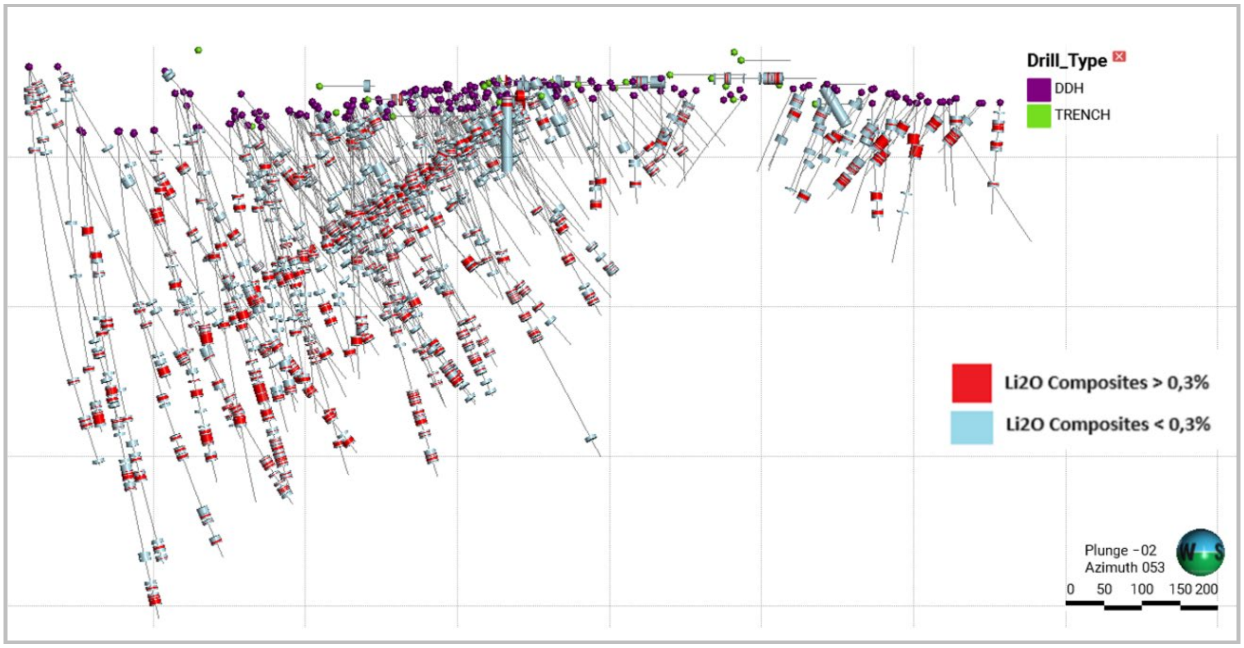


Figure 14-2: Assay Composites Classified by Li2O > 0.3% Grade Limit in Pegmatites Veins, Oblique View NW-SE

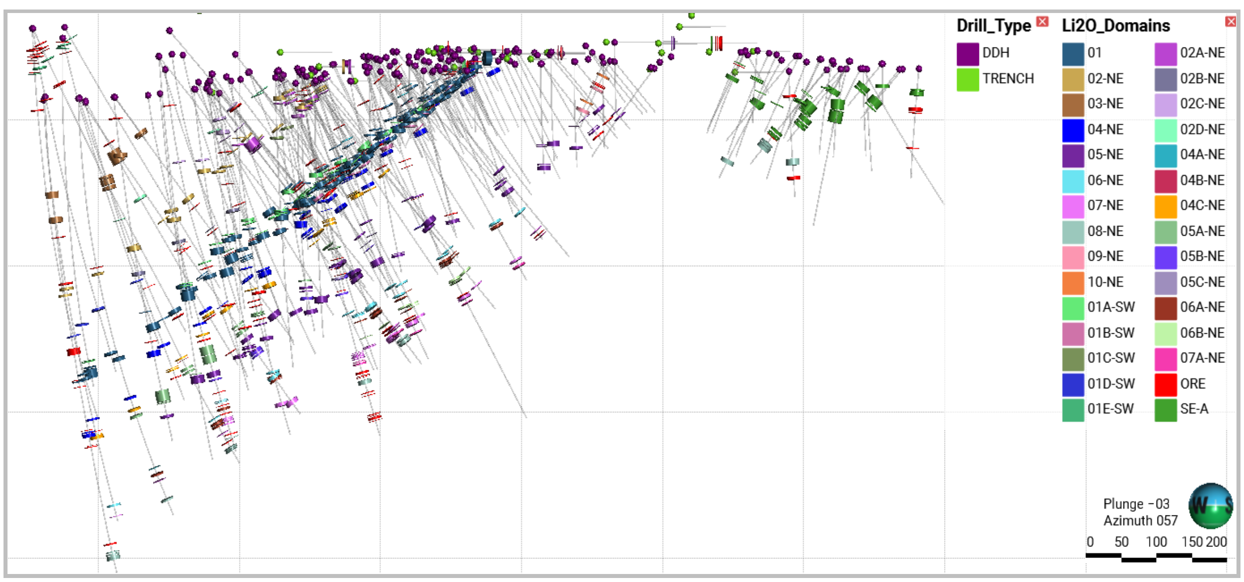


Figure 14-3: Assays Composites Within The Li2O > 0.3% Limit in Pegmatite Veins Grouped by Separated Lenses and Dikes

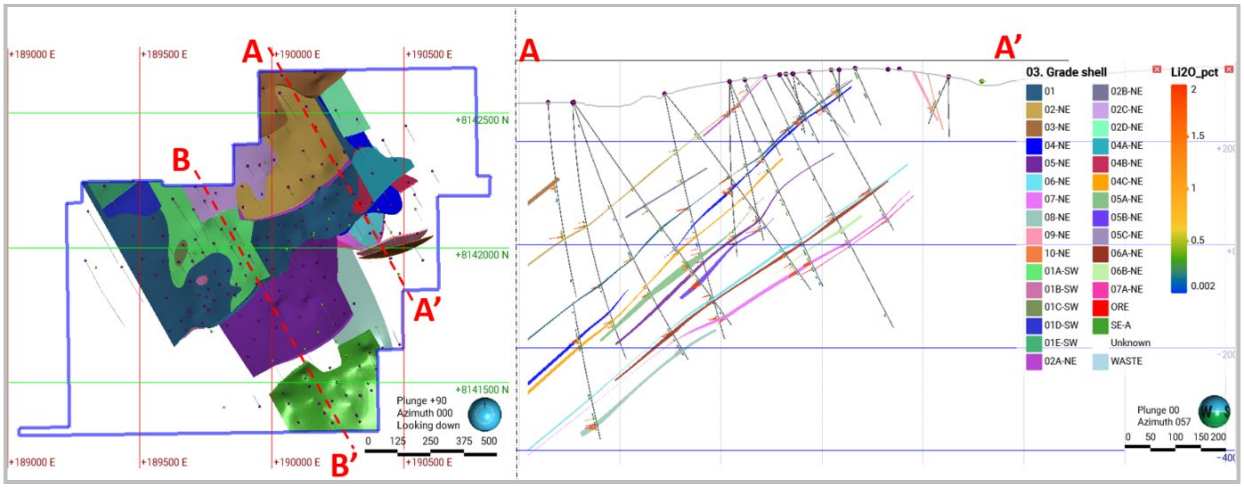


Figure 14-4: Spodumene Grade Shells Modelled With Assays Composites Li2O > 0.3 % - Left, Plan View with Cross-Sections Labelled; Right, Section View of Cross-Section A-A

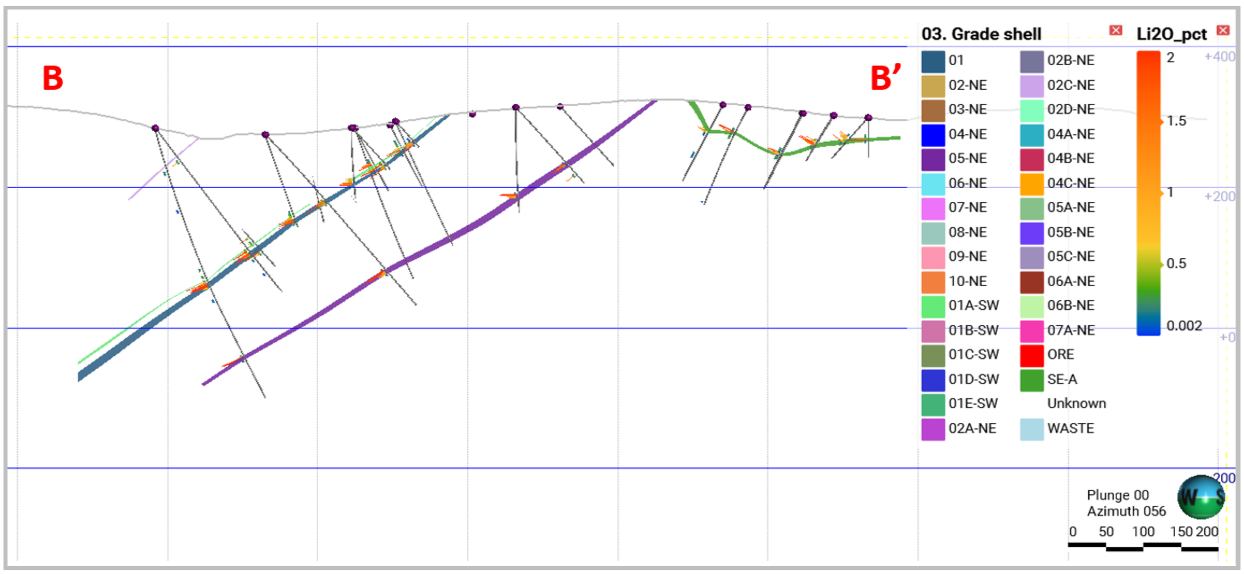


Figure 14-5: Spodumene Grade Shells Model—Assay Composites Li2O > 0.3 %, Section View of Cross-Section B–B' in Figure 14-4 (Left)

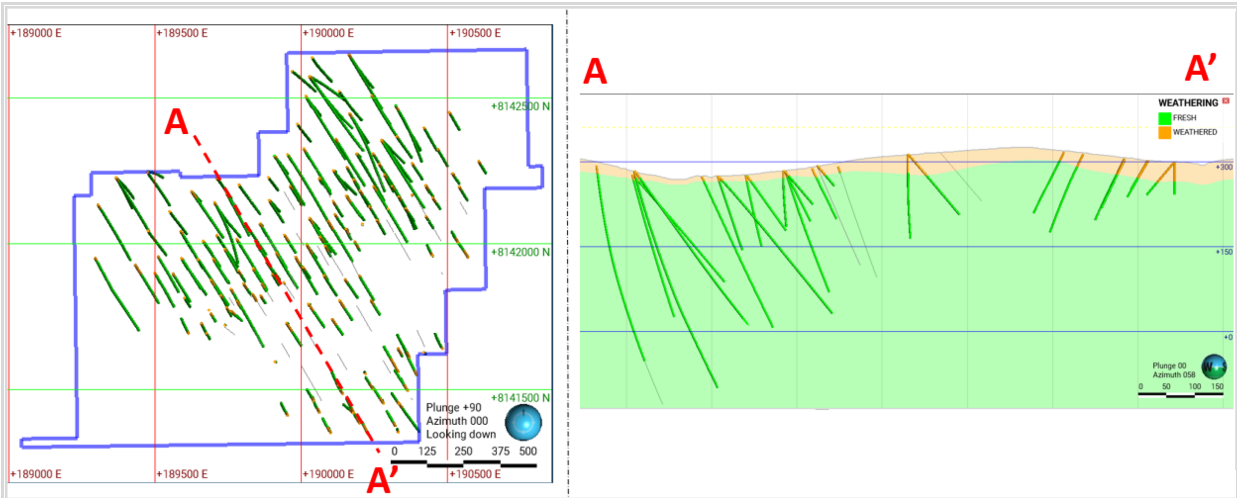
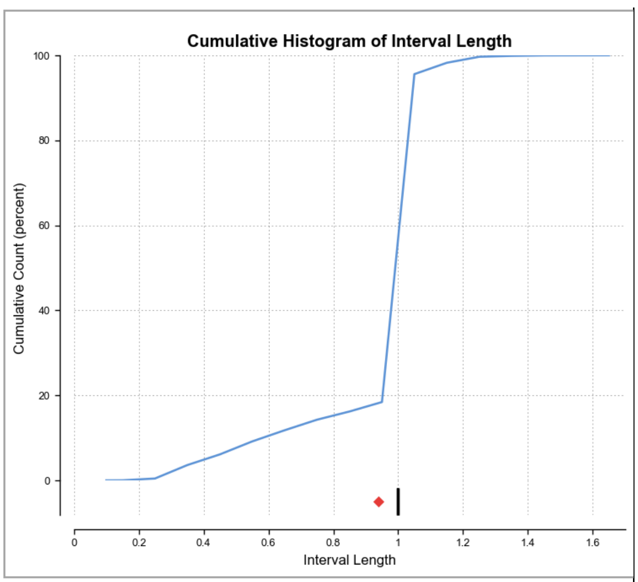


Figure 14-6: Weathering Zone Model - Left, Plan View with Cross-Sections Labelled; Right, Section View of Cross-Section A–A'

14.3 Geostatistical Structural Analysis

14.3.1 Regularization of Samples

The geostatistical structural analysis of the sample support showed that more than 95% of the drilling samples have a length equal to 1 m. GE21 performed the regularization of samples in 1 m for the complementary studies of statistics and geostatistics (Figure 14-7).



	Value
Count	7,351
Mean	0.937985
SD	0.183954
CV	0.196116
Variance	0.033839
Minimum	0.2
Q1	1
Q2	1
Q3	1
Maximum	1.5

Figure 14-7: Bandeira Project Assay Interval Length Statistics

14.3.2 Exploratory Data Analysis

Exploratory data analysis yielded statistics on 161 composited drilling samples performed for the Li_2O% variable inside each modelled typology. Figure 14-8 shows the statistics for pegmatite veins.

Statistical analysis on composite core samples was performed for the variable Li_2O% within each modeled typology. Figure 14-8 shows pegmatite mineralization statistics.

14.3.3 Variographic Analysis

The structural analysis of the domains was conducted to determine the variographic parameters, which are essential for determining the spatial continuity model of the grade variables and for the grade estimate.

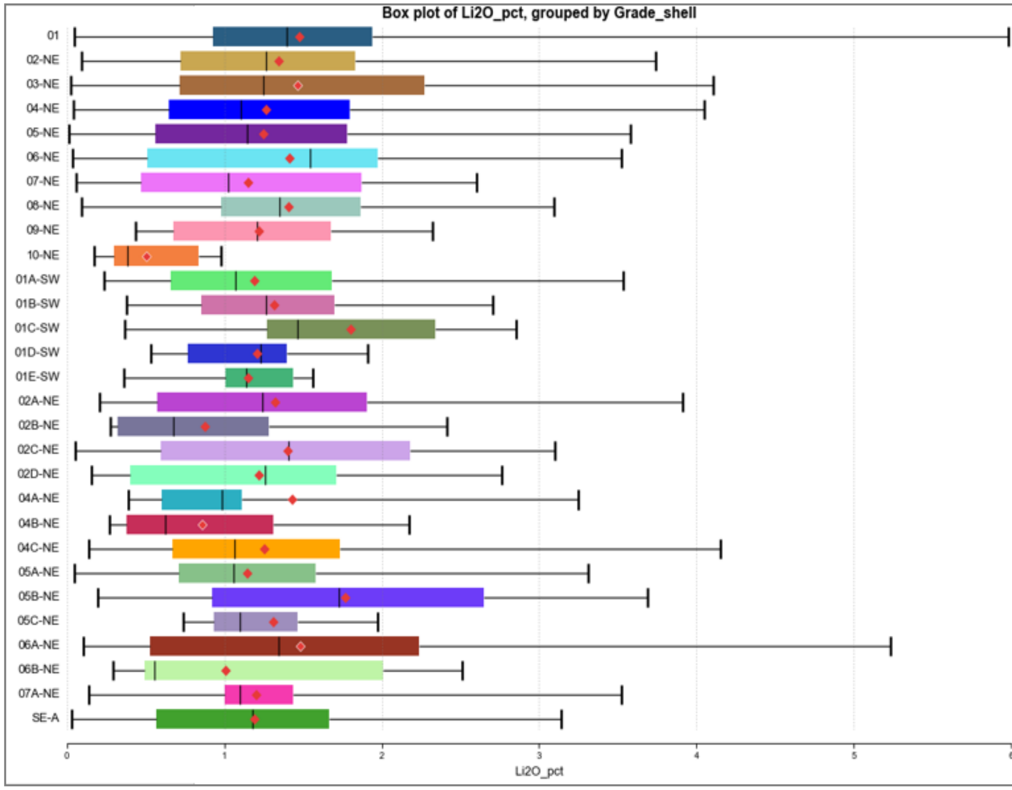
Variograms were generated explicitly for Li_2O% within the spodumene veins suite. This approach considered the geological similarity among them, enhancing the robustness of the variograms. Two distinct sets of veins were considered:

- NW Veins Suite
- SE Veins Suite.

The variographic analysis was executed using Leapfrog Edge software. Figure 14-9 to Figure 14-12 show the variograms for the Li_2O% variable for each set of vein domains. Additionally, Table 14-1 presents the variographic parameters obtained from all conducted analyses. These parameters were applied in the process of grade estimation.

Table 14-1: Variographic Parameters

Variogram Name	Variance	Nugget	Normalized Nugget	Structures	Sill	Normalized Sill	Structure	Major	Semi-Major	Minor	Dip (°)	Dip Azi. (°)	Pitch
NW	0.65	0.14	0.22	Structure 1	0.26	0.41	Spherical	75	45	2	37	323	0
				Structure 2	0.24	0.37	Spherical	130	89	3	37	323	0
SE	0.47	0.16	0.33	Structure 1	0.09	0.19	Spherical	60	40	2	0	58	90
				Structure 2	0.22	0.48	Spherical	85	50	3	0	58	90



Name	Count	Length	Mean	Std. dev.	Coeff. var.	Variance	Minimum	L. quartile	Median	U. quartile	Maximum
Li2O_pct	7,064	6,804.0	0.540478	0.690459	1.2775	0.476733	0.002	0.12665	0.238	0.63124	5.985
01	594	562.1	1.47871	0.763345	0.516222	0.582695	0.046	0.929	1.397	1.942	5.985
02-NE	106	100.1	1.34513	0.820791	0.610193	0.673697	0.093	0.722	1.262	1.833	3.742
03-NE	70	69.2	1.4675	1.02644	0.699447	1.05358	0.024	0.71454	1.246	2.269	4.104
04-NE	171	161.9	1.26206	0.79783	0.632166	0.636533	0.039	0.6489	1.10179	1.795	4.05
05-NE	242	232.2	1.24704	0.828625	0.664472	0.686619	0.015	0.5602	1.147	1.779	3.58269
06-NE	48	42.5	1.41435	0.944216	0.667599	0.891544	0.038	0.507	1.546	1.975	3.522
07-NE	71	65.6	1.15233	0.727981	0.631745	0.529957	0.058	0.46971	1.02179	1.86844	2.604
09-NE	9	8.1	1.22153	0.633566	0.518666	0.401406	0.433	0.673	1.205	1.678	2.32
01A-SW	97	88.6	1.19037	0.6666	0.559995	0.444355	0.23652	0.66102	1.068	1.68172	3.537
01B-SW	23	22.5	1.31425	0.640099	0.487046	0.409727	0.377	0.855	1.263	1.699	2.707
01C-SW	11	9.2	1.79961	0.73229	0.406916	0.536248	0.365	1.27	1.467	2.341	2.855
01D-SW	10	10.0	1.21017	0.459992	0.380105	0.211592	0.534221	0.765	1.233	1.398	1.913
01E-SW	10	8.5	1.14917	0.375371	0.326644	0.140903	0.363	1.007	1.137	1.436	1.564
02A-NE	58	53.7	1.32031	0.836477	0.633548	0.699694	0.206	0.57248	1.243	1.90658	3.91058
02B-NE	19	16.9	0.875478	0.638046	0.728797	0.407103	0.276	0.32292	0.67811	1.282	2.415
02C-NE	24	21.4	1.40064	0.940936	0.67179	0.88536	0.053	0.594	1.406	2.181	3.103
04A-NE	5	4.1	1.42798	1.19326	0.835631	1.42388	0.387	0.6	0.982	1.108	3.249
04B-NE	9	8.3	0.858053	0.681358	0.794074	0.464248	0.268	0.381	0.622	1.311	2.172
04C-NE	61	58.4	1.25181	0.806953	0.64463	0.651173	0.13664	0.669	1.067	1.73456	4.151
05A-NE	81	79.4	1.14403	0.649803	0.567993	0.422243	0.04797	0.71026	1.05796	1.581	3.313
05B-NE	30	27.4	1.76887	0.994974	0.56249	0.989973	0.195	0.919	1.728	2.647	3.692
05C-NE	5	4.1	1.31182	0.510679	0.389291	0.260793	0.737	0.935	1.101	1.467	1.974
06A-NE	51	46.2	1.47931	1.08356	0.732476	1.17411	0.10499	0.52619	1.34364	2.238	5.234
06B-NE	18	17.2	1.00769	0.802843	0.796714	0.644558	0.2949	0.49	0.55386	2.0086	2.512
07A-NE	14	13.0	1.20233	0.827466	0.688219	0.6847	0.13703	1.001	1.09785	1.438	3.524
SE-A	168	163.7	1.19153	0.687624	0.577093	0.472826	0.031	0.56802	1.181	1.665	3.14
02D-NE	11	10.8	1.22054	0.825564	0.676393	0.681555	0.153	0.401	1.258	1.708	2.762
08-NE	64	62.6	1.4096	0.737998	0.523552	0.544641	0.092	0.97585	1.35258	1.8638	3.09453
10-NE	6	5.6	0.505807	0.298262	0.589675	0.0889602	0.174	0.298	0.384	0.834	0.978

Figure 14-8: Li$_2$O (%) Spodumene Pegmatite Veins Model Statistics—Left, Box Plots; Right, Statistics

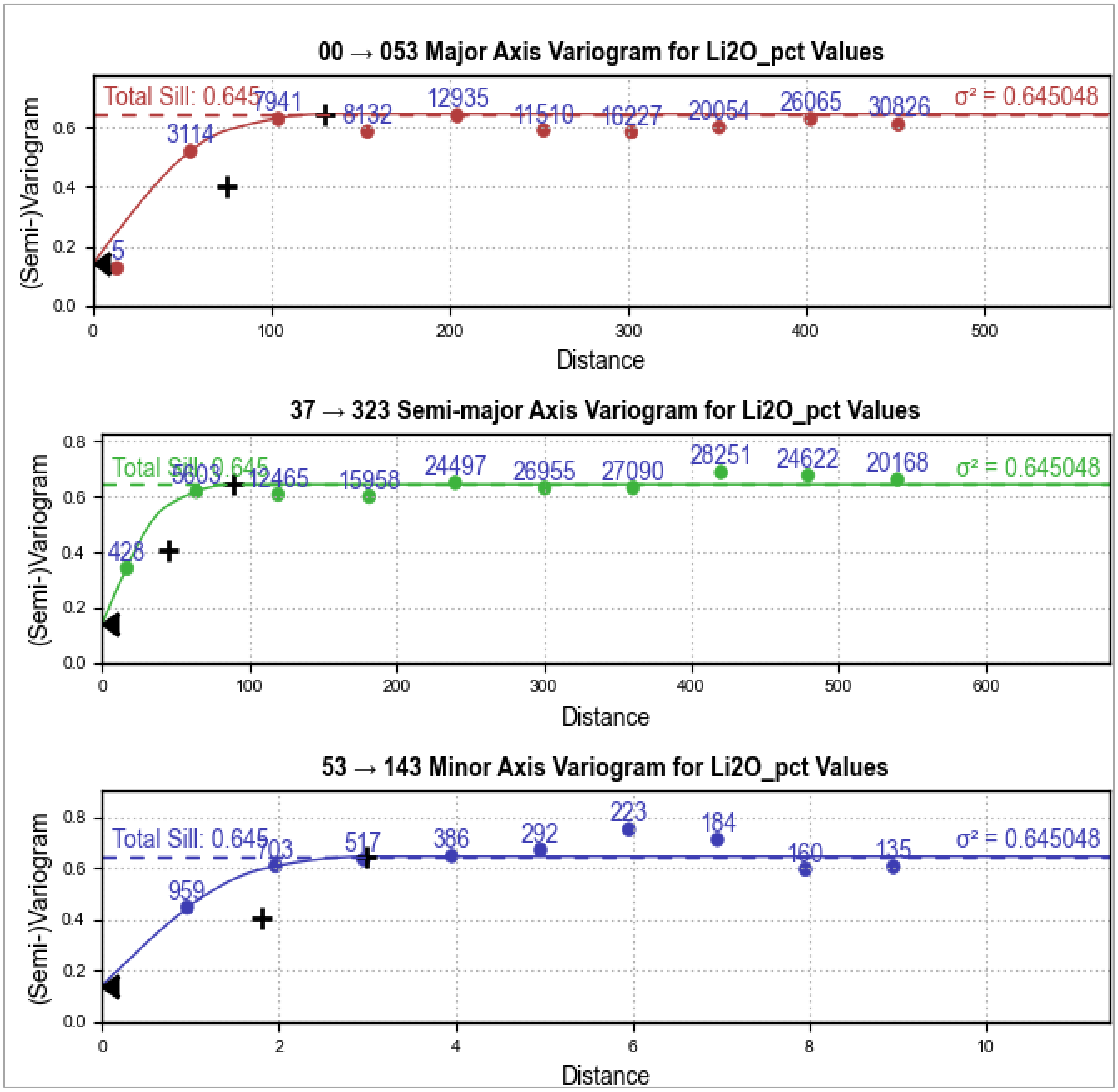


Figure 14-9: Variographic Model—Domains Set NW

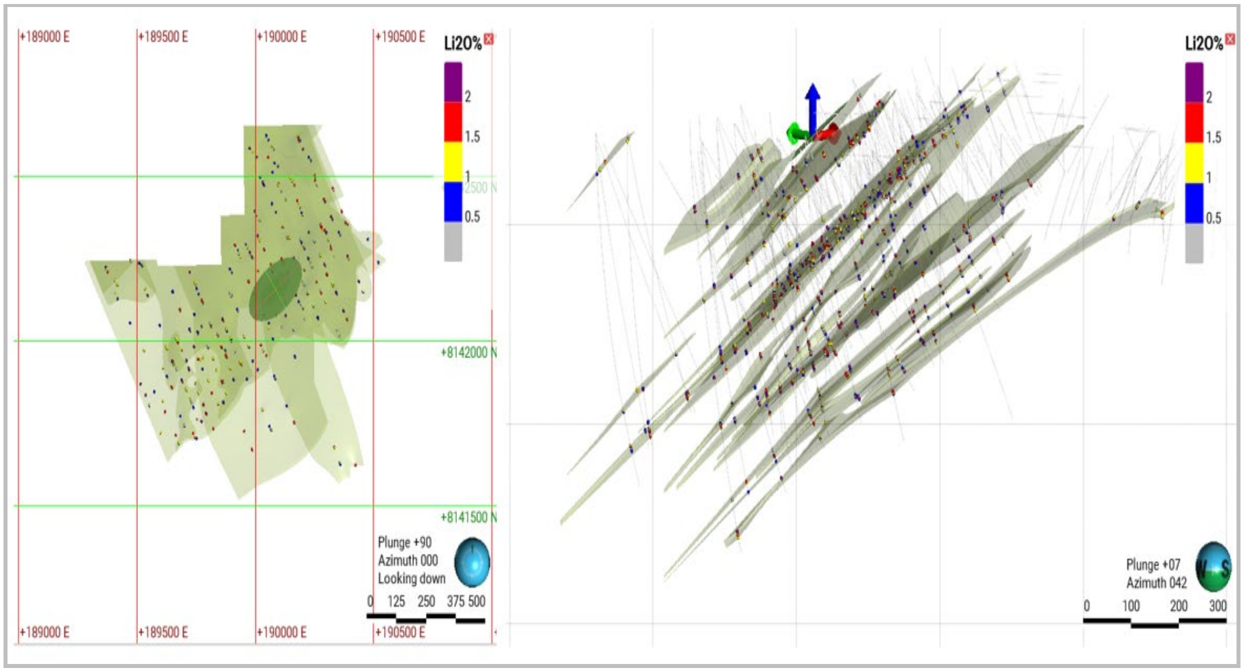


Figure 14-10: Variographic for the Li_2O%

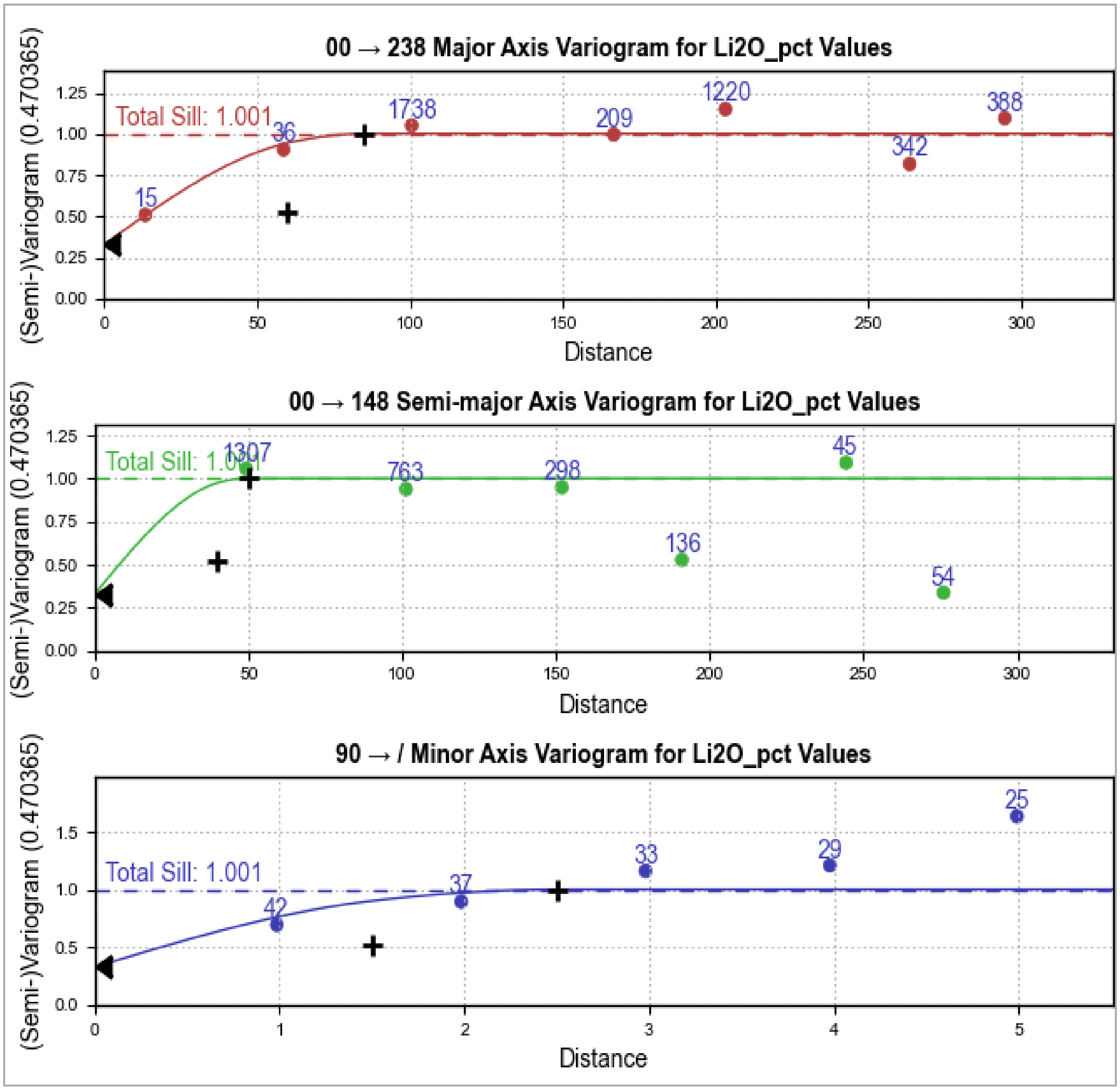


Figure 14-11: Variographic Model—Domains Set SE

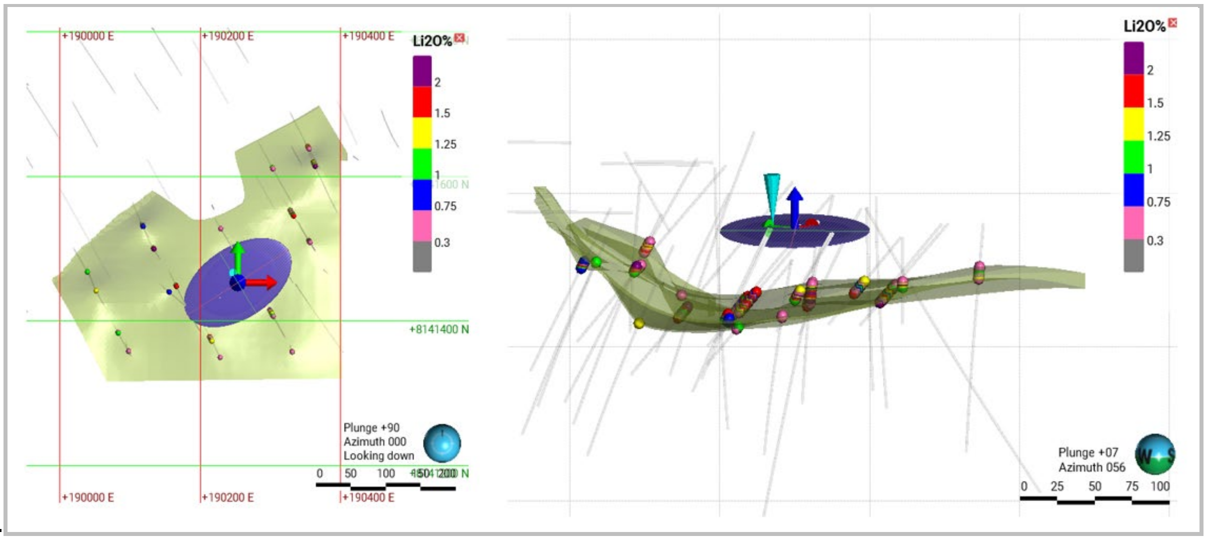


Figure 14-12: Variographic Ellipsoid—Domains set SE

14.4 Block Model

A block model was built to carry out the grade estimation. The model's dimensions—12 m x 12 m x 4 m—were defined based on the minimum spacing of the drilling grid. The sub-blocks model was set in a 1.5 m x 1.5 m x 2 m size to ensure the geometric adherence of the modelled bodies.

The block models dimensions and attributes are shown in Table 14-2 and Table 14-3.

Table 14-2: Block Model Dimensions

	X	Y	Z
Minimum Coordinates (m)	189,018	8,141,277	−467
Maximum Coordinates (m)	190,854	8,142,705	409
Number of nodes	154	120	220
Origin (Center) (m)	189,012	8,141,271	−469
Origin (Corner) (m)	190,860	8,142,711	411
Block size (m)	12	12	4
Sub-Block	1,5	1,5	2

Notes: Azimuth: 0 degrees (rotate clockwise around the Z axis when looking down).
Dip: 0 degrees (then turn around the X' axis down from the horizontal plane).
Pitch: 0 degrees (then rotate clockwise around the Z'' axis when looking down).

Table 14-3: Block Model Variables Summary

Attribute Name	Type	Deals	Background	Description
GM_weat	Character	-		Weathering model
GM_ grad	Character	-		Spodumene veins model
Class	Character	-		Mineral classification
Density	Real	4	−99	Density values
GM_miner	Character	-		Bandeira mineral right

Attribute Name	Type	Deals	Background	Description
Li_2O_ok	Real	4	−99	Li_2O OK estimation

14.5 Grade Estimation

The ordinary kriging (OK) was carried out using Leapfrog Edge software and was used on the Li_2O (%) variable estimation based on the structural analysis results described in this Technical Report.

Each mineralized vein was estimated independently using a hard-boundary strategy, ensuring that samples from one domain did not influence neighbouring domains. The variograms were initially modelled considering the structural continuity across the entire set of domains, followed by an adjustment to honour the specific behaviour for each domain. Table 14-4 shows the main parameters of the kriging strategy applied in the grade estimation.

Table 14-4: Kriging Parameters

Type	Steps	Ellipsoid Ranges			Number of Samples	
		Maximum	Intermediate	Minimum	Minimum	Maximum
Li_2O	Step 1	50	50	4	7	16
	Step 2	100	100	8	7	16
	Step 3	150	150	16	4	16
	Step 4	1500	1500	1600	4	16

Notes: Dynamic variable orientation for estimation was applied to each domain in Leapfrog software.
Moving neighbourhood from ellipsoid—Dip = 37°; Dip Azimuth = 323°; Pitch = 00° (NW Veins).
Moving neighbourhood from ellipsoid—Dip = 00°; Dip Azimuth = 058°; Pitch = 90° (SE Veins).
Step 1 and 2—maximum number of samples per drill = 3.
Step 3 and 4—maximum number of samples per drill = 2.

14.6 Estimation Validation

The QP carried out validation of the estimate through visual verification and by the global and local bias verification.

Global and local bias checks used the nearest neighbour (NN) as the comparison estimate.

NN-check plots (Figure 14-13 and Figure 14-14) show the results for global bias analysis of the estimated Li_2O% and density variables. It allows verifying the expected estimation smoothing by OK within the acceptance limits. The comparison showed that OK globally respected the average grades, and the global bias in the estimated grades is within acceptance limits.

The local bias assessment by the swath-plot method aims to analyze the occurrence of local bias by comparing the average grades for the model through OK and the NN method in swath coordinate intervals graphs along the X, Y, and Z axes. Figure 14-15 and Figure 14-16 show the validation results of the Li_2O% and density swath plots.

The results from the grade estimate OK validation show that the smoothing effect, or local and global bias, are inside acceptance limits for a Mineral Resource estimation

14.7 Density

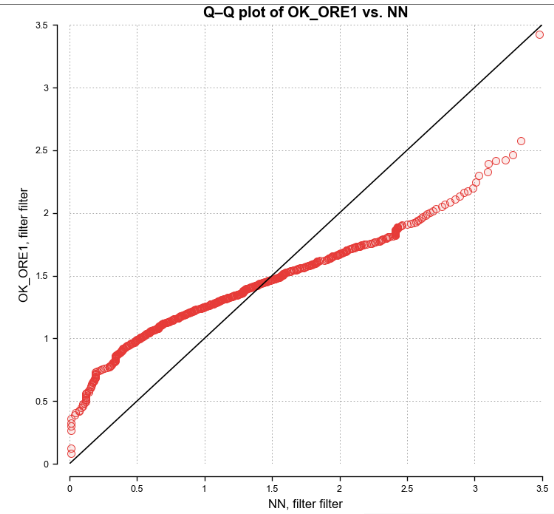
The density (g/cm³) in the spodumene pegmatites was estimated using inverse distance weighting (IDW). There parameters were used for IDW are, Exponent 2, with minimum samples 1 and maximum samples 28.

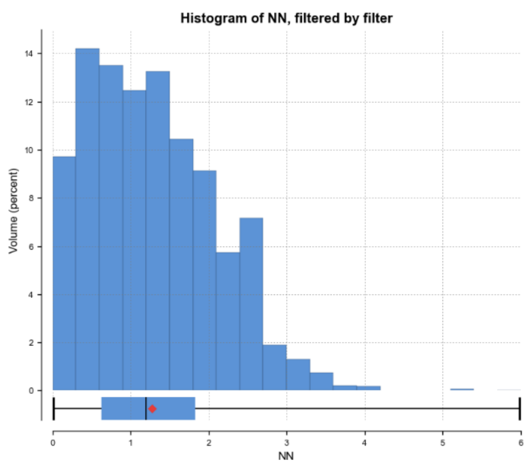
The schist density was defined as the mean of the 4,830 samples from the MGLIT database. The weathered zone does not have measurements, and GE21 has adopted the value of 1.8 g/cm³ for this domain, a common value used by other companies in the Jequitinhonha Valley region. GE21 recommends that additional density tests be carried out in weathered zones.

Table 14-5 shows the average IDW densities of each estimated pegmatite domain, and the adopted densities of the host rocks.

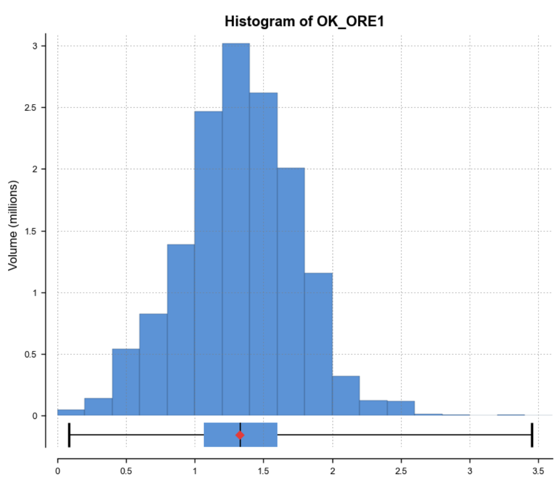
Table 14-5: Density Values

Spodumene Domains	Density (g/cm³)	Domains	Density (g/cm³)
01	2.68	Shist rocks	2.76
02-NE	2.65	Weathered zone	1.8
03-NE	2.69		
04-NE	2.66		
05-NE	2.69		
06-NE	2.69		
07-NE	2.71		
08-NE	2.71		
09-NE	2.31		
10-NE	2.38		
01A-SW	2.69		
01B-SW	2.68		
01C-SW	2.67		
01D-SW	2.71		
01E-SW	2.28		
02A-NE	2.54		
02B-NE	2.72		
02C-NE	2.66		
02D-NE	2.63		
04A-NE	2.52		
04B-NE	2.47		
04C-NE	2.69		
05A-NE	2.66		
05B-NE	2.69		
05C-NE	2.68		
06A-NE	2.70		
06B-NE	2.69		
07A-NE	2.71		
SE-A	2.62		
Average Density	2.68		



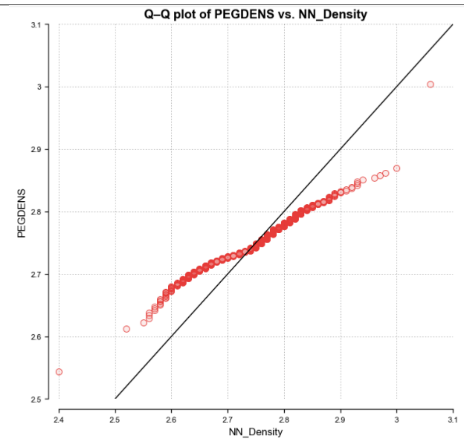


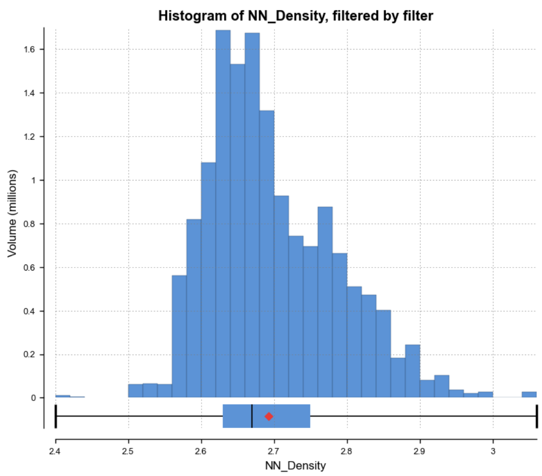
	Weighted Value
Block Count	1,364,631
Volume	14,877,130.5
Mean	1.27952
SD	0.807438
CV	0.631047
Variance	0.651955
Minimum	0.015
Q1	0.63
Q2	1.201
Q3	1.831
Maximum	5.985



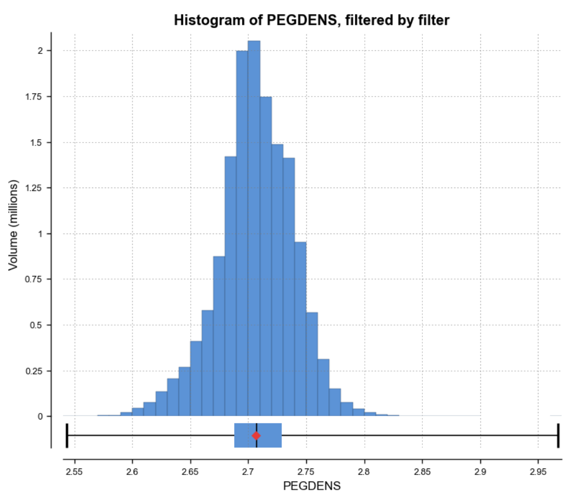
	Weighted Value
Block Count	1,352,656
Volume	14,806,975.5
Mean	1.32757
SD	0.413057
CV	0.311138
Variance	0.170616
Minimum	0.0859873
Q1	1.06901
Q2	1.33123
Q3	1.60432
Maximum	3.44874

Figure 14-13: Estimation Validation—NN Check to Li2O





	Weighted Value
Block Count	1,364,631
Volume	14,877,130.5
Mean	2.69245
SD	0.0885504
CV	0.0328884
Variance	0.00784117
Minimum	2.4
Q1	2.63
Q2	2.67
Q3	2.75
Maximum	3.06



	Weighted Value
Block Count	1,364,631
Volume	14,877,130.5
Mean	2.70663
SD	0.0327248
CV	0.0120906
Variance	0.00107091
Minimum	2.54351
Q1	2.68804
Q2	2.70698
Q3	2.72886
Maximum	2.96703

Figure 14-14: Estimation Validation—NN Check to Density

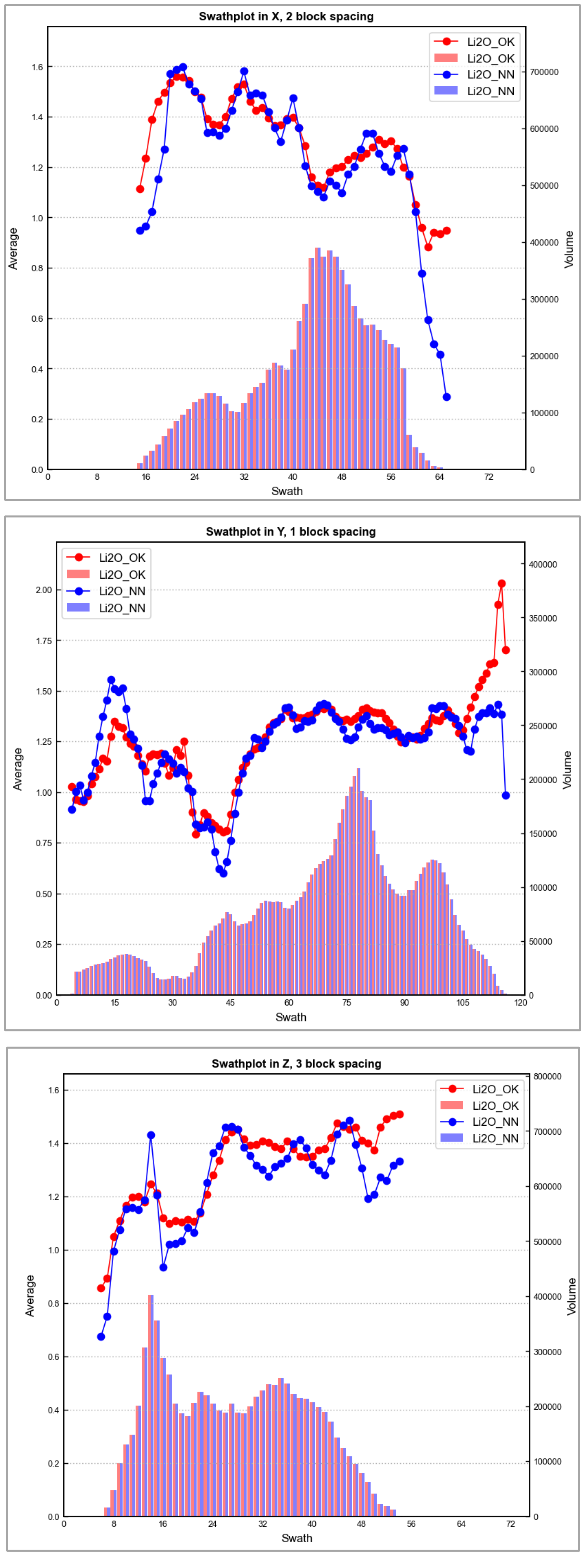


Figure 14-15: Estimation Validation—Swath Plot Li_2O

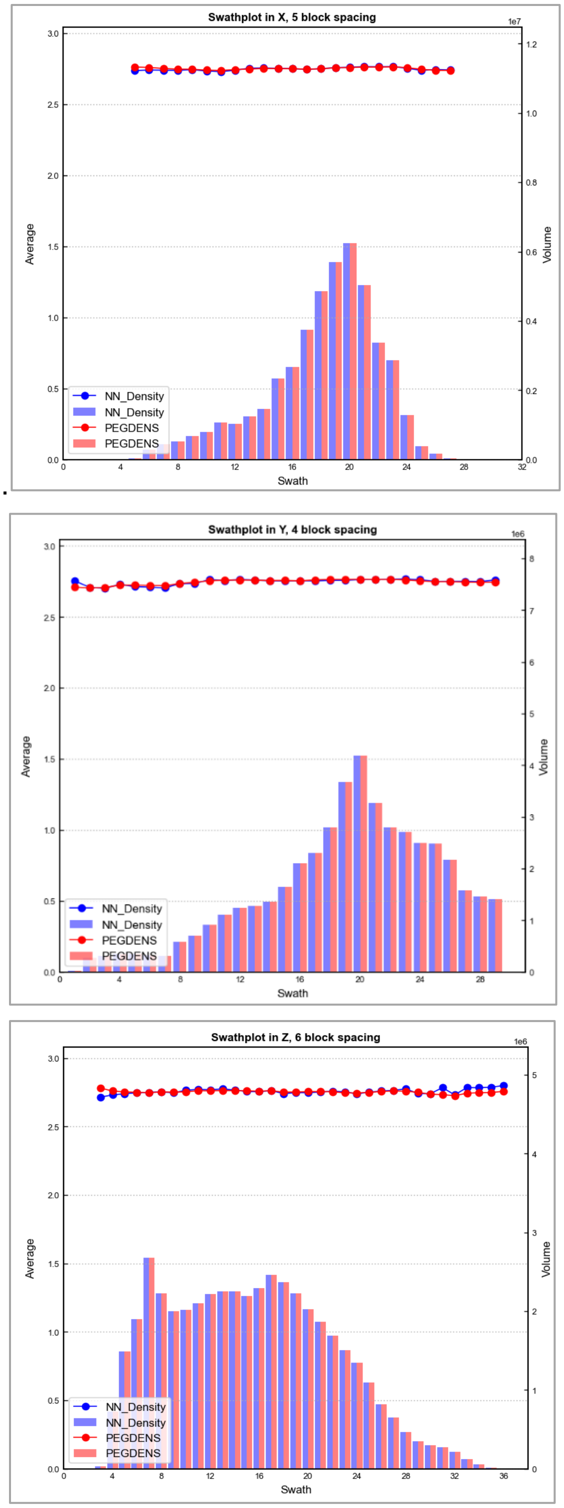


Figure 14-16: Estimation Validation—Swath Plot Density

14.8 Classification Of Mineral Resources

The Mineral Resource was classified per CIM Definition Standards and Guidelines, using geostatistical and classical methods, and economic and mining-appropriate parameters relevant to the deposit type.

CIM's Mineral Resource definitions are transcribed below:

- A Mineral Resource is a concentration or occurrence of diamonds, a natural solid inorganic material or natural fossilized solid organic material, including base and precious metals, coal and industrial minerals in the earth's crust or the earth's crust in such form and quantity and of such grade or quality that allows reasonable prospects of economic extraction. The location, quantity, level, geological characteristics, and continuity of a Mineral Resource are known, estimated, or interpreted from specific geological evidence and knowledge.
- An "Inferred Mineral Resource" is that part of a Mineral Resource for which the quantity and level or quality can be estimated based on geological evidence and limited sampling and reasonably presumed but not verified geological and grade continuity. The estimation is based on limited information and sampling collected using appropriate techniques from locations such as outcrops, trenches, wells, and drill holes.
- An "Indicated Mineral Resource" is that part of a Mineral Resource for which quantity, grade or quality, densities, shape and physical characteristics can be estimated with a level of confidence sufficient to allow the appropriate application of technical and economic parameters to support mine planning and assessment of the deposit's economic viability. The estimation is based on thorough and reliable exploration and testing information gathered using appropriate techniques from locations such as outcrops, trenches, wells, works, and drill holes spaced far enough apart for geological and level continuity to be reasonably assumed.
- A "Measured Mineral Resource" is that part of a Mineral Resource for which quantity, level or quality, densities, shape, and physical characteristics are so well established that they can be estimated with sufficient confidence to allow the appropriate application of technical and economic parameters, to support production planning and assessment of the deposit's economic viability. The estimation is based on thorough and reliable exploration, sampling, and analysis of information gathered using appropriate techniques from locations such as outcrops, trenches, wells, works, and drill holes spaced far enough apart to confirm geological and level continuity.

GE21 made classification boundaries for the Measured, Indicated, and Inferred categories using an approach that considered a comprehensive set of factors. These factors included sampling procedure analysis, sample grid spacing, survey methodology, and quality of assay data. Additionally, drill spacing and the progressive expansion of the search radius during grade estimation stages were also considered, as well as the average anisotropic distance of the samples and the continuity of pegmatite mineralization. This multi-faceted approach ensured the robustness and accuracy of the classification process.

- The Measured Mineral Resource classification referenced the 50 meters of the average Euclidean distance to sample (AvgD) used in OK estimation with a minimum of seven composites in at least three different drill holes.

- The Indicated Mineral Resource classification referenced the 100 meters of the AvgD used in OK with a minimum of seven composites in at least three different drill holes.
- The Inferred Mineral Resource classification comprises all remaining estimated blocks.
- The total Mineral Resources were limited to the mining rights boundaries.

The resource classification was supported by a grade shell representing the underground mining appliance (Reasonable Prospect for Eventual Economic Extraction—RPE3), performed through a restricted wireframe based on a grade shell elaborated considering a cut-off of 0.5% Li_2O.

The Bandeira Project Mineral Resource estimate results are shown in Table 14-6, Figure 14-17 and Figure 14-18.

Table 14-6: Bandeira Project Mineral Resource Estimates (Base-Case Cut-Off Grade of 0.5 % Li_2O)

Category	Resource (Mt)	Grade (% Li_2O)	Contained LCE (kt)
Measured	3.42	1.39	117.61
Indicated	17.52	1.34	578.92
Measured + Indicated	20.95	1.35	696.52
Inferred	16.91	1.40	583.53

Notes:

1. *The spodumene pegmatite domains were modelled using composites with Li_2O grades greater than 0.3%.*
2. *The Mineral Resource estimates (MRE) were prepared in accordance with the CIM Definition Standards and Guidelines, using geostatistical and classical methods, plus economic and mining parameters appropriate to the deposit.*
3. *Mineral Resources are not ore reserves or demonstrably economically recoverable.*
4. *Grades reported using dry density.*
5. *The effective date of the MRE is November 13, 2023.*
6. *Geologist Carlos José Evangelista da Silva (MAIG #7868) is the QP responsible for the MRE.*
7. *The MRE numbers have been rounded up for the purpose of estimate relative precision. Values cannot be added accurately due to rounding.*
8. *The MRE is delimited by Lithium Ionic Bandeira Project target claims (ANM).*
9. *The MRE was estimated using OK in 12 m x 12 m x 4 m blocks.*
10. *The MRE report table was produced using Leapfrog Geo software.*
11. *The reported MRE contains only fresh rock domains.*

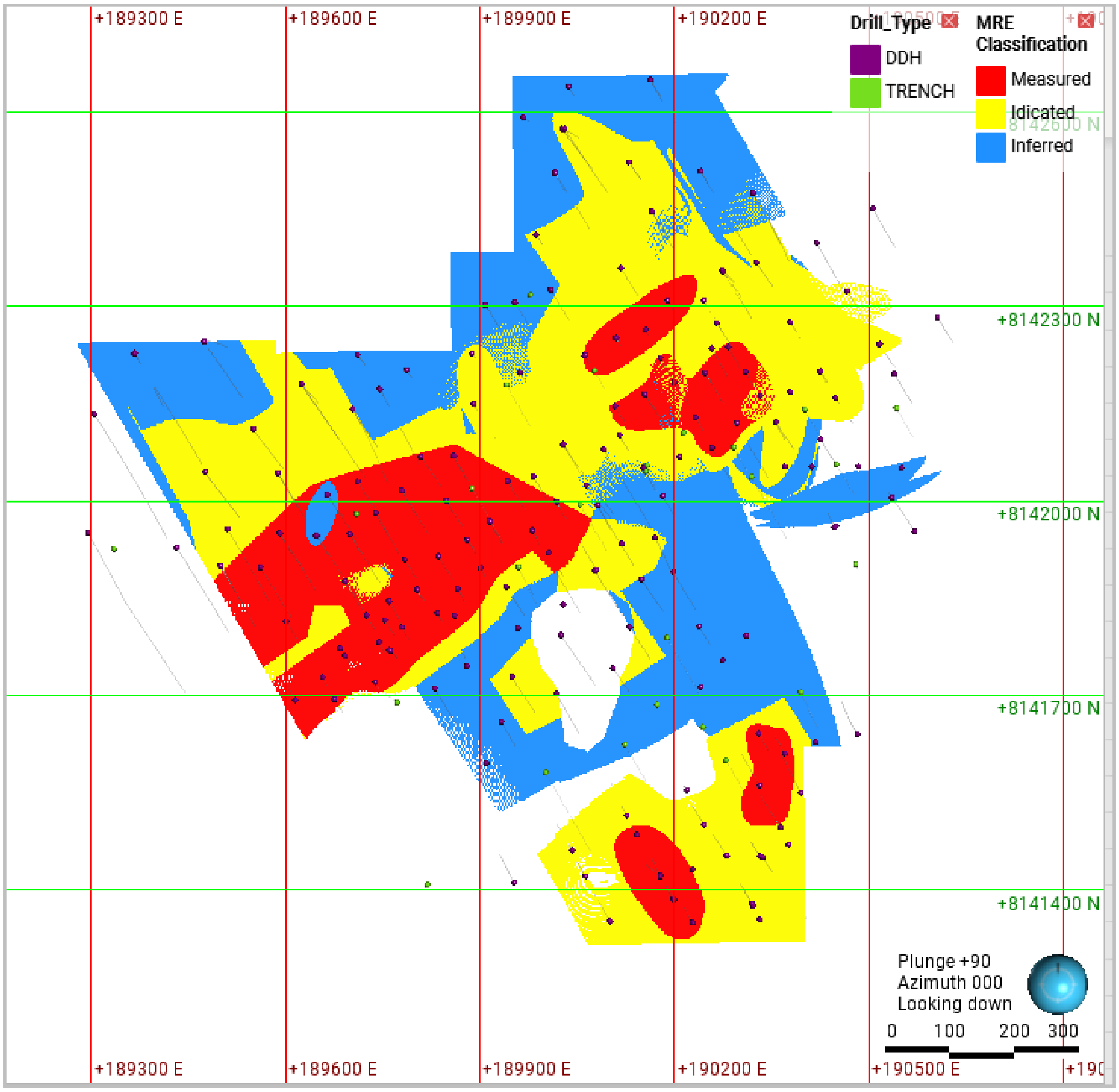


Figure 14-17: Resource Classification with RPE3—Plan view

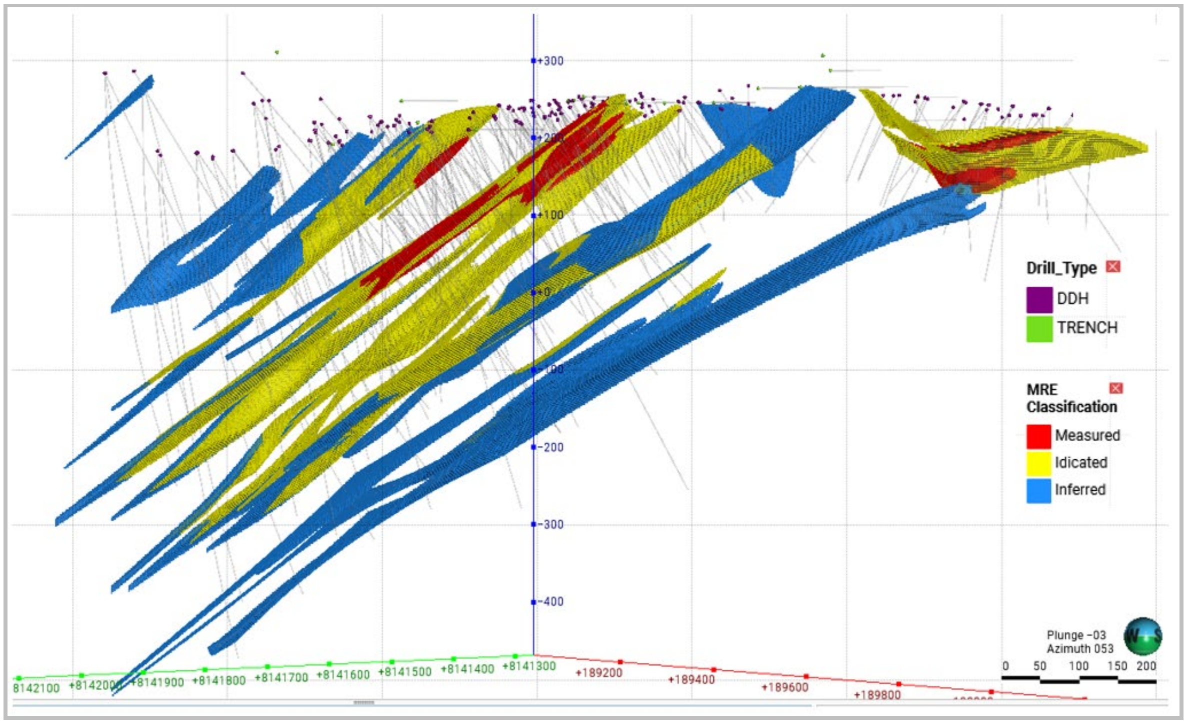


Figure 14-18: Resource Classification with RPE3—Oblique View

15.0 MINERAL RESERVE ESTIMATES

This section details the Mineral Reserve at the Bandeira Project, which was converted from Measured and Indicated Mineral Resources completed on February 20, 2024.

MGLIT meticulously follows the Mineral Reserve estimation standards set by the National Instrument 43-101 and the CIM Standards. These standards ensure that only resource block models classified as Measured or Indicated Mineral Resources, with a grade above the economic cut-off grade and economically mineable based on the mining parameters, are converted to Mineral Reserves. It is important to note that these reporting standards exclude Inferred Mineral Resources from Mineral Reserve estimates, which is why they are not included in the Mineral Resource estimate.

The Mineral Reserve estimates were made using metal prices and foreign exchange rates in accordance with SEC Industry Guide 7. Industry Guide 7 requires the use of prices that reflect current economic conditions at the time of Mineral Reserve determination. The assumptions used in this Mineral Reserve estimate for the period ending February 20, 2024, are a selling price of US$1,900/t of concentrate at 5.5% Li_2O and a R$ to US$ exchange rate of R$5.07 to US$1.00.

There are no known mining, metallurgical, infrastructure, permitting, or other relevant factors that could materially affect the Mineral Reserve estimates.

The Mineral Reserve estimates for the Bandeira Project are shown in Table 15.1.

Table 15.1: Bandeira Project Mineral Reserve, dated February 20, 2024

Ore Reserve Class	Volume (Mm^3)	Mass (dry Mt)	Li_2O (%)	Contained Li_2O (t)
Proven	0.85	2.30	1.17	26,910
Probable	5.50	14.90	1.15	171,350
Total	**6.35**	**17.20**	**1.16**	**199,520**

Notes:

1. The Mineral Resources dated November 13, 2023, are the basis for the Ore Reserve.
2. Only the Measured and Indicated Mineral Resources for the Project have been considered as potentially economic for the mining study.
3. Conventional sublevel stoping and room-and-pillar mining methods and equipment have been proposed.
4. Mineral ore reserve grades are diluted along lithological boundaries and assume a selective mining operation.
5. For the sublevel stoping mining method, ore reserve volumes and tonnages assume 90% mine recovery, 14% of planned dilution, and 0% of operational dilution since the stopes are being cabled.
6. For the room-and-pillar mining method, mineral ore reserve volumes and tonnages assume 100% mine recovery, 9% of planned dilution, and 10% of operational dilution due to overbreaking.
7. For the ore from development works, ore reserve volumes and tonnages assume 100% mine recovery, 46% of planned dilution, and 10% of operational dilution due to overbreaking.
8. Considering all three variations of extraction methods adopted in this project, the average dilution rate is 17%.
9. An original assumed set of optimization parameters was used in the derivation of the current LOM plan, which was developed as part of this Feasibility Study.
10. The mineral ore reserve has been reported within an optimized and engineered underground mining project with a total of 3.27 Mt of waste materials originating from the development works, determined assuming a long-term Li2O price of US$1,900/t of concentrate with 5.5% Li_2O content.
11. The processing plant is expected to produce at a maximum feed rate of 1.3 Mt/a (dry basis).

16.0 MINING METHODS

This section summarizes the underground mine studies developed for the Bandeira Project. The Bandeira Project mine design contemplates two underground mining methods.

The primary ore bodies, accounting for approximately 16.2 Mt of the deposit, are proposed to be extracted using a bottom-up longhole sublevel stoping method. Simultaneously, the secondary southeast ore body, comprising approximately 1.0 Mt, is expected to be mined using the room-and-pillar method.

The selection of the mine method took into consideration the dip of the veins present in the ore body, one being more horizontally oriented and the other more vertically oriented.

The production of run-of-mine (ROM) ore is scheduled to be 1.3 Mt/a on a dry basis. The concentrate production is given by the following formula:

Production of Concentrate (t) = (metallurgical recovery (%)/concentrate grade (%) x (ROM (t) x Li_2O Content (%).

The metallurgical recovery assumed is 68.9%, and the Li_2O concentrate grade is 5.50%.

A gradual increase in ore production will occur over the first years of production until reaching the nominal capacity of the Project.

The focus in the first year is on developing the two main declines and incorporating multiblast techniques to enhance operational efficiency. Over the second year, room-and-pillar mining begins at a slower pace comparing to mine full capacity, gradually increasing production as the mine is developed and more mining faces become operational simultaneously. Full capacity is reached after three years of work counting from the beginning of the mining operation.

Regarding sublevel stoping production, a ramp-up period of four years is considered since the start of mine's opening. Production increases as the mine develops, reaching 1.1 Mt/a in the second year of plant production.

The mine's production operating schedule will be three six-hour shifts per day, with a two-hour interval between shifts for mining ventilation to dissipate blasting gases. The mine will operate 360 days per year, totalling 6,480 hours of planned production per year. The administrative operating schedule will be one nine-hour shift per day, including one hour for lunch, during the weekdays.

16.1 Geotechnical Characterization

The information obtained so far from the geotechnical description of the drill-core samples and results obtained in laboratory tests for the different lithological types of the Bandeira Project target, allows the definition of different geotechnical domains.

The predominant lithology is schists (host rock) and pegmatites (ore). From observations of discontinuities and anisotropies through geotechnical descriptions of the drill-core samples, the presence of at least two families of discontinuities were identified. Generally, these structures have small openings and do not contain filling material.

The structural conditions should be better investigated through geotechnical mapping surveys during the implementation of mining operations to better understand the behaviour of these geothecnical structures in the massif in relation to excavation openings and slope stability. However, the data and information obtained from the descriptions of the drill-core samples can be considered sufficient for geomechanical characterization and classification work, allowing the definition of resistance parameters and geotechnical indices that enable the development of project work for the implementation of the mining activities planned for the Bandeira Project target.

The geomechanical domains were classificated from the geotechnical description of the drill-core samples, which allowed the determination of fracturing patterns, rock-quality designation (RQD) indexes, degree of alteration, and characteristics of the discontinuities.

Also for this study was adopted Rock mass Rating (RMR), a system for classifying the quality of rock masses in geotechnical engineering. It is used to evaluate rock stability and determine the feasibility and necessary support for engineering projects such as tunnels, foundations, and slopes.

The RMR system was developed by Z.T. Bieniawski in 1973 and is widely used to classify rock masses based on several geotechnical parameters. These parameters include:

The classification is given on a scale from 0 to 100, with higher values indicating better rock mass conditions. Based on the RMR, rock quality is classified into five main categories:

- Very good (RMR 81-100)
- Good (RMR 61-80)
- Fair (RMR 41-60)
- Poor (RMR 21-40)
- Very poor (RMR <20).

16.1.1 Soil/Saprolite Domain

The soil and saprolite domain corresponds to an interval of approximately from the surface to 25.0 m below the surface of the massif, characterized by an intense weathering process that determines a predominant alteration pattern (W6/W5) and very low mechanical resistance parameters, with an R0/R1 pattern. There is also evidence of significant water flow in this geomechanical domain.

For this domain, the massif can be characterized as Class V according to Bieniawski classification. It is important to note that the underground mining activities planned for the Bandeira Project target will be developed below this domain, with only the access ramps being developed in this part of the massif. Regarding the box cut, only the first two benches should be implemented in this geomechanical domain.

16.1.2 Schist Domain (Salinas Formation)

The schist domain was divided into two subdomains based on the RQD index.

Schists Subdomain 1—RQD <50%

This schist subdomain is positioned immediately below the soil and saprolite domain and has a highly variable thickness, from absent of nearly so to a maximum depth of 40 m. It exhibits a predominant F4/F3 fracturing pattern and moderate alteration, which partially compromises mechanical resistance parameters of the massif. In this subdomain, R3/R4 pattern will be very common. Evidence of water presence is frequent along fractured planes.

The RQD values range from 5% up to 50%, with predominant values around 40%. There is evidence of at least three families of usually unidirectional discontinuities—rough, sealed, or filled with resistant material.

Schists Subdomain 2—RQD >50%

This schist subdomain typically begins at depths greater than 40 m and is characterized by predominantly intact rock with well-preserved original mechanical-resistance parameters. There is no evidence of water flow, allowing us to assert that the hydro geotechnical characteristics of this domain define very low hydraulic transmissivity and storage capacity, which confers impermeable massif characteristics.

The low degree of fracturing in this domain is defined by the predominant presence of at least two families of discontinuities, in which characterize an F1/F2 fracturing pattern, with an RQD index ranging from 85% to 95%, more commonly above 90%. Fractures are typically rough or irregular, flat, unaltered, and show no signs of groundwater flow. Thus, this domain presents excellent geomechanical conditions, high mechanical resistance parameters, and excellent self-support conditions for the implementation of underground openings and also allows for the implementation of slopes with steep face angles.

Regarding uniaxial strength parameters for this subdomain type, laboratory test results showed uniaxial compression strength values ranging from 30.66 MPa to 309.86 MPa, with an average value of 112.45 MPa. This variation is justified by the rupture models observed in the test specimens, where it is noted that for thirty tests, eight showed values below 50 MPa, with ruptures occurring along preferential planes of weakness.

Generally, this lithological domain does not present prominent foliation, commonly exhibiting a massive aspect. When the values found for the eight tests below 50 MPa are disregarded, an average resistance value of 139.91 MPa is observed a very good resistance value, indicative of the possibility to have significant free spans, with adequate safety parameters in underground mining operations, and also slopes with steep face angles.

16.1.3 Pegmatite Domain (Ore)

The pegmatite domain is characterized by the presence of a massif of intact or nearly intact rock, without changing the original resistance parameters of the rock, with a predominant R5 pattern.

At least two families of fracture were identified in this domain, with an F2/F1 fracturing pattern, the former being more common. The RQD value ranges from 65% to 90%, with values around 85% being more common. Fractures are typically rough and irregular, with no evidence of alterations, indicating an absence of water flow.

The pegmatite domain can be present at different depths according to the observations made in the drill holes, and generally presents good mechanical resistance conditions. The values found for uniaxial compression strength in pegmatite specimens ranged from 59.23 MPa to 125.36 MPa, with an average of 90.36 MPa, which can be considered a good resistance value for the implementation of underground mining, with rib and sill pillars planned for this lithological type.

The results obtained from uniaxial compression tests suggest that adopting the average value for pillar dimensioning is conservative. Figure 16-1 shows the geotechnical domains adopted for the Project.

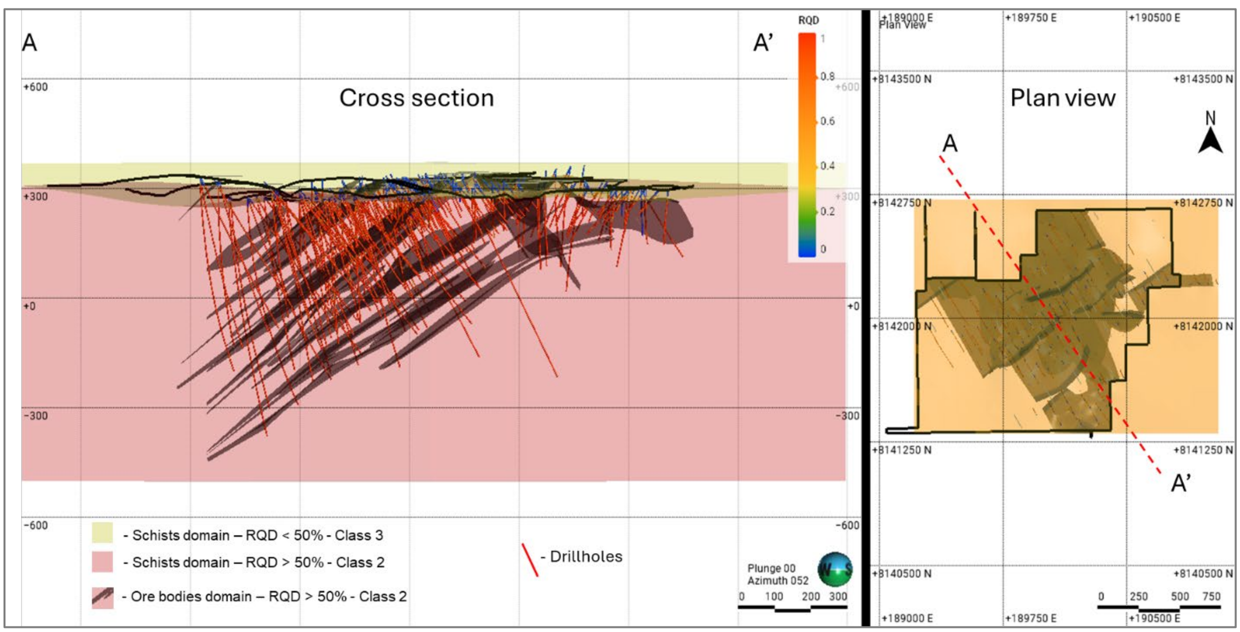


Figure 16-1: Bandeira Project Geotechnical Domains—Left, Cross-Section View; Right, Plan View

16.1.4 Geotechnical Recommendations

Geotechnical recommendations for underground mining activities to be implemented in the Bandeira Project ore body region, based on the obtained information from domains, are described here.

16.1.5 Mining Method

For the area where the ore body exhibits a steep dip, and considering the characteristics of the host rock with high resistance parameters, the recommended mining method is sub-level open stope. For the sector where the ore body shows a gentle dip, given the geomechanical characteristics of the ore, which has resistance parameters that allow the room-and-pillar method is recommended. This is because the characteristics of the host rock will allow a safe operation with high extraction rate.

16.1.6 Dimensioning of Room Openings and Pillars for Stopes

Room-and-Pillar

For determining the optimal size of the rooms and pillars, the results obtained for geomechanical characterization and classification are summarized in a spreadsheet (Table 16-1). This spreadsheet uses the provided information to estimate the stresses that the pillars would be subjected to, based on a geometry that considers the tributary area theory for stress estimation.

Table 16-1: Room-and-Pillar Dimensioning

	Simulation Number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Geomechanical Data	**Poisson Coef.**	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
	RMR	68.00	68.00	68.00	68.00	68.00	68.00	68.00	68.00	68.00	68.00
	RCS (MPa)	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00	83.00
	RCS ratting	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00	7.00
	RMS (MPa)	50.63	50.63	50.63	50.63	50.63	50.63	50.63	50.63	50.63	50.63
	DRMS (MPa)	38.07	38.07	38.07	38.07	38.07	38.07	38.07	38.07	38.07	38.07
	Rock density (t/m^3)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70
Layout	**Overlay height (m)**	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
	Merg. stope (rd)	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Pillar Sizing	**Reduction scale factor**	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
	Blast reduction factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
	Vertical tension (MPa)	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
	Horizontal Tension (MPa)	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34	0.34
	Pilar resistance (MPa)	40.59	30.56	24.99	18.81	15.38	13.16	11.58	17.76	15.19	13.37
	Load on the pillar (MPa)	14.25	14.25	14.25	14.25	14.25	14.25	14.25	11.54	9.70	9.70
	Pillar height (m)	2.00	3.00	4.00	6.00	8.00	10.00	12.00	8.00	10.00	12.00
	Pillar width(m)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00
	Pillar length(m)	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00
	Tributary area length (m)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	12.00	11.00	11.00
	Tributary area width (m)	10.00	10.00	10.00	10.00	10.00	10.00	10.00	12.00	11.00	11.00
	Mine recovery	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.89	0.87	0.87
	Safety factor	**2.85**	**2.15**	**1.75**	**1.32**	**1.08**	**0.92**	**0.81**	**1.54**	**1.57**	**1.38**

In the highlighted line in yellow, the layout option to be adopted for room-and-pillar mining specifies that the rooms should have a width of 8 m and the pillars should be 4 m by 4 m. This layout provides safety factors of 154 and a predicted recovery of about 88%.

Given the conditions predicted for the room roof rock, installing grouted rock bolts is planned to provide additional safety for the operations. These rock bolts should be 3.20 m long due to the span, with a grid spacing of 1.50 m by 1.50 m. The support should be installed initially, as soon as the room is opened.

16.1.7 Sublevel Open-Stope Mining

For mining using the sublevel open-stope method, based on the results obtained from previous geomechanical characterization and considering the rock mass rating (RMR) (Bieniawski) values, Schist Subdomain 1, the host rocks exhibit this geotechnical domain thus significantly restricting underground mining activities to less than one mining panel. On the other hand, Schist Subdomain 2, the host rock below 40 m, has a fracture pattern that shows predominant RQD values above 85% and an RMR of 72.

For the first subdomain with an RMR value of 40, the mining rock mass rating (MRMR) can be estimated by adjusting for the influence of mining activities. Assuming an adjustment of 94% due to blasting effects, 70% due to structural conditions, 100% due to induced stress (considering the shallow depth of the operations), and a 90% adjustment for the compromise of resistance parameters due to weathering processes associated with exposure time, the MRMR value would be:

$$MRMR = 40 \times 0.94 \times 0.70 \times 1 \times 0.90 = 23.68.$$

Figure 16-2 shows the correlation between the MRMR of 23.68 and the stability index for an opening in a rock mass with these characteristics, allowing for the following considerations regarding the expected stability conditions for Schist Domain 1 in the proposed Bandeira Project underground mine:

- It is observed that the stable zone has a hydraulic radius limit of 3.0 m, and a transition zone up to a hydraulic radius of 10.0 m. Openings with larger dimensions would be in the caving zone and, therefore, unstable.
- Openings within the Transition Zone would require systematic support.
- Assuming a panel length of 50 m, a height limit would be 30 m, since an opening with these dimensions would define a hydraulic radius condition of 9.375 m, very close to the caving limit.
- It is important to mention that the mining activities will be primarily conducted in a rock mass with an RMR of 72.

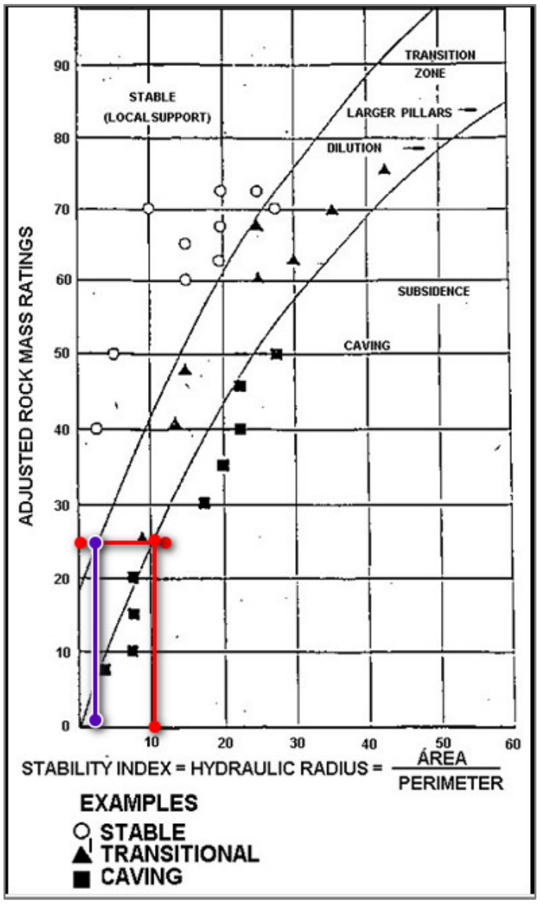


Figure 16-2: Correlation Between MRMR And Stability Index for an MRMR Value of 23.68

The purple line and the red line in the graph above show the working range of the hydraulic radius to keep the excavations in the transition zone. The Hydraulic radius indicates the excavation size.

For mining conditions below 40 m, thus in a massif of class II and RMR 72, assuming adjustments due to mining activities with 94% attributed to blasting, 85% adjustment due to structural conditions, no interference due to weathering processes, and a 90% adjustment due to factors associated with stress redistribution, an MRMR value would be calculated as follows:

$$MRMR = 72 \times 0.94 \times 0.85 \times 1 \times 0.90 = 51.77$$

The resulting value of 51.77, plotted on the chart correlating the stability index of the opening defined from the hydraulic radius value and the MRMR value (Figure 16-3), allows the following considerations for the mining openings implemented below 40 m depth, which represents almost all planned openings:

- It is observed that under these geomechanical conditions, the predicted stability conditions for the mining openings will be favourable. As observed on the chart below, openings with dimensions defining hydraulic radius values up to 14 m exhibit self-supporting conditions without the need for systematic support systems. It is also noted that between 14 m and 25 m of hydraulic radius values, openings could be executed with support systems applied, with supports in this range needing to be more stringent due to proximity to the 25 m limit. Beyond 25 m, the openings are unstable, with a very great possibility of widespread collapse.

- Based on the above results, considering a panel with 75 m exposure of hanging wall would allow the implementation of a free span of 75 m along the strike, defining a hydraulic radius condition of 18.75 m, a value well below the permissible limit of 25 m.
- For the described condition, the use of grouted steel cables installed in the hanging wall region would be necessary to minimize mine dilution, since the overall stability of the Stopes would be assured based on the geomechanical conditions predicted for the country rock mass.

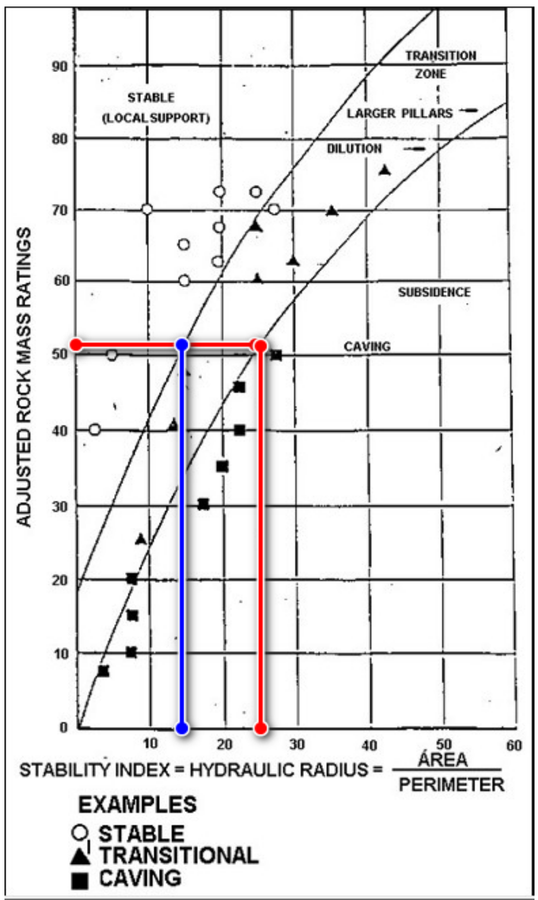


Figure 16-3: Correlation Between MRMR and Stability Index for an MRMR Value of 51.77

Regarding the stability conditions of the stope's roof, defined from the planned sill pillars, it is observed that the pegmatite has an RMR of 69, with the predominant characteristic being a fracturing pattern that consistently yields RQD values above 80%. With these characteristics, assuming the same adjustment pattern is adopted for the surrounding rock mass, an MRMR (Mining Rock Mass Rating) value would be obtained as follows:

$$MRMR = 69 \times 0.94 \times 0.85 \times 1 \times 0.90 = 49.62$$

For these rock mass conditions, Figure 16-4 suggests that the pegmatite mass exhibits a mechanical strength pattern very similar to that predicted for the surrounding rock mass, indicating a highly favourable condition. Under these conditions, the following considerations are made regarding the expected behaviour of the roof mass to be implemented in the ore:

- Figure 16-4 indicates that openings with a hydraulic radius of up to 13 m present expected stability conditions very satisfactory, without the need for systematic support systems. There is a transitional zone between 13 m and 23 m, where stability conditions will depend on support systems to be implemented, with these becoming more stringent as openings approach the hydraulic radius limit of 23 m.
- Based on the chart results, it is verified that for the stope roof, assuming a pegmatite body with 25 m thickness and a clear span along the strike of 75 m, the hydraulic radius value is 9.35 m, significantly below the upper limit. This indicates a very comfortable condition for the stability of the stope roofs, with the support systems to be used aiming to maximize local safety conditions.

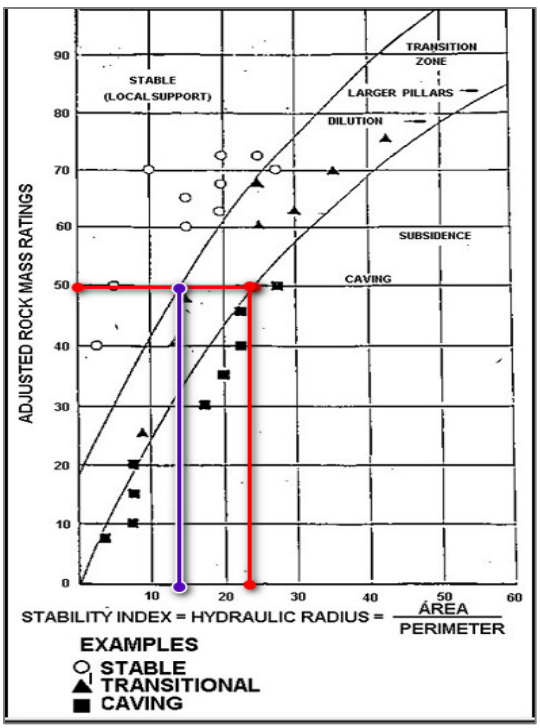


Figure 16-4: Correlation Chart Between MRMR and Stability Index for an MRMR Value of 49.62 in Pegmatite

Regarding the maximum free spans, the results obtained for the massif in the hanging wall region allow the adoption of panel heights ranging between 45 m and 60 m, which are values practiced in underground mines operating in similar geomechanical environments.

The sill pillars between mining panels should have thicknesses of 4 m.

The interlevel should have heights defined based on drilling equipment capabilities, with interlevel around 10 m to 12 m showing good stability behaviour during mining operations in mines with similar geomechanical contexts.

Regarding rib pillars, the characteristics of the massif suggest that the spacing between them can be up to 80 m, with this maximum span also being defined based on the body's thickness. A width of 4 m for rib pillars is sufficient to ensure adequate stability conditions for the excavation.

Concerning the crown pillar at the surface, a rock thickness of 10 m is recommended. In this horizon, the massif should exhibit alteration patterns ranging from A3, moderately altered, to sound rock, A1. Therefore, 10 m, considering these characteristics along with the soil/saprolite horizon, should be the minimum thickness for the crown pillar.

For the barrier pillar of the main access ramp relative to the stopes, 20 m defines a safe pillar condition, even considering variations in ore body positioning. This minimum distance provides adequate safety conditions, regardless of whether the ramp is positioned in the hanging wall (HW) or footwall (FW). Ideally, this structure should be positioned in the hanging wall.

For situations involving parallel ore bodies, practices and observations of stopes behaviour under these conditions indicate that a pillar thickness between Stopes of 4 m ensures adequate safety conditions for mining activities. It is necessary to adopt additional precautions regarding installed support systems and blasting operational procedures. Drift between these stopes to prove ventilation conditions are possible, provided that maximum feasible free spans are adhered to.

16.2 Hydrological Characterization

The hydrological data in the Bandeira Project area comes from the historical series of the rain gauge station 1642028, located in Araçuaí, spanning October 2003 to March 2023. On average, the multi-year average precipitation was around 651.2 mm. It is observed that the rainiest month in the region is December (164.7 mm), while the driest month is July (1.2 mm).

The inventory of springs during the dry period allows for identifying the location of springs at their lowest elevation, indicating that downstream areas have continuous surface water flow throughout the year (perennial drainage). In the absence of water points during this period, it can be assumed that water occurrences in the drainages are only occasional, associated with the rainy season or occasional precipitation.

63 points were registered over the dry period, including:

- 2 springs.
- 41 dry drainages.
- 20 control points.

Geologically, it is believed that this saturated zone is a package of silty-sandy material with a high amount of organic material, overlying the Salinas Formation. It is recharged by rainwater and, due to its low permeability and hydraulic conductivity, remains moist for almost the entire year.

Geophysical studies of electrical resistivity and spontaneous potential indicated that there is a higher presence of regions with lower resistivities, mainly in the western and eastern portions of the project area, except for the massif located in the extreme western portion, whose location limit the saturated zone, with unsaturation evident from the beginning.

It is possible to observe three important locations with lower saturation compared to others in the central portion of the target area. Zones of high saturation were identified even at lower elevations in the area, and these anomalies could be correlated as possible associations with geological structures.

16.3 Hydrogeological Characterization

16.3.1 Regional Hydrogeological Context

The Bandeira Project is in the Jequitinhonha Valley, in the middle sector of the Jequitinhonha River basin, and it is characterized by a semi-arid climate. The prevailing conditions make the use of underground water resources the main alternative for suppling water. However, the predominance of fissure aquifers and reports of high salinity in the water impose restrictions any use of groundwater in the region (Menegasse, et al., 2003).

According to previous investigations, lithologies in the region can be classified into four aquifer units:
Unit 1: These comprise rare alluvial covers found in some portions of the Jequitinhonha River, Araçuaí River, and Piauí river, all three with very small dimensions. They may be locally important, although properties along these rivers do not face water-scarcity issues, as they are perennial.

Unit 2: Aquifers in this unit are granular in nature and consist of thick packages of coarsely stratified sediments from the São Domingos Formation, which can exceed 100 m thick in the Virgem da Lapa region. This unit also includes other eluvial-colluvial covers that overlay tertiary planation surfaces.

Unit 3: This unit, the largest in the area, comprises lithologies from the Macaúbas Group, especially the Salinas Formation. The hydrogeological characteristics of the Salinas Formation are primarily fractured aquifers with a small contribution in its altered portion of granular material where it has considerable thickness. The Salinas Formation is widespread, supporting a relief dominated by gentle to moderately undulating and polyconvex hills, predominantly composed of schist, representing dissected areas with altitudes generally up to 500 m. It has an alteration layer of variable thickness, averaging 10 m, with a dense drainage network clearly dictated by the regional structural pattern (schistosity, fracturing, faulting), facilitating surface runoff at the expense of infiltration. When composed of quartzite, the Salinas Formation occupies higher altimetric positions, supporting plateaus and cliffs.

Portions of the Salinas Formation, predominantly composed of schist, have the possibility of constituting reasonably significant aquifers, by regional standards, when the following conditions coexist:

- Patterns of metamorphic–structural discontinuity
- Thick alteration levels
- Gentle relief

- Overlap with the São Domingos Formation.

Unit 4: This unit encompasses intrusive granitic rocks and is highly significant. The granitoids in the region are little altered or unaltered, not forming an expressive alteration layer (soil + weathered layer), as occurs in humid tropics where the weathering layer can reach tens of metres, giving rise to extensive aquifers. Granite terrains occupy elevated topographic portions, with morphologies resembling "sugarloafs," cliffs, and ridges. They have drainage networks in radial and dendritic patterns, especially in larger bodies. Fractures represent the most important means by which local granitic rocks can conduct and store water.

Figure 16-5 presents a conceptual model of regional groundwater circulation. In this condition, primary permeability is very low, with fractured aquifers predominating. Recharge occurs through the fracture system, which also controls surface drainage. This structural control of drainage is less pronounced compared to areas where schist and quarzitic rocks of the Macaúbas Group and Espinhaço Supergroup occur, respectively. Discharge from these fractured aquifers occurs predominantly in valley bottoms.

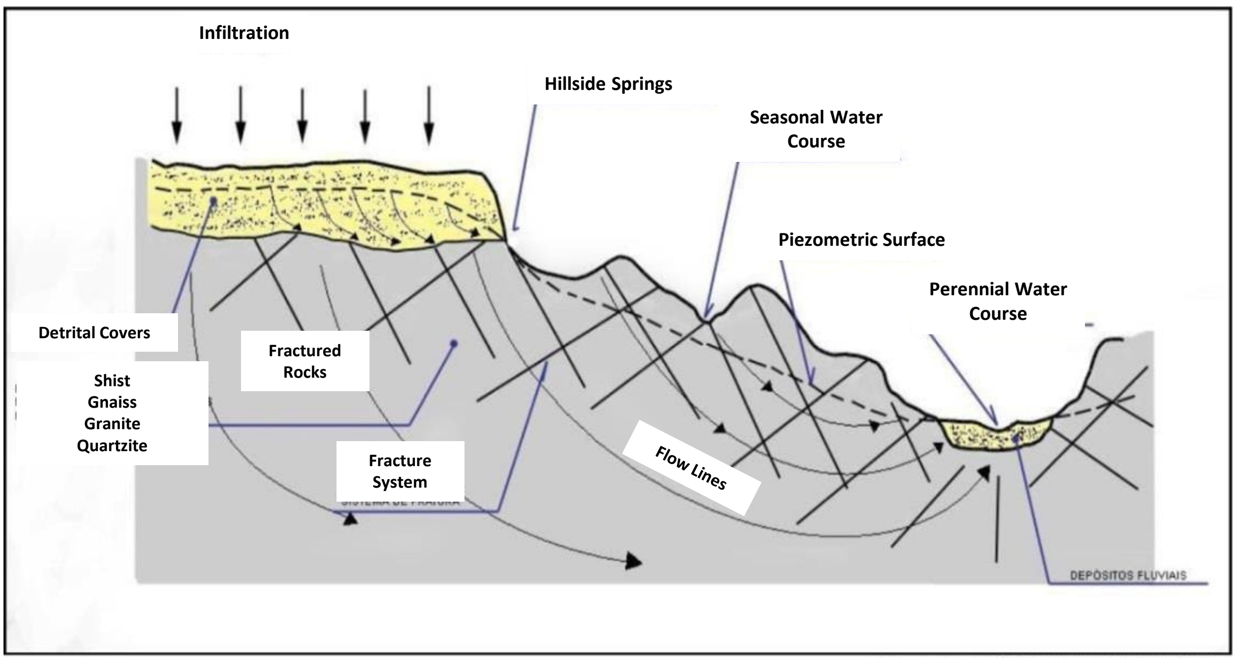


Figure 16-5: Conceptual Model Of Regional Groundwater Circulation

Therefore, it can be said that the watercourses present in the Project area are represented by perennial drainage, where alluvial deposits/coverings prove to be very important in water supply.

The exception is Piauí Creek, which exhibits incipient drainage, almost dry, for at least two months of the year (September and October). The significance of these alluvial ridges on the riverbanks becomes evident during the dry period when they release water stored during the rainy season, contributing to surface flow.

Short and medium-term underground flows originate from the Hydrogeological Cover Units and possibly from the alluvial ridges deposited by rivers. Drainage in the fractured aquifer is represented by longer-term flows that are logically dependent on the degree of rock fracturing.

16.3.2 Conceptual Hydrogeological Model

The conceptual hydrogeological model aims to understand the hydrogeological units and the behaviour of groundwater flow, from infiltration in the soil to its discharge. It involves characterizing the hydrogeological environment, developing the potentiometric surface, and understanding the zones of recharge and discharge, as well as the conditions for storage and circulation of groundwater.

The boundary conditions for developing the conceptual hydrogeological model were defined by considering the limits of the local micro-watersheds that supply the Jequitinhonha River, Piauí Creek, and Santana Creek.

In general, the behaviour of hydrogeological systems is directly related to the lithological units present in the area. Each type of rock or geological unit has specific characteristics of primary (interstitial), secondary (fractures and faults), or tertiary (conduits) porosity that define how groundwater is transmitted and stored. Thus, the geometry of a particular aquifer unit almost always coincides with the geometry of the geological unit in question.

The lithological types occurring in a particular area generally define the local hydrogeological behaviour. Each geological unit will present its own porous characteristics that influence the flow of groundwater, and this should determine how water circulates and is stored.

The four hydrogeological units defined for the study area are:

Aquifer of Coverage: This aquifer is composed of unconsolidated sediments resulting from the weathering of the superficial rocks where groundwater circulates and is stored. According to borehole data, this alteration of rocks can reach depths of up to approximately 40 m in rocky outcrops and 20 m in the floodplain of the Jequitinhonha River.

Alluvial Aquifer: This unit encompasses a shallow, essentially granular aquifer of the free, heterogeneous, and anisotropic type. Recharge occurs through precipitation, raising the water level of the Jequitinhonha River. Locally, sandy and gravelly soils are observed, with less thickness, providing low storage capacity and high conductivity, resulting in ephemeral water conditions for water bodies.

Fissure Aquifer: In this aquifer, porosity is considered secondary, as primary porosity is negligible and is represented by fractures and faults in rocks, also dependent on the degree of weathering. The aquifer has moderate hydraulic conductivity and internal interconnectivity, being linked to geological structures. Geophysical interpretation suggests that this aquifer may be influenced by geological structures, leading to a heterogeneous aquifer system with both saturated and unsaturated portions.

Aquiclude: This unit has negligible primary porosity, and low water transmissivity indicates the absence of geological structures and a low degree of rock weathering. In the context of geophysical interpretation, this unit may be represented by zones with high resistivity indicating minimal saturation, forming natural hydraulic barriers.

16.3.3 Conditions of Groundwater Flow

According to the potentiometric map, the overall flow indicates low transmissivity, with closely spaced equipotential. This behaviour is expected due to the characteristics of the fissure aquifer, where flow depends on structural conditions. The low groundwater level in relation to the terrain is noted, as well as the direction of groundwater flow toward the Jequitinhonha River.

16.4 Mine Planning and Design

16.4.1 Access to the Mine and Development

The underground mine of the Bandeira Project will be accessed by two ramps (or declines, as used as synonymous words in this report) in the footwall of the ore body. The two portals (or entrances, as used as synonymous words in this report) of the ramps will be constructed in an open pit excavation of box-cut type, with the slopes being designed to be 50°, with a 5 m wide berm (catch bench), 10 m high, as shown schematically in plan and vertical section in Figure 16-6.

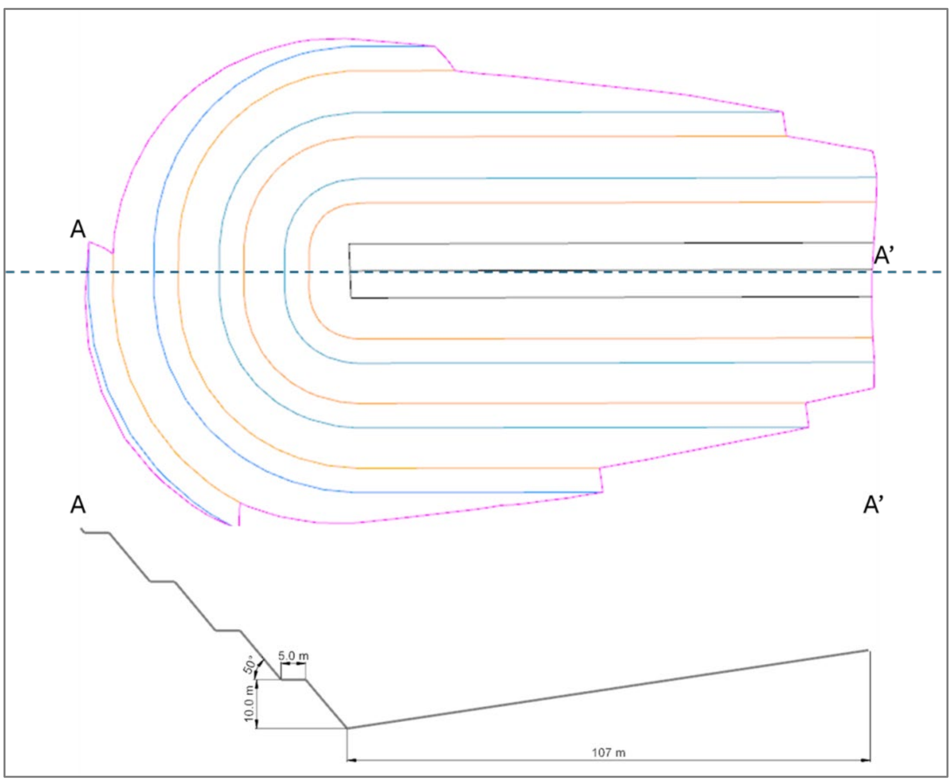


Figure 16-6: Portal of the Underground Mine

The portals will be reinforced with shotcrete to preserve the slopes, prevent erosion, and facilitate safe transportation of ore, waste rock, equipment, and personnel inside the mine.

From the west entrance, one decline was projected to follow the northeast–southwest mineralized trend, while from the east entrance, the decline splits into two: one continues eastward, and the other heads north, providing access to the northeast side of the ore body. Sloped curves will be designed to return to the development direction for the body until it reaches the other end. This eight-shaped pattern will repeat until the last panel of the mine. This configuration allows for optimized entry to all mineralized ore bodies.

The excavation profile will be arched for better stability. The minimum curvature radius will be 25 m with dimensions of 5.5 m high by 5.3 m wide, adequate to accommodate the traffic of 45-tonnes capacity trucks, ventilation and service ducts, and equipment access, as illustrated in Figure 16-7.

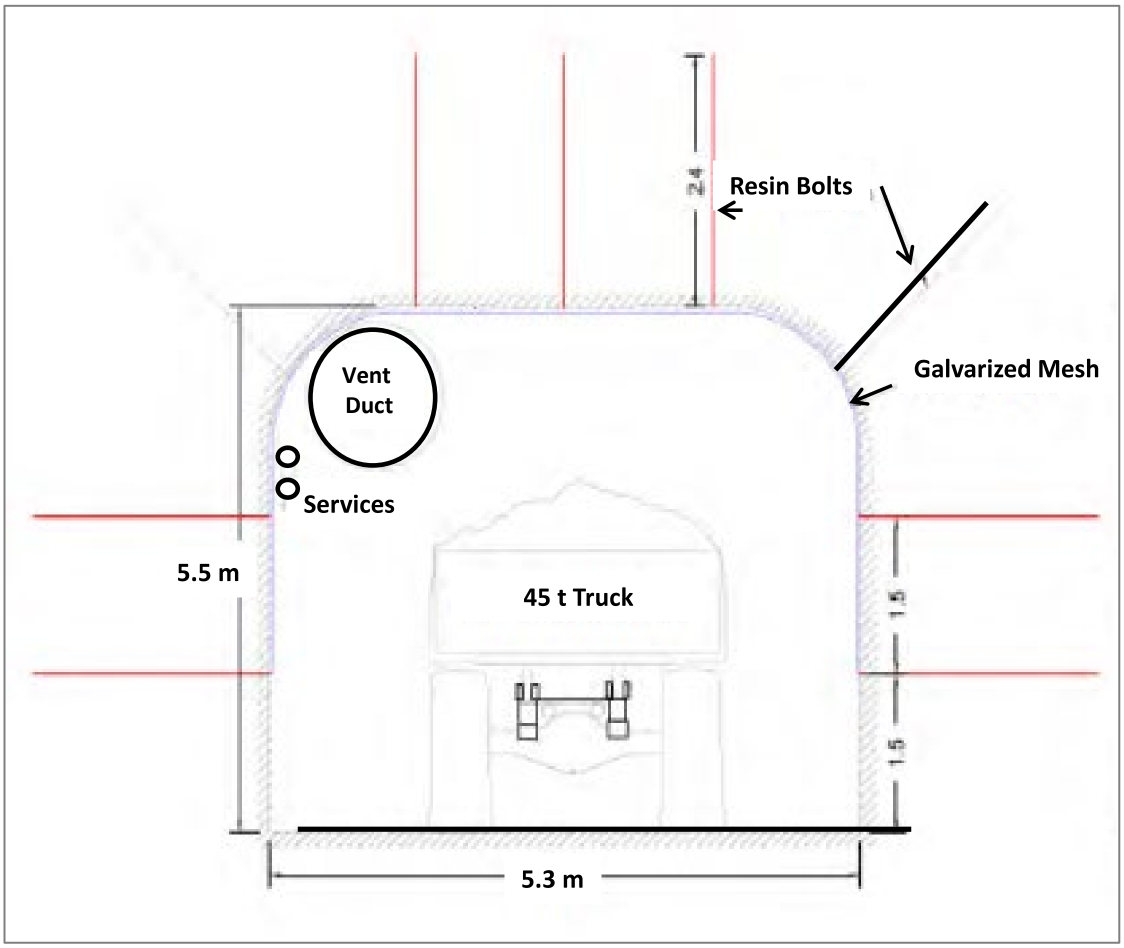


Figure 16-7: Typical Section of the Decline

The ramps, as part of the main ventilation system, serve as a source of fresh air, allowing clean air from the surface to flow through the mine and ventilate the working faces within the panels. Secondary fans are installed at the entrances of each level to collect this air and force it inside the working faces.

The ramps will be designed with a maximum inclination of 15% and with pullouts or mucking bays every 100 m to improve vehicle traffic and facilitate the drifting process.

Each level or mine panel will be accessed from the ramps developed close to the ore bodies.

At each sublevel, crosscuts will be developed to access the bodies, generally with a transversal direction to the mineralized bodies, which must be at least 20 m from the ramp, respecting the pillar between the ramp and the mineralized zones.

Once the mining area is accessed, the development must occur parallel to the ore body's strike. For this project, all ore drives are planned to follow the operational design after completion of the infill drilling model. The ore drives are intended for blast drilling and mineral extraction. Loading points will be opened every 100 m, measuring 16 m wide and 5 m high. The first 3 m will be post excavated with 7 m height to allow the Low bed underground wheel loader know as Load Haul Dump or LHD to tip inside the truck. Figure 16-8 shows the positioned drives in brown within the projected stopes in green.

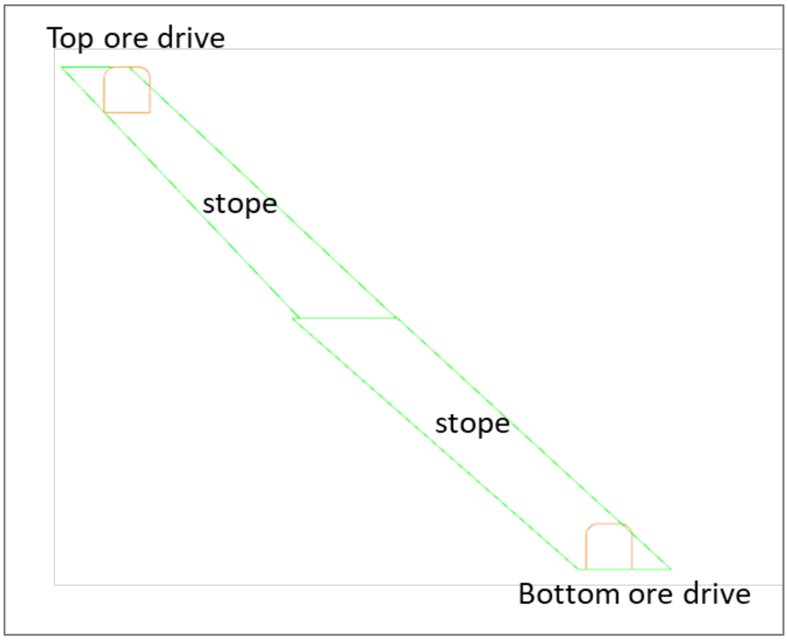


Figure 16-8: Schematic Arrangement of the Gallery Position for Bottom-Up Stope Mining

In each panel, a gallery will be excavated to accommodate facilities such as the electrical substation, pumping station, water tank, bathrooms, and refuge chamber. Additionally, ventilation drives will be excavated to receive the return air, connecting the working faces to the main exhaust system. Exploration bays will also be established at each panel for grade-control drilling, commencing at the ramp. The mucking bays, which will be opened every 100 m, can later be used as sites for grade-control drilling.

The vertical development of the mine will incorporate a network of ventilation raises to facilitate the intake and exhaust of air between the surface and underground areas. The intake ventilation raises will be equipped with escape ladders for emergency exits. These raises will be excavated using a raise borer. The intake raises will have diameters of either 4.1 m or 4.0 m x 4.0 m, while the return raises will have diameters of 4.1 m or 5.0 m x 5.0 m.

Another return raise with a diameter of 2.4 m will be excavated to ventilate the room-and-pillar area and supply clean air during the necessary development activities to reach the main exhaust raise excavation position.

16.4.2 Mine Design Parameters

Ore reserve grades are diluted along lithological boundaries and assume a selective mining operation.

For the sublevel stoping mining method, ore reserve volumes and tonnages assume 90% mine recovery, 14% of planned dilution, and 0% of operational dilution, since the stope stability is being reinforced by cable bolts installed in the hanging wall or in any required area.

For the room-and-pillar mining method, ore reserve volumes and tonnages assume 100% mine recovery, 9% of planned dilution, and 10% of operational dilution due to over-breaking.

For the ore from development works, ore reserve volumes and tonnages assume 100% mine recovery, 46% of planned dilution, and 10% of operational dilution due to over-breaking.

A technical cut-off grade of 0.5% Li_2O was applied to the block model for the classification between ore and waste rock.

The geotechnical parameters adopted for the mine planning design of the sublevel stoping method were:

- Crown pillar: 10 m
- Panel height: 55 m
- Sill pillar: 4 m
- Minimum pillar between parallel stopes: 4 m
- Maximum stopes spam: 80 m
- Rib pillar: 4 m
- Minimum distance between ramp and panels: 20 m.

The panels will be up to 55 m high, with levels of approximately 27.5 m high. Figure 16-9 shows schematically a typical panel of the Bandeira mine, with a representation of the sill pillar, rib pillar, development galleries, and the mining sequence numbered as 1 and 2.

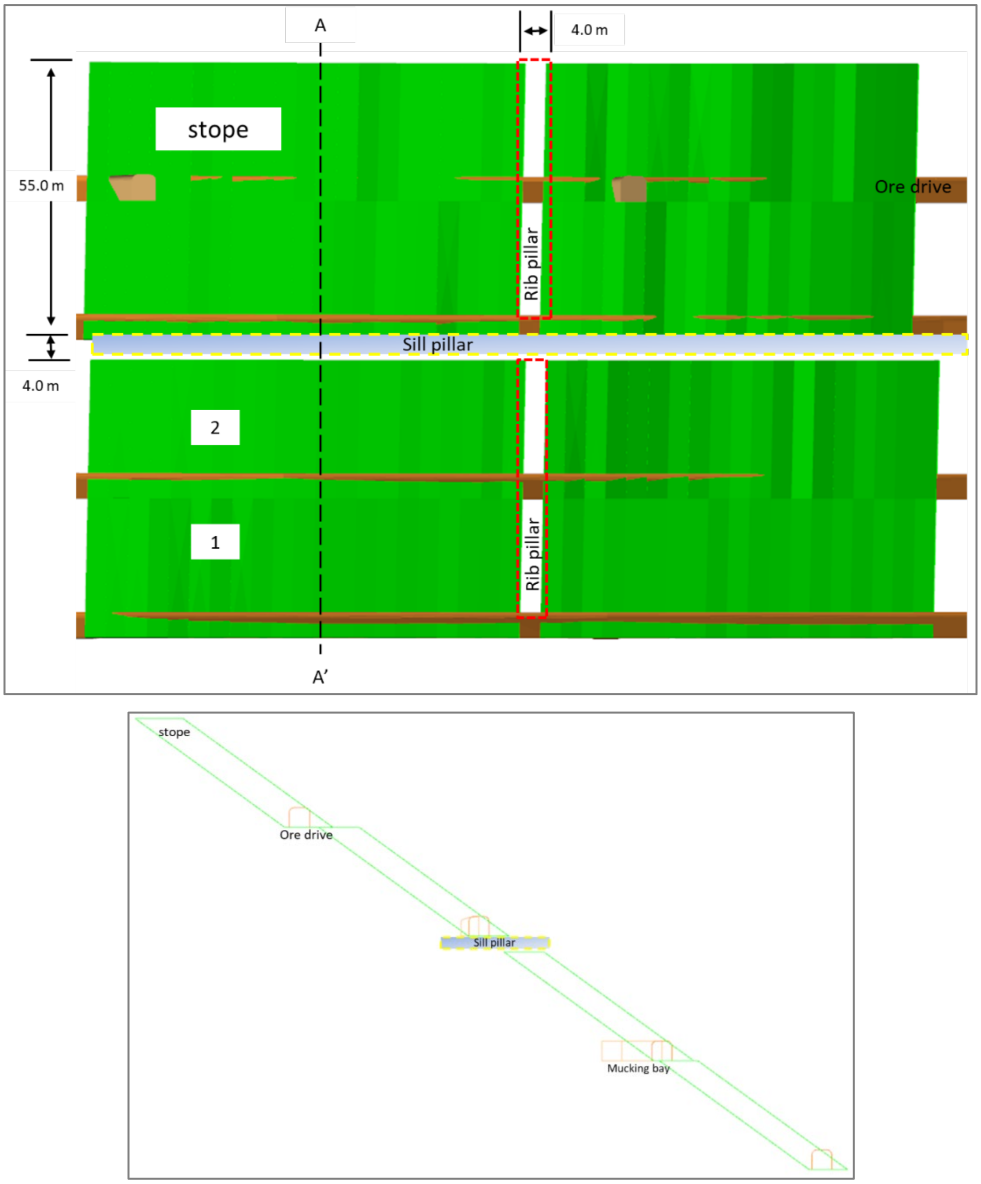


***Figure 16-9:	Typical Panel of the Bandeira Mine***

The geotechnical parameters adopted for the mine planning design of the room-and-pillar method were:

- Pillar width: 4 m
- Pillar length: 4 m
- FW and HW barrier pillar: 20 m
- Maximum panel height: 8 m.

Figure 16-10 shows the schematic drawing of the room-and-pillar mining, where the hatch squares are the pillars and the white squares are the tributary area.

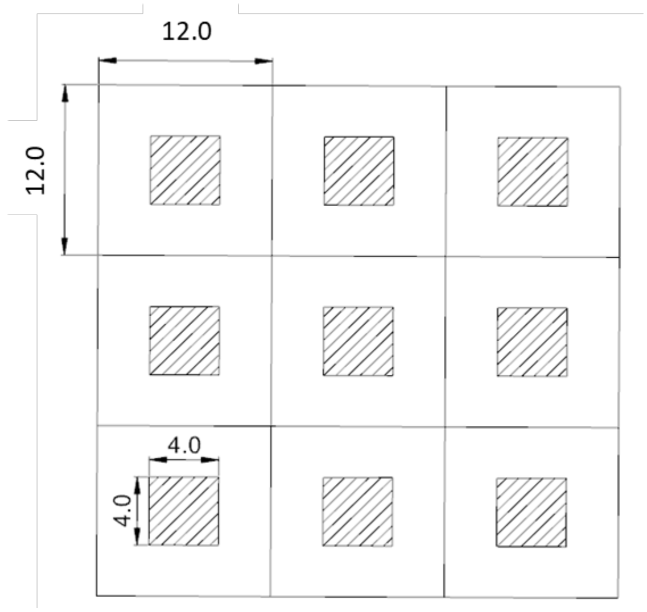


Figure 16-10: Schematic Drawing of the Room-and-Pillar Mining Method

16.4.3 Stope Optimization

The stope design optimization was conducted using the Datamine's Mineable Stope Optimization (MSO) software, allowing for the creation of stopes based on preset dimensions and achieving cut-off values selected based on economic parameters. This software was used to determine the economic division of the mineral deposits.

The MSO algorithms consider economic parameters, geological and geotechnical factors, and operational constraints for the optimal design of stopes throughout the ore body, encompassing elevations from 260 m to −420 m. Due to the complexity of the ore bodies along the azimuth, and the number of present veins, a methodology of creating multiple frameworks was adopted for stope optimization. Each vein was optimized in a configuration that best respected the dip angle of the material and its irregular behaviour along the azimuth.

The stopes were optimized following operational and technical parameters, resulting in an estimated mine life of 14 years. In the sublevel stoping method, the scenarios were configured to result in solids divided into dimensions of 55 m high per panel, a minimum thickness of 2 m, and a minimum dip of 37°. The software ensured compliance with the minimum cut-off grade, and dilution was set free to maximize mine recovery, with no dilution skin considered. During the optimization rounds, all resource categories were considered as ore, and inferred stopes was excluded later during the feasibility evaluation of the stopes.

For the room-and-pillar method, chambers measuring 12 m x 12 m and internal pillars measuring 4 m x 4 m were created.

Table 16-2 presents the parameters used for optimization.

Table 16-2: Optimization Parameters

Item	Value
Optimized Variable	Li_2O
Cut-Off	0.50%
Minimum Mining Width	2 m
Sublevel Panel Height	55 m
Sublevel Stope Height	(20 / 15 / 20) m
Sublevel Stope Width	10 m
Sill Pillar	4 m
Dip	Minimum 37°
Azimuth	By lens
Room	12 m x 12 m
Pillar	4 m x 4 m

As a result, solids were generated representing the mined area of the room-and-pillar and the sublevel stoping methods. Figure 16-11 shows the room-and-pillar mine, Figure 16-12 shows the sublevel mine. The y in the cardinal axis indicates the north direction. The optimization results are presented in Table 16-3.

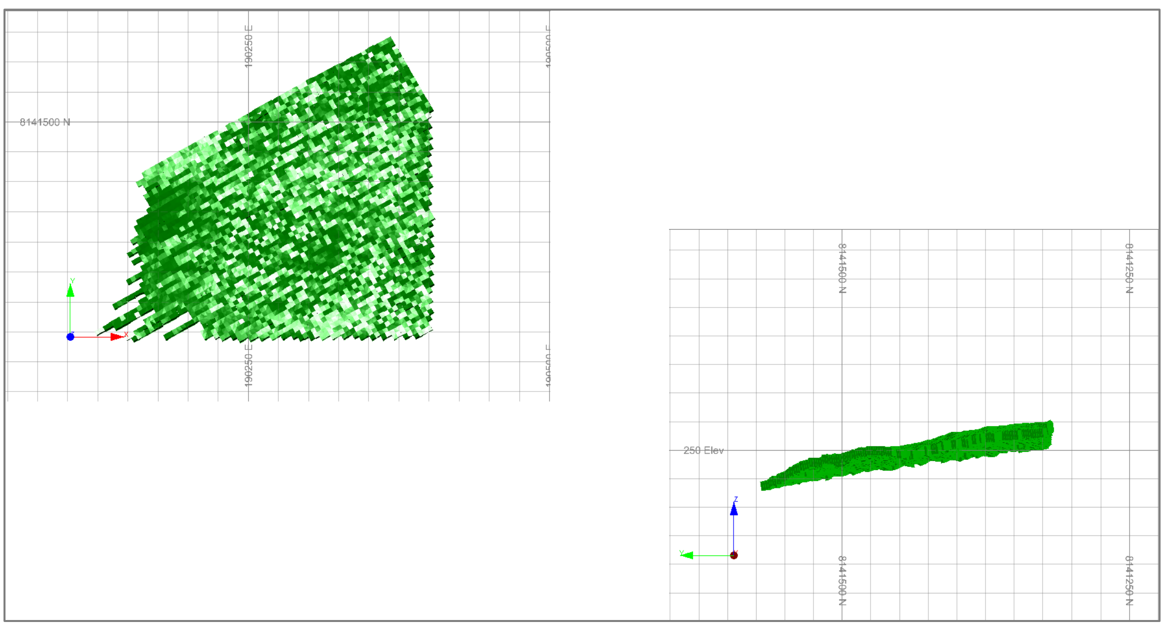


Figure 16-11: Room-and-Pillar Solids

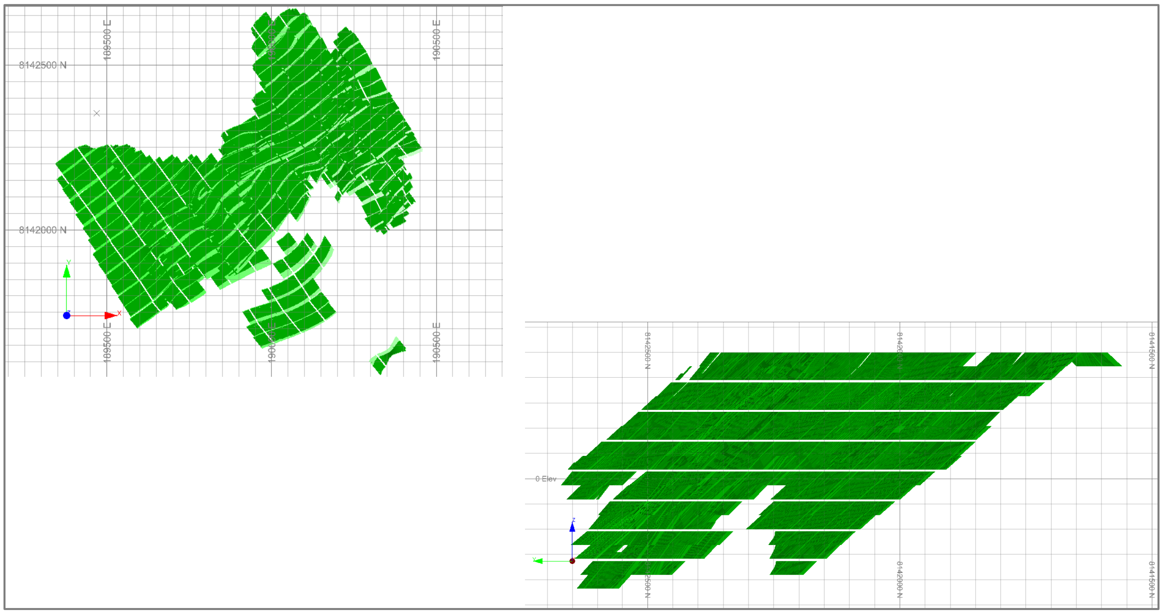


Figure 16-12: Sublevel Stoping Solids

The optimization process outputs a mineable mass of 35.42 Mt at 1.17% Li_2O for the portions mined by the room-and-pillar method and sublevel stoping. The results included the Inferred Mineral Resources and show the Project potential if Inferred Mineral Resources could be treated as ore. Table 16-3 shows detailed results considering all resource categories and potential planned dilution.

Table 16-3: Optimization Results, Including Waste and Inferred Mineral Resources

Category/Material	Tonnes	Li_2O (%)
[1]	1,794,841	1.49
[2]	12,989,975	1.39
[3]	12,955,831	1.47
Waste	7,684,296	0.21
Total	**35,424,943**	**1.17**

Access structures to the stopes were created, including crosscuts, ore drives, declines, waste connections, mucking bays, and ventilation drives. The decline 5.30 m wide and 5.50 m high, primary and secondary development drifts will have dimensions of 5.0 m x 5.0 m, with an arch radius of 1.25 m. Ventilation raises will have two different diameters: 4.1 m for the sublevel stoping mine and 2.4 m diameter for room-and-pillar mine.

Figure 16-13 illustrates the mine development structures and Figure 16-14 and Figure 16-15 show how these structures connect with the stopes for the room-and-pillar and sublevel stoping methods, respectively.

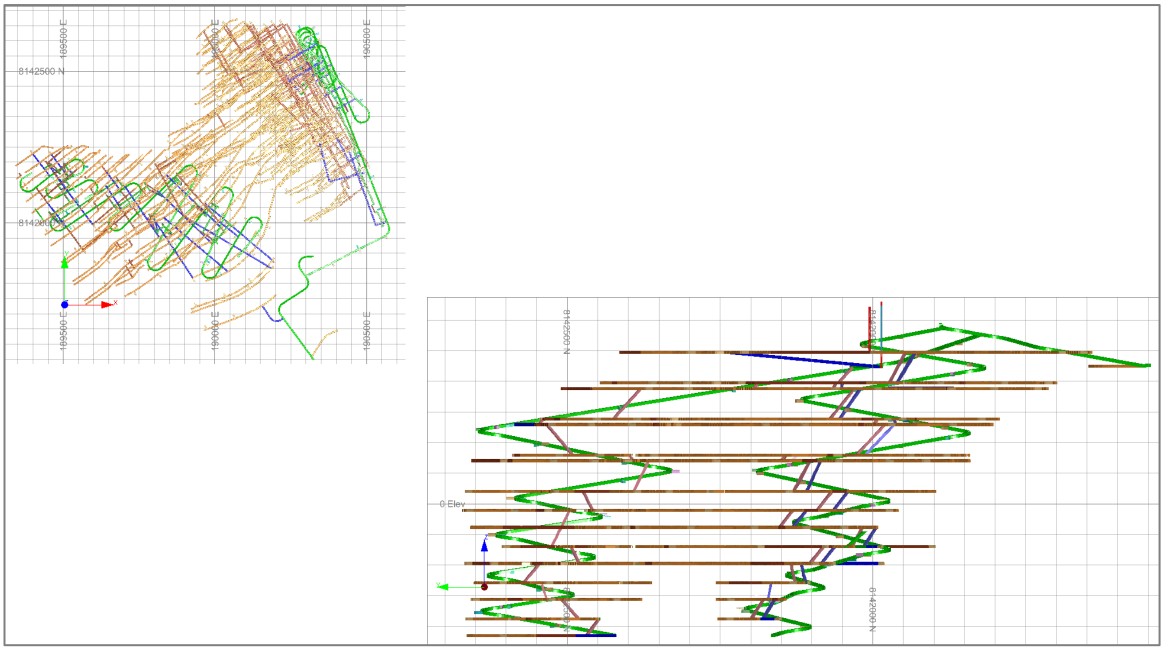


Figure 16-13: Mine Development Structures

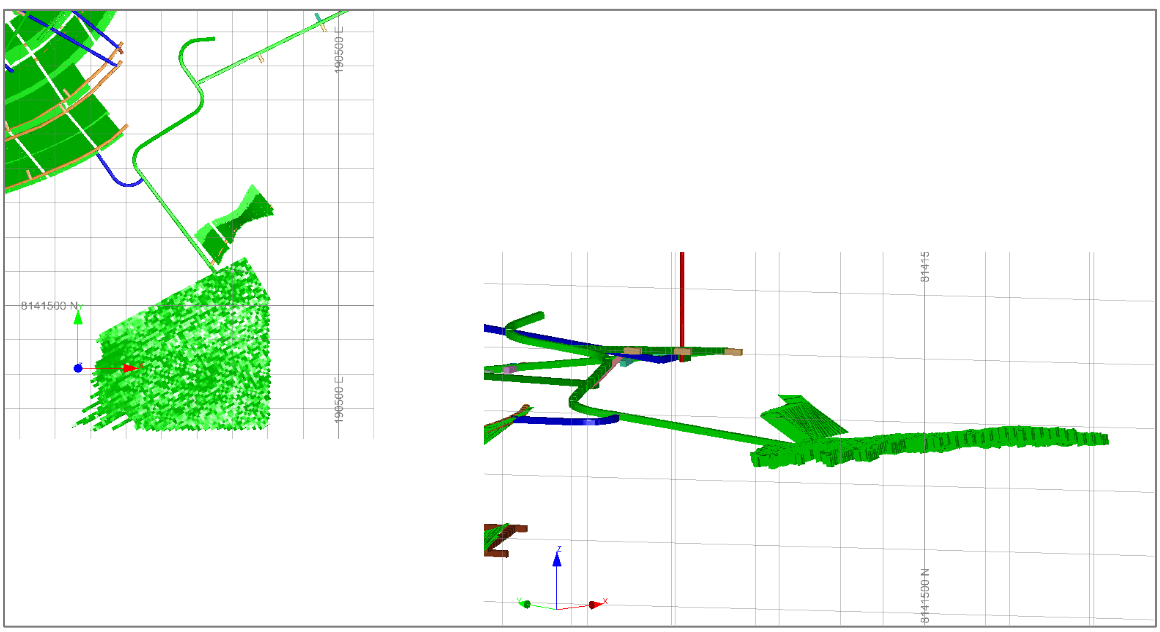


Figure 16-14: Connection Between the Development Structures and Room-and-Pillar Stopes

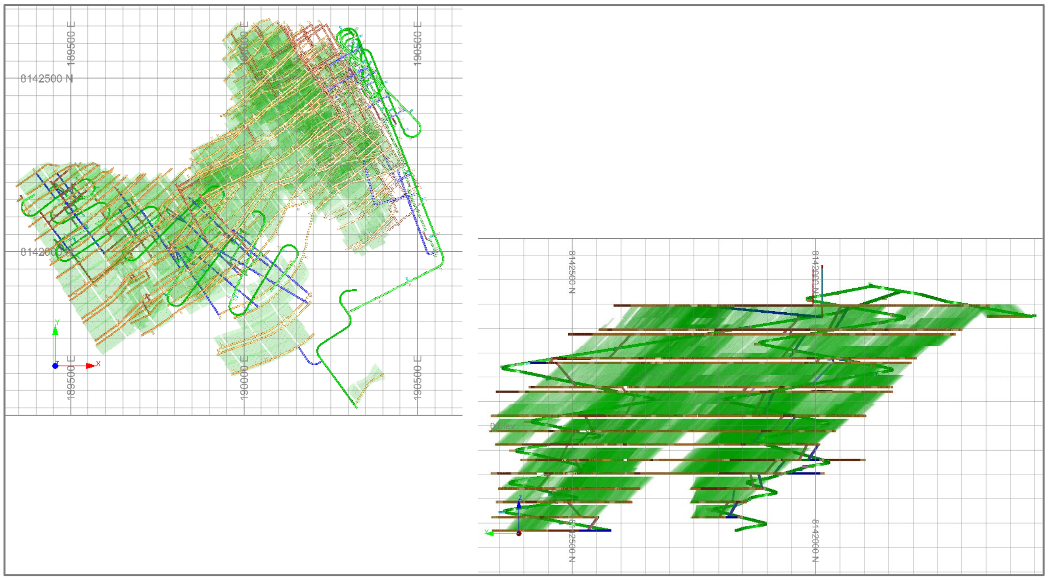


Figure 16-15: Connection Between the Development Structures and Sublevel Stopes

To calculate the reserves a new resource category called "RESCAT" was established, based on the largest amount of metal within a resource category inside the mine solids (stopes). This was necessary to exclude all inferred stopes from the calculations. Additionally, all inferred material present in the reserve stopes was considered as waste and treated as dilution material.

After all development was designed, a feasibility analysis of the stopes was conducted, including all main mine costs such as stoping, mineral process, development, raises, and general and administrative (G&A). Additionally, CFEM (federal mining taxes), TRFM (state taxes for mining activities), and royalties were subtracted from the long-term lithium price used in this evaluation. Table 16-4 presents the first-pass parameters used in the mine economic evaluation.

Table 16-4: First-Pass Parameters in the Stope Optimization

	Unit	Total
Net Concentrate Selling Price 5.5% Li_2O	US$/t conc.	1,662
Net Concentrate Selling Price 3.0% Li_2O	US$/t conc.	711
Process Cost	US$/t	12.3
G&A	US$/t	4.0
Mine Cost—Sublevel	US$/t	35.0
Mine Cost—Room & Pillar	US$/t	42.0
Decline Cost	US$/m	5,000
Lateral Development Cost	US$/m	4,000
Raise Borer Cost	US$/m	7,000
Metallurgical Recovery 1	%	65.9
Metallurgical Recovery 2	%	10.4
Concentrate Grade 1	Li_2O %	5.5
Concentrate Grade 2	Li_2O %	3.0

An average ROM metallurgical recovery of 65% and the mining dilution were already included. The dilution varies from stope to stope, with an average value of 17%. As a result, the ore reserves are 1.96 Mt at 0.97% Li_2O from development, 0.97 Mt at 1.05% Li_2O from room-and-pillar, and 14.27 at 1.19% Li_2O from sublevel stoping, giving a total of 17.20 Mt at 1.19% Li_2O.

After additional tests have been completed, a revised average metallurgical recovery of 68.9% was assumed to produce the 5.5% Li_2O concentrate, and the lower grade concentrate has not been considered at this phase of the Project. Table 16-5 summarizes Bandeira's production profile with the new changes.

Table 16-5: Bandeira's Production Profile

	Unit	Total
Total Project Life (LOM)	years	15
Total LOM Production (Ore Mined)	Mt	17.2
Nominal Plant Capacity	Mt/a	1.3
Average Plant Throughput	Mt/a	1.15
ROM Li_2O Grade (Diluted)	%	1.16
ROM Underground Mine Dilution	%	17
Average Waste Generation	kt/a	218
SPO Annual Production @ 5.5% Li_2O	kt/a	159
SPO Annual Production @ 3.0% Li_2O	kt/a	69
SPO Annual Production @ 5.5% Li_2O Equivalent	kt/a	184
SPO 5.5% Li_2O Metallurgical Recovery	%	65.9
SPO 3.0% Li_2O Metallurgical Recovery	%	10.4
SPO 5.5% Li_2O Mass Recovery	%	13.9
SPO 3.0% Li_2O Mass Recovery	%	6.0

16.4.4 Mining Development

Two declines were developed for the Bandeira underground mine. The east decline starts at Elevation 310 and ends at Elevation −218 in the Z-axis. The west decline begins at Elevation 293 and ends at Elevation −217. Both have a 15% gradient, a minimum radius of 25 m, and footwall access. Safety measures include 20 m pillars between the stopes on mineralized walls and 4 m pillars between galleries.

Sumps developed in cross-cuts are 12 m long, with the first 3 m having 0% gradient, and the remaining 9 m having a −15% gradient. Sumps developed in the declines have the first 3 m with 0% gradient, and the next 12 m with −15% gradient. Sumps were created every 360 m of decline development.

One access was developed for the room-and-pillar mine from the east ramp, providing access to the main chamber.

Two extraction configurations were designed for the sublevel stoping mine. For the 'descending–ascending' extraction method, each panel has two accesses for the stopes: one in the upper sublevel and another in the lower sublevel. This setup ensures the drilling of ascending holes from the lower sublevel, as well as holes going down from the higher sublevel, allowing for the mining of the entire 55 m panel.

The other method is ‘ascending–ascending’ extraction, where the sublevel cross-cuts were projected in the lower level and in the middle of the panel. All drilling will be ascending, and extraction will occur in a top-down order after both sublevels are fully developed. All cross-cuts are at least 20 m long starting from the decline, with a gradient close to 1%, which prevents water accumulation.

Ore drives were developed from cross-cuts along the stopes. Waste connections were designed in sublevels where multiple stopes were generated in different veins, allowing stoping ore in multiple areas. The ore drives include 15 m mucking bays positioned every 100 m to meet maneuvering needs.

Ventilation raises extend from the surface level down to the lowest elevation of the declines. They are connected to the mine through ventilation galleries, with the same development configuration as the cross-cuts and ore drives, and subsequently connecting to the ventilation raises. These raises have a minimum incline of 45%, with both intake and return air shafts measuring 4.1 m in diameter. They are separated from nearby excavations by a minimum 7 m pillar. In the room-and-pillar mine, a smaller return raise will be constructed with a diameter of 2.4 m.

Regarding development, the advancement for each structure is shown in Table 16-6.

Table 16-6: Length of Underground Development Structures (m/a)

Year	−2	−1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Primary Lateral Development	1,518	1,717	1,214	1,723	481	1,636	430	1,053	939	607	736	899	1,125	875	263	-
Secondary Lateral Development	420	3,175	3,806	3,301	4,608	3,420	4,587	3,968	4,062	4,430	4,290	4,063	3,785	3,251	2,009	110
Ramp	1208	480	480	480	481	480	417	436	467	340	320	446	481	480	156	-
Ventilation Raises	336	287	37	617	116	247	124	140	182	108	325	110	328	162	39	-

16.4.5 Stoping activities

The stoping activities assumed for the room-and-pillar mine are similar to face development. The ore extraction cycle starts with the jumbo performing front drilling on the mine face. Then, the blast team will charge and blast the face at the end of the shift. After the dissipation of the explosive gases, the LHD will load haulage trucks, which will travel to the surface to discharge directly into the crusher or the crusher yard. Once all ore from the face has been mucked, the scaler will remove any loose rock. The jumbo will then drill and install the rock bolts with resin, before starting production drilling, in a new mining cycle. To achieve the required production, several faces will be operated simultaneously.

The room-and-pillar chamber is 8 m high, with two cuts of 4 m. In the first 4 m, mesh will be added to the roof area, and 8 m bolts will be installed with cement grout at the intersections. These activities are crucial to ensure the safety of operations when the lower part is being extracted.

For the sublevel operation, the cycle starts after completing the ore drive development with the roof support reinforcement. Cable bolts (steel strand wires grouted into boreholes) measuring 8 m long will be installed into the hanging wall to control dilution, and 5.5 m cable bolts will be installed to protect the stoping brow area.

Then, the fan drill starts to drill the blast rings upward and downward according to the blast plan. To open the slot free face on the bottom level and top level, a slot driller called RHINO will drill the slot bore holes of 0.710 m for every slot in each position. Once the drilling activities are concluded and the stope region is scaled, the blast team charge the free face rings and blast.

As the free face is opened, the real ore ring blasting begins, initially with a small number of rings, starting on the lower levels and then on the upper levels. As the rings are blasted, a larger space will be opened up to accommodate larger blasts, allowing a larger number of rings to be blasted simultaneously. Between the blasts, the LHD loads fragmented ore and mine trucks haul it to the surface.

These activities of ring blasting, loading, and hauling continue until the stope is completely depleted. After that, the void space will be filled with rock fill.

16.4.6 Mining Schedule

Mining scheduling was performed using EPS software version 3.1.144. The software was set up to respect the mine direction and restrictions to deliver a long-term mine plan that offers good predictability over this time frame. Sublevel mining activities occur in retreat at the end of each level's ore drive development, while room-and-pillar mining occurs in advance as the faces are being developed. Targets were set for decline development, lateral gallery development, and mass movement.

Total monthly targets were defined for both decline developments, ranging from 80 m to 90 m per month for the first three months, with production increasing at a varied rhythm from 100 m to 157 m per month. By the start of Year −1, the decline development drops to an average of 100 m per month and in Year 1, it reduces to 80 m per month until the end of the mine’s life.

For lateral development (Including the two declines), production ranges from 80 m per month to 300 m per month at the end of Year −2. As the mine faces increases, production also increases, reaching 350 m per month on Year −1, and growing to an average production of 475 m per month. Lateral development aimed to maintain a consistent pace until Year 6, when it decreased to a range of 350 m per month, decreasing year by year until completing all forecast mine lateral development.

The mining schedule for Bandeira was determined to achieve a plant feed close to 1.3 Mt of ROM. Separate targets were set for the room-and-pillar and sublevel stope methods to achieve the required ROM movement. A target of 1.24 Mt of ROM is achieved in Year 2 and remains consistent until the mine's resources are depleted. The parameters used in the EPS can be seen in Table 16-7. Table 16-8 and Figure 16-16 to Figure 16-22 present the mining scheduling results.

Table 16-7: Mine Scheduling Parameters

	Unit	Scheduled
Sublevel Stoping Production Rates		
Ascending/Descending	ROM t/d	300
Ascending/Ascending	ROM t/d	300
Room-and-Pillar		
Production Rate	ROM t/d	130
Ramp (First Access)	m/month	80
Ramp	m/month	40
Production Drive	m/month	40
Cross Cut	m/month	40
Raise	m/month	50

Table 16-8: Mine Scheduling—Production Plan Bandeira

Year	−2	−1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Plant Production																
Feed Mass	-	-	830,197	1,240,470	1,300,934	1,111,961	1,178,307	1,265,569	1,287,666	1,268,934	1,257,524	1,275,864	1,305,088	1,279,267	1,302,660	1,298,641
Li_2O(%)	-	-	1.08	1.12	0.99	1.08	1.17	1.14	1.18	1.17	1.11	1.19	1.20	1.22	1.22	1.29
Rec Met 5.5 (%)	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9	68.9
Rec Mass 5.5 (%)	0.00	0.00	13.55	14.02	12.39	13.52	14.65	14.27	14.77	14.65	13.90	14.90	15.02	15.27	15.27	16.18
Total Conc Mass 5.5 (t)	**0**	**0**	**112,452**	**173,944**	**161,248**	**150,355**	**172,603**	**180,632**	**190,235**	**185,879**	**174,761**	**190,088**	**196,076**	**195,400**	**198,973**	**210,161**
Detailed Production																
Total ROM Mass(t)	18,184	260,009	552,004	1,240,470	1,300,934	1,111,961	1,178,307	1,265,569	1,287,666	1,268,934	1,257,524	1,275,864	1,305,088	1,279,267	1,302,660	1,181,912
Total Li_2O (%) ROM	**0.88**	**1.10**	**1.08**	**1.12**	**0.99**	**1.08**	**1.17**	**1.14**	**1.18**	**1.17**	**1.11**	**1.19**	**1.20**	**1.22**	**1.22**	**1.28**
Rom Mass Sublevel (t)	-	80,777	213,738	796,534	735,988	952,139	974,591	1,102,092	1,080,489	1,119,393	1,116,355	1,161,328	1,214,391	1,206,503	1,245,723	1,152,577
Li_2O Sublevel (%)	-	1.17	1.04	1.16	1.10	1.11	1.20	1.17	1.22	1.20	1.12	1.21	1.22	1.24	1.23	1.28
Rom Mass RP (t)	-	90,938	184,873	364,750	334,005	-	-	-	-	-	-	-	-	-	-	-
Li_2O RP (%)	-	1.17	1.31	1.12	0.79	-	-	-	-	-	-	-	-	-	-	-
Rom Mass Dev (t)	18,184	88,294	153,393	79,186	230,942	159,822	203,716	163,477	207,177	149,541	141,169	114,536	90,697	72,765	56,938	29,335
Li_2O Dev (%)	0.88	0.96	0.86	0.76	0.93	0.93	1.05	0.94	1.02	0.99	0.98	1.00	1.02	0.99	1.04	1.11
Development																
Dev Primary (m)	1,538	2,076	1,276	2,785	992	1,583	1,520	682	450	498	309	661	624	254	-	-
Dev Secondary (m)	420	2,170	4,237	2,657	4,730	4,238	4,179	5,180	4,685	4,660	4,357	3,701	3,310	3,032	1,121	604
Dev Lat Total (m)	1,958	4,245	5,513	5,442	5,722	5,821	5,699	5,862	5,135	5,158	4,666	4,362	3,934	3,286	1,121	604
Detailed Development																
Dev Decline (m)	1,227	1,195	959	959	962	959	822	97	-	-	-	-	-	-	-	-
Dev Xcut (m)	200	1,440	401	1,501	583	1,388	559	2,086	1,057	1,433	1,386	1,524	1,205	1,029	88	10
Dev Muckbay (m)	120	-	735	360	465	420	465	582	535	540	495	477	515	313	120	60
Dev Ore Drive (m)	220	1,611	3,017	1,682	3,712	2,840	3,487	2,748	3,144	2,730	2,599	1,951	1,738	1,770	914	534
Dev Vent Drive (m)	131	-	300	801	-	154	291	304	279	365	156	335	282	175	-	-
Dev Infra (m)	60	-	100	140	-	60	75	45	120	90	30	75	195	-	-	-
Dev Vertical																
Dev Raise Total (m)	336	-	439	934	116	26	456	442	290	226	438	406	650	166	-	-
Raises Room-and-Pillar - ø=2.40 m	180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raises Intake and Return - ø=4.10 m	-	-	165	654	116	13	290	221	145	113	320	203	389	83	-	-
Waste																
Waste Mass (t)	147,614	177,494	203,530	453,389	194,690	255,347	209,295	211,606	279,444	153,673	224,928	219,669	248,469	252,883	94,252	20,267
Available Back Fill Mass (t)	-	87,211	202,456	597,082	574,732	501,021	511,973	579,672	569,578	590,573	587,603	611,505	640,295	636,307	657,756	617,595

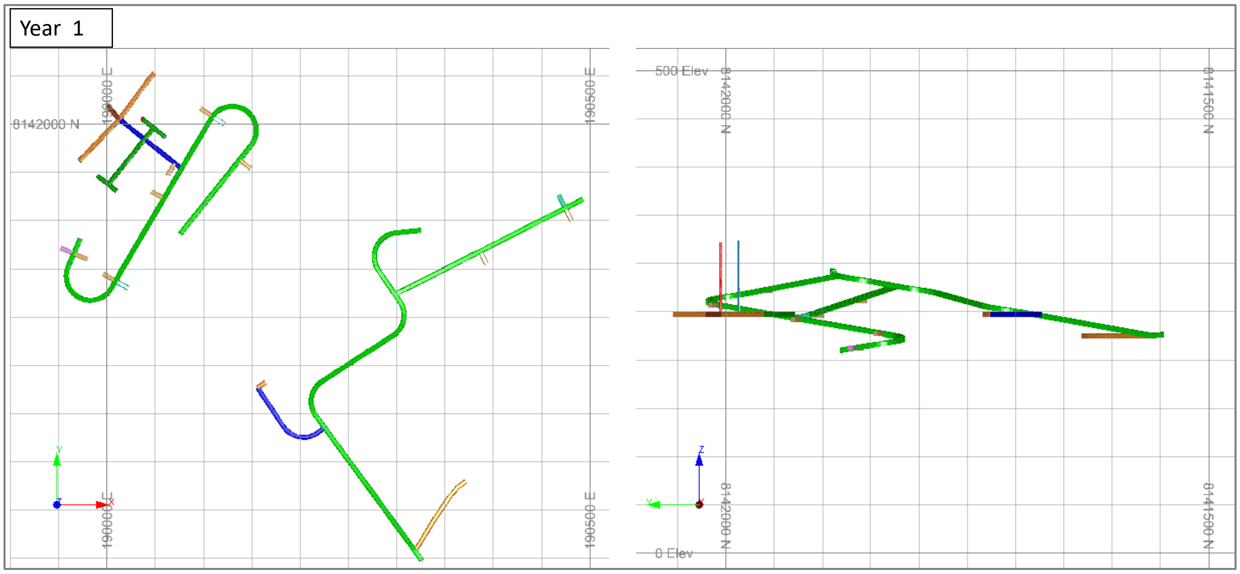


Figure 16-16: Year -2 Mine Sequencing

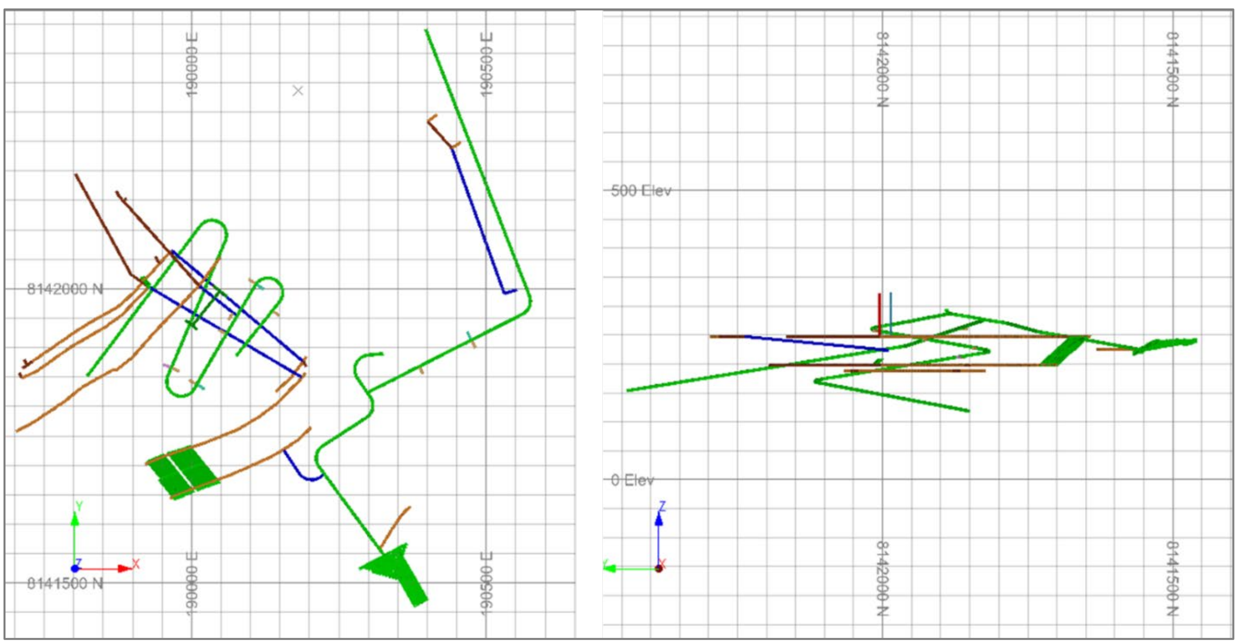


Figure 16-17: Year -1 Mine Sequencing

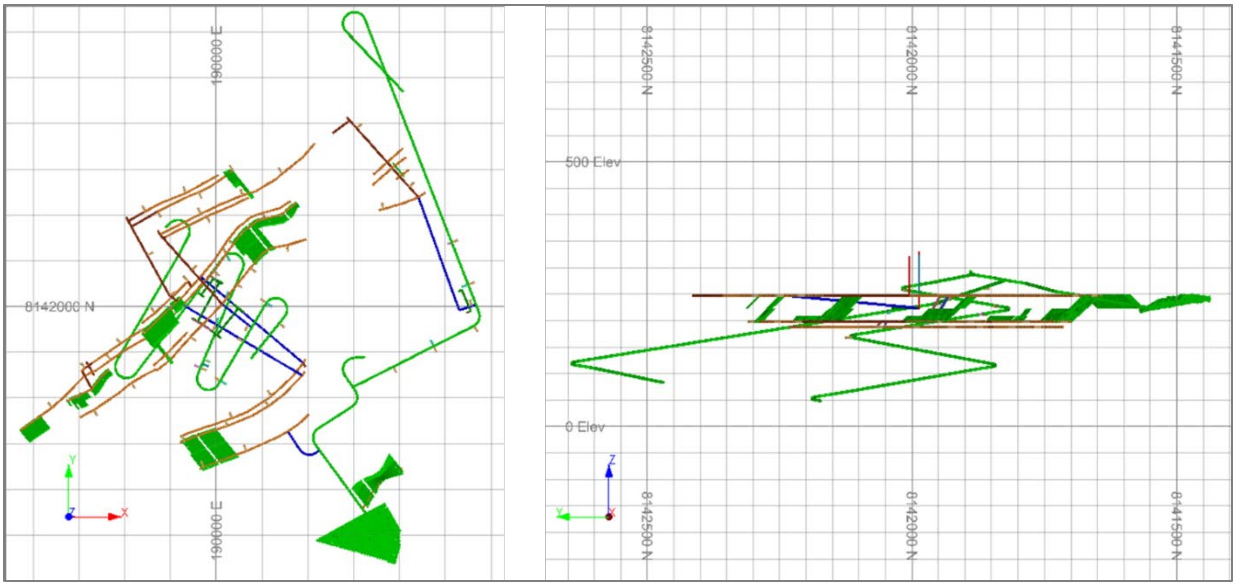


Figure 16-18: Year 1 Mine Sequencing

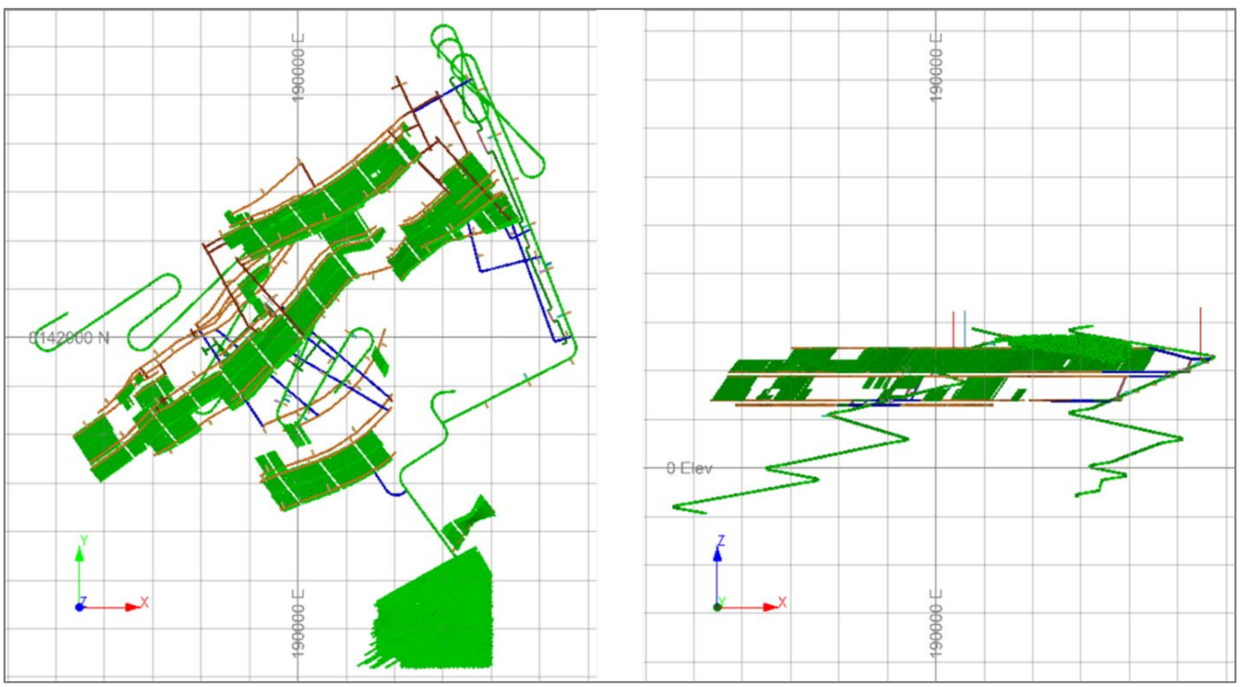


Figure 16-19: Year 2 Mine Sequencing

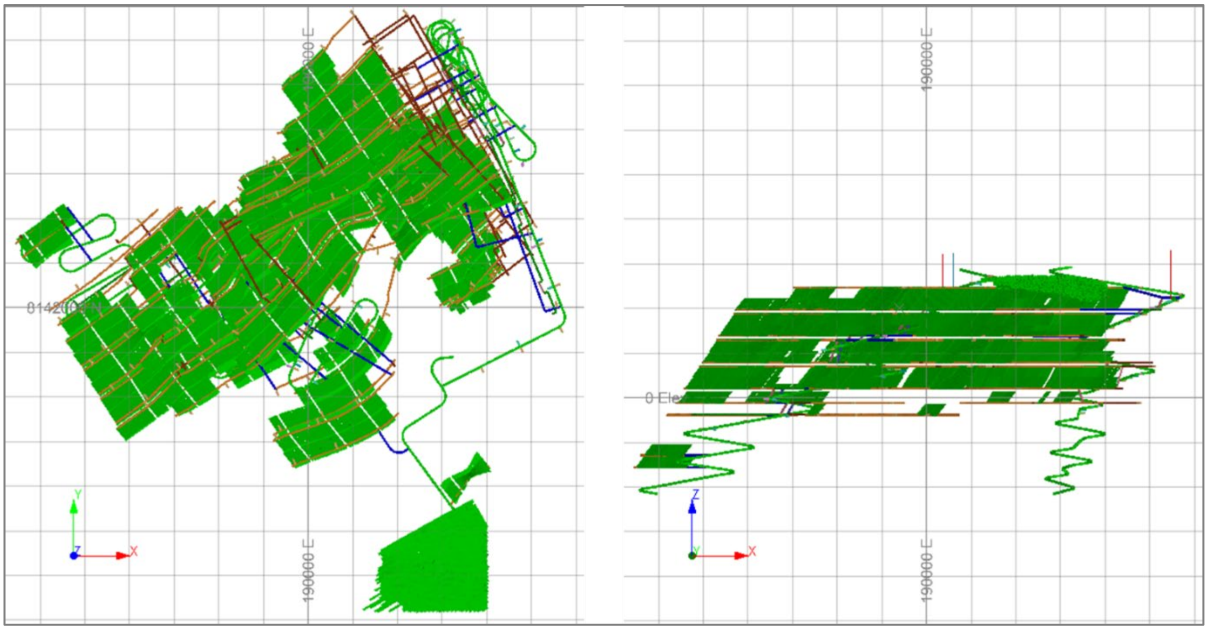


Figure 16-20: Year 7 Mine Sequencing

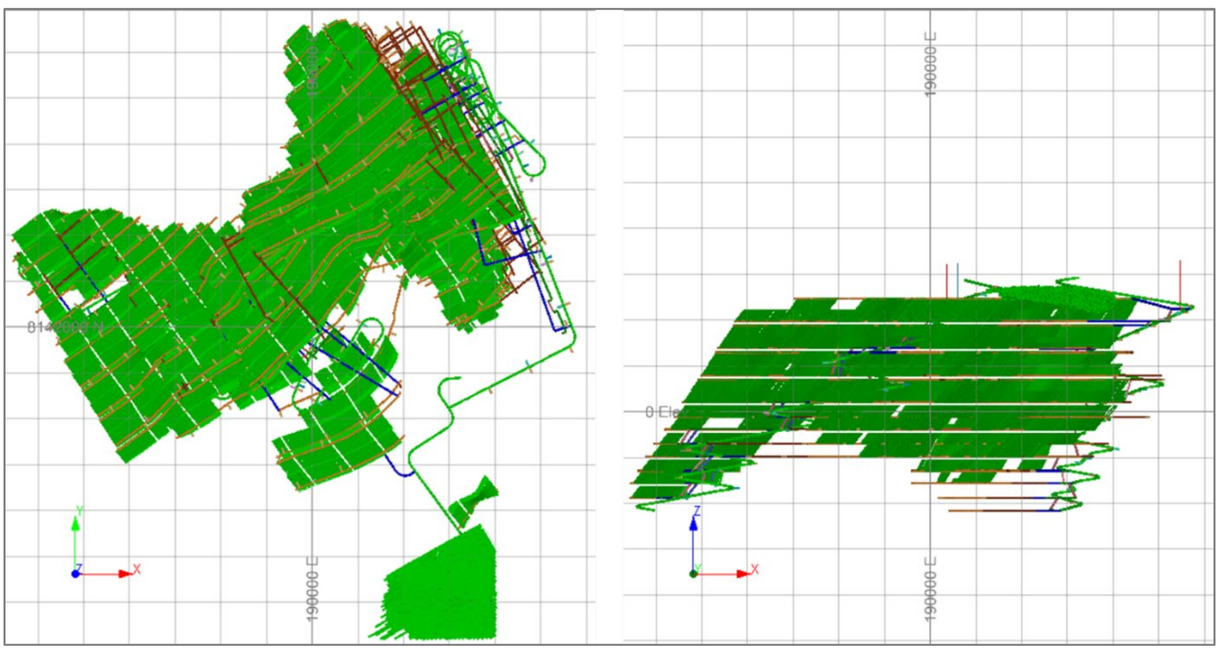


Figure 16-21: Year 12 Mine Sequencing

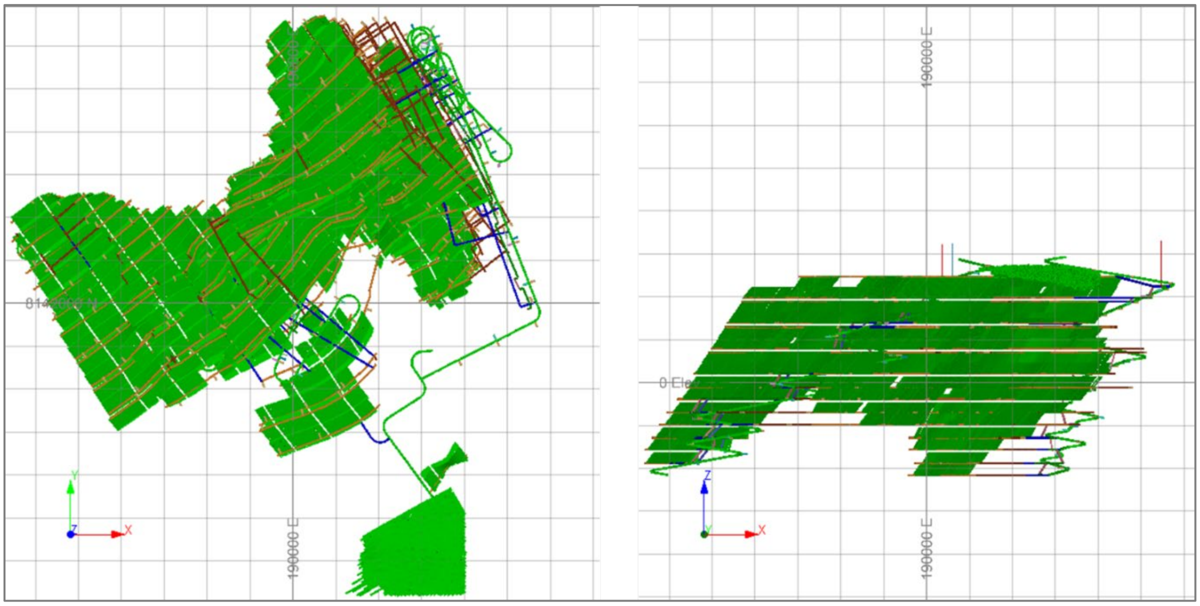


Figure 16-22: Year 14 End of LOM

16.5 Mine Equipment

16.5.1 Mine Production Equipment

Figure 16-9 lists the production equipment selected for the underground mine operation of the Bandeira Project, including their basic specifications, reference models, availability, utilization, and operational efficiency.

Table 16-9: Mine Production Equipment

Equipment	Basic Specification	Reference Model	Availability (%)	Utilization (%)	Op. Efficiency (%)
Truck	45 tonnes	Sandvik TH545i	80	65	83
LHD	15 tonnes	Sandvik LH515i	80	50	83
Longhole Drill	Top hammer 89 mm	Sandvik DL421	80	50	83
Jumbo 2 Boom	22 t op. weight	Sandvik DD321	80	50	83
Cable Bolter	25 t op. weight	Sandvik DS421	80	50	83
Raise Borer	Articulated, mobile, for up to 30 m slot raises	TRB Rhino 100	80	30	83

16.5.2 Drilling Equipment

The equipment used for drilling ore in the stopes will be an electrohydraulic top hammer long hole fan drill capable of drilling vertical and inclined fans and single or parallel long holes up to 54 m deep.

Ore drilling and blasting will be carried out from inside the galleries in the active stope. Blasting is planned to occur after all drilling is completed and all cables installed. The blasted material will be removed from the lower gallery.

The equipment used for drilling the ramps, galleries, and other horizontal openings will be a compact two-boom jumbo with an operational weight of 22 tonnes. The jumbo is capable of face drilling, crosscut drilling, and bolt-hole drilling. The boom provides coverage of 49 m², which is more than enough to cover the required area of 29 m². The equipment is also capable of drilling based on electronic blast fire plan, which represents higher productivity and less exposure. Additionally, the operator's safety cabin is equipped with roll-over protective structures and falling-object protective structures (ROPS/FOPS).

For roof reinforcement, the Project includes a specialized machine capable of installing cable bolts grouted with cement to be used inside the stoping area and for underground openings that require this kind of support. The cable bolter has an operational weight of approximately 25 tonnes, and can drill and install bolts up to 25 m long. Both the cement mixer and the steel strand reel are onboard the machine. The hole size is 51 mm in diameter, and the operator's safety cabin has ROPS/FOPS protection.

The articulated mobile raise borer machine is fully mechanized and self-contained, featuring an electro-hydraulic system. It is specially designed for slot raising in drifts measuring at least 4.7 m x 4.7 m and will perform void hole drilling in stoping blasts. Capable of drilling upward or downward, it handles vertical and inclined raises ranging from 660 mm to 1420 mm in diameter. Equipped with a FOPS/ROPS safety cabin, it incorporates a 290° rotation system, ±30°drilling module rotation, and a ±15° tilting system, all of which contribute to reducing dilution of the free face rings.

Table 16-10 and Table 16-11 summarize the productivity estimates for the fan drill and the cable bolter, respectively.

Table 16-10: Fan Drill Productivity Parameters and Annual Unit Production

	Unit	
Fan Drill Productivity (Slots)	m/d	195
	t/m	2.15
	Mt/a	0.15
Fran Drill Productivity (Rings)	m/d	195
	t/m	4.5
	Mt/a	0.32

Table 16-11: Cable Bolter Productivity Parameters and Annual Unit Production

	Unit	
Bolt Length	m	10
Cable Bolter Productivity	bolts/d	150
	t/bolt	25
	Mt/a	1.35

The productivity of the jumbo and the slot-raise borer are shown in Table 16-12 and Table 16-13, respectively.

Table 16-12: Jumbo Productivity

	Development (m/month)
Decline	
Multiblast (Years −2 and −1)	90
Single Blast	40
Drives and Infrastructure	40
Jumbo Productivity (m/month)	180

Table 16-13: Slot Raise Borer Productivity Parameters and Annual Unit Production

	Unit	
Raise Borer Productivity (Slots)	m/d	15
	m/a	5,400

16.5.3 Loading and Haulage Equipment

Both Both the blasted ore and the waste from mine development will be loaded by remote-controlled LHD loaders with a capacity of 15-t into 45-tonnes underground mine trucks.

Table 16-14 and Table 16-15 show the parameters considered for estimating LHD productivity and truck fleet sizing, respectively.

Table 16-14: LHD Productivity Parameters

LHD Productivity Estimate	
Scheduled time (h/a)	6,552
Availability (%)	80
Utilization (%)	50
Worked hours (h)	2,621
Efficiency factor (%)	83
Effective time (h/a)	2,175
Cycles per hour	25
Bucket capacity (m3)	6.0
Bucket capacity (t)	13.12
Fill Factor (%)	80
Productivity (Mt/a)	0.57

A rehandle of 50% of the ore and waste materials has been added to the LHD production requirements.

Table 16-15: Truck Productivity Parameters

Scheduled time (h/a)	6,552
Availability (%)	80
Utilization (%)	65
Worked hours (h)	3,407
Efficiency factor (%)	83
Effective time (h/a)	2,828
Capacity (m3)	18.0
Average Load (t)	39.4

16.5.4 Auxiliary Equipment

Table 16-16 presents a list of auxiliary equipment planned for the Bandeira Project, including their basic specifications and reference models.

An average availability of 75% was applied to all auxiliary equipment. Their utilizations were calculated based on the estimated hours worked by the fleet and the number of units required.

Table 16-16: Mining Auxiliary Equipment

Auxiliary Mining Equipment		
Scaler	8.5 m vertical boom reach	Normet Scamec 2000 S
Explosive Truck	4 t emulsion carrying capacity	Normet Charmec MF050 D
Scissor Lift	3 t, 3.5 m	Normet Utilift SF330
Shotcrete Remix Truck	4.4 m3	Normet Tornado S2
Shotcrete Spray Truck	up to 27 m3/h (electric operation)	Normet Alpha 30 VC
Fuel & Lub Truck	4,000 l	Normet Multimec SF60 + C350 Cassete
Personnel Carrier	14 persons carrying capacity	Normet Variomec XS 115 PER + C162 Cassete
Maintenance Truck	4 t carrying capacity	Normet Variomec XS 040 Mat + C125 Cassete
Jackleg Drill	34 kg	Tornibras TB303AM+TB300
Stoper Drill	40 kg	Tornibras TB303S
Air Compressor	mobile, diesel, 286 cfm, 10 bar	Atlas Copco XATS 300 Pd
Grader	10 t op. weight	Paus PG 10 HA
Ventilation Fan	110 KW	Howden 4800-VAX-2700 FB 15TG
Exhaustor	800 KW	Howden MVC 2293.00.15 SOV4T ARR8
Dewatering Pump	submersible, 170 m3/h, 73 m maximum height	Atlas Copco WEDA D80H
Diesel Generator	70 KVA	Atlas Copco QAS 70 Pd
Utility Vehycle	1 t, flat deck	Toyota Land Cruiser

Fleet Sizing

Table 16-17 shows the fleet requirements for the Bandeira Project mining operation.

Table 16-17: Mining Equipment Fleet Sizing (Number of Units)

Year	−2	−1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Truck	1	4	6	10	10	11	12	17	13	13	16	16	16	16	13	14
LHD	1	2	3	4	4	4	4	6	4	4	4	4	4	4	3	3
Longhole Drill	0	1	1	3	3	4	4	4	4	4	4	4	5	5	5	5
Jumbo 2 Boom	2	3	5	5	5	3	3	3	3	3	3	3	2	2	1	1
Cable Bolter	0	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Raise Borer	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Scaler	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Explosive Truck	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Scissor Lift	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Shotcrete Remix Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Shotcrete Spray Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fuel & Lube Truck	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Personnel Carrier	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Maintenance Truck	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Jackleg Drill	1	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Stoper Drill	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Air Compressor	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Grader	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Ventilation Fan	2	9	11	11	11	11	11	11	11	11	11	11	11	11	11	11
Exhauster	2	2	2	3	3	4	4	4	4	4	4	4	4	4	4	4
Dewatering Pump	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Diesel Generator	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Utility Vehicle	4	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Total	**24**	**39**	**66**	**74**	**74**	**75**	**76**	**83**	**77**	**77**	**80**	**80**	**80**	**80**	**75**	**76**

16.6 Drilling and Blasting Plan

16.6.1 Longhole Drilling and Blasting

The drilling and blasting plan for the longhole drilling is shown in Table 16-18 and Figure 16-23.

Table 16-18: Longhole drilling and Blasting Plan

	Unit	
Drill Holes	#	29
Total Length	m	462
Average Drill-Hole length	m	15.93
Solid Volume	m^3	1,953
Ore Density	m^3/t	2.7
Solid Mass		5,273.1
Mining Recovery	%	90
Spacing	m	2
Fan Mass	t	1,318
Specific Drilling	t/m	5.71
Charge Ratio	kg/m	4.76

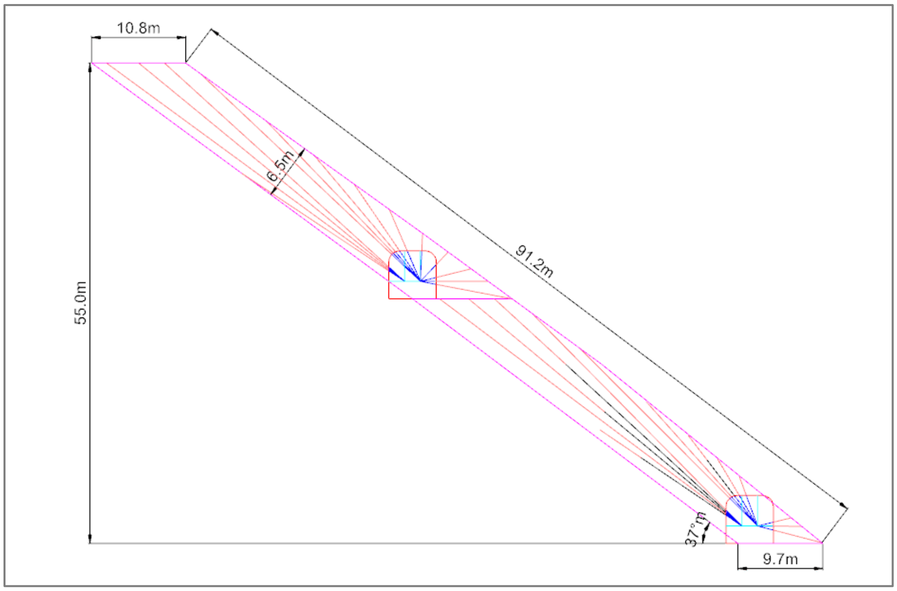


Figure 16-23: Longhole Drilling

16.6.2 Slot Raise Drilling and Blasting

Table 16-19 presents the slot-raise drilling and blasting plan designed for the Bandeira Project sublevel stoping operation.

Table 16-19: Slot-Raise Drilling and Blasting Plan

	Unit	
Total Drill Holes	#	16
Enlarged 6"	#	6
Loaded Drill Holes	#	10
Average Drill-Hole Length	m	38
Enlarged Total Length	m	460
Loaded Total Length	m	383.33
Total Length	m	843.33
Average Dip	º	37
Solid Volume	m³	44.14
Ore Density	m³/t	2.7
Slot Mass	t	119
Specific Drilling	t/m	0.14
Plug	m	0.675
Drill-Hole Diameter	mm	89
Drill-Hole Volume	cm³	2,343
Explosive Density	(g/cm³)	1.5
Drill-Hole Mass	g	3,514
Drill-Hole Mass	kg	3.51
Booster	g	450
Total Booster Mass	g	4500

	Unit	
Total Emulsion	kg	35.14
Total Booster Mass	kg	4.5
Slot Total Mass	kg	39.64
Charge Ratio	g/t	333

16.6.3 Room-and-Pillar

The room-and-pillar drilling and blasting plan is shown in Table 16-20.

Table 16-20: Room-and-Pillar Drilling and Blasting Plan—Technical Parameters

Section area	m²	16.00
Section width	m	4.00
Total Drills holes	#	29.00
Drill length	m	3.70
Blast yield	%	90.00
Blast advance	m	3.33
Total drilled	m	107.30
Total mass	t	158.24
Specific drill	t/m	1.47
Drill plan index	m/m³	1.81
Drill blast round index	m/m	32
Overbreak	%	10.00

16.6.4 Development

The design of the drilling and blasting plans for the ramp and drives is summarized in Table 16-21 and illustrated in Figure 16-24 and Figure 16-25.

Table 16-21: Development Drilling and Blasting Plan

Section area	m²	28.50
Section width	m	5.30
Total Drills holes	#	51.00
Drill length	m	3.70
Blast yield	%	90.00
Blast advance	m	3.33
Total drilled	m	188.70
Specific drill	t/m	1.55
Drill plan index	m/m³	1.81
Drill blast round index	m/m	57
Productivity	t/h	125.47
Productivity	m/h	81.00
Productivity	drills/h	21.89
Overbreak	%	10.00

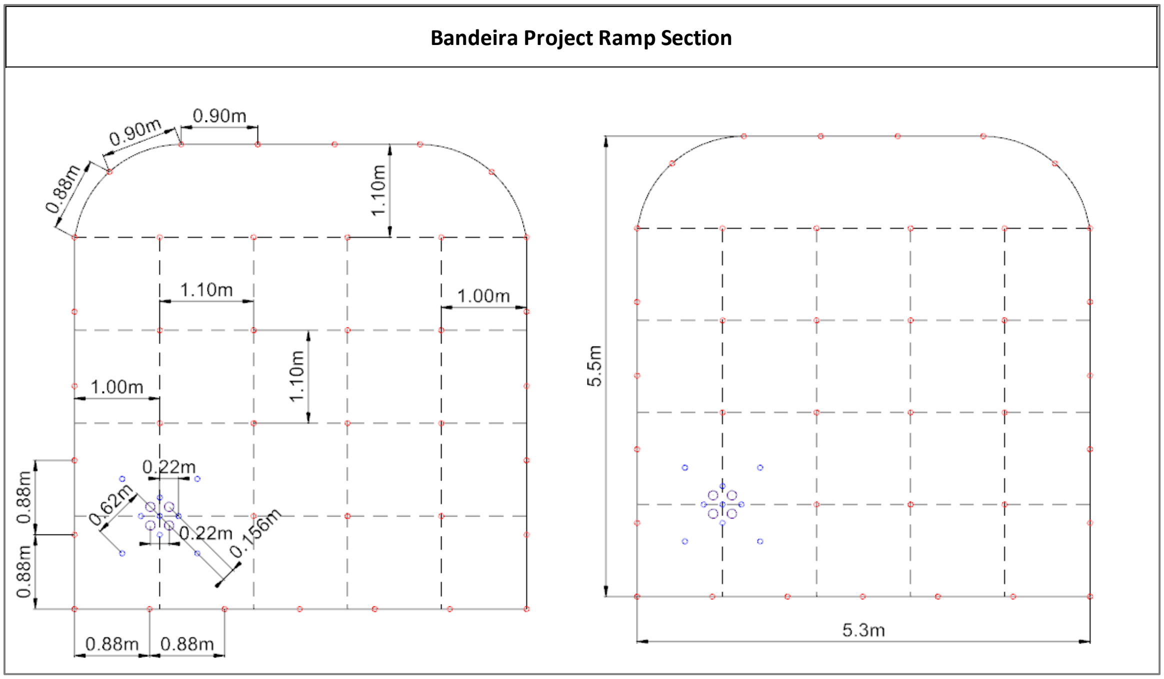


Figure 16-24: Drilling and Blasting Plan for the Ramps

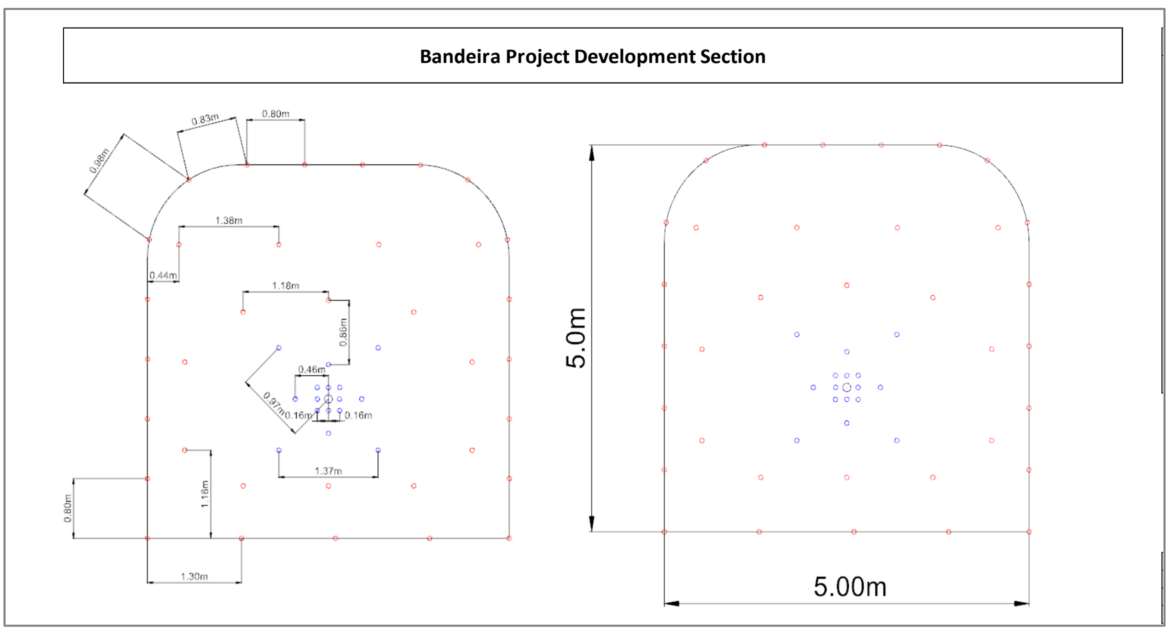


Figure 16-25: Drilling and Blasting Plan for the Drives

16.7 Roof Support

16.7.1 Sublevel Stopes

The design parameters of the cable bolting for the roof supporting of sublevel stopes are listed in Table 16-22.

Table 16-22: Design Parameters of the Roof Support Bolting for the Sublevel Stopes

Cable Bolting for Sublevel Stopes	
Avge lenght of stopes (m)	4
N. of galleries per stope (ascending + descending)	2
Typical stope with galleries area (m2)	20
% of cabled area	100
Typical stope mass (t)	2003
Cabling burden (m)	1.5
Cabling spacing (m)	1.5
N. of cables per line	4
N. of lines	3
N. of cables per 5.5 m line	2
N. of cables per 8.0 m line	2
Total n. of cables per 5.5 m solid	5
Total n. of cables per 8.0 m solid	5
Hangingwall/footwall cable lenght (m)	8.0
Brown cable lenght (middle of gallery) (m)	5.5
Total 8.0 m cabled lenght (m)	43
Total 5.5 m cabled lenght (m)	29
Specific drilling per 8.0 m cable (t/m)	47
Specific drilling per 5.5 m cable (t/m)	68
Specific drilling per total cable (t/m)	17
Grout consumption per 10 m cable (kg)	45
Volume of a 10 m drillhohe (l)	20.43
Cement density (t/m3)	2.20
Volume of a 8 m drillhohe (l)	16.34
Grout consumption per m m cable (kg)	36.00
Grout consumption (kg/m)	4.50
Total grout mass perstope solid (kg)	192.00
Ton per grout mass (t)	10.43
Volume of a 5.50m drillhole (l)	11.24
Grout consumption per 5.5 m cable (kg)	24.75
Grout consumption (kg/m)	4.50
Total grout mass per stope solid (kg)	132.00
Ton per grout mass (t)	15.17

16.7.2 Room-and-Pillar

Table 16-23 and Table 16-24 list the roof support drilling and cable bolting design parameters for the room-and-pillar mining operation.

Table 16-23: Room-and-Pillar Roof Support Drilling

Room and Pillar Roof Support Drilling		
Roof support drill pattern	*m²*	2.25
Supported area	*m²*	14.65
Number of bolts	*#*	7
Bolt lenght	*m*	3
Bolt lenght per blast round	*m*	21
Bolt lenght per blast meter	*m/m*	0.72

Table 16-24: Room-and-Pillar Roof Support Design Parameters

Room and Pillar Roof Support		
Steel Mesh	**Unit**	
Lenght	*m*	3.05
Width	*m*	2.13
Grid dimensions	*m*	100x100
Overlaping squares	*#*	3
Overlaping squares distance	*m*	0.3
Effective width	*m*	1.83
Area	*m²*	5.58
Steel Mesh Area		
Lenght	*m*	3.05
Width	*m*	7.7
Area	*m²*	23.49
N. of meshes	*#*	5
Bolt Drilling		
Burden	*m*	1.2
Spacing	*m*	1.2
Area	*m²*	1.44
Bolt lenght	*m*	0.91
N. of drillholes	*#*	16
Rework factor	*%*	0
Estimated n. of drillholes	*#*	16.3
Estimated drilling	*m*	14.8
N. of clips per mesh	*#*	4
Total n. of clips	*#*	20

16.7.3 Development

Roof support drilling and blasting parameters for the development works of Bandeira Project underground mine operation are shown in Table 16-25 and Table 16-26.

Table 16-25: Development and Auxiliary Roof Support Drilling

Development Roof Support Drilling		
Roof support drill pattern	m^2	2.3
Supported area	m^2	19.4
Number of bolts	#	9.0
Bolt lenght	m	3.0
Bolt lenght per blast round	m	27.0
Bolt lenght per blast meter	m/m	8.1
Auxiliary Drilling		
Infraestructure holes per blast	#	6
Hole lenght	m	0.8
Total drilled per blast round	m	4.8
Drilled infra per blast meter	m/m	1.44

Table 16-26: Design Parameters for Roof Supporting of Ramps

Ramp Roof Support		
Steel Mesh	**Unit**	
Lenght	m	3.05
Width	m	2.13
Grid dimensions	mm	100x100
Overlaping squares	#	3
Overlaping squares distance	m	0.3
Effective width	m	1.8
Area	m^2	5.58
Steel Mesh Area		
Lenght	m	3.05
Width	m	12.7
Area	m^2	38.58
N. of meshes	#	7
Bolt Drilling		
Burden	m	1.2
Spacing	m	1.2
Area	m^2	1.44
Bolt lenght	m	0.91
N. of drillholes	#	27
Rework factor	%	0
Estimated n. of drillholes	#	26.8
Estimated drilling	m	24.4
N. of clips per mesh	#	4
Total n. of clips	#	28

16.8 Rock Backfilling

Due to surface area restriction at Bandeira Project for waste disposal, it has been decided at this feasibility study phase that 80% of the waste generated in development operations will be backfilled, as long as there are available open stopes in the mine.

When the dumping areas above the stopes are opened, an unloading point will be excavated to allow trucks to discharge waste for rock-filling purposes. Additionally, in order to meet height restrictions in the mine, truck units equipped with dump ejectors will be purchased in Years 1, 4, 6, and 9.

16.9 Mine Services

16.9.1 Ventilation

The mine's main ventilation system will be implemented through mechanical ventilation, consisting of fans and exhaust fans. Its operational principle is to force clean air into the mine and exhaust polluted air to the surface, where it will be discharged, thus creating continuous air exchange and renewal of the underground atmosphere

The supply of clean air to the underground mine will be achieved through the following pathways:

- Two main ramps:
  - Ramp 1 with a section of 5.3 m x 5.5 m: from Elevation 290 m to Elevation −426 m (deepest level of Ramp 1)
  - Ramp 2 with a section of 5.3 m x 5.5 m: from Elevation 284 m to Elevation −449 m (deepest level of Ramp 2).
- Three intake raises:
  - Intake Raise No. 1 with a section of Ø 2.4 m: from Elevation 326 m (surface) to Elevation 229 m.
  - Intake Raise No. 2 with a section of Ø 4.1 m: from Elevation 330 m (surface) to Elevation 140 m. Bellow this elevation up to −426 m the section changes to a square section of 4.0 x 4.0 m
  - Intake Raise No. 3 with a section of Ø 4.1 m: from Elevation 324 m (surface) to Elevation 245 m. Bellow this elevation up to −249 m the section changes to a square section of — 4.0 x 4.0 m.

The air intake raises are designed and calculated to serve as:

- Passages for clean air from the surface to the deepest levels of the mine.
- Reducers of air velocity in the main ramps.
- Emergency exits, equipped with ladders along their entire length.
- Operational infrastructure—service water ducts, drinking water, pumping water, electrical cabling, etc.

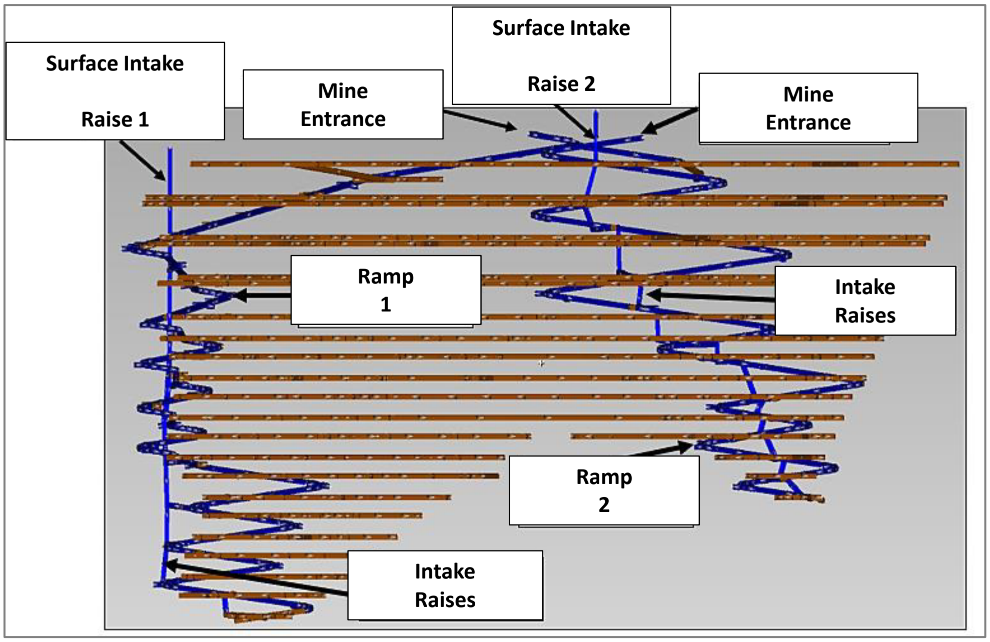


Figure 16-26: Schematic Air Intake Circuit for the Mine

Polluted air exhaust will be conducted upwards through two exhaust raises from the surface to Elevation 221 m. One raise will operate over the production areas of Ramp 1, and the other raise will operate over the production areas of Ramp 2.

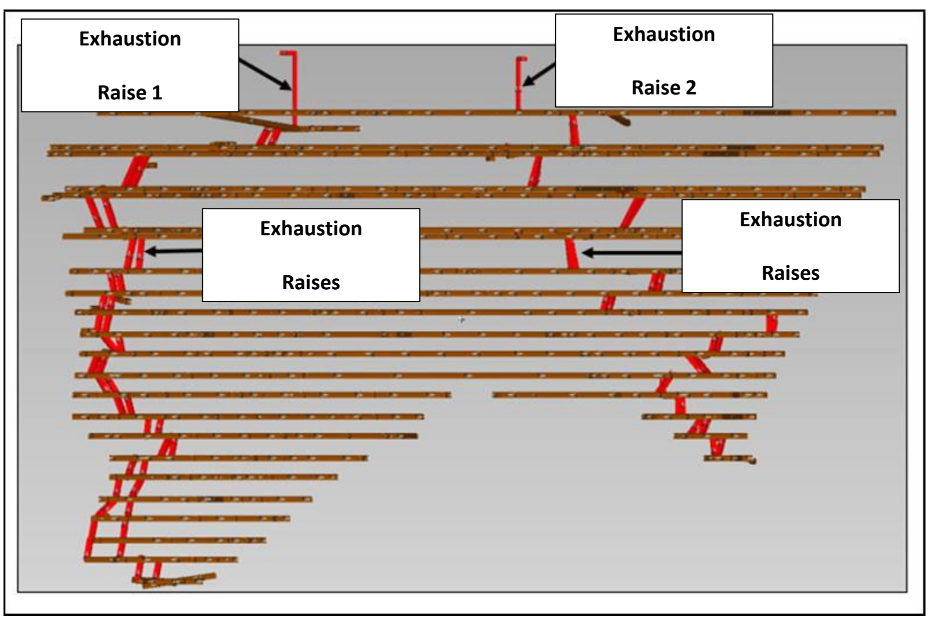


Figure 16-27: Schematic Exhaust Ventilation Circuit for Polluted Air

From Elevation 221 m, four parallel raises will be considered, interconnected at all levels of the mine:

- Two exhaust raises for polluted air acting on the production areas of Ramp 1.
- Two exhaust raises for polluted air acting on the production areas of Ramp 2.

The opening section of the raises are:

- Exhaust Raise No. 1: Ramp 1—section of Ø 4.1 m, from Elevation 330 m (surface) to Elevation 221 m.
- Exhaust Raise No. 2: Ramp 2—section of Ø 4.1 m, from Elevation 322 m (surface) to Elevation 245 m.
- Exhaust raises between levels (four raises), with two raises acting on the production areas of Ramp 1 and two raises acting on the production areas of Ramp 2, with a section of 5.0 m x 5.0 m.

The main exhaust fans to be installed on the surface near raises No. 1 and No. 2 have been calculated and dimensioned to:

- Supply oxygen underground, maintaining tolerance limits at a minimum of 19.5% and <23% by volume.
- Ensure continuous air renewal underground.
- Effectively dilute all flammable or harmful gases in the underground environment.
- Maintain dust, temperature, and relative humidity levels within tolerance limits and suitable for human work.
- Be maintained and operated regularly and continuously, as established in regulatory standards NR22.24.

Ventilation of development faces that are not yet connected to the main ventilation system will be provided by secondary fans, also known as auxiliary fans. These fans are designed with capacity to ventilate a working face where diesel combustion engine equipment is in simultaneous use, ensuring supply of breathable air for the operators.

This ventilation system involves installing an auxiliary fan unit in the clean-air intake pathway, such as on the ramp or clean-air intake raise. The fan captures air and blows it to the working face through ventilation ducts made of PVC fabric, with a diameter of 1,300 mm.

After ventilating the development and mining working face, the air will be directed and discharged into the exhaust raises installed in ventilation drives linked to the decline. Blasting occurs at the end of the shift to ensure that no one is inside the mine during this activity. The interval between shifts ranges from 30 to 60 minutes, allowing sufficient time for the air contaminated with gases and dust resulting from detonations to be cleared, ensuring fresh, clean air at the beginning of the next work shift.

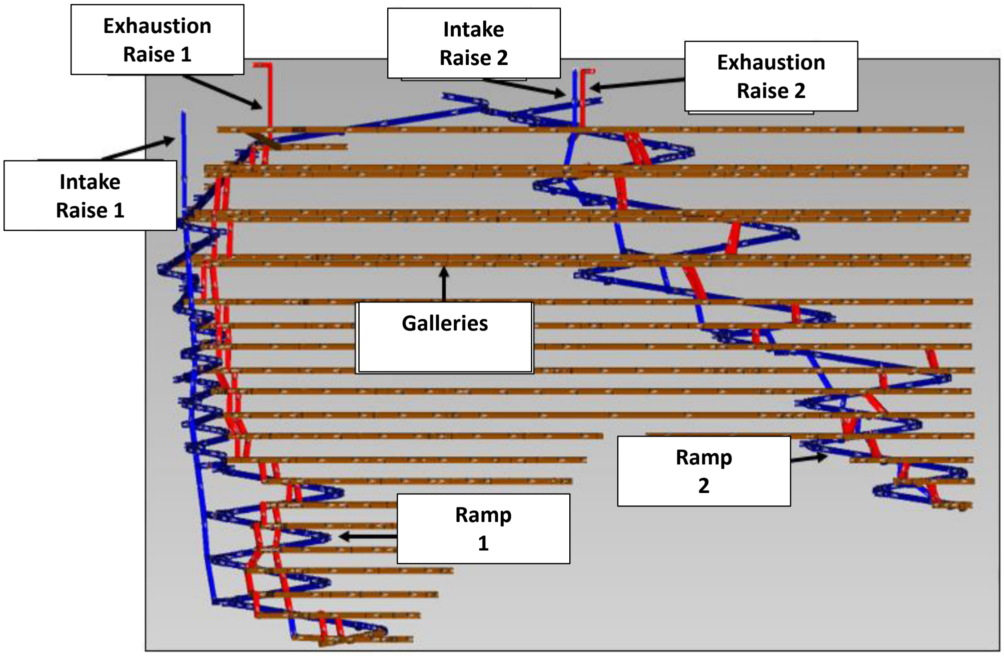


Figure 16-28: Schematic Main Mine Ventilation System

16.9.2 Electric Power

Most of the demand for electrical energy in the underground mine will come from:

- Main and secondary ventilation fans
- Drilling rig machines, explosive loading and scaling equipment
- Dewatering pumps
- Refuge stations
- Air compressors
- Lighting.

The construction of a surface electrical substation with a power capacity of 5,000 kVA is planned to exclusively meet the energy demand of the mine. Additionally, underground substations with a capacity of 1,000 kVA each will be installed over the Project's lifespan as the mine deepens

16.9.3 Service Water

Service water for drilling activities and dust control will be supplied from a reservoir on the surface. The clean water will then be distributed inside the mine by gravity through a network constructed of water storage facilities and PVC pipelines. Furthermore, the storage facilities ensure a continuous water supply in case of any issues with the surface reservoir.

The primary water for underground operations will be sourced from either the nearby Piauí Stream or the Jequitinhonha River. Additionally, water collected from accumulation points within the mine will serve as an alternative source. All water will undergo treatment, including sedimentation and solid filtration before being redistributed to work faces via overhead water lines.

16.9.4 Compressed Air

The mine's compressed-air demand will be met by two mobile, diesel air compressors, each with a capacity of 286 ft^3 per minute at 10 bars of pressure. One will be installed on the surface, and the other will be used inside the mine as needed.

16.9.5 Communication

The communication solution for the Bandeira Project underground mine should consist of an integrated system featuring a private LTE telecommunications module in Band 28 for online interconnection of users and peripherals. This system is essentially composed of 7/8" Tech RFX wave-line radiated cables, VHF radios operating within the 136–174 MHz range, repeaters, antennas, fibre-optic cables, and all necessary material and infrastructure for installation and fixing of the components.

Additionally, the system should provide resources for voice communication, dispatch system, micro-seismic control, monitoring of potentially dangerous atmospheric conditions, and positioning tracking for underground mine workers.

16.9.6 Dewatering

Small sumps will be designed between the mine levels. A main water-collection sump will be installed at the bottom of the mine. The water collected in the sump should either be returned for use within the mine or pumped to the surface water treatment station.

16.9.7 Explosive Storage and Handling

The explosive to be used in the underground mining operation will be emulsion, for both development and ore production inside the mine. Tanks for primary explosives will be located on the surface while secondary tanks will be situated underground to provide explosive reserves for up to three days when needed. Additionally, explosives and detonators will be stored in separate facilities, with a magazine on the surface to accommodate blasting accessories.

It is being considered that explosives, accessories, equipment, and blasting services will be supplied by an outsourced supplier.

16.9.8 Fuel Storage and Handling

The on-site diesel-fuel storage will be installed with a supply capacity of approximately one week. Two tanks will be installed within a lined containment berm. Fueling equipment is to be adjacent to the fuel-tank group, and the fueling area will be drained to a containment dike.

16.9.9 Mining Quality Control

For this project, approximately 1,200 samples per month from the mine have been considered. These samples are sourced from productive development faces, drilling for grade control, exploratory drilling, and from samples collected in the sides of the ore drives.

These samples, combined with the mapping of working faces, resource revaluation, estimation and mining monitoring, and reconciliation will aid the mine geology team in quality control and achieving the projected grades. The analysis will focus on the lithium oxide and iron oxide content of the collected samples.

16.10 Mine Personnel

Table 16-27 summarizes the mine personnel requirements for the Bandeira underground project.

Table 16-27: Underground Mine Personnel

	Shifts		Number of Positions Per Shift	Total Positions Count	Year															
	Admin	Operational			-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Mining Operation																				
Mine Operation Manager	*		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Assistant	*		2	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Coordinator	*		4	4	1	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mine OperationEngineer	*		2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Safety Engineer	*		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trainer	*		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Operation Foreman		*	3	12	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Technician		*	3	12	4	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
Truck Operator		*	Variable	Variable	4	12	16	36	36	40	40	48	48	52	56	60	60	56	56	52
LHD Operator		*	Variable	Variable	4	8	8	16	16	16	16	16	16	16	16	16	16	12	12	12
Drill Operator		*	Variable	Variable	8	24	36	44	44	40	40	44	44	44	44	44	44	44	40	36
Ancillary Equipment Operator		*	Variable	Variable	24	24	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Blaster		*	2	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mine Operation Assistant		*	6	24	12	12	24	24	24	24	24	24	24	24	24	24	24	24	24	24
Technical Services																				
Technical Services Manager	*		1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Assistant	*		1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Coordinator	*		2	2	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mine Geologist	*		3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Mine Planning Engineer	*		2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mine Ventilation Engineer	*		1	1	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Geotechnical Engineer	*		2	2	0	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Supervisor Geociencies	*		3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Quality Control Technician		*	1	4	0	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Surveyor	*		2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Geological Surveyor		*	2	8	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Technical Services Assistant		*	5	20	2	10	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Mine Equipment Maintenance																				
Mine Eq. Maintenance Manager	*		1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Coordinator	*		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Maintenance Engineer	*		2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Mine Maintenance Foreman		*	1	4	1	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Mechanic		*	/ 12 eq. unit	Variable	8	13	21	25	25	25	25	26	26	26	27	27	27	26	26	25
Electrician		*	/ 20 eq. Unit	Variable	5	8	13	15	15	15	15	16	16	16	16	16	16	16	16	15
Welder		*	1	4	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Washer	*		2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Tyre Repairman	*		2	2	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Lubeman		*	2	8	4	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Mine Maintenance Scheduler	*		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Maintenance Controler	*		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mine Maintenance Assistant		*	4	16	8	8	16	16	16	16	16	16	16	16	16	16	16	16	16	16
					109	**187**	**304**	**346**	**346**	**346**	**346**	**360**	**360**	**364**	**369**	**373**	**373**	**364**	**360**	**350**

16.11 Infrastructure

The following structures will be built on the surface as part of the Bandeira Project underground mine:

- Access roads from the underground mine portals to the primary crusher, temporary ore stockpile, and waste rock dump
- Waste rock dump from mine development services, including drainage structures and a sediment-containment dike
- Explosives preparation yard, including an emulsion tank, an accessory magazine, and an office for the outsourced supplier of explosives and blasting services
- Mine administrative facilities, such as technical office, dispatch and communication room, batteries and protective equipment room, and changing room
- Maintenance facilities, including a workshop, warehouse, tire shop, and vehicle and equipment washer
- Fuel facilities
- Service-water tank and treatment station
- Electrical substation.

Figure 16-29 shows the general arrangement of Bandeira's surface infrastructure.

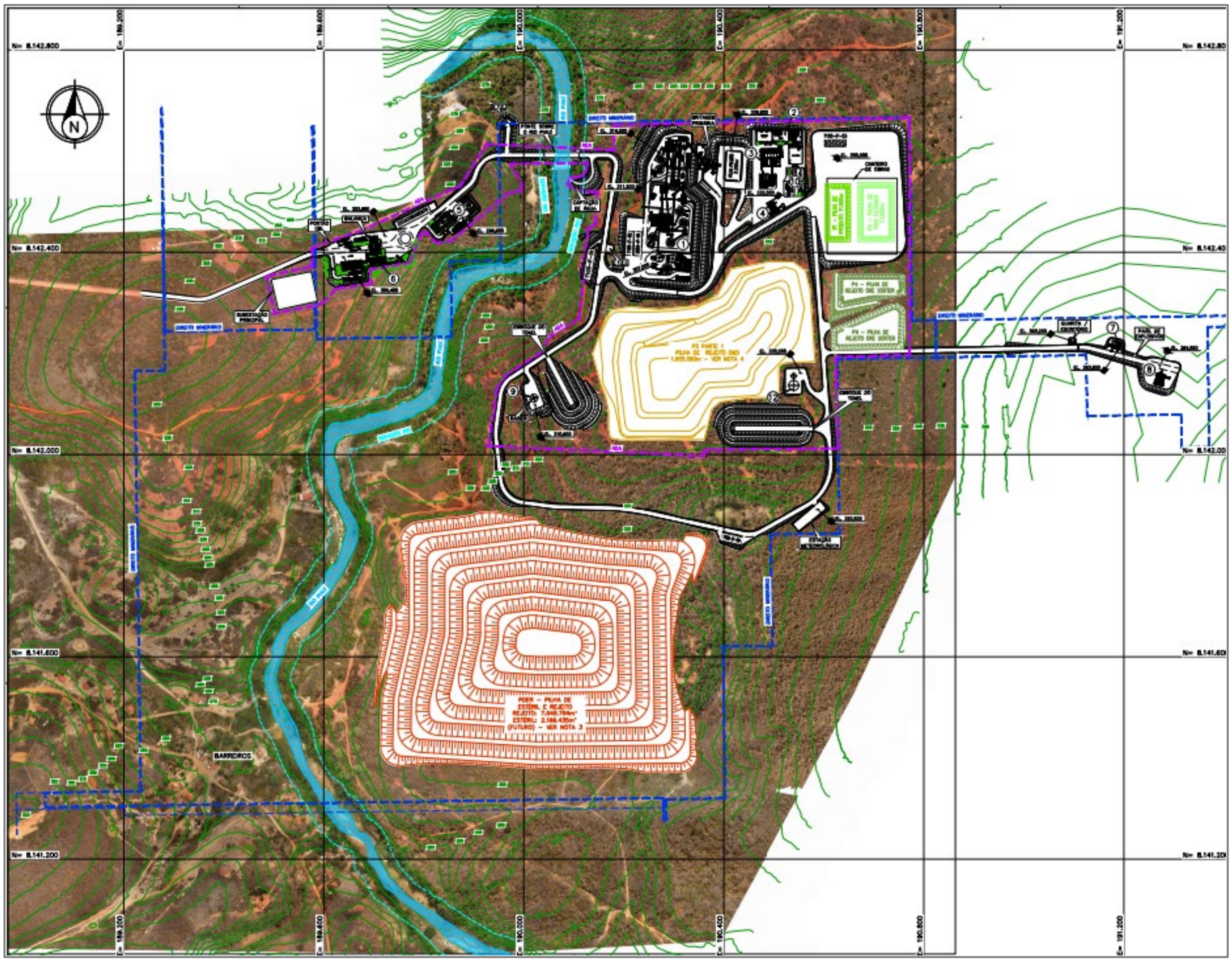


Figure 16-29: Bandeira's Surface Infrastructure

16.12 Safety and Emergency

16.12.1 Safety and Emergency Measures

Escape Ladders

The ventilation raises at the Bandeira Project underground mine will be equipped with ladders to serve as an escape route for the miners.

Escape ladders in underground mines are crucial safety features designed to provide a means of egress for miners in the event of an emergency, such as a fire, gas leak, or other life-threatening situations. These ladders will be strategically installed to facilitate a rapid and safe ascent to the surface or a designated escape route.

Key aspects of escape ladders in the Bandeira mine include:

- Located at some fresh-air ventilation raises that connect different levels of the mine, allowing miners to climb vertically to reach the surface or a safer location.
- Constructed with materials that can withstand the specific environmental conditions of the mine, including corrosion resistance, to prevent deterioration.
- Provided with adequate lighting to ensure visibility, especially in low-light conditions or during power outages.
- Marked with clear and visible signage to guide miners to safety during an emergency.
- Miners will receive training on how to use escape ladders, including proper climbing techniques and safety procedures. Regular evacuation drills are conducted to ensure miners are familiar with the location and use of escape ladders.

Miners will receive training on how to use escape ladders, including proper climbing techniques and safety procedures. Regular evacuation drills are conducted to ensure miners are familiar with the location and use of escape ladders.

Refuge Chambers

The installation of refuge chambers at strategic points in the mine is planned for the Bandeira Project mine.

Refuge chambers play a critical role in enhancing the safety of underground mining operations, providing a secure place for miners to seek shelter and await rescue in the face of unexpected and potentially life-threatening events.

These chambers are specifically designed to offer protection from various hazards, such as fires, explosions, gas leaks, or other life-threatening situations that may occur in underground mining operations.

The Bandeira Project underground mine will be provided with refuge chambers with a capacity for 20 people and autonomy of 48 hours, in quantities to shelter all workers during a shift inside the mine. They will be installed strategically so that each worker must travel a maximum of 400 m from the working face.

Key features and aspects of the Bandeira Projects's refuge chambers include:

- Location and accessibility
  - Strategically located throughout the mine to ensure easy access for miners in case of an emergency.
  - Situated along main escape routes, at intersections, or in areas prone to higher risks.
- Design and Construction
  - Constructed to withstand the specific hazards present in the mines, including fire, blast pressure, and potential structural damage.

  - The walls, roof, and floor will be reinforced and insulated to provide a protective barrier against external hazards.
- Air Supply and Ventilation
  - Equipped with a reliable air supply system to ensure a continuous flow of breathable air.
  - Ventilation systems will include air filtration to remove contaminants and maintain air quality within the chamber.
- Communication Systems
  - Such as two-way radios or other devices to enable contact with the surface or other parts of the mine.
- Emergency Supplies
  - Refuge chambers will be stocked with essential supplies, including food rations, potable water, first aid kits, and other items to sustain occupants until rescue or evacuation is possible.
- Temperature Control
  - A temperature control system will be integrated to maintain a comfortable environment within the refuge chamber, as extreme temperatures can be a concern in some mining environments.
- Lighting
  - Adequate lighting will be provided within the chamber to ensure visibility and create a safe environment for occupants.
- Monitoring and Control Systems
  - Equipped with monitoring systems to keep track of the conditions inside and outside the chamber, including gas levels, temperature, and structural integrity.
- Training and Drills
  - Miners will receive training on how to use refuge chambers and participate in regular drills to ensure they are familiar with emergency procedures.
- Regulatory Compliance
  - The design and installation of refuge chambers in the Bandeira Project underground mine will comply with Brazilian industry regulations and safety standards to ensure their effectiveness during emergencies.

16.12.2 Safety and Emergency Response Plan

The safety and emergency response plan developed for the Bandeira Project mine underground facility aims to establish procedures to identify the potential of and respond to accidents and emergency situations, as well as to prevent and reduce the possible diseases, injuries, and environmental impacts that may be associated with them.

The plan applies to the Bandeira Project, including contracted companies, where activities, products, or services performed may incur emergency scenarios with consequences for safety, health, environment, and community. It includes general actions and specific emergency plans to ensure a quick and effective response when an incident occurs.

Responsibilities will be defined when defining the structure and staff, considering at least the following functions:

- General Manager
  - Knows the emergency scenarios of the Project.
  - Responds to superiors, the community, employees, and local authorities regarding any emergencies that have occurred, when applicable, acting as a spokesperson or appointing a representative.
  - Represents the Bandeira Project to the community, media, and local authorities.
  - Ensures the necessary resources for the prevention and combat of emergencies.
- Managers and coordinators
  - Know the emergency scenarios of the unit.
  - Ensure the necessary resources for the prevention and combat of emergencies.
  - Indicate the components of the Emergency Brigade (EB) in their area of responsibility.
  - Ensure the participation of the EB components in their area of responsibility in training, simulations, and attendance.
- Occupational Safety
  - Ensures that the system of protection and prevention against fire and emergencies is always operational.
  - Ensures inspections and tests on the firefighting system (extinguishers, hydrants, water tanks, pipes, pumps, fire vehicles, ambulances, etc.).
  - Supports project managers in the planning phases of new facilities, before any modification or construction, with an emphasis on fire prevention and protection installations.
  - Provides rescue and emergency equipment for practical training and emergency responses of the EB.
  - Ensures the periodic updating of emergency plans and the list of EB members.
  - Guarantees the maintenance of the EB kits for prompt use when necessary.
  - Ensures the programming, implementation, and evaluation of emergency simulations.
  - Ensures the dissemination of the Plan of Safety and Emergency Response (PSER) to all employees and visitors.
  - Defines the annual budget for the operation of the EB.
- Communication Area
  - Advises on the preparation of statements regarding any emergencies that have occurred.
  - Trains managers and designated persons to communicate clearly and objectively in relation to emergencies that have occurred.
  - Advises and guides the PSER Coordinator, the other groups, as well as the other involved in the emergency, on the institutional communication aspects.
  - Keeps the communication team prepared to respond to emergency scenarios.

- Promotes or grants to the media, as appropriate, interviews and press conferences related to emergencies that have occurred.
- Responds to and directs external communication demands, advised by the PSER Coordinator and Legal Department.
- Advises the company of the occurrence in the institutional and external communication spheres.
- Participates, through its representative, in the periodic meetings with the PSER Coordinator.
- Ensures that communications with external PSER agents are only carried out by the official spokesperson defined by the Bandeira Project or the general manager.
- Assists in the alert to the potentially affected population when determined by the PSER.
- Keeps adequate means of communication to notify employees of other shifts of the provisions triggered due to the occurrence.
- Keeps in contact with local or regional clinics and hospitals to remain on standby due to the possibility of receiving injured persons, upon prior agreement established with them.
- Participates, through its representative, in the periodic meetings with the PSER Coordinator.
- Collaborates in preparing reports on the incident or accident.

The Bandeira Project must be adequately prepared to deal with emergency situations and accidents, including:

- Identifying emergency and accident scenarios.
- Defining the required preventions to prevent accidents and emergency situations from occurring.
- Defining and implementing an emergency response plan.
- Training people, including members of the EB, to deal with accidents and emergencies.
- Conducting simulated exercises.
- Analyzing simulated exercises and real emergency responses.
- Modifying, if necessary, procedures.

The following emergency scenarios are defined for the Bandeira Project:

- Fire.
- Chemical spill.
- Accident involving mobile equipment or traffic.
- Accident involving poisonous animals.
- Underground mine rockfall.
- Explosives accident.
- Personal accident.
- Electricity-related accident.

- Other scenarios according to specific situations.

The resources required for emergency situations or accidents consist of all necessary equipment and materials for the safe and effective handling of emergencies and accidents, such as:

- Hydrant network firefighting systems distributed to cover administrative areas, processing plants, and support areas, designed according to the requirements of the Fire Department of the State of Minas Gerais—CBMG.
- Fire extinguishers distributed across administrative areas, processing plants, and support areas.
- Siren for audible emergency alert across the Bandeira Project surface area—plant, support areas, administration, entrances.
- Automatic systems (sensors) with alarms for detecting heat and smoke in administrative areas, distributed according to CBMG requirements.
- Equipping vehicles for emergency response.
- Tank truck with a capacity of 20,000 L of water, equipped with tools and equipment.
- Communication equipment.
- Firefighting equipment.
- Ambulance.
- Emergency lighting equipment.
- First aid medications (painkillers, saline solution, hydrating agents, etc.).
- Bandages, disposable gloves, adhesive tapes, surgical drapes, blankets.
- Splints for immobilization.
- Rigid stretcher with straps.
- Underground mine refuge chambers.
- Escape ladders at ventilation raises.
- Fire extinguishers in all light vehicles.
- Autonomous firefighting systems or fire extinguishers installed in all underground mine equipment.

Members of the Emergency Brigade should be properly trained in:

- Firefighting: analysis, rescue, fire theory, isolation, fire classes, methods of extinguishing fire, approach and confinement, evacuation from smoke-filled enclosed areas, post-emergency recovery
- First aid: immobilization, hemorrhages, cardio-respiratory resuscitation, trauma care, amputation care, burns, poisoning, asphyxiation, wounds, and fractures.
- Chemical products leakage and spillage: isolation, containment, and waste handling.
- Leakage, fire, and explosion in flammable and combustible liquid installations: isolation, containment, situation analysis, tank cooling, leak containment, firefighting, evacuation.

Simulated emergency response exercises should be conducted monthly per the schedule prepared annually by the Health, Safety, and Environment (HSE) area or EB coordinator, covering identified main scenarios. At the beginning of each year, the schedule will be published for the knowledge of the EB and other stakeholders, with the possibility of revision based on HSE needs and decisions.

After each simulated exercise, the team responsible for conducting the exercise will critically analyze the results using an evaluation form. If any execution flaws or discrepancies in the emergency response plan are identified, corrective measures will be taken to improve the process.

In the event of a real emergency, a nonconformity is opened to correct the generated damages, analyze the cause, and define and implement corrective actions to prevent the recurrence of the same incident.

Any events that could lead to an accident or emergency must be promptly communicated to the HSE Coordination.

The department responsible for receiving emergency communications should have an updated list containing the names, phone numbers, extensions, and so forth, of coordinators, chiefs, leaders, and brigade members for immediate activation if the EB needs to be deployed.

Additionally, there will be a document listing external contacts, including names, addresses, and phone numbers of external support entities that need to be activated during an emergency or simulated exercise.

The receiver of an incident or accident report must promptly locate the brigade coordinator, the responsible person for the area where the incident occurred, and the general manager, and inform them of the incident. The PSER must be put into action.

The EB must evaluate the incident or accident and, if a potential crisis is identified, act in accordance with crisis management standards. Furthermore, for accidents classified with high criticality, the communication of the emergency occurrence must also be forwarded to the company's top management.

The HSE area must have a list with updated names and phone numbers of key external support organizations, such as:

- Fire Department.
- Police.
- Civil Defense.
- Hospitals.

The HSE Coordination is responsible for defining authorized personnel and their respective substitutes for activating external assistance services when necessary.

16.13 Mine Closure

The closure of an underground mine is a complex and multi-faceted process that involves several key steps.

16.13.1 Pre-Closure Planning

This stage begins before the actual closure. It involves:

- Developing a comprehensive closure plan, outlining the goals of closure, the methods to be used, and the timeline for completion. It also considers environmental and social impacts, as well as financial considerations.
- Engaging stakeholders, including government agencies, local communities, and employees. Their input is essential for developing a closure plan that meets everyone's needs.
- Securing financial resources in advance, as this may involve setting up a trust fund or obtaining financial guarantees from the mining company.

16.13.2 Decommissioning

Once the mine is no longer operational, the decommissioning process begins, involving:

- Removing equipment and infrastructure, such as things like conveyor belts, ventilation systems, and processing facilities.
- Sealing shafts and adits to prevent people and animals from entering, and to control water flow and air quality.
- Backfilling mined-out areas to helps to stabilize the ground and prevent subsidence.

16.13.3 Environmental Rehabilitation

This is an important part of the closure process, as it aims to restore the land to a productive state. This may involve:

- Earth movements to shape the land to its original contours or a new, stable configuration.
- Planting vegetation to prevent erosion and restore habitat for wildlife.
- Treating contaminated water, including filtering, settling, or other techniques to remove pollutants.

16.13.4 Post-Closure Monitoring and Maintenance

Even after the closure process is complete, it is important to monitor the site for potential problems, such as subsidence, water quality issues, or gas emissions. This may involve regular inspections, data collection, and maintenance of any remaining infrastructure.

The specific steps involved in the closure process will vary depending on the type of mine, the geology of the site, and the specific environmental and social conditions. However, the overall goal of mine closure is to leave the land in a safe and stable condition that can be used for other purposes in the future.

16.13.5 Bandeira's Mine Closure

A detailed closure and recovery plan will be submitted to state and federal agencies for review and approval only during the formal licensing process for the Bandeira mine. However, for the purpose of this feasibility study, direct mine closure cost items were estimated, as summarized in Table 16-28.

Table 16-28: Bandeira's Mine Closure Activities and Cost Estimate

	Mine Closure Activities and Cost Estimate	US$ M
1	Preparation of a Detailed Mine Closure Plan	0.17
2	Removal of Equipment and Underground Structures	0.25
3	Removal of Mine Structures in Suface (Office, Workshop, Washer, Tyre Shop, Explosive Preparation Yard)	0.65
4	Reconformation and Revegetation of Land Surface	0.95
5	Stabilization and Revegetation of Remnants Waste Piles	0.34
6	Closure and Sealing of All Mine Opening (Portal, Decline, Ventilation Raise)	0.20
7	Monitoring of Structure Stabilization Conditions, Surface and Undergroud Water Quality and Mine Efluents	0.28
	Total	2.83

17.0 RECOVERY METHODS

The Bandeira Project mineral reserve lies in the Araçuaí–Itinga corridor, in the middle valley of the Jequitinhonha River, Minas Gerais. The Project's objective is to process 1.23 Mt/a of run of mine (ROM), with spodumene as the main source of lithium oxide.

This section has the objective of consolidating all network results into a process flowsheet to treat the mineral ore reserve extracted from the mine to produce spodumene concentrate within market specifications.

The spodumene beneficiation plant will consist of several unit operations such as:

- Primary crushing.
- Secondary crushing and screening.
- Pre-concentration in ore sorter (for shale and feldspar removal).
- Wet screening.
- Thickening and filtering of fines (−0.5 mm).
- DMS of the coarse (−19.1 + 7.5 mm).
- DMS of the medium (−7.5 + 0.5 mm).
- Comminution of DMS scavenger concentrates (−19.1 + 0.5 mm) in a crusher.
- Cycling, thickening, and filtration of fines (−0.5 mm).

The objective is to produce a concentrate with a lithium oxide content of 5.50% and a ferric oxide content of less than 1%.

Potentially useful tailings will also be generated, such as feldspar, nutrient or fertilizer load (potassium content), and tailings from the DMS circuit as filling material in civil construction (inert and granulometry in narrow and controlled band).

In addition, fine material (−0.50 mm) with lithium content and potential for future use through other concentration processes (such as concentrating spirals and flotation) will be generated and stored.

A block diagram of unit operations and the flowsheet are shown in Figure 17-1 and Figure 17-2.

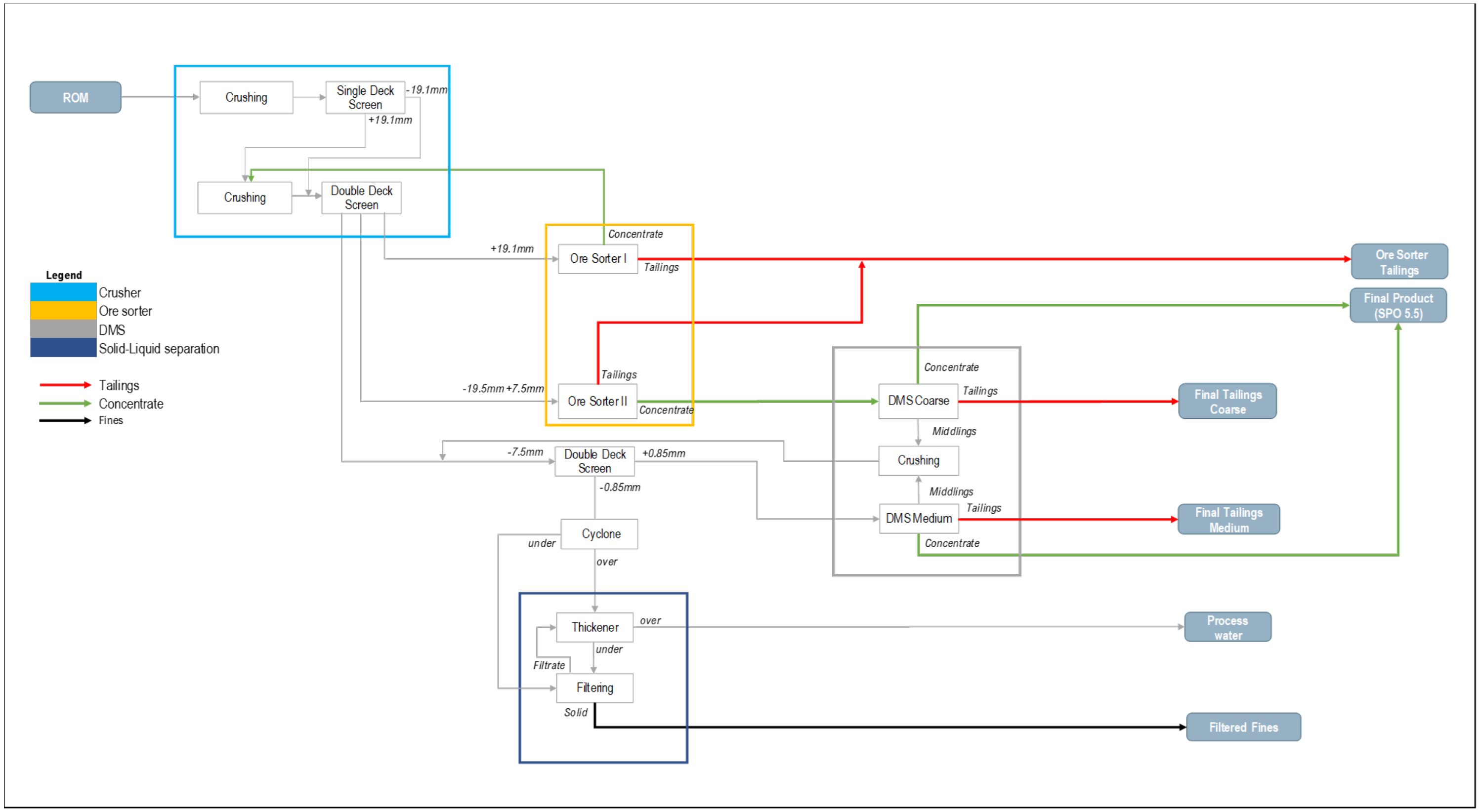


Figure 17-1: Bandeira Project Flowchart

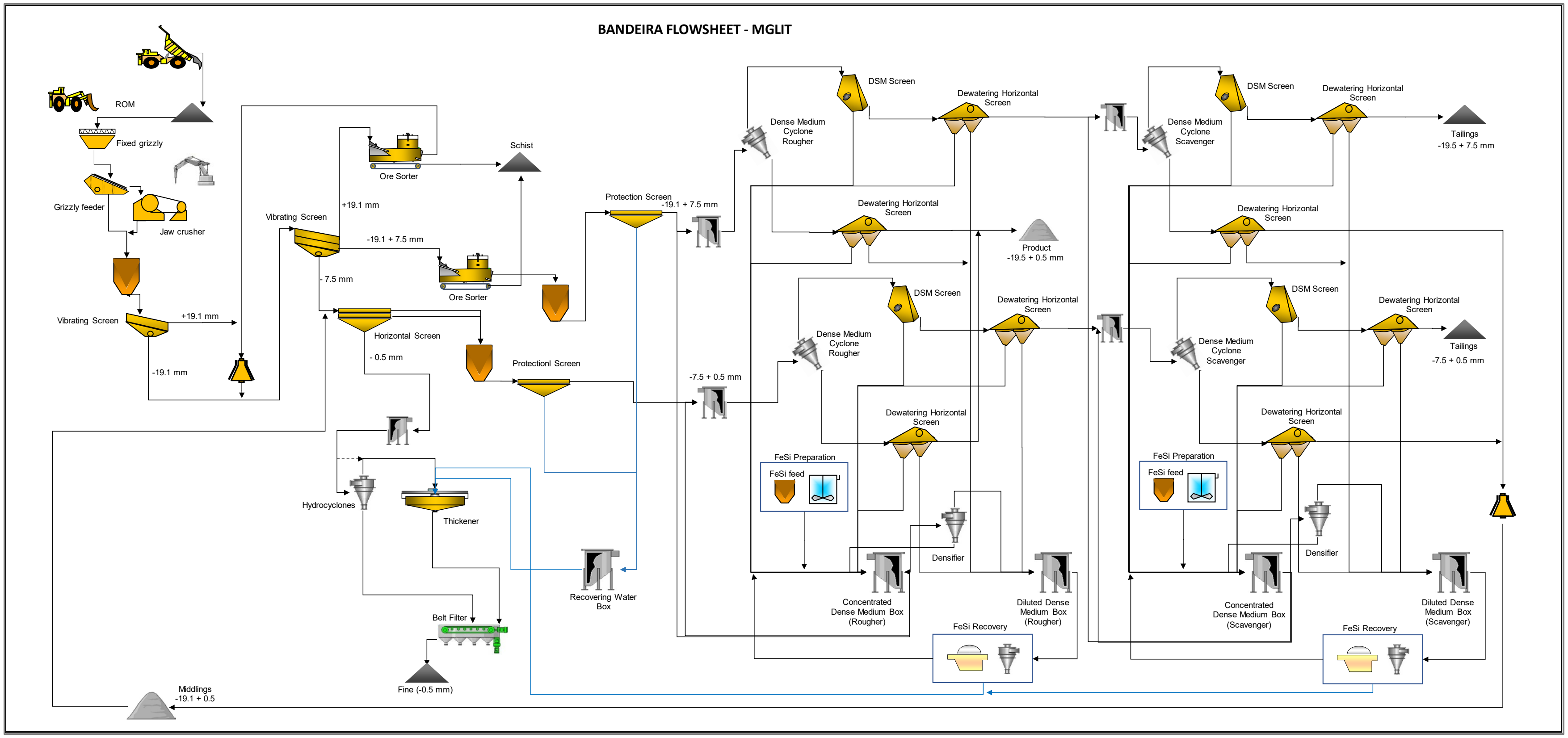


Figure 17-2: Bandeira Project Flowsheet

The beneficiation plant operating regime is given in Table 17-1.

Table 17-1: Operational Parameters

Description	Crushing, Thickening, and Filtration Circuits	DMS Circuits
Production Days per Year	365	
Hours per Day	24	
Days per Week	7	
Hours per Calendar Year	8,760	
Scheduled Operating Time (%)	70.0	85.0
Scheduled Hours per Year	6,132.0	7,446.0
ROM Feed (nominal capacity) (Mt/a)	1.30	
Nominal Hourly Rate of Primary Crushing (t/h)	212.0	
ROM Feed % Moisture	2.0	

The particle size distribution of the ROM is shown in Table 17-2.

Table 17-2: ROM Particle Size Distribution (Cachoeira Mine Reference)

Mesh (mm)	Cumulative Passing (%)
420	100.00
230	89.53
195	79.06
150	68.59
130	58.12
100	47.65
75	39.27
50	35.08
38	28.80
25	24.61
19	19.38
0.85	15.19

The spodumene concentrate (5.50% Li_2O) will be produced from DMS concentration unit. To this end, the crushing products will be separated into three particle-size fractions.

The fine fraction (−0.50 mm) will be cycled, thickened, filtered, and stored for future use in a concentration plant, through the flotation method, for example.

The other two particle size ranges will be defined aiming at an equal distribution of masses, resulting in two similar DMS circuits, one for the coarse fraction (7.5 mm to 19.1 mm) and the other for the finer fraction (0.50 mm to 7.5 mm).

The Project aims to reuse the middlings obtained in the DMS circuits. This material will be crushed and recirculated in the screening.

Table 17-3 shows the mass balance and metallic distribution in relation to lithium oxide for the main flows.

Table 17-3: Average Mass Balance of Mine Life and Metallic Distribution in Relation to Li_2O

Flow	Mass Flow (t/a 000s)	Mass Distribution (%)	Li_2O Content (%)	Li2O (tpa 000s)	Dist. Li_2O Distribution (%)
ROM	1,228.8	100.00	1.16	14.25	100.00
Schist	183.0	14.49	0.35	0.64	4.53
Filtered fines (−0.50 mm)	248.0	20.18	0.67	1.66	11.74
DMS Concentrate (−19.1 mm +0.50 mm)	178.1	14.49	5.50	9.79	68.86
Coarse DMS Tailings (−19.1 mm +7.5 mm)	225.9	18.38	0.36	0.81	5.64
Medium DMS Tailings (−7.5 mm +0.50 mm)	394.0	32.06	0.34	1.35	9.23

Lithium oxide global mass and metallurgical recoveries of DMS 5.5% concentrate are 14.49% and 68.86%, respectively.

17.1 Primary Crushing

The ore extracted from the underground mine (ROM, top size 420 mm, d50 close to 100 mm) will be stored in a pile with a capacity of 5,200 tonnes, corresponding to 24 h of operation (Figure 17-3).

With front-end loaders, the ROM will be fed into the hopper of the primary crusher, which is equipped with a fixed grate with an opening of 420 mm.

The ROM will be extracted from a vibrating feeder with a grate (75 mm opening) to feed the primary jaw crusher with 80 mm closed-side setting (CSS). The vibrating feeder underflow joins the jaw crusher product.

A metal extraction and detection system and a metallurgical sampling system (sample for the laboratory) will be provided for the primary crushing product that goes via conveyors to feed the product storage silo of the primary crushing plant with 145 m^3, equivalent to one working hour of operation. The sampler will be of the cross-belt type, installed on the belt conveyor. A scale is also planned for monitoring and controlling the production rate of the primary crushing circuit, mounted on the belt conveyor.

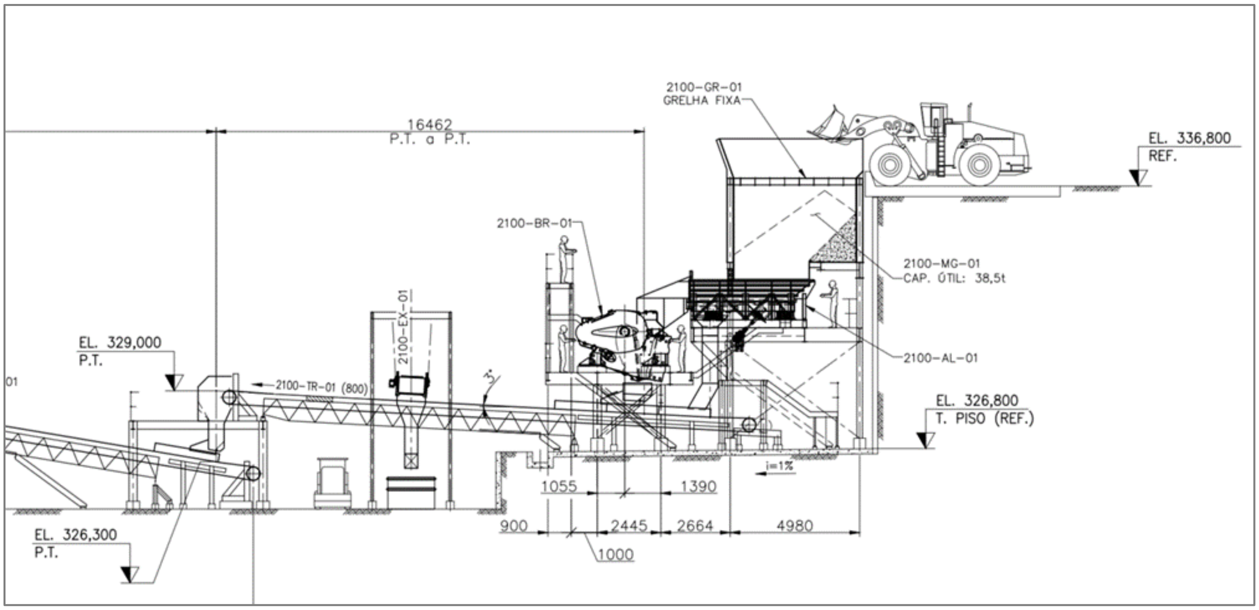


Figure 17-3: Primary Crushing

17.2 Classification (19.1 mm, 7.5 mm and 0.50 mm), Secondary Crushing, and Ore Sorter Systems

The material stored in the primary crushing feed silo will be extracted with a belt feeder and sent via a conveyor to feed the classification circuit (primary screening), to be carried out on an inclined vibrating screen sized at 19.1 mm.

The underflow feed material (−19.1 mm) goes to the next screening, carried out at 7.5 mm. The retained material (+19.1 mm) goes through belt conveyors to feed the secondary crusher (cone crusher, 20 mm CSS) (Figure 17-4). The crushed material in the secondary crusher joins the primary screen undersize to feed the secondary screening, to be carried out in a double-deck screen (19.1 and 7.5 mm cut). A metal detector is provided to protect the cone crusher.

The material retained on the 19.1 mm screen (material between 43 mm and 19.1 mm) will feed the plant’s first ore sorter, which aims to remove shale and feldspar (about 20% of the mass), which will be stockpiled on a pile. The product from the ore sorter will be routed by conveyors to close the circuit by feeding back into the secondary crusher. The ore sorter system can be bypassed via a reversible feeder/conveyor, directing the material retained in the screen (+19.1 mm) to the conveyor circuit to return it to the secondary crushing.

The material retained in the second deck (−19.1 + 7.5 mm) will go to the second ore sorter system to also remove shale and feldspar (about 20% of the mass), which will be stockpiled on a pile, along with the shale removed in the first ore sorter. The stockpile will have an approximate volume of 450 m^3 and will have an autonomy of approximately one day. The ore sorter product will be forwarded by conveyors to the feed silo of the coarse DMS circuit. The second ore sorter system can also be bypassed with a reversible feeder/conveyor, directing the material to the feed silo of the coarse DMS circuit.

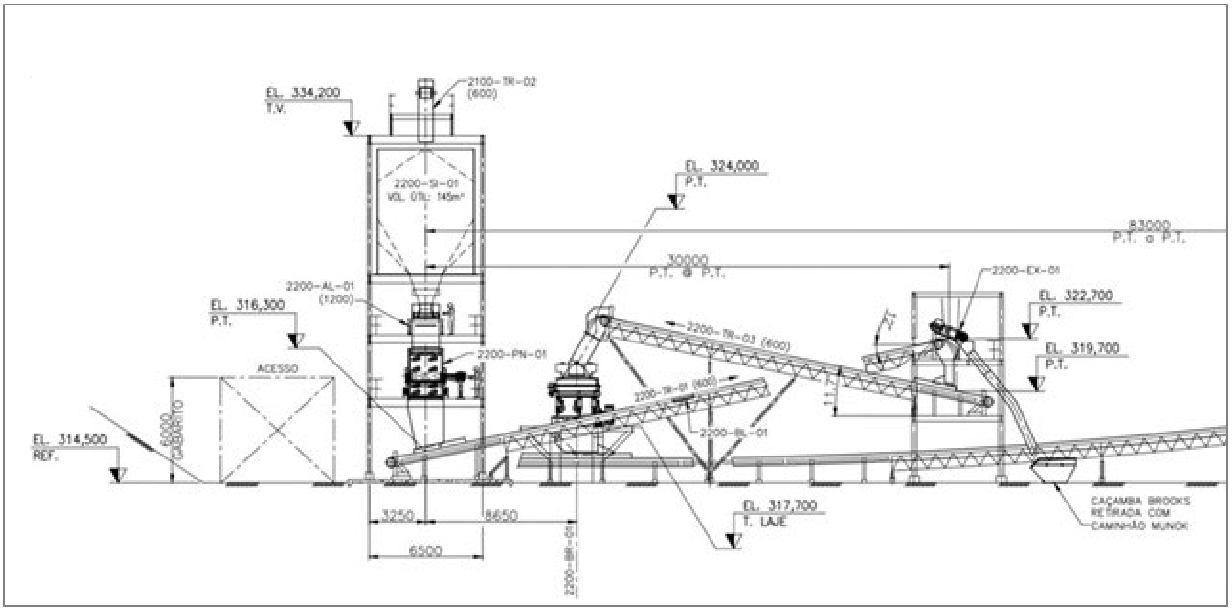


Figure 17-4: Secondary Crushing and Classification

The screening, classification, and secondary crushing circuit will be equipped with scales to control and monitor the production rate. The material from the second deck (−7.5 mm) will go to wet screening (cut in 0.50 mm), which will aim to remove the fines (below 0.50 mm) from the DMS circuit.

The fraction retained in the wet screening (−7.5 + 0.50 mm) will go to the storage silo to feed the DMS medium circuit (−7.5 +0.50 mm). Prior to arrival at their respective silos, the DMS circuit coarse and medium feed streams will be sampled by cross-belt samplers (metallurgical sampling system for generating samples to be analyzed in the laboratory).

17.3 Fines Thickening and Filtration (-0.50 mm)

The fine material (−0.50 mm) will be pumped to feed cyclones to remove the material with a particle size greater than that supported in the thickening (0.25 mm) and to thicken the underflow for filtration (Figure 17-5 and Figure 17-6). A sampling point will be provided to generate a metallurgical sample (pressurized pipe sampler and vezin sampler). The cyclone overflow will feed the thickener (Ø 18 m). The underflow of the thickener, together with the underflow of the cyclones, will feed the filtration.

Filtration will be carried out through a belt filter (area 50 m²). The filter cake with a moisture content of 10% and 0.67% Li_2O will be stacked in a stack with approximately 14 hours of autonomy, corresponding to 450 m^3. The filtrate will be pumped back to the thickener for water recovery.

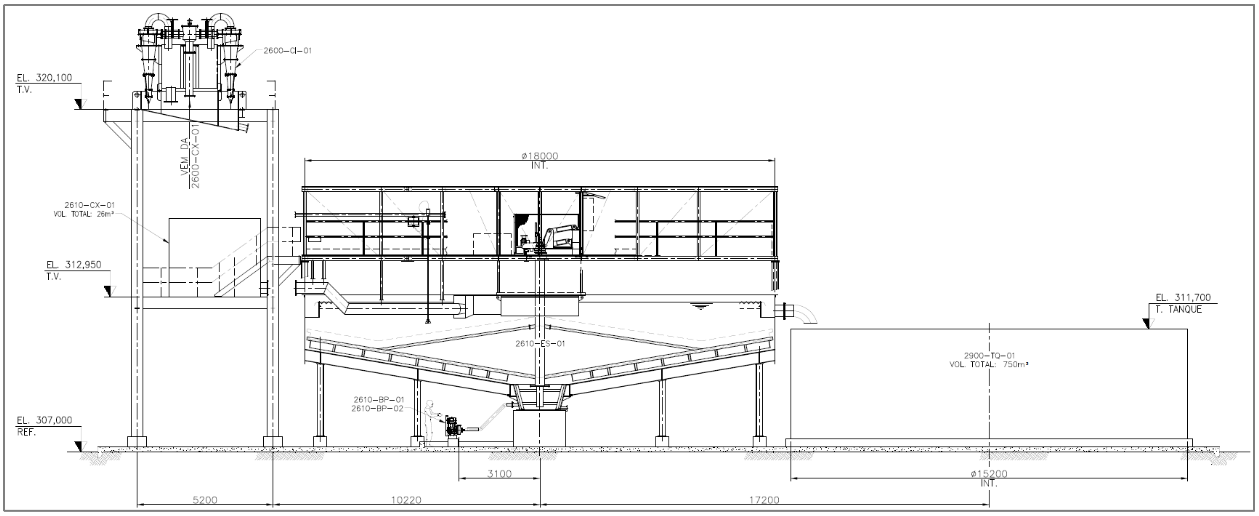


Figure 17-5: Thickening Area

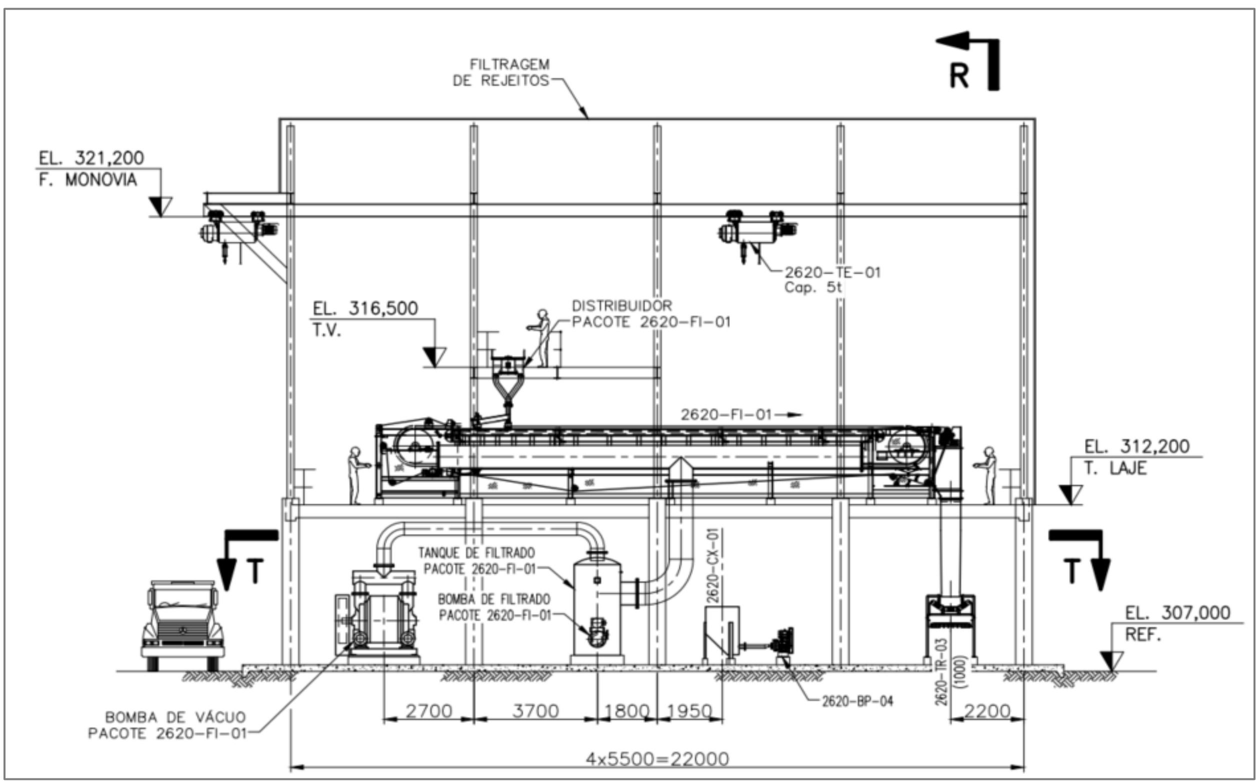


Figure 17-6: Fines Filtration Area

17.4 Coarse DMS Circuit (-19.1 +7.5 mm) and Medium DMS Circuit (-7.5 +0.50 mm)

The coarse- and medium-material storage silos for the DMS circuit feed will have about 145 m^3 of volume, corresponding to around 4.2 and 4.0 hours of autonomy, respectively (Figure 17-7).

The material will be extracted by belt feeders and conveyors to feed horizontal protection screens (with a spray system) that aim to remove fine ore adhering to the surface of the particles that will be processed. The screen fines product will be pumped to the ultrafine removal cyclone. The screen-retained "oversize" will be routed through chutes to feed the solid/dense-media mixing boxes that also receive the dense media (water and FeSi). The ore and dense-media suspension will be pumped to feed the rougher stage to be carried out in dense-media cyclones. Density will be controlled and monitored through density meters. Water addition points will also be provided, as well as densifying cyclones and densifier tubes to adjust the density of the dense media.

For the rougher steps, the dense-media density will be 2.8 g/cm^3. The dense media will be re-fed through a dense-media preparation system composed of a 20 m^3 storage silo, a feeder for extraction, an agitated tank to provide the formation of the suspension of the dense media, and pumps for transfer to the dense-media boxes.

The sunken fractions (higher density) of the rougher steps will exit through the cyclone underflow, being the final concentrate of the dense-media circuits. The cyclone underflows will be conducted to dewatering sieves to remove the dense media. Most of the dense media will exit through the first portion of the screen, which will be routed by gravity to the concentrated dense-media box. In the second portion of the screen, water sprays will be provided to recover the remaining ferrosilicon adhering to the ore particles. This flow will go to boxes of dilute dense media and later to dense-media dense cyclones. The underflow of the densification cyclone will be sent to the concentrated dense-media box and the overflow to the magnetic-drum separator, to recover the ferrosilicon, which will be sent to the concentrated dense-media boxes, passing through demagnetizing pumps. The small portion of non-magnetic and most of the water is pumped into the cycle.

The dewatered concentrates will go to belt conveyors and be stacked with an average moisture content of 4.5% (6% for the medium fraction and 3% for the coarse fraction). The pile will have approximately 450 m^3 of capacity with autonomy of 33 h. The concentrate will have contents of 5.5% Li_2O. Metallurgical sampling will be provided for the concentrates through cross-belt samplers installed on the stacking conveyors. Scales will be provided to monitor production.

The overflows of the dense-media cyclones of the rougher stages will contain the floated material (lower density) and go to static screens and then dewatering screens. In the same way, the ferrosilicon will be recovered and be destined for the boxes of concentrated dense media and dilute dense media. The dewatered materials will then be sent to the mixing boxes with the dense media then pumped to feed the scavenger steps.

The density of the scavenger steps dense media will be 2.7 g/cm^3. Independent systems of dense-media recovery and density adjustment will be provided for each density value—one recovery system to meet the rougher steps and one system to meet the scavenger steps. Each recovery system will contain boxes of concentrated dense media, boxes of dilute dense media, densification cyclones, densifier tubes, low-intensity magnetic-drum separators, degaussers, and handling pumps and pipes.

The scavenger cyclone underflow will be the circuit middlings. In the same way as rougher circuit, they will be dewatered by dewatering screens and ferrosilicon recovery will occur. The coarse and medium circuit concentrate, with an average moisture content of 4.6%, will be reprocessed in a cone crusher with the aim of increasing the mineral release. The crushed product will be stored in a pile and then taken up by a loader and truck to feed a hopper from the wet-screening feed conveyors (0.50 mm) at a more favourable point. A cross-belt sampler (laboratory sample) and a balance for process monitoring will be provided. The medium stack will have 450 m^3 of capacity, equivalent to five days of operation.

The overflows of the scavenger cyclones will be the final tailings of the DMS circuits. They will also pass through DMS static screens and dewatering screens. The ferrosilicon will be recovered for the dense-media scavenger system.

The tailings will be stacked with moisture content of 3% (DMS coarse tailings) and 6% (DMS medium tailings) in piles of 450 m^3, equivalent to 20 h of autonomy for the DMS coarse tailings and 21 h of autonomy for the DMS medium tailings. The coarse DMS tailings will have a content of 0.36% Li_2O. The medium DMS tailings will have a content of 0.34% Li_2O. Cross-belt samplers (laboratory samples) and scales for production monitoring will be planned.

A compact preparation and dosing system of an auxiliary thickening reagent (flocculant/ and coagulant) will also be provided for dosing in the thickener.

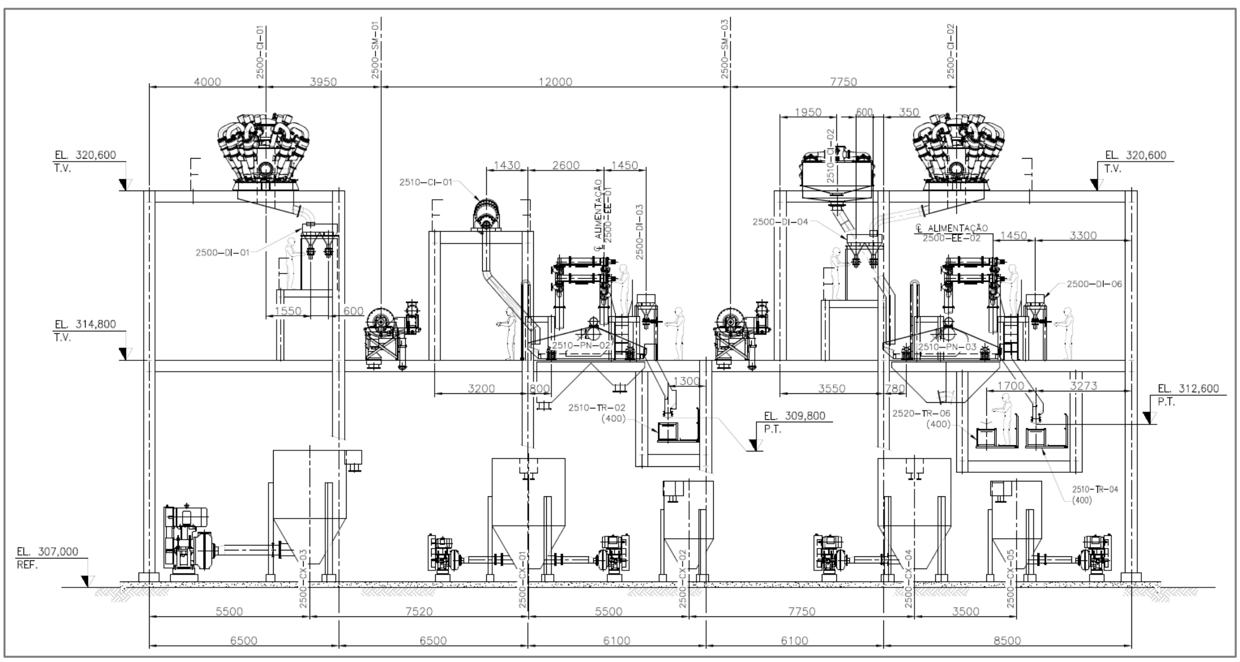


Figure 17-7: DMS Circuit

17.5 Chemical Laboratory

The beneficiation plant will be equipped with a chemical laboratory for preparing and analyzing metallurgical samples from the process, as well as samples from the mine and geology. The laboratory demand is expected to be:

- Mine/geology samples: 1,000/month
- Processing Plant samples: 1,000/month.

Note: 100 samples/month related to environmental control will not be analyzed at the plant's site, and must be transported for analysis at a certified laboratory.

The Project laboratory will occupy an area of approximately 30 m by 30 m, and the concept is to house the sample preparation and analysis equipment in modules. The modules will be installed on concrete floors and in a covered area (shed).

Tests, analyses, and preparations to be carried out are as follows:

- Physical preparation for plant, geology, and mine operational control samples: receipt and recording; crushing at P_{75} 2 mm; quartering in Jones or rotary of 150 g aliquot at P_{85} 200 mesh.
- Physical preparation of plant samples for heavy-liquid separation (HLS) tests: receiving and checking; 12.7 mm crushing; 12.7 mm, 9.5 mm, 3.4 mm, 1.7 and 0.5 mm screening; homogenization and quartering in Jones or rotary aliquot for analysis.
- Physical preparation of samples for granulometry: particle-size analysis in different meshes (according to the plant's comminution process).
- Heavy-liquid separation (HLS): HLS tests using separator hoppers or bécher, depending on the particle size of the sample. The monthly quantity foreseen for the HLS tests was 15 samples per month.

Mineralogical analysis: performed using Fourier-transform infrared spectroscopy (FTIR) technology with Bruker Alpha FTIR equipment or similar equipment.

Quantification of the following minerals is planned:

- Spodumene.
- Petalite.
- Tantalite.
- Quartz.
- Feldspar.
- Mica.
- Chlorite.

The percentages obtained in the mineralogical analysis can also be reported for the chemical analysis, which is calculated based on the stoichiometry of the chemical elements in the minerals.

Chemical analysis of lithium and iron is planned by means of sample decomposition through fusion with sodium peroxide, acid dissolution, and reading by atomic absorption spectrometry (AAS).

The estimated consumption of utilities for the laboratory water and electricity is:

- 5,000 L water tank with a flow rate of 5,000 L/d.
- 190 kVA availability.

The liquid effluent generated in the laboratory will be neutralized to be treated later by the wastewater treatment plant (WWTP) provided for in the Project.

17.6 Visit to the Project and CBL Facilities

The QP responsible for the mineral processing area, Ignacy Antoni Lipiec, visited the Project's local facilities and the mining unit of Companhia Brasileira de Litio (CBL) on March 13 and 14, 2024, in the municipalities of Araçuaí and Itinga.

The visit consisted of the following activities:

- Follow-up of a lecture given by MGLIT geologist Anderson Victoria, to present the geological characteristics of the Project's mineral deposit.
- Visit to MGLIT's core sheds to observe the drilling cores in representative ore and overburden boreholes.
- Visit to CBL facilities, including:
  - Mine: descent into the underground mine to observe the operations and the local conditions of stability of the ramps, galleries, and highlights.
  - Mining unit: the processing plant from the primary crushing plant to the product and tailings piles to observe the unit operations, focusing on the concentration stages.
- Area where the Project will be implemented, to observe the local conditions of topography and vegetation.

The MGLIT mineral deposit is adjacent to the CBL mineral deposit, and the processed litiniferous pegmatites contain quartz, feldspar, mica, and spodumene, from which lithium is extracted. CBL's processing plant has a simpler process route, but it is similar to the one foreseen for the Project, which motivated the CBL site visit.

During the QP’s visit, it was reported that they did not face any difficulties in processing the ore. The ROM is received with a content of 1.4%–1.5% Li_2O and 0.8% Fe_2O_3, and after going through the stages of primary crushing, secondary crushing, particle size classification, and concentration by dense media, a lithium concentrate with 5.4%–5.8% Li_2O, and 1.2%–1.3% Fe_2O_3 is obtained.

CBL currently has a new concentration stage using ore sorting, X-ray transmission, and an optical sensor. This ore sorter operation is in the ramp-up phase, and the efficiency gain from the implementation of the equipment cannot yet be measured.

During the visit to the site where the Project will be implemented, the QP observed that the topography is low hills and wide valleys (Figure 17-8). The Project occupies areas on both banks of the Piauí River, and an access bridge, which will connect the administrative unit to the processing plant, needs to be built.

Figure 17-8: Visiting the Bandeira Project Site Area

18.0 PROJECT INFRASTRUCTURE

18.1 Plateaus and Accesses

The onsite roads were designed to regulatory standards of the Departamento Nacional de Infraestrutura de Transportes (DNIT) (National Department of Transport Infrastructure).

18.2 Earthworks

For the elaboration of the Earthmoving Project, the minimum dimensions for the operation of the equipment and the minimum widths for maneuvering the largest vehicle that will transit on the site will be observed.

The slope and slope height parameters presented below are defined for the presentation of the feasibility project, and in the next phases of the project may undergo changes depending on the stability studies after the conclusion of the Geotechnical studies.

General parameters will be adopted, namely:

- Cutting Slopes H = 1.0 V =1.0 (*)
- Embankment Slopes H = 1.5 V = 1.0
- Height between Benches 8.0 m
- Slope width 4.0 m
- Slope inclination -5% cut/fill.

Aiming at integration with the drainage project, minimum slopes will be ensured for the platforms, and their direction and direction will be defined to facilitate the flow of surface water.

The slope and slope height parameters of the piles indicated in the feasibility study should be confirmed in the next phases of the project after the execution of the drilling plan, analysis of the geotechnical results, and stability studies carried out for different scenarios of disposition of the products in stockpiles and may change both in height and inclination. In the absence of the results of the studies, general parameters will be adopted, namely:

- Embankments H = 2.0 V = 1.0
- Maximum height between pile slopes 8.0 m
- Slope width: 10.0 m
- Scope inclination - 3.0%.

The volumes of the piles are in accordance with the studies carried out for the feasibility phase of the project and were generated by surface difference using Civil 3-D software.

18.3 Administrative Support Facilities

18.3.1 Architectural Concept

The architectural concept adopted for the project aims to optimize the cost, maintain safety, ensure operability and reduce the construction time.

The buildings were designed with functionality and spatial optimization in mind, being dimensioned in order to adequately house all users and equipment necessary for the operation of the activities developed in the building, considering the comfort and safety of employees and always complying with the minimum requirements of the applicable standards.

The determination of the construction system was based on the best cost-benefit for the project and sustainability, without prejudice to the quality, safety and comfort of the buildings.

For the project, the container-type construction system was adopted for the administrative support and industrial support facilities. For the construction of the restaurant, the mixed construction system will be adopted, where the cooking and support areas will be in conventional structure, and the other areas will be container-type construction systems. This typology ensures agility in the execution of the work, reduction in waste generation, in addition to the rationalization of the entire construction process. All administrative support buildings have accessibility, in accordance with the ABNT standard – NBR 9050 – Accessibility to Buildings, Furniture, Spaces and Urban Equipment, prioritizing safety on site according to the activities developed there.

18.3.2 Scope Project

The buildings were defined, prioritizing their use and functionality, and dimensioned by an informed MGLIT person.

The administrative support facilities were distributed in four plateaus in the industrial plant. Below is a list of the buildings that are part of the scope of the project and the plateau to which it was destined:

- Gatehouse
- Concierge
- Uncovered bus stop
- Scale Control / Shipping
- Central Locker Room.

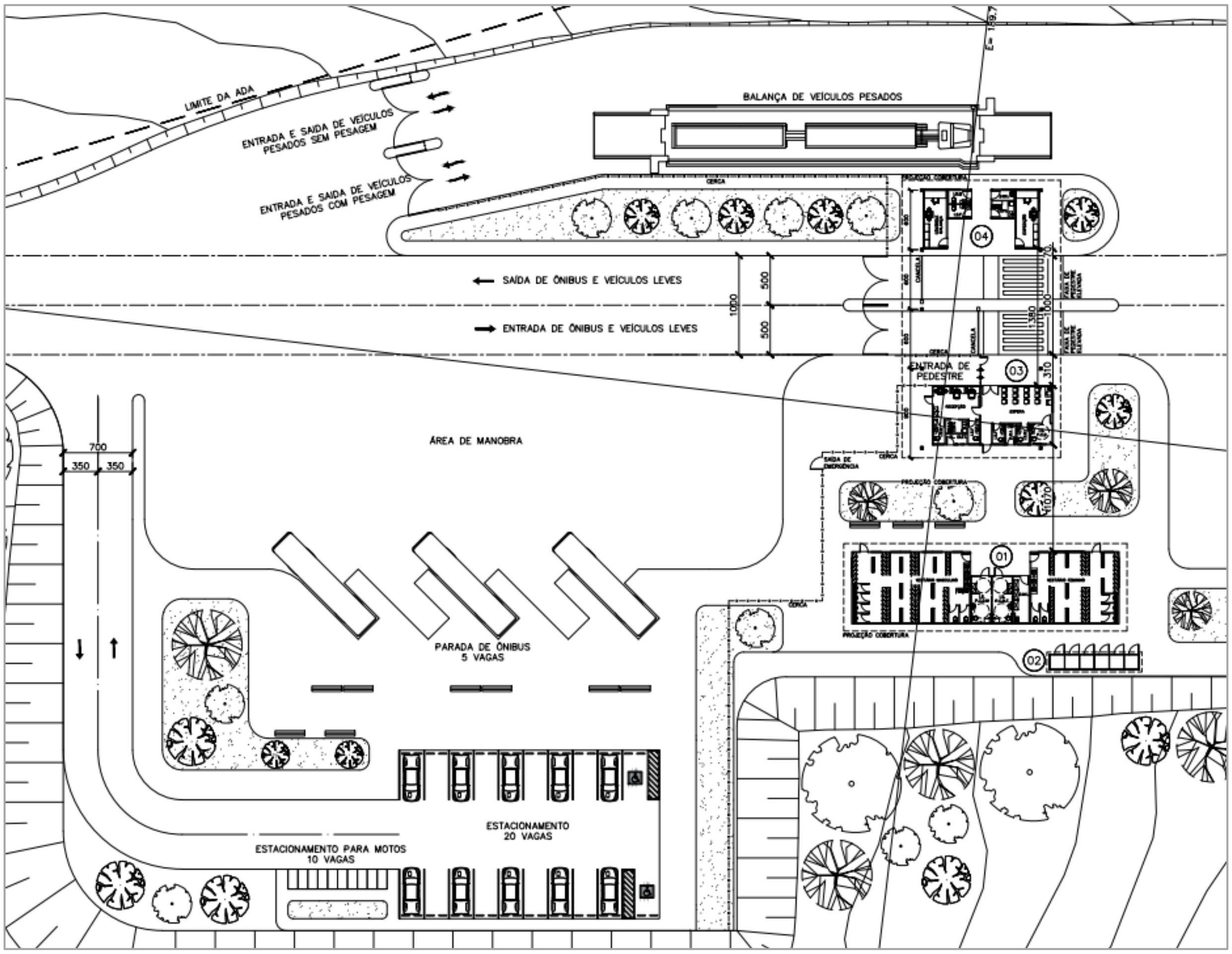


Figure 18-1: Gatehouse Plateau

Administrative Support Plateau

- Restaurant
- Medical center and fire brigade.

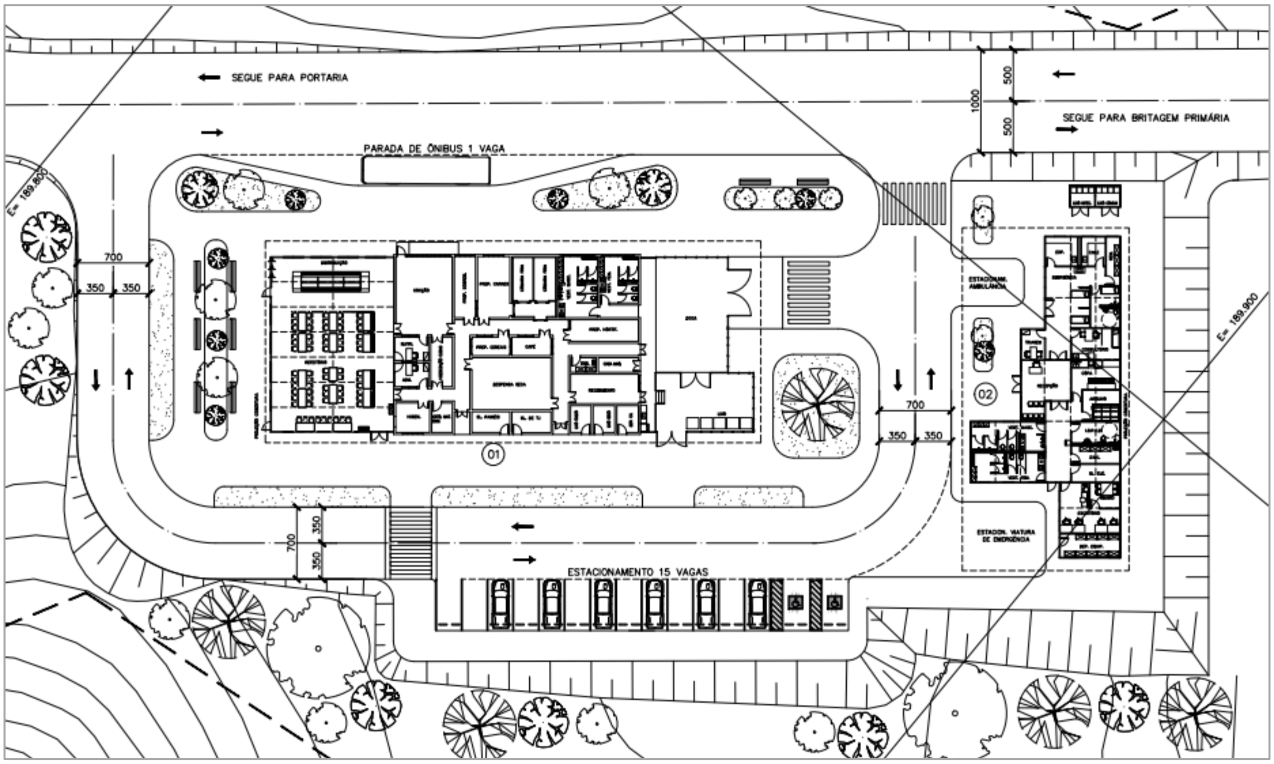


Figure 18-2: Administrative Support Plateau

Laboratory Plateau and Warehouse and Mine Support

- Mine Administrative Building
- Dispatch and Communication
- Mine's Locker Room
- Battery Room
- Physics and Chemistry Laboratory
- Intermediate Waste Deposit (DIR)
- Plant and Mine Warehouse
- Battery Room.

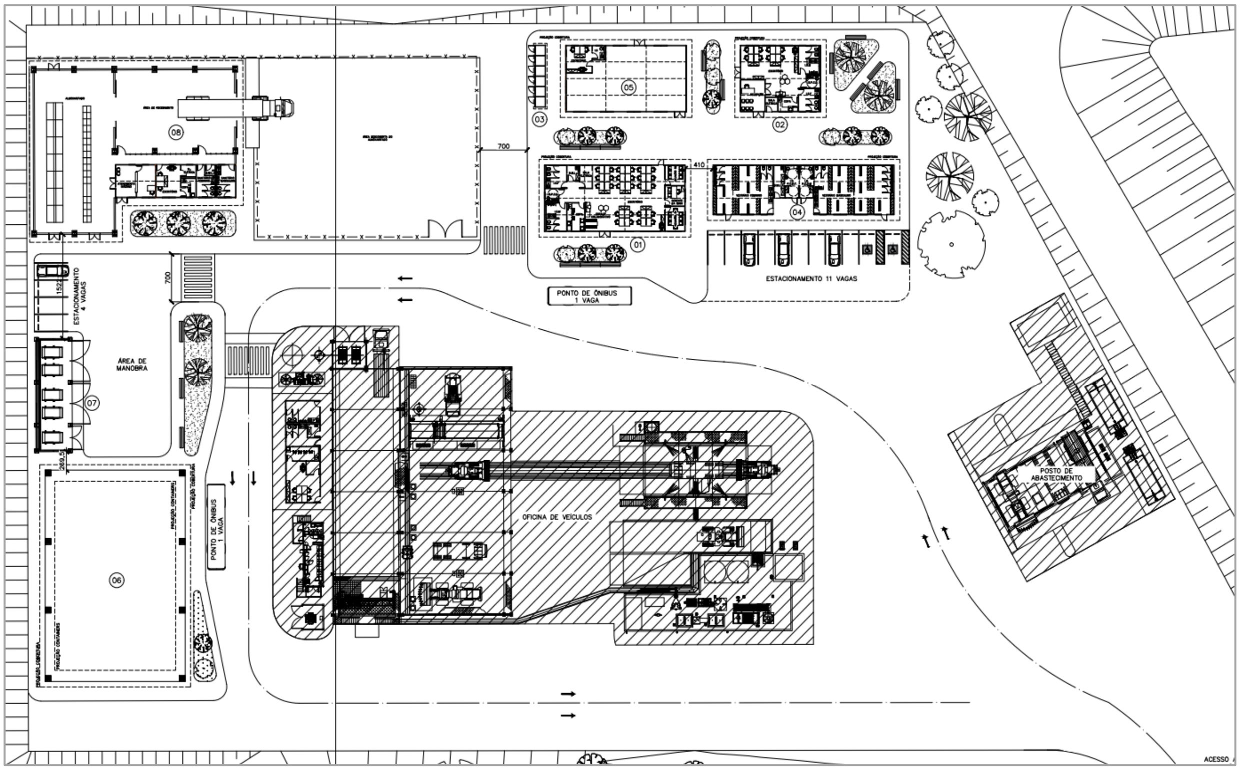


Figure 18-3: Laboratory, Warehouse and Mine Support Plateau

Explosives Magazine Plateau

- Office and Sentry Box
- Accessory Deposit
- Emulsion Tanks.

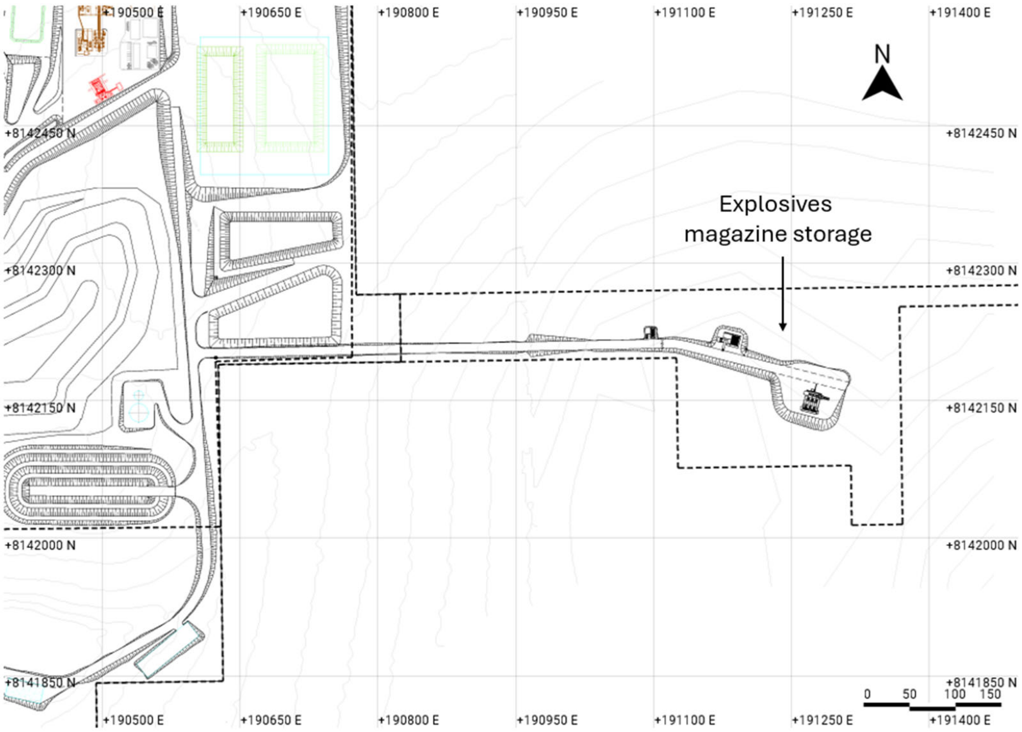


Figure 18-4: Explosives Magazine Plateau

18.3.3 Sizing of Buildings

Mine Administrative Building

- The usable area of the offices considered was at least 7.00 m² per user, including additional administrative areas, such as reception, circulation, meeting rooms and living area.
- Operational support areas were also considered, such as sanitary facilities, pantry, DML, IT room and electrical room.
- Mine Administrative Building: sized for 29 people.

Laboratory

- The Laboratory was designed for 10 people, intended to perform physicochemical analyses of material collected on site.
- The laboratory's construction system consisted of metal containers with a concrete floor and metal tile roof. A free area was foreseen in the concrete floor and metal roof to receive the containers that should compose the laboratory building.
- It has an adjacent area for maneuvering and DIR (Intermediate Waste Deposit).

Medical Center and Fire Brigade

- The Medical Center will provide low-complexity outpatient care and will have an emergency care station (2 units), nursing (1 unit), ambulance space (1 unit) and reception (1 person).

The support areas will also be considered, consisting of: archive area, pantry, changing rooms, electrical room / IT, and adequate disposal area (common garbage / infectious waste);

- The Fire Brigade will consist of an administrative area with 4 workstations for the brigade members, a storage room for SPCI equipment and a parking space for the emergency vehicle. This building will also house the Fire Alarm Control Center.

Concierge and Scale Control—Dispatch and Bus Stop

- The Entrance will consist of a guardhouse where the reception will operate with two workstations, for the identification of visitors and suppliers, as well as employee access control, waiting area and operational support areas, such as sanitary facilities, pantry, DML and electrical room.
- The Fiscal / Shipping Cell will be located next to the Control of the scale that will be used to weigh the inputs. These areas will be located close to the scale and will have 1 workstation for each.
- The Bus Stop will be dimensioned for the parking of 5 buses simultaneously.

Restaurant

- For the construction of the Restaurant, which will consist of the kitchen and dining areas, accommodates a total meal production for 495 people and 232 people per shift.
- For the sizing of the dining area, it was considered that during the meal period per shift, we will have three meal cycles. In this way, the total staff for the cafeteria of 232 people will be divided by three, so the size of the dining area and cafeteria will serve a maximum of 77 people.
- The premise was adopted that all kitchen equipment will work through electrical induction. This technology provides greater safety, avoiding the risk of fire, burns, and electric shocks.

Central Locker Room

- The proportion of 60% of males and 40% females was adopted for the distribution of the locker rooms.
- The locker rooms, male and female, will have a total number of 230 lockers for storing clothing and PPE (total number of people from the industrial unit who will use the locker rooms).
- The showers / toilets / washbasins and urinals area will be sized for a total of 65 people (total number of people per shift who will use the changing rooms).

Mine Locker Room

- The proportion of 60% of males and 40% females was adopted for the distribution of the locker rooms.

- The locker rooms, male and female, will have a total number of 246 lockers for storing clothing and PPE (total number of people from the industrial unit who will use the locker rooms).
- The shower / toilets / washbasins and urinals area will be sized for a total of 62 people (total number of people per shift who will use the changing rooms).

Warehouse

- Dimensioned to meet the needs of storage of parts for maintenance of the Plant and the Mine.

Explosives Magazine

- The operation of the Explosives Magazine will be outsourced.
- There will be no Explosives Depot/ Storage in the scope of the project, the explosives will be delivered by truck as needed by the operation.
- The following buildings were considered for the magazine complex: Office/Sentry Box, Accessories Warehouse and Emulsion Tanks.

18.3.4 Processing Plant Layout

The project's master plan is shown in Figure 18-5. The mechanical layout of the processing plant, Figure 18-6, was developed adopting normative premises and/or good engineering practices, with the main ones as listed below:

- Use, whenever possible, the unevenness of the natural terrain in order to minimize structures and equipment powers.
- The industrial buildings and transfer houses were designed without roofs and sidings, except for the reagent and filtration buildings, which have roofs and sidings.
- Minimum access width of 800 mm for people to access the operation and maintenance of the equipment.
- Minimum access width of 600 mm for the passage of people in areas with restrictions.
- Minimum headroom of 2,200 mm for people to pass through.
- Minimum access width of 4.0 m for vehicle passage.
- Minimum headroom of 5.5 m for vehicle passage.
- Optimization of the structural models of the new installations aiming at the maximum possible reduction of the weight of the steel structures and concrete structures.
- Provision of adequate access to the operation and maintenance of facilities and equipment by means of stairs, walkways, ramps, walkways, etc.
- Use of concrete floors with drainage channels where it is necessary to dispose of effluents from washing and/or leakage, in order to enable adequate cleaning.
- Prediction of locations for installation of ducts, pipe rack and electrical trays with their auxiliary structures, such as: pipe-racks, pipe-ways, cable-racks, etc.

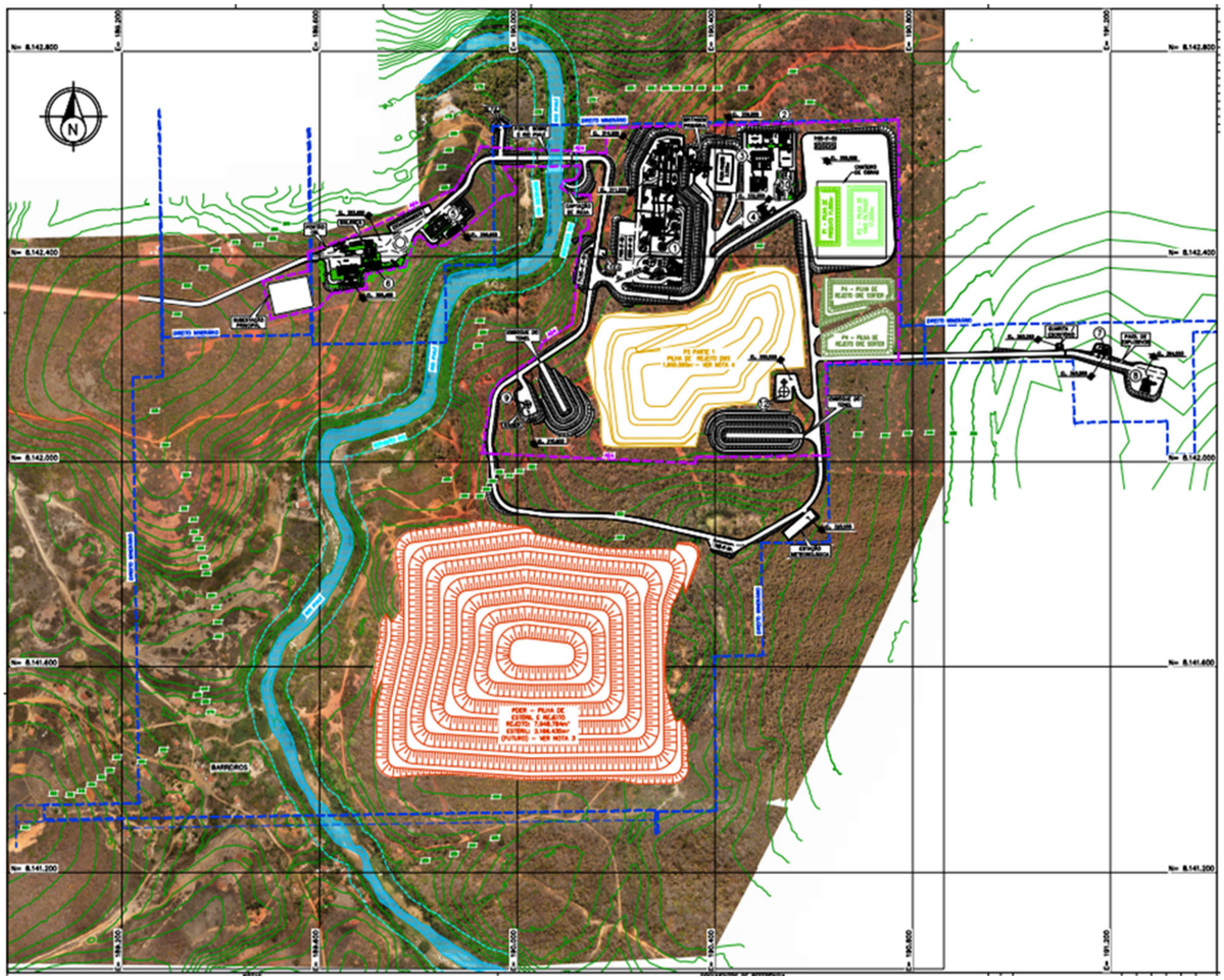


Figure 18-5: Master Plan

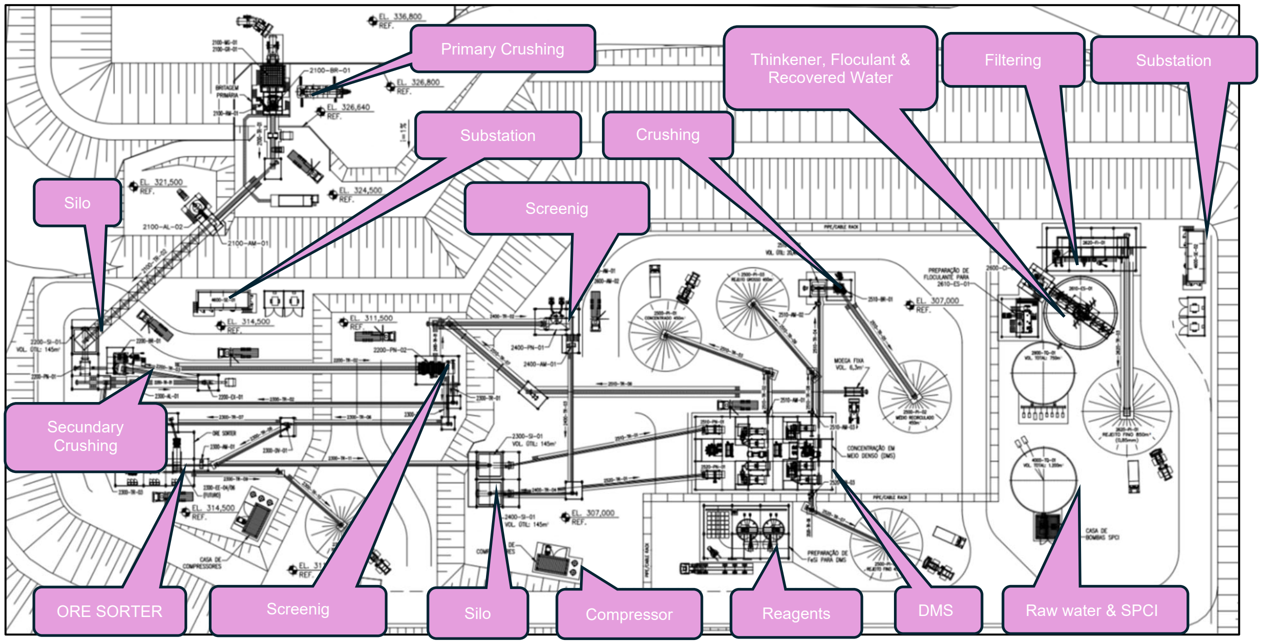


Figure 18-6: Layout of the Processing Plant

Transfer houses, where possible, have been designed as a simple transfer between belt conveyors in order to avoid new buildings and facilitate possible maintenance by mobile equipment and minimize building costs.

The primary crushing and secondary crushing buildings are designed entirely as metal structures, with the crushers supported independently of the building, in order to minimize concrete structures and avoid more robust buildings.

18.3.5 Maintenance/Operation

The development of the layout foresaw the use of mobile equipment for the maintenance of equipment, such as cranes and winch trucks, in order to minimize permanent installation costs of hoists and overhead cranes. Hoists and overhead cranes are provided only at maintenance points that were not feasible for the use of mobile equipment.

Special attention was given to the maintenance points, so that the layout allows for crane support regions (where applicable) and tow truck approach regions, as shown in Figure 18-7.

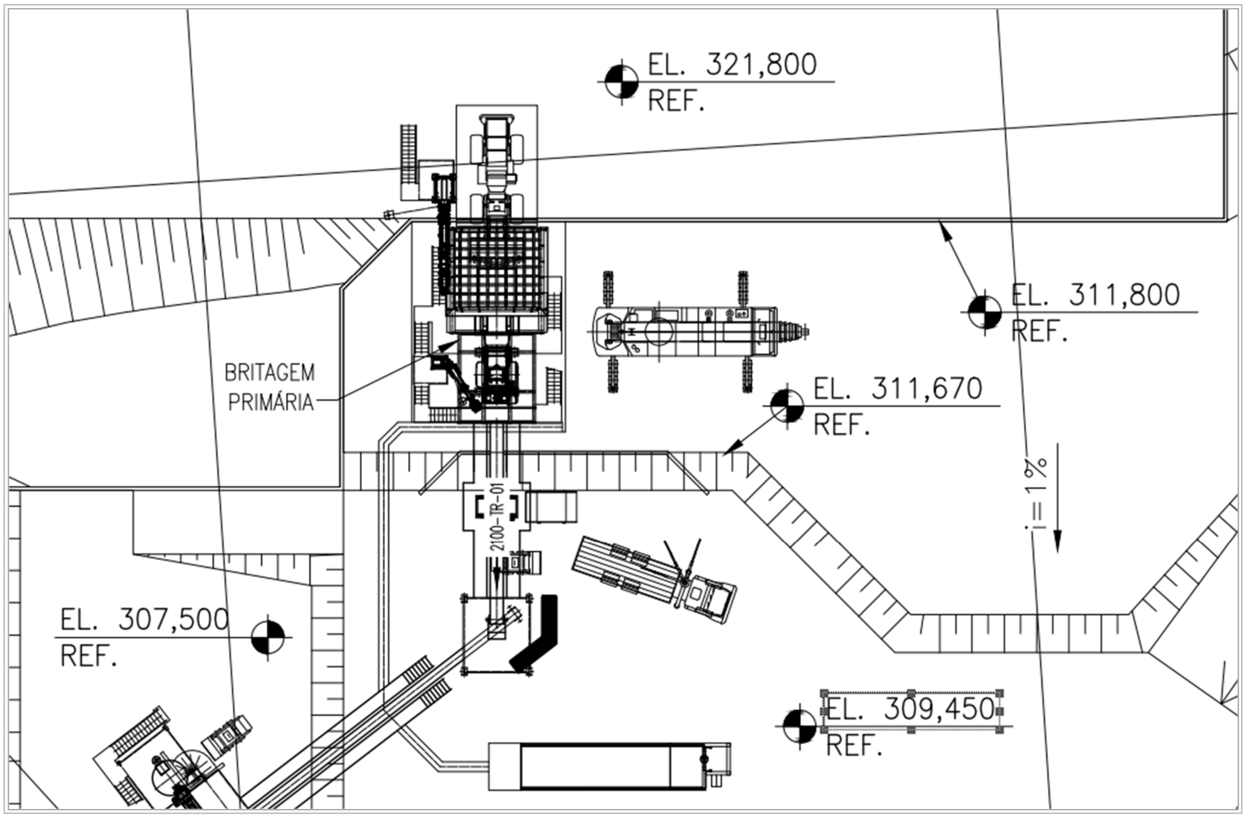


Figure 18-7: Primary Crushing—Crane Patrol and Crane Truck Approach

Electric hoists were provided for the operation/handling of reagent bags. All pumps will be maintained by mobile maintenance equipment (hoist trucks, giraffe-type mobile cranes or mobile gantry cranes).

18.3.6 Platework

All the platework of the project (tanks, pulp boxes, and chutes) will be made of carbon steel. The liners will be natural rubber for the pulp equipment and Hardox 500 for the dry material handling equipment.

Utility Systems

The project's utilities include the extraction of Raw Water from the Piauí River, compressed air generation systems, the effluent treatment systems, etc.

The utility systems studied for the project are:

- Raw water extraction—Piauí River
- Drinking water treatment system
- Sewage treatment system
- Effluent treatment systems
- Process water system recovered from the thickener

- Fire suppression system
- Compressed air generation and distribution system.

18.3.7 Raw Water Extraction—Piauí River

The raw water from the Piauí River will be extracted by pumps and destined for the 1,200 m³ new/raw water tank or make-up of the reclaimed water tank, when necessary, with a dedicated reserve for SPCI.

18.3.8 Drinking Water Treatment System

The project will include the installation of a compact Water Treatment Plant (WTP) with a capacity of 5.0 m³/h, which will meet the drinking water demand of the entire operational staff (495 people).

18.3.9 Sewage Treatment System

The project will include the installation of a compact Sanitary Sewage Treatment Plant with a capacity of 5.0 m³/h, which will treat the sanitary effluent generated by the entire operational staff.

18.3.10 Oily Effluent Treatment Plant

An oily effluent treatment plant with a capacity of 40.0 m³/h will be installed in the project, which will treat the oily effluents generated in the processes of washing light and heavy vehicles in the wash bays and washing parts in the workshop to be installed near the Workshop.

18.3.11 Industrial Effluent Treatment Plant

An Industrial effluent treatment plant with a capacity of 225.5 m³/h will be installed, which will treat the industrial effluents generated during the floor cleaning process in the areas, and general drainage.

18.3.12 Reclaimed Process Water System

The reclaimed water tank (750 m³) will be fed/supplied by the overflow of the thickener, and the water deficit will be replenished by make-up from the catchment. The distribution of recovered water will be through four networks, all of them by pumping, which will meet the following consumptions:

- Water for treatment
- Screen sprays
- Service Water, Thickener Sprays and Flushing of Pulp Pipes
- Water for the pulp boxes and for the cyclone chute.

18.3.13 Fire Control System

The fire protection and firefighting system will have a capacity of 30.0 m³/h and will cover the main plateau of the plant. Technical instructions from the Military Fire Brigade of Minas Gerais and applicable ABNT standards were adopted.

18.3.14 Compressed Air Generation and Distribution System

The compressed air generation, treatment, storage and distribution system will be divided into the Plant and Workshop areas.

In the Plant there will be two compressor houses which will house the compressors, dryers, coalescing filters and air reservoirs that will meet the consumption for instruments, service/cleaning and process air.

To serve the workshop support structures, lubricated screw compressors with dryers and integrated vessels will be provided – one operational and one spare.

18.4 Metallic Structures

The Steel Structure buildings foreseen in this Project follows an arrangement defined by the Mechanical discipline, according to the premises listed in Section 18.5.

The quantities estimated in this phase of the project were based on indices defined in the document Project Criteria BAN–0000–43EC–00001 and a database of similar projects developed by AtkinsRéalis.

An uncertainty of 1.20 was considered in the estimation of quantities, a premise also recorded in the Design Criterion mentioned above.

The materials listed below were considered in the composition of the Metallic Structure quantities:

- Welded Sheets and Profiles: ASTM A572 Gr. 50
- W&HP Laminated Profiles: ASTM A572 Gr. 50
- Perfis L&A Laminates: ASTM A36
- Anchor bolts: ASTM A36
- Cold Formed Profiles: ASTM A1011 Gr. 33
- Checkered flooring sheet: ASTM A36
- Roofing and covering tiles: Trapezoidal galvanized steel sheet H=40 mm, with a thickness of 0.65 mm
- Overhead crane rails: TR57
- Rail clips: Gantrex Boltable Clips
- Other items such as gutters, flashings, guardrails, screws, etc., quantified in miscellanies.

It was considered that the metallic structures of the administrative buildings listed below will be quantified in square metres in the Architectural Quantity Worksheet at this stage of the project. In the Basic Design stage, with pre-dimensioning of the structures, such items will be quantified in the Steel Structure Quantity Worksheet:

- 4600-SE-01: Substation Traffic Bay

- 4600-SE-02: Substation Traffic Bay
- 4600-SE-03: Substation Traffic Bay
- 4600-SE-04: Substation Traffic Bay
- 4600-SE-05: Substation Traffic Bay
- 5130-ED-01: Mine Administrative Building
- 5140-ED-01: Restaurant
- 5150-ED-01: Warehouse
- 5160-ED-01: Ordinance, Scales, and Shipping
- 5170-ED-01: Medical Center/Fire Brigade
- 5180-ED-01: Cloakroom
- 5700-ED-01: Mine Locker Room
- 5900-ED-01: Mine Dispatch and Communication
- 5950-ED-01: Mine Battery Room
- 6100-ED-02: Workshop Office.

The structures listed below were estimated by indexes in the Steel Structure Quantity Worksheet. In the basic design stage, the following will be pre-dimensioned:

- 2000-YY-01: Pipe Rack
- 2100-ED-01: Primary crushing
- 2100-ED-02: Sampling
- 2100-ED-03: Sucatas Extractor
- 2100-YY-01: Road Shelter sub o 2100-TR-02
- 2200-ED-01: Primary Screening
- 2200-ED-02: Secondary crushing
- 2200-ED-03: Sucatas Extractor
- 2200-ED-04: Secondary Screening
- 2200-YY-01: Road Shelter sub o 2200-TR-02
- 2300-ED-01: Sorter Hours
- 2300-ED-02: Silo 2300/ 2400
- 2300-YY-01: Road Shelter sub o 2300-TR-11
- 2300-YY-02: Road Shelter sub o 2300-TR-06
- 2300-YY-03: Road Shelter sub o 2300-TR-02
- 2400-ED-01: Tertiary Screening
- 2500-ED-01: DMS (Concentration in Dense Media)
- 2500-ED-02: FeSi Preparation for DMS
- 2510-ED-01: Medium Crushing

- 2510-YY-01: Road Shelter sub o 2510-TR-01
- 2520-YY-01: Road Shelter sub o 2520-TR-01
- 2610-ED-01: Thickener Tower
- 2610-ED-02: Flocculant Building
- 2620-ED-01: Filtration
- 4000-TQ-01: SPCI Tank Pump House
- 4100-ED-01: Compressor House
- 4100-ED-02: Compressor House
- 4200-ED-01: Fuel Filling Station
- 6100-ED-01: Rubber Shop, Workshop and Industrial Support
- 6200-ED-01: Vehicle Washer.

The structures listed below, despite being in metallic structure, will be the scope of the equipment supplier and, therefore, are quantified in the Mechanical Quantity Worksheet:

- 2100-CT-01: Transfer House
- 2300-CT-01: Transfer House
- 2300-CT-02: Transfer House
- 2300-CT-03: Transfer House
- 2300-CT-04: Transfer House
- 2400-CT-01: Transfer House
- 2510-CT-01: Transfer House
- 2510-MG-01: Hopper.

18.5 Concrete

The scope for the Reinforced Concrete structures was defined by the arrangements of the Mechanical and Architecture Discipline.

The quantities of reinforced concrete foundations and structures were estimated according to similar projects prepared by AtkinsRéalis. To the reference (similar) projects, multiplying factors were applied to correlate the areas of the structures and the allowable stresses in the soil.

According to document 20240204_Moblan Tech_Report, item 18.8, direct foundations of the footing and radier type were considered. The permissible stress in the soil was adopted between 1.20 and 1.50 kg/cm^2 based on the mining boreholes with lithological profile classification.

In the basic design stage, after receiving the drilling reports, reference drawings (DRs) (provided by the client) or load tables provided by the Mechanical and Steel Structures disciplines, the foundations and structures were pre-dimensioned, and may undergo changes in dimensions and concept (type of foundation).

The following structures are part of the concrete scope:

- 2510-ED-01: Medium Crushing
- 2100-ED-01: Primary crushing
- 2200-ED-02: Secondary crushing
- 2200-ED-01: Primary Screening
- 2200-ED-04: Secondary Screening
- 2400-ED-01: Tertiary Screening
- 2100-ED-03: Sucatas Extractor
- 2200-ED-03: Sucatas Extractor
- 2300-ED-01: Ore Sorter
- 2300-ED-02: Silos Building
- 2500-ED-01: DMS
- 2620-ED-01: Filtration
- 2610-ED-01: Thickener/Thickener Bridge
- 2500-ED-02: FeSi Preparation for DMS
- 2510-MG-01: Hopper; Conveyors
- 2100-CT-01: Transfer House
- 2300-CT-01: Transfer House
- 2300-CT-02: Transfer House
- 2300-CT-03: Transfer House
- 2300-CT-04: Transfer House
- 2400-CT-01: Transfer House
- 2510-CT-01: Transfer House
- 2100-ED-02: Sampling
- 7100-IF-01: Sump 1
- 7100-IF-02: Sump 2
- 7100-IF-03: Sump 3
- 7100-IF-04: Sump 4
- 4000-TQ-01: Raw Water Tank and SPCI
- 2900-TQ-01: Reclaimed Water Tank
- 2610-EDS-01: Thickener
- 2610-ED-01: Thickener Centre Well
- 6100-ED-01: Workshop and Industrial Support Facilities
- 6100-ED-01: Tire Shop
- 6200-ED-01: Vehicle Wash
- 6000-ST-01: ETEO

- 4200-ED-01: Fuel Filling Station / Fuel Tankage
- 4100-ED-01: Compressor House 1
- 4100-ED-02: Compressor House 2
- 4120-ST-01: SUMMER
- 4110-ST-01: ETA
- 2900-ST-01: WWTP
- 2000-YY-01: Pipe Rack
- 1500-XX-01: Raiser 1
- 1500-XX-02: Raiser 2
- 1000-TQ-01: Mine Water Reservoir 1
- 1000-TQ-02: Mine Water Reservoir 2.

The administrative installations and substations mentioned below are on a direct foundation in a superficial radier. Other structures will be quantified in the quantitative spreadsheets of the Architecture discipline.

- 5130-ED-01: Mine Administrative Building
- 5140-ED-01: Restaurant
- 5150-ED-01: Warehouse
- 5160-ED-01: Concierge / Scale and Shipping, including metal covering over the premises
- 5170-ED-01: Medical Center / Fire Brigade
- 5180-ED-01: Change Room
- 5700-ED-01: Mine Locker Room
- 5900-ED-01: Mine Dispatch and Communication
- 5950-ED-01: Mine Battery Room
- 6100-ED-02: Workshop Office
- 4600-SE-01: Crushing Substation
- 4600-SE-02: DMS Substation
- 4600-SE-03: Workshops Substation
- 4600-SE-04: Mine Substation
- 4600-SE-05: Exhaust Fans Substation.

Due to the level of Engineering Completion of this design phase, an engineering provision (design factor) of 20% has been considered.

18.6 Electrical

To provide power to the Bandeira Project, a new 138 kV transmission line will be built. The new transmission line will depart from the CEMIG Integrator Substation and will have an approximate length of 3 km.

For the implementation of this Project, it will be necessary to build a new main substation, which will be fed by the new 138 kV transmission line. The new main substation will lower the voltage from 138 kV to 13.8 kV. A 13.8 kV overhead distribution network will power the secondary substations in e-houses distributed throughout the plant.

The plant will have five secondary substations in an e-house. The secondary substations that will feed the loads from the Plant and the Mine are listed below:

- 4600-SE-01: Crushing Substation
- 4600-SE-02: DMS Substation
- 4600-SE-03: Workshops Substation
- 4600-SE-04: Mine Substation
- 4600-SE-05: Exhaust Fan Substation.

The plant will demand the energy presented in Table 18-1:

Table 18-1: Power Demand

System Powered	Voltage (kV)	Active Power (kW)	Reactive Power (kVAr)	Apparent Power (kVA)	FP
Main Substation	13.8	8,734	2,783	9,167	0.95

18.7 Instrumentation, Control, and Automation

The Instrumentation, control and automation project will be developed considering the implementation of a fully automated mining process, with minimal human intervention, based on technologies that allow the best cost-benefit ratio for automated systems.

The control and supervision system will be of the hybrid type, encompassing all control, operation, and supervision activities of the plant. The system will be based on PLCs (programmable logic controllers), which will interface and control all process equipment. Control of the plant will be carried out from the dedicated control and operation room, where the plant's operation and engineering stations will be located. Attached to the control room should also be located in the server room for the plant's automation systems.

The control system must have a client-server architecture, with the ability to expand and perform online modification of the software and hot modifications of the hardware whilst ensuring maximum availability of resources for the operation of the plant. The controllers must be interconnected in a redundant network to the plant servers. The interface with the instruments will be carried out through the remote panels, which will be designed according to the communication needs of the process areas.

The plant's instrumentation will be intelligent, with all analog instrumentation interconnected via the industrial network.

18.8 Telecommunications Systems

The telecommunications systems will be subdivided as follows:

- Network infrastructure (at and it network): considers all optical and metallic network infrastructure necessary for communications and interfaces of it (information technology) and at (automation technology) systems, including all racks, servers, radios, switches, patch panel and other assets necessary for the network infrastructure.
- Process CCTV: the CCTV system for process monitoring is based on a set of cameras installed in the process areas of the plant, making the images available via network to the CCTV stations, according to the plant's operational needs.
- Property security: the CCTV system for property security is based on a set of cameras installed throughout the plant's administrative facilities, making the images available via network to security monitors installed in the security room. In addition to the property security CCTV system, the project will have an access control system, which will enable the control of entry and exit of personnel on the premises of the plant and access control in controlled and/or restricted areas.
- Data and telephone network: the data and telephone network system will be responsible for data traffic between the plant's it equipment, in a fully integrated and secure way, providing high connectivity between all network points. This system will meet all the needs of the plant, through dedicated applications, such as telephone, corporate management systems, e-mail, internet connection, intranet and integrated maintenance systems.

18.9 Geotechnical

The geotechnical characterization with the definition of the subsoil stratigraphy was carried out at the beginning of the geological investigation campaign carried out in January 2024 and forwarded by MGLIT in March 2024 to AtkinsRéalis. Twelve geological boreholes were drilled, totalling about eight hundred and thirty-eight m of drilling. The surveys did not follow a regular distribution network, and they were grouped into five distinct zones. The first zone is located on the western edge of the area of interest, consisting of two boreholes (ITDD-23-195 and ITDD 23-191). The second zone in the southern region also consists of two boreholes (ITDD-22-209 and ITDD-23-213), the central region (ITDD-23-207; ITDD-23-214 and ITDD-23-204) with three boreholes and in the eastern zone three boreholes (ITDD-22-206, ITDD-22-201 and ITDD-23-205) and the northern zone (ITDD-22-208 and ITDD-22-197).

The borehole reports presented the geological description through the classification of the drilled material, indicating their respective thicknesses. There is no quantitative information regarding the standard sampler penetration resistance value (NSPT), torque measurement, RQD index, core recovery percentage or elevation of the presence of water in the borehole. From the interpretation of these soundings, it is observed that there is a layer of brownish red soil with a sandy clay texture with thickness ranging from 3.0 m to 4.68 m. Adjacent to this layer is a saprolite with thickness ranging from 1.5 m to 21.05 m. Finally, the layer of biotite, gray shale, laminated and mottled, whose contact rate with saprolite varies in El. 241.49 m to El. 359.15 m.

No other types of geotechnical investigations were presented that would allow the characterization of the geotechnical behaviour of the soil and rock, either for the performance regarding the load capacity and deformability of the foundation where the structures and pile will be supported, or for the evaluation of the safety regarding the local or global rupture stability of the cut and fill slopes. In view of this condition, a geotechnical investigation plan was developed by AtkinsRéalis, presented in documents 1358-001-0000-4GDI-1000 and BAN-0000-4GES-10000, referring to the geotechnical investigation plan and technical specification.

In view of this condition of the lack of geotechnical information to support infrastructure and foundation projects, it was assumed that for permanent slopes cut into existing soils they should be inclined at 1.5H:1V. The slopes of the controlled embankments can be developed with slopes of 2.0H:1.0V. The slopes must be free of stones and blocks larger than 200 mm in diameter and their moisture content must allow compaction (plus or minus 2% of the optimum moisture content). For foundations, an allowable soil tension in the order of 1.2 kg/cm² will be considered for direct foundations. These parameters should be confirmed from the geotechnical investigation campaign proposed in the investigation plan 1358-001-0000-4GDI-1000 prepared by AtkinsReális.

Three technical reports were made available: MLF-RT-MGLIT002-2024_PDRP5, MLF-RT-MGLIT003-2024_PDRP5.2, MLF-RT-MGLIT004-2024_PDEP6 and three drawings MLF-DT-MGLIT002-01-2024, MLF-DT-MGLIT003-01-2024, MLF-DT-MGLIT004-01-2024, referring to the conceptual design of the P5-Part 1 Tailings Pile, P5-Part 2 Tailings Pile and the P6 Waste Pile. The documents prepared by MLF Geomecânica make recommendations regarding surface drainage, internal drainage and foundation treatment and analysis of the stability of pile slopes based on the experience of other similar structures implemented in other regions.

In these documents, the evaluation of the foundations from a research campaign carried out in another region was presented, indicating a generic model for the foundations of the pile consisting of soil/saprolite with a thickness of 20 m and rock (Biotite schist). The geotechnical criteria were based on the designer's experience in other similar structures. However, it indicates a correlation between these structures and the one to be implemented in the Bandeira project. There is also no record of the characterization of the tailings, and the parameters of this material are presupposed for the stability analyses performed. The project restricts a geometric arrangement of the pile and a typical section, not presenting any details regarding the deposition plan, internal drainage, surface drainage or foundation treatment, geotechnical instrumentation, which brings uncertainty in relation to the quantities to be generated and, therefore, is reflected in the CAPEX value in an estimated order of +/- 30%. For the next stage, it is recommended to develop the project at a detailed level in order to make the necessary adjustments in the CAPEX value related to the stockpiles to be implemented in the Bandeira project.

18.10 Piping

The distribution of utilities and process pipes followed an arrangement defined by the Mechanical discipline, according to the premises listed in Table 18-2. For this phase, pipes above or equal to 4" were considered.

For the process areas, the pipes considered were carbon steel pipes A.53-GR-B-S, sch STD coated in polyurethane (PU), with the following characteristics.

Table 18-2: Coating thickness vs Diameter Band

Diameter	Coating Thickness
8" A 18"	10 mm
20" A 28"	12 mm
30" A 36"	15 mm
38" A 48"	20 mm

For utilities, such as flushing, make-up, dilution, service water, sealing, process water, raw water, and process / service air, the pipes considered were carbon steel pipes A.53-GR-B-S, sch STD and for instrument air were carbon steel pipes A.53-GR-B-S, sch STD galvanized.

18.11 Construction

18.11.1 Construction Strategy

The Project Implementation Strategy covers distinct phases and associated activities.

- Phase 1: Basic and Detail Engineering of areas that does not require additional Certified Vendor Information.
- Phase 2: Construction activities of the Areas represented by the above approved Basic & Detailed Engineering—after receipt of the Construction (Installation) License and MGLIT Board Approval to proceed.
- Phase 3: Construction activities of the Areas.
- Phase 4: Commissioning and start-up of the Areas.

18.11.2 General Objectives

Key Project Drivers are:

- Zero harm to people, the community, and the environment
- Positive impact on surrounding communities
- Maximize project value for Stakeholders
- Achieve On-Specification First Production according to the Project Schedule.

18.11.3 Project Organization Chart

The Project organization are shown in Figure 18-8.

The on-site construction work is to be awarded to experienced contractors as listed below:

- Earthworks
- Civil, Architectural and Electro-mechanical Construction
- Mine Installation
- Transmission Line and Switchyard Contractor
- Fresh water pump station and pipeline Contractor
- Commissioning Company with the support of Construction Contractor
- Engineering—AtkinsRéalis
- Procurement Company—AtkinsRéalis
- Construction Management Company—Third company with the responsibility for managing of the construction site.

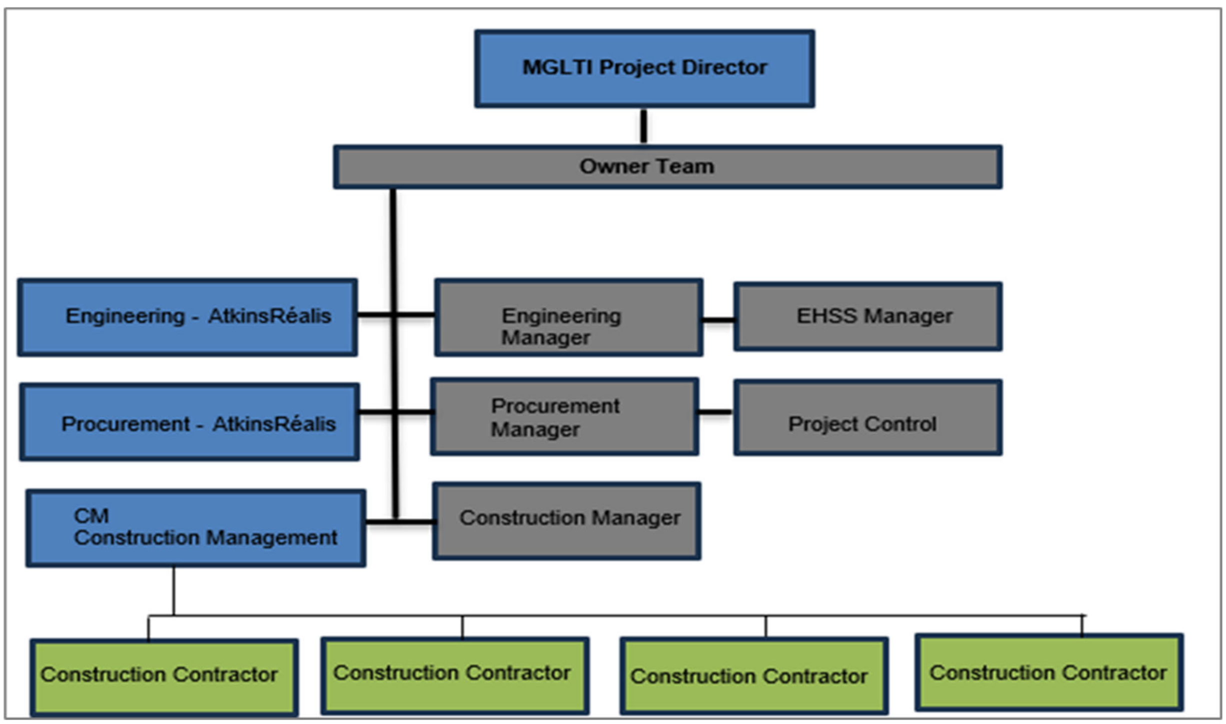


Figure 18-8: Project Organization

18.11.4 Construction Planning and Scheduling

Planning

The CM will develop an estimate of the work hours required for Site Construction Activities. Specialized scheduling software will be used to compare planned/budgeted hours vs. spent/ burned hours to calculate the earned hours and the associated productivity as per the required reporting matrix.

The monthly update will include hours expended by area/discipline, the status of each activity/document and the forecasted hours to completion.

Scheduling

The Project macro-schedule reflects current project conditions, which will be updated with the information from the detailed engineering and final construction contractor.

Project Schedule General Basis

The development of the general planning and implementation schedule is based on:

- Current knowledge of the project
- Prioritization of first production-related activities
- Logical progression linkage by discipline for each WBS activity
- Taking into consideration all required services and material take-off for each area and discipline as developed by engineering.

Assumptions

Assumptions used for defined times (calendar) in the schedule are:

- Working hours considered are from Monday to Friday, with 8-hour shifts
- All national and state holidays are observed
- The project financing approval for project implementation and issuance of all environmental permits is scheduled for June 30, 2024
- The basic engineering is scheduled to start in June 2024
- The earthworks are expected to start in April 2025
- The transmission line is expected in October 2025
- The property acquisition for the freshwater pump station and pipeline is scheduled to end in April 2025
- The expected date for mine production is July 2026 (First Production) and Sublevel Stoping in October 2027
- The commissioning date is expected to start in July 2026
- The expected date for the first production is November 2026
- These calculations include productivity factors

- Schedule durations for the procurement packages are based on quotes received from the market during the FS Project Phase.

Main Project Milestones

The project milestones are listed in Table 18-3 and will be updated during the basic and detail phase once the project implementation start-up is defined.

Table 18-3: Project Main Milestones

Item	Estimated Date
Financial Investment Decision	June 2024
Field Construction Activities Start	April 2025
Mine Development Start	October 2024
Engineering Start	June 2024
Mine Start (First Production)	July 2026
Transmission Line	October 2025
Mechanical Completion	June 2026
Commissioning Start up	July 2026
First Product	October 2026

Preliminary Schedule

Figure 18-9 shows the preliminary schedule, which will be updated on the next phase with basic engineering.

19.0 MARKET STUDIES AND CONTRACTS

Lithium Ionic has used the services of Fastmarkets, a leading independent lithium industry consultancy expert to provide a basis for the long-term price forecast. Fastmarkets is a cross-commodity price reporting agency (PRA) in the metals and mining, new generation energy, agriculture, and forest products markets.

19.1 Macroeconomic Outlook and Lithium

While global economic growth was severely affected by the Covid-19 pandemic in 2020, Russia's invasion of Ukraine in 2022 and the inflation-driven dip in 2022–2023, the current drivers both of battery demand and battery raw material supply override the general macroeconomic fluctuations.

Fastmarkets' September 2023 updated macroeconomic outlook predicts global economic growth (measured by real GDP, purchasing power parity) reaching 2.6% in 2023 before rising to 3.2% in 2024 and 3.3% in 2025. The expected higher overall global economic growth has the potential to boost consumer demand for batteries, especially for non-electric vehicle (EV) products such as Energy Storage Systems (ESS) and power tools. This higher demand could pose a positive risk to the demand side.

Global policies that could affect macroeconomic factors supporting the lithium market are key. These policies relate to the energy transition and energy storage, as well as the electrification of transport (land, maritime, and aviation). Policies enacted since 2021 include the U.S. *Inflation Reduction Act* (IRA), the E.U. Green Deal, the Canadian Critical Minerals Strategy, and India's FAME II Strategy.

The disconnect between the lithium market and macroeconomic growth means that lower-than-expected economic growth should not affect Fastmarkets forecast for lithium demand. We expect EV demand —the largest single source of demand for lithium—to remain robust despite slowing economic growth, higher interest rates, and the possibility of a recession, for five reasons:

- Over the next few years, EVs will continue to be bought primarily by affluent buyers with greater disposable income.
- Government policies and subsidies will continue to encourage the purchase of EVs over internal-combustion engine (ICE) vehicles. The U.S. IRA will make smaller EVs more affordable for less-affluent buyers.
- Waiting lists for EVs are extending current demand into the future.
- High gasoline prices mean EVs are more price-competitive than ICE vehicles over normal ownership timescales.

19.2 Lithium Demand—Historical and Forecast

More countries and regional bodies are committing to transport decarbonization targets, particularly in nascent emerging markets. In 2023, EV sales tripled in Thailand, Brazil, and Malaysia. Falling battery and EV prices are enabling producers, particularly in China, to increase EV affordability. Residential and commercial energy storage products will quickly gain in popularity, with consumers and businesses seeking to decrease carbon emissions.

EVs are becoming increasingly common, and more than 400 new EV models will be introduced in 2024, offering greater choice to consumers. Due to rising demand, EV and ESS products have become more profitable for providers, spurring innovation and investment in the industry. With renewable energy accounting for a greater portion of electricity grids, batteries are required to store excess generation.

19.3 Lithium Demand Increased at a Compound Annual Growth Rate of 23% between 2016 and 2022

The recent growth in lithium demand was mainly fueled by increasing EV demand for lithium-ion batteries, which grew to more than 420,000 tonnes in 2022 from 35,000 tonnes in 2016—surpassing industrial uses as the leading demand sector in 2020.

Industrial demand increased by 7% between 2016 and 2019 to 127,000 tonnes. Demand suffered in 2020 due to the global pandemic, decreasing by 15% year on year before recovering to 124,000 tonnes in 2021.

Fastmarkets forecasts demand from battery electric vehicles (BEV) to increase at a compound annual growth rate (CAGR) of 10% to 1.35 Mt of lithium carbonate equivalent (LCE) in 2034, up from 498,000 tonnes of LCE in 2024. Demand for lithium-ion batteries from battery-swapping terminals, energy storage systems, consumer electronics, power tools, telecoms, and data are expected to add an additional 754,000 tonnes of LCE by 2034. Lithium-ion batteries are forecast to contribute 97% of total lithium demand by 2030.

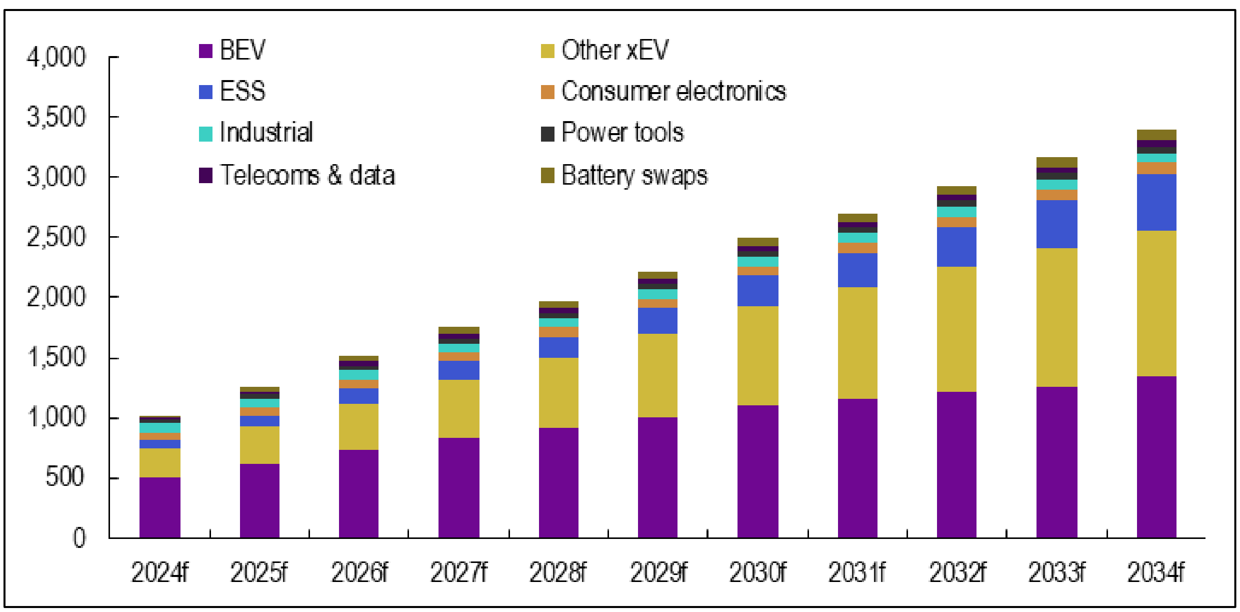


Figure 19-1: Lithium Demand Forecast—Tonnes (000s) LCE

19.4 Lithium Supply—Historical and Forecast

Supply increased at a CAGR of 27% between 2016 and 2023, responding to the positive demand outlook from the nascent EV industry. Australia, Chile, and China fueled most of this growth.

The supply response overshot demand, forcing some producers to place operations on care and maintenance between 2018 and 2020. Supply decreased by 12,000 tonnes in 2020 due to production cuts, lower demand, and COVID-19 exigencies such as social distancing.

Supply recovered in 2021, increasing by 36% year on year, thanks to post-pandemic stimulus measures and an increasingly positive long-term demand outlook. This resulted in a 437% price increase from the start of the year 2021, which incentivized supply expansions. The strong growth continued into 2022, with supply increasing by an estimated 41% year on year and 2023 with 35%.

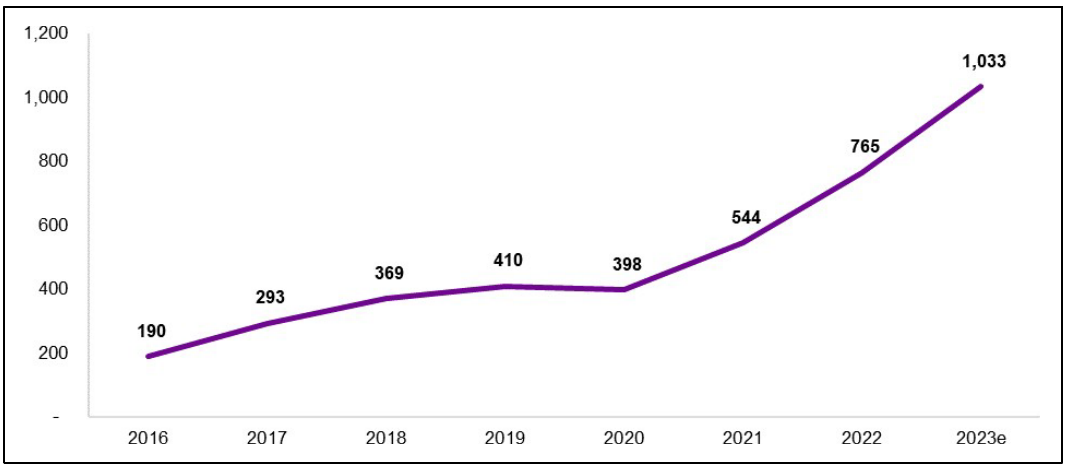


Figure 19-2: Global Lithium Supply 2016-2023—Tonnes (000s) LCE

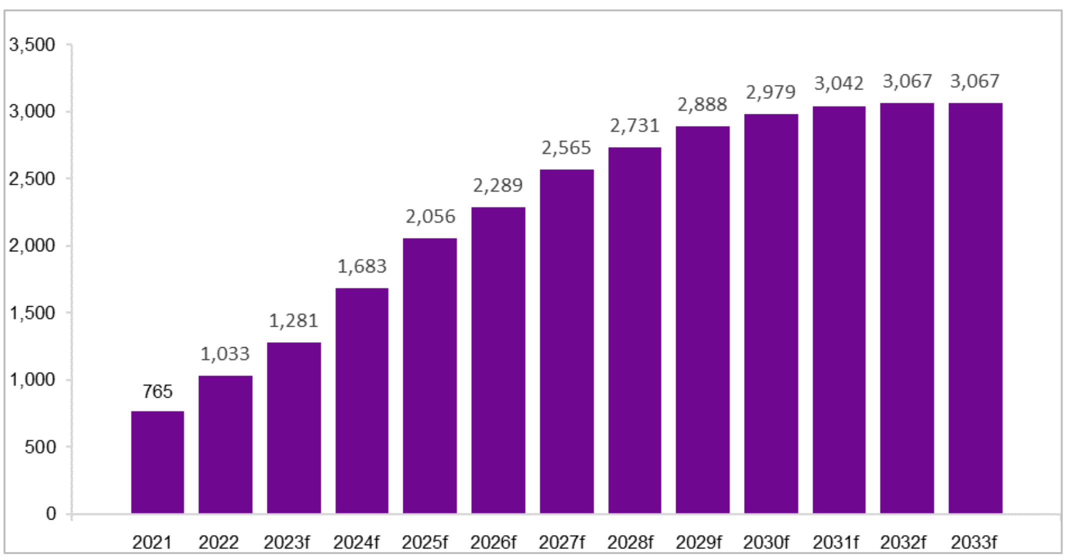


Figure 19-3: Lithium Mine Supply—Tonnes (000s) LCE

In 2023, 94% of global lithium supply came from just four countries: Australia, Chile, Argentina, and China. Supply is diversifying, with new operations coming online in Africa, Brazil, Canada, Europe, and the U.S. within the outlook period. We think China will be the largest single producer globally in 2033, accounting for 28% of supply, followed by Chile and Argentina at a combined 25%, and Australia at 23%.

There is a disconnect between regions of supply and regions of consumption. China has done well to utilize domestic resources, building downstream refining capacity and investing in upstream resources. The main regions for lithium demand outside of China are Europe and the U.S., which we forecast to be the two smallest producing regions in 2033, accounting for 3% and 4% of global supply, respectively, compared with 21% and 24% of demand.

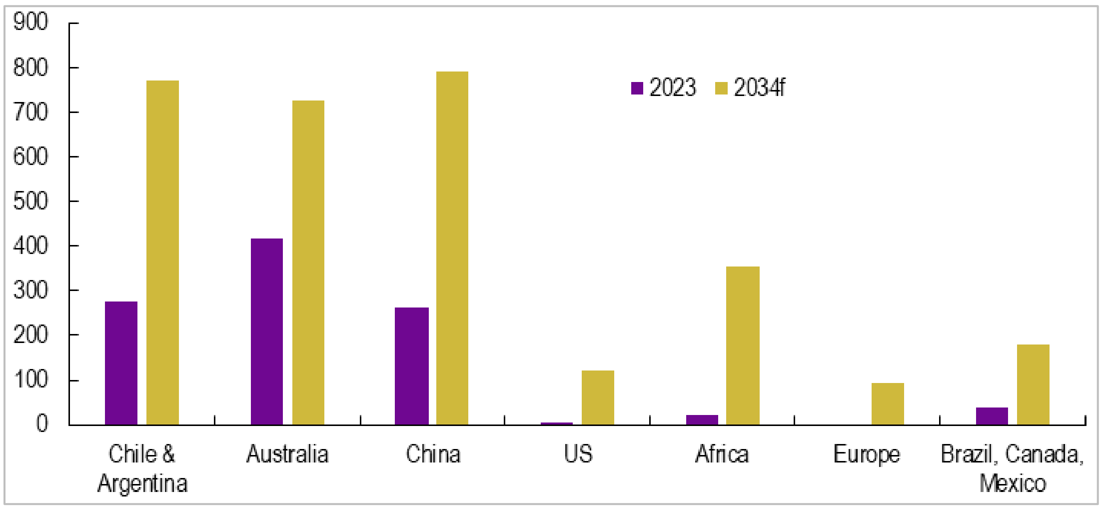


Figure 19-4: Geographical Spread of Mine Supply—Tonnes (000s) LCE

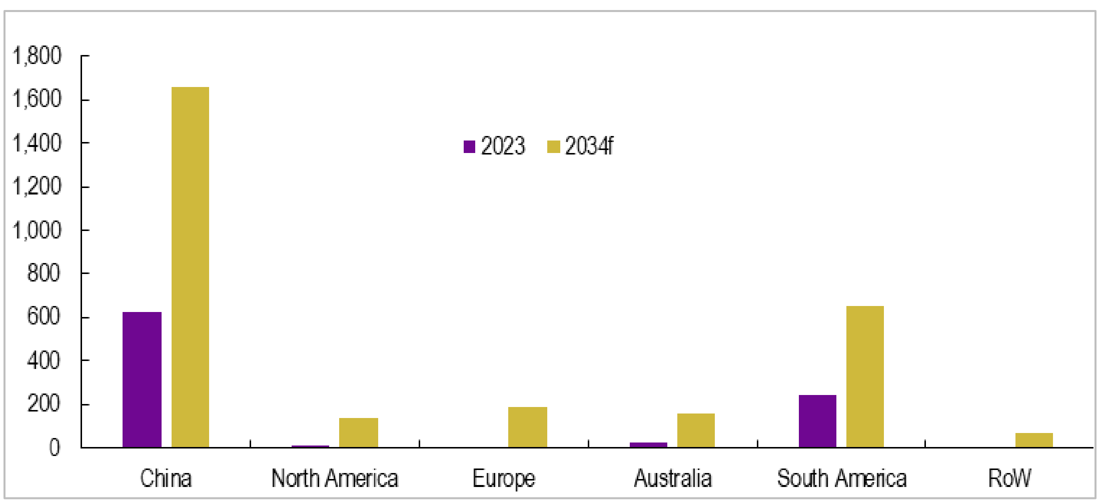


Figure 19-5: Geographical Spread of Lithium Processing Production—Tonnes (000s) LCE

19.5 Lithium Price Forecast

Prices for lithium salt and spodumene fell sharply in 2023 from the unsustainable levels of 2022, when lithium salt averaged more than $70/kg and spodumene more than $6,000/t.

The combination of a significant producer response, exacerbated by the fast-tracking of lepidolite production in China and the shipping of direct-shipped ore (DSO) material from Africa, and weaker-than-expected demand led to the price correction. High prices do indeed cure high prices. Prices have continued to fall in the first quarter of 2024 and are now range-bound around $14/kg to $15/kg for lithium salts and around $850/t for spodumene. For spodumene, these levels are still relatively high compared with the low prices seen in the bear market of 2020, when prices briefly fell to $375/t.

Now that the 2021–2022 froth has come out of the market, we expect prices to settle down around current levels for the next several years. Fastmarkets believes that the current price environment will increase the difficulty of accessing funding, which has the potential to sow the seeds for another price cycle. Considering this, we expect prices to see a notable increase at the back end of the decade and into the 2030s, as the price will need to incentivize a supply response.

We forecast that hydroxide, carbonate, and spodumene prices will average $18.9/kg, $18.30/kg, and $1,450/t, respectively, between 2024 and 2030.

Fastmarkets still expects ongoing volatility in the global lithium market, driven by restocking and destocking cycles, as well as periods of surplus supply followed by supply disruptions and supply deficits later in the decade.

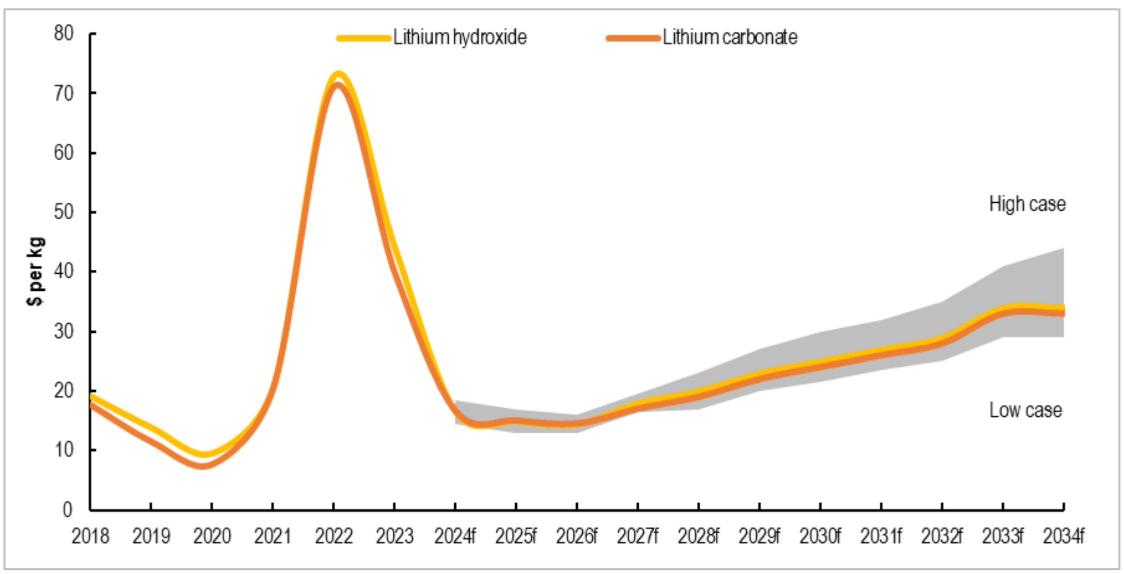


Figure 19-6: Lithium Price Forecast 2024–2034

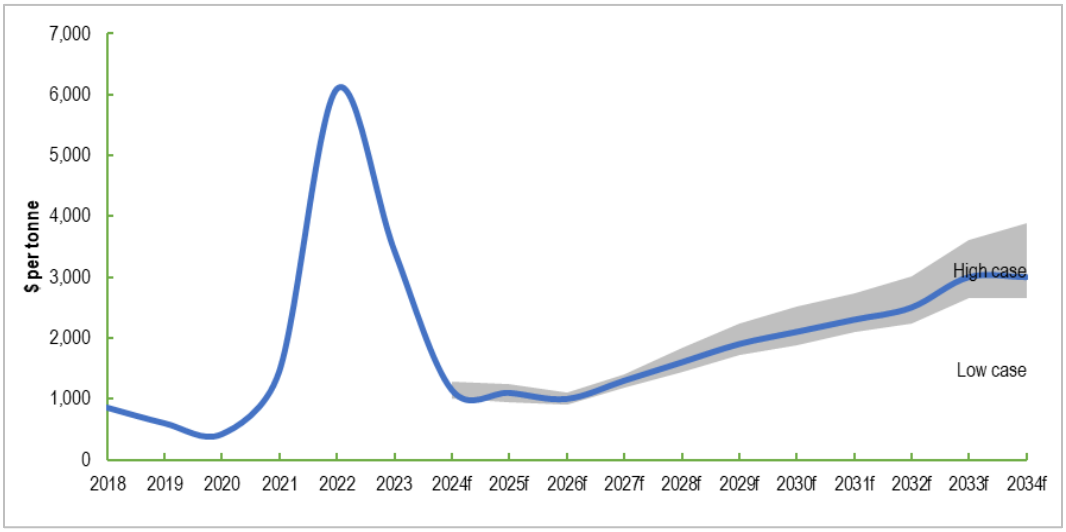


Figure 19-7: Spodumene Price Forecast 2024–2034

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND COMMUNITY IMPACTS

This section presents the findings from the Project's environmental and socio-economic assessment. The analysis adheres to the relevant federal, state, and municipal legislation concerning environmental factors, including water; liquid effluents; flora; fauna; noise; natural, cultural, historical, and archaeological heritage; environmental education; as well as Indigenous and Quilombola territories and traditional populations. Conducted as part of the mandatory environmental licensing process for mineral extraction activities in Brazil, this assessment complies with federal decree No. 99.274/90, which regulates federal law No. 6,938/81 and establishes the Brazilian National Environmental Policy. The information presented here is sourced from public data and information provided by MGLIT.

20.1 Brazilian Mining Regulatory Framework

Mining in Brazil is governed predominantly by the Brazilian Federal Constitution (1988) and the Brazilian Mining Code. These legal and regulatory frameworks impose numerous obligations on mining companies, including the responsible exploitation of mineral deposits, ensuring the health and safety of workers and local communities, and implementing environmental protection and remediation measures.

Mining activities within Brazil are regulated by the Ministry of Mines and Energy (MME) and the National Mining Agency (ANM). The MME is responsible for formulating and coordinating Brazilian public policies regarding mineral resources and energy production and has jurisdiction over government agencies and federal public companies responsible for executing such policies, such as the oil and gas industry, mining projects, and other energy sectors.

Associated with the MME, the ANM is a federal agency responsible for monitoring, analyzing, and promoting the performance of Brazil's mineral economy, awarding rights for the exploration and development of mineral resources, and planning and inspecting mineral exploration and extraction activities in the country. According to the Brazilian Federal Constitution, surface property rights are distinct from mineral rights. This means that mineral rights belong exclusively to the Brazilian federal government, which oversees mineral exploration and mining activities in Brazil. The Brazilian Mining Code currently establishes different regimes for regulating mineral exploration and mining activities in Brazil, which may vary according to mineral type and project size. The Mining Code regimes applicable to the Bandeira Lithium Project are exploration authorization, mining concessions, and mining licenses.

For mining activities, entities must prove they hold the rights and authorization to exploit the intended mineral substance. The rights for mineral extraction are granted by the ANM since the mineral resources are considered Union property and are, therefore, pursuant to Article 20, IX of the Federal Constitution (1988). MGLIT holds the mining rights within the exploration area, as formalized in the mining process ANM: 832.439/2009.

20.1.1 Land Access and Occupation

The surface rights owner is legally required to grant access to mineral rights holders for conducting mineral exploration and mining activities. If a holder of mineral rights or mining concession does not own the surface land where mineral interests or mining-related infrastructure is situated, they can obtain access or occupy the land through mining easements granted by the ANM under the Brazilian Mining Code or can choose to enforce their access rights through Brazilian courts.

Mineral rights holders must compensate the surface rights owner for surface access and use and indemnify them for any property damage. The fee amount can be negotiated between the parties within parameters set by the Mining Code, with subsequent notification to the ANM about said agreement. However, if no agreement is reached, entities, after obtaining exploration authorization or a mining concession, can petition a court to determine the indemnification amounts.

The Area Directly Affected (ADA) by the Bandeira Project covers three rural properties in the municipality of Araçuaí, Minas Gerais. MGLIT has a private instrument of assignment of rights with Valitar Participações S.A. (Valitar), owner of the Brejos, Piauí Boa Vista Part 1 and Part 2 farms, to conduct mining activities on its properties.

20.1.2 Legal Reserve

The Brazilian Forest Code sets forth that on rural properties, a minimum percentage of the local vegetation must be preserved as Legal Reserve (RL). This requirement promotes the sustainable use of natural resources, the conservation of biodiversity, and the protection of native fauna and flora.

The Project is situated in a rural area. It thus falls under Article 12 of Law 12.651/2012—Forest Code, which mandates the preservation of the Legal Reserve (RL), ensuring the conservation of at least 20% of the property area. The Legal Reserve must be registered with the appropriate environmental agency via the Rural Environmental Registry (CAR).

The properties targeted for future mining activity—Brejos, Piauí Boa Vista Part 1, and Part 2 farms—comprise a Legal Reserve (RL) as required by Law No. 12,651 (May 2012). Valitar Participações S.A. owns all three farms, registered in the Rural Environmental Registry (CAR) as a single property, complying fully with legal requirements. Notably, the designated RL areas of these properties do not overlap with the Project's Area of Direct Influence (ADA).

20.2 Mine Closure

In Brazil, under Federal Decree No. 97.632/1989, mineral extraction projects must submit a Degraded Area Recovery Plan with the Environmental Impact Study and Environmental Impact Report (collectively EIA) during the environmental licensing process. Therefore, the environmental restoration of areas degraded by mineral exploitation should be planned from the outset. Mining companies must present their Approved Economic Plan (PAE) to ANM to receive a mining concession. These studies must address the reclamation and decommissioning of the mined areas, describing the measures to be implemented throughout the mining process to prevent severe degradation and minimize environmental impacts. Mining companies must regularly update the mining decommissioning plan to align with project developments. The MME grants approval for mine closure when the applicant can prove compliance with the decommissioning plan, particularly with environmental condition requirements.

The recovery of degraded areas involves actions to restore ecological balance and reintegrate altered environments into their natural landscape. This process aims to rectify human-induced alterations, such as those resulting from ore extraction, in accordance with legal mandates for mandatory re-vegetation. The conceptual strategy proposed for the Project's degraded areas focuses on facilitating ecological succession to expedite the establishment of native vegetation, aiming to seamlessly reintegrate these rehabilitated areas into their surrounding environment.

The Conceptual Mine Closure Plan outlines activities aimed at minimizing impacts during the Project's closure phase. Its primary goal is establishing guidelines and corporate criteria for closure activities approved by the ANM and the Minas Gerais Department of Environment and Sustainable Development (SEMAD). These activities ensure technical and financial conditions for mine closure, transitioning to post-closure status and determining future land use. NeoAgro Ambiental's (2023) Conceptual Mine Closure Plan for the Bandeira Project incorporates final pile configurations with properly sloped sides to ensure the effective execution of the closure strategy. The plan includes a meticulously designed drainage network to control surface water and promote vegetation growth on slope faces. These measures mitigate the visual impact of mining activities and significantly reduce erosive effects.

20.2.1 Environmental Licensing and Approval

The Brazilian Federal Constitution establishes the division of powers between the federal, state, and municipal governments to issue environmental laws and regulations. While the Brazilian federal government has the authority to issue environmental regulations, each state is legally allowed to develop and implement specific regulations governing environmental licensing procedures under its jurisdiction. Municipal governments may only issue regulations regarding matters of local interest or as a supplement to federal or state laws.

According to Brazilian law, any construction, installation, expansion, or operation of an establishment or activity that utilizes environmental resources, causes or may cause pollution, or has the potential to degrade the environment must undergo a prior licensing process. The National Environmental Council (CONAMA) regulates the environmental licensing process. CONAMA Resolution No. 237/1997 establishes the types of authorizations, procedures, and criteria for environmental licensing, which occurs in a three-stage permitting process:

- The Preliminary License (LP) certifies the environmental viability of the proposed activities in terms of their design and location. It is the most critical part of the process and requires environmental baseline studies, community engagement, public hearings, and the preparation of an EIA.
- The Installation License (LI) allows for the proposed project's construction, installation, and commissioning.
- The Operating License (LO) authorizes the project to operate after it has been constructed, commissioned, and inspected to ensure it complies with the Preliminary License, Installation License, and any other applicable permits.

The responsibility for the Environmental Regularization of the Bandeira Project lies with Minas Gerais, as established by Law No. 6,938/81 and CONAMA Resolution No. 237/97. The Secretariat of Environment and Sustainable Development of Minas Gerais, an agency under the State Government, is tasked with evaluating the licensing process. This agency has the authority to plan, propose, and coordinate integrated environmental management within the state to preserve ecosystems and promote sustainable development, as mandated by Law No. 11,903 (September 1995).

For the Bandeira Lithium Project, the submission of the Environmental Control Report (RCA) was required for the environmental licensing process. The RCA is a supporting document accompanying the application for the preliminary license or the combined preliminary license and concomitant installation, which does not require an EIA. The RCA evaluates the project's characteristics and the socio-environmental conditions of its location to identify and assess the possible impacts that the intended activity may cause. The supporting Environmental Control Plan (PCA) details the environmental plans and programs proposed to mitigate or minimize the impacts identified in the RCA.

Once the technical, locational, and environmental feasibility is confirmed through the Environmental Control Report (RCA), the environmental agencies can issue a preliminary license to confirm the project's feasibility. MGLIT, a private legal entity registered with the National Register of Legal Entities/Ministry of Finance under No. 31.931.255/0003-63, plans to operate in the mining sector (lithium and its by-products) via the Bandeira Project.

The environmental licensing process for the Bandeira Project was formalized with SEMAD on November 20, 2023, under the number 2023.07.01.003.0000498, comprising the RCA and the PCA and is in the technical analysis stage by the agency.

According to COPAM Normative Resolution No. 217 (December 2017), the Project's activities fall within the following codes:

- Tailings/waste pile of ornamental and casing rocks, pegmatites, gems and non-metallic minerals (A-05-04-6): 20.67 ha usable area, medium polluting/degrading potential, large size, Class 04
- Underground mining of pegmatites and buds (A-01-01-5): Gross production
- >787,800 m³/a, medium polluting/degrading potential, large size, Class 04
- Mineral Treatment Unit - UTM, with wet treatment (A-05-02-0): Installed capacity of ≤1,300,000 t/a, considerable polluting/degrading potential, medium size, Class 05.
- Retail stations, filling stations, refuelling points, retail system installations, floating fuel stations and aviation fuel retail stations (F-06-01-7): Storage capacity ≤14.9 m³, activity classified as non-passable—Class 02.

In addition, as outlined in COPAM Normative Resolution No. 217, "*Considering the new matrix for setting the environmental licensing modality in Minas Gerais, by the criteria established by COPAM Normative Resolution No. 217, of December 6, 2017, to be evaluated according to the class of the enterprise, calculated based on the size/polluting potential of the enterprise/activity combined with the weight of the enterprise/activity, to be evaluated based on the locational criteria is for the Bandeira Project. A large-scale project, Class 5, where it focuses on the locational criterion of suppression of* *native vegetation and in a planned location in an area of high or very high degree of potential for the occurrence of cavities, according to official data from CECAV-ICMBio, whose assigned weight results in a concomitant environmental license modality, That is, the prior and concomitant installation will be granted, thus attesting to the environmental locational feasibility and referred implementation authorization concomitantly"* (GE21, June/2024).

The environmental licensing process for the Bandeira Project—Environmental Licensing System Request No. 2023.07.01.003.0000498—is associated with a request for environmental intervention in an area of the Atlantic Forest Biome, specifically the phytophysiognomy of a Seasonal Deciduous Forest (FED) in the early stage of regeneration, as indicated by Electronic Information Licensing System SEI No.: 2090.01.0008281/2023-66.

Requests were also made for permissions to cross the Piauí River under No. 2090.01.0008237/2023-90 and to withdraw surface water at a rate of 110 m3/hour under No. 2090.01.0008240/2023-09. These requests were formalized within the environmental licensing of the Bandeira Project, which includes the withdrawal of water from the Piauí River. Water use limits are evaluated by the Minas Gerais Institute of Water Management (IGAM). The approved volume of water withdrawal of 110 m3/hour is sufficient to meet the Project's maximum demand, which has an expected average consumption of 47 m3/h. IGAM granted the water extraction permit for a period of 10 years, documented as No. 1401880/2024, on April 25, 2024.

Within the scope of municipal consents, in November 2023, the Bandeira Project received certificates of regularity from the municipalities of Araçuaí and Itinga regarding the use and occupation of municipal land. With the first stage of the formalization process complete and all required documents submitted to the environmental agency, the only remaining steps are the technical and legal analysis of the administrative process.

Regarding the deadlines for the process analysis, the timeline for the LP (Preliminary License), LI (Installation License), and LO (Operating License) stages is established by CONAMA Resolution No. 237/1997. According to Article 14, the environmental agency typically takes about six months to review the MGLIT Project; however, as outlined in Article 14 below:

"It should be noted that, based on the particularities of each project or criterion to be defined by the licensing body, other institutions may also be involved in the licensing, such as the National Institute of Historical and Artistic Heritage (IPHAN) and the Minas Gerais State Institute of Historical and Artistic Heritage (IEPHA), among others. These requests are confirmed by the wording established by Article 26 of State Decree No. 47,383, of March 2, 2018, which establishes the relationship between environmental licensing and the of the intervening agencies."

Obtaining IPHAN's consent is in progress, No. 01514.001028/2023-31.

20.3 Relevant Socio-Environmental Aspects

Based on the verified content, including procedural control documents and environmental studies (RCA & PCA) conducted by the specialized consulting firm Neo Ambiental, MGLIT presents a summary of the environmental assessments used to determine the project's feasibility.

Regarding locational factors, these are considered non-impacting under the current criteria outlined in Deliberação Normativa (DN) 217/17, which serves as the basis for environmental licensing purposes. Within the context of restrictive environmental factors, particularly concerning the biotic environment, the Bandeira Project, being a mining enterprise deemed of public utility, is permitted to conduct vegetation suppression in the early stage of regeneration within the Atlantic Forest, intervention in Permanent Preservation Areas (APP), and the removal of protected species as stipulated by the environmental intervention process and corresponding compensatory measures mandated by current legislation.

Based on the Brazilian Forest Code (Law 12.651 of May 25, 2012) and the Mineral Forest Law (State Law 20.922, of 10/16/13), specific protected environmental areas, including Permanent Preservation Areas (APPs), require prior government authorization for the suppression of vegetation or interference with natural habitats. However, CONAMA Resolution No. 369 of 2006 provides exceptions for cases of public utility, social interest, or low environmental impact, allowing for intervention or vegetation suppression in APPs.

Regarding the suppression of protected tree species, according to Article 70, II of Law No. 12,651/2012, any tree may be declared protected due to its location, rarity, physical attributes, or condition of seed carrier. It is important to note that in cases where it is necessary to carry out works, plans, activities, or projects of public utility or social interest, suppression may be allowed, subject to prior authorization from the government.

The general rule is that the entity preserves the vegetation located in APPs, as indicated in Article 9 (CONAMA 369/2006), and the intervention in this area must be authorized by the competent environmental agency, as established by CONAMA Resolution No. 369/2006.

In this context, State Decree No. 47,749/2019 outlines the authorization procedures for environmental interventions within the State of Minas Gerais. The decree allows for the authorization of interventions in Permanent Preservation Areas (APPs) in cases of public utility or social interest, provided that no feasible technical or locational alternatives exist and compensation measures are implemented as required. To obtain authorization for intervention in APPs, the entity must submit an application, along with an Environmental Intervention Project plan and a Planting Project plan for native or fostered forests, as outlined in Joint Resolution SEMAD/ State Forestry Institute (IEF) No. 1,914/2013. MGLIT has adhered to all technical requirements and studies submitted to the environmental agency for review under process No.: 2090.01.0008281/2023-66.

After reviewing the request for environmental intervention, the applicable environmental agency, SEMAD or FEAM, will decide on the applicable compensatory measures and mitigating measures required to grant the authorization under the terms of SEMAD/IEF Joint Resolution No. 3,102/2021.

Mining enterprises that require the removal of native vegetation must submit a request to the Environmental Compensation Management of the IEF to initiate a process for compensating the removal of native vegetation necessary for mining activities, as stipulated by State Law No. 20,922 of 2013, Article 75.

Mining activities, including extraction, processing, and tailings waste pilings, are subject to environmental licensing under DN217. In addition, the right to withdraw surface water must be granted by applicable authorities, which can impose restrictions on project development. To account for these restrictions, specialized environmental studies are required. MGLIT has fulfilled the necessary requirements of the National Water Resource Policy under Federal Law No. 9,433/1997.

MGLIT submitted to the environmental agency the Location Statement, in accordance with Article 27 of State Law No. 21,972/2016, which states that the Project does not cause a social impact on Indigenous land, on Quilombola land, on cultural property safeguarded in a municipal environmental protection area, in a conservation unit and its buffer zone, or in any area where there is a need relocate existing populations.

Notwithstanding, in compliance with Article 26 of State Decree No. 47,383 of March 2, 2018, which defines the relationship between environmental licensing and the opinions of intervening agencies, it is noted that MGLIT filed the petition for the Impact Assessment Project on Archaeological Heritage in the Area of Influence of the Bandeira Project, with the National Historical Heritage Institute – IPHAN, via SEI No. 1514.001028/2023-31. After conducting the field surveys, the Archaeological Heritage Impact Assessment Report (RAIPA) was filed on April 24, 2024, and the Impact Assessment Report on Intangible Heritage (RAIPI) was filed on March 22, 2024. Both are awaiting IPHAN's evaluation for the issuance of an opinion on the Project.

According to the National System of Nature Conservation Units (SNUC) Law No. 9,985 of July 18, 2000, Conservation Units (UC) correspond to "a *territorial space and its environmental resources, including jurisdictional waters, with relevant natural characteristics, legally established by the Government, with conservation objectives and defined limits, under a special regime of administration, to which adequate safeguards of protection apply*." It is important to note that the project's location is not within any government-designated area created and protected for conservation purposes.

Additionally, it's noteworthy that the results of speleological research conducted by NeoAgro Ambiental (2023) indicate there are no cavities, caves, grottoes, or shelters within the granite massifs in the area of the Bandeira Project or within 250 m of its boundaries.

Regarding the socioeconomic environment, Bandeira Project has obtained the Declarations of Conformity issued by the Secretaries of Environment of the Municipalities of Araçuaí and Itinga, Minas Gerais, attesting that the location and type of enterprise comply with the legislation applicable to the use and occupation of the land, in accordance with the provisions of Art. 10, Paragraph 1 of CONAMA Resolution No. 237/97.

MGLIT holds the mining rights for the exploration area, as formalized under the mining process ANM: 832.439/2009. Therefore, the entity complies with SISEMA Service Instruction No. 01/2018 provisions. As previously mentioned, the Valitar-owned farms have a Legal Reserve (RL), and their boundaries do not overlap with the future Project area. Valitar is part of the same group as MGLIT, with which the Private Instrument of Assignment of Rights and Other Covenants was executed. Notably, there are no residents on the rural properties where the Project will be implemented or on adjacent properties. The nearest community to the project site is the Barreiros community.

Therefore, MGLIT has fully complied with the technical studies and legal regulations relevant to the project, demonstrating its environmental locational feasibility.

20.4 Summary of Socio-Environmental Conditions

20.4.1 Regional Landscape Conditions

The Bandeira Project area is part of the Salinas Formation (CPRM, 2008; NeoAgro Ambiental, 2023), composed of fine mica-quartz schist, mottled, with frequent andalusite, cordierite, white/muscovite mica, and tourmaline. Ore mineralization presents a banded structure from centimetres to metres — intercalations of calcium-silicate rock and quartz-mica shale (CPRM, 2010). The Project area lies in the Metasediment/Metavolcanic Hydrogeological Domain (fissural) (NeoAgro Ambiental, 2023).

The Hydrogeological Domain of Metasediments–Metavolcanic is characterized as discontinuous and of limited regional extent. It is locally composed of rocks belonging to the Salinas Formation, which present predominant secondary fracture permoporosity. In this aquifer type, discontinuity planes associated with the existing schistosities favour water accumulation. However, this aquifer is classified as unproductive, where the water flow of wells can vary between 1 m^3/h and 5 m^3/h (CPRM, 2010).

The Bandeira Project area has relief predominantly composed of degraded flattened surfaces. The slope varies between 0º and 5º, and topographic amplitude varies from 10 m to 30 m (CPRM, 2009).

The Project's Area of Direct Influence (ADA) includes remnants of native vegetation alongside areas devoid of vegetation. Some areas were previously used as cattle pasture, which often intensifies soil erosion through trampling. However, on-site inspections did not identify excessive soil erosion. Therefore, the ground cover variability at the Project site is characterized as having low susceptibility to erosion (NeoAgro Ambiental, 2023).

The Project is situated within the Jequitinhonha River Basin, specifically in the sub-basin of the Piauí River, a tributary of the Jequitinhonha River. Given the semi-arid climate of the region, the Piauí River is the sole perennial watercourse, exhibiting characteristics of intermittency and ephemerality (NeoAgro Ambiental, 2023).

The climate in the Project region is classified as Aw according to the Köppen classification, characterized as continental-dry and hot, with an average temperature during the coldest month above 18°C and maximum temperatures averaging around 34°C. This results in two distinct seasons: a dry winter and a humid summer.

The average annual rainfall in the Jequitinhonha Valley region is below 1,000 mm; however, in the municipalities of Itinga and Itaobim, it is below 700 mm (PLANVALE, 1994). The average relative humidity is 75%, with evapotranspiration around 1,450 mm and an annual water deficit of about 700 mm.

The rural properties to be occupied by Project implementation share the same physiographic context, predominantly characterized by Seasonal Deciduous Forest—Submontane EDF phytophysiognomies. These properties fall within the jurisdiction of Federal Law No. 11,428/2006 and Decree No. 6,660/2008, which regulate the use and conservation of native vegetation within the Atlantic Forest biome. In the Project's Area of Direct Influence (ADA), the predominant land use is livestock farming, specifically cattle. The presence of ruderal herbaceous species, shrubs, and isolated trees has been confirmed in these areas. It is important to note that buildings are integrated into these established rural areas. These consolidated areas have pre-existing anthropic occupation as of July 22, 2008, regulated under State Decree No. 47,749/19 (NeoAgro Ambiental, 2023). Currently, the remaining native vegetation on the site comprises mostly disconnected forest fragments, with the predominant phytophysiognomy being Seasonal Deciduous Forest—FED (NeoAgro Ambiental, 2023).

The Barreiros community is situated on the south bank of the Piauí River, approximately 1.5 km from the proposed industrial unit site. It consists of around 166 residents from 60 families who primarily sustain themselves through subsistence agriculture and livestock farming. The environmental study for project implementation covers a border zone between the municipalities of Araçuaí and Itinga, divided by the Piauí River. This area lies within the Northeast macro-region of Minas Gerais, in the Middle and Lower forks of the Jequitinhonha River.

Studies conducted in the Bandeira Project area indicate that it has been anthropogenically disturbed due to previous agricultural activities and contains small patches of natural vegetation in various stages of regeneration.

20.4.2 Local Fauna

The faunal survey was based on bibliographic data, reports from local residents, and primary surveys carried out by biologists from Ekob Environmental Consulting. The primary surveys were carried out in accordance with IBAMA Normative Instruction No. 146/2007 and were conducted without collecting, capturing, or transporting specimens (i.e., only sightings, photographs, or hearing animal vocalizations).

The majority of species identified in the studies exhibit broad geographic distributions and low sensitivity to anthropogenic interference, indicating a high level of disturbance in natural environments. However, certain higher taxa with specific ecological requirements and mammalian species facing conservation challenges were also identified. The ichthyofauna recorded includes species of lesser concern; however, species inhabiting small watercourses are typically highly sensitive to changes in water quality (Ekob Environmental Consulting, 2023, as cited in NeoAgro Ambiental, 2023).

The taxa identified to have the most significant conservation challenges were predominantly medium and large carnivorous mammals, namely *Puma concolor* (puma), *Leopardus pardalis* (ocelot), *Lycalopex vetulus* (field fox), *Chrysocyon brachyurus* (wolf), and *Herpailurus yagouaroundi* (Moorish cat). The other groups surveyed, avifauna, herpetofauna, and ichthyofauna, did not present heightened conservation concerns (NeoAgro Ambiental, 2023).

Given the local environmental conditions, the likely species inhabiting the region, identified through primary records, indicate significant ecological disturbance and simplification of fauna communities in the sampled areas. This outcome was expected due to the study area's proximity to the Barreiros community, ongoing mineral exploration in the neighbouring regions, and the intensity of rural activities surrounding the Project area.

The studies indicate that the sampled faunal species exhibit a wide geographical distribution. Given the project's location, the study area harbours species typical of the Atlantic Forest, Cerrado, and Caatinga biomes, thereby enhancing local biodiversity and conservation potential. However, the remaining forest fragments in the study area are significantly affected by human activities such as logging and livestock grazing, resulting in habitat fragmentation and a decline in forest species biodiversity. Nevertheless, the biodiversity within the project area holds considerable regional significance in maintaining ecosystems capable of supporting diverse fauna populations. Preserving forest remnants, maintaining landscape structure, and ensuring water body quality can foster faunal biodiversity in the region.

20.4.3 Local and Directly Affected Communities

The Bandeira Project, currently in the economic feasibility phase, aims to implement and operate within the territorial limits of Araçuaí/MG and Itinga/MG. This phase focuses on exploring and developing projects within the lithium mineral sector and its by-products. The project is expected to benefit Araçuaí and Itinga economically by generating employment and boosting the service sector. The Brazilian Institute of Geography and Statistics (IBGE) found that Araçuaí had a population of 34,297 in 2022. The GDP per capita in 2020 was R$13,441.04. In 2010, 59.83% of the population aged 18 and over was economically active. Companhia de Saneamento de Minas Gerais (COPASA) is responsible for sanitation, and Centrais Eletricas de Minas Gerais (CEMIG) for electricity. The education system is predominantly public, with 32 elementary schools, nine high schools and 13 kindergartens staffed with 549 teachers (NeoAgro Ambiental, 2023).

In 2010, Itinga had 14,407 inhabitants. The GDP per capita in 2020 was R$8,393.59, with public administration representing 52%. In 2010, 56.65% of the population aged 18 and over was economically active. Itinga has water and sewage infrastructure, with the subsidiary COPASA (COPANOR) responsible for water supply until 2040. The Municipal Health Department manages health, and education is primarily public, with 20 elementary schools, four high schools, and an enrollment rate of 96.8% for children aged 6 to 14. Cultural heritage includes architectural structures and religious movable property (NeoAgro Ambiental, 2023).

Near the Bandeira Project ADA are two rural communities: Barreiros and Fazenda Velha. Both are in the rural area of the municipality of Araçuaí. It should be noted that there are no residents in the rural property where the Project will be implemented or in the adjacent properties (NeoAgro Ambiental, 2023).

Barreiros is located 424 m from the Bandeira Project site, where plans include constructing a bridge to facilitate the movement of workers, transport of mining output, and disposal of waste in designated waste piles (NeoAgro Ambiental, 2023).

For most of Fazenda Velha's population, retirement and government social programs are the primary sources of income. Other economic activities include agriculture and livestock, but most production is small-scale only for personal consumption.

20.5 Analysis of the Assessment of Socio-Environmental Impacts and Respective Mitigating Actions

Federal Law No. 6,938/81 established the National Environmental Policy, which includes provisions for assessing environmental impacts and licensing activities that have the potential to degrade the environment (Article 225, paragraph I, item IV). It requires "*the installation of a work or activity* *potentially causing significant degradation of the environment, preliminary environmental impact study, which will be publicized"* (GE21, June 2024.)

The direct impacts on the physical environment identified include industrial waste generation, sanitary issues, spills of oil and petroleum derivatives, effluents of Class I and II solid waste, soil and water contamination, alterations in rainwater drainage patterns, initiation of erosive processes, noise, visual landscape impacts, and increased vehicle traffic on nearby roads (NeoAgro Ambiental, 2023).

To control and mitigate this impact, MGLIT will propose guidelines through environmental control programs, such as the execution of the Solid and Liquid Waste Management Program, the Erosion and Effluent Processing Control Program, the Surface Water Quality Monitoring Program, and the Air and Noise Quality Maintenance Program.

Water quality management will include an evaluation of the potential generation of acid drainage from mine waste and DMS tailings. This assessment will help determine the appropriate disposal methods for these materials and whether soil sealing is necessary. Static tests for acid generation potential will be conducted by SGS Geosol, a specialized laboratory in Vespasiano, Minas Gerais.

The Degraded Areas Recovery Plan, presented in the PCA, proposes measures for rehabilitating degraded areas. This includes actions such as planting and soil regeneration, which will be carried out throughout the project's lifespan.

The Bandeira Project aims to optimize water usage to enhance the environmental sustainability of its operations. A management plan will be implemented to maximize water recirculation and reuse. The engineering plan outlined in the Feasibility Study includes the selection of the most suitable equipment for solid-liquid separation, such as dewatering cyclones, thickeners for decanting solids, and filtration systems, to minimize unnecessary water loss. It is estimated that 90% of the water withdrawn from the source will be recirculated.

The waste material extracted from the mine will be deposited in pre-evaluated areas chosen based on specific engineering requirements that predetermined the suitability and safety of slope and pile stability. A total of three location alternatives were assessed to determine the optimal location. Additionally, the use of voids within the mine will be maximized to reduce surface impact. The tailings from the DMS concentration unit are deposited in separate piles distinct from general waste piles. There are plans to donate these materials to municipalities or use them in civil construction. However, the current project plan involves depositing all tailings in designated piles within the project area until interest in recycling and reuse purposes is expressed and feasibility is determined.

Regarding impacts on the biotic environment, it's crucial to note that the areas designated for the mining project installation have already been significantly affected by longstanding anthropogenic activities, such as neighbouring mineral exploration and proximity to the Barreiros community. Moreover, the construction phase of the Bandeira Project and its associated environmental impacts necessitate vegetation suppression in specific areas to facilitate further project development.

The current environmental conditions in the area are conducive to project installation. The local flora and fauna have been shaped by longstanding anthropogenic activities, resulting in resilient fauna populations and vegetation in the early stages of regeneration. However, activities such as vegetation suppression and noise generation from machinery and equipment will disturb the local fauna and may lead to habitat loss for terrestrial species. This could potentially impact less mobile specimens during the initial clearing phases in the area. Vegetation suppression activities will be supervised by a team of biologists tasked with conducting proper surveys and, when necessary, rescuing animals before implementing habitat-altering actions. The Fauna Monitoring Program will be conducted throughout the installation and operation stage of the Project. It will provide and track key biodiversity indicators to allow for better evaluation of project impacts on local fauna.

Concerning the impact on biodiversity reduction, the Project will implement forest compensation measures alongside actions specified in the Recovery Plan for Degraded Areas and the Maintenance and Conservation Program for Permanent Preservation Areas and Legal Reserves (RL).

In terms of socioeconomic impacts, the municipalities of Araçuaí and Itinga will benefit from tax revenues such as Financial Compensation for Mineral Exploration (CFEM), alongside economic growth through job creation and the development of local labour and suppliers. The Bandeira Project is committed to prioritizing local employment and services and investing in training the local workforce, aiming to foster economic growth and income enhancement opportunities within the Project's area of influence. However, socio-cultural conflicts may arise, linked to heightened population expectations, pressure on infrastructure, landscape changes, and concerns such as atmospheric emissions, dust, and noise. To manage and mitigate these impacts, alongside environmental quality monitoring programs, the Social Communication Program includes planned actions to foster interaction with local communities.

Based on the comprehensive environmental assessment conducted, it is concluded that the Project is environmentally feasible. The thorough evaluation indicates that while potential negative impacts associated with the Project exist, these can be effectively minimized or mitigated through appropriate measures and mitigation strategies. The findings highlight the feasibility of implementing the Project in a manner that ensures environmental sustainability, balancing development objectives with the preservation and protection of the natural surroundings.

20.6 Community and Government Relations in the Environment, Social and Governance Context

The Jequitinhonha Valley boasts profound cultural significance for the people of Minas Gerais, renowned for its biodiversity and community dynamics. Moreover, in recent years, the valley has emerged as a significant contributor to the energy transition, with abundant mineral resources such as lithium, cesium, rubidium, tantalum, niobium, rare earth elements, and graphite. This natural wealth holds unique potential to catalyze rapid development within the municipalities, underscoring its pivotal role in regional advancement. The Bandeira Project was designated as a state priority for social and economic development through a Memorandum of Understanding (MOU) signed on July 17, 2023, by His Excellency Governor Romeu Zema and MGLIT President Mr. Helio Diniz. This agreement grants the Bandeira Project priority status in internal state agency assessments aimed at expediting the licensing process for its implementation.

MGLIT acknowledges the significance of all stakeholders—including individuals, entities, communities, authorities, and associations—in contributing to the success of this project, fostering economic growth, knowledge, and the development of the Jequitinhonha Valley region. Future economic contributions will be substantial, specifically through royalties paid under the CFEM framework, set at 2% of gross revenue from product sales. These royalties are allocated to federal, state, and local governments, ensuring equitable distribution of economic benefits.

Effective and transparent communication is crucial for fostering positive relationships with all project stakeholders, showcasing MGLIT's dedication to transparency and respect in project planning and operations. To further this commitment, an on-site ESG Analyst will work closely with senior management to oversee and implement Environmental, Social, and Governance projects, ensuring the sustainable development of our operations.

20.0 ENVIRONMENTAL STUDIES, PERMITTING, AND COMMUNITY IMPACTS

This section presents the findings from the Project's environmental and socio-economic assessment. The analysis adheres to the relevant federal, state, and municipal legislation concerning environmental factors, including water; liquid effluents; flora; fauna; noise; natural, cultural, historical, and archaeological heritage; environmental education; as well as Indigenous and Quilombola territories and traditional populations. Conducted as part of the mandatory environmental licensing process for mineral extraction activities in Brazil, this assessment complies with federal decree No. 99.274/90, which regulates federal law No. 6,938/81 and establishes the Brazilian National Environmental Policy. The information presented here is sourced from public data and information provided by MGLIT.

20.1 Brazilian Mining Regulatory Framework

Mining in Brazil is governed predominantly by the Brazilian Federal Constitution (1988) and the Brazilian Mining Code. These legal and regulatory frameworks impose numerous obligations on mining companies, including the responsible exploitation of mineral deposits, ensuring the health and safety of workers and local communities, and implementing environmental protection and remediation measures.

Mining activities within Brazil are regulated by the Ministry of Mines and Energy (MME) and the National Mining Agency (ANM). The MME is responsible for formulating and coordinating Brazilian public policies regarding mineral resources and energy production and has jurisdiction over government agencies and federal public companies responsible for executing such policies, such as the oil and gas industry, mining projects, and other energy sectors.

Associated with the MME, the ANM is a federal agency responsible for monitoring, analyzing, and promoting the performance of Brazil's mineral economy, awarding rights for the exploration and development of mineral resources, and planning and inspecting mineral exploration and extraction activities in the country. According to the Brazilian Federal Constitution, surface property rights are distinct from mineral rights. This means that mineral rights belong exclusively to the Brazilian federal government, which oversees mineral exploration and mining activities in Brazil. The Brazilian Mining Code currently establishes different regimes for regulating mineral exploration and mining activities in Brazil, which may vary according to mineral type and project size. The Mining Code regimes applicable to the Bandeira Lithium Project are exploration authorization, mining concessions, and mining licenses.

For mining activities, entities must prove they hold the rights and authorization to exploit the intended mineral substance. The rights for mineral extraction are granted by the ANM since the mineral resources are considered Union property and are, therefore, pursuant to Article 20, IX of the Federal Constitution (1988). MGLIT holds the mining rights within the exploration area, as formalized in the mining process ANM: 832.439/2009.

20.1.1 Land Access and Occupation

The surface rights owner is legally required to grant access to mineral rights holders for conducting mineral exploration and mining activities. If a holder of mineral rights or mining concession does not own the surface land where mineral interests or mining-related infrastructure is situated, they can obtain access or occupy the land through mining easements granted by the ANM under the Brazilian Mining Code or can choose to enforce their access rights through Brazilian courts.

Mineral rights holders must compensate the surface rights owner for surface access and use and indemnify them for any property damage. The fee amount can be negotiated between the parties within parameters set by the Mining Code, with subsequent notification to the ANM about said agreement. However, if no agreement is reached, entities, after obtaining exploration authorization or a mining concession, can petition a court to determine the indemnification amounts.

The Area Directly Affected (ADA) by the Bandeira Project covers three rural properties in the municipality of Araçuaí, Minas Gerais. MGLIT has a private instrument of assignment of rights with Valitar Participações S.A. (Valitar), owner of the Brejos, Piauí Boa Vista Part 1 and Part 2 farms, to conduct mining activities on its properties.

20.1.2 Legal Reserve

The Brazilian Forest Code sets forth that on rural properties, a minimum percentage of the local vegetation must be preserved as Legal Reserve (RL). This requirement promotes the sustainable use of natural resources, the conservation of biodiversity, and the protection of native fauna and flora.

The Project is situated in a rural area. It thus falls under Article 12 of Law 12.651/2012—Forest Code, which mandates the preservation of the Legal Reserve (RL), ensuring the conservation of at least 20% of the property area. The Legal Reserve must be registered with the appropriate environmental agency via the Rural Environmental Registry (CAR).

The properties targeted for future mining activity—Brejos, Piauí Boa Vista Part 1, and Part 2 farms—comprise a Legal Reserve (RL) as required by Law No. 12,651 (May 2012). Valitar Participações S.A. owns all three farms, registered in the Rural Environmental Registry (CAR) as a single property, complying fully with legal requirements. Notably, the designated RL areas of these properties do not overlap with the Project's Area of Direct Influence (ADA).

20.2 Mine Closure

In Brazil, under Federal Decree No. 97.632/1989, mineral extraction projects must submit a Degraded Area Recovery Plan with the Environmental Impact Study and Environmental Impact Report (collectively EIA) during the environmental licensing process. Therefore, the environmental restoration of areas degraded by mineral exploitation should be planned from the outset. Mining companies must present their Approved Economic Plan (PAE) to ANM to receive a mining concession. These studies must address the reclamation and decommissioning of the mined areas, describing the measures to be implemented throughout the mining process to prevent severe degradation and minimize environmental impacts. Mining companies must regularly update the mining decommissioning plan to align with project developments. The MME grants approval for mine closure when the applicant can prove compliance with the decommissioning plan, particularly with environmental condition requirements.

The recovery of degraded areas involves actions to restore ecological balance and reintegrate altered environments into their natural landscape. This process aims to rectify human-induced alterations, such as those resulting from ore extraction, in accordance with legal mandates for mandatory re-vegetation. The conceptual strategy proposed for the Project's degraded areas focuses on facilitating ecological succession to expedite the establishment of native vegetation, aiming to seamlessly reintegrate these rehabilitated areas into their surrounding environment.

The Conceptual Mine Closure Plan outlines activities aimed at minimizing impacts during the Project's closure phase. Its primary goal is establishing guidelines and corporate criteria for closure activities approved by the ANM and the Minas Gerais Department of Environment and Sustainable Development (SEMAD). These activities ensure technical and financial conditions for mine closure, transitioning to post-closure status and determining future land use. NeoAgro Ambiental's (2023) Conceptual Mine Closure Plan for the Bandeira Project incorporates final pile configurations with properly sloped sides to ensure the effective execution of the closure strategy. The plan includes a meticulously designed drainage network to control surface water and promote vegetation growth on slope faces. These measures mitigate the visual impact of mining activities and significantly reduce erosive effects.

20.2.1 Environmental Licensing and Approval

The Brazilian Federal Constitution establishes the division of powers between the federal, state, and municipal governments to issue environmental laws and regulations. While the Brazilian federal government has the authority to issue environmental regulations, each state is legally allowed to develop and implement specific regulations governing environmental licensing procedures under its jurisdiction. Municipal governments may only issue regulations regarding matters of local interest or as a supplement to federal or state laws.

According to Brazilian law, any construction, installation, expansion, or operation of an establishment or activity that utilizes environmental resources, causes or may cause pollution, or has the potential to degrade the environment must undergo a prior licensing process. The National Environmental Council (CONAMA) regulates the environmental licensing process. CONAMA Resolution No. 237/1997 establishes the types of authorizations, procedures, and criteria for environmental licensing, which occurs in a three-stage permitting process:

- The Preliminary License (LP) certifies the environmental viability of the proposed activities in terms of their design and location. It is the most critical part of the process and requires environmental baseline studies, community engagement, public hearings, and the preparation of an EIA.
- The Installation License (LI) allows for the proposed project's construction, installation, and commissioning.
- The Operating License (LO) authorizes the project to operate after it has been constructed, commissioned, and inspected to ensure it complies with the Preliminary License, Installation License, and any other applicable permits.

The responsibility for the Environmental Regularization of the Bandeira Project lies with Minas Gerais, as established by Law No. 6,938/81 and CONAMA Resolution No. 237/97. The Secretariat of Environment and Sustainable Development of Minas Gerais, an agency under the State Government, is tasked with evaluating the licensing process. This agency has the authority to plan, propose, and coordinate integrated environmental management within the state to preserve ecosystems and promote sustainable development, as mandated by Law No. 11,903 (September 1995).

For the Bandeira Lithium Project, the submission of the Environmental Control Report (RCA) was required for the environmental licensing process. The RCA is a supporting document accompanying the application for the preliminary license or the combined preliminary license and concomitant installation, which does not require an EIA. The RCA evaluates the project's characteristics and the socio-environmental conditions of its location to identify and assess the possible impacts that the intended activity may cause. The supporting Environmental Control Plan (PCA) details the environmental plans and programs proposed to mitigate or minimize the impacts identified in the RCA.

Once the technical, locational, and environmental feasibility is confirmed through the Environmental Control Report (RCA), the environmental agencies can issue a preliminary license to confirm the project's feasibility. MGLIT, a private legal entity registered with the National Register of Legal Entities/Ministry of Finance under No. 31.931.255/0003-63, plans to operate in the mining sector (lithium and its by-products) via the Bandeira Project.

The environmental licensing process for the Bandeira Project was formalized with SEMAD on November 20, 2023, under the number 2023.07.01.003.0000498, comprising the RCA and the PCA and is in the technical analysis stage by the agency.

According to COPAM Normative Resolution No. 217 (December 2017), the Project's activities fall within the following codes:

- Tailings/waste pile of ornamental and casing rocks, pegmatites, gems and non-metallic minerals (A-05-04-6): 20.67 ha usable area, medium polluting/degrading potential, large size, Class 04
- Underground mining of pegmatites and buds (A-01-01-5): Gross production
- >787,800 m³/a, medium polluting/degrading potential, large size, Class 04
- Mineral Treatment Unit - UTM, with wet treatment (A-05-02-0): Installed capacity of ≤1,300,000 t/a, considerable polluting/degrading potential, medium size, Class 05.
- Retail stations, filling stations, refuelling points, retail system installations, floating fuel stations and aviation fuel retail stations (F-06-01-7): Storage capacity ≤14.9 m³, activity classified as non-passable—Class 02.

In addition, as outlined in COPAM Normative Resolution No. 217, "*Considering the new matrix for setting the environmental licensing modality in Minas Gerais, by the criteria established by COPAM Normative Resolution No. 217, of December 6, 2017, to be evaluated according to the class of the enterprise, calculated based on the size/polluting potential of the enterprise/activity combined with the weight of the enterprise/activity, to be evaluated based on the locational criteria is for the Bandeira Project. A large-scale project, Class 5, where it focuses on the locational criterion of suppression of* *native vegetation and in a planned location in an area of high or very high degree of potential for the occurrence of cavities, according to official data from CECAV-ICMBio, whose assigned weight results in a concomitant environmental license modality, That is, the prior and concomitant installation will be granted, thus attesting to the environmental locational feasibility and referred implementation authorization concomitantly"* (GE21, June/2024).

The environmental licensing process for the Bandeira Project—Environmental Licensing System Request No. 2023.07.01.003.0000498—is associated with a request for environmental intervention in an area of the Atlantic Forest Biome, specifically the phytophysiognomy of a Seasonal Deciduous Forest (FED) in the early stage of regeneration, as indicated by Electronic Information Licensing System SEI No.: 2090.01.0008281/2023-66.

Requests were also made for permissions to cross the Piauí River under No. 2090.01.0008237/2023-90 and to withdraw surface water at a rate of 110 m3/hour under No. 2090.01.0008240/2023-09. These requests were formalized within the environmental licensing of the Bandeira Project, which includes the withdrawal of water from the Piauí River. Water use limits are evaluated by the Minas Gerais Institute of Water Management (IGAM). The approved volume of water withdrawal of 110 m3/hour is sufficient to meet the Project's maximum demand, which has an expected average consumption of 47 m3/h. IGAM granted the water extraction permit for a period of 10 years, documented as No. 1401880/2024, on April 25, 2024.

Within the scope of municipal consents, in November 2023, the Bandeira Project received certificates of regularity from the municipalities of Araçuaí and Itinga regarding the use and occupation of municipal land. With the first stage of the formalization process complete and all required documents submitted to the environmental agency, the only remaining steps are the technical and legal analysis of the administrative process.

Regarding the deadlines for the process analysis, the timeline for the LP (Preliminary License), LI (Installation License), and LO (Operating License) stages is established by CONAMA Resolution No. 237/1997. According to Article 14, the environmental agency typically takes about six months to review the MGLIT Project; however, as outlined in Article 14 below:

"It should be noted that, based on the particularities of each project or criterion to be defined by the licensing body, other institutions may also be involved in the licensing, such as the National Institute of Historical and Artistic Heritage (IPHAN) and the Minas Gerais State Institute of Historical and Artistic Heritage (IEPHA), among others. These requests are confirmed by the wording established by Article 26 of State Decree No. 47,383, of March 2, 2018, which establishes the relationship between environmental licensing and the of the intervening agencies."

Obtaining IPHAN's consent is in progress, No. 01514.001028/2023-31.

20.3 Relevant Socio-Environmental Aspects

Based on the verified content, including procedural control documents and environmental studies (RCA & PCA) conducted by the specialized consulting firm Neo Ambiental, MGLIT presents a summary of the environmental assessments used to determine the project's feasibility.

Regarding locational factors, these are considered non-impacting under the current criteria outlined in Deliberação Normativa (DN) 217/17, which serves as the basis for environmental licensing purposes. Within the context of restrictive environmental factors, particularly concerning the biotic environment, the Bandeira Project, being a mining enterprise deemed of public utility, is permitted to conduct vegetation suppression in the early stage of regeneration within the Atlantic Forest, intervention in Permanent Preservation Areas (APP), and the removal of protected species as stipulated by the environmental intervention process and corresponding compensatory measures mandated by current legislation.

Based on the Brazilian Forest Code (Law 12.651 of May 25, 2012) and the Mineral Forest Law (State Law 20.922, of 10/16/13), specific protected environmental areas, including Permanent Preservation Areas (APPs), require prior government authorization for the suppression of vegetation or interference with natural habitats. However, CONAMA Resolution No. 369 of 2006 provides exceptions for cases of public utility, social interest, or low environmental impact, allowing for intervention or vegetation suppression in APPs.

Regarding the suppression of protected tree species, according to Article 70, II of Law No. 12,651/2012, any tree may be declared protected due to its location, rarity, physical attributes, or condition of seed carrier. It is important to note that in cases where it is necessary to carry out works, plans, activities, or projects of public utility or social interest, suppression may be allowed, subject to prior authorization from the government.

The general rule is that the entity preserves the vegetation located in APPs, as indicated in Article 9 (CONAMA 369/2006), and the intervention in this area must be authorized by the competent environmental agency, as established by CONAMA Resolution No. 369/2006.

In this context, State Decree No. 47,749/2019 outlines the authorization procedures for environmental interventions within the State of Minas Gerais. The decree allows for the authorization of interventions in Permanent Preservation Areas (APPs) in cases of public utility or social interest, provided that no feasible technical or locational alternatives exist and compensation measures are implemented as required. To obtain authorization for intervention in APPs, the entity must submit an application, along with an Environmental Intervention Project plan and a Planting Project plan for native or fostered forests, as outlined in Joint Resolution SEMAD/ State Forestry Institute (IEF) No. 1,914/2013. MGLIT has adhered to all technical requirements and studies submitted to the environmental agency for review under process No.: 2090.01.0008281/2023-66.

After reviewing the request for environmental intervention, the applicable environmental agency, SEMAD or FEAM, will decide on the applicable compensatory measures and mitigating measures required to grant the authorization under the terms of SEMAD/IEF Joint Resolution No. 3,102/2021.

Mining enterprises that require the removal of native vegetation must submit a request to the Environmental Compensation Management of the IEF to initiate a process for compensating the removal of native vegetation necessary for mining activities, as stipulated by State Law No. 20,922 of 2013, Article 75.

Mining activities, including extraction, processing, and tailings waste pilings, are subject to environmental licensing under DN217. In addition, the right to withdraw surface water must be granted by applicable authorities, which can impose restrictions on project development. To account for these restrictions, specialized environmental studies are required. MGLIT has fulfilled the necessary requirements of the National Water Resource Policy under Federal Law No. 9,433/1997.

MGLIT submitted to the environmental agency the Location Statement, in accordance with Article 27 of State Law No. 21,972/2016, which states that the Project does not cause a social impact on Indigenous land, on Quilombola land, on cultural property safeguarded in a municipal environmental protection area, in a conservation unit and its buffer zone, or in any area where there is a need relocate existing populations.

Notwithstanding, in compliance with Article 26 of State Decree No. 47,383 of March 2, 2018, which defines the relationship between environmental licensing and the opinions of intervening agencies, it is noted that MGLIT filed the petition for the Impact Assessment Project on Archaeological Heritage in the Area of Influence of the Bandeira Project, with the National Historical Heritage Institute – IPHAN, via SEI No. 1514.001028/2023-31. After conducting the field surveys, the Archaeological Heritage Impact Assessment Report (RAIPA) was filed on April 24, 2024, and the Impact Assessment Report on Intangible Heritage (RAIPI) was filed on March 22, 2024. Both are awaiting IPHAN's evaluation for the issuance of an opinion on the Project.

According to the National System of Nature Conservation Units (SNUC) Law No. 9,985 of July 18, 2000, Conservation Units (UC) correspond to "a *territorial space and its environmental resources, including jurisdictional waters, with relevant natural characteristics, legally established by the Government, with conservation objectives and defined limits, under a special regime of administration, to which adequate safeguards of protection apply*." It is important to note that the project's location is not within any government-designated area created and protected for conservation purposes.

Additionally, it's noteworthy that the results of speleological research conducted by NeoAgro Ambiental (2023) indicate there are no cavities, caves, grottoes, or shelters within the granite massifs in the area of the Bandeira Project or within 250 m of its boundaries.

Regarding the socioeconomic environment, Bandeira Project has obtained the Declarations of Conformity issued by the Secretaries of Environment of the Municipalities of Araçuaí and Itinga, Minas Gerais, attesting that the location and type of enterprise comply with the legislation applicable to the use and occupation of the land, in accordance with the provisions of Art. 10, Paragraph 1 of CONAMA Resolution No. 237/97.

MGLIT holds the mining rights for the exploration area, as formalized under the mining process ANM: 832.439/2009. Therefore, the entity complies with SISEMA Service Instruction No. 01/2018 provisions. As previously mentioned, the Valitar-owned farms have a Legal Reserve (RL), and their boundaries do not overlap with the future Project area. Valitar is part of the same group as MGLIT, with which the Private Instrument of Assignment of Rights and Other Covenants was executed. Notably, there are no residents on the rural properties where the Project will be implemented or on adjacent properties. The nearest community to the project site is the Barreiros community.

Therefore, MGLIT has fully complied with the technical studies and legal regulations relevant to the project, demonstrating its environmental locational feasibility.

20.4 Summary of Socio-Environmental Conditions

20.4.1 Regional Landscape Conditions

The Bandeira Project area is part of the Salinas Formation (CPRM, 2008; NeoAgro Ambiental, 2023), composed of fine mica-quartz schist, mottled, with frequent andalusite, cordierite, white/muscovite mica, and tourmaline. Ore mineralization presents a banded structure from centimetres to metres — intercalations of calcium-silicate rock and quartz-mica shale (CPRM, 2010). The Project area lies in the Metasediment/Metavolcanic Hydrogeological Domain (fissural) (NeoAgro Ambiental, 2023).

The Hydrogeological Domain of Metasediments–Metavolcanic is characterized as discontinuous and of limited regional extent. It is locally composed of rocks belonging to the Salinas Formation, which present predominant secondary fracture permoporosity. In this aquifer type, discontinuity planes associated with the existing schistosities favour water accumulation. However, this aquifer is classified as unproductive, where the water flow of wells can vary between 1 m³/h and 5 m³/h (CPRM, 2010).

The Bandeira Project area has relief predominantly composed of degraded flattened surfaces. The slope varies between 0º and 5º, and topographic amplitude varies from 10 m to 30 m (CPRM, 2009).

The Project's Area of Direct Influence (ADA) includes remnants of native vegetation alongside areas devoid of vegetation. Some areas were previously used as cattle pasture, which often intensifies soil erosion through trampling. However, on-site inspections did not identify excessive soil erosion. Therefore, the ground cover variability at the Project site is characterized as having low susceptibility to erosion (NeoAgro Ambiental, 2023).

The Project is situated within the Jequitinhonha River Basin, specifically in the sub-basin of the Piauí River, a tributary of the Jequitinhonha River. Given the semi-arid climate of the region, the Piauí River is the sole perennial watercourse, exhibiting characteristics of intermittency and ephemerality (NeoAgro Ambiental, 2023).

The climate in the Project region is classified as Aw according to the Köppen classification, characterized as continental-dry and hot, with an average temperature during the coldest month above 18°C and maximum temperatures averaging around 34°C. This results in two distinct seasons: a dry winter and a humid summer.

The average annual rainfall in the Jequitinhonha Valley region is below 1,000 mm; however, in the municipalities of Itinga and Itaobim, it is below 700 mm (PLANVALE, 1994). The average relative humidity is 75%, with evapotranspiration around 1,450 mm and an annual water deficit of about 700 mm.

The rural properties to be occupied by Project implementation share the same physiographic context, predominantly characterized by Seasonal Deciduous Forest—Submontane EDF phytophysiognomies. These properties fall within the jurisdiction of Federal Law No. 11,428/2006 and Decree No. 6,660/2008, which regulate the use and conservation of native vegetation within the Atlantic Forest biome. In the Project's Area of Direct Influence (ADA), the predominant land use is livestock farming, specifically cattle. The presence of ruderal herbaceous species, shrubs, and isolated trees has been confirmed in these areas. It is important to note that buildings are integrated into these established rural areas. These consolidated areas have pre-existing anthropic occupation as of July 22, 2008, regulated under State Decree No. 47,749/19 (NeoAgro Ambiental, 2023). Currently, the remaining native vegetation on the site comprises mostly disconnected forest fragments, with the predominant phytophysiognomy being Seasonal Deciduous Forest—FED (NeoAgro Ambiental, 2023).

The Barreiros community is situated on the south bank of the Piauí River, approximately 1.5 km from the proposed industrial unit site. It consists of around 166 residents from 60 families who primarily sustain themselves through subsistence agriculture and livestock farming. The environmental study for project implementation covers a border zone between the municipalities of Araçuaí and Itinga, divided by the Piauí River. This area lies within the Northeast macro-region of Minas Gerais, in the Middle and Lower forks of the Jequitinhonha River.

Studies conducted in the Bandeira Project area indicate that it has been anthropogenically disturbed due to previous agricultural activities and contains small patches of natural vegetation in various stages of regeneration.

20.4.2 Local Fauna

The faunal survey was based on bibliographic data, reports from local residents, and primary surveys carried out by biologists from Ekob Environmental Consulting. The primary surveys were carried out in accordance with IBAMA Normative Instruction No. 146/2007 and were conducted without collecting, capturing, or transporting specimens (i.e., only sightings, photographs, or hearing animal vocalizations).

The majority of species identified in the studies exhibit broad geographic distributions and low sensitivity to anthropogenic interference, indicating a high level of disturbance in natural environments. However, certain higher taxa with specific ecological requirements and mammalian species facing conservation challenges were also identified. The ichthyofauna recorded includes species of lesser concern; however, species inhabiting small watercourses are typically highly sensitive to changes in water quality (Ekob Environmental Consulting, 2023, as cited in NeoAgro Ambiental, 2023).

The taxa identified to have the most significant conservation challenges were predominantly medium and large carnivorous mammals, namely *Puma concolor* (puma), *Leopardus pardalis* (ocelot), *Lycalopex vetulus* (field fox), *Chrysocyon brachyurus* (wolf), and *Herpailurus yagouaroundi* (Moorish cat). The other groups surveyed, avifauna, herpetofauna, and ichthyofauna, did not present heightened conservation concerns (NeoAgro Ambiental, 2023).

Given the local environmental conditions, the likely species inhabiting the region, identified through primary records, indicate significant ecological disturbance and simplification of fauna communities in the sampled areas. This outcome was expected due to the study area's proximity to the Barreiros community, ongoing mineral exploration in the neighbouring regions, and the intensity of rural activities surrounding the Project area.

The studies indicate that the sampled faunal species exhibit a wide geographical distribution. Given the project's location, the study area harbours species typical of the Atlantic Forest, Cerrado, and Caatinga biomes, thereby enhancing local biodiversity and conservation potential. However, the remaining forest fragments in the study area are significantly affected by human activities such as logging and livestock grazing, resulting in habitat fragmentation and a decline in forest species biodiversity. Nevertheless, the biodiversity within the project area holds considerable regional significance in maintaining ecosystems capable of supporting diverse fauna populations. Preserving forest remnants, maintaining landscape structure, and ensuring water body quality can foster faunal biodiversity in the region.

20.4.3 Local and Directly Affected Communities

The Bandeira Project, currently in the economic feasibility phase, aims to implement and operate within the territorial limits of Araçuaí/MG and Itinga/MG. This phase focuses on exploring and developing projects within the lithium mineral sector and its by-products. The project is expected to benefit Araçuaí and Itinga economically by generating employment and boosting the service sector. The Brazilian Institute of Geography and Statistics (IBGE) found that Araçuaí had a population of 34,297 in 2022. The GDP per capita in 2020 was R$13,441.04. In 2010, 59.83% of the population aged 18 and over was economically active. Companhia de Saneamento de Minas Gerais (COPASA) is responsible for sanitation, and Centrais Eletricas de Minas Gerais (CEMIG) for electricity. The education system is predominantly public, with 32 elementary schools, nine high schools and 13 kindergartens staffed with 549 teachers (NeoAgro Ambiental, 2023).

In 2010, Itinga had 14,407 inhabitants. The GDP per capita in 2020 was R$8,393.59, with public administration representing 52%. In 2010, 56.65% of the population aged 18 and over was economically active. Itinga has water and sewage infrastructure, with the subsidiary COPASA (COPANOR) responsible for water supply until 2040. The Municipal Health Department manages health, and education is primarily public, with 20 elementary schools, four high schools, and an enrollment rate of 96.8% for children aged 6 to 14. Cultural heritage includes architectural structures and religious movable property (NeoAgro Ambiental, 2023).

Near the Bandeira Project ADA are two rural communities: Barreiros and Fazenda Velha. Both are in the rural area of the municipality of Araçuaí. It should be noted that there are no residents in the rural property where the Project will be implemented or in the adjacent properties (NeoAgro Ambiental, 2023).

Barreiros is located 424 m from the Bandeira Project site, where plans include constructing a bridge to facilitate the movement of workers, transport of mining output, and disposal of waste in designated waste piles (NeoAgro Ambiental, 2023).

For most of Fazenda Velha's population, retirement and government social programs are the primary sources of income. Other economic activities include agriculture and livestock, but most production is small-scale only for personal consumption.

20.5 Analysis of the Assessment of Socio-Environmental Impacts and Respective Mitigating Actions

Federal Law No. 6,938/81 established the National Environmental Policy, which includes provisions for assessing environmental impacts and licensing activities that have the potential to degrade the environment (Article 225, paragraph I, item IV). It requires "*the installation of a work or activity* *potentially causing significant degradation of the environment, preliminary environmental impact study, which will be publicized"* (GE21, June 2024.)

The direct impacts on the physical environment identified include industrial waste generation, sanitary issues, spills of oil and petroleum derivatives, effluents of Class I and II solid waste, soil and water contamination, alterations in rainwater drainage patterns, initiation of erosive processes, noise, visual landscape impacts, and increased vehicle traffic on nearby roads (NeoAgro Ambiental, 2023).

To control and mitigate this impact, MGLIT will propose guidelines through environmental control programs, such as the execution of the Solid and Liquid Waste Management Program, the Erosion and Effluent Processing Control Program, the Surface Water Quality Monitoring Program, and the Air and Noise Quality Maintenance Program.

Water quality management will include an evaluation of the potential generation of acid drainage from mine waste and DMS tailings. This assessment will help determine the appropriate disposal methods for these materials and whether soil sealing is necessary. Static tests for acid generation potential will be conducted by SGS Geosol, a specialized laboratory in Vespasiano, Minas Gerais.

The Degraded Areas Recovery Plan, presented in the PCA, proposes measures for rehabilitating degraded areas. This includes actions such as planting and soil regeneration, which will be carried out throughout the project's lifespan.

The Bandeira Project aims to optimize water usage to enhance the environmental sustainability of its operations. A management plan will be implemented to maximize water recirculation and reuse. The engineering plan outlined in the Feasibility Study includes the selection of the most suitable equipment for solid-liquid separation, such as dewatering cyclones, thickeners for decanting solids, and filtration systems, to minimize unnecessary water loss. It is estimated that 90% of the water withdrawn from the source will be recirculated.

The waste material extracted from the mine will be deposited in pre-evaluated areas chosen based on specific engineering requirements that predetermined the suitability and safety of slope and pile stability. A total of three location alternatives were assessed to determine the optimal location. Additionally, the use of voids within the mine will be maximized to reduce surface impact. The tailings from the DMS concentration unit are deposited in separate piles distinct from general waste piles. There are plans to donate these materials to municipalities or use them in civil construction. However, the current project plan involves depositing all tailings in designated piles within the project area until interest in recycling and reuse purposes is expressed and feasibility is determined.

Regarding impacts on the biotic environment, it's crucial to note that the areas designated for the mining project installation have already been significantly affected by longstanding anthropogenic activities, such as neighbouring mineral exploration and proximity to the Barreiros community. Moreover, the construction phase of the Bandeira Project and its associated environmental impacts necessitate vegetation suppression in specific areas to facilitate further project development.

The current environmental conditions in the area are conducive to project installation. The local flora and fauna have been shaped by longstanding anthropogenic activities, resulting in resilient fauna populations and vegetation in the early stages of regeneration. However, activities such as vegetation suppression and noise generation from machinery and equipment will disturb the local fauna and may lead to habitat loss for terrestrial species. This could potentially impact less mobile specimens during the initial clearing phases in the area. Vegetation suppression activities will be supervised by a team of biologists tasked with conducting proper surveys and, when necessary, rescuing animals before implementing habitat-altering actions. The Fauna Monitoring Program will be conducted throughout the installation and operation stage of the Project. It will provide and track key biodiversity indicators to allow for better evaluation of project impacts on local fauna.

Concerning the impact on biodiversity reduction, the Project will implement forest compensation measures alongside actions specified in the Recovery Plan for Degraded Areas and the Maintenance and Conservation Program for Permanent Preservation Areas and Legal Reserves (RL).

In terms of socioeconomic impacts, the municipalities of Araçuaí and Itinga will benefit from tax revenues such as Financial Compensation for Mineral Exploration (CFEM), alongside economic growth through job creation and the development of local labour and suppliers. The Bandeira Project is committed to prioritizing local employment and services and investing in training the local workforce, aiming to foster economic growth and income enhancement opportunities within the Project's area of influence. However, socio-cultural conflicts may arise, linked to heightened population expectations, pressure on infrastructure, landscape changes, and concerns such as atmospheric emissions, dust, and noise. To manage and mitigate these impacts, alongside environmental quality monitoring programs, the Social Communication Program includes planned actions to foster interaction with local communities.

Based on the comprehensive environmental assessment conducted, it is concluded that the Project is environmentally feasible. The thorough evaluation indicates that while potential negative impacts associated with the Project exist, these can be effectively minimized or mitigated through appropriate measures and mitigation strategies. The findings highlight the feasibility of implementing the Project in a manner that ensures environmental sustainability, balancing development objectives with the preservation and protection of the natural surroundings.

20.6 Community and Government Relations in the Environment, Social and Governance Context

The Jequitinhonha Valley boasts profound cultural significance for the people of Minas Gerais, renowned for its biodiversity and community dynamics. Moreover, in recent years, the valley has emerged as a significant contributor to the energy transition, with abundant mineral resources such as lithium, cesium, rubidium, tantalum, niobium, rare earth elements, and graphite. This natural wealth holds unique potential to catalyze rapid development within the municipalities, underscoring its pivotal role in regional advancement. The Bandeira Project was designated as a state priority for social and economic development through a Memorandum of Understanding (MOU) signed on July 17, 2023, by His Excellency Governor Romeu Zema and MGLIT President Mr. Helio Diniz. This agreement grants the Bandeira Project priority status in internal state agency assessments aimed at expediting the licensing process for its implementation.

MGLIT acknowledges the significance of all stakeholders—including individuals, entities, communities, authorities, and associations—in contributing to the success of this project, fostering economic growth, knowledge, and the development of the Jequitinhonha Valley region. Future economic contributions will be substantial, specifically through royalties paid under the CFEM framework, set at 2% of gross revenue from product sales. These royalties are allocated to federal, state, and local governments, ensuring equitable distribution of economic benefits.

Effective and transparent communication is crucial for fostering positive relationships with all project stakeholders, showcasing MGLIT's dedication to transparency and respect in project planning and operations. To further this commitment, an on-site ESG Analyst will work closely with senior management to oversee and implement Environmental, Social, and Governance projects, ensuring the sustainable development of our operations.

21.0 CAPITAL AND OPERATING COSTS

21.1 Basis of Estimates

Capital (CAPEX) and operating cost (OPEX) estimates were developed to support the Bandeira Project's feasibility study, according to the guidelines of the Canada's National Instrument (NI) 43-101, Form 31-101F1. These estimates are calculated within a range of −20% to +30%.

The base date of the estimates is the second quarter (Q2) 2024, with a reference exchange rate of US$1 = R$5.07.

These estimates are based on the feasibility-study conceptual sizing of the main mine, process, mechanical, and electrical equipment, which were costed through consultations with traditional market suppliers. Three quotations per package were obtained. The engineering team prepared a Avaliação de conformidade técnica (ACT) (Technical Conformity Assessment), and the value to be adopted is defined based on the average of the three quotations.

For steel structures, boilermaking, piping, concrete, and architecture, the preliminary design and issuance of quantity sheets (materials take-offs [MTO]) were also carried out. The items were priced through a recently updated monetary database.

For the infrastructure, the volumes of cut and fill, vegetation suppression, and primary coating were estimated and priced based on the Tucuman proposal that MGLIT received and a recent database.

Other items (instrumentation, automation, electrical materials, and smaller-diameter piping) were estimated from similar installations and benchmarking, applying an appropriate estimate factor in each case.

21.1.1 Estimate Price Source

For the feasibility study, AtkinsRéalis and MGLIT prepared cost estimates for process and mechanical equipment, design criteria, process flowchart, mass balance, descriptive process sheets, master layout/plan, conveyor belt calculation sheets, general earthmoving plan, quantity sheets for the disciplines of metal structures, boiler making, and piping. The sources of costs are presented in Table 21-1.

Table 21-1: Sources of Direct and Indirect Cost Estimates

Description	Responsibility	Source
Mine Equipment Supply	AtkinsRéalis	Supplier—Market Quotes
Process, Mechanical and Electrical Equipment Supply	AtkinsRéalis	Supplier—Market Quotes
Equipment Installation—Process and Mechanical	AtkinsRéalis	Database
Supply and Installation of Structural Steel, Platework and Piping >4”	AtkinsRéalis	Database
Supply and Installation of Electrical, Piping <4”, and Instrumentation and Telecom Equipment	AtkinsRéalis	Factored

Description	Responsibility	Source
Civil	AtkinsRéalis	Database
Production Support Infrastructure	AtkinsRéalis	Database
Infrastructure	AtkinsRéalis	Quotes—Database
Freight	AtkinsRéalis	Factored
Mobilization—Demobilization—Camp	AtkinsRéalis	Factored
Spares	AtkinsRéalis	Factored
Erection Supervision	AtkinsRéalis	Factored
Commissioning	AtkinsRéalis	Factored
QA / QC	AtkinsRéalis	Factored
Pre-OPEX—Mine	AtkinsRéalis	Estimated
Pre-OPEX—Plant	AtkinsRéalis	Factored
Topography	AtkinsRéalis	Factored
EPCM	AtkinsRéalis	Factored
Owner´s Team	MGLIT	Estimated
Insurance / Risk	AtkinsRéalis/MGLIT	Factored
Contingency	AtkinsRéalis/MGLIT	Factored

21.2 Work Breakdown Structure

Costs were classified according to the Project's work breakdown structure (WBS) (Table 21-2).

Table 21-2: CAPEX and OPEX Classification

Area	Description
00	General
10	Underground Mines
20	Beneficiation Plant
30	Disposition Dry
40	Utilities
50	Administrative
60	Workshops
70	Infrastructure
80	Temporary Construction

21.3 Estimate Plan

AtkinsRéalis developed costing for the infrastructure, mine development, and beneficiation plant, where the main process steps are crushing, ore sorting, classification, DMS, fines filtration, and all general infrastructure for administrative and operational support of the facilities.

The prices adopted in the estimate preserved the source currencies; conversion rates from U.S. dollars and Euros to Brazilian reals are given in Table 21-3.

Table 21-3: U.S. Dollar and Euro Conversion Rates

Currency	Conversion Rate
US$	US$1.00 = R$5.07
€	€1.00 = R$5.48

21.4 Capital Cost

21.4.1 Capital Cost Estimation

A CAPEX summary is presented in Table 21-4. The total Project CAPEX is estimated at US$266.1 million.

This value considers the Owner's Costs budget, a contingency of 15%, and pre-OPEXs, in addition to the reduction of US$13.07 million referring to the financing of the main initial mine equipment, to be paid in the first two years by CAPEX and after by SUSEX during the operation. The owner's costs include a team dedicated to following project development, environmental costs, social project costs and hired services.

The amount of Social Integration Program (PIS), Contribution to Social Security Financing (COFINS), and Tax on Operations Relating to the Circulation of Goods and on the Provision of Interstate and Intermunicipal Transport and Communication Services (ICMS) tax credits to be recovered, totalling US$18.8 million.

Table 21-4: Capital Cost Summary

	Total (US$ M)
Direct Cost	190.0
Indirect Cost	89.2
Equipment Financing	(13.1)
Total	**266.1**

Sustaining Capital was estimated at US$84.1 million to cover mine and plant equipment reinvestments during the LOM, including tailings disposal.

US$2.8 million was earmarked to cover the costs of closing the mine and various facilities.

Table 21-5: Capital Cost by Area and Sub-Area

Area	Description	Cost (US$)
00	GENERAL	93,816,956
0000	General	93,816,956
05	MINE	70,408,546
0000	General	70,408,546
10	WATER CATCHMENT SYSTEM, MINE WATER RESERVOIR, RAISE AND SUBSTATIONS	6,985,217
1000	General	6,912,608
1500	Ventilation	72,609
20	BENEFICIATION PLANT	60,670,713
2000	General	9,982,233
2100	Primary crushing	4,413,596
2200	Secondary crushing and screening	5,707,031
2300	Ore sorter	10,328,564
2400	Fine screening	3,120,471
2500	DMS (general)	8,267,712
2510	Coarse DMS concentration	6,485,479
2520	Medium DMS concentration	3,168,326
2600	Solid-liquid separation	583,339
2610	Fines thickening	2,793,811
2620	Fines filtration	3,428,166
2700	Flocculant	214,965
2900	Water recovery	2,177,021
30	DRY STACKING	-
40	UTILITIES	19,895,358
4000	Raw-water tank	1,282,132
4045	Electrical Substation	2,495,813
4100	Compressor house	430,590
4110	Water Treatment Plant	187,629
4120	Sewage Treatment Plant	285,712
4140	Fire Protection Systems	392,971
4200	Fuel station	292,402
4600	Substations	14,528,108
50	ADMINISTRATION	7,086,158
5000	General	343,290
5110	Laboratory	2,726,362
5130	Administrative mine buildings	246,740
5140	Restaurant	988,844
5150	Warehouse	803,611
5160	Entrance gate and reception	671,305
5170	Medical post and fire brigade	362,945
5180	Dressing room	224,372
5200	Explosive and detonators magazine	139,099

Area	Description	Cost (US$)
5700	Lockers, mine	224,372
5900	Dispatch area, mine	143,043
5950	Battery room, mine	212,175
60	WORKSHOPS	2,246,867
6000	Oily Effluent Treatment Plant	84,016
6100	Office	1,741,749
6200	Vehicle wash station	421,102
70	INFRASTRUCTURE	17,657,344
7000	General	14,973,730
7100	Sumps	2,393,428
7200	Intermediary stockpiles	290,186
80	TEMPORARY CONSTRUCTION	392,810
8300	Fences	392,810
	Subtotal	279,159,968
	Export Credit Agency Cross-Border Loan During CAPEX Phase	(13,067,940)
	Total	**266,092,027**

21.4.2 Financial Operation—ECA Cross-Border Loan (SANDVIK)

Supplier SANDVIK (BRA) offered a proposal for foreign currency financing from a foreign partner bank, guaranteed by EKN (Swedish Export Credit Agency). The financing will be in 60 installments, with pre-fixed interest for the mine's main equipment. For CAPEX, disbursements are foreseen for the following years—Year −2, 12 installments; Year −1, 12 installments; Year 1, 6 installments—totalling 30 installments totalling US$13 million. The remaining 30 installments will occur in: Year 1, 6 installments; Year 2, 12 installments; and Year 3, 12 installments.

21.4.3 Summary of Main Quantities

Table 21-4 presents the main quantities for each area of investment estimation.

Table 21-6: Summary of Quantities

Area	References	Unit	Quantity
Mine (Equipment and Infrastructure)			
Infrastructure—Bulk Earthworks	Cut and fill	m^3	1,020,080.00
Concrete	Volume	m^3	8,290.64
Piping	Pipes	m	5,484.00
Instrumentation—Telecom and IT	Instruments		Index
Electrical Equipment	Equipment	Unit	8.00
Electrical Material	Cables	m	Index
Overhead Cables	Length	km	3.70
Platework	Weight	t	817.81
Structural Steel	Weight	t	1,465.40

21.4.4 Contingency

The contingency for this study phase was estimated at 15% for the mine and the plant. A total of US$13.07 million related to the financial transaction with Sandvik was excluded from the basis of calculation of the mine contingency.

21.4.5 Taxes

To compose the feasibility study cost estimate, the incidence of the usual taxes was considered, such as the federal level, Social Integration Program and Social Security Financing Contribution (PIS/COFINS), Tax on Industrialised Products (IPI), Additional Charge for Renewal of the Merchant Navy (AFRMM), and Tax on Financial Transactions (IOF); the state level, Tax on the Circulation of Goods and Services (ICMS) and Difference Between Internal and Interstate Rates (DIFAL) of ICMS; and the municipal level, Tax on Services of Any Nature (ISSQN).

21.4.6 Exclusions

The following expense items were not included in the CAPEX estimate:

- Those incurred by the owner to date.
- Any related to obtaining licenses, or any others related to regulatory agencies.
- Those related to the closure at the end of the useful life of the facilities.
- Light vehicles for industrial and administrative support facilities.
- Those related to obtaining funds from the venture, if necessary.
- Entrepreneur's implementation overhead.
- Those related to any impact on the shortening or lengthening of the implementation period.
- Possible exchange-rate variations.
- Escalation.
- Technological characterization.
- Specialized consultancies.
- Impacts on costs intended to cover any type of risk.

21.4.7 Mine Capital Cost Estimation

The initial and sustaining mining CAPEX considered for the Project mine operations are as follows:

- Purchase of production equipment by financial loan supplied by the manufacturer bank—truck, LHD loader, long hole drill, two-arm jumbo, cable bolter, slot raise borer.
- Purchase of auxiliary mine equipment—scaler, explosives truck, lifting platform, fuel and lubrication truck, personnel transport truck, maintenance truck, jackleg drill, stoper drill, air compressor, motor grader, ventilation fans, exhaust fans, dewatering pump, diesel generator and utility vehicle.

- Mine equipment maintenance facilities—workshop, warehouse, equipment washer, tire repair shop.
- Mine buildings—office, dispatch and communication room, battery and security equipment room, changing room.
- Surface infrastructure—vegetation removal, access roads, water tank, electrical substation, preparation of waste dumps and temporary ore stockpiles, sedimentation dikes.
- Systems, hardware and software—mine management, communication, topography, geology and mine planning.
- Underground infrastructure—box cut, decline, ventilation system, electrical substation.
- Purchase of service materials and accessories—roof support, ventilation, water, electrical, compressed air.
- Pre-production.

CAPEX is summarized in Table 21-7. The breakdown of initial and sustaining mining CAPEX is shown in Table 21-8.

Table 21-7: Summary Of Initial and Sustaining Mining Capital

Year	Summary of Initial and Sustaining Mining Capital Cost (US$ million)														
	Purchase of Mine Equipment	ECA supported Cross-border loan	Purchase of Spare Parts (2)	Mine Equipment Maintenance Facilities	Mine Buildings (6)	Surface Mine Infrastructure (6)	Systems, Hardware & Software	Underground Mine Infrastructure	Ventilation System	BOXCUT construction Contractor	Service Materials and Accessories	Mine Closure (3)	DECLINE CAPEX COST (4)	PRE-OPERATION CAPEX COST (5)	TOTAL
-2	1,37	1,56	0,45	0,31			1,20	0,87	0,45	4,68	0,25		6,14	3,15	20,41
-1	5,89	5,13	1,69	0,46			1,20	1,44	0,51		0,38		5,98	5,13	27,81
1	5,60	5,18							0,11				2,40		13,29
2	11,63	4,07													15,70
3		4,07				0,04		0,47	0,20						4,78
4	3,72	3,23				0,04		0,47							7,47
5	2,05	1,03							0,20						3,27
6	10,42					0,04		0,47							10,93
7						0,04		0,47							0,51
8	1,22														1,22
9	7,13					0,04		0,47							7,64
10	3,53					0,04		0,47							4,05
11	7,26														7,26
12	1,04					0,04		0,47							1,55
13	3,54					0,04		0,47							4,05
14	1,87														1,87
15												2,83			2,83
16															
17															
Total	66,27	24,27	2,14	0,77		0,32	2,41	6,09	1,46	4,68	0,63	2,83	14,51	8,29	134,66

Notes:
(1) Disbursement for the purchase of mine equipment considered in the year the equipment went into operation
(2) 8% of the mine equipment purchase in the pre-production period
(3) Outsourced services at the end of mine operation
(4) The operational costs during the first three years from decline's opening were categorized as CAPEX. The calculation costs associated with them were displayed in the Total OPEX tab
(5) The operational costs during the first two years from primary development and raise boring were categorized as CAPEX. The calculation costs associated with them were displayed in the Total OPEX tab
(6) All values referred to this itens are calculated and considered in SNC Surface CAPEX

Table 21-8: Breakdown of Initial and Sustaining Mining Capital Costs (US$ Million)

Other Capex	Year																
	-2	**-1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Mine Equipment Maintenance Facilities	**0.31**	**0.46**															
Workshop	0.19	0.29															
Warehouse	0.07	0.11															
Equipment Washing Facilities	0.02	0.03															
Tire Repair Shop	0.01	0.02															
Other	0.02	0.02															
Initial & Sustainable Surface Infrastructure					**0.04**	**0.04**		**0.04**	**0.04**		**0.04**	**0.04**		**0.04**	**0.04**		
Vegetation Removal					0.00	0.00		0.00	0.00		0.00	0.00		0.00	0.00		
Access Road																	
Water Tank																	
Electrical Substation																	
Waste Dump & Stockpile Preparation					0.01	0.01		0.01	0.01		0.01	0.01		0.01	0.01		
Sediment Pond					0.01	0.01		0.01	0.01		0.01	0.01		0.01	0.01		
Other					0.02	0.02		0.02	0.02		0.02	0.02		0.02	0.02		
Systems, Hardware & Software	**1.20**	**1.20**															
Mine Management	0.49	0.49															
Communication	0.28	0.28															
Survey	0.08	0.08															
Geology and Mine Planning	0.16	0.16															
Other	0.20	0.20															
Initial & Sustainable Underground Infrastr	**0.87**	**1.44**			0.47	0.47		0.47	0.47		0.47	0.47		0.47	0.47		
Portal																	
Ramp																	
Electrical Substations	0.63	0.69															
Pumping Station																	
Refuge Chamber		0.38															
Emergency Exits	0.04	0.04															
Safety Equipment		0.19															
Robotic Bit sharpener	0.06																
Orther	0.14	0.14															
Ventilation System	**0.45**	**0.51**	**0.11**		**0.20**		**0.20**										
Ventilation Ducts	0.05	0.11	0.11														
Exhausting Ducts	0.20	0.20															
Exhausor Control Panel	0.16	0.16			0.16		0.16										
Monitoring Sensors	0.02	0.02			0.02		0.02										
Other	0.02	0.02			0.02		0.02										
Box Cut 1 &2	**4.68**																
Contractors service	4.68																
Service Materials and Accessories	**0.25**	**0.38**															
Roof Support	0.08	0.13															
Ventilation	0.02	0.04															
Service Water	0.11	0.18															
Electrical																	
Compressed Air	0.03	0.03															
Mine Closure *																	2.83
Preparation of a Detailed Mine Closure Plar																	0.17
Removal of Equipment and Underground St																	0.25
Removal of Mine Structures in Surface																	0.65
Reconformation and Revegetation of Land																	0.95
Stabilization and Revegetation of Remnants																	0.34
Closure and Sealing of All Mine Opening																	0.20
Monitoring of Structure Stabilization																	0.28
Conditions, Surface and Undergroud Water																	
Total	**7.75**	**4.00**	**0.11**		**0.71**	**0.51**	**0.20**	**0.51**	**0.51**		**0.51**	**0.51**		**0.51**	**0.51**		**2.83**

21.5 Operating Costs

21.5.1 Operating Cost Summary

The mine OPEX estimate includes the operation of the underground mine; the processing plant estimate includes the operation of a crushing circuit, two-stage screening, and DMS circuits (two-stage for the coarse and medium material fractions).

The OPEX for operation and maintenance labour, energy, consumables, fuel, and indirect and administrative charges associated with the processing plant were considered (Table 21-9).

Table 21-9: Sources of Direct and Indirect Operating Costs

DESCRIPTION	US$/t ROM
Underground Mine	36.70
Plant and Tailing Handling	24.63
General and Administrative Sales (SG&A)	3.00
Total	**64.33**

21.5.2 Detailed Operational Cost

The breakdown of the OPEX is presented in Table 21-10, without the tax considerations that are described in Section 22.

Table 21-10: Operating Cost Breakdown

	US$/t ROM	US$/t SPO
Mine Subtotal	**36.70**	**253.50**
Labour	11.70	80.73
Diesel	1.93	13.34
Electrical Power	1.95	13.49
Consumables	15.97	110.20
Services and Maintenance	2.80	19.35
Others	2.38	16.40
Plant	**24.63**	**170.01**
Labour	9.54	65.81
Electrical Power	1.44	9.92
Consumables	0.82	5.63
Maintenance	1.33	9.15
Services	9.28	64.03
Others	2.24	15.46
SG&A	**3.00**	**20.70**
Total	**64.33**	**444.21**
Transport		112.56
CIF Cost, Shangai		556.70

Note: SPO = Spodumene

21.5.3 Labour

Labour costs were defined based on the estimated headcount (Table 21-11 and Table 21-12) and average wage values.

Table 21-11: Mine Headcount

	Year																
	−2	−1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Mining Operation																	
Mine Operation Manager	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Assistant	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Coordinator	1	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Mine Operation Engineer	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1
Safety Engineer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Trainer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Mine Operation Supervisor	8	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	0
Technician	4	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	1
Truck Operator	4	16	24	40	40	44	48	68	52	52	64	64	64	64	52	56	0
LHD Operator	4	8	12	16	16	16	16	24	16	16	16	16	16	16	12	12	0
Drill Operator	8	24	36	44	44	40	40	40	40	40	40	40	40	40	36	36	0
Ancillary Equipment Operator	24	24	60	60	60	60	60	60	60	60	60	60	60	60	60	60	2
Blaster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
Mine Operation Assistant	12	12	24	24	24	24	24	24	24	24	24	24	24	24	24	24	0
Technical Services																	
Technical Services Manager	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Assistant	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Coordinator	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Mine Geologist	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
Mine Planning Engineer	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Mine Ventilation Engineer	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Geotechnical Engineer	0	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Supervisor Geosciences	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	0
Quality Control Technician	0	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Surveyor	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Geological Surveyor	0	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0
Technical Services Assistant	2	10	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
Mine Equipment Maintenance																	
Mine Eq. Maintenance Manager	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Coordinator	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Mine Maintenance Engineer	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Mine Maintenance Foreman	1	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Mechanic	8	13	22	25	25	25	26	28	26	26	27	27	27	27	25	26	2
Electrician	5	8	14	15	15	15	16	17	16	16	16	16	16	16	15	16	2
Welder	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	0
Washer	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Tire Repairer	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0
Luber	4	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	0
Mine Maintenance Scheduler	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0

		Year																
		−2	**−1**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
	Mine Maintenance Controller	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0
	Mine Maintenance Assistant	8	8	16	16	16	16	16	16	16	16	16	16	16	16	16	16	0
		109	191	318	350	350	350	356	387	360	360	373	373	373	373	350	356	12

Table 21-12: Plant Headcount

Level		Quantity
1	**Aux Operation**	
	Auxiliary	80
	Helper	9
	Subtotal	**89**
2	**Operation**	
	Helper	67
	Technician	71
	Warehouse	8
	Tire Shop	4
	Welder	4
	Toolmaker	4
	Lubricator	4
	Electrician	8
	Mech Maintenance	12
	Subtotal	182
3	**Coordination**	
	Health	4
	Security	4
	Environmental	6
	Finance	4
	Logistics	3
	Procurement	4
	Contracts	3
	Taxation	2
	Community	4
	Subtotal	34
4	**Managerial**	
	Engineer	12
	Administrator	11
	Subtotal	23
5	**Executive**	
	Manager	7
	Director	1
	Subtotal	8
Total Headcount		**336**

21.5.4 Plant Consumables

Consumable costs were defined based on consumption and unit values (Table 21-13).

Table 21-13: Consumables

Description	Unit	Price
Flocculant	R$/kg	26.62
Ferrosilicon	R$/kg	11.60
Annual Consumption		
Flocculant	kg/a	5,690
Ferrosilicon		
DMS (Coarse)	kg/a	217,051
DMS (Medium)	kg/a	208,488

The price of ferrosilicon was obtained through consultation in the international market - estimated to be R$11.64/kg. This results in an ore-feed unit cost of US$0.73/t after considering the tax incidence and tax benefits applicable to the imported item under the drawback regime.

The price of the flocculant was obtained from the AtkinsRealis database.

21.5.5 Power

CEMIG provided the cost of electricity. It presented a unit value of R$296.76/MWh (off-peak hours) and R$465.84/MWh for peak hours. The Project considered purchasing energy in the free market for R$269/MWh and plus other fees brings the free market cost estimate to R$320/MWh.

Table 21-14 shows the plant and mine estimated consumption.

Table 21-14: Plant and Mine Estimated Consumption

Area	Description	kWh	kWh/a
4600-SE-01	Crushing substation	1,031	6,325,002
4600-SE-02	DMS substation	2,388	17,784,356
4600-SE-03	Workshops substation	611	3,749,013
Unit 6	Administrative area	39	125,582
4600-SE-04	Mine substation	2,255	13,825,361
4600-SE-05	Ventilation substation	2,409	14,773,599
Total			**56,582,912**

21.5.6 Plant Maintenance

Plant maintenance cost is estimated at 5% of the mechanical equipment cost.

21.5.7 Plant Services

For the laboratory services, an SGS proposal was used for the cost of implementation and operation. In addition to this cost, MGLIT estimated what it would cost to cover environmental samples.

The cost of leasing plant equipment was taken from a Minax proposal that included 5% for mobilization and demobilization expenses. The proposal considers equipment operation during 8 hours, except for two front-wheel loaders and the truncated dump trucks that will operate during 16 hours or 24 hours (Table 21-15).

The outsourced services were estimated at 10% of the labour cost.

For other non-dimensioned costs, a 10% was estimated on top of the plant's other OPEX values.

Table 21-15: Equipment Leasing Cost

Equipment	Model	Quantity	Hourly Cost (R$/h)	Monthly Unit Value (R$/month)	Total Annual Value (R$/a)	Function
Front Wheel Loader	CAT 966	1	867.15	379,759.67	4,557,116.05	Operation of concentrate piles, (2 shifts)
Front Wheel Loader	CAT 966	1	867.15	520,290.00	6,243,480.00	Operation of concentrate piles, (3 shifts)
Front Wheel Loader	CAT 966	1	867.15	173,430.00	2,081,160.00	Feeding of the plant from the regularization pile or the temporary ore storage pile on the primary crushing plateau. (1 shift)
Grader	140 K	1	746.21	149,242.00	1,790,904.00	Maintenance of roads and surface accesses. Rented 6 months/year (1 shift)
Tanker Truck	8 x 4 18.000 L	1	524.41	104,882.00	1,258,584.00	Wetting of roads and surface accesses. (1 turn)
Truncated Dump Truck	Scania G410	3	640.35	280,434.88	10,095,655.64	Waste transport, products, tailings, (2 shifts)
Backhoe	Cat 416F	1	551.49	110,298.00	1,323,576.00	(1 shift)
Crawler Tractor	D8	1	1434.80	286,960.00	3,443,520.00	Drystacking (1 Shift)
Winch Truck	Mercedez Benz Actros 2646/33 6 x 4 + Munck 15t	2	640.35	128,070.00	3,073,680.00	General Maintenance (1 shift)
Ambulance	Fiat Ducato	1		50,000.00	600,000.00	Emergency Ambulance. (1 shift)
Forklift	Hyster 170 HD Diesel 7.5t	1		16,006.07	192,072.84	Handling of spareparts at workshops (1 shift)
Mobile Crane on Tires	Grove RT540E – 35t	1	518.23	103,646.00	1,243,752.00	General Maintenance (1 shift)
Lighting Tower		3		25,.268.76	909,675.24	Waste rock and rejects Stockpile (1 shift)
Double Cab Pickup Truck 4x4	Chevrolet S10	4		33,145.74	1,590,995.40	Mine (1 shift)
Pick Up Truck	Toro	4		33,145.74	1,590,995.40	Plant (1 shift)
Scissor Lift	Telescopic Lifter 1200SJP	1	518.23	103,646,.00	1,243,752.00	General Maintenance (1 shift)
Subtotal (R$/Year)					**41,238,918.58**	
Total (R$/Year) % Accredited Operator + mobilization/demobilization (5%)					**43,300,864.50**	

21.5.8 Mine Operating Cost Estimate

The following are the Project OPEX items estimated for the mining operations:

- Main production and auxiliary mine equipment—diesel, electricity, lubricants, greases and filters, tires, maintenance, undercarriage, and wear parts.
- Labour for mine management, mine operation, technical services, and maintenance of equipment.
- Explosives, accessories, and outsourced blasting equipment and services.
- Roof support.
- Drilling of ventilation shafts using raise borers through outsourced operations.
- Maintenance of mine equipment maintenance facilities—workshop, warehouse, equipment washer, and tire repair.
- Maintenance of mine buildings—office, dispatch and communication room, battery and safety equipment room, locker room, and core shed.
- Maintenance of surface mine structures—entry and portal, waste piles and temporary ore stockpile, access roads, water tank, electrical substation, and sedimentation ponds.
- Maintenance of underground structures and mine services—ventilation, service water, electrical, compressed air.
- Mine quality control—chemical and physical laboratory analysis.
- Exploration drilling.
- Maintenance of software, hardware, and mine operation management systems, communication, topography, geology, and mine planning.
- Revegetation and environmental recovery services for mine structures.

Table 21-16 summarizes the Project's annual mining operating costs and Table 21 16 the Project's average annual mining operating costs. The mining operating cost distribution is shown in Figure 21-1.

Table 21-16: Bandeira's Annual Mining Operating Costs

Summary of Mine Operating Cost (US$ Million)																		
	Year																	
MINE OPERATING COST (R$)	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
Mine Equipment	1.14	3.21	5.08	7.97	7.87	8.39	8.84	11.61	9.02	9.38	10.49	10.44	10.65	10.80	8.95	9.43		**133.26**
(+)Labor	4.29	8.01	12.69	13.89	13.89	13.85	14.07	15.18	14.20	14.20	14.64	14.64	14.64	14.64	13.79	14.01	0.47	**211.11**
(+)Blasting	1.75	4.35	6.33	9.57	9.20	9.27	9.37	10.13	9.83	10.05	9.92	10.09	10.27	10.07	9.75	9.76		**139.71**
(+)Roof Support	0.51	1.27	1.97	2.77	1.80	2.11	2.10	2.10	1.98	2.03	1.98	2.02	2.05	1.98	1.84	1.83		**30.35**
(+)Drilling Wear Parts	0.32	1.37	2.48	6.00	5.66	6.46	6.57	7.34	7.10	7.32	7.23	7.44	7.67	7.52	7.39	7.44		**95.32**
(+)Outsourced Raise Boring	1.91	1.61	0.20	3.58	0.71	1.31	0.76	0.74	0.96	0.57	1.89	0.58	1.84	0.86	0.21			**17.73**
(+)Other Cost		0.44	1.58	2.47	2.36	2.78	2.82	3.07	3.03	3.10	3.10	3.19	3.29	3.27	3.35	3.40		**41.25**
(-) Decline cost transfered to CAPEX	6.14	5.98	2.40															**14.51**
(-)Pré-operation cost transfered to CAPEX	3.15	5.13																**8.29**
(=)TOTAL	**0.63**	**9.15**	**28.38**	**47.13**	**42.38**	**44.87**	**44.77**	**50.16**	**46.13**	**46.67**	**49.25**	**48.39**	**50.42**	**49.15**	**45.28**	**45.86**	**0.47**	**649.11**

Table 21-17: Average Annual Mining Operating Costs

Average Annual Mine Operating Costs (US$ M)	
Mine Equipment	8.06
Labour	12.43
Blasting	8.35
Roof Support	1.79
Drilling Wear Parts	5.85
Outsourced Raise Boring	1.09
Other Costs	8.06
Total	**45.62**
Unit Mine Operating Cost (US$/dry tonne)	
Plant feed	36.73

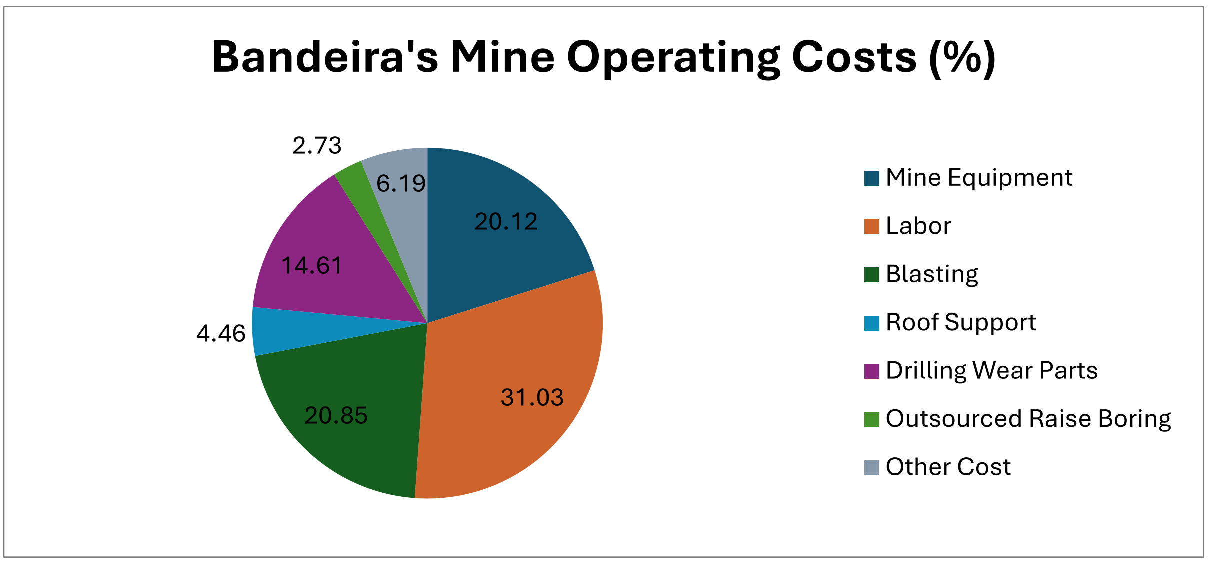


Figure 21-1: Percentage Breakdown of Project Mining Operating Cost

22.0 ECONOMY ANALYSIS

Section 22 was written by L&M Assessoria Empresarial (L&M Advisory) the information and opinions contained herein are those of L&M Advisory.

22.1 Introduction

This summary details the results of the economic analysis for the Bandeira Project Feasibility Study.

The economic analysis of the project was completed by L&M Advisory, based on information provided by AtkinsRéalis, through the files: General CAPEX: BAN-0000-33KB-10000_Rev_1_20240510_RevLM11_Polly.xlsx and Opex Plant: BAN-0000-33KC-10000_Rev_2_OPEX_A.xlsx, which is responsible for the mine and processing plant, production schedule, capital and operating costs for the mine, processing plant, infrastructure and logistics. We also received information from the market study and product price forecast for Spodumene concentrate (SPO). L&M Advisory was in charge of the estimation of tax impacts on the Project including revenue, operating costs, capital expenditures and profits. The tax rates used are all according to Brazilian tax legislation as well as the applicable tax benefits to be negotiated with the Minas Gerais State Government.

The main tool used for the analyses is an Excel-based discounted cash-flow model developed by L&M Advisory. The purpose of this model is to assess the key economic metrics and to identify and assess the key value drivers of the Project. From a technical/operational point of view it is a high-level model focused on detailed tax implications and resulting Project economics appropriate for this phase of the Project's development.

22.2 Main Assumptions and Parameters

The following sections outline the main assumptions used for this economic analysis.

22.2.1 Production

The annual production rate varies from year to year and is based on a design capacity of 1.3 Mt/a of ore feed. The expected LOM is 14 years, including ramp up and down. The average SPO concentrate at 5.50% Li_2O is estimated to be 178 kt/a.

Table 22.12 summarizes the annual feed to the plant with the respective mineral grades, masses of ore and waste mined, metallurgical recoveries and plant production.

22.2.2 Initial CAPEX

The initial after-tax capital cost is US$279.2 million, including an allowance for contingencies of US$33.7 million, equivalent to 13.7% of the total initial CAPEX. The capital cost expenditure disbursement schedule is shown in Table 22-1.

For the project's development phase (CAPEX phase), MGLIT has adopted the option of financing some of the main mining equipment. The financing should be guaranteed by EKN (Swedish Export Credit Agency), under the conditions and terms presented by SANDVIK, a potential supplier of such equipment, through its banking partner.

The cash flow projections for the drawdown and repayment of the financing are presented in Table 22-2. The positive balance related to financing provides a reduction in the total disbursement during the CAPEX phase by US$13.1 million to a net value of US$266.1 million.

Table 22-1: Initial CAPEX (US$ M)

Year	CIF + Non Recoverable Taxes	Recoverable Taxes	Total
-2	59.1	4.2	63.4
-1	151.1	10.8	161.9
1	50.3	3.6	53.9
Total CAPEX	260.5	18.6	279.2
Mining Equipment Financing Net Cash Flow			13.1
Total disbursement CAPEX phase			266.1

Table 22-2: Mining Equipment Financing (US$ M)

Year	CAPEX Phase			Operations Phase	Total Financing Cash Flow
	Drawdown	Financing Repayment	Total CAPEX Phase	Financing Repayment	
-2	4.2	(1.0)	3.2	0.0	3.2
-1	11.0	(3.8)	7.3	0.0	7.3
1	5.1	(2.5)	2.6	(2.5)	0.1
2	0.0	0.0	0.0	(5.0)	(5.0)
3	0.0	0.0	0.0	(5.0)	(5.0)
4	0.0	0.0	0.0	(4.0)	(4.0)
5	0.0	0.0	0.0	(1.3)	(1.3)
	20.4	**(7.3)**	**13.1**	**(17.8)**	**(4.7)**

22.2.3 Sustaining Capital and Mine Closure

The total capital expenditure during operation is estimated at US$84.2 millions. The Supporting Capital, which includes replacement or refurbishment of mining mobile equipment, equipment for the processing plant, and other infrastructure, amounts to US$81.4 millions.

The total estimated Mine Closure costs amount to US$2.8 millions and is planned to be spent in Year 15, starting immediately after commercial production shuts down.

The sustaining capital annual schedule and mine closure costs, including recoverable and non-recoverable taxes, are detailed in Table 22-3.

Table 22-3: Sustaining Capital and Mine Closure (US$ M)

Year	Sustaining Capital CIF + Non recoverable Taxes	Recoverable Taxes	Total Sustaining Capital	Mine Closure Costs	Total Sustaining Capital + Mine Closure Costs
2	14.3	2.5	16.8	0.0	16.8
3	2.3	0.6	3.0	0.0	3.0
4	5.2	1.2	6.4	0.0	6.4
5	2.4	0.8	3.2	0.0	3.2
6	8.6	1.5	10.1	0.0	10.1
7	2.0	0.6	2.6	0.0	2.6
8	3.8	0.9	4.7	0.0	4.7
9	5.7	1.3	7.0	0.0	7.0
10	6.1	1.3	7.4	0.0	7.4
11	7.5	1.5	8.9	0.0	8.9
12	2.6	0.7	3.3	0.0	3.3
13	4.4	1.0	5.4	0.0	5.4
14	1.9	0.7	2.6	0.0	2.6
15	0.0	0.0	0.0	2.8	2.8
Total	**67.0**	**14.4**	**81.4**	**2.8**	**84.2**

22.2.4 OPEX, SPO Logistics and Other Costs

The average LOM OPEX for the Project is US$64.33/t of ore feed to plant. The annual average of all operating costs amounts to US$79.0 millions. The summary of the operating costs by activity showing percentual participation in totals is presented in Table 22-4.

Table 22-4: OPEX

Activity	LOM Annual Average (US$ M)	Unit LOM Cost (USD/t of ROM)	Part%
Mining	45.1	36.70	57.0%
Processing	30.2	24.63	38.3%
SG&A	3.7	3.00	4.7%
Total OPEX	**79.0**	**64.33**	**100.0%**

The unitary cost for the transport of the SPO concentrate from the plant site to Shanghai port is US$112.56/t. The details of the logistics costs are presented in Table 22-5. The annual average of all Logistics costs amounts to US$20.0 million.

Table 22-5: SPO Logistics Costs

	LOM Annual Average (US$M)	Unit LOM Cost (USD/t of SPO Conc.)	Part%
Transport Plant - Ilhéus	7.64	42.43	37.7%
Logistic Operation	1.44	7.78	6.9%
Port Costs	0.44	2.35	2.1%
Transport Ilhéus - Shanghai	10.73	60.00	53.3%
Total SPO Logistics Costs	**20.25**	**112.56**	**100.0%**

In addition to OPEX and SPO Logistics, items grouped as Other Costs include Royalties to Landowners, equivalent to 1% of the gross revenue and TFRM (Taxa de Controle, Monitoramento e Fiscalização das Atividades de Pesquisa, Lavra, Exploração e Aproveitamento de Recursos Minerários), a fee due to the Minas Gerais State Government. The annual average of Other Costs amounts to US$2.9 million, equivalent to US$3.81/t of ore feed to the plant.

The detailed, year-by-year LOM projections of total costs and unit costs per ton of ore by activity are shown in Table 22-13.

22.2.5 Revenue

The projections of gross revenue are based on the quantity of SPO Concentrate to be sold at the price forecasted for the Project's life period. The prices are expressed in real dollars for 2024 on the basis of CIF Shanghai. Logistics cost for the product transport from the MGLIT site to its final destination, the Port of Shanghai, is based on the Logistics Study carried out by AtkinsRéalis and allocated as an SPO Logistics cost.

Table 22.6 shows yearly prices, CIF Shanghai basis, for the SPO concentrate to be produced by MGLIT (5.5% Li_2O). The methodology adopted for the price forecast, as well as the complete forecast, is detailed in Section 19.

Table 22-6: SPO Concentrate sale price (CIF Shanghai)

Project Year	Concentrate 5.5% Li_2O (US$/t)
1	1,122.9
2	1,329.2
3	1,604.2
4	1,833.3
5	2,016.7
6	2,200.0
7	2,520.8
8	2,750.0
9	2,750.0
10	2,750.0
11	2,750.0

Project Year	Concentrate 5.5% Li_2O (US$/t)
12	2,750.0
13	2,750.0
14	2,750.0

The annual average gross revenue during the production period is US$416.6 million. A royalty is due to the government (CFEM) on sales at the rate of 2.0%.

The net revenue, after deduction of CFEM, averages US$408.3 millions during the same period. The CFEM taxation is detailed in Section 22.2.6.

22.2.6 Taxation

The tax analysis for the Bandeira Project takes into consideration current tax laws applied to capital costs, operating costs, SPO Concentrate sales and profits. This work was developed from the identification and analysis of the basic taxes applicable to the various activities of the Project and respective tax benefits provided for by the legislation of each tax, whether at the federal, state, or municipal level.

The relevant taxes included in the analysis are summarized in Table 22-7.

Table 22-7: List of Taxes

Federal Level	
II	Importation Tax
IPI	Tax over Industrialized Products
IRPJ	Corporate Income Tax
CSLL	Social Contribution on Net Income
COFINS	Contribution to Social Security Financing
PIS	Social Integration Program
CFEM	Financial Compensation for the Exploration of Mineral Resources
AFRMM	Additional to Freight for Merchant Marine Renewal
IOF	Financial Operation Tax
State Level - MG	
ICMS	Tax on Operations Relating to the Circulation of Goods and on the Provision of Interstate and Intermunicipal Transport and Communication Services
DIFAL	Supplement related to the ICMS Rate Differential
TFRM	Control, Monitoring and Inspection Fee for Research, Mining, Exploration and Use of Mining Resources Activities
Municipal Level	
ISSQN	Tax on Services of Any Nature

TAXES ON SPO CONCENTRATE SALES

Federal Level Taxes: PIS, COFINS and IPI:

SPO Concentrate is classified as "NT", that is, not taxed by the IPI (TIPI – Incidence table over IPI by NCM 2530.90.10).

ICMS: 100.0% for sales outside Brazil (exports):

The ICMS law of Minas Gerais follows the legislation applied since 1988 and its subsequent amendments. For sales outside Brazil (exports) there will be no ICMS levy. The legislation of Minas Gerais ensures the maintenance of all ICMS credits on the purchase of equipment, inputs and electricity.

CFEM Royalty

Royalty paid to the Federal Government – Financial Compensation for the Exploration of Mineral Resources (CFEM).

For the SPO Concentrate, the applicable CFEM rate is 2%. CFEM is calculated based on sales revenue.

Taxes on CAPEX and OPEX

Tax analysis on the CAPEX and OPEX was developed using the cost estimates prepared by AtkinsRéalis. Tax classification requires very detailed work, based on the General Rules of the Common External Tariff (TEC) of Mercosul (Southern Common Market) and on the Industrialized Products Tax Table (TIPI), as defined in legislation. Basic incidence of taxes at federal, state and municipal levels was applied, as well as tax benefits provided for by legislation, considering the activity and location of the Project. Taxation on the CAPEX and OPEX estimates, on project's revenue and profits, including applicable tax benefits, were updated according to the current tax legislation in 2024.

Taxes on Profits

Corporate income tax (IRPJ):

Brazilian corporate income tax is a federal tax charged on the net taxable income. It applies at a basic rate of 15% and a surplus of 10% on the annual income, totaling a 25% load. IRPJ payable may be reduced if the company obtain a benefit from SUDENE.

Social contribution on net profits (CSLL):

Social contribution (CSLL) is applied on a similar calculation basis as defined for the corporate income tax. The applicable rate of CSLL is 9% on net income.

SUDENE Incentives

The Project is considered eligible for the tax incentive granted by the Superintendence of the Development of the Northeast (SUDENE). This incentive implies a reduction of 75% of the IRPJ due by the Project for ten years of production, as it is a new investment and is located in one of the

Municipalities of the State of Minas Gerais benefited by the SUDENE Tax Incentives Law. This is the case of the Municipality of Araçuaí Vale do Jequitinhonha.

Two 10-year periods of 75% reduction in income tax payable were considered in this study. The first period awarded is expected to start in Year 1, during the last year of the ramp-up phase of the project, and end in Year 10. A second ten-year benefit period, if granted, would be based on the modernization of the plant, expected to take place early in Year 10 and remain in place until the end of the mine's life, Year 14.

22.2.7 Evaluation Base Date and Others

The evaluation base dated is the beginning of Year -2. All financial modelling and analysis work is based in real terms as of 2024 using real, ungeared, discount rate the economic model projections exclude any project debt financing but include equipment financing. The project funding is assumed to be through equity for the purposes of this report.

Economic projections are reported in 2024 US dollars utilizing a base case exchange rate of BRL/US$= 5.07. This exchange rate was utilized for the Initial Capital estimation, as well as the long-term rate during operation of the mine including Operating Costs, Sustaining Capital and Mine Closure costs. Project economics at a range of ex-change rates (+/- 20%) are assessed as part of project sensitivity analysis in item 22.4.1.

The base case exchange rate of BRL/US$= 5.07 is within the range of historical actual rates over the past 2 years as shown in Figure 22-1. The forecasted exchange rate adopted is in accordance with the median of the forecasts for the period 2024 to 2027 of the Top 5 Brazilian independent market analysts listed in the Banco Central do Brasil weekly publication "Focus Market Readout".

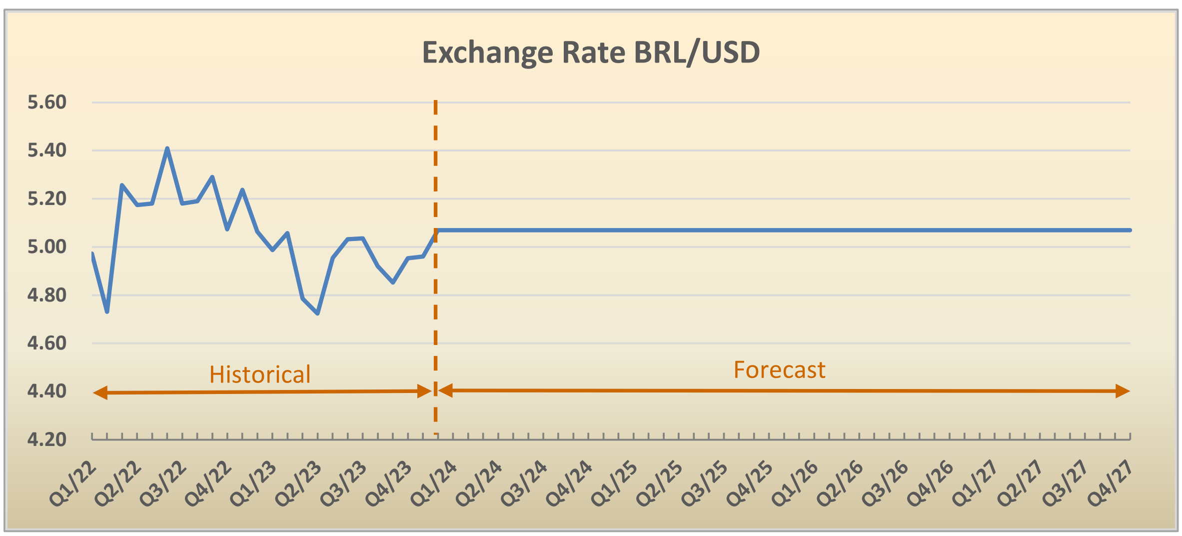


Figure 22-1: Exchange Rate BRL/US$

22.2.8 Cash Flow Analysis

The Project's estimated post-tax, unlevered net present value (NPV) is US$1,308.8 millioin using a discount rate of 8.0%. The post-tax, unlevered Internal Rate of Return (IRR) is 40.3% and the average annual earnings before interest, taxes, depreciation and amortization (EBITDA) is US$304.6 millioin. The total undiscounted free cash flow generated over the life of the project is US$3,223.4 millioin and the payback period after the startup of the operations is 3.4 years (41 months). Table 22-8 summarizes the financial results.

Based on the assumptions used in this feasibility study, the Project is economically viable, given the significantly positive NPV and IRR as compared to the discount rate adopted.

Table 22-8: Financial Results Summary

Financial Analysis	Unit	Post-Tax
NPV@8%	(US$M)	1,308.8
Payback(*)	(Years)	3.4
IRR	(%)	40.3%
Profitability Ratio	(%)	544.7%
EBITDA (**)	(US$M)	304.6
Total Cash Flow	**(US$M)**	**3,223.4**

Notes: (*) Undiscounted, after start-up (**) Annual average

22.3 Sensitivity Analysis

The sensitivity analysis shows the impact of adjusting key input variables on the Project's NPV and IRR.

In assessing the sensitivity of the project returns, each of these inputs is varied independently of the others. Scenarios combining beneficial or adverse variations simultaneously in two or more variables will have a more marked effect on the economics of the Project than will the individual variations considered. The sensitivity analysis has been conducted assuming no change to the mine plan or schedule.

The following item 22.4.1 shows sensitivity analyses of the Project´s NPV and IRR to Key Input Variables. In item 22.4.2, a sensitivity analysis showing the Project's NPV in a range of discount rates between 6% to 10% is presented.

22.3.1 Sensitivity Analysis to Key Input Variables – After Tax, Unlevered NPV and IRR

As with most mining operations, the cash flows of the project are sensitive not only to commodity prices. The DCFM therefore was varied in a range of +/- 20% for the key input variables as follows:

- SPO Concentrate price.
- CAPEX.
- OPEX.
- Exchange rate BRL/USD.

Table 22-9 and Figure 22-2 present the results of the sensitivity analysis for the project's NPV on an after-tax unlevered basis and for each of the critical variables. NPV results are reported at a discount rate of 8%. Table 22-10 and Figure 22-3 present the same for the IRR. As can be seen, the project's returns are highly sensitive to the SPO Concentrate sales price and exchange rate and, to a lesser extent, to operating costs and capital expenditures.

Table 22-9: Sensitivity for Post-Tax NPV @ 8%

Δ%	Concentrate PRICE (Ref. 5.5% Li_2O)		Exchange Rate		OPEX		Initial CAPEX	
(%)	US$/t (CIF Shanghai)	NPV@8% (US$ M)	BRL/US$	NPV@8% (US$ M)	Total US$/t Ore	NPV@8% (US$ M)	(US$ M)	NPV@8% (US$ M)
20%	2,770.2	1,752.4	6.08	1,422.7	77.17	1,162.8	334.7	1,265.1
15%	2,654.7	1,641.5	5.83	1,397.9	73.96	1,199.8	320.7	1,276.0
10%	2,539.3	1,530.6	5.58	1,370.9	70.74	1,236.3	306.8	1,286.9
5%	2,423.9	1,419.7	5.32	1,341.3	67.52	1,272.6	292.8	1,297.7
0%	2,308.5	1,308.6	5.07	1,308.6	64.31	1,308.6	278.9	1,308.6
-5%	2,193.0	1,197.5	4.82	1,272.5	61.09	1,344.4	264.9	1,319.5
-10%	2,077.6	1,086.3	4.56	1,232.3	57.88	1,379.7	251.0	1,330.3
-15%	1,962.2	974.9	4.31	1,187.4	54.66	1,414.9	237.0	1,341.1
-20%	1,846.8	863.5	4.06	1,136.6	51.45	1,449.7	223.1	1,351.9

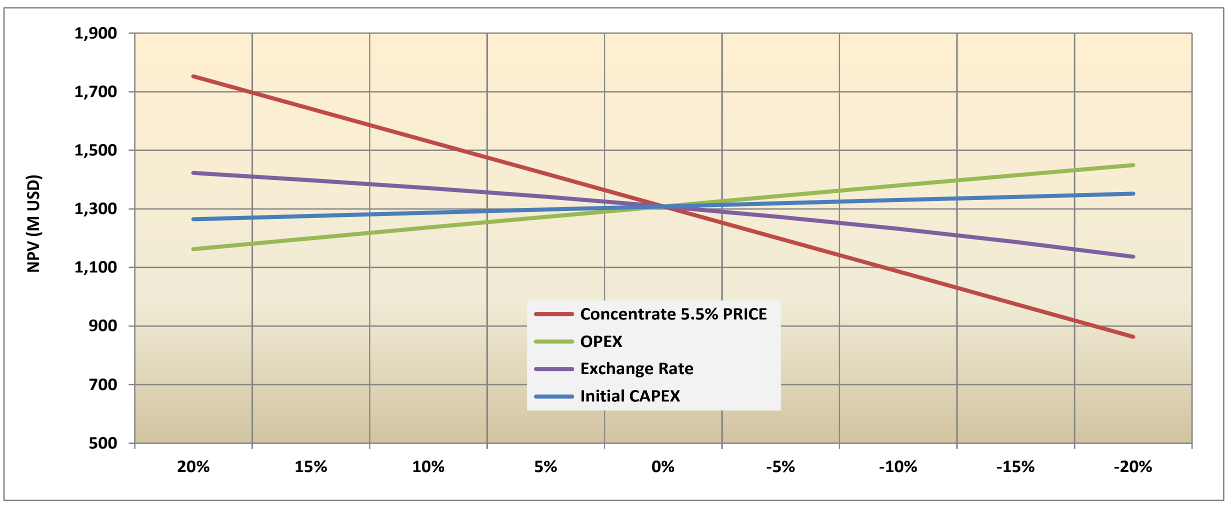


Figure 22-2: Sensitivity for Post-Tax NPV @ 8%

Table 22-10: Sensitivity post-tax IRR

Δ%	Concentrate 5.5% PRICE		Exchange Rate		OPEX		Initial CAPEX	
(%)	US$/t (CIF Shanghai)	IRR (%)	BRL/US$	IRR (%)	Total US$/t Ore	IRR (%)	(US$M)	IRR (%)
20%	2,770.2	48.7%	6.08	45.7%	77.17	36.1%	334.7	36.2%
15%	2,654.7	46.7%	5.83	44.4%	73.96	37.2%	320.7	37.1%
10%	2,539.3	44.6%	5.58	43.1%	70.74	38.2%	306.8	38.1%
5%	2,423.9	42.5%	5.32	41.8%	67.52	39.3%	292.8	39.2%
0%	2,308.5	40.3%	5.07	40.3%	64.31	40.3%	278.9	40.3%
-5%	2,193.0	38.1%	4.82	38.8%	61.09	41.4%	264.9	41.6%
-10%	2,077.6	35.8%	4.56	37.2%	57.88	42.4%	251.0	42.9%
-15%	1,962.2	33.5%	4.31	35.5%	54.66	43.4%	237.0	44.3%
-20%	1,846.8	31.1%	4.06	33.6%	51.45	44.4%	223.1	45.8%

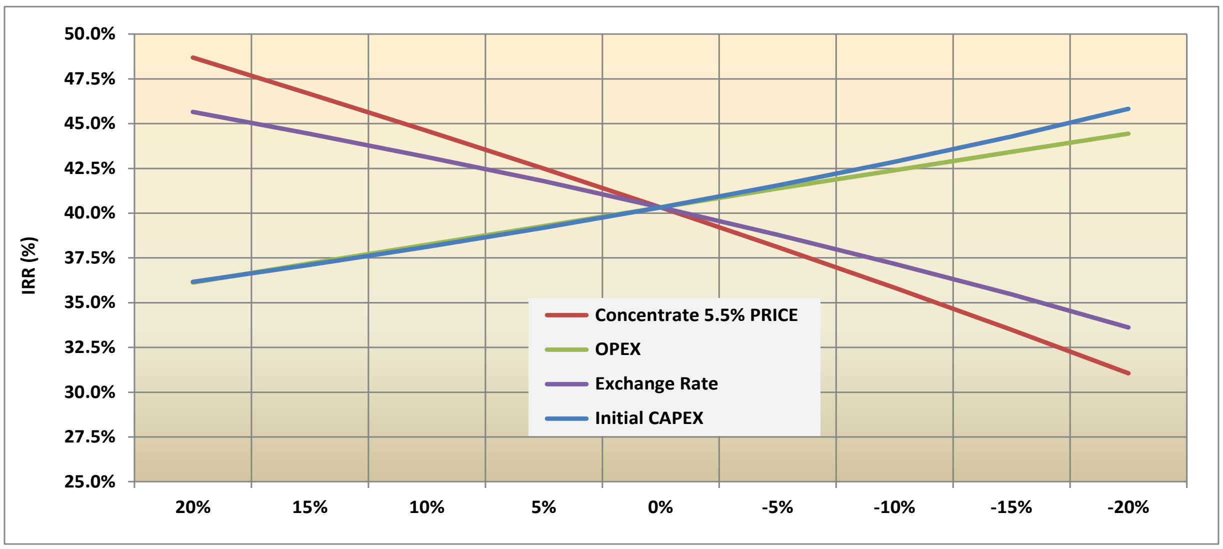


Figure 22-3: Sensitivity for Post-Tax IRR

22.3.2 Sensitivity Analysis – NPV x Discount Rate

Table 22-11 and Figure 22-4 present a sensitivity analysis showing the Project's NPV in a range of discount rates between 6% to 10%.

Table 22-11: Sensitivity for Post-Tax, Unlevered NPV x Discount RATE

Discount Rate	
(%)	NPV (US$ M)
6.0%	1,627.3
6.5%	1,540.4
7.0%	1,458.6
7.5%	1,381.4
8.0%	1,308.6

Discount Rate	
(%)	NPV (US$ M)
8.5%	1,239.9
9.0%	1,175.1
9.5%	1,113.9
10.0%	1,056.1

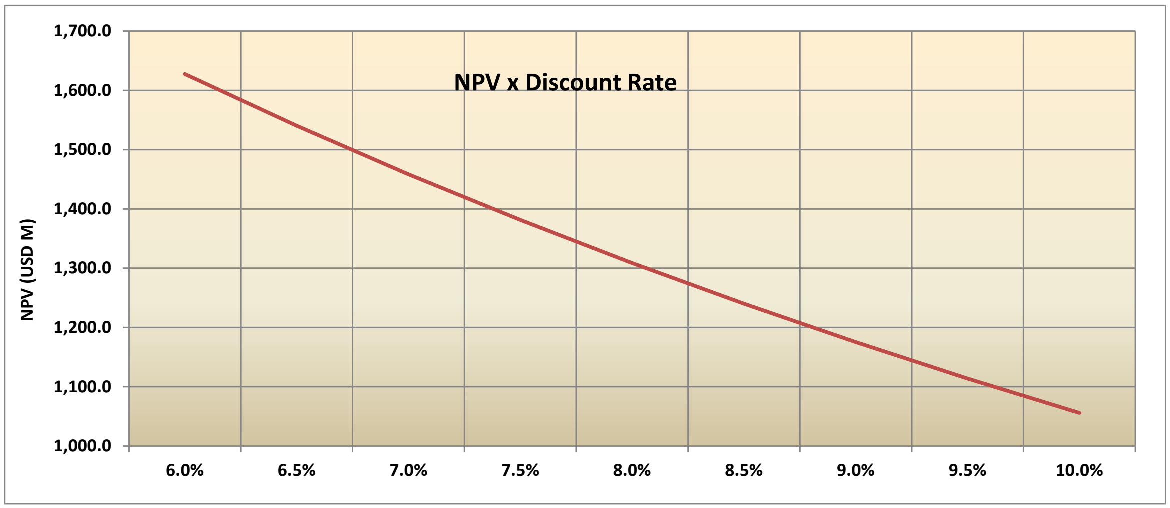


Figure 22-4: Sensitivity Post-Tax, Unlevered NPV x Discount Rate

22.4 Financial Projections

Table 22-12: Production Flow

Annual Projections		Project Year->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OPERATING FLOW		**Total LOM**															
MINING																	
ROM	(000t)	**17,203**	830.2	1,240.5	1,300.9	1,112.0	1,178.3	1,265.6	1,287.7	1,268.9	1,257.5	1,275.9	1,305.1	1,279.3	1,302.7	1,298.6	-
Li2O grade in ROM	(%)	**1.16**	1.08	1.12	0.99	1.08	1.17	1.14	1.18	1.17	1.11	1.19	1.20	1.22	1.22	1.29	-
PROCESSING																	
Metallurgical Recovery SPO Concentrate !	(%)	**68.9%**	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	0.0%
Total SPO Concentrate 5.5 %	(000t)	**2,492.8**	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
LOGISTICS																	
Output to Shanghai	(000t)	**2,492.8**	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
SPO Concentrate 5.5 %	"	**2,492.8**	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-

Table 22-13: Annual Projections: OPEX, SPO Logistics and Other Costs

Annual Projections		Project Year->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OPEX, SPO LOGISTICS AND OTHER COSTS		**Total LOM**															
OPEX																	
Annual costs	(000USD)	**1,106.3**	68.9	79.5	75.0	76.6	77.3	83.0	79.4	79.8	82.1	81.4	83.5	82.1	78.6	79.1	0.0
Mining	"	**631.9**	37.2	45.5	40.7	43.4	43.7	49.0	45.2	45.7	48.1	47.2	49.2	48.0	44.3	44.8	0.0
Processing	"	**422.8**	29.2	30.2	30.4	29.9	30.1	30.3	30.3	30.3	30.3	30.3	30.4	30.3	30.4	30.4	0.0
G&A	"	**51.6**	2.5	3.7	3.9	3.3	3.5	3.8	3.9	3.8	3.8	3.8	3.9	3.8	3.9	3.9	0.0
Unit Costs	(USD/t ROM)	**64.31**	82.97	64.05	57.63	68.92	65.60	65.62	61.66	62.88	65.31	63.77	64.01	64.19	60.33	60.91	0.00
Mining	"	**36.73**	44.76	36.68	31.29	39.02	37.07	38.68	35.09	36.01	38.24	37.01	37.73	37.49	34.01	34.53	0.00
Processing	"	**24.58**	35.21	24.37	23.35	26.90	25.52	23.93	23.56	23.87	24.07	23.76	23.28	23.70	23.32	23.38	0.00
G&A	"	**3.00**	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
SPO LOGISTICS COSTS																	
Annual costs	(000USD)	**280.4**	12.6	19.6	18.1	16.9	19.4	20.3	21.4	20.9	19.7	21.4	22.1	22.0	22.4	23.6	0.0
Unit Costs	(USD/t ROM)	**16.30**	15.23	15.77	13.94	15.21	16.47	16.05	16.62	16.47	15.63	16.76	16.90	17.18	17.18	18.20	0.00
	(USD/t SPO Conc.)	**112.47**	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	0.00
OTHER COSTS																	
Annual costs	(000USD)	**65.5**	1.6	2.8	3.1	3.2	4.0	4.5	5.3	5.6	5.3	5.8	5.9	5.9	6.0	6.3	0.0
Royalties	"	**58.3**	1.3	2.3	2.6	2.8	3.5	4.0	4.8	5.1	4.8	5.2	5.4	5.4	5.5	5.8	0.0
TRFM	"	**7.2**	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Unit Costs	(USD/t ROM)	**3.81**	1.94	2.28	2.40	2.90	3.37	3.56	4.14	4.44	4.24	4.51	4.55	4.62	4.62	4.87	0.00
Royalties	"	**3.39**	1.52	1.86	1.99	2.48	2.95	3.14	3.72	4.03	3.82	4.10	4.13	4.20	4.20	4.45	0.00
TRFM	"	**0.42**	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.00
TOTAL OPEX, SPO LOGISTICS & OTHER COSTS		**1,452.2**	83.1	101.8	96.2	96.8	100.7	107.9	106.1	106.3	107.1	108.5	111.5	110.0	107.0	109.1	0.0

Table 22-14: Profit and Loss Statement

Annual Projections		Project Year->	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PRODUCTION SUMMARY																			
ROM	(000t)	**17,203.1**	-	-	830.2	1,240.5	1,300.9	1,112.0	1,178.3	1,265.6	1,287.7	1,268.9	1,257.5	1,275.9	1,305.1	1,279.3	1,302.7	1,298.6	-
Li2O grade in ROM	(%)	**1.16%**	0.00%	0.00%	1.08%	1.12%	0.99%	1.08%	1.17%	1.14%	1.18%	1.17%	1.11%	1.19%	1.20%	1.22%	1.22%	1.29%	0.00%
Metallurgical Recovery																			
Li2O concentrate 5.5%	(%)	**68.9%**	0.0%	0.0%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	0.0%
Total Products delivered		**2,492.8**	-	-	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
Li2O concentrate 5.5%	(000t)	**2,492.8**	-	-	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
PROFIT & LOSS																			
GROSS REVENUE	(000USD)	**5,833.0**	**0.0**	**0.0**	**126.3**	**231.2**	**258.7**	**275.7**	**348.1**	**397.4**	**479.5**	**511.2**	**480.6**	**522.7**	**539.2**	**537.4**	**547.2**	**577.9**	**0.0**
Li2O concentrate 5.5%	(000USD)	**5,833.0**	0.0	0.0	126.3	231.2	258.7	275.7	348.1	397.4	479.5	511.2	480.6	522.7	539.2	537.4	547.2	577.9	0.0
Sales volume	(000t)	**2,492.8**	0.0	0.0	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	0.0
Concentrate Price	(USD/t)	**2,339.9**	0.0	0.0	1,122.9	1,329.2	1,604.2	1,833.3	2,016.7	2,200.0	2,520.8	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0	0.0
(-) Deductions	(000USD)	**(116.7)**	**0.0**	**0.0**	**(2.5)**	**(4.6)**	**(5.2)**	**(5.5)**	**(7.0)**	**(7.9)**	**(9.6)**	**(10.2)**	**(9.6)**	**(10.5)**	**(10.8)**	**(10.7)**	**(10.9)**	**(11.6)**	**0.0**
CFEM	"	**(116.7)**	0.0	0.0	(2.5)	(4.6)	(5.2)	(5.5)	(7.0)	(7.9)	(9.6)	(10.2)	(9.6)	(10.5)	(10.8)	(10.7)	(10.9)	(11.6)	0.0
(=) Net Revenue	(000USD)	**5,716.3**	**0.0**	**0.0**	**123.7**	**226.6**	**253.5**	**270.1**	**341.1**	**389.4**	**470.0**	**500.9**	**471.0**	**512.3**	**528.4**	**526.6**	**536.2**	**566.4**	**0.0**
(-) OPERATING COSTS	(000USD)	**(1,452.2)**	**0.0**	**0.0**	**(83.1)**	**(101.8)**	**(96.2)**	**(96.8)**	**(100.7)**	**(107.9)**	**(106.1)**	**(106.3)**	**(107.1)**	**(108.5)**	**(111.5)**	**(110.0)**	**(107.0)**	**(109.1)**	**0.0**
OPEX	"	**(1,106.3)**	0.0	0.0	(68.9)	(79.5)	(75.0)	(76.6)	(77.3)	(83.0)	(79.4)	(79.8)	(82.1)	(81.4)	(83.5)	(82.1)	(78.6)	(79.1)	0.0
SPO Logistics	"	**(280.4)**	0.0	0.0	(12.6)	(19.6)	(18.1)	(16.9)	(19.4)	(20.3)	(21.4)	(20.9)	(19.7)	(21.4)	(22.1)	(22.0)	(22.4)	(23.6)	0.0
Other Costs	"	**(65.5)**	0.0	0.0	(1.6)	(2.8)	(3.1)	(3.2)	(4.0)	(4.5)	(5.3)	(5.6)	(5.3)	(5.8)	(5.9)	(5.9)	(6.0)	(6.3)	0.0
(=) EBITDA	(000USD)	**4,264.2**	**0.0**	**0.0**	**40.6**	**124.7**	**157.3**	**173.4**	**240.4**	**281.6**	**363.8**	**394.6**	**363.9**	**403.8**	**416.9**	**416.6**	**429.3**	**457.3**	**0.0**
EBITDA Margin	*(%)*	***76.8%***	-	-	*32.2%*	*53.9%*	*60.8%*	*62.9%*	*69.1%*	*70.9%*	*75.9%*	*77.2%*	*75.7%*	*77.2%*	*77.3%*	*77.5%*	*78.4%*	*79.1%*	-
(-) Depreciation	(000USD)	**(327.0)**	**0.0**	**0.0**	**(66.0)**	**(72.9)**	**(39.0)**	**(22.6)**	**(22.6)**	**(9.2)**	**(8.7)**	**(6.6)**	**(8.4)**	**(9.3)**	**(10.7)**	**(8.9)**	**(7.0)**	**(32.2)**	**(2.8)**
(=) EBIT		**3,937.1**	**0.0**	**0.0**	**(25.4)**	**51.8**	**118.2**	**150.8**	**217.9**	**272.4**	**355.2**	**388.0**	**355.5**	**394.4**	**406.2**	**407.7**	**422.2**	**425.1**	**(2.8)**
(-) Corporate Tax Payable	(000USD)	**(597.4)**	**0.0**	**0.0**	**0.0**	**(5.5)**	**(13.1)**	**(23.0)**	**(33.2)**	**(41.5)**	**(54.2)**	**(59.2)**	**(54.2)**	**(60.2)**	**(61.9)**	**(62.2)**	**(64.4)**	**(64.8)**	**0.0**
IRPJ	"	**(979.4)**	0.0	0.0	0.0	(9.1)	(21.5)	(37.7)	(54.5)	(68.1)	(88.8)	(97.0)	(88.9)	(98.6)	(101.6)	(101.9)	(105.6)	(106.3)	0.0
CSLL	"	**(352.6)**	0.0	0.0	0.0	(3.3)	(7.7)	(13.6)	(19.6)	(24.5)	(32.0)	(34.9)	(32.0)	(35.5)	(36.6)	(36.7)	(38.0)	(38.3)	0.0
SUDENE Benefit	"	**734.5**	0.0	0.0	0.0	6.8	16.1	28.3	40.8	51.1	66.6	72.8	66.7	74.0	76.2	76.4	79.2	79.7	0.0
(=) Net Profit After Taxes		**3,339.7**	**0.0**	**0.0**	**(25.4)**	**46.3**	**105.1**	**127.8**	**184.6**	**230.9**	**301.0**	**328.9**	**301.3**	**334.3**	**344.3**	**345.5**	**357.8**	**360.3**	**(2.8)**

Table 22-15: Project Free Cash Flow

Annual Projections		Project Year->	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Net Profit After Taxes		**3,339.7**	**0.0**	**0.0**	**(25.4)**	**46.3**	**105.1**	**127.8**	**184.6**	**230.9**	**301.0**	**328.9**	**301.3**	**334.3**	**344.3**	**345.5**	**357.8**	**360.3**	**(2.8)**
(+) Depreciation	(000USD)	**327.0**	**0.0**	**0.0**	**66.0**	**72.9**	**39.0**	**22.6**	**22.6**	**9.2**	**8.7**	**6.6**	**8.4**	**9.3**	**10.7**	**8.9**	**7.0**	**32.2**	**2.8**
(-) TOTAL CAPEX	(000USD)	**(363.3)**	**(63.4)**	**(161.9)**	**(53.9)**	**(16.8)**	**(3.0)**	**(6.4)**	**(3.2)**	**(10.1)**	**(2.6)**	**(4.7)**	**(7.0)**	**(7.4)**	**(8.9)**	**(3.3)**	**(5.4)**	**(2.6)**	**(2.8)**
Total Initial Capex	"	**(279.2)**	**(63.4)**	**(161.9)**	**(53.9)**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Initial CAPEX cost	"	**(260.5)**	(59.1)	(151.1)	(50.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recoverable taxes	"	**(18.6)**	(4.2)	(10.8)	(3.6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sustaining Capital	"	**(81.4)**	**0.0**	**0.0**	**0.0**	**(16.8)**	**(3.0)**	**(6.4)**	**(3.2)**	**(10.1)**	**(2.6)**	**(4.7)**	**(7.0)**	**(7.4)**	**(8.9)**	**(3.3)**	**(5.4)**	**(2.6)**	**0.0**
Sustaining Capital cost	"	**(67.0)**	0.0	0.0	0.0	(14.3)	(2.3)	(5.2)	(2.4)	(8.6)	(2.0)	(3.8)	(5.7)	(6.1)	(7.5)	(2.6)	(4.4)	(1.9)	0.0
Recoverable Taxes	"	**(14.4)**	0.0	0.0	0.0	(2.5)	(0.6)	(1.2)	(0.8)	(1.5)	(0.6)	(0.9)	(1.3)	(1.3)	(1.5)	(0.7)	(1.0)	(0.7)	0.0
Mine Closure	"	**(2.8)**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.8)
Mine Closure cost	"	**(2.8)**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.8)
Recoverable Taxes	"	**0.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(+) ECA EQUIPMENT FINANCING	(000USD)	**(4.0)**	**3.2**	**7.3**	**0.3**	**(4.8)**	**(4.9)**	**(3.9)**	**(1.2)**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
CAPEX phase	"	**13.1**	**3.2**	**7.3**	**2.6**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Drawdown	"	**20.4**	4.2	11.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Repayment		**(7.3)**	(1.0)	(3.8)	(2.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operations phase		**(17.8)**	0.0	0.0	(2.5)	(5.0)	(5.0)	(4.0)	(1.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Repayment	"	**(17.8)**	0.0	0.0	(2.5)	(5.0)	(5.0)	(4.0)	(1.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Expenses Tax Shield		**0.7**	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(-/+) WORKING CAPITAL MOVEMENTS	"	**0.0**	**(0.6)**	**(9.0)**	**(17.5)**	**(25.4)**	**(7.0)**	**(4.1)**	**(17.8)**	**(11.9)**	**(20.4)**	**(7.8)**	**7.6**	**(10.4)**	**(4.0)**	**0.4**	**(2.6)**	**(7.6)**	**138.2**
Working Capital			**0.0**	**0.0**	**30.3**	**56.4**	**63.0**	**67.3**	**85.2**	**97.5**	**117.6**	**125.4**	**118.0**	**128.3**	**132.5**	**132.0**	**134.2**	**141.9**	**0.0**
Receivables			0.0	0.0	31.1	57.0	63.8	68.0	85.8	98.0	118.2	126.0	118.5	128.9	133.0	132.5	134.9	142.5	0.0
Inventories			0.0	0.0	1.5	1.9	1.7	1.8	1.8	2.0	1.9	1.9	2.0	1.9	2.0	2.0	1.8	1.8	0.0
Payables			0.0	0.0	(2.4)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	0.0
ROM stockplile movement		**0.0**	(0.6)	(9.0)	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(+/-) Recoverable Taxes Cash Flow and Off	(000USD)	**(76.0)**	**0.0**	**0.4**	**(1.0)**	**(5.5)**	**2.6**	**(3.0)**	**(6.5)**	**(7.1)**	**(6.8)**	**(7.0)**	**(7.0)**	**(6.9)**	**(6.9)**	**(7.4)**	**(6.8)**	**(7.1)**	**0.0**
Recoverable taxes payable on OPEX		**(193.7)**	**0.0**	**0.0**	**(9.9)**	**(13.0)**	**(12.6)**	**(13.2)**	**(13.5)**	**(15.1)**	**(14.0)**	**(14.3)**	**(14.6)**	**(14.8)**	**(15.1)**	**(15.0)**	**(14.2)**	**(14.4)**	**0.0**
PIS/COFINS		**(82.1)**	0.0	0.0	(4.4)	(5.6)	(5.4)	(5.6)	(5.7)	(6.3)	(5.9)	(6.0)	(6.2)	(6.2)	(6.3)	(6.3)	(6.0)	(6.1)	0.0
ICMS		**(52.6)**	0.0	0.0	(2.5)	(3.5)	(3.3)	(3.6)	(3.6)	(4.2)	(3.8)	(3.9)	(4.1)	(4.1)	(4.2)	(4.1)	(3.8)	(3.9)	0.0
PIS/COFINS credits offset		**105.3**	**0.0**	**0.0**	**8.0**	**6.7**	**14.3**	**9.3**	**6.1**	**7.2**	**6.4**	**6.5**	**6.8**	**7.0**	**7.4**	**6.7**	**6.5**	**6.4**	**0.0**
Against corporate taxes payable		**81.7**	0.0	0.0	0.0	5.5	13.1	8.1	4.9	6.0	5.2	5.3	5.6	5.8	6.2	5.5	5.3	5.2	0.0
Against other federal taxes payable		**23.6**	0.0	0.0	8.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0
ICMS credits sale		**12.3**	**0.0**	**0.4**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.9**	**0.0**
(=) FREE CASH FLOW	(000USD)	**3,223.4**	(60.8)	(163.2)	(31.6)	66.7	132.0	133.0	178.5	211.0	279.9	315.9	303.3	318.9	335.1	344.1	350.1	375.2	135.3
Accumulated Free Cash Flow	(000USD)		(60.8)	(224.0)	(255.6)	(188.9)	(56.9)	76.1	254.6	465.6	745.5	1,061.4	1,364.7	1,683.6	2,018.7	2,362.8	2,712.9	3,088.1	3,223.4
Avg. Number of periods			0.50	1.50	2.50	3.50	4.50	5.50	6.50	7.50	8.50	9.50	10.50	11.50	12.50	13.50	14.50	15.50	16.50
Discount factor @8% p.y.			0.0	0.0	1.0	1.0	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discounted Free Cash Flow	(000USD)	**1,308.8**	(58.5)	(145.4)	(26.0)	51.0	93.3	87.1	108.2	118.4	145.5	152.1	135.2	131.6	128.1	121.8	114.7	113.8	38.0
Nbr of Payback periods	(years)	**3.4**	0.0	0.0	1.0	1.0	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Internal Rate of Return (IRR)	(% p.y.)	**40.3%**																	
PRE-TAX CASH FLOW		**3,820.8**	(60.8)	(163.2)	(31.6)	72.3	145.1	156.0	211.7	252.5	334.1	375.1	357.5	379.0	397.1	406.3	414.4	440.0	135.3
Discounted Pre-Tax Cash Flow @8% p.y.		**1,572.9**	(58.5)	(145.4)	(26.0)	55.2	102.6	102.2	128.4	141.8	173.7	180.6	159.3	156.4	151.7	143.8	135.8	133.5	38.0

22.0 ECONOMIC ANALYSIS

Section 22 was written by L&M Assessoria Empresarial (L&M Advisory) the information and opinions contained herein are those of L&M Advisory.

22.1 Introduction

This summary details the results of the economic analysis for the Bandeira Project Feasibility Study.

The economic analysis of the project was completed by L&M Advisory, based on information provided by AtkinsRéalis, through the files: General CAPEX: BAN-0000-33KB-10000_Rev_1_20240510_RevLM11_Polly.xlsx and Opex Plant: BAN-0000-33KC-10000_Rev_2_OPEX_A.xlsx, which is responsible for the mine and processing plant, production schedule, capital and operating costs for the mine, processing plant, infrastructure and logistics. We also received information from the market study and product price forecast for Spodumene concentrate (SPO). L&M Advisory was in charge of the estimation of tax impacts on the Project including revenue, operating costs, capital expenditures and profits. The tax rates used are all according to Brazilian tax legislation as well as the applicable tax benefits to be negotiated with the Minas Gerais State Government.

The main tool used for the analyses is an Excel-based discounted cash-flow model developed by L&M Advisory. The purpose of this model is to assess the key economic metrics and to identify and assess the key value drivers of the Project. From a technical/operational point of view it is a high-level model focused on detailed tax implications and resulting Project economics appropriate for this phase of the Project's development.

22.2 Main Assumptions and Parameters

The following sections outline the main assumptions used for this economic analysis.

22.2.1 Production

The annual production rate varies from year to year and is based on a design capacity of 1.3 Mt/a of ore feed. The expected LOM is 14 years, including ramp up and down. The average SPO concentrate at 5.50% Li_2O is estimated to be 178 kt/a.

Table 22.12 summarizes the annual feed to the plant with the respective mineral grades, masses of ore and waste mined, metallurgical recoveries and plant production.

22.2.2 Initial CAPEX

The initial after-tax capital cost is US$279.2 million, including an allowance for contingencies of US$33.7 million, equivalent to 13.7% of the total initial CAPEX. The capital cost expenditure disbursement schedule is shown in Table 22-1.

For the project's development phase (CAPEX phase), MGLIT has adopted the option of financing some of the main mining equipment. The financing should be guaranteed by EKN (Swedish Export Credit Agency), under the conditions and terms presented by SANDVIK, a potential supplier of such equipment, through its banking partner.

The cash flow projections for the drawdown and repayment of the financing are presented in Table 22-2. The positive balance related to financing provides a reduction in the total disbursement during the CAPEX phase by US$13.1 million to a net value of US$266.1 million.

Table 22-1: Initial CAPEX (US$ M)

Year	CIF + Non Recoverable Taxes	Recoverable Taxes	Total
-2	59.1	4.2	63.4
-1	151.1	10.8	161.9
1	50.3	3.6	53.9
Total CAPEX	260.5	18.6	279.2
Mining Equipment Financing Net Cash Flow			13.1
Total disbursement CAPEX phase			266.1

Table 22-2: Mining Equipment Financing (US$ M)

Year	CAPEX Phase			Operations Phase	Total Financing Cash Flow
	Drawdown	Financing Repayment	Total CAPEX Phase	Financing Repayment	
-2	4.2	(1.0)	3.2	0.0	3.2
-1	11.0	(3.8)	7.3	0.0	7.3
1	5.1	(2.5)	2.6	(2.5)	0.1
2	0.0	0.0	0.0	(5.0)	(5.0)
3	0.0	0.0	0.0	(5.0)	(5.0)
4	0.0	0.0	0.0	(4.0)	(4.0)
5	0.0	0.0	0.0	(1.3)	(1.3)
	20.4	**(7.3)**	**13.1**	**(17.8)**	**(4.7)**

22.2.3 Sustaining Capital and Mine Closure

The total capital expenditure during operation is estimated at US$84.2 millions. The Supporting Capital, which includes replacement or refurbishment of mining mobile equipment, equipment for the processing plant, and other infrastructure, amounts to US$81.4 millions.

The total estimated Mine Closure costs amount to US$2.8 millions and is planned to be spent in Year 15, starting immediately after commercial production shuts down.

The sustaining capital annual schedule and mine closure costs, including recoverable and non-recoverable taxes, are detailed in Table 22-3.

Table 22-3: Sustaining Capital and Mine Closure (US$ M)

Year	Sustaining Capital CIF + Non recoverable Taxes	Recoverable Taxes	Total Sustaining Capital	Mine Closure Costs	Total Sustaining Capital + Mine Closure Costs
2	14.3	2.5	16.8	0.0	16.8
3	2.3	0.6	3.0	0.0	3.0
4	5.2	1.2	6.4	0.0	6.4
5	2.4	0.8	3.2	0.0	3.2
6	8.6	1.5	10.1	0.0	10.1
7	2.0	0.6	2.6	0.0	2.6
8	3.8	0.9	4.7	0.0	4.7
9	5.7	1.3	7.0	0.0	7.0
10	6.1	1.3	7.4	0.0	7.4
11	7.5	1.5	8.9	0.0	8.9
12	2.6	0.7	3.3	0.0	3.3
13	4.4	1.0	5.4	0.0	5.4
14	1.9	0.7	2.6	0.0	2.6
15	0.0	0.0	0.0	2.8	2.8
Total	**67.0**	**14.4**	**81.4**	**2.8**	**84.2**

22.2.4 OPEX, SPO Logistics and Other Costs

The average LOM OPEX for the Project is US$64.33/t of ore feed to plant. The annual average of all operating costs amounts to US$79.0 millions. The summary of the operating costs by activity showing percentual participation in totals is presented in Table 22-4.

Table 22-4: OPEX

Activity	LOM Annual Average (US$ M)	Unit LOM Cost (USD/t of ROM)	Part%
Mining	45.1	36.70	57.0%
Processing	30.2	24.63	38.3%
SG&A	3.7	3.00	4.7%
Total OPEX	**79.0**	**64.33**	**100.0%**

The unitary cost for the transport of the SPO concentrate from the plant site to Shanghai port is US$112.56/t. The details of the logistics costs are presented in Table 22-5. The annual average of all Logistics costs amounts to US$20.0 million.

Table 22-5: SPO Logistics Costs

	LOM Annual Average (US$M)	Unit LOM Cost (USD/t of SPO Conc.)	Part%
Transport Plant - Ilhéus	7.64	42.43	37.7%
Logistic Operation	1.44	7.78	6.9%
Port Costs	0.44	2.35	2.1%
Transport Ilhéus - Shanghai	10.73	60.00	53.3%
Total SPO Logistics Costs	**20.25**	**112.56**	**100.0%**

In addition to OPEX and SPO Logistics, items grouped as Other Costs include Royalties to Landowners, equivalent to 1% of the gross revenue and TFRM (Taxa de Controle, Monitoramento e Fiscalização das Atividades de Pesquisa, Lavra, Exploração e Aproveitamento de Recursos Minerários), a fee due to the Minas Gerais State Government. The annual average of Other Costs amounts to US$2.9 million, equivalent to US$3.81/t of ore feed to the plant.

The detailed, year-by-year LOM projections of total costs and unit costs per ton of ore by activity are shown in Table 22-13.

22.2.5 Revenue

The projections of gross revenue are based on the quantity of SPO Concentrate to be sold at the price forecasted for the Project’s life period. The prices are expressed in real dollars for 2024 on the basis of CIF Shanghai. Logistics cost for the product transport from the MGLIT site to its final destination, the Port of Shanghai, is based on the Logistics Study carried out by AtkinsRéalis and allocated as an SPO Logistics cost.

Table 22.6 shows yearly prices, CIF Shanghai basis, for the SPO concentrate to be produced by MGLIT (5.5% Li_2O). The methodology adopted for the price forecast, as well as the complete forecast, is detailed in Section 19.

Table 22-6: SPO Concentrate sale price (CIF Shanghai)

Project Year	Concentrate 5.5% Li_2O (US$/t)
1	1,122.9
2	1,329.2
3	1,604.2
4	1,833.3
5	2,016.7
6	2,200.0
7	2,520.8
8	2,750.0
9	2,750.0
10	2,750.0
11	2,750.0

Project Year	Concentrate 5.5% Li_2O (US$/t)
12	2,750.0
13	2,750.0
14	2,750.0

The annual average gross revenue during the production period is US$416.6 million. A royalty is due to the government (CFEM) on sales at the rate of 2.0%.

The net revenue, after deduction of CFEM, averages US$408.3 millions during the same period. The CFEM taxation is detailed in Section 22.2.6.

22.2.6 Taxation

The tax analysis for the Bandeira Project takes into consideration current tax laws applied to capital costs, operating costs, SPO Concentrate sales and profits. This work was developed from the identification and analysis of the basic taxes applicable to the various activities of the Project and respective tax benefits provided for by the legislation of each tax, whether at the federal, state, or municipal level.

The relevant taxes included in the analysis are summarized in Table 22-7.

Table 22-7: List of Taxes

Federal Level	
II	Importation Tax
IPI	Tax over Industrialized Products
IRPJ	Corporate Income Tax
CSLL	Social Contribution on Net Income
COFINS	Contribution to Social Security Financing
PIS	Social Integration Program
CFEM	Financial Compensation for the Exploration of Mineral Resources
AFRMM	Additional to Freight for Merchant Marine Renewal
IOF	Financial Operation Tax
State Level - MG	
ICMS	Tax on Operations Relating to the Circulation of Goods and on the Provision of Interstate and Intermunicipal Transport and Communication Services
DIFAL	Supplement related to the ICMS Rate Differential
TFRM	Control, Monitoring and Inspection Fee for Research, Mining, Exploration and Use of Mining Resources Activities
Municipal Level	
ISSQN	Tax on Services of Any Nature

TAXES ON SPO CONCENTRATE SALES

Federal Level Taxes: PIS, COFINS and IPI:

SPO Concentrate is classified as "NT", that is, not taxed by the IPI (TIPI – Incidence table over IPI by NCM 2530.90.10).

ICMS: 100.0% for sales outside Brazil (exports):

The ICMS law of Minas Gerais follows the legislation applied since 1988 and its subsequent amendments. For sales outside Brazil (exports) there will be no ICMS levy. The legislation of Minas Gerais ensures the maintenance of all ICMS credits on the purchase of equipment, inputs and electricity.

CFEM Royalty

Royalty paid to the Federal Government – Financial Compensation for the Exploration of Mineral Resources (CFEM).

For the SPO Concentrate, the applicable CFEM rate is 2%. CFEM is calculated based on sales revenue.

Taxes on CAPEX and OPEX

Tax analysis on the CAPEX and OPEX was developed using the cost estimates prepared by AtkinsRéalis. Tax classification requires very detailed work, based on the General Rules of the Common External Tariff (TEC) of Mercosul (Southern Common Market) and on the Industrialized Products Tax Table (TIPI), as defined in legislation. Basic incidence of taxes at federal, state and municipal levels was applied, as well as tax benefits provided for by legislation, considering the activity and location of the Project. Taxation on the CAPEX and OPEX estimates, on project's revenue and profits, including applicable tax benefits, were updated according to the current tax legislation in 2024.

Taxes on Profits

Corporate income tax (IRPJ):

Brazilian corporate income tax is a federal tax charged on the net taxable income. It applies at a basic rate of 15% and a surplus of 10% on the annual income, totaling a 25% load. IRPJ payable may be reduced if the company obtain a benefit from SUDENE.

Social contribution on net profits (CSLL):

Social contribution (CSLL) is applied on a similar calculation basis as defined for the corporate income tax. The applicable rate of CSLL is 9% on net income.

SUDENE Incentives

The Project is considered eligible for the tax incentive granted by the Superintendence of the Development of the Northeast (SUDENE). This incentive implies a reduction of 75% of the IRPJ due by the Project for ten years of production, as it is a new investment and is located in one of the

Municipalities of the State of Minas Gerais benefited by the SUDENE Tax Incentives Law. This is the case of the Municipality of Araçuaí Vale do Jequitinhonha.

Two 10-year periods of 75% reduction in income tax payable were considered in this study. The first period awarded is expected to start in Year 1, during the last year of the ramp-up phase of the project, and end in Year 10. A second ten-year benefit period, if granted, would be based on the modernization of the plant, expected to take place early in Year 10 and remain in place until the end of the mine's life, Year 14.

22.2.7 Evaluation Base Date and Others

The evaluation base dated is the beginning of Year -2. All financial modelling and analysis work is based in real terms as of 2024 using real, ungeared, discount rate the economic model projections exclude any project debt financing but include equipment financing. The project funding is assumed to be through equity for the purposes of this report.

Economic projections are reported in 2024 US dollars utilizing a base case exchange rate of BRL/US$= 5.07. This exchange rate was utilized for the Initial Capital estimation, as well as the long-term rate during operation of the mine including Operating Costs, Sustaining Capital and Mine Closure costs. Project economics at a range of ex-change rates (+/- 20%) are assessed as part of project sensitivity analysis in item 22.4.1.

The base case exchange rate of BRL/US$= 5.07 is within the range of historical actual rates over the past 2 years as shown in Figure 22-1. The forecasted exchange rate adopted is in accordance with the median of the forecasts for the period 2024 to 2027 of the Top 5 Brazilian independent market analysts listed in the Banco Central do Brasil weekly publication “Focus Market Readout”.

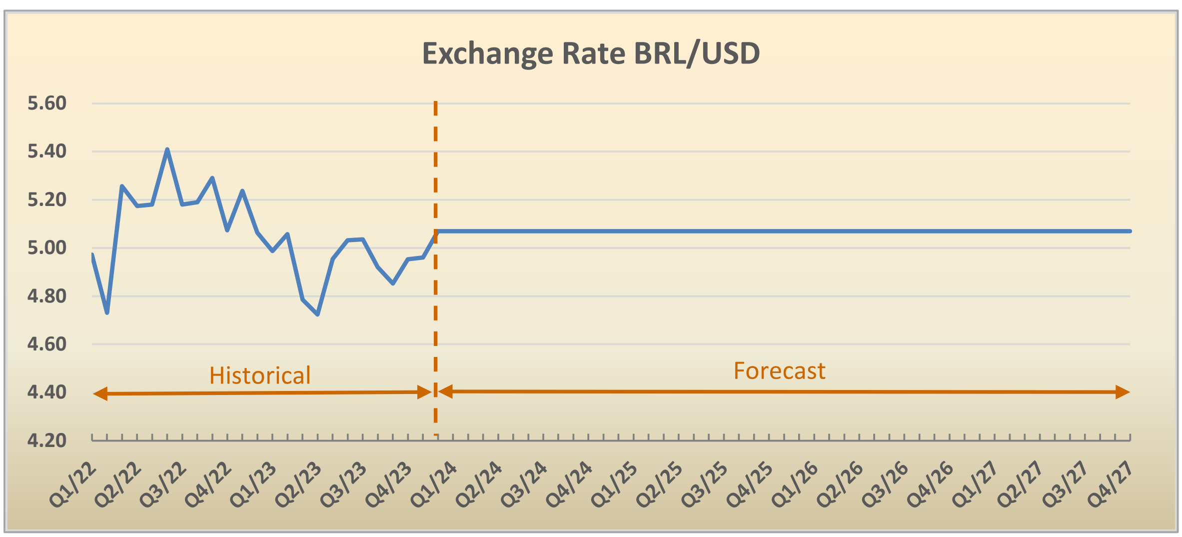


Figure 22-1: Exchange Rate BRL/US$

22.2.8 Cash Flow Analysis

The Project's estimated post-tax, unlevered net present value (NPV) is US$1,308.8 millioin using a discount rate of 8.0%. The post-tax, unlevered Internal Rate of Return (IRR) is 40.3% and the average annual earnings before interest, taxes, depreciation and amortization (EBITDA) is US$304.6 millioin. The total undiscounted free cash flow generated over the life of the project is US$3,223.4 millioin and the payback period after the startup of the operations is 3.4 years (41 months). Table 22-8 summarizes the financial results.

Based on the assumptions used in this feasibility study, the Project is economically viable, given the significantly positive NPV and IRR as compared to the discount rate adopted.

Table 22-8: Financial Results Summary

Financial Analysis	Unit	Post-Tax
NPV@8%	(US$M)	1,308.8
Payback(*)	(Years)	3.4
IRR	(%)	40.3%
Profitability Ratio	(%)	544.7%
EBITDA (**)	(US$M)	304.6
Total Cash Flow	**(US$M)**	**3,223.4**

Notes: (*) Undiscounted, after start-up (**) Annual average

22.3 Sensitivity Analysis

The sensitivity analysis shows the impact of adjusting key input variables on the Project's NPV and IRR.

In assessing the sensitivity of the project returns, each of these inputs is varied independently of the others. Scenarios combining beneficial or adverse variations simultaneously in two or more variables will have a more marked effect on the economics of the Project than will the individual variations considered. The sensitivity analysis has been conducted assuming no change to the mine plan or schedule.

The following item 22.4.1 shows sensitivity analyses of the Project´s NPV and IRR to Key Input Variables. In item 22.4.2, a sensitivity analysis showing the Project's NPV in a range of discount rates between 6% to 10% is presented.

22.3.1 Sensitivity Analysis to Key Input Variables – After Tax, Unlevered NPV and IRR

As with most mining operations, the cash flows of the project are sensitive not only to commodity prices. The DCFM therefore was varied in a range of +/- 20% for the key input variables as follows:

- SPO Concentrate price.
- CAPEX.
- OPEX.
- Exchange rate BRL/USD.

Table 22-9 and Figure 22-2 present the results of the sensitivity analysis for the project's NPV on an after-tax unlevered basis and for each of the critical variables. NPV results are reported at a discount rate of 8%. Table 22-10 and Figure 22-3 present the same for the IRR. As can be seen, the project's returns are highly sensitive to the SPO Concentrate sales price and exchange rate and, to a lesser extent, to operating costs and capital expenditures.

Table 22-9: Sensitivity for Post-Tax NPV @ 8%

Δ%	Concentrate PRICE (Ref. 5.5% Li_2O)		Exchange Rate		OPEX		Initial CAPEX	
(%)	US$/t (CIF Shanghai)	NPV@8% (US$ M)	BRL/US$	NPV@8% (US$ M)	Total US$/t Ore	NPV@8% (US$ M)	(US$ M)	NPV@8% (US$ M)
20%	2,770.2	1,752.4	6.08	1,422.7	77.17	1,162.8	334.7	1,265.1
15%	2,654.7	1,641.5	5.83	1,397.9	73.96	1,199.8	320.7	1,276.0
10%	2,539.3	1,530.6	5.58	1,370.9	70.74	1,236.3	306.8	1,286.9
5%	2,423.9	1,419.7	5.32	1,341.3	67.52	1,272.6	292.8	1,297.7
0%	2,308.5	1,308.6	5.07	1,308.6	64.31	1,308.6	278.9	1,308.6
-5%	2,193.0	1,197.5	4.82	1,272.5	61.09	1,344.4	264.9	1,319.5
-10%	2,077.6	1,086.3	4.56	1,232.3	57.88	1,379.7	251.0	1,330.3
-15%	1,962.2	974.9	4.31	1,187.4	54.66	1,414.9	237.0	1,341.1
-20%	1,846.8	863.5	4.06	1,136.6	51.45	1,449.7	223.1	1,351.9

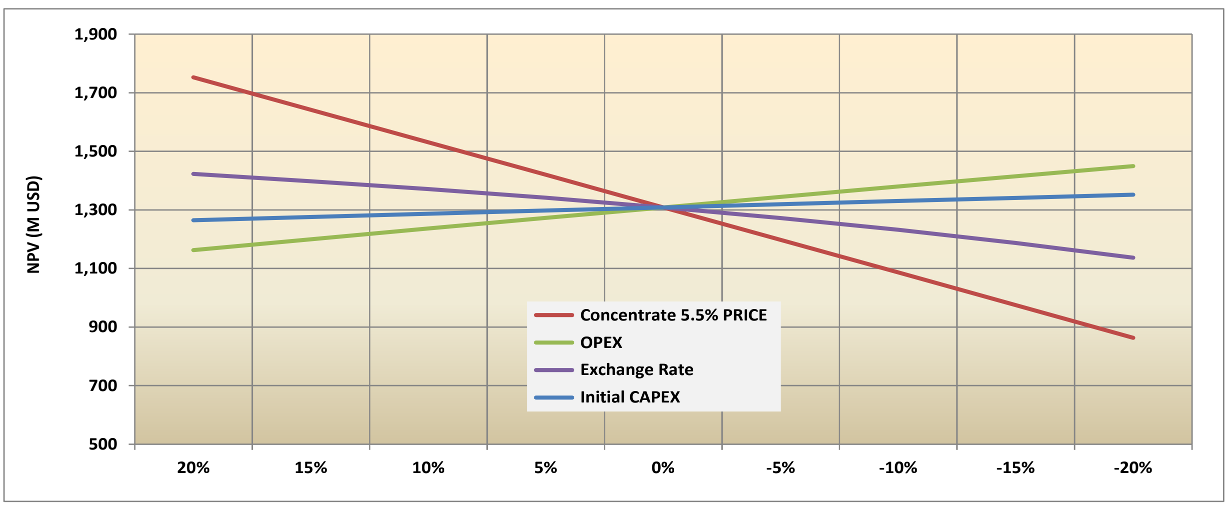


Figure 22-2: Sensitivity for Post-Tax NPV @ 8%

Table 22-10: Sensitivity post-tax IRR

Δ%	Concentrate 5.5% PRICE		Exchange Rate		OPEX		Initial CAPEX	
(%)	US$/t (CIF Shanghai)	IRR (%)	BRL/US$	IRR (%)	Total US$/t Ore	IRR (%)	(US$M)	IRR (%)
20%	2,770.2	48.7%	6.08	45.7%	77.17	36.1%	334.7	36.2%
15%	2,654.7	46.7%	5.83	44.4%	73.96	37.2%	320.7	37.1%
10%	2,539.3	44.6%	5.58	43.1%	70.74	38.2%	306.8	38.1%
5%	2,423.9	42.5%	5.32	41.8%	67.52	39.3%	292.8	39.2%
0%	2,308.5	40.3%	5.07	40.3%	64.31	40.3%	278.9	40.3%
-5%	2,193.0	38.1%	4.82	38.8%	61.09	41.4%	264.9	41.6%
-10%	2,077.6	35.8%	4.56	37.2%	57.88	42.4%	251.0	42.9%
-15%	1,962.2	33.5%	4.31	35.5%	54.66	43.4%	237.0	44.3%
-20%	1,846.8	31.1%	4.06	33.6%	51.45	44.4%	223.1	45.8%

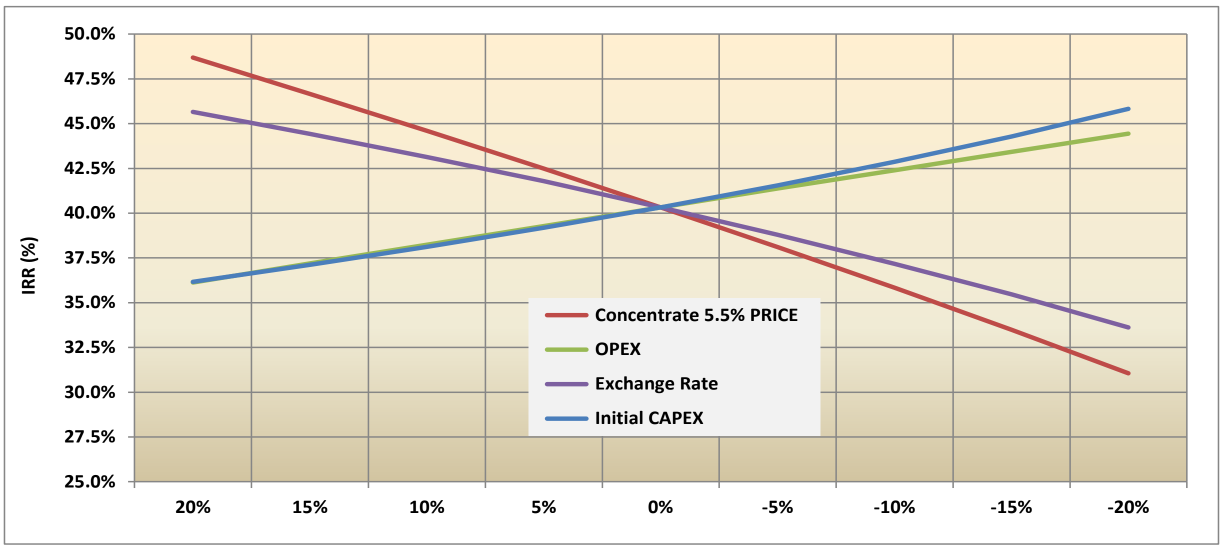


Figure 22-3: Sensitivity for Post-Tax IRR

22.3.2 Sensitivity Analysis – NPV x Discount Rate

Table 22-11 and Figure 22-4 present a sensitivity analysis showing the Project's NPV in a range of discount rates between 6% to 10%.

Table 22-11: Sensitivity for Post-Tax, Unlevered NPV x Discount RATE

Discount Rate	
(%)	NPV (US$ M)
6.0%	1,627.3
6.5%	1,540.4
7.0%	1,458.6
7.5%	1,381.4
8.0%	1,308.6

Discount Rate	
8.5%	1,239.9
9.0%	1,175.1
9.5%	1,113.9
10.0%	1,056.1

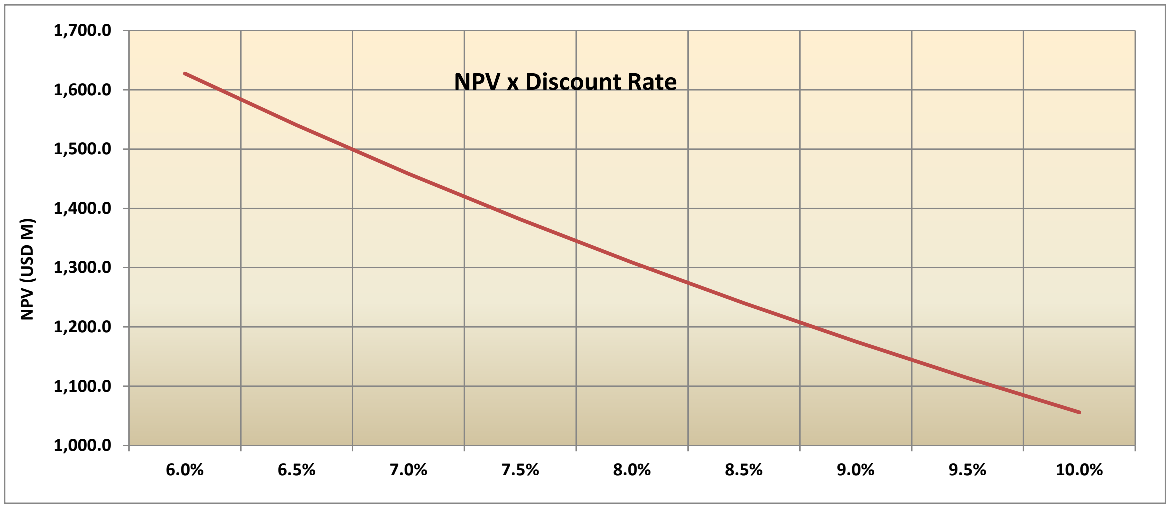


Figure 22-4: Sensitivity Post-Tax, Unlevered NPV x Discount Rate

22.4 Financial Projections

Table 22-12: Production Flow

Annual Projections		Project Year->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OPERATING FLOW		**Total LOM**															
MINING																	
ROM	(000t)	**17,203**	830.2	1,240.5	1,300.9	1,112.0	1,178.3	1,265.6	1,287.7	1,268.9	1,257.5	1,275.9	1,305.1	1,279.3	1,302.7	1,298.6	-
Li2O grade in ROM	(%)	**1.16**	1.08	1.12	0.99	1.08	1.17	1.14	1.18	1.17	1.11	1.19	1.20	1.22	1.22	1.29	-
PROCESSING																	
Metallurgical Recovery SPO Concentrate	(%)	**68.9%**	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	0.0%
Total SPO Concentrate 5.5 %	(000t)	**2,492.8**	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
LOGISTICS																	
Output to Shanghai	(000t)	**2,492.8**	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
SPO Concentrate 5.5 %	"	**2,492.8**	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-

Table 22-13: Annual Projections: OPEX, SPO Logistics and Other Costs

Annual Projections		Project Year->	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OPEX, SPO LOGISTICS AND OTHER COSTS		**Total LOM**															
OPEX																	
Annual costs	(000USD)	**1,106.3**	68.9	79.5	75.0	76.6	77.3	83.0	79.4	79.8	82.1	81.4	83.5	82.1	78.6	79.1	0.0
Mining	"	**631.9**	37.2	45.5	40.7	43.4	43.7	49.0	45.2	45.7	48.1	47.2	49.2	48.0	44.3	44.8	0.0
Processing	"	**422.8**	29.2	30.2	30.4	29.9	30.1	30.3	30.3	30.3	30.3	30.3	30.4	30.3	30.4	30.4	0.0
G&A	"	**51.6**	2.5	3.7	3.9	3.3	3.5	3.8	3.9	3.8	3.8	3.8	3.9	3.8	3.9	3.9	0.0
Unit Costs	(USD/t ROM)	**64.31**	82.97	64.05	57.63	68.92	65.60	65.62	61.66	62.88	65.31	63.77	64.01	64.19	60.33	60.91	0.00
Mining	"	**36.73**	44.76	36.68	31.29	39.02	37.07	38.68	35.09	36.01	38.24	37.01	37.73	37.49	34.01	34.53	0.00
Processing	"	**24.58**	35.21	24.37	23.35	26.90	25.52	23.93	23.56	23.87	24.07	23.76	23.28	23.70	23.32	23.38	0.00
G&A	"	**3.00**	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	0.00
SPO LOGISTICS COSTS																	
Annual costs	(000USD)	**280.4**	12.6	19.6	18.1	16.9	19.4	20.3	21.4	20.9	19.7	21.4	22.1	22.0	22.4	23.6	0.0
Unit Costs	(USD/t ROM)	**16.30**	15.23	15.77	13.94	15.21	16.47	16.05	16.62	16.47	15.63	16.76	16.90	17.18	17.18	18.20	0.00
	(USD/t SPO Conc.)	**112.47**	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	112.47	0.00
OTHER COSTS																	
Annual costs	(000USD)	**65.5**	1.6	2.8	3.1	3.2	4.0	4.5	5.3	5.6	5.3	5.8	5.9	5.9	6.0	6.3	0.0
Royalties	"	**58.3**	1.3	2.3	2.6	2.8	3.5	4.0	4.8	5.1	4.8	5.2	5.4	5.4	5.5	5.8	0.0
TRFM	"	**7.2**	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.0
Unit Costs	(USD/t ROM)	**3.81**	1.94	2.28	2.40	2.90	3.37	3.56	4.14	4.44	4.24	4.51	4.55	4.62	4.62	4.87	0.00
Royalties	"	**3.39**	1.52	1.86	1.99	2.48	2.95	3.14	3.72	4.03	3.82	4.10	4.13	4.20	4.20	4.45	0.00
TRFM	"	**0.42**	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.00
TOTAL OPEX, SPO LOGISTICS & OTHER COSTS		**1,452.2**	83.1	101.8	96.2	96.8	100.7	107.9	106.1	106.3	107.1	108.5	111.5	110.0	107.0	109.1	0.0

Table 22-14: Profit and Loss Statement

Annual Projections		Project Year->	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PRODUCTION SUMMARY																			
ROM	(000t)	**17,203.1**	-	-	830.2	1,240.5	1,300.9	1,112.0	1,178.3	1,265.6	1,287.7	1,268.9	1,257.5	1,275.9	1,305.1	1,279.3	1,302.7	1,298.6	-
Li2O grade in ROM	(%)	**1.16%**	0.00%	0.00%	1.08%	1.12%	0.99%	1.08%	1.17%	1.14%	1.18%	1.17%	1.11%	1.19%	1.20%	1.22%	1.22%	1.29%	0.00%
Metallurgical Recovery																			
Li2O concentrate 5.5%	(%)	**68.9%**	0.0%	0.0%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	68.9%	0.0%
Total Products delivered		**2,492.8**	-	-	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
Li2O concentrate 5.5%	(000t)	**2,492.8**	-	-	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	-
PROFIT & LOSS																			
GROSS REVENUE	(000USD)	**5,833.0**	**0.0**	**0.0**	**126.3**	**231.2**	**258.7**	**275.7**	**348.1**	**397.4**	**479.5**	**511.2**	**480.6**	**522.7**	**539.2**	**537.4**	**547.2**	**577.9**	**0.0**
Li2O concentrate 5.5%	(000USD)	**5,833.0**	0.0	0.0	126.3	231.2	258.7	275.7	348.1	397.4	479.5	511.2	480.6	522.7	539.2	537.4	547.2	577.9	0.0
Sales volume	(000t)	**2,492.8**	0.0	0.0	112.5	173.9	161.2	150.4	172.6	180.6	190.2	185.9	174.8	190.1	196.1	195.4	199.0	210.2	0.0
Concentrate Price	(USD/t)	**2,339.9**	0.0	0.0	1,122.9	1,329.2	1,604.2	1,833.3	2,016.7	2,200.0	2,520.8	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0	2,750.0	0.0
(-) Deductions	(000USD)	**(116.7)**	**0.0**	**0.0**	**(2.5)**	**(4.6)**	**(5.2)**	**(5.5)**	**(7.0)**	**(7.9)**	**(9.6)**	**(10.2)**	**(9.6)**	**(10.5)**	**(10.8)**	**(10.7)**	**(10.9)**	**(11.6)**	**0.0**
CFEM	"	**(116.7)**	0.0	0.0	(2.5)	(4.6)	(5.2)	(5.5)	(7.0)	(7.9)	(9.6)	(10.2)	(9.6)	(10.5)	(10.8)	(10.7)	(10.9)	(11.6)	0.0
(=) Net Revenue	(000USD)	**5,716.3**	**0.0**	**0.0**	**123.7**	**226.6**	**253.5**	**270.1**	**341.1**	**389.4**	**470.0**	**500.9**	**471.0**	**512.3**	**528.4**	**526.6**	**536.2**	**566.4**	**0.0**
(-) OPERATING COSTS	(000USD)	**(1,452.2)**	**0.0**	**0.0**	**(83.1)**	**(101.8)**	**(96.2)**	**(96.8)**	**(100.7)**	**(107.9)**	**(106.1)**	**(106.3)**	**(107.1)**	**(108.5)**	**(111.5)**	**(110.0)**	**(107.0)**	**(109.1)**	**0.0**
OPEX	"	**(1,106.3)**	0.0	0.0	(68.9)	(79.5)	(75.0)	(76.6)	(77.3)	(83.0)	(79.4)	(79.8)	(82.1)	(81.4)	(83.5)	(82.1)	(78.6)	(79.1)	0.0
SPO Logistics	"	**(280.4)**	0.0	0.0	(12.6)	(19.6)	(18.1)	(16.9)	(19.4)	(20.3)	(21.4)	(20.9)	(19.7)	(21.4)	(22.1)	(22.0)	(22.4)	(23.6)	0.0
Other Costs	"	**(65.5)**	0.0	0.0	(1.6)	(2.8)	(3.1)	(3.2)	(4.0)	(4.5)	(5.3)	(5.6)	(5.3)	(5.8)	(5.9)	(5.9)	(6.0)	(6.3)	0.0
(=) EBITDA	(000USD)	**4,264.2**	**0.0**	**0.0**	**40.6**	**124.7**	**157.3**	**173.4**	**240.4**	**281.6**	**363.8**	**394.6**	**363.9**	**403.8**	**416.9**	**416.6**	**429.3**	**457.3**	**0.0**
EBITDA Margin	*(%)*	***76.8%***	-	-	*32.2%*	*53.9%*	*60.8%*	*62.9%*	*69.1%*	*70.9%*	*75.9%*	*77.2%*	*75.7%*	*77.2%*	*77.3%*	*77.5%*	*78.4%*	*79.1%*	-
(-) Depreciation	(000USD)	**(327.0)**	**0.0**	**0.0**	**(66.0)**	**(72.9)**	**(39.0)**	**(22.6)**	**(22.6)**	**(9.2)**	**(8.7)**	**(6.6)**	**(8.4)**	**(9.3)**	**(10.7)**	**(8.9)**	**(7.0)**	**(32.2)**	**(2.8)**
(=) EBIT		**3,937.1**	**0.0**	**0.0**	**(25.4)**	**51.8**	**118.2**	**150.8**	**217.9**	**272.4**	**355.2**	**388.0**	**355.5**	**394.4**	**406.2**	**407.7**	**422.2**	**425.1**	**(2.8)**
(-) Corporate Tax Payable	(000USD)	**(597.4)**	**0.0**	**0.0**	**0.0**	**(5.5)**	**(13.1)**	**(23.0)**	**(33.2)**	**(41.5)**	**(54.2)**	**(59.2)**	**(54.2)**	**(60.2)**	**(61.9)**	**(62.2)**	**(64.4)**	**(64.8)**	**0.0**
IRPJ	"	**(979.4)**	0.0	0.0	0.0	(9.1)	(21.5)	(37.7)	(54.5)	(68.1)	(88.8)	(97.0)	(88.9)	(98.6)	(101.6)	(101.9)	(105.6)	(106.3)	0.0
CSLL	"	**(352.6)**	0.0	0.0	0.0	(3.3)	(7.7)	(13.6)	(19.6)	(24.5)	(32.0)	(34.9)	(32.0)	(35.5)	(36.6)	(36.7)	(38.0)	(38.3)	0.0
SUDENE Benefit	"	**734.5**	0.0	0.0	0.0	6.8	16.1	28.3	40.8	51.1	66.6	72.8	66.7	74.0	76.2	76.4	79.2	79.7	0.0
(=) Net Profit After Taxes		**3,339.7**	**0.0**	**0.0**	**(25.4)**	**46.3**	**105.1**	**127.8**	**184.6**	**230.9**	**301.0**	**328.9**	**301.3**	**334.3**	**344.3**	**345.5**	**357.8**	**360.3**	**(2.8)**

Table 22-15: Project Free Cash Flow

Annual Projections		Project Year->	-2	-1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Net Profit After Taxes		3,339.7	0.0	0.0	(25.4)	46.3	105.1	127.8	184.6	230.9	301.0	328.9	301.3	334.3	344.3	345.5	357.8	360.3	(2.8)
(+) Depreciation	(000USD)	327.0	0.0	0.0	66.0	72.9	39.0	22.6	22.6	9.2	8.7	6.6	8.4	9.3	10.7	8.9	7.0	32.2	2.8
(-) TOTAL CAPEX	(000USD)	(363.3)	(63.4)	(161.9)	(53.9)	(16.8)	(3.0)	(6.4)	(3.2)	(10.1)	(2.6)	(4.7)	(7.0)	(7.4)	(8.9)	(3.3)	(5.4)	(2.6)	(2.8)
Total Initial Capex	"	(279.2)	(63.4)	(161.9)	(53.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Initial CAPEX cost	"	(260.5)	(59.1)	(151.1)	(50.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Recoverable taxes	"	(18.6)	(4.2)	(10.8)	(3.6)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Sustaining Capital	"	(81.4)	0.0	0.0	0.0	(16.8)	(3.0)	(6.4)	(3.2)	(10.1)	(2.6)	(4.7)	(7.0)	(7.4)	(8.9)	(3.3)	(5.4)	(2.6)	0.0
Sustaining Capital cost	"	(67.0)	0.0	0.0	0.0	(14.3)	(2.3)	(5.2)	(2.4)	(8.6)	(2.0)	(3.8)	(5.7)	(6.1)	(7.5)	(2.6)	(4.4)	(1.9)	0.0
Recoverable Taxes	"	(14.4)	0.0	0.0	0.0	(2.5)	(0.6)	(1.2)	(0.8)	(1.5)	(0.6)	(0.9)	(1.3)	(1.3)	(1.5)	(0.7)	(1.0)	(0.7)	0.0
Mine Closure	"	(2.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.8)
Mine Closure cost	"	(2.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2.8)
Recoverable Taxes	"	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(+) ECA EQUIPMENT FINANCING	(000USD)	(4.0)	3.2	7.3	0.3	(4.8)	(4.9)	(3.9)	(1.2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CAPEX phase	"	13.1	3.2	7.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drawdown	"	20.4	4.2	11.0	5.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Repayment		(7.3)	(1.0)	(3.8)	(2.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Operations phase		(17.8)	0.0	0.0	(2.5)	(5.0)	(5.0)	(4.0)	(1.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Repayment	"	(17.8)	0.0	0.0	(2.5)	(5.0)	(5.0)	(4.0)	(1.3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financing Expenses Tax Shield		0.7	0.0	0.0	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(-/+) WORKING CAPITAL MOVEMENTS	"	0.0	(0.6)	(9.0)	(17.5)	(25.4)	(7.0)	(4.1)	(17.8)	(11.9)	(20.4)	(7.8)	7.6	(10.4)	(4.0)	0.4	(2.6)	(7.6)	138.2
Working Capital			0.0	0.0	30.3	56.4	63.0	67.3	85.2	97.5	117.6	125.4	118.0	128.3	132.5	132.0	134.2	141.9	0.0
Receivables			0.0	0.0	31.1	57.0	63.8	68.0	85.8	98.0	118.2	126.0	118.5	128.9	133.0	132.5	134.9	142.5	0.0
Inventories			0.0	0.0	1.5	1.9	1.7	1.8	1.8	2.0	1.9	1.9	2.0	1.9	2.0	2.0	1.8	1.8	0.0
Payables			0.0	0.0	(2.4)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	0.0
ROM stockplile movement		0.0	(0.6)	(9.0)	9.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(+/-) Recoverable Taxes Cash Flow and Off	(000USD)	(76.0)	0.0	0.4	(1.0)	(5.5)	2.6	(3.0)	(6.5)	(7.1)	(6.8)	(7.0)	(7.0)	(6.9)	(6.9)	(7.4)	(6.8)	(7.1)	0.0
Recoverable taxes payable on OPEX		(193.7)	0.0	0.0	(9.9)	(13.0)	(12.6)	(13.2)	(13.5)	(15.1)	(14.0)	(14.3)	(14.6)	(14.8)	(15.1)	(15.0)	(14.2)	(14.4)	0.0
PIS/COFINS		(82.1)	0.0	0.0	(4.4)	(5.6)	(5.4)	(5.6)	(5.7)	(6.3)	(5.9)	(6.0)	(6.2)	(6.2)	(6.3)	(6.3)	(6.0)	(6.1)	0.0
ICMS		(52.6)	0.0	0.0	(2.5)	(3.5)	(3.3)	(3.6)	(3.6)	(4.2)	(3.8)	(3.9)	(4.1)	(4.1)	(4.2)	(4.1)	(3.8)	(3.9)	0.0
PIS/COFINS credits offset		105.3	0.0	0.0	8.0	6.7	14.3	9.3	6.1	7.2	6.4	6.5	6.8	7.0	7.4	6.7	6.5	6.4	0.0
Against corporate taxes payable		81.7	0.0	0.0	0.0	5.5	13.1	8.1	4.9	6.0	5.2	5.3	5.6	5.8	6.2	5.5	5.3	5.2	0.0
Against other federal taxes payable		23.6	0.0	0.0	8.0	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	0.0
ICMS credits sale		12.3	0.0	0.4	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.0
(=) FREE CASH FLOW	(000USD)	3,223.4	(60.8)	(163.2)	(31.6)	66.7	132.0	133.0	178.5	211.0	279.9	315.9	303.3	318.9	335.1	344.1	350.1	375.2	135.3
Accumulated Free Cash Flow	(000USD)		(60.8)	(224.0)	(255.6)	(188.9)	(56.9)	76.1	254.6	465.6	745.5	1,061.4	1,364.7	1,683.6	2,018.7	2,362.8	2,712.9	3,088.1	3,223.4
Avg. Number of periods			0.50	1.50	2.50	3.50	4.50	5.50	6.50	7.50	8.50	9.50	10.50	11.50	12.50	13.50	14.50	15.50	16.50
Discount factor @8% p.y.			0.0	0.0	1.0	1.0	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Discounted Free Cash Flow	(000USD)	1,308.8	(58.5)	(145.4)	(26.0)	51.0	93.3	87.1	108.2	118.4	145.5	152.1	135.2	131.6	128.1	121.8	114.7	113.8	38.0
Nbr of Payback periods	(years)	3.4	0.0	0.0	1.0	1.0	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Internal Rate of Return (IRR)	(% p.y.)	40.3%																	
PRE-TAX CASH FLOW		3,820.8	(60.8)	(163.2)	(31.6)	72.3	145.1	156.0	211.7	252.5	334.1	375.1	357.5	379.0	397.1	406.3	414.4	440.0	135.3
Discounted Pre-Tax Cash Flow @8% p.y.		1,572.9	(58.5)	(145.4)	(26.0)	55.2	102.6	102.2	128.4	141.8	173.7	180.6	159.3	156.4	151.7	143.8	135.8	133.5	38.0

23.0 ADJACENT PROPERTIES

The Araçuaí Pegmatitic District, in the northeastern sector of the Brazil's Eastern Pegmatitic Province, covers the region of the Minas Gerais municipalities of Salinas, Araçuaí, and Capelinha, to the west, and Itinga and Caraí, to the east. In this district, Brazil's largest lithium producer, hundreds of pegmatites occur, including litiniferous pegmatites, gemological pegmatites, and pegmatites producing ceramic minerals and ornamental rocks, many of which have been exploited by mineral exploration and mining companies, and prospectors, for more than a century.

The Bandeira lithium ore deposit, under ANM mining right 832439/2009, is adjacent to the spodumene-bearing pegmatite minerals of CBL's Cachoeira mine, and the Barreiro, Murial, and Lavra do Meio deposits of Sigma Lithium Corporation.

Immediately to the north of the Bandeira deposit are CBL's concessions, totalling 411.66 ha, where the Cachoeira mine has been in continuous production since 1991. To the south and east of the Bandeira deposit are the Sigma Lithium Corporation concessions, with a total area of 1,506.75 ha. The Barreiro deposit has Measured and Indicated Mineral Resources of 25 Mt, with an average lithium oxide content of 1.38% (Table 23-1); the Measured and Indicated resources for the Murial deposit are 5.5 Mt, with an average content of 1.14% Li_2O; and the Lavra do Meio deposit contains 2.3 Mt of Measured and Indicated resources, with an average content of 1.09% Li_2O (Delboni Jr. et al, 2033).

Figure 23-1 shows the locations of CBL and Sigma Lithium's mineral rights near MGLIT's mining rights.

Table 23-1: Estimated Resources of the Sigma Lithium Deposits

Deposit	Li_2O Cut-Off Grade (%)	Classification	Mass (t)	Li_2O Average Grade (%)	LCE (kt)
Barreiro	0.5	Measured	18,741,000	1.41	653.5
		Indicated	6,341,000	1.30	203.9
		Measured + Indicated	25,081,000	1.38	857.4
		Inferred	3,825,000	1.39	131.5
Murial	0.5	Measured	4,175,000	1.17	120.8
		Indicated	1,389,000	1.04	35.7
		Measured + Indicated	5,564,000	1.14	156.5
		Inferred	669,000	1.06	17.5
Lavra do Meio	0.5	Measured	1,626,000	1.16	44.6
		Indicated	649,000	0.93	14.9
		Measured + Indicated	2,275,000	1.09	59.5
		Inferred	261,000	0.87	5.6

Source: Delboni, Jr. et al. (2023, pp. 243, 252, 263).
Note: LCE = Lithium Carbonate Equivalent

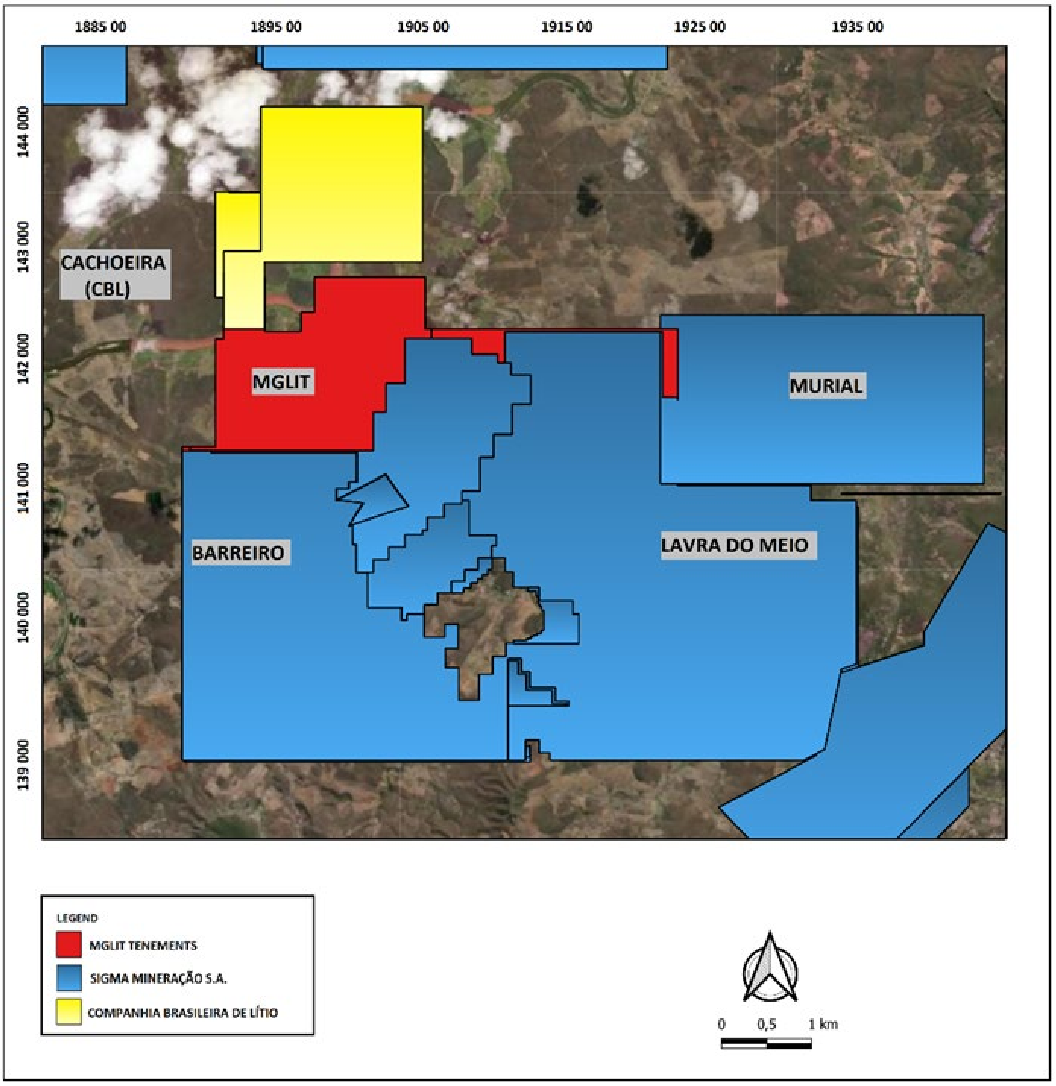


Figure 23-1: MGLIT Mining Rights 832439/2009 (Red) and Surrounding Areas of CBL and Sigma Lithium

24.0 OTHER RELEVANT INFORMATION

24.1 Cooperation Agreement with the Government of Minas Gerais

On July 19, 2023, the Minas Gerais government and MGLIT signed a cooperation agreement, an MOU, to prioritize and speed requests with state government secretariats and agencies regarding lithium ore exploration and deployment projects in MGLIT's Jequitinhonha Valley (Lithium Ionic, 2023, July 19).

24.2 Electric Power Connection Agreement with Centrais Elétricas de Minas Gerais

On October 31, 2023, MGLIT signed a contract with Centrais Elétricas de Minas Gerais (CEMIG) to connect electricity to the Bandeira Project. The Project foresees the construction of the 138 kV transmission line and a substation to connect to the industrial unit's distribution substation. The substation is expected to be energized by October 1, 2025 (Lithium Ionic, 2023, October 13).

24.3 Lithium Decree of 1997

The lithium decree was created on December 4, 1997, benefiting Brazilian companies that explore and produce lithium compounds in Brazil. The decree ensures their priority in the national market.

Decrees No. 4,338, dated August 19, 2002, No. 5,473 dated June 21, 2005, and No. 10,577 dated December 14, 2020, renewed the objective of maintaining the Brazilian lithium market for domestic producers.

On July 5, 2022, through Decree No. 11,120, the Brazilian market was opened for import and export for lithium ores and minerals and their compounds.

25.0 INTERPRETATION AND CONCLUSIONS

This Technical Report outlines the requirements and needs for operating an underground mine equipped with two ramps, and a spodumene DMS concentration plant that produces 5.50% Li2O concentrate as part of the Bandeira Project. The design production capacity of the plant is 1.3 Mt/a of ore. The report describes all the infrastructure necessary for removing ore from the mine, and its processing, including producing concentrate within the technical specifications for supply to the international market. The LOM mining plan defined an ore mass of 17.2 Mt with an average grade of 1.16% Li2O after operational dilution, to be mined over a period of 14 years of operation. All production of spodumene concentrate is expected to be exported through the port of Ilhéus to downstream lithium chemical compound conversion facilities in China, North America, and the European Union.

25.1 Geology and Mineral Resources

Mineral Resources are estimated in this Technical Report, limited to the areas outlined using the mining rights polygon, which comprises the Bandeira Property and the Reasonable Prospect for Eventual Economic Extraction—RPE3.

The Bandeira database contains 7,351 assay intervals covering 6,895 m, comprising 166 assays from trenches totalling 160 m and 7,185 assay intervals from drill holes totalling 6,735 m.

Advanced technology was employed in the Bandeira Project, with a set of solid-grade shells for estimation domains created using a 0.3% Li_2O (%) threshold. These interpretations were then transformed into a series of implicit three-dimensional (3-D) models aligned with the dominant strike directions of 235° and 140°. Additionally, weathering modelling was performed, considering the information provided in the core logs. The model was built from implicit modelling using Leapfrog 2023.2.

Based on the structural analysis results, the ordinary kriging (OK) estimation method was used on the Li_2O% and density variables.

The mathematical and geostatistical criterion for classifying the resource was based on the following:

- The Measured Mineral Resource classification referenced the 50 m of the average Euclidean distance to sample (AvgD) used in OK estimation with a minimum of seven composites in at least three different drill holes.
- The Indicated Mineral Resource classification referenced the 100 m of the AvgD used in OK with a minimum of seven composites in at least three different drill holes.
- The Inferred Mineral Resource classification contains all remaining estimated blocks.

The Mineral Resource estimate is limited to the area delimited by the polygon of the ANM mining right 832.439/2009 that makes up the Bandeira Project and the Reasonable Prospect for Eventual Economic Extraction—RPE3.

Bandeira's geological database contains:

- 7,185 chemical analyses for 6,735 m of diamond drilling
- 166 chemical analyses of 160 m of trench
- 7,351 chemical analyses from 6,895 m.

A set of envelopes for domain estimation was created using a cut-off grade of 0.3% Li_2O. These interpretations were then transformed into a series of 3-D models aligned to the dominant 140° and 320° dip directions. In addition, the altered ore was modelled using Leapfrog 2023.2 and considering the information provided by the geological description.

Based on the structural analysis results, the OK estimation method was used for the variables of lithium oxide content and density.

The mathematical and geostatistical criteria for the classification of the resource are as follows:

- The classification of Measured Mineral Resources was referenced with 50 m of the AvgD used in the OK estimation with a minimum of seven composites in at least three different boreholes.
- The Indicated Mineral Resources classification was referenced with 100 m of the AvgD used in OK with a minimum of seven composites in at least three different boreholes.
- The classification of Inferred Mineral Resources encompasses all remaining estimated blocks.

The Bandeira Mineral Resource estimates are summarized in Table 25-1.

Table 25-1: Bandeira Mineral Resource Estimate (0.5% Li_2O Cut-Off)

Category	Resource (Mt)	Grade (%Li_2O)	Contained LCE (kt)
Measured	3.42	1.39	117.61
Indicated	17.52	1.34	578.92
Measured + Indicated	**20.95**	**1.35**	**696.52**
Inferred	**16.91**	**1.40**	**583.53**

Notes:

1. The spodumene pegmatite domains were modelled using composites with Li2O grades greater than 0.3%.
2. The mineral resource estimates were prepared following CIM Estimation of Mineral Resources & Mineral Reserves Best Practice Guidelines, using geostatistical and classical methods, plus economic and mining parameters appropriate to the deposit.
3. Mineral Resources are not ore reserves or demonstrably economically recoverable.
   Grades were reported using dry density.
4. The effective date of the Mineral Resource estimate was November 13, 2023.
5. Geologist Carlos José Evangelista da Silva (MAIG #7868) is the QP responsible for the Mineral Resource estimate.
6. The Mineral Resource estimate numbers provided have been rounded to estimate relative precision. Values cannot be added accurately due to rounding.
7. The Mineral Resource estimate is delimited by Lithium Ionic Bandeira Target Claims (ANM).
8. The Mineral Resource estimate was estimated using OK in 12m x 12m x 4m blocks.
9. The Mineral Resource estimate report table was produced using Leapfrog Geo software.
10. The reported Mineral Resource estimate contains only fresh rock domains.
11. The Mineral Resource estimate was restricted by RPE3 with grade shells using 0.5% Li2O cut-off.
12. To convert percentage lithium (Li) to percentage lithium oxide (Li2O), multiply by 2.153; to convert Li to lithium carbonate (Li2CO3), multiply by 5.323. To convert a percentage of Li2O to Li2CO3, multiply by 2.472.

25.2 Industrial Plant

The process flowchart developed for the Bandeira Project is based on the usual practice of utilizing DMS to produce spodumene concentrate and has been used as a reference at the CBL operation in the Jequitinhonha Valley for more than 30 years.

Metallurgical tests performed with core samples from geological boreholes resulted in spodumene concentrates that comply with the minimum specifications of 5.50% Li2O and a maximum of 1.00% Fe2O3, with a metallurgical recovery of 68.86%.

The simple process flowchart includes two-stage crushing, screen classification, pre-concentration by ore sorter, DMS concentration of two crushed streams (−19.1 +0.5 mm) and (−7.5 +0.5 mm), and dewatering of the fine rejects below 0.5 mm.

The process design criteria are well supported with multiple rounds of bench and pilot scale testwork complete with mineralogy for understanding the deposit. This was done on composite and individual samples to de-risk deposit variability. The selected process flowsheet is demonstrated by adjacent operations, and the low complexity presents a low-risk and low-cost solution to processing ore from the Bandeira deposit.

25.3 Infrastructure

The infrastructure required to keep the industrial unit in operation with the necessary utilities, services, and accesses comprises the main and secondary substations, unpaved roads kept in good condition, administrative buildings, restaurant, industrial kitchen, medical clinic, warehouse, maintenance building, mine office, compressed-air distribution networks, fire pipeline, and drinking and process water.

25.4 Water Management

Water drawn from the Piauí and Jequitinhonha Rivers will be received directly in the water treatment unit tank and will be of sufficient quantity for the operation of all the units that make up the Project industrial plant. Rainwater runoff within the industrial areas will be directed through channels and pipes to tanks that will take it to the Piauí River. All surface mine-affected contact water is collected and treated prior to discharge at permitted discharge points.

25.5 Underground Mine

The Bandeira underground mine will be accessed by two ramps, which together should have a maximum mining capacity of 1.3 Mt/a of ore out of a calculated reserve of 17.2 Mt, with an average grade of 1.16% Li_2O after the planned dilution of 21%. In the northern part of the mine, the mining process to be adopted is sublevel stoping, and in the southeastern part, the process will be room and pillar stoping. The southeast body is expected to operate only for the first four years of the mine's operation. All ore from the mine will be extracted by blasting and transported from the mine to the plant using 45-tonne trucks

The selected mining method and respective design will be suitable for this deposit and is demonstrated by adjacent operations with a long operating history. The room and pillar operation will provide adequate ore supply to support the ramp up of the plant and sub-level stope portion of the mine until the site ramps up to full production by Year 2.

25.6 Geotechnical and Hydrogeology

These are two important components for the design and operation of the underground mine. In this feasibility study, conceptual studies were carried out by companies specializing in these disciplines: MLF (Mauri Ferreira, which provides technical consultancy to CBL), provided geotechnical support while MDGEO hydrogeology support. The design inputs provided were utilized in the underground mine design to ensure safety and operability.

25.7 Mineral Reserves Estimate and Mining Methods

The estimated Mineral Reserves for the Bandeira Project underground mine are deemed adequate and sufficient to support the proposed Project production rate.

Atkins Réalis concludes that the Bandeira Project's mine component is well developed and aligns with all international requirements for mine studies at the feasibility study level.

25.8 Environment

The environmental licensing process was filed with the Minas Gerais Department of Environment's Unidades Regionais de Regularização Ambiental (URA) (Regional Environmental Regularization Unit) on November 20, 2023. On January 26, 2024, MGLIT received notification from the responsible body that the documentation filed met the requirements and that the analysis of the process was beginning

25.9 Capital Cost Estimate

The estimated CAPEX was developed using the concept of the American Association Cost Estimation (AACE) Class III for an underground mine equipped with two ramps and an industrial spodumene concentration unit. The contingencies adopted for the mine and plant were 15%. The total estimated cost is US$266.1 million, with an assumed accuracy of −20 to +30% (Table 25-2).

Table 25-2: AACE Class III Capital Cost Estimate

Discipline	Vendor/Supplier (US$ M)	Services (US$ M)	Total (US$ M)
Direct Cost	**111.4**	**78.5**	**190.0**
Mine (Major Equipment)	22.9	-	22.9
Mine (Auxiliary Equipment)	19.3	2.2	21.5
Mine (Opening of the Shaft and Mine Ramp)	-	19.2	19.2
Mechanical Equipment	28.0	4.6	32.6
Platework	6.2	3.1	9.3
Architecture	2.4	3.8	6.3
Infrastructure	-	23.2	23.2

Discipline	Vendor/Supplier (US$ M)	Services (US$ M)	Total (US$ M)
Concrete	-	9.6	9.6
Piping	2.1	2.2	4.2
Instrumentation and Telecomunication	3.7	1.1	4.7
Electrical Equipment	10.5	1.2	11.7
Electrical Material	4.0	2.4	6.5
Underground Cables (Turnkey—Package 22)	3.6	-	3.6
Overhead Lines	-	0.4	0.4
Structural Steel	7.0	5.0	12.0
Waste Pile—MGLIT	-	0.5	0.5
Waste Pile—ATKINS	-	-	-
Water Intake—Rio Jequitinhonha (Lump-Sum—Piping, Pumping, etc.)	1.8	-	1.8
Indirect Cost	**1.7**	**87.5**	**89.2**
Pre-Operational Mine	-	8.3	8.3
Pre-Operational Plant	-	2.5	2.5
Indirect Costs	-	4.0	4.0
Commissioning and Performance Tests	-	0.8	0.8
Spares	1.7	-	1.7
Expediting and Inspection	-	0.3	0.3
Topography	-	3.7	3.7
Owners Cost	-	5.8	5.8
Engineering, Procurement and Contruction Management	-	26.6	26.6
Indirect Field Cost	-	1.3	1.3
Assembly Supervision	-	0.6	0.6
Contingency Mine	-	6.9	6.9
Contingency Plant	-	26.8	26.8
Sub-Total	**113.1**	**166.1**	**279.2**
ECA Main Mine Equipment Financing during CAPEX Phase:	**-**	**-**	**-**
Drawdown	20.4	-	20.4
Financing Repayment	7.3	-	7.3
Total (Net Effect)	**(13.1)**	**-**	**(13.1)**
Total	**100.0**	**166.1**	**266.1**

25.10 Operating Cost Estimate

The underground mine and industrial spodumene concentration unit OPEX is shown in Table 25-3, with a maximum processing capacity of 1.3 Mt/a of lithium ore. To produce 1.23 Mt/a of ore from the mine and 178 kt/a of spodumene concentrate (SPO) with a lithium oxide grade of 5.5%, the production cost of the mine and plant are calculated at US$36.70/t and US$24.63/t of ore (ROM), respectively. Also added is US$3.00/t of ore for general and administrative sales (SG&A) cost, totalling US$64.33/t.

Table 25-3: Estimated Cost of Production

	US$/t ROM	US$/t SPO
Mine	**36.70**	**253.50**
Labor	11.70	80.73
Diesel	1.93	13.34
Electrical Power	1.95	13.49
Consumables	15.97	110.20
Services & Maintenance	2.80	19.35
Others	2.38	16.40
Plant	**24.63**	**170.01**
Labour	9.54	65.81
Electrical Power	1.44	9.92
Consumables	0.82	5.63
Maintenance	1.33	9.15
Services	9.28	64.03
Others	2.24	15.46
SG&A	**3.00**	**20.70**
Total	**64.33**	**444.14**
Transport (US$/t of SPO Concentrate)		112.56
CIF cost, Shangai		556.70

25.11 Risk Assessment—HAZID Identification

A risk assessment has been conducted, and the risks identified are as follows:

- Possible negative impact on the price of lithium due to, for example, economic slowdown, or decrease in lithium consumption.
- Availability of skilled labour in the region.
- Any unforeseen environmental or social restrictions.
- Unforeseen exaggerated increases in the main costs of the operation, such as personnel, fuel, or electricity.

25.12 Opportunities

Some opportunities were identified for operational and financial improvement of the Bandeira Project:

- Commercialization of ore sorter tailings as rock remineralize as fertilizer or additive for the ceramic industry.
- Optimizing and reducing operating costs, such as using photovoltaic electricity owned by the company or outsourced.
- Increasing mine automation to reduce costs.
- Producing mineral by-products with the process tailings and fines for sale.

26.0 RECOMMENDATIONS

26.1 Work Required to Increase Confidence in the Resource

26.1.1 Geology and Mineral Resource Estimate

GE21 proposes the following recommendations for the continuous improvement of the Mineral Resource estimate:

- A 50 x 50 m infill drilling program in the domain of the indicated resource classification will focus on improving resource delineation.
- A 100 x 100 m infill drilling program in the domain of the inferred resource classification that will focus on resource delineation improvement.
- A density campaign to measure the density of drill hole cores by drying the samples in an oven and waterproofing them. Compare the results with the methodology used in the current project procedure to check whether there is a bias in the results.
- Conduct an on-site density survey in the weathered zone.
- An updated mineral resource assessment is underway through the ongoing infill drilling program.
- Detail Geotechnical analysis, including a geotechnical-oriented diamond drilling campaign, logging, and sampling collecting for tensile, compressive and shear strength tests.
- Perform supplementary geotechnical investigations of planned infrastructure sites, including waste pile areas; additional geochemical tests (ARD); large-scale waste rock and tailings co-disposal stockpile field test.
- To implement the hydrological and hydrogeological studies for the subsequent phases of the project.

26.1.2 Mineral Reserves Estimate and Mining Methods

Atkins Réalis recommends that the following activities related to the mine area be carried out during the development of the next phase of basic project:

- Conduct a dilution study in the mine to determine the optimal block size and confirm the value of diluted content in the model.
- Detail the sequential mining plans on a monthly or quarterly basis for the first three years of project operation.
- Perform large-diameter geotechnical drilling to collect sufficient material for tests that require larger volumes of material.
- Conduct hydrogeological investigations, including monitoring with the installation of piezometers and INAs, a network of streamflow monitoring in watercourses, and aquifer tests in underground instruments to estimate hydrodynamic parameters and gain a better understanding of water flow behaviour.

- Evaluate the feasibility of a mechanical stabilization method for the surface of the decline, using geocells or geogrids.
- Elaborate a trade-off study for the mine entrance between boxcut and tunnelling.

26.2 Project Infrastructure

26.2.1 Bridge over the Piauí River

Start the construction of the bridge over the Piauí River in the dry season of 2024, as it is very important in the interconnection when the industrial plant is implemented.

26.2.2 Jequitinhonha River Water Pipeline Project

Execute the project of capturing and pumping water from the Jequitinhonha River for the project, as an alternative to the collection of the Piauí River.

26.3 Process

26.3.1 Fine Fraction Processing Alternatives (<0.5mm)

- Continue to evaluate alternatives for processing the fines to increase spodumene recovery with the use of flotation, Spirals or and gravity concentrator.
- Perform a pilot plant testwork crushing the DMS middlings and refeeding them on the Rougher DMS stage to evaluate the metallurgical recovery gains.

26.4 Environmental Feasibility Assessment

The results of the Environmental Feasibility Assessment of the Bandeira Project were based on the analysis of the current situation of the environmental regularization of the project and its relevant socio-environmental factors, in the light of the applicable environmental legislation.

This analysis is carried out within the scope of environmental licensing, which, for the activity of mineral extraction, is mandatory in Brazil and must be conducted in accordance with Federal Decree No. 99,274/90, which regulates Federal Law No. 6,938/81 which, in turn, establishes the National Environmental Policy.

The competence for the Environmental Regularization of the project in question is of the State of Minas Gerais, through the State Secretariat for the Environment and Sustainable Development (Semad), and it is necessary to submit to this Secretariat, among other technical documents, the Environmental Impact Assessment, as determined by the national environmental policy established by Federal Law 6.938/1981, as well as CONAMA Resolution No. 237/97.

Also, according to CONAMA Resolution No. 237/97, which defines concepts, procedures and criteria used in environmental licensing, the three-phase model is a modality of Brazilian environmental licensing, which is divided into the stages of preliminary license (LP), which certifies the environmental feasibility of the proposed activities in terms of location, the installation license (LI), which allows its construction as long as environmental control and monitoring actions are carried out, and the operating license (LO), which authorizes the project to operate after it has been built and commissioned in accordance with the preliminary and installation license, and also requires the execution of environmental control and monitoring actions during operation in accordance with current legislation.

For mining activities, it is also necessary for the entrepreneur to prove that he is the holder of the right to exploit the intended mineral substance, which is granted by the National Mining Agency – ANM, considering that mineral resources are assets of the Union according to article 20, IX of the Federal Constitution of 1988.

In this context, MGLIT is then the current holder of mining right number ANM 832.439/2009, having complied with the formalization of the environmental licensing of the Bandeira Project on November 20, 2023, under number 092023.07.01.003.0000498, for the modality Preliminary License and Concomitant Installation License (LP+LI), in accordance with state legislation, through COPAM Normative Resolution 217/2017. Grants were also requested for crossing under No. 2090.01.0008237/2023-90 and for surface water abstraction under No. 2090.01.0008240/2023-09 and respective authorization for environmental intervention with suppression of native vegetation in permanent preservation areas - APP, in an area in the Atlantic Forest Biome of phytophysiognomy of Seasonal Deciduous Forest - FED in an initial stage, according to process PA/SEI No: 2090.01.0008281/2023-66.

The request for environmental licensing was duly carried out for the main activity of underground mining pegmatites and gems, gross production greater than 787,800 m^3/year, being the processing of wet ore with an installed capacity of up to 1,300,00 tons/year, with a forecast of tailings/waste pile in a useful area of 20.67 ha.

Also, in accordance with COPAM Normative Resolution 217/2017, in relation to the evaluation of locational criteria for framing and restriction or prohibition factors provided for in DN COPAM No. 217/2017, and identified in the Spatial Data Infrastructure of the State System of Environment and Water Resources (IDE-Sisema), established through Joint Resolution SEMAD/FEAM/IEF/IGAM No. 2,466/2017, it was found that the project is outside indigenous lands, quilombolas or Cultural Heritage assets. However, this platform confirms that the project focuses on the locational criterion of suppression of native vegetation and the planned location in an area of high or very high degree of potential for the occurrence of cavities, according to official data from CECAV-ICMBio).

The company Neo Agroambiental was then hired by MGLIT to carry out socio-environmental studies requested by the environmental agency for the environmental licensing of a project that includes the operation of an underground mine for ore extraction and the construction of a spodumene treatment unit, a lithium-bearing mineral.

The area affected by the project, called Bandeira, is located in the Atlantic Forest biome of the phytophysiognomy of Seasonal Deciduous Forest – FED in an initial stage, in the Jequitinhonha River Valley, in Minas Gerais. Although it is a large-scale, Class 5 project, the environmental intervention in the Atlantic Forest Biome will occur in an initial successional stage and, therefore, the request for the Environmental Impact Study (EIA) was not applied, as provided for by Art.32 of Law 11.428/2006.

The basic studies, required by the Term of Reference, called Environmental Control Report – RCA cover several areas, such as land use, flora, fauna, archaeology, conservation units, climate, water, soil, geology, geomorphology, speleology (caves), socioeconomic aspects of the surrounding communities, local infrastructure, among others, aiming to relate the activities of the enterprise, with the possible aspects, impacts and respective mitigating measures.

Regarding environmental control measures, Neo Agroambiental complied with the elaboration of the Environmental Control Plan (PCA), designed with the objective of maximizing the viability and compliance of the project with legal regulations. The PCA is based on preventive, corrective and monitoring measures. The plans and programs outlined in the PCA include:

- Surface water quality monitoring program
- Subprogram for monitoring and control of liquid and oily effluents
- Solid Waste Management Program (PGRS)
- Atmospheric emissions and air quality control program
- Noise and vibration level control and monitoring program
- Program for the implementation and maintenance of rainwater drainage systems and containment of erosion processes
- Program for reformation, revegetation and drainage system of the tailings/waste piles
- Program to scare away, rescue and dispose of local fauna
- Maintenance and conservation program for preservation areas
- Fauna monitoring program
- Vegetation Suppression Control Program
- Plan for the recovery of degraded areas – PRAD
- Program for prioritization and professional training of local labour and suppliers
- Accident prevention and public health promotion program
- Social Communication Program (PCS)
- Risk Management Program (RMP)
- Medical Control and Occupational Health Program (PCMSO)
- Occupational Safety Engineering Program
- Environmental management and supervision plan.

It should also be noted that water and waste management, as well as the relationship with communities and local public authorities, are priority aspects for the Bandeira Project. Thus, the company adopts measures such as water recirculation, proper waste classification, accident prevention, recovery plans for degraded areas and construction of a seedling nursery.

The Bandeira Project is considered a priority for the social and economic development of the region, with government support and a commitment to generating economic value and sustainable development.

The Bandeira Project also provides for a closure and rehabilitation plan for the decommissioning stage of mining activities. The conceptual studies foresee the stability of the remaining piles, revegetation of degraded areas and continuous monitoring after the closure of operations, aiming to mitigate impacts and promote reintegration into the local ecosystem.

It should be noted that the Bandeira Project received from the municipalities of Araçuaí and Itinga the certificates of regularity of activity regarding the use and occupation of municipal land in November 2023, a requirement for the analysis of the environmental licensing process.

Notwithstanding, MGLIT has a private instrument of assignment of rights with VALITAR, owner of the Brejos, Piauí Boa Vista Part 1 and Part 2 farms, to carry out mining activities on its properties. The farms include Legal Reserve (RL), according to Law No. 12,651, of May 25, 2012.

Finally, it should be noted that, although MGLIT has complied with the protocol of all the technical documents necessary for the analysis of the licensing process, the environmental agency may also request documents, complementary technical studies, and manifestation of the intervening bodies, such as the State Institute of Historical and Artistic Heritage of the State of Minas Gerais (IEPHA-MG) and the Institute of National Historical and Artistic Heritage - IPHAN in order to, to support the final analysis of the process.

From the above, based on the documents analyzed, considering the characteristics of the Bandeira Project and the applicable legal regulation, it is proven that the environmental feasibility of the intended mining activity is proven, attested by compliance with the technical and legal requirements for environmental licensing, having its feasibility reinforced by the conclusive analysis of the environmental agency and respective obtaining of the environmental license certificate expected to occur in the next 06 months, legal deadline of the environmental agency to carry out the analysis of the request, according to article 22 of State Decree No. 47,383/2018 and article 14 of CONAMA Resolution No. 237/1997.

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28.0 CERTIFICATE OF AUTHORS

28.1 Branca Horta de Almeida Abrantes, Master Environmental Consultant

I, Branca Horta de Almeida Abrantes, Geographer and postgraduate degree in project management, as an author of this report titled *Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil* with an effective date of November 13th, 2023 (the "Technical Report") prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a(n) Master Environmental Consultant, with a business address on 12th Floor, 3130, Afonso Pena Avenue, CEP 30.130-910, Belo Horizonte, Brazil.
2. I am a graduate of Belo Horizonte University Centre UNI-BH, Professor Mário Werneck 1.685, Avenue, Estoril, Belo Horizonte, Minas Gerais, Brazil (06 July 2007) with a degree of bachelor and licentiate in Geography and Environmental Analysis, and I am a(n): Registered Regional Council ofEngineering and Agronomy (95295/D) in the state of Minas Gerais. I have been a member of the Society for Mining, Metallurgy, and Exploration (SME) since 2021.
3. I have practiced my profession for 20 years since the beginning of my degree.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) andcertify that by reason of my education, affiliation with a professional association (as defined in
5. NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" forthe purposes of NI 43-101.
6. I didn´t visit the Bandeira Project site.
7. I am responsible for Section 1.17, 1.21, 1.22, 20, 25.8 and 26.4 of the Technical Report.
8. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
9. I have had no prior involvement with the property that is the subject of the Technical Report.
10. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
11. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, theTechnical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
12. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary ofmy sections of this report.
13. I consent to the filing of the Technical Report with any stock exchange and other regulatory authorityand any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

Branca Horta de Almeida Abrantes,
Master Environmental Consultant

28.2 Brian Levich, MAHons, (BA)

I, Brian Levich, MA with Hons, as an author of this report titled Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil with an effective date of November 13th, 2023 (the "Technical Report") prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a Consultancy Director at Fastmarkets Global Limited, with a business address at 8 Bouverie St, Temple, EC4Y 8AX, London, United Kingdon.
2. I am a graduate of DeMontfort University 1999 Demontfort University, The Philip Tasker Building, 2nd Floor, The Gateway, Leicester LE1 9BH with a Master of Arts (with Honours) in Economics and a Consultancy Director at Fastmarkets (www.fastermarkets.com) specializing in commodity market intelligence services.
3. I have practiced my profession for 25 years since my graduation.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43 101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I did not visit the Bandeira Project site.
6. I am responsible for Sections 1.16 and 19 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary of my sections of this report.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

Brian Levich, MAHons, (BA)
Fastmarkets Global Limited
Consultancy and Special Projects Director

28.3 Carlos José Evangelista Silva, Geologist, MSc, AIG

I, Carlos José Evangelista Silva, Geologist, as an author of this report titled *Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil* with an effective date of November 13th, 2023 (the "Technical Report") prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a geologist at GE21 Consultoria Mineral, whose business address is on the 12th floor, 3130 Afonso Pena Ave, Belo Horizonte, Brazil.
2. I am a graduate in Geology from the Federal University of Minas Gerais (UFMG) in Belo Horizonte, Brazil (January 26, 2026), and have a master's degree in engineering in Mineral Technology from the Postgraduate Program in Mining, Metallurgical and Materials Engineering (PPGE3M) at the Federal University of Rio Grande do Sul, Brazil (March 3, 2020). I have been a Fellow of the Australian Institute of Geoscientists #7868 since 2021.
3. I have practiced my profession for 18 years since my graduation.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I recently visited the Bandeira Project from September 13 -14 and December 13 of 2023.
6. I am responsible for Sections 1.2, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.11, 1.20. 1.21, 1.22, 4, 6, 7, 8, 9, 10, 11, 12, 14, 23, 25.1 and 26.1.1 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary of my sections of this report.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

Carlos José Evangelista Silva, Geologist, MSc
GE21 Consultoria Mineral
Geologist

28.4 Ignacy Antoni Lipiec, P. Eng.

I, Ignacy Antoni Lipiec, P. Eng., Bachelor of Applied Science and Mining & Mineral Process Engineering, as an author of this report titled *Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil* with an effective date of November 13th, 2023 (the "Technical Report") prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a Vice President, Minerals & Metallurgical Processing with AtkinsRéalis with a business address at 745 Thurlow Street, Vancouver, British Columbia, Canada, V6E 0C5.
2. I am a graduate of the University of British Columbia, Vancouver (1985) with a Degree in Bachelor of Applied Science and Mining & Mineral Process Engineering, and I am Registered with the Professional Engineers of Ontario (100076251).
3. I have practiced my profession for 39 years since my graduation.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I recently visited the Bandeira Project from March 13 to 14, 2024.
6. I am responsible for Sections 1.1, 1.3, 1.10, 1.14, 1.15, 1.21, 1.22, 2, 3, 5, 13, 17, 18 (except 18.14), 21 (except 21.4.2, 21.4.5, 21.4.7, 21.5.7, 21.5.8), 24, 25.2, 25.3, 25.4, 25.9, 25.10, 25.11, 26.2 and 26.3 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary of my sections of this report.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

Ignacy Antoni Lipiec
Mineral Processing Engineer
VP Mineral & Metallurgical Processing, AtkinsRéalis

28.5 João Augusto Hilário de Souza, B.A.Sc., MBA

I, João Augusto Hilário de Souza, B.A.Sc., MBA, ("MAIG") #4084, as an author of this report titled *Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil* with an effective date of November 13th, 2023 (the "Technical Report")" prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a senior Mining Engineer and Associate Consultant at L&M Assessoria ("L&M"), with a business address at Rua Senhora das Graças, 99/1002, Belo Horizonte, MG, Brasil, CEP 30.310-130.
2. I am a graduate in Mining Engineer at the Federal University of Minas Gerais (UFMG), in Belo Horizonte, Brazil; Geostats Specialization at the Federal University of Ouro Preto (UFOP), Brazil and MBA in Mining at the University of São Paulo (USP), Registered as Mining Engineer in the Conselho Regional de Engenharia e Agronomia (Crea – MG 16.917 and National – 140610073-0) in the state of Minas Gerais. I have been a member of Australian Institute of Geoscientists (AIG) since 8th July 2009 and of Sociedade Mineira dos Engenheiros (SME) since 13th June 1977.
3. I have practiced my profession for more than 40 years since my graduation.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I recently visited the Bandeira Project from January 17 to 19, 2024.
6. I am responsible for Sections 1.19, 22 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary of my sections of this report.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

João Augusto Hilario de Souza
Associate Consultant at
L&M Assessoria Empresarial S.S. Ltda (L&M)
Mining Engineer and MBA

28.6 Porfirio Cabaleiro Rodriguez, Bsc Mining Engineer, FAIG

I, Porfirio Cabaleiro Rodriguez, P. Eng, and degree as above, as an author of this report titled *Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil* with an effective date of November 13th, 2023 (the "Technical Report") prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a Technical Director of GE21 Consultoria Mineral, with a business address at 12th floor, 3130, Afonso Pena Avenue, CEP 30.130-190, Belo Horizonte, Brazil.
2. I am a graduate in Mining Engineer at the Federal University of Minas Gerais (UFMG), in Belo Horizonte, Brazil, and I am Fellow of Australian Institute of Geoscientists #3708, since 2008.
3. I have practiced my profession for 46 years since my graduation.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I didn´t visit the Bandeira Project site.
6. I am responsible for Section 18.14.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary of my sections of this report.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

Porfirio Cabaleiro Rodriguez, Min Eng, Bsc
GE21 Consultoria Mineral
Technical Director

28.7 Rubens José de Mendonça, MAusIMM (#228607) CP-Mining

I, Rubens José de Mendonça, P. Eng. and degree as above, as an author of this report titled *Bandeira Lithium Project, National Instrument (NI 43-101) Feasibility Study Technical Report, Araçuaí–Itinga, Minas Gerais, Brazil* with an effective date of November 13th, 2023 (the "Technical Report")" prepared for Lithium Ionic and dated July 11th, 2024, do hereby certify that:

1. I am a Principal Consultant at Planminas – Projetos e Consultoria em Mineração Ltda , with a business address at Rua Sebastião Fabiano Dias 37 / 401 – Bairro Belvedere, Belo Horizonte MG State, Brazil.
2. I am a graduate of Federal University of Minas Gerais in 1980 with a Bachelor Degree in Mining Engineering, and I am a Registered Professional Engineer (# CREA-MG 25.791/D). I have been a member of AusIMM since 2006 and a Chartered Professional (CP-Mining) since 2015.
3. I have practiced my profession for 44 years since my graduation.
4. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I recently visited the Bandeira Project from March 13 to 14, 2024.
6. I am responsible for Sections 1.12, 1.13, 1.18, 1.21, 1.22, 15, 16, 21.4, 21.5, 25.5, 25.6, 25.7, 25.9 and 26.1.2 of the Technical Report.
7. I am independent of the Issuer applying the test set out in Section 1.5 of NI 43-101.
8. I have had no prior involvement with the property that is the subject of the Technical Report.
9. I have read NI 43-101 and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.
11. I have read the News Release Dated May 29th, 2024, and confirm it is a fair and accurate summary of my sections of this report.
12. I consent to the filing of the Technical Report with any stock exchange and other regulatory authority and any publication by them for regulatory purposes, including electronic publication in the public company files on their websites accessible by the public, of the Technical Report.

Dated this 11th day of July 2024, at Toronto, Ontario, Canada.

Original Signed and Sealed

Rubens José de Mendonça, Mining Engineer Bachelor
Planminas – Projetos e Consultoria em Mineração Ltda
CP-Mining