Technical Report on the James Bay Lithium Project, Québec, Canada

Report for NI 43-101

Allkem Limited

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1. EXECUTIVE SUMMARY

1.1 Introduction

SLR Consulting (Canada) Ltd (SLR), Wave International Pty Ltd. (Wave), WSP Canada Inc. (WSP), and G Mining Services Inc. (GMS) were retained by Allkem Limited (Allkem or the Company) to prepare this Technical Report on the James Bay Lithium Project, Québec, Canada (the Project or James Bay). The purpose of this Technical Report is to disclose Mineral Resource and Mineral Reserve estimates for the Project.

This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). The definitions for Mineral Resources and Mineral Reserves in this Technical Report are consistent with those defined by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions and are furthermore consistent with the definitions in the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code) and United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300).

The Project is in the Nord-du-Québec administrative region of Québec. Galaxy Lithium (Canada) Inc. (GLCI), a wholly owned subsidiary of Allkem, is proposing to develop a conventional open-pit lithium mine and concentrator operation. The concentrated ore (spodumene) will be trucked to a transfer site in Matagami, Québec. The spodumene will then be loaded onto trains and transported to a port facility in either Trois-Rivières or Quebec City, Québec.

Allkem, a company listed on the Australian Securities Exchange (ASX: AKE) and the Toronto Stock Exchange (TSX: AKE), is the result of the merger of Orocobre Limited (Orocobre) and Galaxy Resources Limited (Galaxy) on August 25, 2021. Allkem is a leading producer and developer of lithium with several projects in Australia, Argentina, and Canada.

A previous technical report titled "NI 43-101 Technical Report Feasibility Study, James Bay Lithium Project, Québec, Canada" was prepared for the Project by G Mining Services Inc. (GMS) to summarize the results of a Feasibility Study (the 2022 FS) and to disclose an initial Mineral Reserve estimate with an effective date of January 11, 2022 (GMS, 2022).

Since the 2022 FS, the following updates have been completed, as detailed in this Technical Report:

- Mineral Resources increased due to new drilling, a new geological interpretation, and a larger constraining pit shell.
- Mineral Reserves and the mining schedule were re-run on the updated block model, but within the same footprint (the 2022 FS pit design).

- Lithium prices have increased, and a new market study has been completed.
- Capital and operating cost estimates have been updated to reflect intervening work on basic engineering and new cost inputs.
- The Project cash flow has been updated to reflect the changes above.

All units of measurement within this report are metric unless otherwise stated. Monetary units are in Canadian dollars (CAD), unless stated otherwise.

1.2 Technical Summary

1.2.1 Property Description and Ownership

The Project is located in the Nord-du-Québec administrative region, approximately 10 km south of the Eastmain River and 130 km east of James Bay and the Cree Nation of Eastmain community. The property is located on Category III lands of the James Bay and Northern Québec Agreement (JBNQA). The centre of the property is located at approximately 52.24 degrees latitude north and -77.07 degrees longitude west or 358,891 E and 5,789,180 N in the NAD83, UTM, zone 18N system.

The Project is easily accessed by the Billy Diamond Highway, which connects the communities of Matagami and Radisson. This road crosses the Project property 382 km north of Matagami, close to the Truck Stop at km 381. The truck stop is managed by the *Société de Développement de la Baie James* (SDBJ).

The Project comprises two contiguous packages of mining titles located in NTS map sheet 33C03, covering an area of approximately 11,130 ha. The 224 claims are classified as “map designed claims”, also known as CDC-type claims under the government of Québec’s mining title classification system. The boundaries of the claims have not been legally surveyed. All claims are in good standing, with expiry dates between June 12, 2024, and November 2, 2025. The tenures are registered under Galaxy Lithium (Canada) Inc. (GLCI) or Galaxy Lithium (Ontario) Inc. (GLOI). Both GLCI and GLOI are wholly owned subsidiaries of Allkem.

As of the effective date of this report, two NSR royalties remain on the James Bay Lithium Project:

- 0.50% NSR royalty previously held by Gérard Robert, which was subsequently sold to Ridgeline Royalties Inc. Portions of the Mineral Resources subject to this royalty are located on six claims (claim number 2329097, 2329098, 2238480, 2238478, 2329101 and 2329100) of the Project, although the royalty covers 11 claims in total.
- 1.50% NSR royalty previously held by Resources d’Arianne Inc., subsequently sold to Lithium Royalty Corp. Galaxy has the right to buy back 0.5% of the NSR for C$500,000, reducing the royalty to 1.00%. Portions of the Mineral Resources reported herein that are subject to this royalty are located on two claims (claim numbers 2126988 and 2126860) of the Project, although the royalty covers 23 claims in total.

1.2.2 Geological Setting, Mineralization and Deposit

The Project is in the northeastern part of the Superior Province. It lies within the Lower Eastmain Group of the Eastmain greenstone belt, which consists predominantly of amphibolite grade mafic to felsic metavolcanic rocks, metasedimentary rocks and minor gabbroic intrusions.

The property is underlain by the Auclair Formation, consisting mainly of paragneisses of probable sedimentary origin which surround the pegmatite dikes to the northwest and southeast. Volcanic rocks of the Komo Formation occur to the north of the pegmatite dikes. The greenstone rocks are surrounded by Mesozonal to catazonal migmatite and gneiss. All rock units are Archean in age.

The pegmatites delineated on the property to date are oriented in a generally parallel direction to each other and are separated by barren host rock of sedimentary origin (metamorphosed to amphibolite facies). They form irregular dikes attaining up to 60 m in width and over 200 m in length. The pegmatites crosscut the regional foliation at a high angle, striking to the south-southwest and dipping moderately to the west-northwest.

Spodumene is the principal source of lithium found at the Project. Spodumene is a relatively rare pyroxene that is composed of lithium (8.03% Li_2O), aluminium (27.40% Al_2O_3), silicon (64.58% SiO_2) and oxygen (51.59% O). It is found in lithium rich granitic pegmatites, with its occurrence associated with quartz, microcline, albite, muscovite, lepidolite, tourmaline and beryl.

1.2.3 Sampling Method, Approach and Analysis

Galaxy (now Allkem) used sampling procedures that meet generally accepted industry best practices. All sampling was conducted by appropriately qualified personnel under the direct supervision of appropriately qualified geologists. Assay samples were collected from half core sawed lengthwise on nominal 1.5 m intervals, honoring geological boundaries.

Samples were shipped to ALS Val-d'Or for preparation and analyses in Vancouver. The laboratory is accredited ISO/IEC 17025:2005 by the Standards Council of Canada for various testing procedures.

Galaxy relied partly on the internal analytical quality control measures implemented at ALS. In addition, Galaxy implemented external analytical quality control measures consisting of using control samples (blanks, in-house and certified standards, and field duplicates) inserted with batched samples submitted for certain holes. Pulps were sent to umpire laboratories for external check assays on a regular basis. A comprehensive reanalysis of pulps was completed in 2021 to compare the 4-acid digestion with a sodium-peroxide fusion. The results were very similar and supported the previous analyses.

In the SLR QP's opinion, the sample preparation, analysis, QA/QC programs, and security procedures at the James Bay Lithium Project are very good and the diamond drill and channel sampling assay results are reasonable and acceptable for use in a Mineral Resource estimate.

1.2.4 Data Verification

Extensive data verification work has been carried out by previous owners and by Qualified Persons with SRK Consulting Inc. (SRK) related to the 2021 Preliminary Economic Assessment (GMS, 2021) and more recently by GMS related to the 2022 Feasibility Study (GMS, 2022). Past data verification work included site visits, re-surveying of collar coordinates by Corriveau, database checks against original assay certificates, external check assays at accredited laboratories, comparing results from different analytical methods, inspecting drill core and the channel sample locations.

The SLR QP visited the property from June 6 to June 7, 2023, accompanied by James Purchase, GLCI's Geology Manager. Spodumene is easy to identify in the drill core and outcrops, and the blast pits provide excellent exposures of the spodumene crystals in three dimensions. The SLR QP reviewed the spodumene mineralization in six drill holes and found that the lithium oxide grades in the drill logs correlate very well with spodumene abundance. Spodumene has a theoretical Li_2O content of 8.03% and most of the drill core grades in the pegmatite mineralization viewed ranged from approximately 1% to 2% Li_2O, which is consistent with visual spodumene abundance estimates of up to approximately 25%.

Data verification of the drill hole database included manual verification against original digital sources, a series of digital queries, and a review of the quality assurance and quality control (QA/QC) procedures and results.

SLR's review of the resource database included collar, survey, lithology, mineralization, and assay tables. Database verification was performed using tools provided within Leapfrog Geo Version 2023.1.0 software package (Leapfrog). A visual check on the drill hole Leapfrog collar elevations and drill hole traces was completed. No major discrepancies were identified.

SLR compared 23,510 assay records for lithium, given in ppm units in the resource database, against 12,953 samples from original digital laboratory analysis certificates. The analysis involved laboratories COREM Research and ALS Canada Ltd Minerals laboratory in Val d'Or (ALS) during the drilling campaigns conducted by Lithium One and GLCI between 2008 and 2023. The comparison revealed no significant errors. In addition, the SLR QP carried out the following:

- Completed validity checks for out-of-range values, overlapping intervals, gaps, and mismatched sample intervals. During the analysis, one drill hole was identified with one overlapping interval, and two drill holes were found to have no logging information.
- Verified the specific gravity values against the original certificate from ALS or on site measurement files and no mismatches were identified during the comparison.
- Carried out spot checks on 269 drill holes, including 127 original certificates of COREM and 120 of ALS and only two samples out of 12,953 samples compared were identified with switched grades of Lithium in ppm.
- Reviewed the conversion factor applied to the Li_ppm concentrations to ensure their consistency with the final value of % Li_2O. No errors were detected during this process.

The SLR QP is of the opinion that database verification procedures for the James Bay Lithium Project comply with industry standards and the diamond drill hole and channel sample assay results are of high quality and acceptable for the purposes of Mineral Resource estimation.

1.2.5 Mineral Processing and Metallurgical Testing

SGS Canada Inc. (SGS) and Nagrom Analytical (Nagrom) of Perth, Australia, were contracted in 2011 and 2018, respectively, to undertake metallurgical testwork programs. SGS's scope was to undertake preliminary gravity separation testwork on a single composite sample. Nagrom's testwork was divided into two phases, with the first phase evaluating several composite samples and the second phase devoted to the testing of composites samples expected to be processed in "Early Years" (EY) and "Mid/Later Years" (MY/LY) related to the original mine plan/schedule.

Flowsheets for the lithium beneficiation were developed in conjunction with the testwork programs with the flowsheet evolving as more results were received and evaluated. The target was to produce a concentrate containing at least 6.0% Li_2O and no more than 1% Fe_2O_3.

The results from the testwork program at SGS indicated that the heavy liquid separation (HLS) and dense medium separation (DMS) testwork results were similar with a 75% recovery of Li_2O achieved at a concentrate grade of 6.5%. The rejected material via DMS floats was relatively low at 8% of total contained Li_2O (Lithia).

Phase 1 testwork program at Nagrom examined multiple composites and used different crusher product screen sizes. The overall DMS recoveries achieved were 56.5% for the coarse DMS and 87.5% for the fines DMS, however, the target concentrate grade of 6.0% Li_2O was not reached.

Further testwork was then undertaken with re-crushing to 4 millimetres (mm) on the coarse secondary DMS floats material resulting in an improvement of concentrate grade of 6.0% Li_2O. It was also noted that there was a large difference between the HLS and DMS results for the same samples. This led to a requirement for further investigation and a second phase of testwork was instigated at Nagrom.

The following three composites were formed and tested in the Phase 2 Nagrom testing program representing plant feed materials during nominal early, mid, and later years of processing.

A total DMS recovery of 85.8% at a Li_2O grade of 6.0% was achieved for the EY composite. This result has been scaled using operating data from Allkem's Mt Cattlin operation and other operations in Western Australia, therefore, the predicted actual overall plant recovery and grade were reduced to 66.5% and 6.0%, respectively.

The DMS results for the "MY/LY" composites were lower than that achieved for the "EY" composite with a total DMS lithia recovery of 79.9% at an achieved grade of 5.9%. These results were also scaled using operating data from Mt Cattlin and other operations in Western Australia to 61.9% recovery at a product grade of 5.9% Li_2O.

Modifying factors including particle size distribution, larger diameter cyclones used in the operating plant, dense medium contamination as well as operating data from other spodumene plants were used to determine performance on a full-scale plant. Recovery scale-up factors of 0.85 for EY and 0.82 for MY and LY were used for James Bay.

The basis of design for the processing plant will be to produce 6.0% Li_2O and engineering was performed on that basis. Process plant design typically include a design allowance to allow process plant operations within a normal range of conditions (e.g., higher or lower throughput) based on market conditions.

Following the recent changes in the lithium market, the modelled operating parameters of the James Bay processing plant have been flexed to produce a final product grade of 5.6% Li_2O, as this will improve the economics of the Project by improving the overall plant recovery to 69.6% and 66.9% for EY and MY/LY ores (related to the original mine schedule), respectively. These increased recovery targets have been estimated using the James Bay variability testwork. The changes have been incorporated into the process design criteria (PDC) and mass balance. Plant design changes are anticipated to be minimal and will not materially affect the capital cost and operating cost estimates of the Project.

1.2.5.1 Metallurgical Samples

A single ore sample weighing 14,690 kg grading 1.51% Li_2O was sent to SGS for testing.

Approximately 400 kg of drill core samples were sent to Nagrom in 2017 for Phase 1 testing. The Li_2O (lithia) assays of the tested composite samples ranged from 0.9% to 1.8% Li_2O. Samples were composited based on pegmatite zone and grouped by depth (typically 0 to 100 m or 100 m to 200 m). The samples represent an average composite.

A total of 4,643 kg of EY, 1,751 kg of MY and 1,760 kg of LY samples were sent to Nagrom for testing.

1.2.6 Mineral Resource Estimate

As of August 2023, a total of 67 individual pegmatite dikes have been identified within the deposit. The pegmatite dikes are located within a “deformation corridor” that has been identified in drilling and outcrop along a strike length of over five kilometres. The dikes present as en-echelon orientations, varying in length from 200 m to 400 m, and perpendicular to the strike of the deformation corridor. The dikes have been traced to depths of up to 500 m vertically from surface and are mostly open at depth. The dikes range in thickness from a few metres to over 50 m. Spodumene is the dominant lithium-bearing mineral identified within the pegmatites.

The definitions for Mineral Resources and Mineral Reserves in this Technical Report are consistent with those defined by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions and are furthermore consistent with the definitions in the United States Securities and Exchange Commission’s (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300).

The SLR QP also confirms that the Mineral Resource estimate has been prepared in compliance with the JORC Code (2012). The Mineral Resource estimates, inclusive and exclusive of the Mineral Reserves are presented in Table 1-1, effective June 30, 2023.

Table 1-1 – Summary of Mineral Resources – June 30, 2023

Inclusive of Mineral Reserves			
Category	**Tonnage (Mt)**	**Grade (% Li_2O)**	**Contained Metal (kt Li_2O)**
Measured	-	-	-
Indicated	54.3	1.30	706
Total Measured + Indicated	**54.3**	**1.30**	**706**
Inferred	55.9	1.29	724
Exclusive of Mineral Reserves			
Category	**Tonnage (Mt)**	**Grade (% Li_2O)**	**Contained Metal (kt Li_2O)**
Measured	-	-	-
Indicated	18.1	1.12	204
Total Measured + Indicated	**18.1**	**1.12**	**204**
Inferred	55.9	1.29	724

Notes:

1. *The definitions for Mineral Resources in CIM (2014) were followed for Mineral Resources which are consistent with S-K 1300 definitions and the JORC Code.*
2. *Mineral Resources are estimated at a cut-off grade of 0.5% Li_2O, which is higher than the calculated cut-off grade and has been selected based on the available testwork supporting the metallurgical recoveries.*
3. *Mineral Resources are estimated using a long-term spodumene concentrate (6.0% Li_2O) price of USD 1,500/t, and a CAD/USD exchange rate of 1.33.*
4. *A minimum true thickness of 2 m was used during pegmatite modelling.*
5. *Bulk density has been applied to pegmatite blocks using a regression curve with Li_2O - Bulk Density (g/cm^3) = (0.0669 x Li_2O%) + 2.603.*
6. *Mineral Resources have been declared both inclusive and exclusive of Mineral Reserves.*
7. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
8. *Mineral Resources were constrained using a Whittle pit optimization shell using the following assumptions:*
    a. *Costs: Processing: CAD 13.23/t ore, G&A, Closure, Sustaining CAPEX, Owner's cost and IBA Payments: CAD 20.69/t ore, Mining: CAD 4.82/t mined.*
    b. *Metallurgical recovery: 70.1%.*
    c. *Transport Costs: USD 86.16/ t concentrate*
    d. *NSR Royalty: 0.32%.*
9. *Mineral Resources are 100% attributable to GLCI.*
10. *Numbers may not add due to rounding.*

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1 and 26 of this Technical Report, any issues relating to all relevant technical and economic factors likely to influence the prospect of eventual economic extraction can be resolved with further work. The SLR QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

The current Mineral Resource has increased significantly and now includes 54.3 Mt at 1.30% Li_2O in the Indicated category, and an additional 55.9 Mt at 1.29% Li_2O in the Inferred category. A description of the major factors contributing to the changes between the December 2021 MRE and the June 2023 MRE are:

- Addition of 36,220 m of exploration and delineation drilling over two drilling campaigns since the previous mineral resource update, increasing the extent of pegmatite dikes by 800 m to the north-west.
- An updated geological model has incorporated some lower-grade pegmatite dikes that were excluded in the previous Mineral Resource.
- Changes in resource classification, notably the addition of tonnage associated with the pegmatites discovered in the NW Sector in the Inferred category.
- Changes in economic assumptions resulting in a deeper optimized pit shell (updated mining and processing costs, updated spodumene concentrate sale price).
- Reduction of the reporting cut-off grade to align with new economic assumptions and metallurgical considerations.

The SLR QP is of the opinion that there is very good potential to increase the resource with more drilling.

1.2.7 Mineral Reserves Estimate

The Mineral Reserve estimate in this report adheres to CIM (2014) definitions, which are consistent with S-K 1300 definitions, and includes only Measured and Indicated Mineral Resources, excluding Inferred Mineral Resources. These Reserves are representative of the economically extractable tonnage and grade of ore, factoring in considerations such as ore dilution and potential losses during mining or extraction.

The James Bay Lithium Project Mineral Reserve is estimated at 37.3 million tonnes (Mt), with an average grade of 1.27% Li_2O, as summarized in Table 1-2.

Table 1-2 – James Bay Project Open Pit Mineral Reserve (June 30, 2023)

	Tonnage (Mt)	Grade (% Li_2O)	Contained Metal (kt Li_2O)
Proven	0	0	-
Probable	37.3	1.27	475
Proven + Probable	37.3	1.27	**475**

Notes:

1. *CIM (2014) definitions were followed, which are consistent with S-K 1300 definitions.*
2. *The effective date of the estimate is June 30, 2023.*
3. *Mineral Reserves are estimated using the following long-term metal prices (Li_2O Conc = USD 1,500/t Li_2O at 6.0% Li_2O) and an exchange rate of CAD/USD 1.33.*
4. *A minimum mining width of 5 m was used.*
5. *A cut-off grade of 0.62% Li_2O was used.*
6. *The bulk density of ore is variable, outlined in the geological block model, and averages 2.7 t/m³.*
7. *The average strip ratio is 3.6:1.*
8. *The average mining dilution factor is 8.66% at 0.42% Li_2O.*

9. *Overall Metallurgical recovery is 68.9%*
10. *Mineral Reserves are 100% attributable to GLCI.*
11. *Numbers may not add up due to rounding.*

The Mineral Reserve estimates herein supersedes the Mineral Reserves reported previously in the Technical Report prepared by GMS for the James Bay Lithium Project (GMS, 2022). The SLR QP is not aware of any known mining, metallurgical, infrastructure, permitting, and / or other relevant factors that could materially affect the stated Mineral Reserve estimates.

The Mineral Reserve considers modifying factors — a variety of considerations, including but not limited to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social, and governmental factors — used to convert Mineral Resources to Mineral Reserves. This demonstrates that extraction could reasonably be justified, as of the reporting time.

SLR developed a regularized block model in Deswik. The block dimensions of 3 m x 5 m x 5 m were chosen to accurately represent the selective mining unit size, considering the loading units. The weighted mass average method was used for density and Li_2O grade computations, and domain and class assessments were based on the largest volume value.

The open pit's optimal economic shape was determined using GEOVIA Whittle software (Whittle), employing the Lerchs-Grossmann algorithm. The design of the open pit, including the pit slopes, was guided by the Petram Mechanica feasibility level pit slope design study (GMS, 2022).

Using Whittle, SLR generated both constrained and unconstrained pit shells for Indicated Mineral Resources at various lithium prices. Constraints were based on the open pit footprint defined in the 2022 FS by GMS. Due to the existing infrastructure and project permitting constraints, the optimized constrained pit shell was selected for the Reserve estimate.

A spatial calculation was conducted within the Mineral Reserve block model to assess dilution and mine loss. Each block was categorized as either ore or waste, followed by an analysis of adjacent blocks based on their categorization. In cases where an ore block was surrounded by waste blocks, the model designated a mine loss flag. Similarly, if a waste block had ore partially adjoining it, the model marked it with an external dilution flag. Complete encirclement of a waste block by ore resulted in the assignment of an internal dilution flag.

The James Bay deposit will be mined through conventional open pit methods, utilizing mining excavators and haul trucks. Drilling and blasting will be required for all material removal. The pit spans two kilometres NW/SE and averages 500 m in width, divided into three areas: JB1, JB2, and JB3, with depths of 160 m, 260 m, and 170 m, respectively.

The pit design, grounded in geotechnical investigation and lab results, incorporates specific features:

- Nominal face height of 20 m (double benched 10 m-high benches)
- Bench face angle of 75° for in-situ rock material
- Berm widths of 9 m

Additional geotechnical berms of 20 m are used in JB2, where elevation differences exceed 120 m.

Phased pits will smooth the transition of lower waste stripping in early production years, gradually increasing later in the mine's life. Waste will be managed through transportation to designated storage areas, with grade control accomplished through various methods.

The life-of-mine (LOM) is 19 years based on a designed concentrator throughput of 2.0 million tonnes per annum (Mtpa), totalling 170.0 million tonnes (Mt) of material mined, with an average strip ratio of 3.6:1. Pre-production years will focus on waste utilization and site preparation, involving tasks such as logging, clearing, and topsoil removal. The project ramp-up in year 1 considers a progressive capacity increase until reaching the plant nominal capacity in the 9th month.

The equipment requirements are based on mining 10 m benches, including 11-m^3 and 6.3-m^3 bucket diesel hydraulic excavators (backhoe configuration), and up to nine 100-t rigid frame haul trucks, two 10.7-m^3 front end loaders, two drills, and secondary equipment such as track dozers, wheel dozers, graders, and water trucks. Personnel requirements are based on two fly-in, fly-out (FIFO) rosters, peaking at 164 individuals on site in Year 10.

1.2.8 Recovery Methods

The process design is based on the concentration of spodumene mineralization from the mine to a beneficiated concentrate of 6.0% Li_2O. The selected process is similar to that currently being utilized at Allkem's Mt Cattlin mining operation in Australia, which comprises a flowsheet based on crushing and DMS.

Metallurgical modelling predicts an improvement in recovery of approximately 3% and increase in final product tonnage of approximately 12% at a lower 5.6% Li_2O final product grade.

Testwork recoveries were used to develop actual plant operating recoveries and indicate that a recovery of 66.5% in the early years and 61.9% in later years (related to the original mine schedule) is achievable for a spodumene concentrate containing 6.0% Li_2O. Operating the James Bay processing plant to produce a final product grade target of 5.6% Li_2O compared to the testwork and basis of design of 6.0% Li_2O will markedly improve the economics of the Project, by increasing the overall plant recovery to 69.6% and 66.9% for EY and MY/LY, respectively. These increased recovery targets have been estimated using the James Bay variability testwork results.

The processing plant includes the following sub processes:

- Three stage crushing circuit and crushed ore stockpile
- DMS plant
- Tailings dewatering and loading system for hauling to waste rock and tailings storage facilities (WRTSF)
- Water, air, and ancillary services
- Spodumene concentrate stockpile and dispatch system.

1.2.8.1 Crushing Circuit

The ROM ore is fed to the three-stage crushing plant consisting of a primary jaw crusher, a secondary cone crusher, and tertiary cone crusher. These crushers, combined with a double-deck sizing screen, produce a crushed product which is all less than 15 mm and is stored in a covered primary ore stockpile.

1.2.8.2 DMS Plant

The primary ore is reclaimed from the stockpile and fed in a controlled manner by vibrating feeders and a reclaim conveyor to the DMS plant. Ahead of the DMS is a sizing screen, with a 1 mm deck which removes the fines (- 1 mm) material which is sent to the tails dewatering section for disposal.

Prior to feeding the DMS cyclones, the crushed ore is mixed with a ferrosilicon (FeSi) slurry, which acts as a densifying medium to enhance the gravity separation of the spodumene from lower density gangue minerals.

DMS cyclone overflow streams are dewatered over a series of screens from where the FeSi is also recovered for re-use in the process. These dewatered waste products are then conveyed to the tailings loadout facility.

The DMS cyclone underflow, containing the high SG minerals, are also dewatered over a series of screens from where the FeSi is recovered in the screen undersize and a magnetic recovery process. The primary underflow product is screened to produce a coarse (-15 +4 mm) and fine (-4 +1 mm) product.

The primary coarse underflow product will report to the Secondary Coarse DMS circuit where the process is repeated in order to achieve the target concentrate grade. After processing, the concentrate is conveyed to the product stockpile from where it is transported to the customers.

For recovery enhancement, the oversize from the secondary coarse floats screen is re-crushed using a cone crusher. After removal of the minus 1 mm material, which is sent to the tailings treatment area, the oversize is processed through the re-crush DMS plant which follows the same process as the primary and secondary DMS circuits.

The plant also incorporates a secondary fine DMS for re-processing of the Primary fine underflow product from the primary DMS circuit. This material is processed through a fine DMS cyclone with underflow screened and oversize reporting to the final product. Screening recovers the FeSi slurry for re-use and the effluent from the FeSi magnetic separators sent to the tailing's treatment area.

The following are the utilities and consumables that are required to operate the processing plant:

- Process make-up water
- Potable water
- Electrical power
- Consumables as required for operation of the crushing and DMS plants

- Ferrosilicon, lime, and flocculant

1.2.9 Project Infrastructure

1.2.9.1 On-Site Infrastructure

The Project operations will include the following facilities:

- Open pit mine
- Crushed ore stockpile
- Process plant (crushing & reclaim, dense medium separation (DMS) building)
- Spodumene concentrate storage facility
- Fine and coarse tailing bins
- Four waste rock and tailings storage facilities (WRTSF)
- Overburden and peat storage facility (OPSF)
- Two water management ponds (WMP) and a plant water management pond
- Run-of-Mine (ROM) pad
- Contact water ditches and non-contact diversion water ditches

The tailings bins and spodumene concentrate warehouse will be located adjacent to the process plant.

All storage areas were selected to minimize their environmental impact. A surface drainage network will be built to divert non-contact water from the ROM pad and stockpile, WRTSF, OPSF, stockpiles, and process plant. A similar drainage network will be used to manage the surface water run-off (contact water) for all disturbed land. A pumping system with heat traced pipe will be installed.

In addition, the following infrastructure facilities are planned for the Project:

- 69 kV Main-substation
- Laboratory building
- Accommodation camp, Kitchen, Recreation Center, and Reception
- Workshop and reagent buildings within DMS Building
- Propane storage and distribution facilities
- Diesel storage and distribution facility
- Mine Service Center including a Truck-shop and wash-bay

- Dome warehouse for the storage of critical parts
- Mine Dry
- Explosives Storage
- Water treatment plant (effluent)
- Potable water treatment plant
- Sewage treatment plant
- Communications

Operational personnel will be housed on-site. Planned permanent accommodations will be sufficiently sized and will include back-up power generation, potable water storage and distribution, and waste-water treatment and disposal. Raw water from suitably selected wells will be sourced and treated for potable water requirements.

The process plant and supporting infrastructure will be powered by Hydro-Québec's 69 kV overhead distribution system. The 69 kV transmission line is relayed through Hydro-Québec's Muskeg substation and ultimately fed by the Némiscau substation located roughly 100 km southwest of the Project site. An overhead distribution line extension was built to the plant substation from the 69 kV line (L-614) located 10 km south of the Project site. The 69 kV power supply is limited by a capacity of 8 MVA due to the sensitivity of the network and distance from the supplying substation.

All essential power loads will be supported with emergency power supply available from the diesel generators, in the event of loss of grid power supply. The diesel generators will also be used during the winter to compensate for the power demand peaks that exceeds the maximum capacity allocated by Hydro-Québec. Suitable diesel storage, unloading, and distribution facilities will be installed to provide uninterrupted diesel fuel supply to the operations and maintenance fleet and equipment.

A propane storage, unloading, and distribution facility will be installed to supply propane gas to the camp and kitchen. This facility will supply propane for the accommodation facilities' heating and cooking requirements. Three other propane facilities will be installed at the DMS, Crushing, and Effluent Treatment Plant (ETP) building for space heating purposes.

Additionally, communication facilities will need to be developed as the site is not currently serviced by cellular data or fiber optics.

All on-site work and locations of the various infrastructure and buildings will comply with the required minimal setback distance of 60 m from the high-water line of any lake or watercourse.

1.2.9.2 Off-site Infrastructure

1.2.9.2.1 Air Transport

The Eastmain airport (130 km from site) will be used to transport workers from southern Québec. GLCI is in discussions with Transport Canada with respect to regulations and permits for operating equipment upgrades/installations, such as de-icing equipment and a fueling station. Instrumentation upgrades and procedures need upgrading to mitigate flight cancellations due to bad weather.

OWNERSHIP/GOVERNANCE

The airport is the property of Transport Canada, which offers advantages in terms of quality and maintenance with respect to new installations.

Transport Canada has awarded a five-year contract to the Cree Nation of Eastmain Council for management of the airport. The land on which the airport is built is designated as a Category I ancestral land by the James Bay and Northern Québec Agreement, which reserves the land to the exclusive use and benefit of the Cree population.

FLIGHT OPERATIONS

The gravel apron tarmac covering approximately 3,700 m^2 can accommodate, with some limitations, two Dash 8–100 aircrafts at a time, allowing GLCI flights to transit concurrently with commercial flights. The runway is 1,067 m long and 30 m wide and can readily accommodate Dash 8–100 type aircraft (37 passengers). Under certain circumstances, it can accept Dash 8–300 types (52 passengers), provided several conditions are met and evaluated before the flight, including weather, temperature, runway conditions and the loaded weight of the aircraft.

The following additional support equipment will be required: de-icing equipment, ground power units and fueling facilities (to avoid a refueling stop).

1.2.10 Market Studies and Contracts

1.2.10.1 Market Studies

Lithium is the lightest and least dense solid element, exhibiting unique properties such as good heat and electric conductivity, and it is highly reactive. It is found within minerals and salts and does not occur in pure form. Its crustal abundance is around 0.002%, making it the 32nd most abundant crustal element.

Lithium has diverse applications including ceramic glazes, enamels, lubricating greases, and as a catalyst. Demand in traditional sectors grew by approximately 4% compound annual growth rate (CAGR) from 2020 to 2022. The dominant lithium usage is in rechargeable batteries, which accounted for 80% in 2022, with 58% attributed to automotive applications. Between 2023 and 2033, growth is forecast at 11% CAGR for total lithium demand, 13% for automotive, and 7% for other applications. Growth is expected to slow as the market matures.

Different lithium chemical compositions are used in various products. Lithium carbonate and hydroxide accounted for 90% of refined lithium demand in 2022. High demand is expected for lithium hydroxide due to high-nickel Li-ion batteries, and lithium-iron-phosphate (LFP) cathode demand is growing, especially in China. Wood Mackenzie predicts growth in lithium carbonate at 14% CAGR between 2023 and 2033.

Lithium is supplied through mineral mines, continental lithium brines, and reprocessing. Recycling is a small but growing source, accounting for 2% in 2022 and expected to rise to 36% by 2050. Mineral concentrates are the primary source of lithium, with 82% from spodumene and 17% from lepidolite in 2022. Brine production accounted for 38% of refined lithium in 2022 and is expected to grow at 8% CAGR between 2023 to 2033. Total production was estimated at 701 thousand tonnes (kt) lithium carbonate equivalent (LCE) in 2022, with a 12% annual growth forecast between 2023 and 2033.

Historical underinvestment and strong electric vehicle (EV) demand have created a supply deficit, influencing prices and investment in additional supply. Market balance remains uncertain due to project delays and cost overruns. The market is forecast to be in deficit in 2024, have a fragile surplus in 2025, and a sustained deficit from 2033.

Prices have fluctuated in 2022-2023, with factors like plateauing EV sales, Chinese production slowdown, and supply chain destocking influencing trends. The price for battery grade (BG) lithium carbonates is linked to demand growth for LFP cathode batteries and is expected to decline in the short-term but rebound by 2031. The growth in the market for BG lithium hydroxide supports a strong demand outlook, with long-term prices between USD 25,000/t and USD 35,000/t (real USD 2023 terms). Chemical-grade Spodumene Concentrate's prices are expected to align with market imbalances, with a long-term price forecast between USD 2,000/t and USD 3,000/t (real USD 2023 terms).

1.2.10.2 Contracts

As of the date of this Technical Report, GLCI has no existing commercial offtake agreements in place for the sale of lithium concentrate, lithium carbonate, or lithium hydroxide (collectively, “lithium products”) from the James Bay Project.

GLCI has initiated discussions with potential offtake customers for James Bay. In line with the Project execution schedule, these discussions are expected to advance to negotiations throughout the course of the project.

Allkem has been an active participant in lithium markets since 2012 and has been a seller in both lithium concentrate (“concentrate” or “spodumene”) and lithium chemicals markets due to past and present operations.

GLCI has progressed overall procurement to 70% (with process plant equipment progressed to 80%) and issued contracts with supporting purchase orders.

1.2.11 Environmental Studies, Permitting and Social or Community Impact

1.2.11.1 Regulations and Permitting

The mining industry in Québec is subject to federal and provincial regulations and environmental review processes. In addition, the Project is located within the territory governed by the James Bay and Northern Québec Agreement (JBNQA).

An Environmental and Social Impact Assessment (ESIA) was prepared in 2017 and submitted to the authorities in 2018. An environmental review process aiming at optimizing the project was conducted following this submittal. A second version of the ESIA, addressing these changes, was submitted to the authorities in July 2021 (WSP, 2021).

Federal Regulations and Permitting

The federal environmental assessment process, under the Canadian Environmental Assessment Act (2012), was initiated in October 2017 and completed with the approval of the ESIA in January 2023. The Decision Statement, establishing the conditions GLCI must comply with, was received from the Minister of Environment and Climate Change on January 16, 2023. The ESIA, Decision Statement and other related documentation is available on the Impact Assessment Agency of Canada (IAAC) registry at https://aeic.gc.ca/050/evaluations/exploration?projDocs=80141. In addition to the ESIA approval, other federal authorizations are required, such as:

- Authorization from the Minister of Fisheries and Oceans under paragraphs 34.4(2) (b) and 35(2)(b) of the Fisheries Act.
- Approval from the Minister of Transport under paragraphs 23(1) and 24(1) of the Canadian Navigable Waters Act.

Provincial Regulations and Permitting

The ESIA was prepared according to Section 153 of the Environmental Quality Act (EQA) which embeds any mining project in the process described in the Regulation respecting the environmental and social impact assessment and review procedure applicable to the territory of James Bay and Northern Québec (CQLR, c.Q-2, r.25). In parallel to the federal assessment process, the provincial environmental assessment process was initiated in October 2017. As part of the ESIA review by the Committee of the James Bay and Northern Québec Agreement (COMEX), several rounds of questions and comments were completed. The Project is pending approval from the provincial authorities as of July 2023. The ESIA and related documentation is available on the COMEX registry at https://comexqc.ca/en/fiches-de-projet/projet-de-de-lithium-baie-james-galaxy-lithium-canada-inc/.

After ESIA approval, the Project will be subjected to Section 22 of the EQA, pursuant to which an authorization is required for activities that may result in a change to the environment. Each activity such as earthworks in wetlands, mining, concentration, tailings management and water management may be subjected to different authorizations. The applications to the Québec *Ministère de l'Environnement, de la*

Lutte contre les changements climatiques, de la Faune et des Parcs (MELCCFP) need to be accompanied by sufficiently comprehensive studies to address the requirements of Directive 019 applicable to the mining Industry, as well as the MELCCFP's EQA section 22 application form requirements.

Any application for an authorization involving works in wetland will have to be accompanied by a compensation program. Such a program has been developed for the Project area. The nature of the program is to be determined by agreement between the proponents, the authorities, and the Cree Nation.

Other permits, authorizations, approvals and leases from the Québec's Ministry of Natural Resources and Forestry (*Ministère des Ressources naturelles et des Forêts*, MRNF), the MELCCFP, the Québec Building Agency (*Régie du Bâtiment*, RBQ), the Eeyou Istchee James Bay Regional Government (EIJBRG), and Québec's National Police Force (*Sûreté du Québec*) for various Project components or activities on the Project site are required, such as:

- Approval of tailing storage facilities and concentration plant locations (Mining Act, s.240 & 241)
- Surface leases ("*Demande d'utilisation du territoire public*", Act respecting the lands in the domain of the State, s.47)
- Mining lease (Mining Act, s.101)
- Tree clearing (Mining Act, s.213 & Sustainable Forest Development Act)
- Sand pit exploitation (Mining Act, s.140 & Regulation respecting the regulatory scheme applying to activities on the basis of their environmental impact, s.117)
- Municipal Building Permits
- High-risk petroleum products containment installation (Safety Code, s.120 & Construction Code, Chap. VIII, s.8.01)
- Explosive storage (Regulation under the Act respecting explosives, Division II)

The required applications will be filed during the Project's development, when appropriate. A permit register coherent with the Project construction schedule has been developed by GLCI. Each governmental body (MELCCFP, MRNF, EIJBRG, RBQ) was consulted by GLCI to confirm what activities require a permit, as well as confirm application requirements.

Except for wood cutting permits required for exploration activities, and approval of the concentration plant, North-East and South-West storage facility locations, no other permit, lease or certificate application has been granted as of July 2023.

1.2.11.2 Environmental Impact Assessment

In 2017, various studies were undertaken to update a former data collection from 2011 to obtain necessary baseline information required to assess the Project's impacts as part of the ESIA. Other complementary baseline studies were conducted in 2019 and 2020.

Geochemical Characterization

Kinetics tests showed the following:

- The four main lithologies, namely barren pegmatite, gneiss, banded gneiss and mafic volcanic/basalt are considered Non-Potential Acid Generating ("Non-PAG"). Some metal leaching that exceeded the criteria applicable for resurgence to surface water (RES) was encountered during the first weeks of testing, but all metals complied with the RES criteria after week 14.
- Diabase (dike) is considered Non-PAG. Some metal leaching exceeding the RES criteria was encountered for the first weeks of testing, but all metals complied with the RES criteria after week 13, except for mercury concentrations that were still occasionally above the RES criterion up to the end of the test. No clear tendency was observed for mercury concentrations throughout the test.
- Tailings shows that they are considered Non-PAG. Metal leaching above the RES criteria was encountered for the first weeks of testing, but all metals complied with RES criteria after week 14, except copper that was still occasionally over the RES criterion up to week 28.
- Pegmatite is considered Non-PAG. Some metal leaching exceeding the RES criteria was encountered during the first weeks of testing, but all metals complied with the RES criteria after week 13, except for mercury concentrations that were still occasionally above the RES criterion up to the end of the test. No clear tendency was observed for mercury concentrations throughout the test.

A total of eight samples (two clay and six sand samples) were submitted to static leaching tests. Both clay samples results exceeded the RES criteria for copper, lead, and zinc. One of these two samples also exceeded the RES criterion for manganese. No exceedance of the RES criteria was noted for sand samples.

An additional sampling campaign was conducted in March 2023 on the waste rock, unconsolidated and granular material that will be used for construction to determine their acid generation and metal leaching potential. The results from this campaign are pending.

Physical Environment

Natural background levels in soils are lower than the generic criterion 'A' (background level) from the provincial guidelines for barium, hexavalent chromium (CrVI) and manganese, except for hexavalent chromium in the gravelly sand unit where it exceeds the 'C' criteria (industrial use) of the same guidelines. Based on further soil sampling and analysis for CrVI in 2020, there is no indication at this stage that there is a hexavalent chromium problem on the site.

Modelling of hydrogeological conditions show that once operation activities are completed, the groundwater table drawdown will be nil at approximately 2 km east of the pit. For the south and west sectors, the drawdown will be almost nil at 500 to 900 m from the pit walls. In the northwest sector, the retention basin will create a slight local increase in the groundwater level of about 0.5 m. According to the modifications on the hydrogeological regime, the results also show that the impact on lakes and watercourses will involve a decrease in average overall flow between 0 and 2%. Groundwater contribution to the base flow of watercourse CE4 will become very low and Lake Kapisikama, located less than 200 m from the pit, will be impacted and will no longer be supplied by groundwater as of Year 4.

The groundwater in the area has significant concentrations of calcium and magnesium bicarbonate. Since the hardness of the receiving medium is low (less than 10 mg/l), the applicable criteria for some metals are very restrictive. Applicable criteria (RES) or threshold were exceeded for one or the other of the following metals: silver, barium, copper, manganese and zinc. Results for all other metals are below the RES criteria. The drinking water criteria were exceeded for the following metals: aluminum, arsenic and manganese.

Groundwater modelling results indicate that the maximum daily percolation rate of 3.3 L/m2 set by Directive 019 will be respected under the waste rock and tailings piles as well as under the two water management basins. Modelling of dissolved metal transport also shows that the groundwater quality protection objectives will be met.

Watersheds of the watercourses CE2, CE3, CE4 and to a lesser degree CE5 will be impacted due to the presence of the mine infrastructures. Because it will receive the mine effluent, the CE2 stream flow will increase. A rise in water levels from 3 to 13 cm is expected during the baseflow periods of summer and winter, downstream from the outlet. For the CE3 stream, a slight decrease of 1 to 3 cm is expected for baseflow and annual-average water levels, and a decrease of up to 7 cm is expected during the flood period. The CE4 stream water levels will decrease by 2 cm to 9 cm from the junction with the Billy-Diamond Road to its connection to Asyian Awkawkatipusich Lake. During baseflow periods, the decrease in flow is such that it is expected that there will be no more flow but simply pooling water, with water level maintained by the hydraulic controls present in the stream. Kapisikama Lake will gradually dry up as mining progresses, starting Year 4.

The waterbodies in the project area are natural and are not affected by any forms of pollution that originate directly from human activity. Measurements taken on site showed that pH and dissolved oxygen values were low and that the surface water is very acidic. The nature of the soil and the vegetation are the main causes of these conditions. Although the concentrations of a few trace elements were higher than the recommended criteria in the surface water samples, they were within natural range for Canadian surface waters. Some sediment samples exceeded the criteria for different metals, but they are also within the range of the possible natural conditions.

Since no air quality sampling has been conducted on the Project site, the air quality baseline has been established using initial concentrations (background) suggested in the air modelling provincial guidelines for mining projects in northern Québec (*Guide d'instructions – Préparation et réalisation d'une modélisation de la dispersion des émissions atmosphériques – Projets miniers*). The modelling results indicated emissions of nitrogen dioxide exceeding the CAAQs and silica dust exceeding the provincial criteria at some sensitive receptors. Some modifications to the blasting program, to truck and heavy equipment characteristics and dust collecting systems were made to reduce these potential emissions. In addition, GLCI intends to implement a dust management plan, through appropriate mitigation measures and supported by the ambient air quality monitoring program, to minimize the project's impacts on air quality.

All noise background levels monitored were under the guideline criteria for Zone IV (non-sensitive area), which is 70 dBA for both day and night periods. However, on the land of an existing dwelling in an industrial zone and established in accordance with municipal regulations in force at the time of its construction, the criteria are 50 dBA at night and 55 dBA during the day. A noise modelling study considering all the facilities and mobile equipment for the Project, as well as sensitive receptors, was conducted as part of the ESIA. Modelling results show that noise levels during construction and operation will comply with the guidelines criteria for day and night periods. General mitigation measures will however have to be implemented by GLCI to minimize the effects of the Project on the ambient noise environment.

Modelling was conducted to assess the impact of future facilities on artificial nocturnal light. Results show that expected changes in the brightness of the sky will have very little effect in the sky glow. The effects will only be visible near lit areas. Changes will be barely perceptible on all other sensitive receptors in the study area, including permanent Cree camps, and on the uses of the territory (traditional or otherwise).

Biological Environment

Across the study area (3,677 ha), terrestrial environments cover 18.2% (668 ha), wetlands 78.6% (2,891 ha), hydric environments (including lakes and streams) 2.0% (74 ha), and anthropogenic environments 1.2% (44 ha). Even if ecosystems have adapted to forest fire dynamics over the past decade (2005, 2009 and 2013), successive forest fires have modified the composition of the vegetation cover in the short and medium terms.

No species at risk or invasive species were identified during inventories. Up to 27 plants of interest to the Cree were also identified: five tree species, 16 shrub species, five herbaceous species and one nonvascular species. For the most part, the medicinal plants observed during inventories are common in the study area and in this part of Québec.

The apprehended impacts on vegetation are mainly related to the destruction and modification of natural habitats. These impacts are caused by deforestation and excavation, necessary for land preparation and the construction of temporary or permanent infrastructures. Work required to develop the future mining infrastructures will result in the transformation of approximately 145 hectares of terrestrial and 305 hectares of wetlands. A wetland compensation plan is currently being developed, which will be submitted for approval by the federal and provincial authorities.

Forest fires that struck the area in the last decade have profoundly changed habitats in terms of vegetation cover and food availability. These phenomena caused death or flight of most of wildlife species.

Opportunistic observations of herpetofauna in potential habitats were conducted since no species at risk was foreseen in the study area. The four species identified are largely spread across Québec's territory.

Various field surveys confirmed the presence of 53 bird species. Most of them are common and largely distributed across habitats at these latitudes in Québec. Of these species, two species at risk were surveyed: the nighthawk (Chordeiles minor) and the rusty blackbird (Euphagus carolinus). Availability of their habitats is not at risk in the surrounding environment near the study area or across Québec.

Survey results indicate very low density of chiroptera (68 crossings) and identity three out of four species potentially present in the study area (the big brown bat (Eptesicus fuscus), hoary bat (Lasiurus cinereus), and a chiroptera of the Myotis genus). The scarcity of mature forest due to forest fires may be the cause of chiroptera's weak presence in the study area. Habitat of higher quality for species at risk are found in the surrounding environment of the study area.

The small mammal survey identified eight species in 2011 and two species in 2017. One species at risk was identified, the yellow-nosed vole (Microtus chrotorrhinus), but its habitat seems to have disappeared between 2011 and 2017.

Large mammal inventories confirmed the presence of moose (Alces alces). Black bear (Ursus americanus) and grey wolf (Canis lupus) have also been seen by Cree and km 381 Truck Stop personnel in recent years.

Regarding the caribou (woodland and migratory of the Leaf River Herd) (Rangifer tarandus caribou), which is protected at both federal and provincial levels, no individuals or signs of their presence were observed, even if the species distribution could be in the study area. The presence of migratory caribou in the area is marginal as its preferential habitat (mature forest) is absent.

Habitat loss and fragmentation are the main direct impacts of the project on wildlife. These impacts will lead to a change in the natural behavior of large wildlife and their movements. Accidental mortalities of large fauna could also occur during collisions with vehicles.

Fish sampling showed low density in streams and none of the species recorded are listed on the federal Species at Risk Act or likely to be vulnerable or endangered in Québec. The Yellow perch was only captured in the Kapisikama Lake. Its population seems completely isolated from the rest of the water network.

Physical characteristics of all streams were similar featuring U channel, meandering through peatlands and floodplains, fine particles substrate, low flow and an acidic pH. Even though these characteristics are not optimal for salmonids, it did not seem to affect brook char settlement in watercourses. Watercourses sheltered between two and six fish species.

No potential spawning grounds were found for brook char in watercourses of the study area. In CE5 Creek, its floodplain may be used as potential spawning grounds for northern pike. The floodplain of the Asiyan Akwakwatipusich Lake may also provide potential spawning grounds for this species.

In September 2019, a total of 20 brook char were collected in the CE1 and CE2 watercourses to analyse the mercury content in their flesh. All the samples analysed were below the MELCCFP criterion related to fish consumption recommendations.

Regarding benthic communities, 48 species were identified at four sampling stations in July, September and October 2017. Communities were mainly composed of insects for all three sampling campaigns.

Fish habitat loss is the main impact resulting from project activities. A fish habitat compensation plan is currently being developed and will be submitted for approval by the federal and provincial authorities.

Social Environment

The Cree Nation of Eastmain is located 130 km West of the proposed Project site. The Cree community of Eastmain is impacted by the Project with respect to traplines located near the Project site (RE1, RE2, RE3, VC33 and VC35). The Project site is located on the RE2 trapline. Most activities conducted on this trapline are located near the Eastmain River, which is outside the proposed Project site. Marginal activities are also carried out along on both sides of the Billy Diamond Highway. They include moose and goose hunting, beaver trapping, fishing, wood cutting, and blueberry picking. A small camp, snowmobile trails and goose ponds set by the tallyman are located near the Project.

A truck stop owned and managed by the *Société de développement de la Baie-James* (SDBJ) is in the study area, at km 381. The truck stop provides lodging, restaurant, meeting room and mechanical repair services. A convenience store, laundry room, cafeteria, motel, two garages and a service station are also part of the complex. Two secondary roads are located within the study area: one south-east of the project area, which provides access to the transmission line corridor of the 4003-4004 circuit, and another along the pegmatite hill, in the south, which stops at the remote landfill ("LETI").

The LETI is located near the future open pit and is associated with the operations of the truck stop. The LETI site has been used for the management of residual materials since 1983. Until 2011, residual materials transported to site were buried in trenches, but these are now incinerated in containers and buried.

An archaeologic inventory of areas presenting high archaeological potential was conducted in July 2021. No archaeological evidence was revealed during the visual inspection and inventory (Arkéos, 2021).

According to the knowledge acquired as part of the Eastmain-1 Hydro Québec Complex Development Project, human occupation in the region dates from 4600 to 4100 BP. Besides, a prehistoric archaeological site is known at the site of km 381Truck Stop. The territory has been occupied and harnessed by First Nations since prehistoric times, and even today, the study area and its immediate surroundings encompass sections, of varying sizes, of Eastmain traplines.

The study area is divided into five types of landscape units based on the homogeneity of the permanent elements of the landscape and the visual characteristics that prevail: valley, plain, plateau, powerline, road.

Socio-Economic

GLCI established a stakeholder consultation and engagement process as part of its project acceptance activities, which allowed GLCI to gather information, questions and expectations of local communities and stakeholders. Mitigation measures were proposed based on the consultation process.

GLCI signed a Preliminary Development Agreement ("PDA") with the Cree Nation of Eastmain, Grand Council of the Cree and Cree Nation Government dated on March 15, 2019. This PDA is to be replaced by an Impact Benefit Agreement ("IBA") before project construction.

Surveillance and Monitoring Program

As presented in the ESIA and required as part of the federal and provincial authorization process, an environmental surveillance and monitoring program will ensure that work carried out complies with laws, policies and regulations in effect, commitments, and obligations of the proponent, plans and specifications, and mitigation measures that were presented in the ESIA to minimize the Project's effects. In addition, an environmental surveillance and monitoring program will verify the proper functioning of equipment and facilities and manage any environmental changes caused by the Project.

Construction

Regular surveillance will be carried out by GLCI during the construction. The surveillance program will include inspection of the construction site, documentation control, report preparation and communications.

Operation procedures are being developed to document and follow all construction activities, construction site observations, decisions regarding non-conforming situations, corrective actions, observed results of these actions, and preventive measures put in place to ensure that these non-conforming situations do not occur again.

During the construction phase of the Project, the social monitoring program will namely include the monitoring of socioeconomic conditions within the Eastmain community as well as the monitoring of the quality of life and well-being for the population of the Eastmain community.

Operations

Several monitoring programs are currently being developed in consultation with concerned First Nations and relevant authorities. These programs namely concern the monitoring of groundwater quantity and quality, surface water quantity and quality, sediment quality, air quality, noise and vibrations, vegetation (including wetlands and invasive alien plant species), wildlife, traditional food, land use.

Social monitoring will also be performed during the operation phase of the Project. The social monitoring program will namely include:

- Monitoring of socioeconomic conditions within the Eastmain community.
- Monitoring of land and resource uses for traditional purposes.
- Monitoring of the quality of life and well-being for the population of the Eastmain community.

Closure and Rehabilitation

A closure plan was submitted to the MRNF/authorities in accordance with article 232.1 of the Mining Act for approval prior to the filing of the mining lease application. The closure plan was developed according to the guidelines for preparing mine closure plans in Québec (MERN, 2017) and with the objective of:

- Eliminating unacceptable risks to health and ensure the safety of persons.
- Limiting the production and spread of substances liable to harm the receiving environment and, in the long term, aim to eliminate all forms of maintenance and follow-up.
- Restoring the site to a visually acceptable condition for the community.

- Restoring the infrastructure site to a state compatible with future use.

Post Closure Monitoring Program

A follow-up study of the physical stability of the structures, chemical quality of drainage and return of vegetation will be carried out after the cessation of mining activities.

The environmental post-closuring monitoring will be conducted for a period of 11 years whereas the agronomic monitoring and monitoring of the physical stability of the structures will be conducted for a period of eight years following the three-year rehabilitation period.

1.2.11.3 Public Consultation

GLCI established a stakeholder consultation and engagement process as part of its project acceptance activities, which allowed GLCI to gather information, questions and expectations of local communities and stakeholders. Mitigation measures were proposed based on the consultation process.

GLCI signed a Preliminary Development Agreement ("PDA") with the Cree Nation of Eastmain, Grand Council of the Cree and Cree Nation Government dated on March 15, 2019. This PDA is to be replaced by an Impact Benefit Agreement ("IBA"), before project construction.

To reach the largest number of people in the James Bay area, in 2011-2012 and in 2017-2018, GLCI met with a wide reach of Jamesian stakeholders including, municipal administration, economic development, land use and planning, and natural resources.

Jamesian stakeholders expressed support for responsible mining development in their region, but also voiced the importance of establishing positive working relationships, regional socioeconomic benefits, and carefully considered environmental protection planning and monitoring.

Stakeholder concerns, expectations and recommendations regarding the Project were recorded throughout the consultation process.

GLCI has already responded to all concerns, expectations and recommendations voiced by the James Bay and Cree stakeholders. GLCI's responses are detailed in the ESIA consultation log or its review in 2021.

Since the submittal of the 1st version of the ESIA in October 2018, communication and engagement with Project stakeholders have continued and will be ongoing through life of project. No particular concerns have however been expressed since the submittal of this ESIA in 2018 and 2021.

1.2.11.4 Consultation of Indigenous Peoples

Meetings were organized with the Eastmain Cree community to inform and consult stakeholders concerned by this mining development. These meetings were primarily aimed at socioeconomic stakeholders, RE1, RE2, RE3, VC33 and VC35 tallymen, the users of the territory of these traplines, and members of the Eastmain community. RE2 trapline is the most impacted. Meetings were also organized with Waskaganish and Waswanipi where community members, designated senior community officials and tallymen were consulted.

GLCI conducted interviews in Eastmain with stakeholders from various sectors relating to the economy, the socio-cultural aspects, health, hunting, fishing, trapping, quality of the surrounding environment, and from focus groups.

GLCI also hosted community presentations to share project information, organized individual and group sessions with stakeholders, posted updates on the James Bay Project website and maintains direct contact with community members on a regular basis, including the RE2 Tallyman.

Here is a list of the main stakeholder interviewed in the consultation process:

- Cree Nation Government (CNG)
- Cree School Board (CSB)
- Cree Board of Health and Social Services of James Bay
- Cree Human Resources Department
- Apatisiiwin Skills Development (ASD)
- Cree Women of Eeyou Istchee Association (CWEIA)
- Cree Nation of Eastmain (CNE) and its community
- Cree Nation of Waskaganish and its community
- Cree Nation of Waswanipi and its community
- Local Cree Trappers Association (CTA)
- Wabannutao Eeyou Development Corporation (WEDC)

Communications with the Cree community has been maintained since the submittal of the first version of the ESIA in October 2018. Meetings were held in 2019 with Cree stakeholders. Although the 2020 Covid-19 sanitary crisis have limited the consultations activities, some were held by using videoconferencing platforms in 2020 and 2021. The changes made to the project design were presented during the consultations conducted in 2021.

1.2.12 Capital and Operating Costs

The capital expenditures (CAPEX) for Project construction, including processing, mine equipment purchases, infrastructures, and other direct and indirect costs is estimated and summarized in Table 1-3 The total initial Project CAPEX, including a 6.2% contingency, is estimated at CAD 508.7 million. Sustaining CAPEX is required during operations for additional equipment purchases, a truck shop bay addition, and mine civil works. In addition to the CAPEX, an amount of CAD 39.3 million for Pre-production is forecasted during the construction phase.

Operating costs include mining, processing, general and administrative services, mining, processing and concentrate transportation. The LOM operating cost summary is presented in Table 1-4.

Table 1-3 – Summary of LOM Capital Costs

Capital Expenditures	CAD million
Initial CAPEX (CAD M)	
001 - All site General	1.93
100 - Infrastructure	62.87
200 - Power and Electrical	60.50
300 - Water	36.35
400 - Surface Operations	11.15
500 - Mining Open Pit	43.12
600 - Process Plant	112.71
Subtotal Direct Costs	328.63
700 - Construction Indirects	97.90
800 - General Services	45.56
900 - Start-up, Commissioning	6.79
990 - Contingency	29.79
Subtotal Indirect Costs	180.04
Total Initial CAPEX	**508.67**
Pre-Production	39.26
Sustaining CAPEX (CAD million)	
001 - General	1.9
100 - Infrastructure	3.2
200 - Power and Electrical	1.1
300 - Water	52.7
500 - Mining	113.2
600 - Process Plant	11.7

Capital Expenditures	CAD million
Others	70.0
Total Deferred and Sustaining CAPEX	**253.8**

Table 1-4 – Summary of LOM Operating Costs

Item	Total Cost (CAD million)
Mining	969.3
Processing	675.9
G&A, Royalties, IBA, Sustaining, and Closure	1,389.2
Concentrate Transportation	841.2
Total	**3,875.7**

1.2.13 Economic Analysis

An economic analysis of the Project was carried out utilizing the discounted cash flow (DCF) method. This approach draws on comprehensive data and detailed assumptions pertaining to capital and operating costs, which are elaborated upon in this report. The costs encapsulate mining, processing, and other associated infrastructure requirements.

For the purpose of this analysis, an exchange rate of CAD 1.33 per USD was applied to convert specific cost estimates from USD to CAD. Importantly, no provisions were made to account for inflation, and all monetary values were assessed on a constant 2023 CAD basis, reflecting the base currency utilized in this evaluation.

The assessment was carried out entirely on a 100% equity basis, and it should be noted that exploration costs are considered outside of this project scope. Consequently, any additional study costs related to the project were omitted from the analysis.

The base case scenario, presenting the key results of this analysis, is detailed in Table 1-5. This scenario serves as a benchmark against which other potential outcomes can be measured, providing key insights into the project's financial viability and potential return on investment.

Table 1-5 – Base Case Scenario Results

Production Summary (Life-of-Mine)	Units	Value
Tonnage Mined	000 t	169,999
Ore Processed	000 t	37,296
Strip Ratio	W:O	3.6
Spodumene Concentrate	000 dmt	5,845
Metal		
Head Grade	% Li_2O	1.27
Contained Metal	000 t Li	221
Recovered Metal	000 t Li	152

Production Summary (Life-of-Mine)	Units	Value
Cash Flow Summary	**million CAD**	
Gross Revenue		14,980
Mining Costs (incl. rehandle)		-969
Processing Costs		-676
Concentrate Transportation		-841
G&A, Royalties, IBA		-1,011
Total Operating Costs		-3,497
Operating Cash Flow		11,483
Initial CAPEX		-509
Operation Cost during Construction		-39
Owner's Cost and Sustaining CAPEX		-254
Total CAPEX		-802
Salvage Value		0
Closure Costs		-125
Interest and Financing Expenses		0
Taxes (mining, prov. & fed.)		-4,288
Before-Tax Results		
Before-Tax Undiscounted Cash Flow	million CAD	10,462
NPV 8% Before-Tax	million CAD	3,919
Project Before-Tax Payback Period	years	1.38
Project Before-Tax IRR	%	62.2
After-Tax Results		
After-Tax Undiscounted Cash Flow	million CAD	6,175
NPV 8% After-Tax	million CAD	2,244
Project After-Tax Payback Period	years	1.71
Project After-Tax IRR	%	45.4

1.3 Recommendations

1.3.1 Mineral Resources

In reviewing the geological and block model constructed for the Project, the SLR QP makes the following recommendations:

- Conduct the following drilling and sampling programs:

   - An infill drilling and channel sampling program in the NW Sector to convert Mineral Resources currently in the Inferred category to Indicated category.
   - Infill drilling at depth to convert any blocks of Inferred category within the new RPEEE pit shell to Indicated category.
   - Step-out exploration drilling to the north-west with the objective of discovering new pegmatites beneath thin glacial overburden.
- Update the surface geology map with more detailed lithological and structural mapping.
- Carry out a test reverse circulation grade control drilling program in the starter pit area.
- Investigate extent of sericite altered spodumene mineralization near diabase dikes.
- Try to define the bounding structures that control the pegmatite locations and extents.
- Carry out metallurgical testwork on lower grade mineralization in the 0.15% Li_2O to 0.5% Li_2O range to investigate potential to lower the current cut-off grade in the future.

The SLR QP is unaware of any other significant factors and risks that may affect access, title, or the right or ability to perform the exploration work recommended for the Project.

1.3.2 Mining and Mineral Reserves

The SLR QP offers the following recommendations with regard to mining:

- As currently planned, develop a slope monitoring program and a ground control management plan for the operations phase.
- Complete additional studies on dilution and ore recovery factors to inform mining operations decisions regarding the trade-off between productivity and selectivity.
- Refine the open pit mining schedule to maximize profitability.
- Conduct additional hydrogeological studies to improve water ingress estimates and dewatering strategy. Monitor ground water conditions and assess predicted conditions against actual conditions for the Ultimate Wall design (during the operations phase).
- Further define levels of deleterious metals (i.e., Fe_2O_3) that may be present within the external waste dilution.
- Carry out metallurgical testwork on lower grade Li_2O mineralization (<0.6%) to investigate potential to lower the current cut-off grade.

1.3.3 Mine Waste and Water Management

1.3.3.1 Geotechnical Investigation

The WSP QP offers the following recommendations related to geotechnical investigations:

- Conduct additional geotechnical investigation and laboratory testing to further delineate and characterize the foundation materials at the waste rock and tailings co-placement storage facilities (WRTSF), overburden and peat storage facility (OPSF) and water management pond (WMP) areas. The laboratory testing should focus on further strength (direct simple shear) testing and consolidation (oedometer) testing of clayey soil foundation materials.
- Conduct additional geotechnical investigation in the process plant area to support detailed design of the foundations and to improve the accuracy of bulk earthworks capital expenditure estimates. Investigation should include provisions for rock coring to confirm bedrock hydrogeological conditions, cone penetration tests (CPT), particle size distribution (PSD) evaluation, direct simple shear testing, and one-dimension consolidation (oedometer) testing on select soil samples.
- Carry out geotechnical investigations to identify and/or confirm potential granular borrow sources.

1.3.3.2 Mine Waste Storage Facilities

The WSP QP recommends the following additional validation to refine the detailed design of the WRTSF, OPSF and WMPs, in addition to the geotechnical investigations:

- Assess static and cyclic liquefaction susceptibility of WRTSF foundation soils, including post-liquefaction stability analysis.
- Consider staged consolidation and slope stability analysis, given the presence of undrained foundation conditions.
- Carry out laboratory testing to determine the filterability (dewatering) and geotechnical (shear strength) characteristics of the tailings.
- Carry out geotechnical laboratory testing of the waste rock, including strength and durability testing.
- Re-evaluate the WRTSF site selection and footprints considering water management criteria. For example, interim collection of runoff/drainage from the Southwest and East WRTSFs in the open pit mine may not be the most energy efficient strategy (e.g., water pumping cost) and could impact mining operations during the spring or extreme rainfall events.
- Conduct optimization and further evaluation of the proposed WRTSF designs and construction staging based on the findings of the geotechnical site investigations.

- Validation for the WRTSF filling plan methodology (i.e., optimization of filtered tailings and waste rock co-disposal details). Tailings and waste rock mixing tests should be carried out to evaluate interface shear strength, filter compatibility and seepage characteristics. In addition, field trials can be carried out during operations to assess opportunities for efficient co-mingling of the tailings with waste rock.
- Develop an instrumentation and monitoring program for construction and operation of the WRTSF with established threshold alert levels and appropriate response framework.
- Review the mine plan and material balance to confirm availability of construction materials for development of the WRTSFs over the life of mine, including pre-production and closure periods.
- Conduct condemnation drilling for the WRTSF sites to verify the absence of mineralization.
- Advance mine closure planning for the WRTSF and OPSF.

1.3.3.3 Water Management

The WSP QP recommends the following studies related to water management to support future detailed design:

- Update the site-wide water management strategy and the water balance model once the design of the effluent treatment system is completed, considering the operational requirements of the effluent treatment plant.
- Further consider liner requirements, minimizing excavation, and dam height during optimization of the WMP designs.
  - Complete a trade-off study evaluating geosynthetic versus clay lining for the WMP dams and North WMP basin. In particular, confirm if the existing clay overburden material is suitable for WMP dam construction and/or if it can be dried to a moisture content suitable for construction.
- Complete a dam breach and inundation study to support the WMP dam classification.
- Perform a more detailed flood study based on improved topographic mapping for the CE-3 Creek, considering spring and summer fall extreme events, and potential risk of blockage of the James Bay Road culvert by ice or debris.
- Refine the design of the water management infrastructure based on improved site topographic survey data.
- Confirm water treatment requirements for effluent discharge.

1.3.4 Processing and Metallurgy

The Wave QP recommends the following additional testwork and studies for Processing:

- Review treatment options for fines (-1 mm) tailings and complete a trade-off study to establish the best option for increasing Li_2O recovery/economics outcome.

1.3.5 Environment

The WSP QP offers the following recommendation related to the environment:

- Conduct fish sampling in the proposed WRTSF and WMP areas to confirm fish presence/absence in the waterbodies of interest that may be impacted by the proposed development.

2. INTRODUCTION

SLR Consulting (Canada) Ltd (SLR), Wave International Pty Ltd. (Wave), WSP Canada Inc. (WSP), and G Mining Services Inc. (GMS) were retained by Allkem Limited (Allkem or the Company) to prepare this Technical Report on the James Bay Lithium Project, Québec, Canada (the Project or James Bay). The purpose of this Technical Report is to disclose Mineral Resource and Mineral Reserve estimates, effective June 30, 2023, for the Project.

This Technical Report conforms to National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101). The definitions for Mineral Resources and Mineral Reserves in this Technical Report are consistent with those defined by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Definition Standards for Mineral Resources and Mineral Reserves dated May 10, 2014 (CIM (2014) definitions and are furthermore consistent with the definitions in the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code) and United States Securities and Exchange Commission's (SEC) Modernized Property Disclosure Requirements for Mining Registrants as described in Subpart 229.1300 of Regulation S-K, Disclosure by Registrants Engaged in Mining Operations (S-K 1300).

The Project is in the Nord-du-Québec administrative region of Québec. Galaxy Lithium (Canada) Inc. (GLCI), a wholly owned subsidiary of Allkem, is proposing to develop a conventional open-pit lithium mine and concentrator operation. The concentrated ore (spodumene) will be trucked to a transfer site in Matagami, Québec. The spodumene will then be loaded onto trains and transported to a port facility in either Trois-Rivières or Québec City, Québec.

Allkem, a company listed on the Australian Securities Exchange (ASX), is the result of the merger of Orocobre Limited (Orocobre) and Galaxy Resources Limited (Galaxy) on August 25, 2021. Allkem is a leading producer and developer of lithium with several projects in Australia, Argentina, and Canada.

A previous technical report titled "NI 43-101 Technical Report Feasibility Study, James Bay Lithium Project, Québec, Canada" was prepared for the Project by GMS to summarize the results of a FS and to disclose an initial Mineral Reserve estimate with an effective date of January 11, 2022 (GMS, 2022).

Since the 2022 FS, the following updates have been completed, as detailed in this Technical Report:

- Mineral Resources increased due to new drilling, a new geological interpretation, and a larger constraining pit shell.
- Mineral Reserves and the mining schedule were re-run on the updated block model, but within the same footprint (the 2022 FS pit design).
- Lithium prices have increased, and a new market study has been completed.

- Capital and operating cost estimates have been updated to reflect intervening work on basic engineering and new cost inputs.
- The Project cash flow has been updated to reflect the changes above.

2.1 Terms of Reference and Purpose of the Report

The report supports the disclosure of updated Mineral Resource and Mineral Reserve estimates by Allkem.

2.2 Qualified Persons

Table 2-1 lists the Qualified Persons (QPs) who prepared this Report and the sections for which they are responsible.

Table 2-1 – Qualified Persons' Responsibilities by Report Section

Qualified Person Firms	Company	Report Sections
Luke Evans, P.Eng, ing.	SLR Consulting (Canada) Ltd.	1.1, 1.2.1 – 1.2.4, 1.2.6, 1.3.1, 2 – 4, 6 – 12, 14, 23, 25.1.1, 25.2.1, 26.1
Jeremy Ison, AusIMM (Fellow)	Wave International Pty Ltd.	1.2.5, 1.2.8, 1.3.4, 13, 17, 25.1.3, 25.2.2, 26.4
Normand Lecuyer, P.Eng., ing	SLR Consulting (Canada) Ltd.	1.2.7, 1.2.10, 1.2.12 (Mining), 1.2.13, 1.3.2, 15, 16, 19, 21.1.2, 21.2.5, 21.3.1, 22, 25.1.2, 26.2
Robin Macaskill, CPEng	Wave International Pty Ltd.	1.2.9, 1.2.12 (Process, 21.3.2 – 21.3.4
Pierre Groleau, P.Eng.	WSP Canada Inc.	1.2.11, 1.3.5, 20, 26.5
Darrin Johnson, P.Eng.	WSP Canada Inc.	1.3.3.1, 1.3.3.2, 18.2, 18.3, 18.4.2, 25.2.3, 26.3
Joao Paulo Lutti, P.Eng	WSP Canada Inc.	1.3.3.3, 18.4
Joel Lacelle, P.Eng.	G Mining Services Inc.	1.2.9, 1.2.12 (excluding Process and Mining OPEX), 5, 18.1, 18.5 – 18.19, 21.1.1, 21.2 (excluding 21.2.5 and 21.2.6), 24, 25.2.4, 25.2.5
All		3, 27

SLR Consulting (Canada) Ltd. (SLR) is a third-party firm comprising mining experts in accordance with NI 43-101. The SLR QPs for this report are employees of SLR and are not employees of or otherwise affiliated with Allkem. Wave International Pty Ltd. (Wave) is a third-party firm comprising mining experts in accordance with NI 43-101. The Wave QPs for this report are employees of Wave and are not employees of or otherwise affiliated with Allkem. WSP Canada Inc. (WSP) is third-party firm comprising mining experts in accordance with NI 43-101. The WSP QPs for this report are employees of WSP and are not employees of or otherwise affiliated with Allkem. G Mining Services Inc. (GMS) is third-party firm comprising mining experts in accordance with NI 43-101. The GMS QPs for this report are employees of GMS and are not employees of or otherwise affiliated with Allkem.

2.3 Site Visits

Luke Evans, M.Sc., P.Eng., ing. visited the Project from June 6 to 7, 2023, accompanied by Mr. James Purchase, P.Geo. (OGQ 2082) of Galaxy Lithium (Canada) Inc. (GLCI), a wholly owned subsidiary of Allkem.

The site visit did not take place during active drilling activities. All aspects that could materially impact the integrity of the data informing the Mineral Resource estimate were reviewed, including outcrop inspection, channel sampling areas, core logging, sampling methods and security and database management.

SLR was given full access to relevant data and conducted interviews with GLCI personnel to obtain information on exploration work and to understand the procedures used to collect, record, store and analyze historical and current exploration data.

2.4 Units of Measure and Currency of Report

The International system of units (SI) are used, including metric tonnes (tonnes, t) for mass.

All currency amounts are stated in Canadian dollars (CAD) unless otherwise stated.

2.5 Abbreviations and Acronyms

Table 2-2 – Units of Measure.

Unit of Measurement	Description
%	Percent
µm	Micrometer (one millionth of a Meter)
BCM	Banked cubic meter
CY	Calendar Year
dmt	Dry metric tonne

Unit of Measurement	Description
g/t	Grams per tonne
H1	1st half of year 1
Ha	Hectares (area)
kg/m^3	Kilograms per Meter cubed
kL	Kilolitre (thousand litres)
km	Kilometer
km/hr	Kilometer per hour
L/s	Litres per second
lb	Pound
m	Meter
m^3/d	Cubic meter per day
mg/L	Milligram per litre
mm	Millimetre (one thousandth of a metre)
Mt	Million metric tonnes
Mtpa	Million tonnes per annum
MW	Megawatt (Power)
°C	Degrees Celsius
p.a.	Per annum
t	Metric tonne
tpa	Tonnes per annum
wmt	Wet metric tonne

Table 2-3 – Chemicals, elements, and associated abbreviations.

Abbreviation	Mineral or Element
Al	Aluminium
H	Hydrogen
K	Potassium
LFP	lithium-iron-phosphate
Li	Lithium
Li_2O	Lithium oxide
$LiAl(F,OH)PO_4$	Amblygonite
$LiAl(SiQ_3)_2$	Spodumene

Abbreviation	Mineral or Element
Mg	magnesium
MHO	mixed hydroxide
Na	Sodium
NCA	Nickel-cobalt-aluminium oxide
NCM	Nickel-cobalt-manganese oxide
O	Oxygen
SI	Silica
Ta	Tantalum
Ta_2O_5	Tantalum oxide
TaO_5	Tantalite

Table 2-4 – Acronyms and Abbreviations.

Abbreviations	Full Description
AA	Atomic absorption
ACQ	Association de Construction du Québec
Ai	Bond abrasion index
Al_2O_3	Aluminium oxide
ALS	ALS Canada Ltd.
BBWi	Bond ball mill work index
BCM	Bank cubic metres (in situ)
BRWi	Bond rod mill work index
°C	Celsius
CAD	Canadian Dollar
$CaCO_3$	Calcium carbonate
CaO	Lime
CARS	Community Aerodrome Radio Stations
CBHSSJB	Cree Board of Health and Social Services of James Bay
CDA	Canadian Dam Association
CEAA	Canadian Environmental Assessment Act
CEAAg	Canadian Environmental Assessment Agency
CoG	Cut-off grade

Abbreviations	Full Description
COMEX	Committee of the James Bay and Northern Québec Agreement
COREM	COREM Research Laboratory
CSA	Canadian Standards Association
CWi	Bond crusher work index
DOR	Direction of Rotation
DMS	Dense media separation
DTH	Down the Hole
EIA	Environmental Impact Assessment
EIJB	Eeyou Istchee James Bay
EIJBRG	Eeyou Istchee James Bay Regional Government
EPA	Environmental Protection Agency
EQA	Environment Quality Act
ESA	Environmental Site Assessment
ESIA	Environmental and Social Impact Assessment
EWMP	East Water Management Pond
EY	Early years
FEL	Front end loader
FeSi	Ferrosilicon
g	Grams
GLCI	Galaxy Lithium Canada Inc.
GLOI	Galaxy Lithium (Ontario) Inc.
GSLib	Geostatistical Software Library
Ha	Hectares
HARD	Half absolute relative deviation
HLS	Heavy liquid separation
HQ	Hydro-Québec
HRD	Half relative deviation
IAAC	Impact Assessment Agency of Canada
ICP-AES	Inductively coupled plasma-atomic emission spectrometry
Ind	Indicated material (classification)
IO	Input/Output

Abbreviations	Full Description
IP	Induced Polarization
JAC	Joint Assessment Committee
JBNQA	James Bay and Northern Québec Agreement
kg	Kilograms
km	Kilometres
kt	Thousand tonnes
l	Litre
LCM	Loose cubic metre
LCT	Lithium, Caesium, Tantalum
LETI	Landfill in remote area (Lieux d'enfouissement en territoire isolé)
Li_2CO_3	Lithium Carbonate
Li_2O	Lithium Oxide
Li_2O	Lithia
Li_2SO_4	Lithium sulphate
Lithium One	Lithium One Inc.
LOM	Life of Mine
LY	Later years
m	Metre
m^2	Square metre
m^3	Cubic metre
Ma	Million years ago
MASL	Metres above mean sea level
MCAF	Mining cost adjustment factor
MCC	Motor Control Centre
MELCC	Ministry of Environment and Fight against Climate Change (*Ministère de l'Environnement et de la Lutte contre les changements climatiques*)
MERN	Ministère de l'Énergie et des Ressources naturelles
MFFP	Ministry of Forests, Wildlife and Parks
Mg(OH)2	Magnesium hydroxide
MLEGB	Middle and Lower Eastmain Greenstone Belt
MDMER	Metal and Diamond Mining Effluent Regulations

Abbreviations	Full Description
mm	Millimetres
MNRF	Ministry of Natural Resources and Forestry (*Ministère des Ressources naturelles et des Forêts)*
MOU	Memorandum of Understanding
MP	Mining Plus
MR	Mineral Reserve
MRE	Mineral Resource Estimate
Mt	Million tonnes
Mtpa	Million tonnes per annum
MY	Mid years
Na_2CO_3	Sodium carbonate
NAG	Non-acid generating
NaOH	Sodium hydroxide
NBL	Natural background levels
NOR	Notice of Energization
NPAG	Non-Potential Acid Generating
NPV	Net present value
NSR	Net smelter return
NTS	National Topographic System
NWMP	North Water Management Pond
O	Oxygen
OCS	Operator Control Station
OK	Ordinary kriging
OEE	Overall Equipment Effectiveness
OPSF	Overburden and Peat Storage Facility
PAG	Potentially Acid Generating
PCS	Process Control System
PLC	Programmable Logic Controller
Q-Q	Quantile-quantile
RES	Water Quality criteria for groundwater (*Résurgence dans l'eau de surface*)
RF	Revenue Factor
RL	Reduced Level

Abbreviations	Full Description
RWP	Process Plant Raw Water Pond
ROM	Run of Mine
SCADA	Supervisory Control and Data Acquisition
SDBJ	Société de développement de la Baie James
SD	Standard Deviation
SG	Specific gravity
SGS	SGS Mineral Services Lakefield Laboratory
SI	Site Investigation
SiO_2	Silicon Dioxide (Silica)
SMC	SAG mill comminution
SPLP	Synthetic precipitation leaching procedure
SR	Stripping ratio
STP	Sewage treatment plant
t	Tonnes (metric tonnes)
TCLP	Toxicity characteristic leaching procedure
tph	Tonnes per hour
TTG	Plutonic rocks
TWRSF	Tailing and Waste Rock Storage Facility
UCS	Uniaxial compressive strength
UF	Ultrafine
USD	United States Dollar
Whittle	Mining software produced by Dassault Systèmes' Geovia software
WMP	Water Management Pond
WRAC	Work risk assessment control
WRTSF	Waste Rock and Tailings Storage Facility
XRD	X-Ray Diffraction
µm	Micron
Ω	Ohm

3. RELIANCE ON OTHER EXPERTS

The information, conclusions, opinions, and estimates contained herein are based on:

- Information and documents available to all QPs at the time of preparation of this Technical Report.
- Assumptions, conditions, and qualifications as set forth in this Technical Report.
- Data, reports, and other assumptions supplied by Allkem and other third party sources.

For the purpose of this Technical Report, the SLR QPs have relied on mineral tenure ownership information provided by GLCI. The SLR QPs have not researched property title or mineral rights for the Project and expresses no opinion as to the ownership status of the Project described in Sections 1 and 4 of this Report.

The SLR QPs are not experts with respect to legal, socio-economic, land title, or political issues, and are therefore not qualified to comment on issues related to the status of permitting, legal agreements, and royalty agreements in place. Information related to these matters has been provided directly by GLCI and include, without limitation, validity of mineral tenure, status of environmental and other liabilities, and permitting. These matters were not independently verified by the QPs but appear to be reasonable representations that are suitable for inclusion in Section 4 of this report.

In Section 1, 4.4, and Section 22, the SLR QPs have relied on GLCI for guidance on applicable taxes, royalties, and other government levies or interests, applicable to revenue or income from the Project.

The QPs consider it reasonable to rely on such information as Allkem has obtained opinions from appropriate experts with regard to such information.

Except for the purposes legislated under securities laws, any use of this Technical Report by any third party is at that party’s sole risk.

4. PROPERTY DESCRIPTION AND LOCATION

4.1 Location

The Project is located in northwestern Québec, 382 km north of the community of Matagami (Figure 4-1 and Figure 4-2). The property is located 10 km south of the Eastmain River and 130 km east of James Bay and is readily accessible by the paved Billy-Diamond Highway that connects Matagami to the village of Radisson.

The centre of the property is located at approximately 52.24 degrees latitude north and -77.07 degrees longitude west.

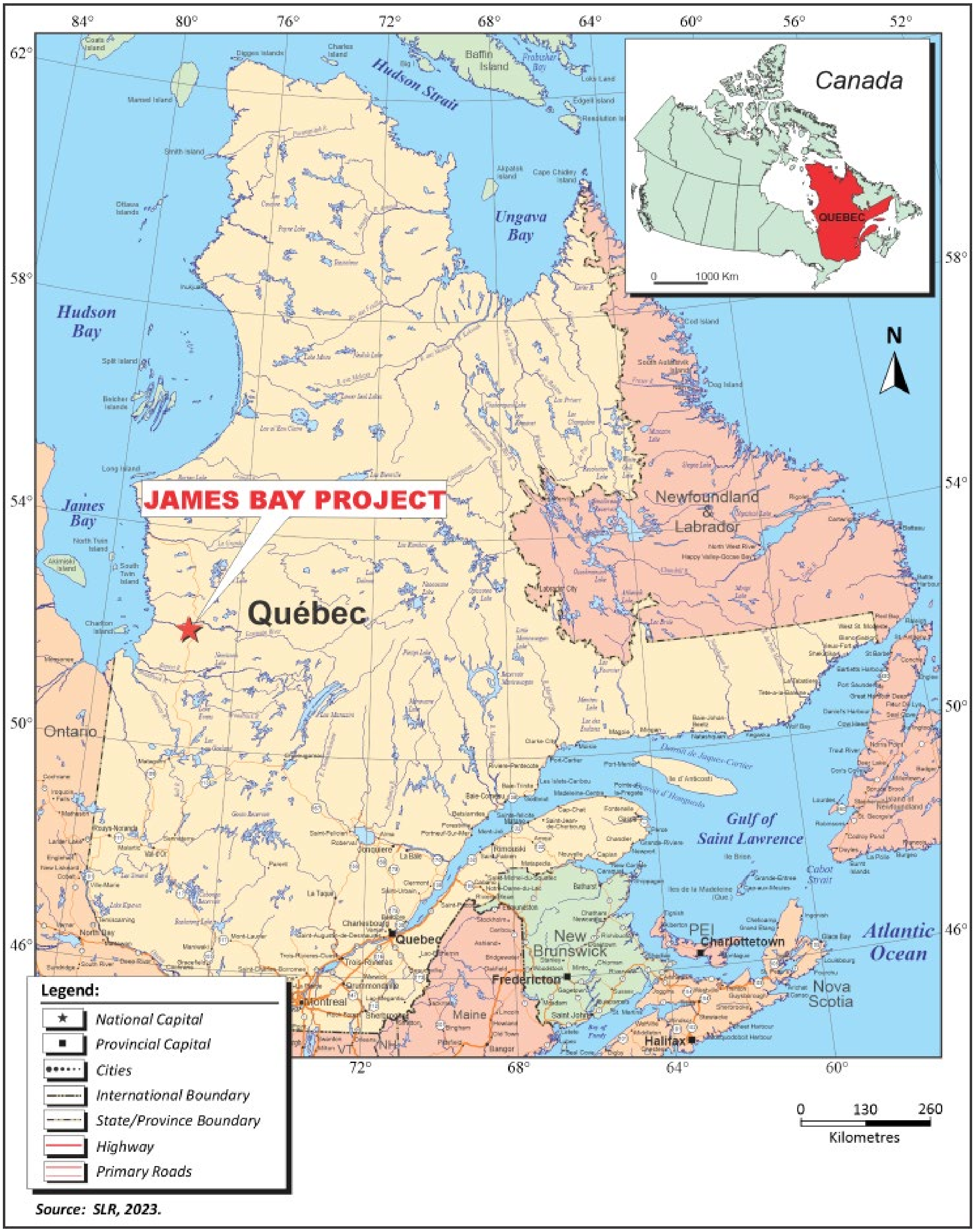
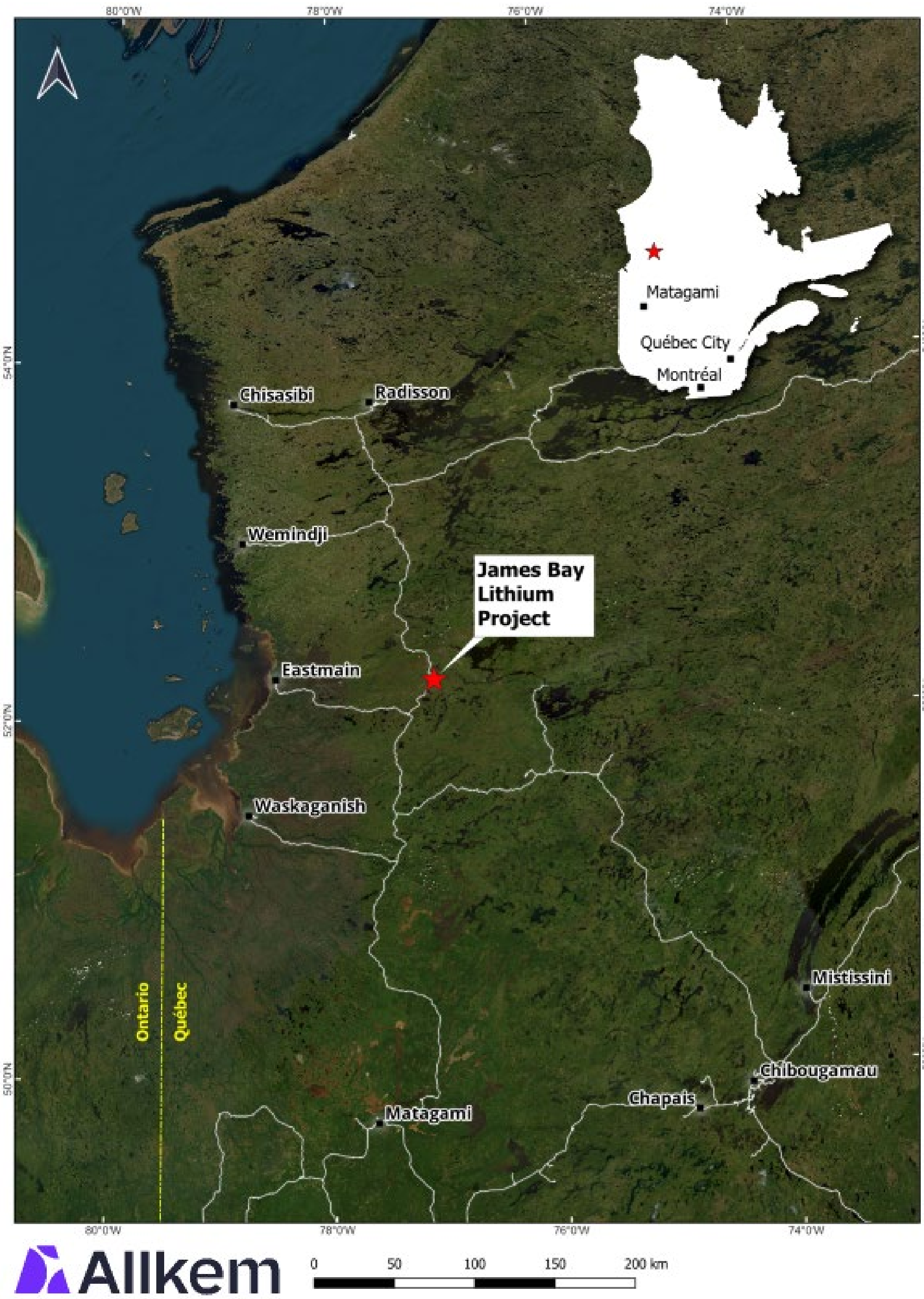


Figure 4-1 – James Bay Lithium Project Location Map



Source: GLCI, 2023

Figure 4-2 – James Bay Lithium Project Detailed Location Map

4.2 Land Tenure

The Project comprises two contiguous packages of mining titles located in NTS map sheet 33C03, covering an area of approximately 11,130 ha (Figure 4-3 and Figure 4-4). The 224 claims are classified as "map designed claims", also known as CDC-type claims under the government of Québec's mining title classification system. The boundaries of the claims have not been legally surveyed. A summary of the tenure information, as extracted from the government of Québec GESTIM website on June 9, 2023, is presented in Table 4-1. The property is located on Category III lands of the James Bay and Northern Québec Agreement (JBNQA).

All claims are in good standing, with expiry dates between June 12, 2024, and November 2, 2025. At the time of writing, the tenures are registered under Galaxy Lithium (Canada) Inc. (GLCI) or Galaxy Lithium (Ontario) Inc. (GLOI). Both GLCI and GLOI are wholly owned subsidiaries of Allkem.

It should be noted that at the time of writing, the claims registered under Select Lithium Corp. and acquired by GLCI on May 2, 2023, are being transferred to GLCI.

A mining lease application is in progress and, once granted, it will provide sufficient surface rights for the proposed infrastructure.

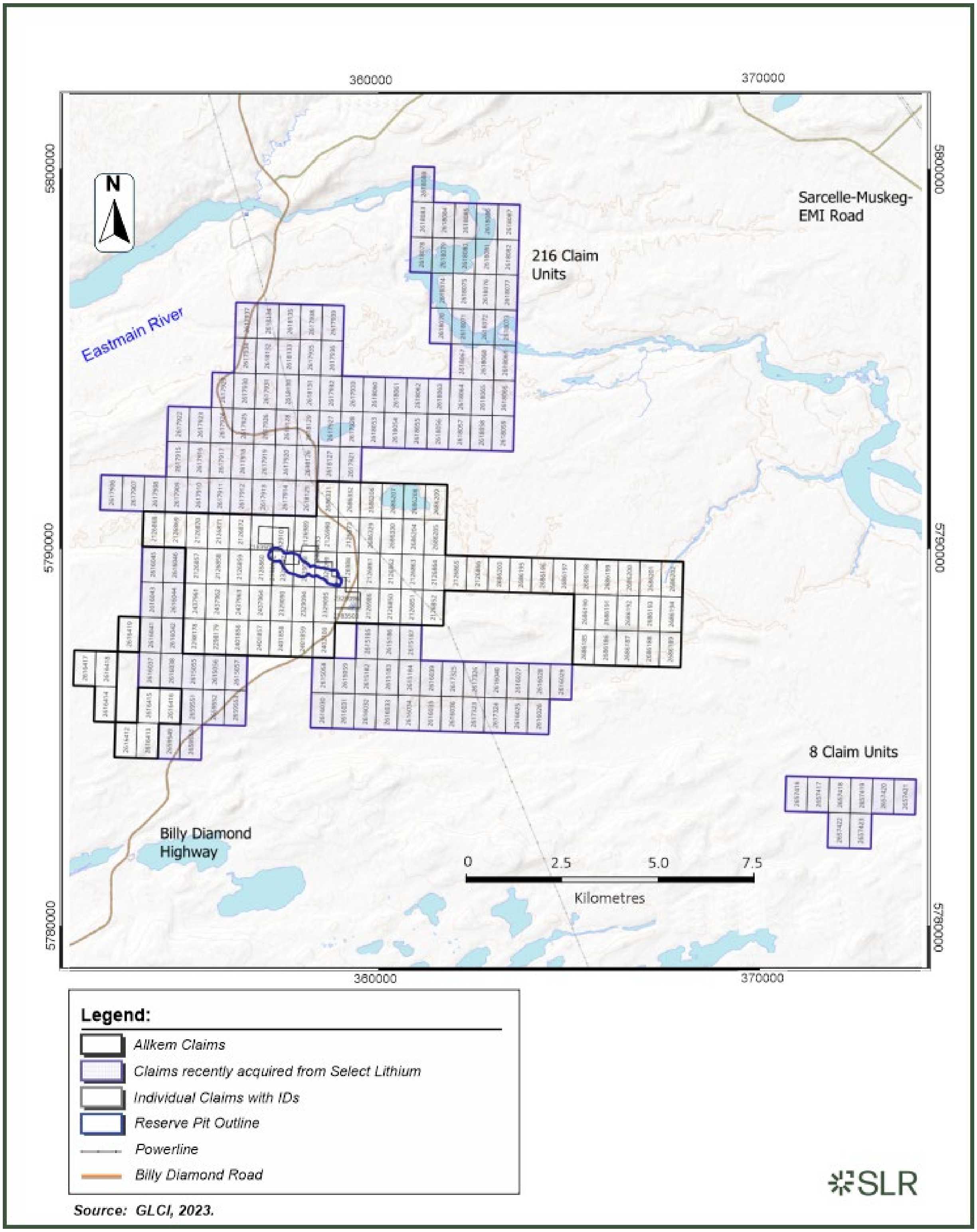
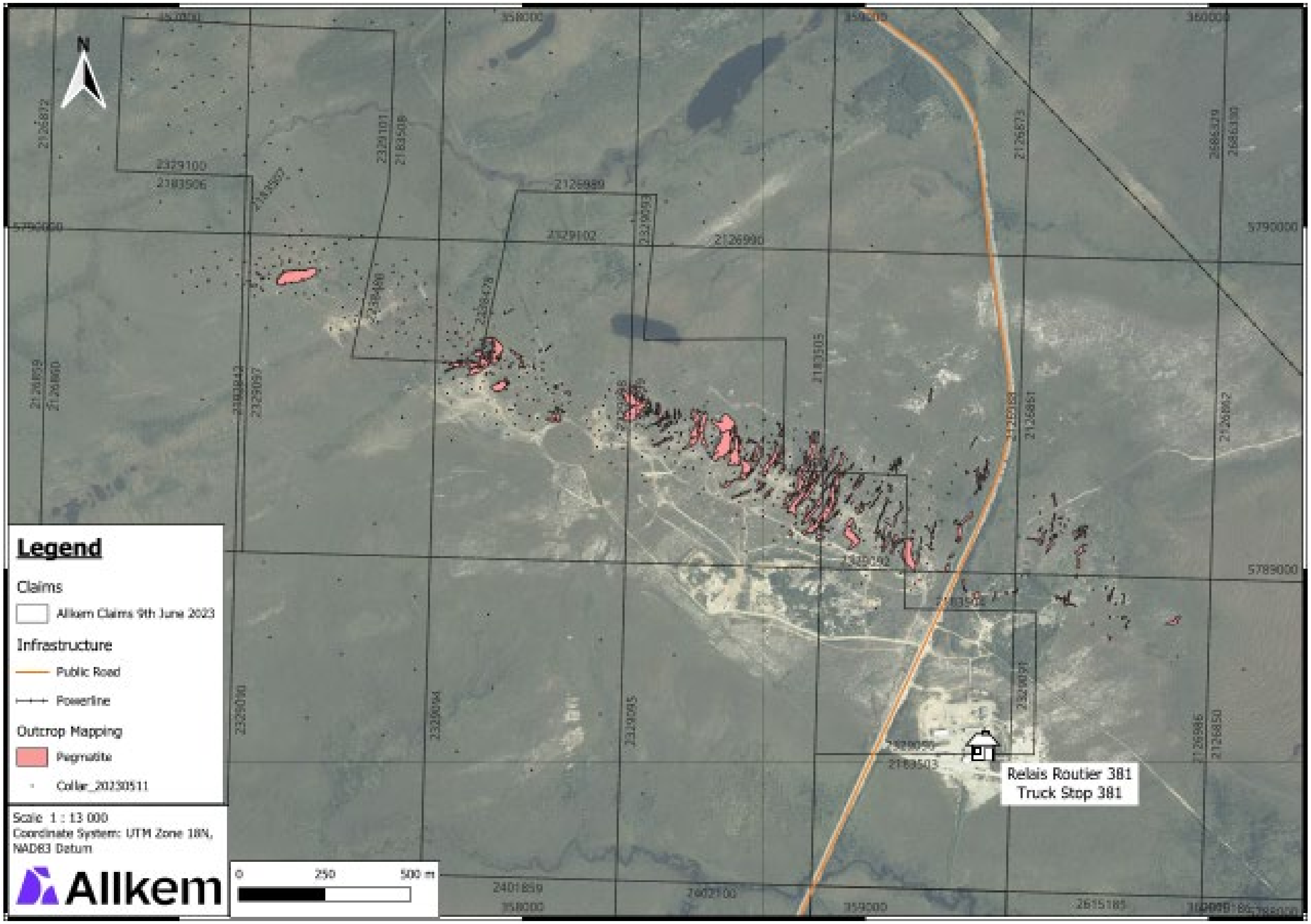


Figure 4-3 – Regional Tenure Map



Source: GLCI, 2023

Figure 4-4 – Location Map of James Bay Lithium Deposit with Claim Numbers

Table 4-1 – Claim Details

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2126850	2007-10-04	2024-06-12	7	52.78	2,500	GLOI 49%; GLCI 51%	170
2126851	2007-10-04	2024-06-12	7	52.78	2,500	GLOI 49%; GLCI 51%	170
2126852	2007-10-04	2024-06-12	7	52.78	2,500	GLOI 49%; GLCI 51%	170
2126857	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126858	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126859	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126861	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126862	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126863	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126864	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2126865	2007-10-04	2024-10-03	7	52.77	2,500	GLCI 100%	170
2126866	2007-10-04	2024-10-03	7	52.77	2,500	GLCI 100%	170
2126868	2007-10-04	2024-06-12	7	52.76	2,500	GLOI 49%; GLCI 51%	170
2126869	2007-10-04	2024-06-12	7	52.76	2,500	GLOI 49%; GLCI 51%	170
2126870	2007-10-04	2024-06-12	7	52.76	2,500	GLOI 49%; GLCI 51%	170
2126871	2007-10-04	2024-06-12	7	52.76	2,500	GLOI 49%; GLCI 51%	170
2126872	2007-10-04	2024-06-12	7	52.76	2,500	GLOI 49%; GLCI 51%	170
2126873	2007-10-04	2024-06-12	7	52.76	2,500	GLOI 49%; GLCI 51%	170
2126986	2007-10-04	2024-06-12	7	49.98	2,500	GLOI 49%; GLCI 51%	152
2126990	2007-10-04	2024-06-12	7	51.91	2,500	GLOI 49%; GLCI 51%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2183503	2009-06-16	2024-06-12	6	22.41	1,000	GLOI 49%; GLCI 51%	37.5
2183504	2009-06-16	2024-06-12	6	3.55	1,000	GLOI 49%; GLCI 51%	37.5
2329090	2012-02-10	2024-06-12	13	52.78	2,500	GLOI 49%; GLCI 51%	170
2329091	2012-02-10	2024-06-12	13	2.8	1,000	GLOI 49%; GLCI 51%	37.5
2329093	2012-02-10	2024-06-12	13	0.85	1,000	GLOI 49%; GLCI 51%	37.5
2329094	2012-02-10	2024-06-12	13	52.78	2,500	GLOI 49%; GLCI 51%	170
2329100	2012-02-10	2024-06-12	13	16.68	1,000	GLOI 49%; GLCI 51%	37.5
2329102	2012-02-10	2024-06-12	13	5.37	1,000	GLOI 49%; GLCI 51%	37.5
2298178	2011-06-21	2024-06-12	5	52.79	1,800	GLOI 49%; GLCI 51%	170
2298179	2011-06-21	2024-06-12	5	52.79	1,800	GLOI 49%; GLCI 51%	170
2401856	2014-03-18	2025-03-17	4	52.79	1,800	GLOI 49%; GLCI 51%	170
2401857	2014-03-18	2025-03-17	4	52.79	1,800	GLOI 49%; GLCI 51%	170
2401858	2014-03-18	2025-03-17	4	52.79	1,800	GLOI 49%; GLCI 51%	170
2401859	2014-03-18	2025-03-17	4	52.79	1,800	GLOI 49%; GLCI 51%	170
2402100	2014-03-27	2025-03-26	4	52.79	1,800	GLOI 49%; GLCI 51%	170
2437961	2016-03-14	2025-03-13	3	52.78	1,350	GLCI 100%	170
2437962	2016-03-14	2025-03-13	3	52.78	1,350	GLCI 100%	170
2437963	2016-03-14	2025-03-13	3	52.78	1,350	GLCI 100%	170
2437964	2016-03-14	2025-03-13	3	52.78	1,350	GLCI 100%	170
2616412	2021-08-13	2024-08-12	0	52.82	135	GLCI 100%	170
2616413	2021-08-13	2024-08-12	0	52.82	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2616414	2021-08-13	2024-08-12	0	52.81	135	GLCI 100%	170
2616415	2021-08-13	2024-08-12	0	52.81	135	GLCI 100%	170
2616416	2021-08-13	2024-08-12	0	52.81	135	GLCI 100%	170
2616417	2021-08-13	2024-08-12	0	52.8	135	GLCI 100%	170
2616418	2021-08-13	2024-08-12	0	52.8	135	GLCI 100%	170
2616419	2021-08-13	2024-08-12	0	52.79	135	GLCI 100%	170
2618053	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618054	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618055	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618056	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618057	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618058	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618059	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618060	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618061	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618062	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618063	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618064	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618065	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618066	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618067	2021-08-30	2024-08-29	0	52.71	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2618068	2021-08-30	2024-08-29	0	52.71	135	GLCI 100%	170
2618069	2021-08-30	2024-08-29	0	52.71	135	GLCI 100%	170
2618070	2021-08-30	2024-08-29	0	52.7	135	GLCI 100%	170
2618071	2021-08-30	2024-08-29	0	52.7	135	GLCI 100%	170
2618072	2021-08-30	2024-08-29	0	52.7	135	GLCI 100%	170
2618073	2021-08-30	2024-08-29	0	52.7	135	GLCI 100%	170
2618074	2021-08-30	2024-08-29	0	52.69	135	GLCI 100%	170
2618075	2021-08-30	2024-08-29	0	52.69	135	GLCI 100%	170
2618076	2021-08-30	2024-08-29	0	52.69	135	GLCI 100%	170
2618077	2021-08-30	2024-08-29	0	52.69	135	GLCI 100%	170
2618078	2021-08-30	2024-08-29	0	52.68	135	GLCI 100%	170
2618079	2021-08-30	2024-08-29	0	52.68	135	GLCI 100%	170
2618080	2021-08-30	2024-08-29	0	52.68	135	GLCI 100%	170
2618081	2021-08-30	2024-08-29	0	52.68	135	GLCI 100%	170
2618082	2021-08-30	2024-08-29	0	52.68	135	GLCI 100%	170
2618083	2021-08-30	2024-08-29	0	52.67	135	GLCI 100%	170
2618084	2021-08-30	2024-08-29	0	52.67	135	GLCI 100%	170
2618085	2021-08-30	2024-08-29	0	52.67	135	GLCI 100%	170
2618086	2021-08-30	2024-08-29	0	52.67	135	GLCI 100%	170
2618087	2021-08-30	2024-08-29	0	52.67	135	GLCI 100%	170
2618088	2021-08-30	2024-08-29	0	52.66	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2618125	2021-08-30	2024-08-29	0	52.75	135	GLCI 100%	170
2618126	2021-08-30	2024-08-29	0	52.74	135	GLCI 100%	170
2618127	2021-08-30	2024-08-29	0	52.74	135	GLCI 100%	170
2618128	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618129	2021-08-30	2024-08-29	0	52.73	135	GLCI 100%	170
2618130	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618131	2021-08-30	2024-08-29	0	52.72	135	GLCI 100%	170
2618132	2021-08-30	2024-08-29	0	52.71	135	GLCI 100%	170
2618133	2021-08-30	2024-08-29	0	52.71	135	GLCI 100%	170
2618134	2021-08-30	2024-08-29	0	52.7	135	GLCI 100%	170
2618135	2021-08-30	2024-08-29	0	52.7	135	GLCI 100%	170
2616025	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616026	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616027	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616028	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616029	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616030	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616031	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616032	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616033	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616034	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2616035	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616036	2021-08-10	2024-08-09	0	52.81	135	GLCI 100%	170
2616037	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616038	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616039	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616040	2021-08-10	2024-08-09	0	52.8	135	GLCI 100%	170
2616041	2021-08-10	2024-08-09	0	52.79	135	GLCI 100%	170
2616042	2021-08-10	2024-08-09	0	52.79	135	GLCI 100%	170
2616043	2021-08-10	2024-08-09	0	52.78	135	GLCI 100%	170
2616044	2021-08-10	2024-08-09	0	52.78	135	GLCI 100%	170
2616045	2021-08-10	2024-08-09	0	52.77	135	GLCI 100%	170
2616046	2021-08-10	2024-08-09	0	52.77	135	GLCI 100%	170
2617323	2021-08-19	2024-08-18	0	52.81	135	GLCI 100%	170
2617324	2021-08-19	2024-08-18	0	52.81	135	GLCI 100%	170
2617325	2021-08-19	2024-08-18	0	52.8	135	GLCI 100%	170
2617326	2021-08-19	2024-08-18	0	52.8	135	GLCI 100%	170
2617906	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617907	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617908	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617909	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617910	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2617911	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617912	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617913	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617914	2021-08-27	2024-08-26	0	52.75	135	GLCI 100%	170
2617915	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617916	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617917	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617918	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617919	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617920	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617921	2021-08-27	2024-08-26	0	52.74	135	GLCI 100%	170
2617922	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617923	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617924	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617925	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617926	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617927	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617928	2021-08-27	2024-08-26	0	52.73	135	GLCI 100%	170
2617929	2021-08-27	2024-08-26	0	52.72	135	GLCI 100%	170
2617930	2021-08-27	2024-08-26	0	52.72	135	GLCI 100%	170
2617931	2021-08-27	2024-08-26	0	52.72	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2617932	2021-08-27	2024-08-26	0	52.72	135	GLCI 100%	170
2617933	2021-08-27	2024-08-26	0	52.72	135	GLCI 100%	170
2617934	2021-08-27	2024-08-26	0	52.71	135	GLCI 100%	170
2617935	2021-08-27	2024-08-26	0	52.71	135	GLCI 100%	170
2617936	2021-08-27	2024-08-26	0	52.71	135	GLCI 100%	170
2617937	2021-08-27	2024-08-26	0	52.7	135	GLCI 100%	170
2617938	2021-08-27	2024-08-26	0	52.7	135	GLCI 100%	170
2617939	2021-08-27	2024-08-26	0	52.7	135	GLCI 100%	170
2615055	2021-07-17	2024-07-16	0	52.8	135	GLCI 100%	170
2615056	2021-07-17	2024-07-16	0	52.8	135	GLCI 100%	170
2615057	2021-07-17	2024-07-16	0	52.8	135	GLCI 100%	170
2615058	2021-07-17	2024-07-16	0	52.8	135	GLCI 100%	170
2615059	2021-07-17	2024-07-16	0	52.8	135	GLCI 100%	170
2615182	2021-07-20	2024-07-19	0	52.8	135	GLCI 100%	170
2615183	2021-07-20	2024-07-19	0	52.8	135	GLCI 100%	170
2615184	2021-07-20	2024-07-19	0	52.8	135	GLCI 100%	170
2615185	2021-07-20	2024-07-19	0	52.79	135	GLCI 100%	170
2615186	2021-07-20	2024-07-19	0	52.79	135	GLCI 100%	170
2615187	2021-07-20	2024-07-19	0	52.79	135	GLCI 100%	170
2657416	2022-07-21	2025-07-20	0	52.83	135	GLCI 100%	170
2657417	2022-07-21	2025-07-20	0	52.83	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2657418	2022-07-21	2025-07-20	0	52.83	135	GLCI 100%	170
2657419	2022-07-21	2025-07-20	0	52.83	135	GLCI 100%	170
2657420	2022-07-21	2025-07-20	0	52.83	135	GLCI 100%	170
2657421	2022-07-21	2025-07-20	0	52.82	135	GLCI 100%	170
2657422	2022-07-21	2025-07-20	0	52.84	135	GLCI 100%	170
2657423	2022-07-21	2025-07-20	0	52.84	135	GLCI 100%	170
2686185	2022-11-03	2025-11-02	0	52.79	135	GLCI 100%	170
2686186	2022-11-03	2025-11-02	0	52.79	135	GLCI 100%	170
2686187	2022-11-03	2025-11-02	0	52.79	135	GLCI 100%	170
2686188	2022-11-03	2025-11-02	0	52.79	135	GLCI 100%	170
2686189	2022-11-03	2025-11-02	0	52.79	135	GLCI 100%	170
2686190	2022-11-03	2025-11-02	0	52.78	135	GLCI 100%	170
2686191	2022-11-03	2025-11-02	0	52.78	135	GLCI 100%	170
2686192	2022-11-03	2025-11-02	0	52.78	135	GLCI 100%	170
2686193	2022-11-03	2025-11-02	0	52.78	135	GLCI 100%	170
2686194	2022-11-03	2025-11-02	0	52.78	135	GLCI 100%	170
2686195	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686196	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686197	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686198	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686199	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2686200	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686201	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686202	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686203	2022-11-03	2025-11-02	0	52.77	135	GLCI 100%	170
2686204	2022-11-03	2025-11-02	0	52.76	135	GLCI 100%	170
2686205	2022-11-03	2025-11-02	0	52.76	135	GLCI 100%	170
2686206	2022-11-03	2025-11-02	0	52.75	135	GLCI 100%	170
2686207	2022-11-03	2025-11-02	0	52.75	135	GLCI 100%	170
2686208	2022-11-03	2025-11-02	0	52.75	135	GLCI 100%	170
2686209	2022-11-03	2025-11-02	0	52.75	135	GLCI 100%	170
2126860	2007-10-04	2024-06-12	7	52.77	2,500	GLOI 49%; GLCI 51%	170
2192842	2009-10-27	2024-06-12	6	1.83	1,000	GLOI 49%; GLCI 51%	37.5
2329097	2012-02-10	2024-06-12	13	43.41	2,500	GLOI 49%; GLCI 51%	135
2238480	2010-06-21	2025-06-20	6	7.54	1,000	GLOI 49%; GLCI 51%	37.5
2238478	2010-06-21	2025-06-20	6	5.75	1,000	GLOI 49%; GLCI 51%	37.5
2329098	2012-02-10	2024-06-12	13	47.03	2,500	GLOI 49%; GLCI 51%	152
2329099	2012-02-10	2024-06-12	13	34.26	2,500	GLOI 49%; GLCI 51%	135
2183505	2009-06-16	2024-06-12	6	18.51	1,000	GLOI 49%; GLCI 51%	37.5
2329095	2012-02-10	2024-06-12	13	52.78	2,500	GLOI 49%; GLCI 51%	170
2329096	2012-02-10	2024-06-12	13	26.82	2,500	GLOI 49%; GLCI 51%	135
2329092	2012-02-10	2024-06-12	13	6.89	1,000	GLOI 49%; GLCI 51%	37.5

Claim No.	Staking Date	Expiry Date	Year of Rent	Area (ha)	Work Required before expiry (CAD)	Holder	Rent Required (CAD)
2126988	2007-10-04	2024-06-12	7	45.88	2,500	GLOI 49%; GLCI 51%	152
2126989	2007-10-04	2024-06-12	7	47.39	2,500	GLOI 49%; GLCI 51%	152
2183508	2009-06-16	2024-06-12	6	27.53	2,500	GLOI 49%; GLCI 51%	135
2329101	2012-02-10	2024-06-12	13	24.9	1,000	GLOI 49%; GLCI 51%	37.5
2183507	2009-06-16	2024-06-12	6	0.33	1,000	GLOI 49%; GLCI 51%	37.5
2183506	2009-06-16	2024-06-12	6	36.08	2,500	GLOI 49%; GLCI 51%	135
2686329	2022-11-03	2025-11-02	0	52.76	135	GLCI 100%	170
2686330	2022-11-03	2025-11-02	0	52.76	135	GLCI 100%	170
2686331	2022-11-03	2025-11-02	0	52.75	135	GLCI 100%	170
2686332	2022-11-03	2025-11-02	0	52.75	135	GLCI 100%	170
2659549	2022-08-05	2025-08-04	0	52.82	135	GLCI 100%	170
2659550	2022-08-05	2025-08-04	0	52.82	135	GLCI 100%	170
2659551	2022-08-05	2025-08-04	0	52.81	135	GLCI 100%	170
2659552	2022-08-05	2025-08-04	0	52.81	135	GLCI 100%	170
2659553	2022-08-05	2025-08-04	0	52.81	135	GLCI 100%	170

In February 2011, Galaxy Resources Limited (Galaxy) signed a Joint Venture Agreement with Lithium One Inc. (Lithium One) for the exploration and eventual development of the Project. In May 2011, under the terms of that agreement, Galaxy acquired an initial 20% equity interest for CAD 3.0 million and had the potential to increase its stake to 70% through the completion of a definitive feasibility study within a 24-month period.

On July 4, 2012, Galaxy successfully completed a CAD 112 million merger with Lithium One, effectively acquiring 100% of the Project. Lithium One shares were de-listed from the TSX and the transfer of Galaxy shares to eligible Lithium One shareholders was completed, such that 80% of the Project was now held by GLOI (formerly Lithium One) and 20% by GLCI. In October 2018, this holding was further amended by Deed of Transfer between the parties to reflect the current holding of 49% GLOI and 51% GLCI. On August 25, 2021, Galaxy merged with Orocobre Limited (Orocobre). Under the merger, Orocobre acquired 100% of the fully paid ordinary shares in Galaxy in exchange for the issue of new fully paid ordinary shares in Orocobre. The company has since changed its name to Allkem Limited.

Lithium One had previously entered three option agreements between March 2008 and June 2009; the status of these agreements remain unchanged since Galaxy's acquisition of the company and are described below.

On March 29, 2008, Lithium One entered into an option agreement with *Société de Développement de la Baie-James* (SDBJ) and four arm's length Optionors to acquire a 100% interest in the Cyr Lithium Prospect. Portions of the Mineral Resources reported herein are located on these claims of the Project. The terms of the agreement are as follows:

- A non-refundable cash payment of CAD60,000 (completed),
- Issue 500,000 free trading common shares of Lithium One (completed),
- Two further payments of 1,000,000 free trading shares each (four-month hold) with the first payment occurring in October 2008 (completed) and the second payment scheduled for October 2009 but deferred until April 2010 for consideration of cash payment of CAD25,000 (completed),
- On the third anniversary of the agreement in 2010, if the value of the 2,500,000 shares mentioned above is less than CAD5.0 million, Lithium One shall pay in cash the difference (completed),
- A 2% net smelter return (NSR) royalty, of which Lithium One can purchase half (or 1%) for CAD1,000,000. This royalty has been repurchased by Galaxy and is described in Section 3.4 below.

Lithium One fully exercised its option to complete the acquisition of the Cyr Lithium Prospect on November 2, 2010, with a final payment of CAD2.5 million to the Optionors and CAD500,000 in common shares to SDBJ. The vendors retain a 2% NSR interest.

On May 14, 2009, Lithium One entered into an option agreement with Jacques Frigon and Gérard Robert. Portions of the Mineral Resources reported herein are located on six of these claims (claim number 2329097, 2329098, 2238480, 2238478, 2329101, and 2329100). The terms of the agreement are stated below:

- Lithium One will acquire a 100% interest in the Frigon property by paying CAD32,000 (completed),
- Issue 100,000 common shares of the company (completed),
- Four annual payments of CAD25,000 and issuance of 100,000 common shares (completed),
- A 1.5% NSR on the Project. Lithium One will have the right to repurchase at any time one third (or 0.5%) of this royalty for a cash payment of CAD500,000. This royalty has been partially repurchased by Galaxy and is described in Section 3.4 below.

On June 9, 2009, Lithium One entered into an agreement with Resources d'Arianne Inc. Portions of the Mineral Resources reported herein are located on two of the claims (claim numbers 2126988 and 2126860) covered by this agreement. The terms of the agreement are stated below:

- Lithium One will acquire 100% of all the mineral substances on the mining claims and lithium only on four mineral claims,
- Cash payment of CAD75,000 (completed),
- Issuance of a total of 500,000 common shares over a five-year period (completed),
- Vendors retain a 1.5% NSR of which one third (0.5%) can be purchased by Lithium One for a cash payment of CAD500,000.

On May 2, 2023, GLCI entered into an agreement with Select Lithium Corp. and Advantage Lithium Argentina SA to acquire 131 mining claims surrounding the property for a total area of 6,913 ha. The agreement was an all-cash offer, with no royalty retained by the Vendors.

4.3 Encumbrances

GLCI is required to meet the minimum exploration expenditure requirements as outlined by the Québec Mining Act (M-13.1) on an annual basis. The annual expenditure requirement depends on the aerial extent of the claim, and the number of prior renewals (age of the claim). The amounts vary between CAD135 in the first and second year of the claims, up to CAD2,500 for claims in this sixth renewal year and beyond.

At the time of writing, the minimum exploration expenditure requirements for the Project are CAD132,180 on an annual basis.

In addition to exploration expenditure, a rental fee is charged depending on the aerial extent of the claim. The rental fee varies between CAD37.50 and CAD170.00. Claim rental fees are estimated to be in the order of CAD36,000 on an annual basis.

GLCI is not aware of any other obligations or encumbrances on the property.

4.4 Royalties

In 2023, GLCI entered into an agreement with the SDBJ and four other parties to buy back the entirety of its NSR royalty (the main royalty applicable to the James Bay Property). In addition, Galaxy executed its buyback option under the Frigon/Robert agreement to buy back 0.5% of the 1.5% royalty for CAD500,000. Galaxy subsequently entered into an agreement with Jacques Frigon to purchase outright his half of the remaining 1.0% NSR royalty covering the western portion of the deposit.

As of the effective date of this report, two NSR royalties remain on the James Bay Lithium Project (Figure 4-5):

- 0.50% NSR royalty previously held by Gérard Robert, which was subsequently sold to Ridgeline Royalties Inc. Portions of the Mineral Resources subject to this royalty are located on six claims (claim number 2329097, 2329098, 2238480, 2238478, 2329101 and 2329100) of the Project, although the royalty covers 11 claims in total.
- 1.50% NSR royalty previously held by Resources d'Arianne Inc., subsequently sold to Lithium Royalty Corp. Galaxy has the right to buy back 0.5% of the NSR for CAD500,000, reducing the royalty to 1.00%. Portions of the Mineral Resources reported herein that are subject to this royalty are located on two claims (claim numbers 2126988 and 2126860) of the Project, although the royalty covers 23 claims in total.

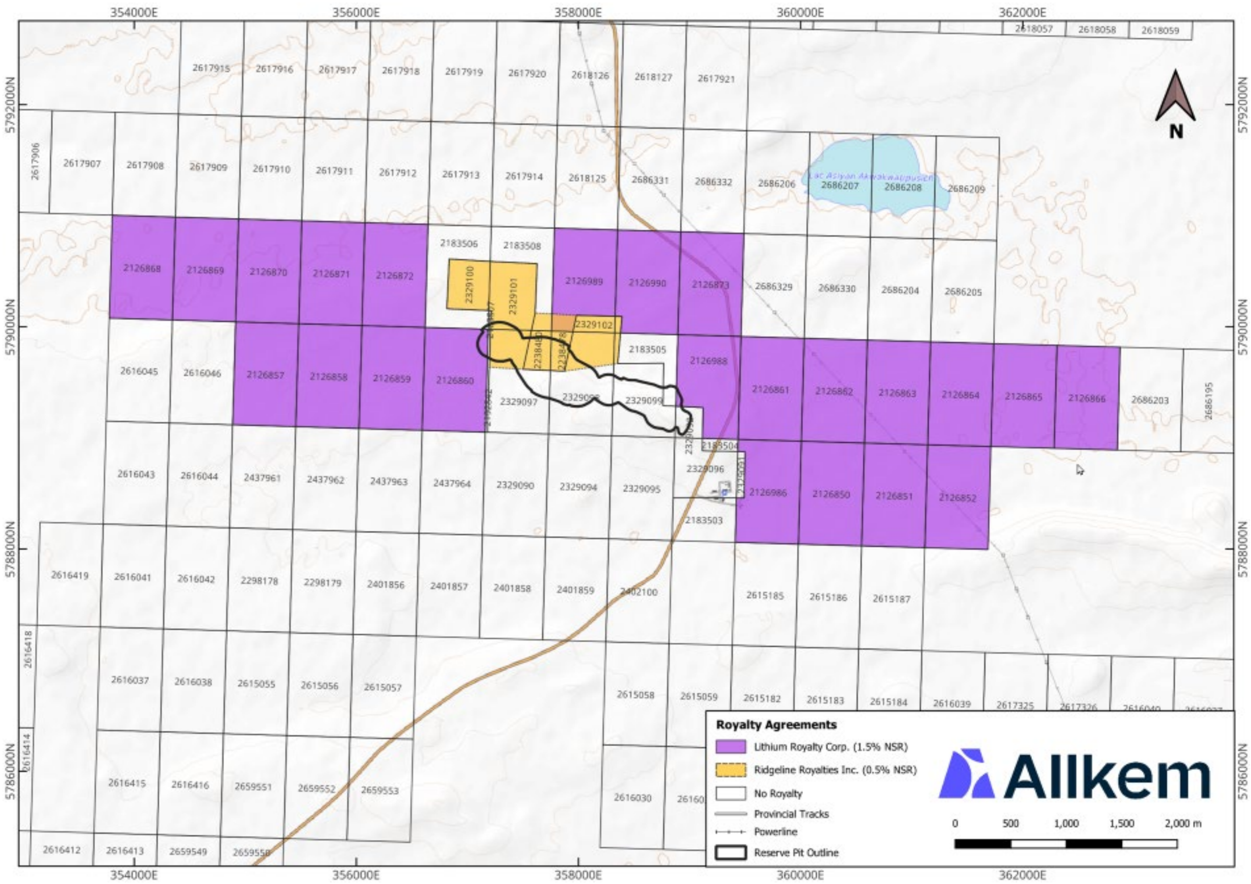


Figure 4-5 – Royalty Map

4.5 Required Permits and Status

GLCI has obtained all necessary permits and certifications from government agencies to allow exploration on the property.

In 2020 and 2021, Ministry of Forests, Wildlife and Parks (Ministère des Forêts, de la Faune et des Parcs (MFFP) issued annual Forest intervention licences for mining activities to GLCI allowing the clearance of 6.12 ha and 1.72 ha to create access for geotechnical drilling. In 2021, the geotechnical drilling was also subjected to the recent regulation known as *Règlement sur l'Encadrement d'Activités en Fonction de leur Impact sur l'Environnement* (REAFIE). The required *Déclaration de conformité* was approved by Québec's *Ministère de l'Environnement de la Lutte Contre les Changements Climatiques* (MELCC) on January 27, 2021.

In 2022 and 2023, MFFP issued annual Forest intervention licences for mining activities to GLCI allowing the clearance of 3.37 ha and 22.38 ha to create access for exploration drilling and condemnation drilling. In addition, drilling permits were received from the MELCC on January 6, 2022, and October 17, 2022.

4.6 Other Significant Factors and Risks

SLR is not aware of any environmental liabilities on the property. GLCI has all required permits to conduct the proposed exploration work on the property. SLR is not aware of any other significant factors and risks that may affect access, title, or the right or ability to perform the proposed work program on the property.

5. ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

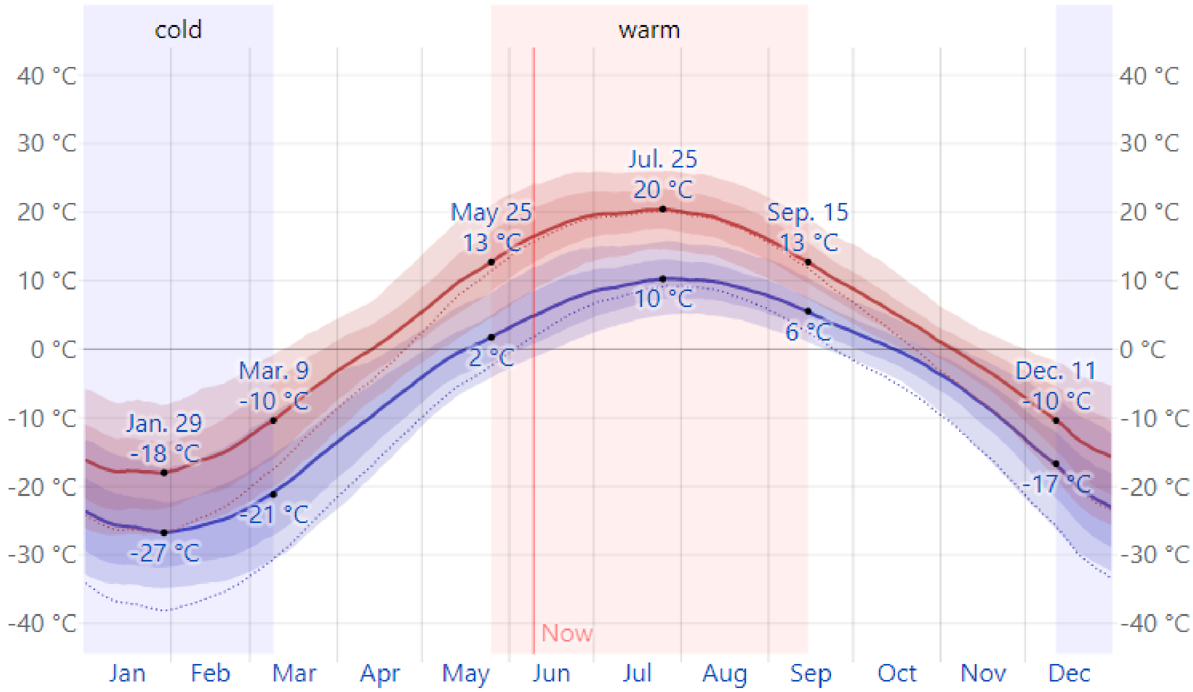
5.1 Accessibility

The Project is accessible year-round via the paved Billy-Diamond Highway. The property is approximately four hours drive north of Matagami, Québec, located adjacent to the Relais Routier km 381 Truck Stop operated by the SDBJ.

5.2 Climate

The climate at the Project site is classified as Continental Subarctic. The Project area is characterized as having long cold winters and short warm summers. The winter season can begin as early as October and extend through April. Temperatures in winter range from 5°C to below -45°C, with significant snow cover. Temperatures range from approximately 15°C to 35°C during the summer months, with moderate rainfall and thunderstorms during exceptionally hot weather conditions. During dry summer period, forest fires are common in the region. Mines in this area can operate year round, with minimal interruptions due to bad weather.

The La Grande Riviere Airport weather station located 200 km to the north of the Project has been operating since 1980 and provides a reasonable representation of the typical climate encountered at the Project. Average temperatures are presented in Figure 5-1.



The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	-18 °C	-16 °C	-8 °C	1 °C	10 °C	18 °C	20 °C	18 °C	12 °C	5 °C	-3 °C	-12 °C
Temp.	-22 °C	-21 °C	-14 °C	-4 °C	5 °C	12 °C	15 °C	14 °C	8 °C	2 °C	-5 °C	-15 °C
Low	-26 °C	-25 °C	-18 °C	-9 °C	0 °C	6 °C	10 °C	9 °C	5 °C	-1 °C	-8 °C	-19 °C

Source: Weatherspark.com, 2023

Figure 5-1 – Historical Average Temperatures at La Grande Riviere Airport Weather Station

5.3 Local Resources

The Relais Routier truck stop provides services including lodging and food, fuel, electricity, telephone services, and a helipad. It is owned and operated by the SDBJ. It is located less than one kilometre from the Project.

The town of Matagami is an established mining and forestry community, located 381 km south of the Truck Stop. The community is able to provide labour and additional services and support to industrial projects in the James Bay territory, including the mining sector. In addition, a transhipment zone owned by the Town of Matagami is intended to be used for transportation of goods and concentrate. In March 2023, and agreement was concluded between the Town of Matagami and the SDBJ to further develop and operate the transhipment zone to facilitate the transfer of lithium concentrate from trucks arriving from the Billy- Diamond highway to the Québec railway network.

5.4 Infrastructure

The paved Billy-Diamond highway passes adjacent to the Property, providing an all-weather, year-long access to the site. The road is managed and maintained by the SDBJ.

A 450 kV DC electrical transmission line passes one kilometre to the east of the deposit, which provides direct power from Radisson to New England, USA. Electrical power is not available for public use from this line, however, Galaxy finished construction of a new powerline in April 2023 that links the 69 kV line located eight kilometres to the south of the Project to the proposed location of the processing plant.

The nearest major population centre is Matagami, a four hour drive to the south of the property. The Eastmain Road links the property to the Eastmain village on the coast of James Bay and is a 1.5 hour drive. The nearest airport is at Eastmain village, which has regular flights from Montreal with Air Creebec.

5.5 Physiography

The Canadian Shield covers nearly 90% of Québec. It is relatively flat and exposed, punctuated by the higher relief of mountain ranges such as the Laurentian Mountains in southern Québec, the Otish Mountains in central Québec, and the Torngat Mountains near Ungava Bay in northern Québec. The topography of the Shield has been scoured by glaciers, explaining the extensive glacial deposit of boulders, gravel and sand, and the thick clay deposits left behind by postglacial seawater and lakes. The Canadian Shield is also characterized by an intricate hydrological network of lakes, peat bogs, rivers, and streams.

The Eastmain River, located approximately ten kilometres north of the property, is a west-flowing river of approximately 600 km in length. The river separates approximately 40 km from its mouth and divides into two branches that are frequently interrupted by rapids and falls of up to 35 m in height.

The boreal forest is the most northerly and abundant of Québec's three forest zones, straddling the Canadian Shield and Hudson Bay Lowlands regions of the province. Dominated by black spruce and carpets of moss, the ecology of this zone is heavily influenced by fire disturbance regimes, meaning that forest fires are critical in defining the numbers of, and the relationship between, living organisms in this zone. Figure 5-2 and Figure 5-3 illustrate the landscape typical of the Project area in spring and winter.

Source: GLCI, 2022

Figure 5-2 – View during spring from the outcropping deposit towards the northwest

Source: GLCI, 2022

Figure 5-3 – Aerial footage during winter of the outcropping deposit, looking northeast

6. HISTORY

6.1 Prior Ownership

Prospector Jean Cyr first discovered spodumene pegmatite outcrops on the property in 1964. The property was staked in 1966 by Mr. Cyr and was optioned by the SDBJ in 1974, which, after conducting some exploration on the property, returned it to Mr. Cyr on June 10, 1986. After 1986, there was a long hiatus of exploration activities until Coniagas Resource Limited (subsequently renamed to Lithium One Inc.) entered into an option agreement on March 29, 2008, with five arm's length parties (including the SDBJ and Jean Cyr) to acquire a 100% interest in the property through a shares issue in exchange for exploration expenditure on the property over a period of three years (discussed in Section 4).

In July 2012, Lithium One Inc. and Galaxy Resources Limited completed a merger, effectively transferring ownership of the property to Galaxy Lithium (Canada) Inc. and Galaxy Lithium (Ontario) Inc. Both Galaxy Lithium (Canada) Inc. and Galaxy Lithium (Ontario) Inc. are wholly owned subsidiaries of Allkem.

6.2 Exploration and Development History

A consultant, Mr. G. Valiquette, prepared a preliminary evaluation report on the property in 1974. This report described a ridge-like occurrence of spodumene pegmatite outcrops that rose 15 m above the surrounding swamp and extended for approximately 500 m. Selected samples from four test pits excavated by Mr. Cyr yielded the following results:

- Pit Number 1 2.34% Li_2O, 3.35% Li_2O
- Pit Number 2 4.42% Li_2O, 3.63% Li_2O
- Pit Number 3 3.58% Li_2O, 3.28% Li_2O
- Pit Number 4 0.86% Li_2O

Note: The reader is cautioned that the assaying results reported herein are from selected samples that may not be representative of the overall lithium oxide (Li_2O) grades of the pegmatite dikes sampled.

Commencing in 1974, the SDBJ conducted an exploration program that consisted of geological mapping, systematic sampling, and diamond drilling of the mineralized outcrops to evaluate the lithium potential of the property. The mapping defined an area of 45,000 m^2 of outcropping spodumene dikes. According to a 1977 report by SDBJ, the pegmatite dikes contained 25% spodumene and dipped at 65° to the west. The geological mapping suggested a possible extension of the spodumene pegmatite dikes into an irregular east-west trending "corridor" four kilometres in length, with lenses or sill-like bodies up to 300 m in length.

The average grade from 277 powder samples recovered by SDBJ in 1974 was found to be 1.70 ± 0.1 weight percent Li_2O (95% confidence limits), with a standard deviation of 0.8% Li_2O. The analyses also indicated low concentrations of beryllium (less than 200 ppm), cesium (less than 100 ppm), niobium, and tantalum.

In 1975, SDBJ produced a geological map of the property showing typical rock types for greenstone belts of the northern Superior Province, including biotite schists, gneiss, mafic metavolcanic rocks, dacite, quartzite, conglomerate, gabbro, granite, and pegmatite. The pegmatites occur as northeast-southwest trending irregular dikes or lenses and are interlayered with biotite schists and contain inclusions of greenstone. Spodumene occurs as bladed crystals ranging from a few centimetres to over a metre in length.

The Centre de Recherches Minérales du Québec conducted concentration tests and chemical analyses in 1975. A composite sample of the spodumene pegmatite grading 1.70% Li_2O yielded a spodumene concentrate grading an average of 6.2% Li_2O with a recovery factor of 71%.

In 1977, M. Giroux of SDBJ drilled three core boreholes totalling 383 m on the property, which confirmed the presence of spodumene mineralization to a depth of approximately 100 m (Pelletier, 1978). The three boreholes were drilled along the axis of the "corridor," across the pegmatite lenses, and intersected a sequence of interlayered spodumene pegmatite and biotite schists. The pegmatite contained up to 35% spodumene, locally, and several Li_2O intersections were reported. The results indicated grades up to 1.92% (Li_20) over 34 m, from 17 m to 51 m.

Since 1977, no significant exploration was conducted on the property until Lithium One Inc. conducted drilling in 2008. The details of this and subsequent exploration campaigns are discussed in Section 9, as they are considered part of exploration campaigns conducted by the current owner.

6.3 Historical Resource Estimates

No historical estimates have been prepared by previous owners.

6.4 Past Production

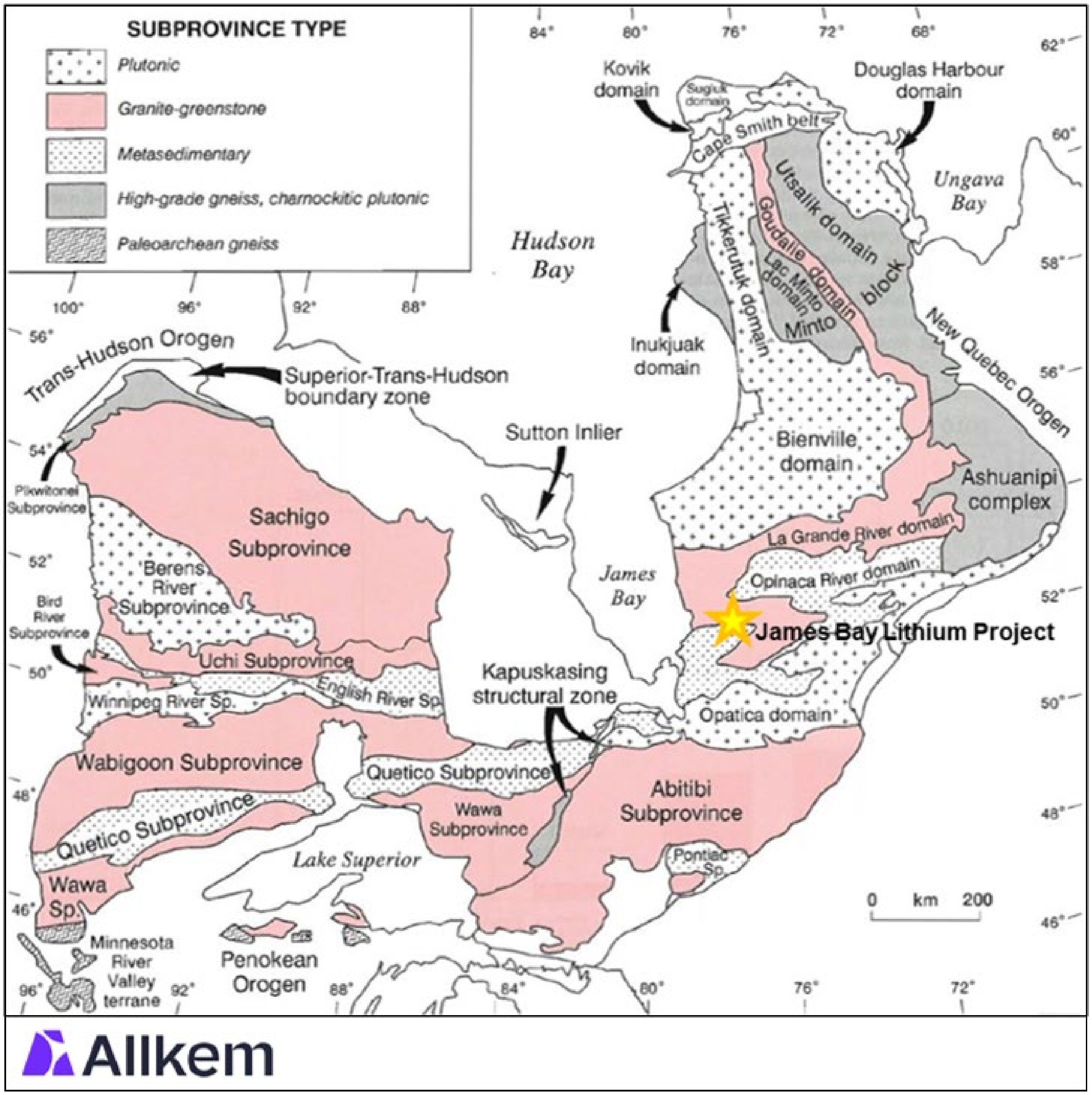
There has been no past production on the Project.

7. GEOLOGICAL SETTING AND MINERALIZATION

7.1 Regional Geology

The Project is located in the northeastern part of the Superior Province (Figure 7-1). The James Bay Lithium deposit occurs within the Lower Eastmain Group of the Eastmain greenstone belt, which consists predominantly of amphibolite grade mafic to felsic metavolcanic rocks, metasedimentary rocks, and minor gabbroic intrusions.

The deposit is located at a major tectonic break between the La Grande sub-province to the north and the Nemiscau sub-province to the south.



Source: Moukhsil et al., 2007

Figure 7-1 – Regional Geology Setting and Subdivisions of the Superior Province

7.2 Local Geology

The property is underlain by the Auclair Formation, consisting mainly of paragneisses, of probable sedimentary origin, which surround the pegmatite dikes to the northwest and southeast. Volcanic rocks of the Komo Formation occur to the north and east of the pegmatite dikes. The greenstone rocks are surrounded by Mesozonal to Catazonal migmatite and gneiss (Franconi, 1978; Moukhsil et al., 2007). All rock units are Archean in age, and their temporal relationship is shown in Figure 7-2.

The following excerpt extracted from Moukhsil et al. (2007) summarizes the regional geological setting of the Project:

"The Middle and Lower Eastmain greenstone belt (MLEGB) is in the James Bay region. The region comprises an Archean volcano-sedimentary assemblage which is assigned to the Eastmain Group. This group is made up of komatiitic to rhyolitic volcanic rocks and a variety of sedimentary rocks. The assemblage is overlain by the paragneisses of the Auclair Formation (Nemiscau and Opinaca basins). The mineral occurrences are spatially related to the MLEBG and grouped in very specific areas.

In the Middle and Lower Eastmain sector, four volcanic cycles are recognized based on age: 1) 2,752 to 2,739 Ma; 2) 2,739 to 2,720 Ma 3) 2,720 to 2,705 Ma, and 4) <2,705 Ma (Figure 7-2). Research on plutons allowed the identification of several suites (TTG, TGGM and TTGM) with emplacement episodes spanning the period 2,747 to 2,697 Ma.

The regional settings and the geochemical composition of the volcanic rocks of the Middle and Lower Eastmain belt suggest that the earliest volcanic formations are the product of volcanism associated with ocean floor spreading (i.e., mid-ocean ridges and/or oceanic platforms).

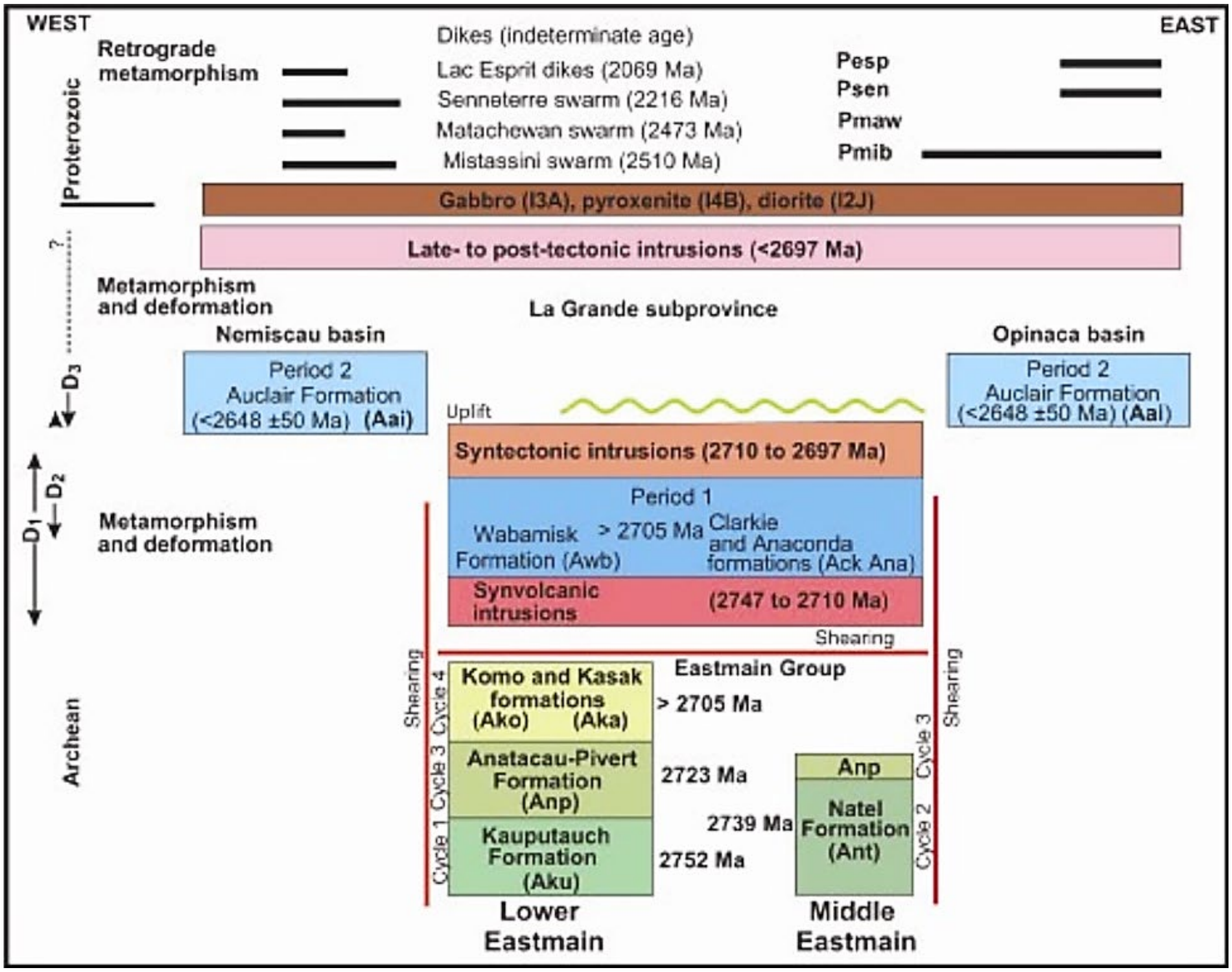
The period 2,752 to 2,720 Ma (stages 1 and 2) marks the construction of oceanic platforms and a few andesitic arcs. The calc-alkaline (1-type) plutonic rocks (TTG) are indicative of subduction zone magmatism occurring around 2,747 Ma, although an episode of crustal thickening, followed by melting at the base of the crust, may explain the emplacement of a considerable array of batholiths up until 2,710 Ma. The different types of synvolcanic mineralization reveal peak activity at specific stages of volcanic construction, that is, epithermal mineralization about 2,751 Ma, volcanogenic massive sulphide mineralization between 2,720 and 2,739 Ma, and porphyry-type mineralization at about 2,712 Ma.

Between 2,697 and 2,710 Ma (stage 4), a resurgence of syntectonic plutonism (D1) occurred. After this period, crustal shortening (N-S) generated a few regional faults (E-W to ENE) and widespread uplifting. The destruction of volcano-plutonic assemblages is partly reflected in the deposition of conglomerates (D2). Orogenic-type gold occurrences are associated with these two deformation episodes; however, the most extensive zones of mineralization, such as the Eau Claire deposit and the mineral occurrences on the Auclair property, are related to the D2 event. Tectonic activity culminated with the formation of the Nemiscau and Opinaca basins (before 2,700 Ma), which are associated with arc-extension periods.

Around 2,668 Ma, late intrusions of granodioritic to granitic composition that are locally pegmatitic transected the Auclair Formation. Several lithium and molybdenum showings are associated with these late intrusions, which are attributed to a period of crustal extension."

Since the classification by Moukhsil et al. (2007), the Auclair Formation in the vicinity of the Project was renamed to the Jolicoeur Complex (Bandyayera et al., 2022) as it was considered to represent sedimentary sequences that spatially separated from the volcanic extrusives and represents a longer period of sedimentation compared to the Auclair Formation to the east and north. The paragneisses were separated into numerous sub-divisions representing subtle changes in mineralogy and textures, with the lithologies surrounding the deposit described as a paragneiss dominated by garnet, staurolite, and andalusite.

Paleoproterozoic diabase dikes traverse the area, cutting the stratigraphy north-south, with some NW-SE orientations. The dikes are strongly magnetic and have been dated between 2,473 and 2,446 Ma.



Source: Moukhsil, 2007

Figure 7-2 – Stratigraphic Column and Schematic Time Chart for the Three Phases of Deformation

7.3 Property Geology

The outcropping pegmatites at the Project are surrounded by a thick sequence of intensely folded paragneiss with minor concordant felsic porphyry sills. The paragneiss can be subdivided into two distinct groups observed in outcrop:

- Strongly bedded paragneiss with associated garnets, staurolite, andalusite, and occasional cordierite observed in drill core.
- Massive, quartz-dominant paragneiss with no bedding textures

In the eastern portion of the deposit, a feldspar porphyry sill sub crops measuring 5 m to 10 m wide and oriented towards 100° azimuth. It is difficult to ascertain the dip, but this unit has been intersected in drilling and can be traced at depth with a dip of 60° to the south. The unit is strongly porphyritic, with feldspars measuring from 2 mm to 8 mm. The groundmass is predominantly biotite, with a weak foliation. Tourmaline is observed in close proximity to contacts with surrounding pegmatites.

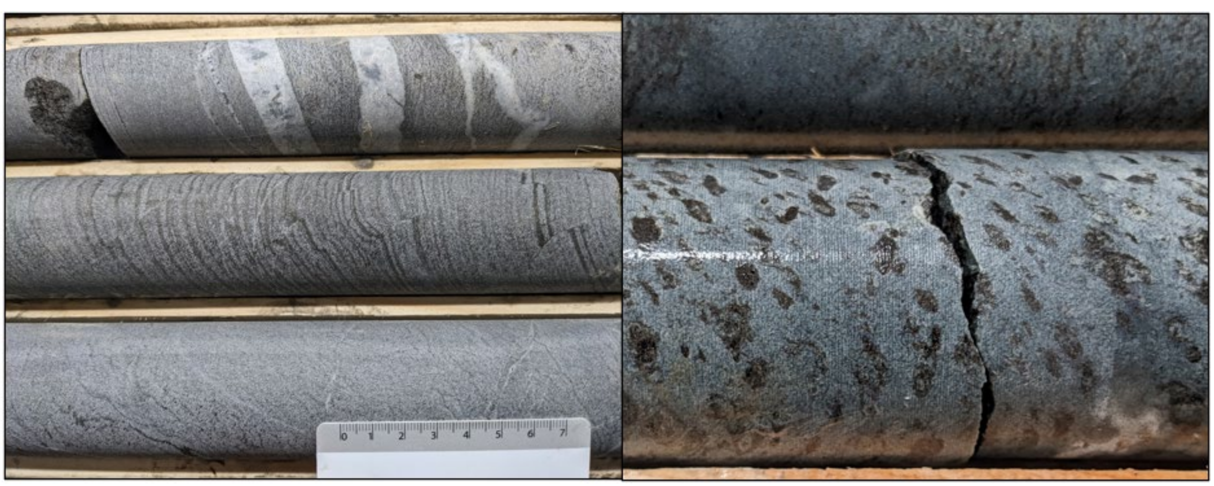
To the north of the outcropping pegmatites, a lithology rich in biotite and amphibole has been identified both in outcrop and drill core. Biotite porphyroblasts are common and make up 20% to 30% of the total composition of the rock. The groundmass is a mix of plagioclase, biotite, and amphiboles. The quantity of amphibole is highly variable, with some areas described as gabbro due to the high concentration of coarse-grained amphiboles and biotite. This unit also exhibits a slightly elevated concentration of sulphides, which supports its mafic origin. This biotite-rich mafic intrusive is generally 2 m to 10 m thick, can be traced the length of the orebody, and dips 60° to 65° to the south.

An image showing the cross-cutting relationship between the pegmatite dikes and the paragneiss host rock is shown in Figure 7-3.

Source: SLR, 2023

Figure 7-3 – Cross-cutting relationships between the pegmatites (white) and the bedded paragneiss (grey)

Typical examples of the lithologies encountered surrounding the pegmatites are shown in Figure 7-4.



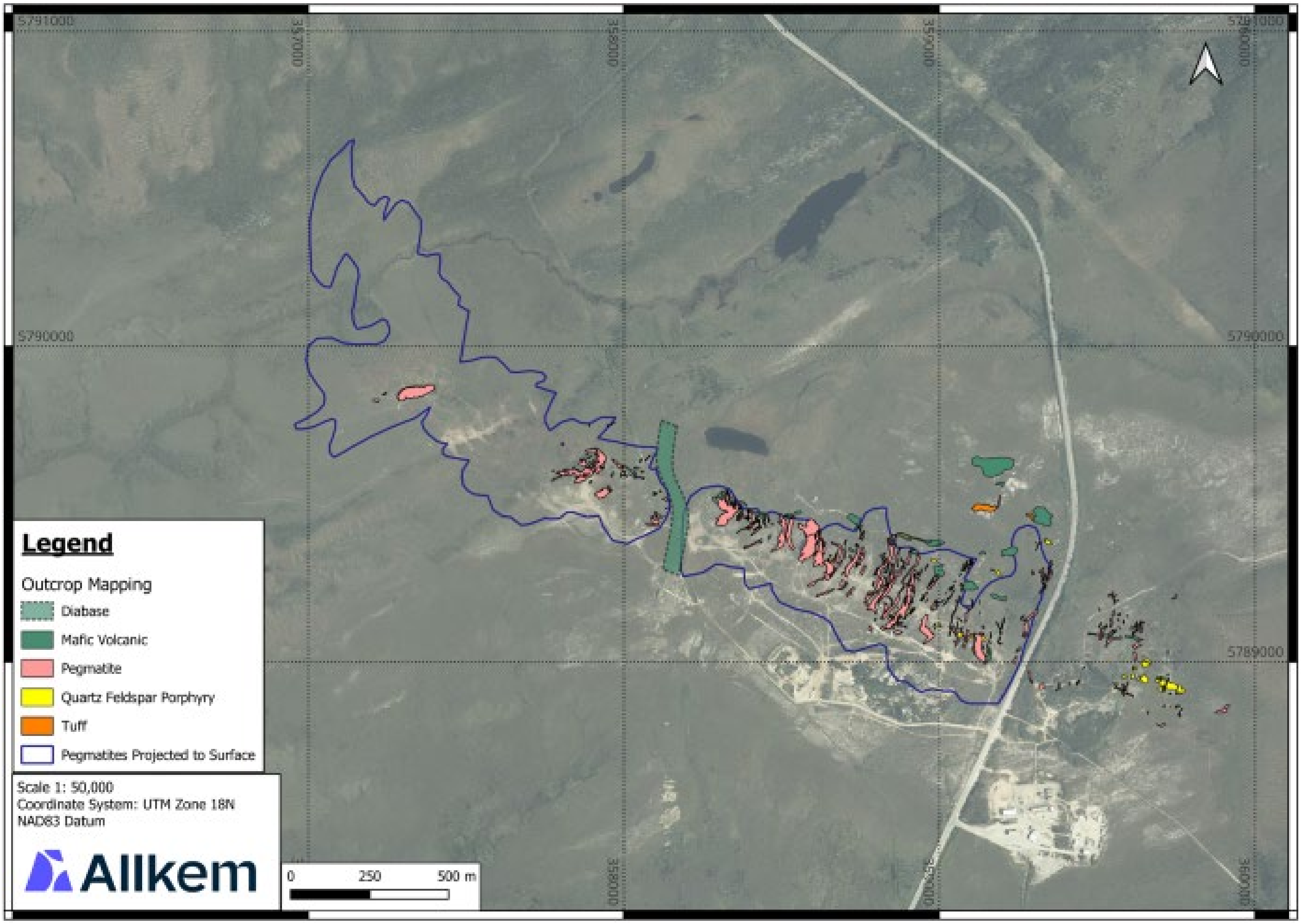
Source: GLCI, 2023

Figure 7-4 – (Left) Typical paragneiss textures with preserved bedding. (Right) Biotite-rich porphyroblasts in mafic intrusive

In regard to the outcropping pegmatites, the following is reproduced from a report prepared for Coniagas Resources Ltd. by A. James McCann in 2008.

"Mapping by J. C. Potvin of SDBJ had identified 14 main dikes of spodumene (SDBJ: GEOLOGIE ET STRUCTURE MAPS, project 350-3610-010, Oct. '75). According to Pelletier (1977), the individual bodies are mostly irregular dikes or lenses attaining up to 60 metres in width and over 100 metres in length. They cross-cut at a high angle the foliation and presumed bedding of the intruded rocks on a local and regional scale. These dikes strike most often N20°E/60°W but may vary from north-east to north-west and generally show a westerly dip of 60° or steeper". The group of outcrops forms a discontinuous band or "corridor" approximately 4 kilometres long by 300 metres wide striking N103°E and cutting the host rock at a low angle. The pegmatites are generally perpendicular to the trend of the "corridor"; they form small hills reaching up to 30 metres above the surrounding swamps".

As of June 2023, a total of 67 individual pegmatite dikes have been identified within the deposit (some grouped into swarms), with the potential of additional dikes to be delineated on the property along strike to the east of the Billy Diamond Highway and to the north-west. A Paleoproterozoic diabase dike cuts north-south through the deposit, possibly truncating the pegmatite dikes and altering the spodumene to sericite in proximity to the contacts of the diabase. The diabase may have been emplaced in proximity to a sinistral strike-slip fault that displaces the pegmatite at the centre of the deposit. A plan view of mapped outcrops is presented in Figure 7-5.



Source: GLCI, 2023

Figure 7-5 – Outcrop Geology Displaying Mapped Pegmatites and Modelled Pegmatites Projected to Surface

The geometry of the pegmatite dikes in the vicinity of outcrop is well understand and supported by drilling, which has confirmed continuity of both Li_2O grades and thickness of mineralization at depth. The pegmatites have been grouped into clusters based on their spatial location and outcrop positions (Figure 7-6). In 2023, step-out scout drilling to the northwest of the outcropping 1700 pegmatite cluster continued to discover mineralized pegmatites under thin glacial overburden. Based on correlated intersections of pegmatites in wide-spaced drilling, the orientation of the pegmatites appears to rotate from 067° azimuth to 010° azimuth. This suggests that the deposit is either offset and rotated by a strike-slip fault to the north of the 1700 cluster, or there is a sigmoidal inflection of the structural "corridor" hosting the deposit. The deposit remains open to the north-west of pegmatite cluster 1900.

Source: GLCI, 2023

Figure 7-6 – Isometric View and Cross Section of the Pegmatite Dikes, Coloured by Pegmatite Groupings

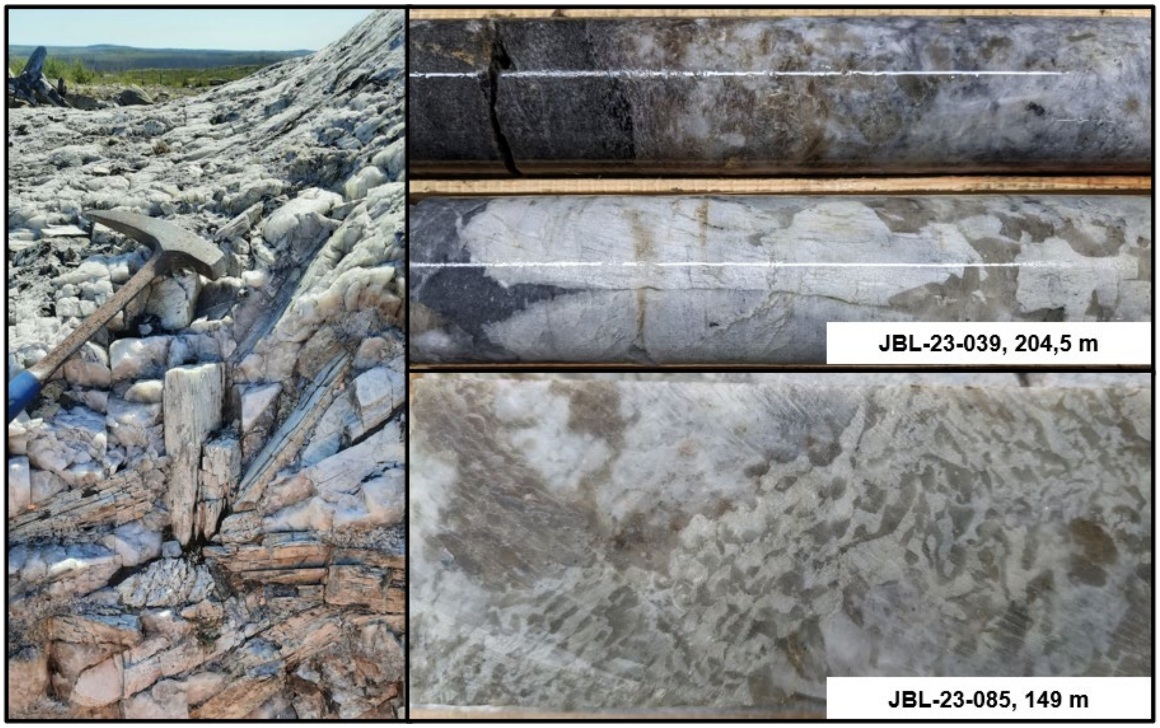
7.4 Mineralization

Spodumene is a relatively rare pyroxene that is composed of lithia (8.03% Li_2O), aluminum oxide (27.40% Al_2O_3), and silica (64.58% SiO_2). It is found in lithium-rich granitic pegmatites, commonly associated with quartz, k-feldspar, albite, muscovite with minor lepidolite, tourmaline, and beryl. Spodumene is the principal source of lithium found at the property.

The spodumene found on the property tends to have a pale-green colouration, with grain size varying from sub-millimetric to one metre lengths. Grain size tends to be very fine within a chilled margin on the dikes, usually 3 cm to 5 cm wide, and then increases towards the centre of the pegmatite dikes. Crystal orientation is generally perpendicular to the contacts on the dike within the first one to two metres of the dike contact, and then becomes random and chaotic towards the centre of the dike with a megacrystic texture. Outcropping spodumene mineralization is shown in Figure 7-7, and typical examples of pegmatite in drill core is shown in Figure 7-8 and Figure 7-9.

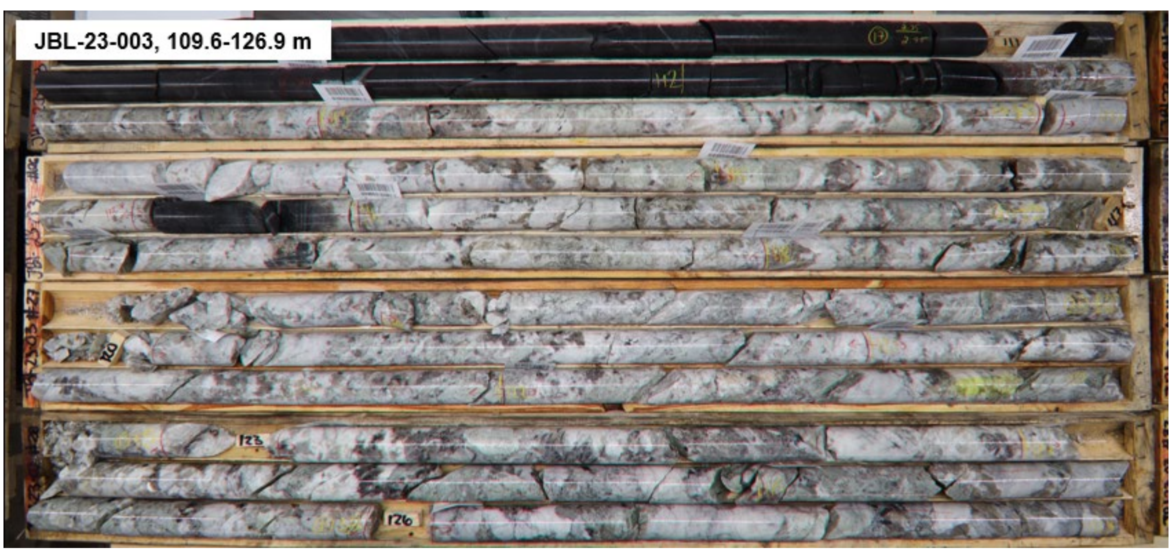
Source: SLR, 2023

Figure 7-7 – Spodumene Crystals in Outcrop. (Left) Cross-Section through Spodumene Crystals. (Right) Long-Section through Spodumene Crystals.



Source: GLCI, 2023

Figure 7-8 – (Left) Large Spodumene Crystals Observed in Outcrop. (Top Right) Typical Coarse-Grained Spodumene in Drill Core. (Bottom Right) Graphic Texture of Quartz and Spodumene.



Source: GLCI, 2023

Figure 7-9 – Typical Pegmatite Intersection in Drill Core

Concentrations of spodumene within the pegmatite dikes range from 2% to 40%, with the majority of crystals between 1 cm and 8 cm in length. Towards the extremities of the dikes, and occasionally at depth, spodumene is sometimes replaced by either muscovite or sericite. Work is ongoing to better understand the alteration assemblages in 3D for the deposit.

The following is reproduced from a report prepared for Coniagas Resources Ltd. by A. James McCann regarding spodumene mineralization:

"The crystal orientation of the spodumene laths can be used as a means to identify the orientation of the pegmatites; as the crystal laths are generally perpendicular to the dike trend or long axis (Valiquette, 1974). Spodumene occur as white to greenish prismatic and striated crystals varying from a few millimetres to over one metre in length. When altered, sericite forms on the surface of the spodumene and as it progresses, the colour changes to brown from the increasing iron oxides adhering to the surface. Spodumene can also alter to a Li-bearing mica in platy aggregates pseudomorphs after spodumene. Microprobe analyses reveal the Cyr-Lithium spodumene with the following formula (Li0.99 Na0.01) AlSi2O6, with an iron content of 0.96% (Total Fe_2O_3). Work by the SDBJ identified the major minerals associated with spodumene pegmatites in decreasing order of abundance as: perthitic feldspar, spodumene (25%), quartz, muscovite, apatite, beryl, iron oxides, ilmenite, serpentine, tourmaline (?) and ferrisicklerite or lithiophilite (Li (Mn, Fe) PO4). In 1974, Valiquette revealed that pale green muscovite contained 0.18% Li_2O".

Although spodumene is the dominant lithium-bearing mineral found within the pegmatites, some minor occurrences of lepidolite have been visually noted in drill core. These observations are rare, and accumulations of lepidolite have not been identified in laboratory testwork. Holmquistite has been observed within discrete veins in the encasing paragneiss in proximity (< one metre) to pegmatite contacts. The holmquistite presents as a purple, fibrous mineral within centimetric veins exclusively within the paragneiss. Other minerals identified in drill core include columbite, apatite, and beryl.

Geochemical analyses for tantalum, cesium, and rare-earth elements have returned non-economic concentrations. Summary statistics of available geochemical data collected within pegmatite intervals is presented in Table 7-1.

Table 7-1 – Summary Statistics of Geochemical Assays Within Pegmatites

Element	# Assays	Mean	Median	Standard Deviation
Cs_2O (ppm)	696	60	50	45
Fe_2O_3 (%)	2,202	0.90	0.70	0.83
K_2O (%)	832	2.81	2.64	1.21
Li_2O (%)	12,103	1.31	1.41	0.74
Nb_2O_5 (ppm)	702	99	100	61
P_2O_5 (%)	832	0.44	0.35	0.34

Element	# Assays	Mean	Median	Standard Deviation
Rb_2O (ppm)	725	916	843	431
SIO_2 (%)	832	72.7	73.6	4.4
Ta_2O_5 (ppm)	724	41	28	42
TiO_2 (%)	688	0.03	0.01	0.06
U_3O_8 (ppm)	693	6	6	4

8. DEPOSIT TYPES

London (2008) describes pegmatite as: “an igneous rock commonly of granitic composition, that is distinguished from other igneous rocks by its extreme coarse but variable grain-size, or by an abundance of crystals with skeletal, graphic or other strongly directional growth habits. Pegmatites occur as sharply bounded homogeneous to zoned bodies within igneous or metamorphic host rocks.”

Granitic pegmatites are a well-known source of a variety of rare metals and industrial minerals. The high concentration of rare metal mineralization and the high purity of most industrial minerals, combined with their coarse-grained nature, are the primary factors favouring pegmatite exploitation (Ĉerný, 1991). The available data suggests that the pegmatites of the Project are of the rare-element ‘class’, the lithium, cesium, tantalum (LCT) ‘family’ and the albite-spodumene ‘type’ according to the classification of Ĉerný (1991).

LCT pegmatites are the products of plate convergence and have been emplaced into orogenic hinterlands, even those now in the core of Precambrian cratons (Bradley and McCauley, 2016). Most LCT pegmatites are known to have intruded metasedimentary rocks, typically at low-pressure amphibolite to upper green schist facies (Ĉerný, 1991). LCT pegmatites represent the most highly differentiated and last to crystallizing components of certain granitic melts. Regional zonation of rare metals is generally observed in such pegmatites, resulting from a cogenetic intrusion (Ĉerný, 1991). This zonation indicates an enrichment of various rare metals in pegmatite dikes as a function of their distance from the cogenetic intrusion. Spodumene-bearing pegmatites of the Project are likely the most differentiated dikes and the most distant from the cogenetic intrusion; the Kapiwak Pluton located to the south of the property (Moukhsil et al., 2001).

Individual pegmatites can form tabular sills, dikes, and lenticular bodies or irregular masses, and most LCT pegmatites show some sort of structural control. At shallower crustal depths, pegmatites tend to be intruded along faults, fractures, foliation, and bedding (Brisbin, 1986), whereas in higher grade metamorphic terranes, pegmatites are typically concordant with the regional foliation and form lenticular, ellipsoid, or “turnip-shaped” bodies (Fetherston, 2004).

Granitic pegmatites are generally more resistive to weathering and stand above their surroundings, as is the case for the James Bay pegmatites, and are readily recognizable due to their light color and unusually large crystal size. The pegmatite dikes of the Project are interpreted as being up to 60 m in width and over 200 m in length, generally striking south-southwest and dipping moderately to the west-northwest (215 degrees / 60 degrees).

9. EXPLORATION

9.1 Exploration

9.1.1 Historical Exploration

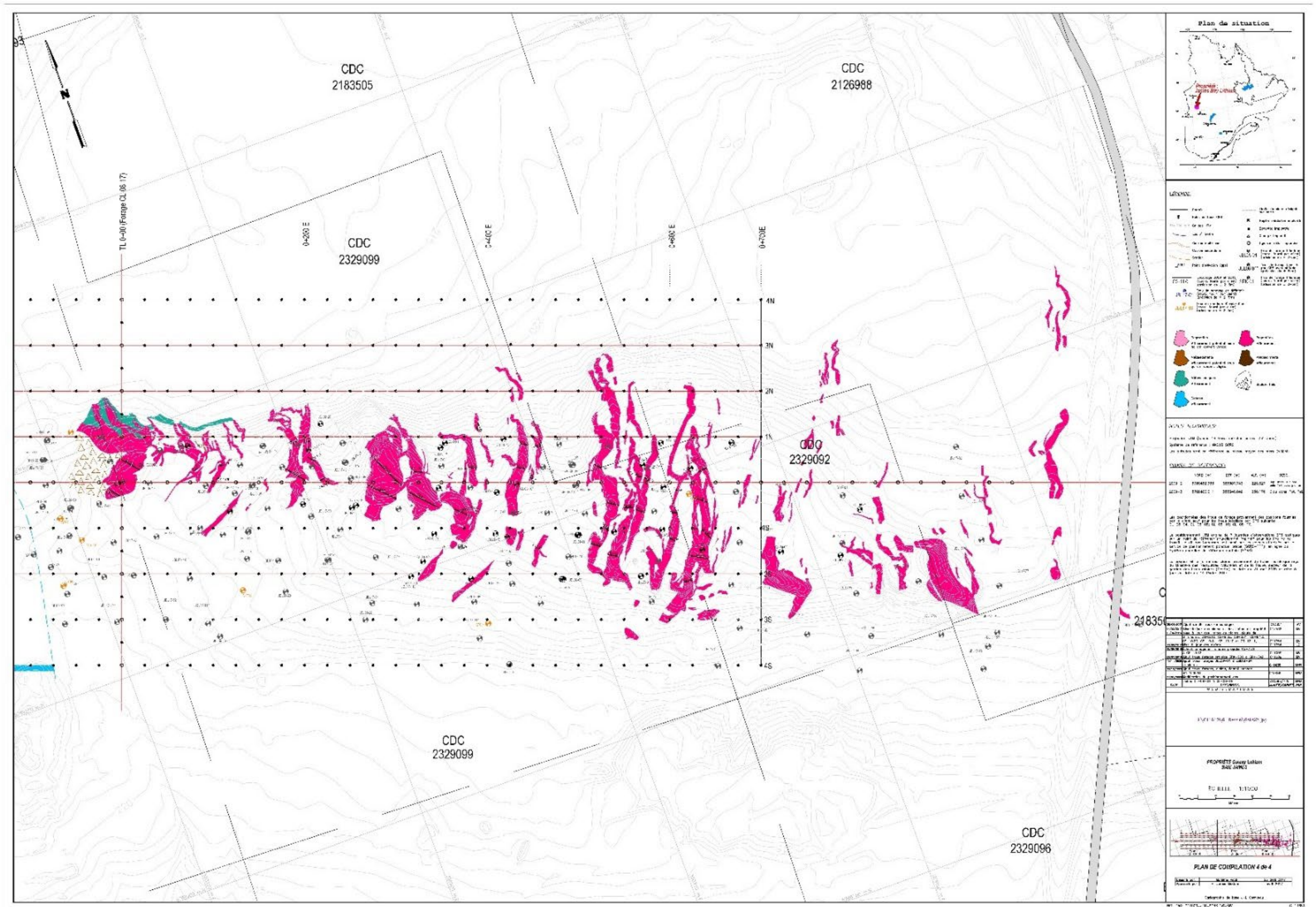
Although the Deposit was discovered in the 1960s by Jean Cyr by surface prospecting, no systematic exploration was conducted on the property until Lithium One (formally known as Coniagas Resources Ltd.) started exploring the property after entering into an option agreement in March 2008 with five parties, including SDBJ.

Initial cartography in the region was undertaken by SDBJ and is summarized in Potvin (1976), which included the following description of the pegmatite dikes: "The individual bodies are mostly irregular dikes or lenses attaining up to 60 m in width and over 100 m in length."

9.1.2 Geological Mapping and Prospecting

In May 2009, Lithium One undertook a detailed 1:1,000 scale surface mapping campaign, which produced high-definition maps of surface outcrops, drill hole locations, topographic contours, and interpreted geology. Through subsequent drilling campaigns, these maps were updated until April 2017 when final versions were produced by Galaxy with all recent information. An example is shown in Figure 9-1.

In 2017, a LiDAR survey was flown, managed by Corriveau JL & Associates Inc. (Corriveau), to better define the topography in preparation for geotechnical and infrastructure studies. This survey was also used to obtain high-definition aerial photography, which has been used by GLCI to relocate and georeference surface channel samples taken in 2009, 2010, and 2011.



Source: Galaxy, 2017.

Figure 9-1 – 1:1000 Scale Geological Map of Pegmatite Outcrops and Drill Holes up to April 2017

9.1.3 Geophysics

9.1.3.1 Induced Polarization and Magnetometer Survey – 2008

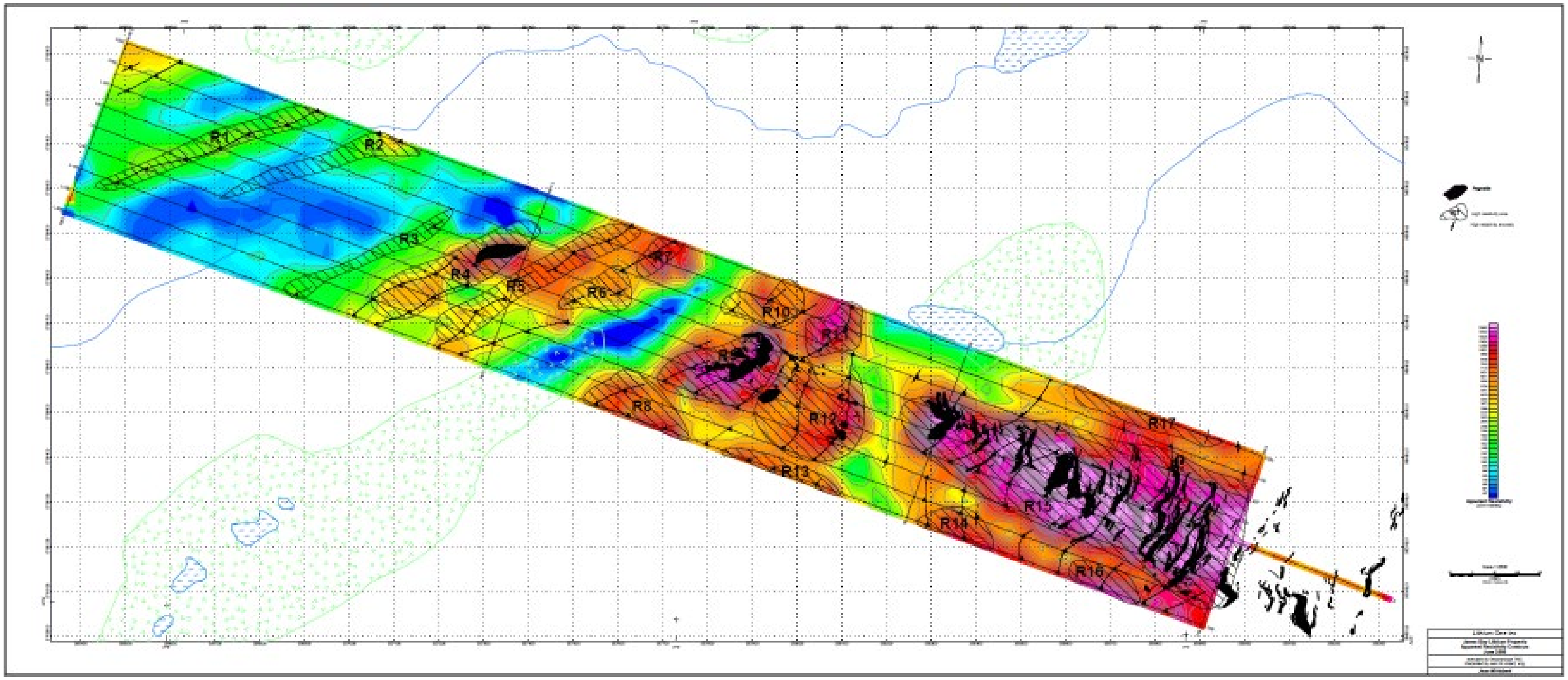
Géophysique TMC Inc. (TMC Geophysics), a geophysical consulting firm from Val-d'Or, Québec, performed an induced polarization (IP) and magnetometer survey over the Project property in June 2008. The purpose of the survey was to gain a better understanding of the geology of the property and its relationship with spodumene-bearing pegmatites that outcrop in the area. The surveys were carried out along northwest-southeast oriented lines. The survey grid lines, totalling 26.6 line-kilometres, were spaced every 50 m and picketed every 25 m by Corriveau. All stations were surveyed using a high precision GPS.

The magnetic survey was conducted along the survey lines, base line, and tie lines for a total length of 26.3 line-kilometres, with readings every 12.5 m (Figure 9-2 to Figure 9-4). The readings were taken using an Overhauser GSM-19 magnetometer built by GEM Systems. The IP survey was conducted along the lines for a total length of 24.3 line-kilometres. An Elrec Pro time domain receiver built by Iris Instruments and a transmitter GDD Tx III built by GDD Instrumentation were used to carry out the survey.

A highly magnetic anomaly observed between grid line L200S – 1+00W and L200N – 2+50 W is due to a diabase dike (Figure 9-4). Its deviation north of L0 was interpreted as being caused by a fault, however, the magnetic map did not indicate in which direction. In the northwest portion of the surveyed area, high and low magnetic lineaments oriented in a northeast-southwest direction reflect the regional trend of the geology in the area. No significant contrast in the magnetic properties of the pegmatites and the surrounding rocks were observed, and it was concluded that the magnetic map was not useful in defining the extent of known pegmatites or for finding new pegmatite bodies.

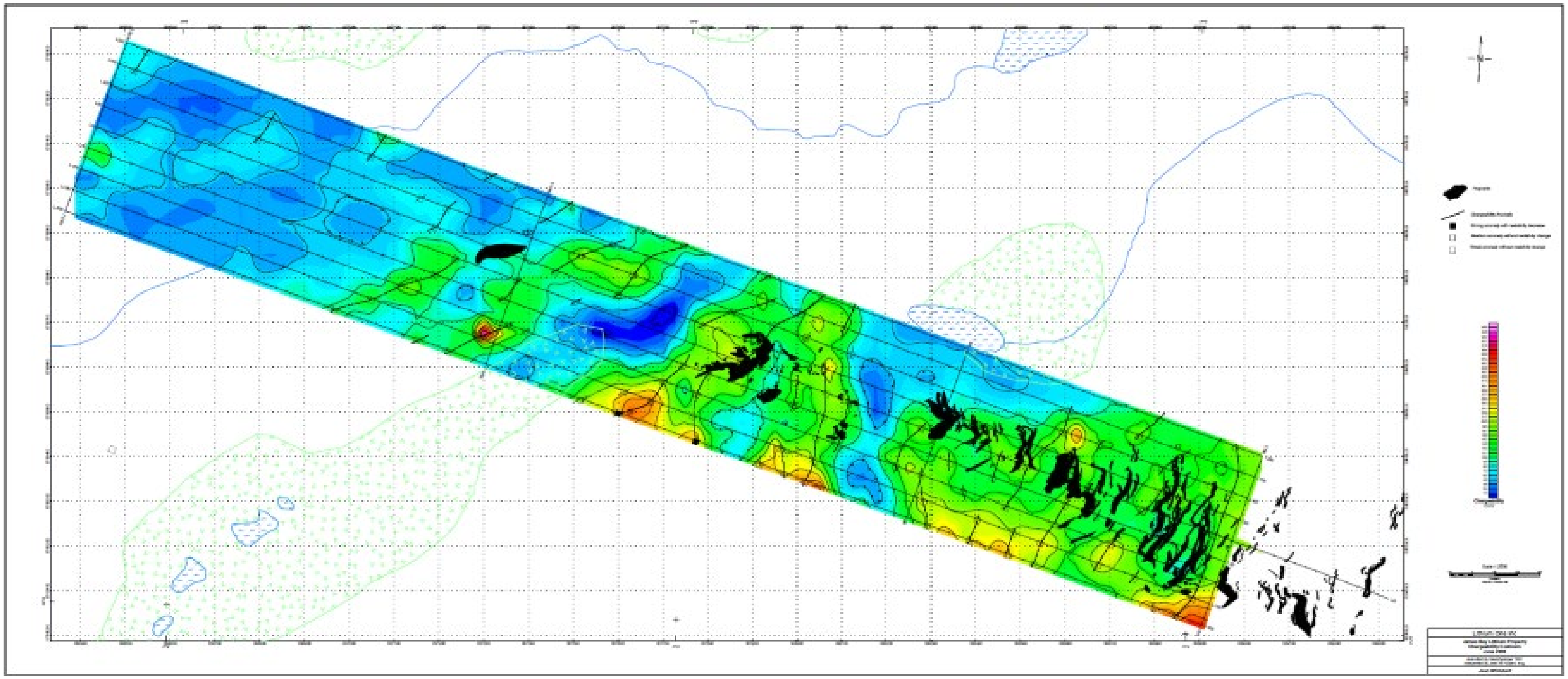
The apparent resistivity values measured in the survey area varied from 220 Ω-metres to 51,000 Ω metres (controlled primarily by the thickness and the conductivity of the overburden); a total of 17 high-resistivity areas were interpreted from the survey (Figure 9-2). In the northwest portion of the survey area, a number of resistive formations were identified. Pseudo sections indicated that the overburden in this area could be 15 m to 25 m thick, however, the inversion model suggested the resistive formations form a ridge, and the overburden thickness should therefore be less over them; these anomalies were recommended to be tested. It was also recommended that the resistivity survey be extended to the southeast for approximately two kilometres, as pegmatites have been observed for over one kilometre beyond the Billy Diamond Highway (formerly the James Bay road). Furthermore, additional survey lines were recommended to the north and south of the actual line grid to delineate some of the resistive areas prior to drill investigation.

Most of the chargeability anomalies were associated with increased resistivity. Spodumene bearing pegmatites are not chargeable, and the chargeability did not provide any additional information to define them.



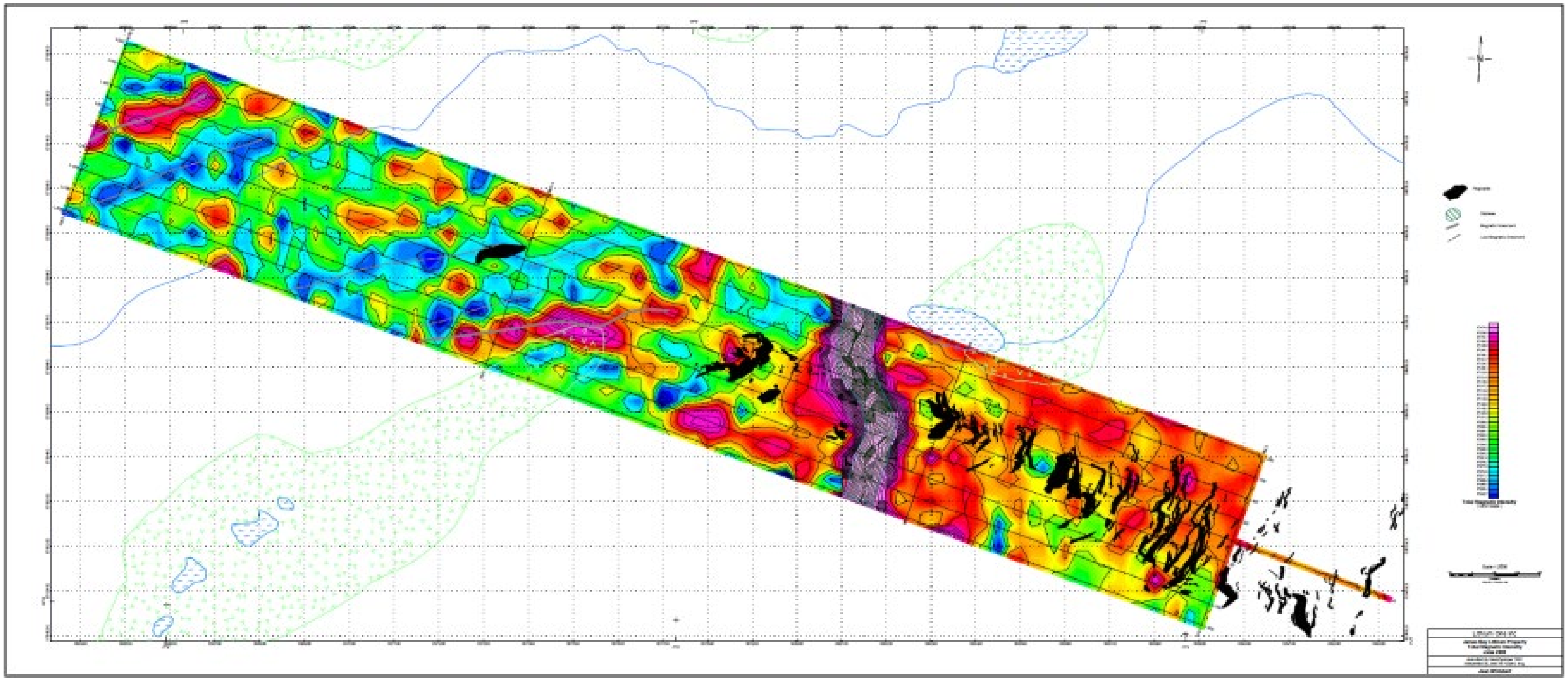
Source: Géophysique TMC, June 2008.

Figure 9-2 – Geophysical Survey Conducted over the Project Property in June 2008: Apparent Resistivity



Source: Géophysique TMC, June 2008

Figure 9-3 – Geophysical Survey Conducted over the Project Property in June 2008: Chargeability Contours



Source: Géophysique TMC, June 2008

Figure 9-4 – Geophysical Survey Conducted over the Project Property in June 2008: Total Magnetic Intensity

9.1.3.2 Induced Polarization and Magnetometer Survey – 2021

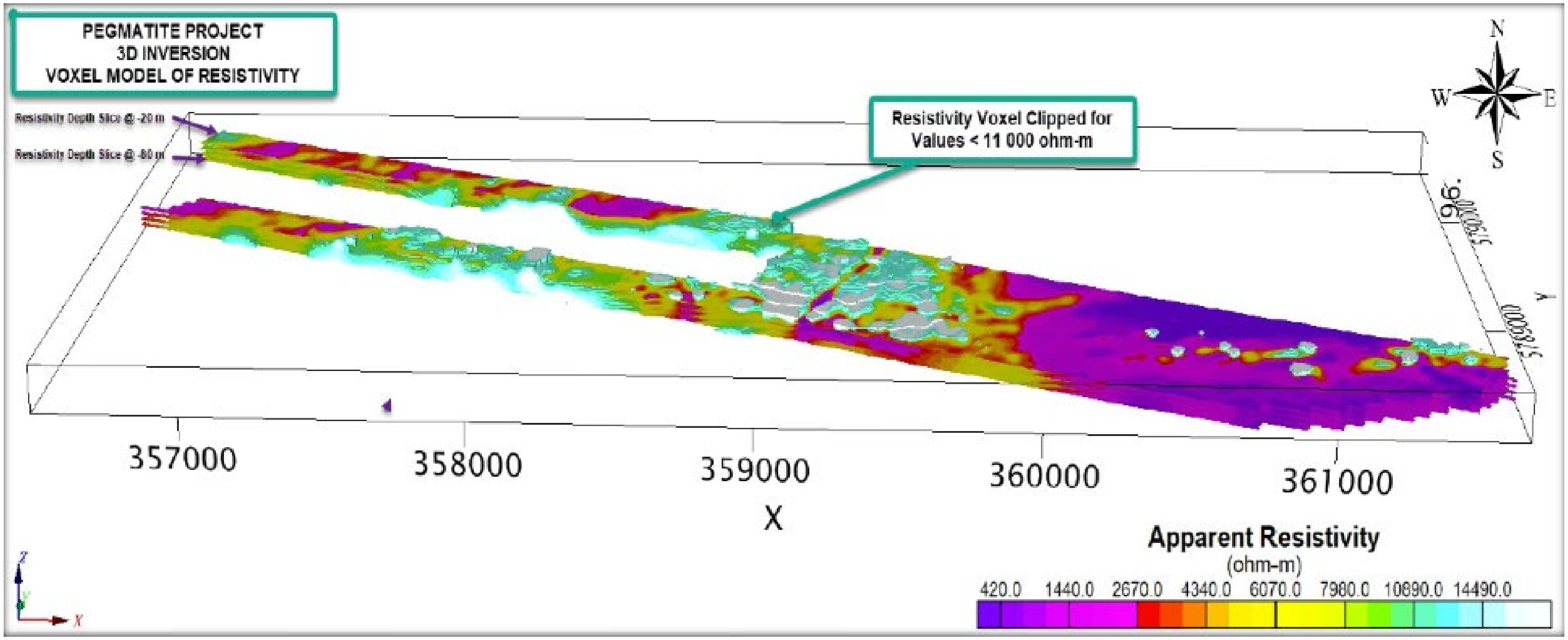
As a part of the ongoing exploration program, GLCI commissioned TMC Geophysics to carry out a ground resistivity survey on the Project. The fieldwork was carried out from April 13 through May 10, 2021, and consisted of 58.9 line-km of ground IP resistivity profiles using the dipole-dipole electrode array.

The ground resistivity measurements were acquired on a single grid that consists of a network of 17 N110°/N290° oriented profiles spaced every 50 m from L-400S to L-400N. Profiles were designed over distances ranging between 2.425 km and 5.50 km and crosscut the central and eastern part of the property. The survey lines were picketed every 25 m with wooden stakes. On each of these stakes, the line and station numbers were indicated. The coordinates of all pickets were determined by using a Garmin GPS receiver. This information was ultimately used to geo-reference the geophysical database to the UTM18N_NAD83.

The induced polarization equipment consisted of a transmitting and receiving apparatus using a commuted signal. A motor generator drove the GDD Instrumentation TX-III transmitter capable of supplying 1.8 kW of continuous power.

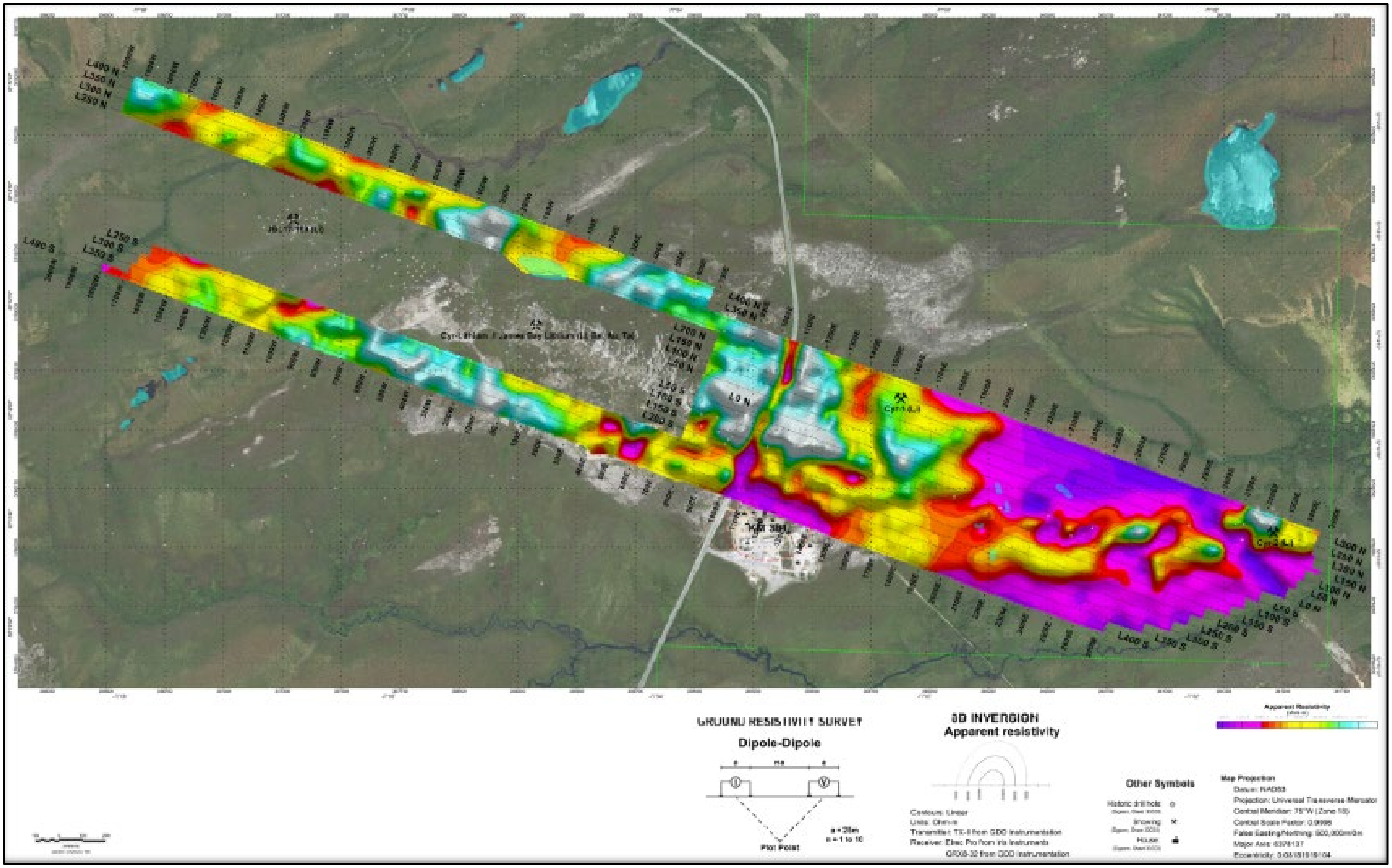
A 3D inversion of the resistivity data was produced (Figure 9-5), and sections were cut at 20 m, 40 m, and 60 m depths. Figure 9-6 illustrates the section at 40 m depth.

The continuation of the resistivity anomaly to the east of the highway suggests the pegmatite dike swarm continues beneath glacial overburden. This hypothesis is supported by isolated outcrops of spodumene-bearing dikes located one kilometre to the east of the deposit (Cyr-2 Prospect).



Source: Géophysique TMC, 2021.

Figure 9-5 – 3D Inversion of Resistivity – 2021 Survey



Source: Géophysique TMC, 2021.

Figure 9-6 – Horizontal Slice of 3D Inversion Model at 40-m Vertical Depth – Resistivity

9.1.4 2011 Bulk Sample

From November 15 to 24, 2011, four outcropping pegmatites sites were bulk sampled to provide samples for metallurgical testwork. Test pits were drilled and blasted to 4.6 m wide and 4.6 m long, with depths varying between 0.9 m and 1.8 m. Nord-Fort Inc. was contracted to undertake the extraction, with Dynamitage St-Pierre contracted for the blasting. Twelve, 45-gallon steel barrels from each of the four sites were filled with blasted mineralization, with approximately four tonnes obtained from each site.

10. DRILLING

10.1.1 Overview

Drilling at the Project has been conducted by two previous operators: Lithium One and Galaxy. Drilling has been conducted exclusively using diamond drilling methodologies, with some channel sampling of surface outcrops using mechanized methods.

A summary of all drilling conducted on the property is shown in Table 10-1.

Table 10-1 – Diamond Drilling and Channel Sampling Summary

Operator	Drilling Campaign	Type1	Purpose	Number of Drill Holes	Total Meterage	Average Depth
Lithium One	2008	DDH	Exploration	18	1,096	61
	2009	Channel	Delineation	8	201	-
	2009	DDH	Delineation	84	12,391	148
	2010	Channel	Delineation	37	499	-
	2011	Channel	Delineation	8	109	-
	TOTAL	DDH		102	13,487	132
		Channel		53	809	-
Galaxy / GLCI	2017	DDH	Exploration	5	888	178
	2017	DDH	Metallurgical	2	183	92
	2017	DDH	Delineation	155	33,697	217
	2017	DDH	Sterilisation	32	3,846	120
	2018	DDH	Exploration	10	1,860	186
	2018	DDH	Geotechnical	14	1,565	112
	2018	DDH	Metallurgical	28	1,294	46
	2018	DDH	Sterilisation	23	2,766	120
	2022	DDH	Delineation	50	8,255	165
	20222	DDH	Sterilisation	54	6,919	128
	2023	DDH	Delineation	116	27,128	234
	2023	DDH	Sterilisation	4	504	126
	2023	DDH	Exploration	7	837	120
	TOTAL	DDH		500	89,741	179

Notes:

1. *DDH: Diamond drill hole*
2. *Includes meterage from three holes from 2022 which were extended in 2023 (JBL-22-024, JBL-22-028 and JBL-22-029)*

10.1.2 Lithium One Era – 2008 to 2011

10.1.2.1 2008 Core Drilling Program – Lithium One

In September 2008, Lithium One drilled 18 drill holes at a nominal spacing of 100 m for a total meterage of 1,096 m. Due to a highly accentuated topography, large variations existed in the borehole spacing as maintaining a constant distance between holes was difficult due to the size of the drilling equipment used. Drill hole collars were surveyed using a handheld GPS unit. Chibougamau Diamond Drilling Ltd. was contracted to undertake the drilling and all holes were drilled vertically to depths varying between 51 m and 105 m. No downhole surveys were collected.

The drill holes were initially planned to investigate the pegmatite dikes along a rectangular grid consisting of two parallel lines of nine holes each, set at a 50-m spacing between holes. The grid would have covered an area of 50,000 m^2 (five hectares), evaluating approximately 500 m of strike length of the "corridor." The original concept was modified to investigate a longer strike length of the pegmatite field at wider line spacing. The area increased to 180 ha, and the strike length investigated by the drilling reached 900 m.

10.1.2.2 2009 Core Drilling Program – Lithium One

In 2009, Lithium One drilled a total of 84 drill holes with a total meterage of 12,391 m, achieving an average spacing of 50 m to 60 m. New pegmatite dikes were identified in drilling, and a grid was established over these areas to facilitate drilling at an optimum angle. Drill hole collars were surveyed using a handheld GPS unit (Garmin 60-csx). Downhole surveys were collected at 3 m intervals using the FLEX-IT tool provided by REFLEX. Both magnetic declination and grid conversion corrections (to NAD83 UTM Zone 18N) were applied to correct the downhole survey azimuths.

10.1.2.3 2009, 2010, and 2011 Channel Sampling – Lithium One

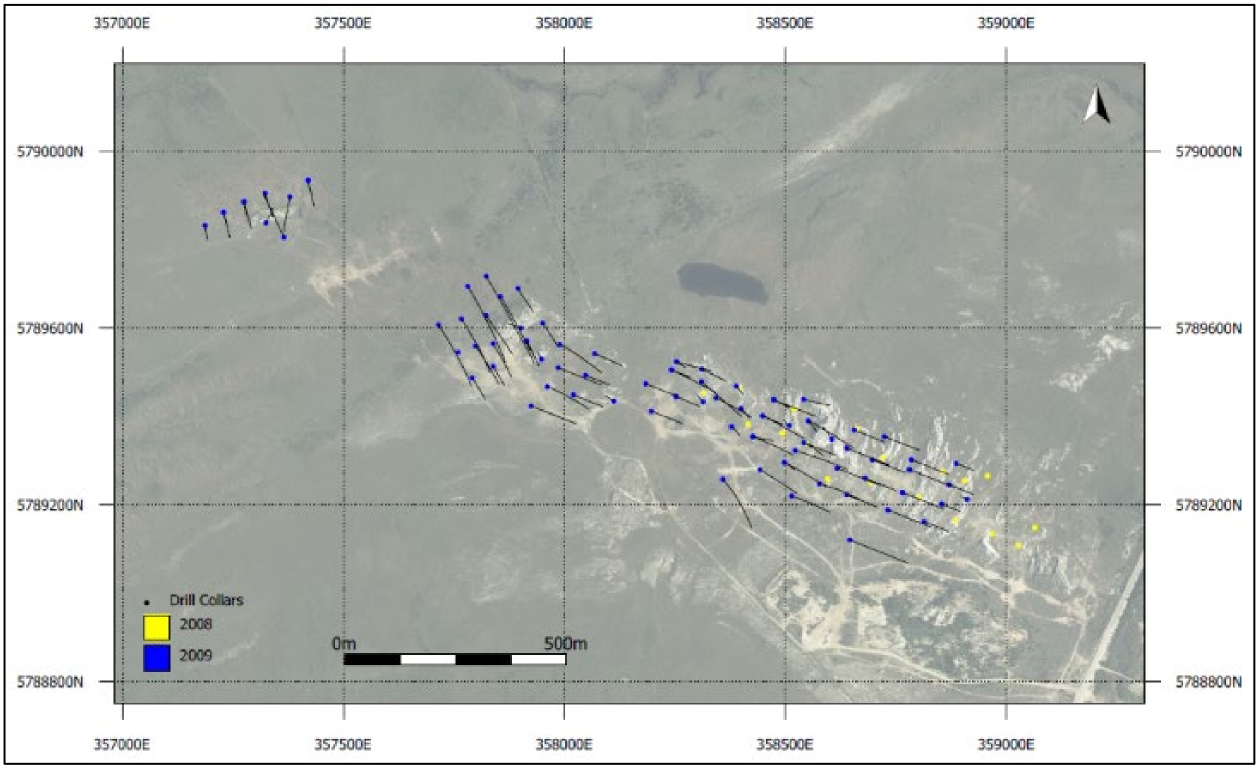
Three channel sampling programs were conducted between 2009 and 2011 to sample the outcropping surface of a number of the pegmatite dikes; a total of 53 channel samples were cut from surface outcrops. From August 10 and 22, 2009, a total of 200.5 m of channelling was completed, with a goal of correlating drilling at depth to surface outcrops.

From August 19 to 31, 2010, Lithium One hired Nord-Fort Inc. from Ste-Anne-des-Lacs, Québec to sample specific sections of the outcropping pegmatites using 14-inch diamond channelling saws. These channel samples were taken in areas of the mineralization that required further definition to be upgraded to the Indicated category. A total of 482 m of channel samples were obtained.

Lastly, from November 13 to 21, 2011, an additional 86 m of channel samples were taken to upgrade areas of Inferred Mineral Resources into the Indicated category.

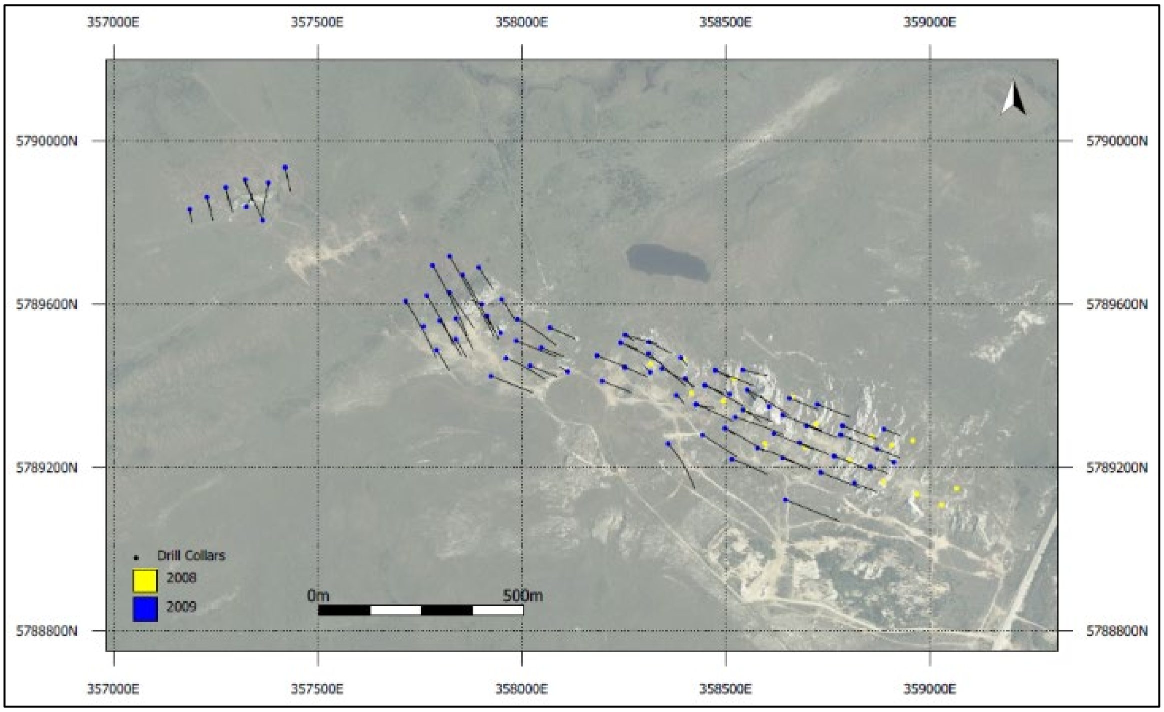
The channel samples are represented in the exploration database as sub-horizontal boreholes that closely follow the topographic surface of the LiDAR survey.

Figure 10-1 is a location map showing the drill holes from the 2008 and 2009 campaigns. A location map of the channel samples taken in 2009, 2010, and 2011 is presented in Figure 10-2. Figure 10-3 shows the channel sampling in 2011.



Source: GLCI, 2023

Figure 10-1 – Drill Hole Locations – 2008 and 2009 Drilling Programs



Source: GLCI, 2023

Figure 10-2 – Channel Sample Locations and Grades – 2009, 2010, and 2011 Sampling Programs

Source: McCann, 2011

Figure 10-3 – Channel Sampling in 2011 Using a Double-Bladed Circular Saw

10.1.2.4 Drilling and Sampling Methodologies – Lithium One

Drilling was conducted primarily using NQ core diameter. Casing was inserted to the base of the overburden, and drill core recovery started at the top of hard rock. Standardized core sampling protocols were used by Lithium One. Initially, during the 2008 drilling program, core was sampled at 2.5 m intervals, and subsequently at 1.5 m intervals. A selective sampling procedure was used based on lithological contacts, where the maximum (and most common) sample interval was 1.5 m. Shorter samples were collected to define geological domains. Channel samples were also sampled at 1.5 m intervals.

Sample intervals were marked by appropriately qualified geologists. Two sample tags were placed at the beginning of each sample interval, while a third copy remained in the sample booklet along with the associated “from” and “to” information recorded by the geologist. A geotechnician was responsible for core cutting and for preparing the samples for dispatch to the preparation laboratory, “Table Jamésienne de Concertation Minière” in Chibougamau, Québec. Assay samples were collected on half core sawed lengthwise using a diamond saw; the remaining half was replaced in the core box for future reference. When quarter-core duplicates were taken, the original sample was also quarter-core, resulting in half-core remaining in the core boxes.

Archived drill core was stored outdoors, cross-stacked on shipping pallets or in metal racks at Relais Routier km 381 truck stop.

10.1.3 Galaxy / GLCI – 2017 to Present

10.1.3.1 2017 Diamond Drilling Program

Infill drilling at the Project commenced in early March 2017 and was completed in mid August 2017, with the objective of delineating the various pegmatite dikes, and to find potential resource extensions. Step-out holes were drilled to explore the down-dip extension of known pegmatites, and drilling commenced on previously mapped, but unexplored, pegmatites.

Previous drilling by Lithium One in 2008 and 2009 focused entirely on pegmatites located on the west side of the Billy Diamond Highway. Galaxy mapped and drilled additional pegmatite bodies located on the east side of the highway, expanding the footprint of the known mineralization. Galaxy drilled 160 exploration and delineation drill holes on the property in the summer of 2017, totalling 34,585 m.

Downhole surveys were collected at 3 m intervals using the multi-shot EZ-TRAC tool provided by REFLEX. Both magnetic declination and grid conversion corrections (to NAD83 UTM Zone 18N) were applied to correct the downhole survey azimuths.

10.1.3.2 2017 / 2018 Geotechnical, Metallurgical and Sterilization Drilling

In addition to the resource definition program in the summer of 2017, additional drilling was conducted from late November 2017 to the end of February 2018 for the following purposes:

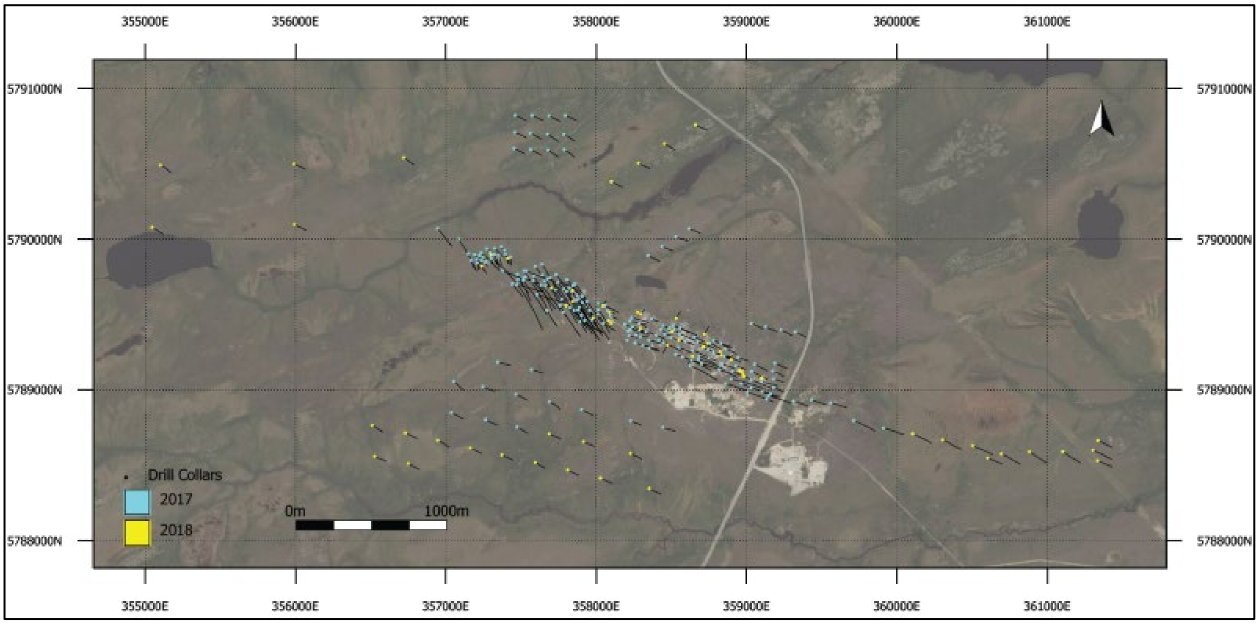
- Metallurgical drilling – 30 drill holes
- Geotechnical drilling and logging – 14 drill holes
- Sterilization drilling under proposed infrastructure locations – 55 drill holes

Metallurgical and sterilization drilling was surveyed at the top of fresh rock and at the base of the hole using a single-shot system (EZ-TRAC). Geotechnical drilling was surveyed every 3 m using the multi-shot EZ-TRAC tool provided by REFLEX. Both magnetic declination and grid conversion corrections (to NAD83 UTM Zone 18N) were applied to correct the downhole survey azimuths.

All collar coordinates were initially recorded in 2017 using a handheld GPS unit, however, in 2017 Galaxy engaged Corriveau to resurvey a large proportion of the drill hole collars using a real-time kinematic (RTK) method and the database was updated accordingly. In addition, in 2020, a second attempt was made to locate collars not found during 2017.

Out of a total of 371 drill holes completed between 2008 and 2018, 288 have been resurveyed using RTK methodology. Out of the remaining 83 un-surveyed drill hole collars, 64 are either geotechnical, metallurgical or sterilisation drill holes that are not used to estimate the mineral resource. The remaining 19 drill holes (of which 15 were from the initial 2008 drilling campaign) were originally surveyed using a handheld GPS and could not be relocated in the field.

A location map showing the 2017 / 2018 drilling is shown in Figure 10-4.



Source: GLCI, 2023.

Figure 10-4 – 2017 and 2018 Drill Holes Locations

10.1.3.3 2022 Resource Delineation Drilling Program

A resource delineation program was conducted from February 28 to March 31, 2022. Drill holes were designed to delineate the edges of the pegmatites that were still open to the north, and also tested for extensions around the most western pegmatite outcrops. A total of 50 drill holes totalling 8,225 m were drilled.

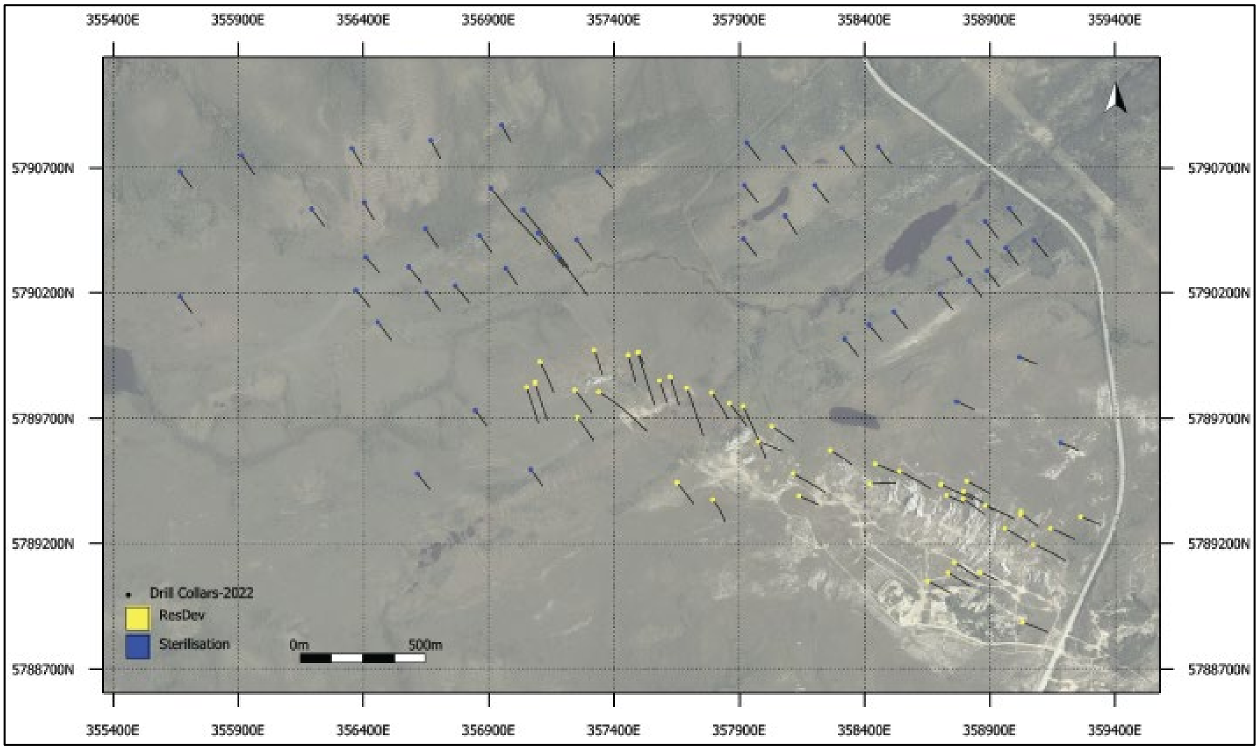
Drilling was surveyed every three metres using a combination of the multi-shot EZ-TRAC tool provided by REFLEX, and a separate gyroscopic tool. Both magnetic declination and grid conversion corrections (to NAD83 UTM Zone 18N) were applied to correct the downhole survey azimuths. Drill hole collars were surveyed using RTK methods and undertaken by Corriveau.

10.1.3.4 2022 Sterilization Drilling Program

To support the application for the Environmental and Social Impact Assessment (ESIA), a sterilization (also known as condemnation) drilling campaign was completed on the property. Critical infrastructure locations such as the processing plant, waste dumps and water storage/treatment facilities were drilled to ensure that there were no indications of lithium mineralization that would be sterilized by the construction of these facilities. A total of 54 drill holes totalling 6,919 m were drilled.

Sterilization drilling intercepted a new pegmatite located 500 m to the north-west of the last known outcrop.

A map showing the location of the 2022 drill holes is shown in Figure 10-5.



Source: GLCI, 2023.

Figure 10-5 – 2022 Drill Hole Locations

10.1.3.5 2023 Resource Delineation and Exploration Drilling Program

A significant resource delineation drilling program was conducted between December 2, 2022, and April 12, 2023, comprising the follow aspects:

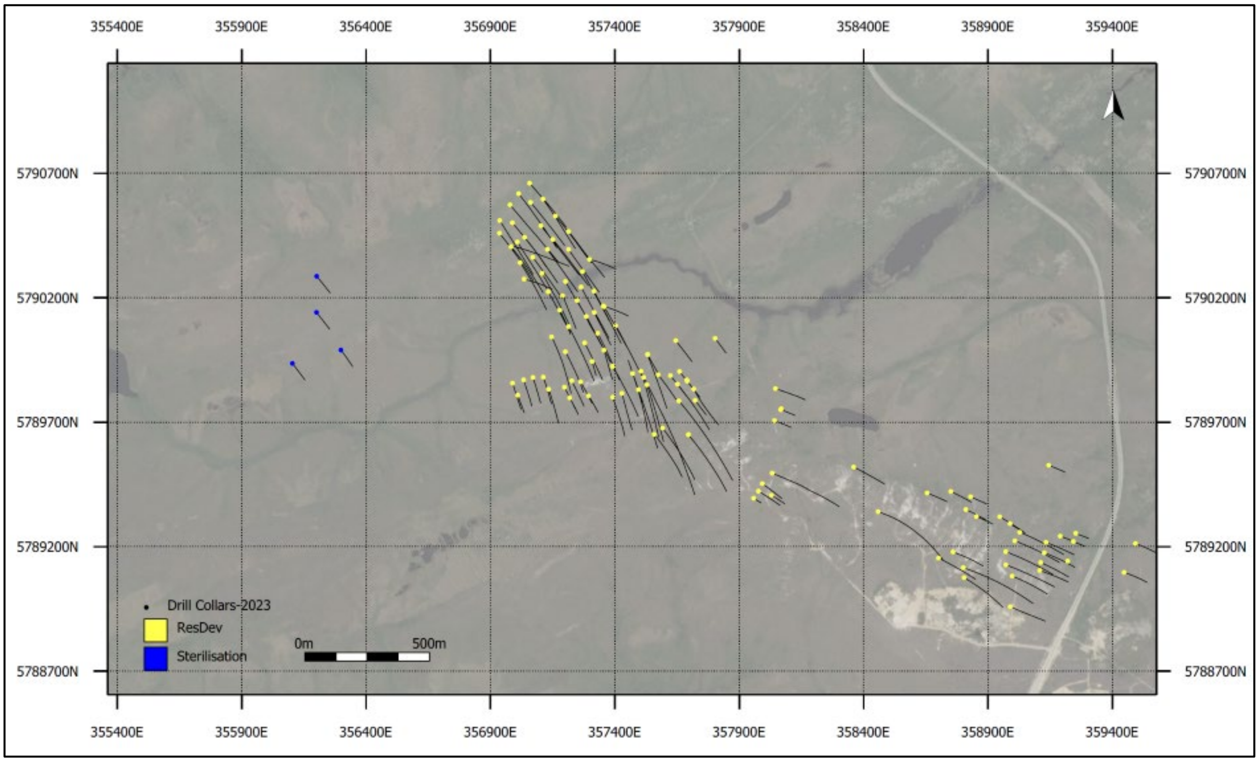
- Infill and extensional drilling of the eastern portion of the orebody at depth, below the reserve pit outline.
- Extensional drilling between the most western outcrop and northwest discovery made in 2022.
- Exploration drilling within the northwest discovery to better understand the geometry of dikes in an area of the property with no outcrop and 10 m of overburden.
- Testing of IP geophysical targets generated in 2021.

A total of 123 resource delineation and exploration drill holes were completed, with a total meterage of 27,965 m. Drilling was surveyed every three metres using a multi-shot EZ-TRAC tool provided by REFLEX, and a TN14 gyrocompass for the collar reading. Both magnetic declination and grid conversion corrections (to NAD83 UTM Zone 18N) were applied to correct the downhole survey azimuths. Drill hole collars were surveyed using RTK methods and undertaken by Corriveau. Due to time constraints, 23 drill collars in the northwest area were not resurveyed using RTK methods and were instead resurveyed by handheld GPS.

Significant intercepts from the drilling were announced on May 4, 2023, including 125 m grading 1.70% Li_2O from 68 m in JBL-23-048, and 72 m grading 1.89% Li_2O from 11 m in JBL-23-024. A location map of the 2023 drilling program is shown in Figure 10-6. An active diamond drill is shown in Figure 10-7.

10.1.3.6 2023 Sterilization Drilling Program

Due to the new pegmatite dike swarm discovered in the northwest area, four additional sterilization holes were drilled totaling 504 m to support plans to locate the western waste dump towards the southwest.



Source: GLCI, 2023.

Figure 10-6 – 2023 Drill Hole Locations

Source: GLCI, 2023.

Figure 10-7 – Active Drill Rig During the 2023 Drilling Campaign

10.1.3.7 Drilling and Sampling Methodologies – Galaxy/GLCI

All drill core handling was performed at a core logging facility located at the Relais Routier km 381 Truck Stop, with logging and sampling conducted by employees and contractors of Galaxy. Lithology, structure, mineralization, sample number, and location were recorded by the geologists in a GEOTIC™ log database and stored on an external hard drive for additional security.

Drill core was stored in wooden core boxes and delivered to the core logging facility twice daily by the drill contractor. The drill core was first aligned and measured for core recovery by a technician, followed by rock quality designation (RQD) measurements. Due to the hardness of the pegmatite units, the recovery of the drill core was generally very good, averaging over 95%. The SLR QP did not identify any drilling, sampling, or recovery factors that could materially impact the accuracy and reliability of the results.

The core was then logged, and sampling intervals were defined by the geologist. Before sampling, the core was photographed using a digital camera and core boxes were marked with box number, hole ID, and aluminum tags indicating "from" and "to" measurements.

Sample intervals were determined based on observations of the lithology and mineralization and were marked and tagged by the geologist. The typical sample length was between 1.0 m and 1.5 m but varied according to lithological contacts between the mineralized pegmatite and the country rock. In general, one country rock sample was collected from each side of the contact with the pegmatite.

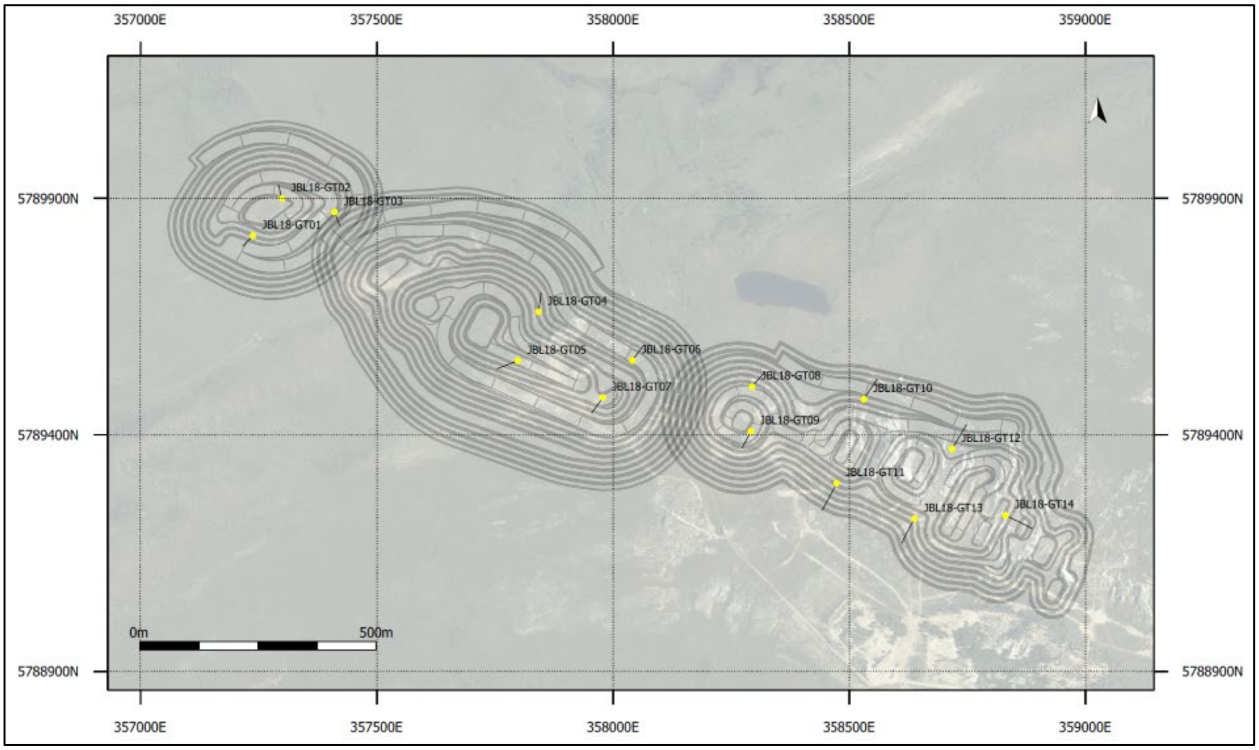
The drill core was split lengthwise; one half was placed in a plastic bag with a sample tag, and the other half was left in the core box with a second samples tag for reference. The third sample tag was archived on site. The samples were then catalogued and placed in rice bags for shipping. Sample shipment forms were prepared on site, with one copy inserted with the shipment and a second copy given to the carrier. One copy was kept for reference. The samples were transported regularly by contractors' truck directly to the ALS Canada Ltd – ALS Minerals laboratory in Val d'Or, Québec (ALS Val d'Or). At the ALS Val d'Or facility, the sample shipment was verified, and a confirmation of receipt of shipment and content was sent digitally to the GLCI (previously Galaxy) project manager.

10.2 Geotechnical Data

From January 14 to 24, 2018, Galaxy drilled 14 geotechnical drill holes in the vicinity of the proposed open-pit walls along a two kilometre strike length of mineralization to gather information on rock strength parameters. Drill holes varied in depth between 75 m and 150 m, with whole core samples recovered for testwork. The drill holes were logged for lithological, mineralogical, and geotechnical aspects, however, the holes were not geochemically sampled. A location map of the geotechnical drilling is shown in Figure 10-8.

RQD data has been gathered during all drilling programs since 2017, with a median RQD reading of 98% in both pegmatite and metasediment lithologies and a slightly lower median of 94% in mafic volcanics.

Samples were collected and subjected to Unconfined Compression Strength (UCS), Tri-Axial Strength and Unconfined Tensile Strength (UTS) testwork. Rock Mass ratings were developed and RQD data was also reviewed. Petram Mechanica LLC was contracted to manage data collection and make recommendations on rock strength and potential slope stability, and the results were summarized in Petram (2018).



Source: GLCI, 2023.

Figure 10-8 – Geotechnical Drill Hole Locations - 2018

11. SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sample Preparation and Analysis

11.1.1 2008 to 2010 Lithium One Core and Channel Samples

From 2008 to 2010, Lithium One collected 3,239 core samples from 102 drill holes (totaling 4,140 m of sampling material) and 562 channel samples from 53 channel cuts on surface outcrops (totaling 809 m). The average sample lengths for this phase were 1.28 m for diamond drilling and 1.44 m for channel sampling, with median lengths of 1.50 m for both sample types.

Samples were shipped from site in secure containers to Table Jamésienne de Concertation Minière in Chibougamau, Québec, for preparation. The protocol for sample preparation involved weighing, drying, crushing, splitting, and pulverizing.

The pulverized pegmatite core samples were shipped by the Table Jamésienne de Concertation Minière to the COREM Research Laboratory (COREM) in Québec City. COREM was accredited ISO/IEC 17025:2005 by the Standards Council of Canada for various testing procedures on April 30, 2009. The scope of accreditation did not include the specific testing procedures used by COREM to assay lithium (method code B23).

Lithium One also utilized SGS Mineral Services Lakefield Laboratory (SGS) as an umpire laboratory to monitor the reliability of assaying results delivered by the primary laboratory, COREM. SGS is also accredited ISO/IEC 17025:2005 by the Standards Council of Canada for mineral testing by various methods. Similar to COREM, the scope of accreditation of SGS does not include the specific testing procedures used to assay lithium (method code 9-8-40).

In February 2010, Lithium One observed a positive bias (+17%) in the SGS Li_2O umpire check assays. Pulps were reanalyzed and additional samples were sent to ALS Chemex in Vancouver for further checks on the results. The initial SGS umpire assays were found to be inaccurate as inserted standards were consistently higher than the expected values by 17% to 19%, and the ALS Chemex umpire assays reproduced the original COREM values. A detailed account of the erroneous umpire assays in April 2010 by consulting geochemist Dr. Jeff Jaacks is included in McCann (2011).

At COREM, prepared samples were assayed using three-acid digestion (nitric acid, hydrofluoric acid, perchloric acid) in boiling water. The dissolved sample was analyzed by atomic absorption (AA) spectrometry. At SGS, prepared samples were assayed by sodium peroxide fusion and AA spectroscopy. At ALS Chemex prepared samples were assayed using four-acid digestion (perchloric acid, hydrofluoric acid, nitric acid, and hydrochloric acid) with inductively coupled plasma – atomic emission spectroscopy (ICP-AES) finish.

Composite core samples were also submitted to Hazen Research Inc. in Golden, Colorado, for metallurgical testing. This laboratory is not accredited.

11.1.2 2017 Galaxy Core Samples

To inform an update to the Mineral Resource estimate, Galaxy collected 9,194 core samples from 160 drill holes totalling 11,863 m in 2017. The average sample length for this phase is 1.29 m, with a median of 1.50 m.

Samples were shipped to ALS in Val-d'Or for preparation and analyses were done in Vancouver. The laboratory is accredited ISO/IEC 17025:2005 by the Standards Council of Canada for various testing procedures, however, the scope of accreditation does not include the specific testing procedure used to assay lithium.

Sample preparation involved the sample material being weighed and crushed to 70% passing 2 mm. A sample split was taken using a riffle splitter to obtain a 250 g subsample. The crushed subsample was then pulverized to 90% passing 75 microns before being analyzed.

At ALS, prepared samples were assayed for mineralization grade lithium by specialized four-acid digestion and (ICP-AES) finish (method code Li-OG63). An approximately 0.4 g sample was first digested with perchloric, hydrofluoric, and nitric acid until dry. The residue was subsequently re-digested in concentrated hydrochloric acid, then cooled and topped up to volume. Finally, the samples were analyzed for lithium by ICP-AES. The method used has a lower detection limit of 0.005% lithium and an upper limit of 10% lithium.

11.1.3 2022 – 2023 GLCI Core Samples

Two major drilling campaigns were conducted from November 2021 to April 2022 (the "2022" drilling program), and from December 2022 to April 2023 (the "2023" drilling program).

In the 2022 drilling campaign, 3,406 core samples from 82 drill holes totalling 2,949 m were collected. The average sample length for this phase is 0.87 m, with a median of 1.00 m.

In the 2023 drilling campaign, 6,689 core samples from 88 drill holes totalling 6,224 m were collected. The average sample length for this phase is 0.93 m, with a median of 1.00 m.

Samples were shipped to ALS Val-d'Or for preparation and analyses in Vancouver. The laboratory is accredited ISO/IEC 17025:2005 by the Standards Council of Canada for various testing procedures, however, the scope of accreditation does not include the specific testing procedure used to assay lithium.

Sample preparation involved the sample material being weighed and crushed to 70% passing 2 mm. A sample split was taken using a riffle splitter to obtain a 250 g subsample. The crushed subsample was then pulverized to 85% passing 75 microns before being analyzed. Frequent quality assurance (QA) and quality control (QC) tests were undertaken on the granulometry during the process.

At ALS, prepared samples were assayed for mineralization grade lithium by sodium-peroxide fusion and ICP-AES finish (method code ME-ICP81). An approximately 0.4 g sample was used, and a complete dissolution was achieved using three fluxes: sodium carbonate, sodium peroxide, and sodium hydroxide.

Finally, the samples were analyzed for lithium by ICP-AES. The method used has a lower detection limit of 0.001% lithium and an upper limit of 10% lithium.

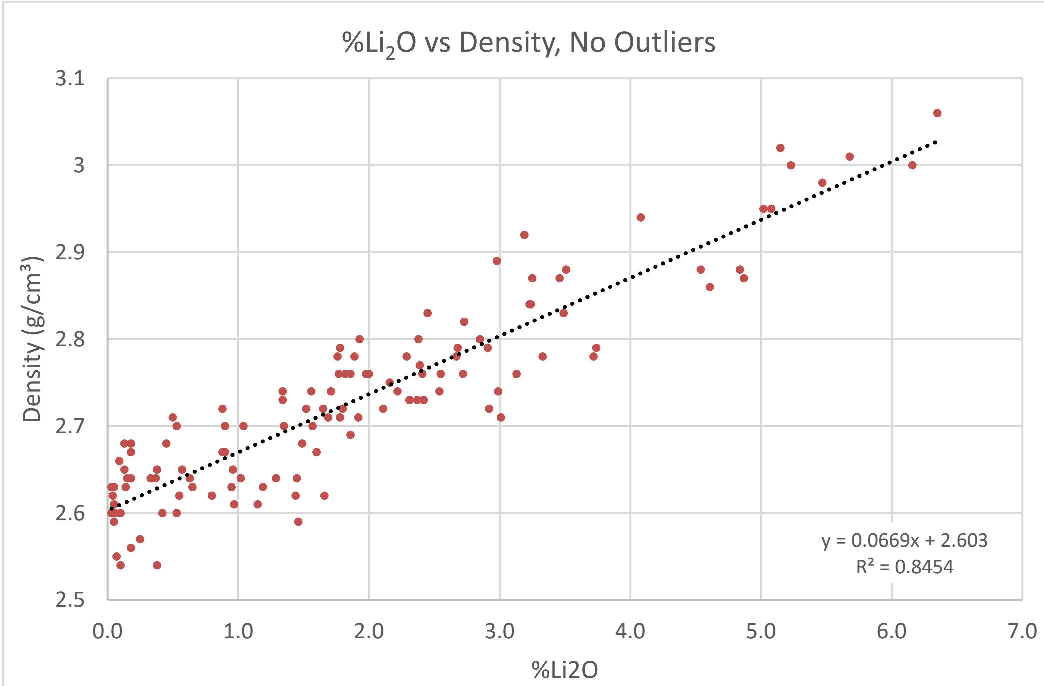
11.2 Specific Gravity Data

In 2017, Galaxy conducted specific gravity on 92 core samples collected from various pegmatite dikes (30 samples) and host rock (62 samples) on the property. The ALS laboratory determined the specific gravity by weighing each sample in air and in water and reporting the ratio between the density of the sample and the density of water (method code OA-GRA08).

The core sample was weighed (up to 6 kg) and then weighed again while suspended in water. The weight of the samples varied between 1.25 kg and 3.6 kg, with an average of 2.21 kg. The resulting measurements reported an average specific gravity value of 2.70 for the pegmatite material and 2.77 for the host rock.

In April 2023, Galaxy conducted additional specific gravity measurements collected from both pegmatite dikes and newly identified lithologies in the host rock. A density measurement station was set up on-site and 241 measurements were taken in total. The Archimedes method was used, which measures the ratio of the weight of the sample in air and the weight of the sample in water. A total of 137 measurements were taken in pegmatite intervals, and 104 were taken in host rock lithologies.

In June 2023, ALS undertook pycnometer testwork on a selection of pulps with varying lithium grades to determine if there was a relation between the concentrations of spodumene and density. A total of 128 analyses was undertaken, and the results confirmed that a robust regression formula can be obtained between Li_2O grade and bulk density (Figure 11-1).



Source: SLR, 2023.

Figure 11-1 – Relationship Between Li_2O and Density Measured by Pycnometer – ALS June 2023

11.3 Quality Assurance and Quality Control

Quality control measures are typically set in place to ensure the reliability and trustworthiness of exploration data. This includes written field procedures and independent verifications of drilling, surveying, sampling and assaying, data management, and database integrity. Appropriate documentation of quality control measures and regular analysis of quality control data are important as a safeguard for project data and form the basis for the quality assurance program implemented during exploration.

Analytical control measures typically involve internal and external laboratory control measures implemented to monitor the precision and accuracy of the sampling, preparation, and assaying. They are also important to prevent sample mix-up and monitor the inadvertent contamination of samples. Assaying protocols typically involve regular duplicate and replicate assays and insertion of quality control samples to monitor the reliability of assaying results throughout the sampling and assaying process. Check assaying is typically performed as an additional reliability test of assaying results. This typically involves re-assaying a set number of pulps at a secondary umpire laboratory.

11.3.1 Lithium One QA/QC Program

Lithium One relied partly on the internal analytical quality control measures implemented by COREM laboratory. Additionally, Lithium One implemented external analytical quality control measures consisting of using control samples (field blanks, in-house standards, and field duplicates) inserted with sample batches submitted for analysis in 2009 and 2010, and coarse reject duplicate samples in 2008. Table 11-1 summarizes the analytical control samples inserted by Lithium One.

Table 11-1 – Summary of QA/QC Samples Used in the 2009 and 2010 Drilling and Channel Sampling Campaigns

QA/QC Item	No. Samples	Insertion Rate %	Expected Value
Total Sample count	3,801	-	-
Field blanks (silica sand)	23	0.6%	<0.01 Li_2O (%)
Standard – Low Grade	21	0.6%	0.84 Li_2O (%)*
Standard – High Grade	23	0.6%	1.34 Li_2O (%)*
Field duplicates	91	2.4%	-
Total QC Samples	158	4.2%	-
Check Assays	100	2.6%	ALS
	100	2.6%	SGS Lakefield

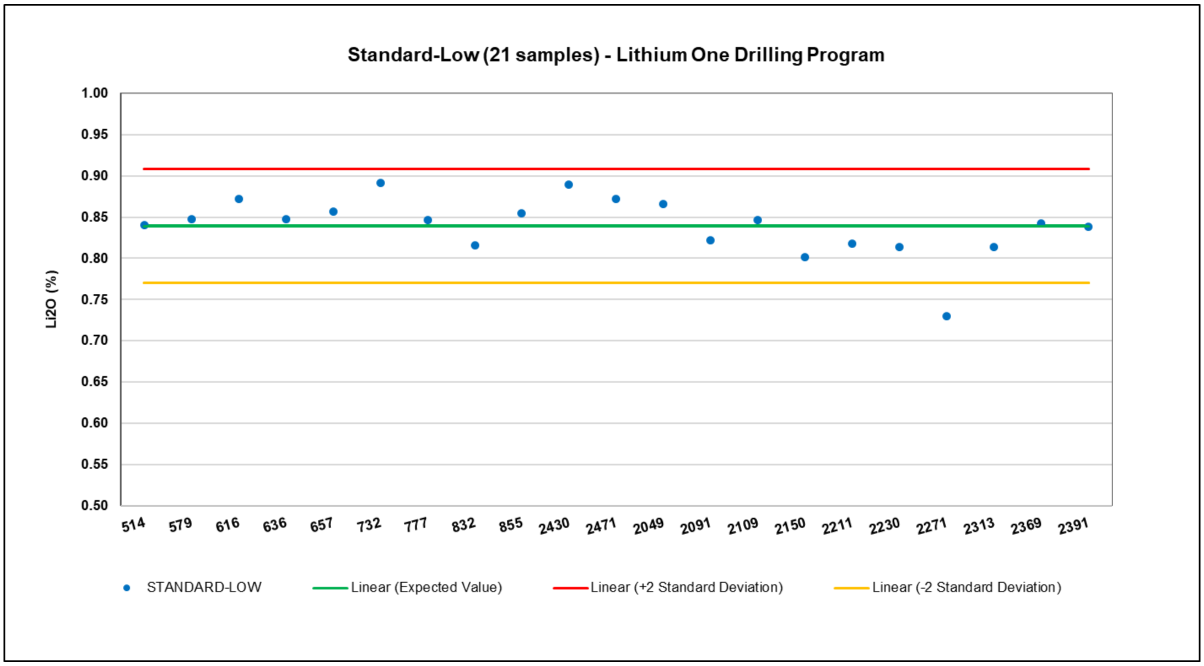
11.3.1.1 Field Blanks

The field blank used by Lithium One consisted of barren filtration sand (pure silica); blanks were generally inserted every 40 samples. All field blanks returned a value below the detection limit of 0.01% Li_2O.

11.3.1.2 Non-Certified Reference Material (Standards)

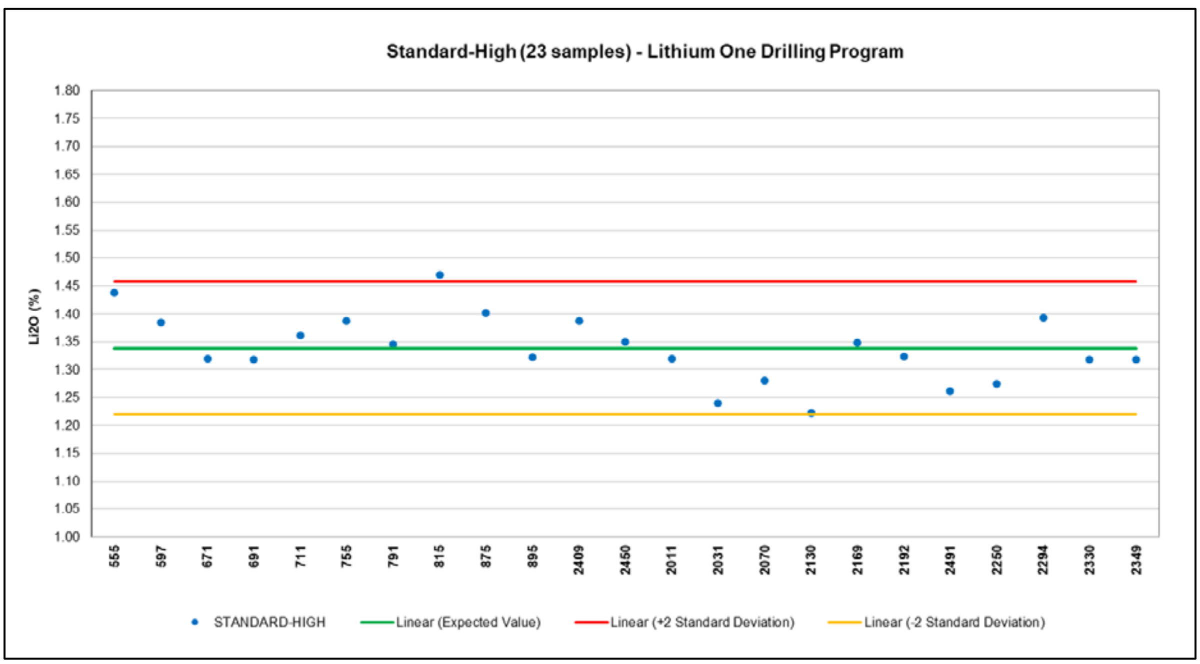
The non-certified standards consist of two in-house standards prepared at the Table Jamésienne de Concertation Minière laboratory at the request of Lithium One. The standards were made from outcropping material from one of the pegmatite dikes. The "Standard High" consisted of material representing the average grade of the pegmatite dikes sampled, while the "Standard Low" was created by adding 40% silica blank to "Standard High" to dilute the lithium grade. Although these control samples were not certified through round-robin assaying, the SLR QPis of the opinion they are appropriate control samples to monitor accuracy and analytical drift through time.

Figure 11-2 and Figure 11-3 show performance charts of standards during the Lithium One drilling campaign. Standards are generally inserted every 40 samples. Given that these standards are not certified, the average and standard deviation (SD) of the populations were used as threshold guides to evaluate the laboratory performances. As shown, a total of two standards (one low and one high) failed to pass the ±2 SD test (4.5%). Only one (Standard Low) failed the ±3 SD test. Investigations of nearby standards, blanks, or field duplicate in the sequence do not show any sign of sample contamination. The grade of the Standard Low is approximately 60% of the grade of the Standard High, which is consistent with the methodology used to produce this material.



Source: GMS, 2022.

Figure 11-2 – Non-Certified Reference Material (Standard Low) – COREM Laboratory

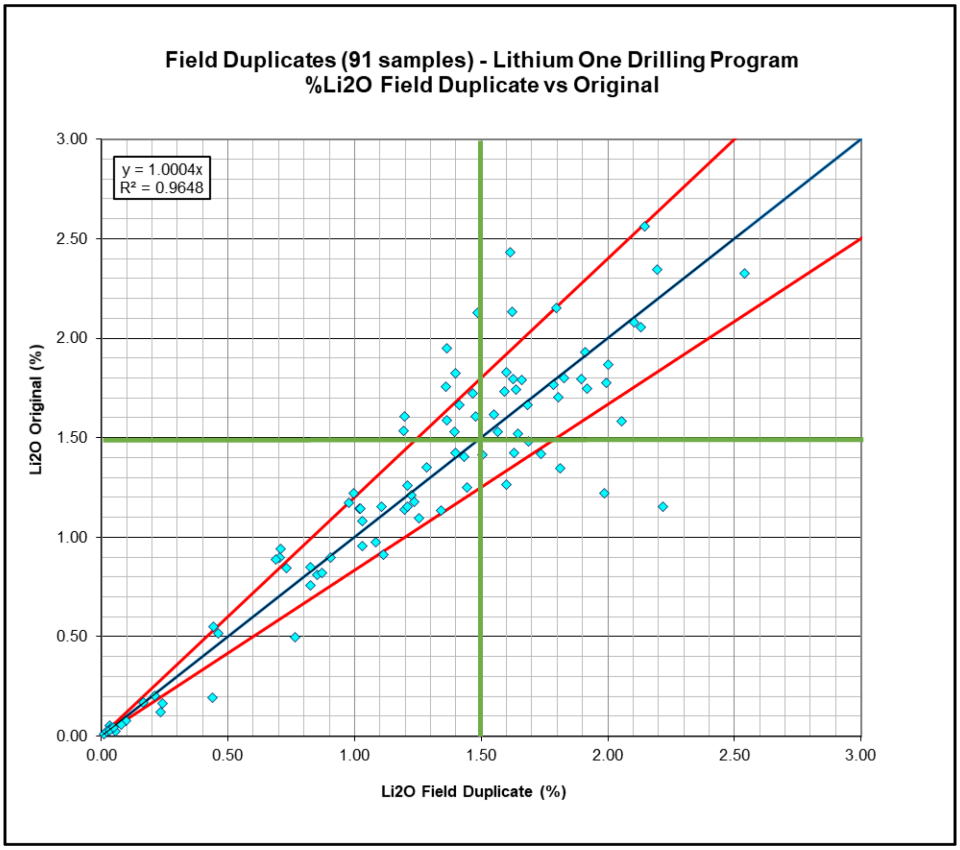


Source: GMS, 2022.

Figure 11-3 – Non-Certified Reference Material (Standard High) – COREM Laboratory

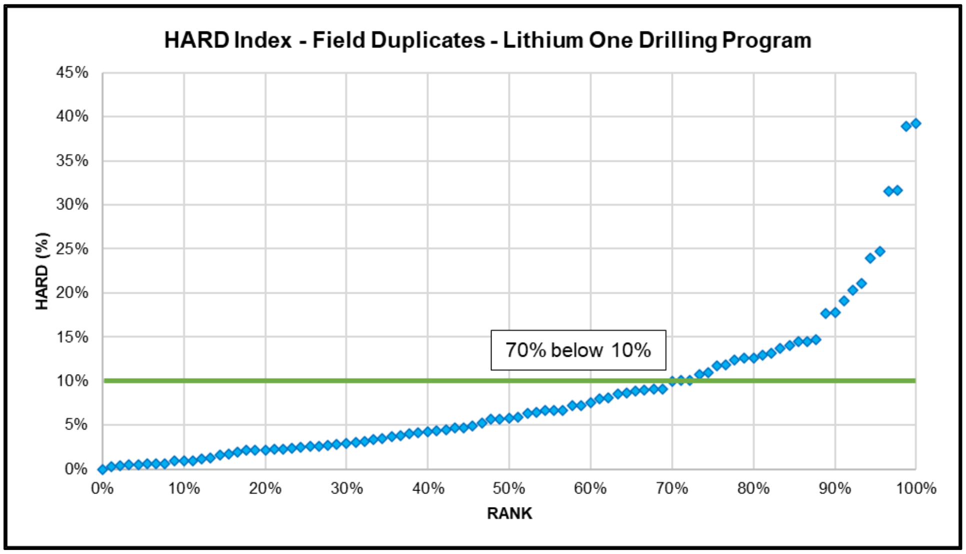
11.3.1.3 Field Duplicates

Field duplicates were generated from quarter core samples and inserted every 40 samples. Results, shown in Figure 11-4, show that while some results are above or below ±20%, there is no positive or negative bias in assay results. This can be witnessed by a trend near y=x (y=1.004x). The spread of data can be explained by the coarse-grained spodumene mineralization in the pegmatites, as observed in outcrop and drill core, resulting in a certain variability between the field duplicate results. To gain further confidence in the reproducibility of data, the Half-Absolute-Relative-Difference (HARD) index plot, shown in Figure 11-5, was prepared and indicates that approximately 70% of data have a half absolute relative difference below 10%.



Source: GMS, 2022.

Figure 11-4 – Field Duplicate (Quarter Core) – COREM Laboratory

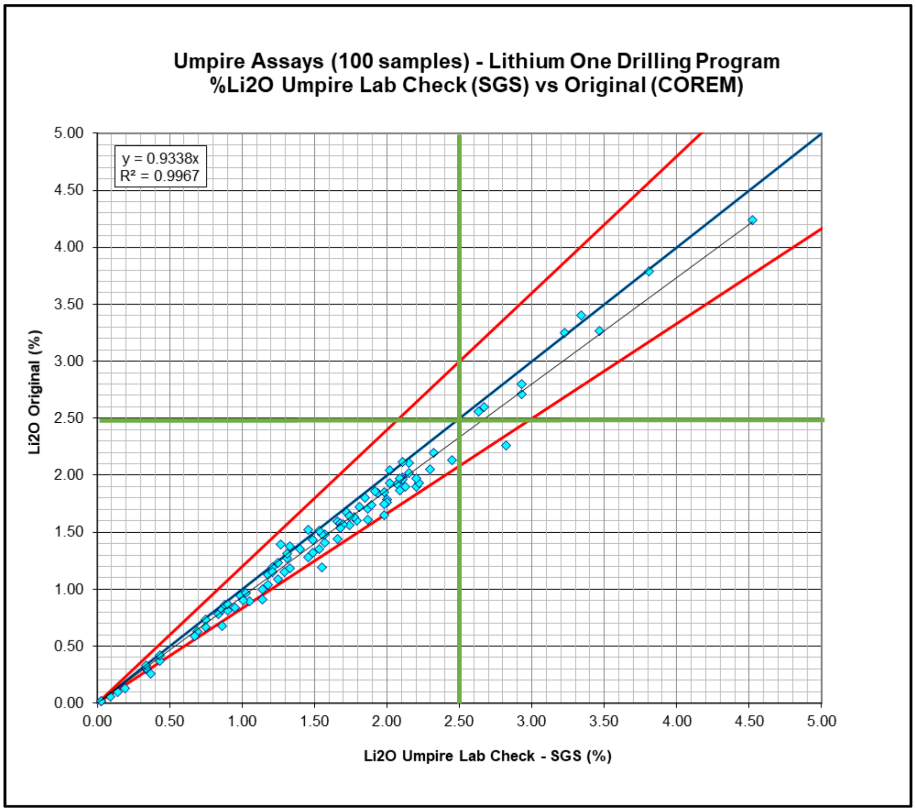


Source: GMS, 2022.

Figure 11-5 – HARD Index Plot of Field Duplicates – COREM Laboratory

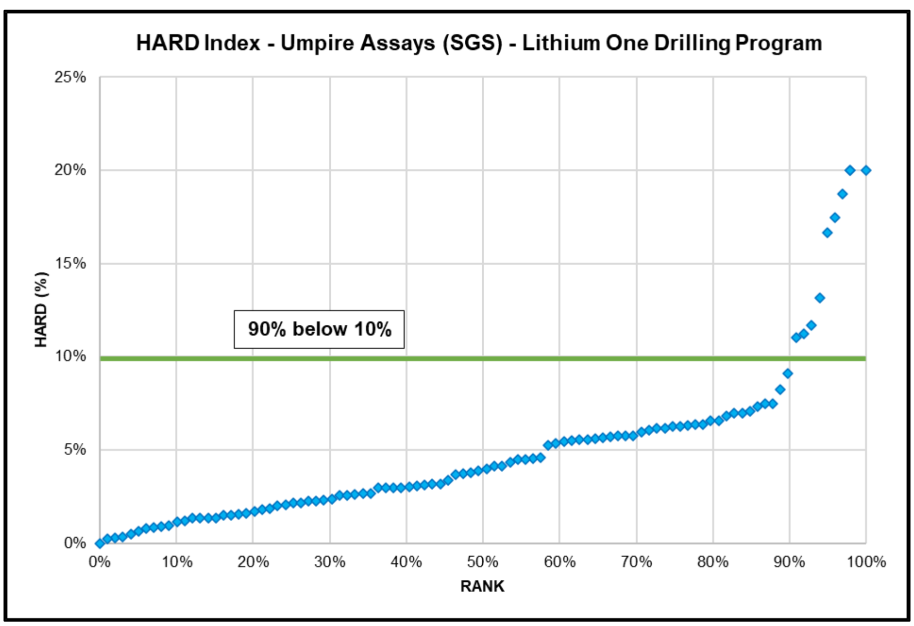
11.3.1.4 Umpire/Intra-laboratory Assays

Umpire pulp duplicates were sent to SGS and ALS to test for any bias between the COREM laboratory and other external laboratories. Compilation of results against original assays show that COREM results are globally 7% lower than SGS and 4% lower than ALS results. Results are shown in Figure 11-6 and Figure 11-8 for SGS and ALS, respectively, where the positive bias of umpire laboratories is observed, but within acceptable ranges. HARD indexes (Figure 11-7 and Figure 11-9) also show that the assays are well replicated by umpire laboratories with 90% of data with a half absolute relative difference below 10%.



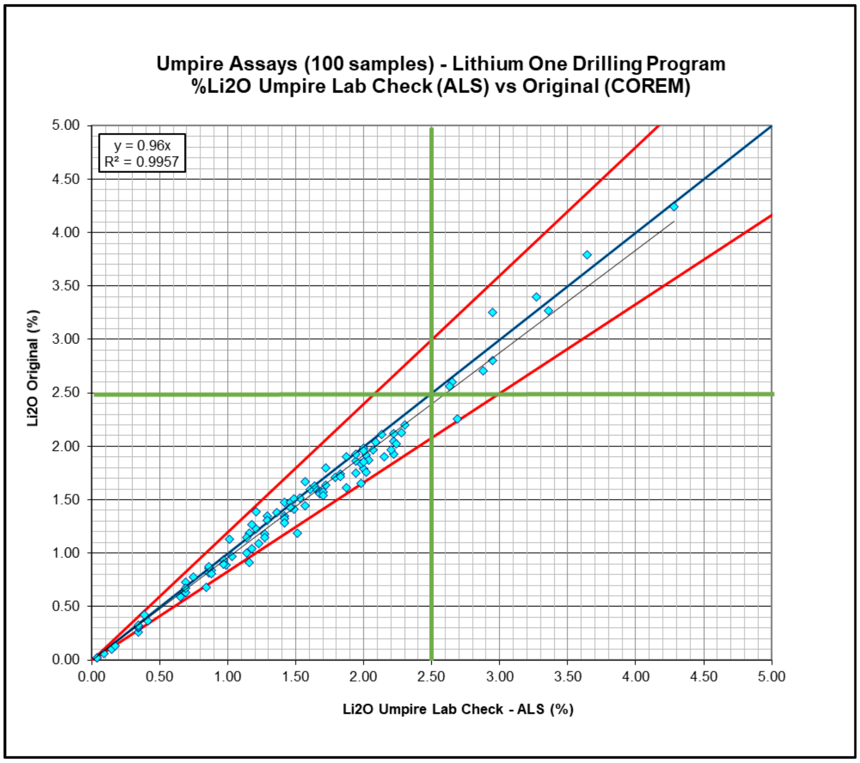
Source: GMS, 2022.

Figure 11-6 – Umpire Assays – SGS Laboratory



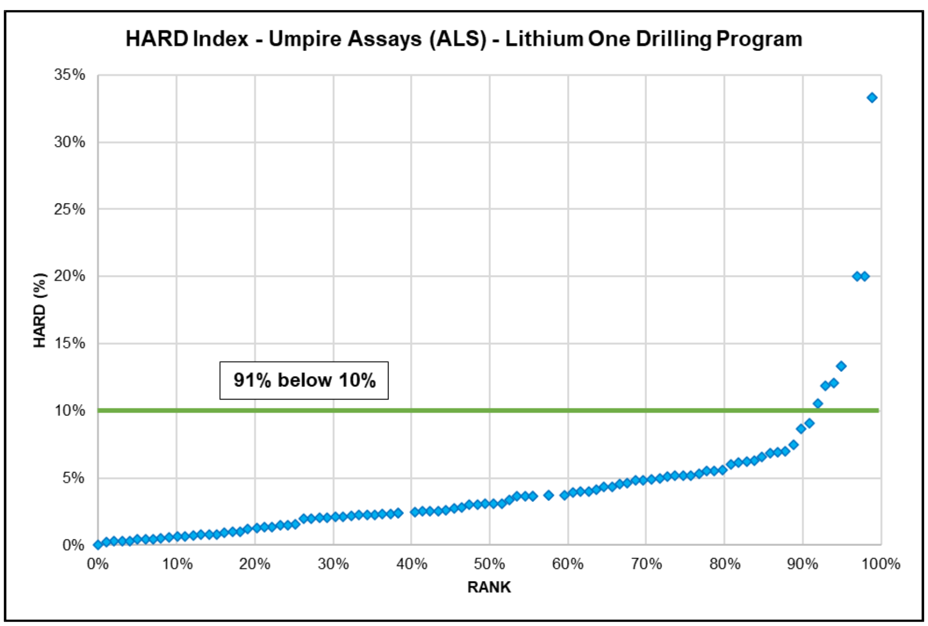
Source: GMS, 2022.

Figure 11-7 – HARD Index Plot of Umpire Assays – SGS Laboratory



Source: GMS, 2022.

Figure 11-8 – Umpire Assays – ALS Val-d'Or Laboratory



Source: GMS, 2022.

Figure 11-9 – HARD Index Plot of Umpire Assays – ALS Val-d'Or Laboratory

11.3.2 Galaxy 2017 and 2018 QA/QC Program

Galaxy relied partly on the internal analytical quality control measures implemented by the ALS laboratory, which involved routine pulp duplicate analyses. GLCI also implemented external analytical quality control measures including the insertion of control samples (blanks, in house standards, and field duplicates) with sample batches submitted for analysis at ALS in 2017.

In 2017, a number of pulp samples were also re-submitted to the SGS laboratory in Lakefield, Ontario, for umpire check assays. In 2020, additional pulp samples were resubmitted to Nagrom Analytical, located in Perth, Australia (Nagrom).

Table 11-2 summarizes the 2017 and 2018 QA/QC program.

Table 11-2 – Summary of QA/QC Samples Used in the 2017 and 2018 Drilling Campaigns

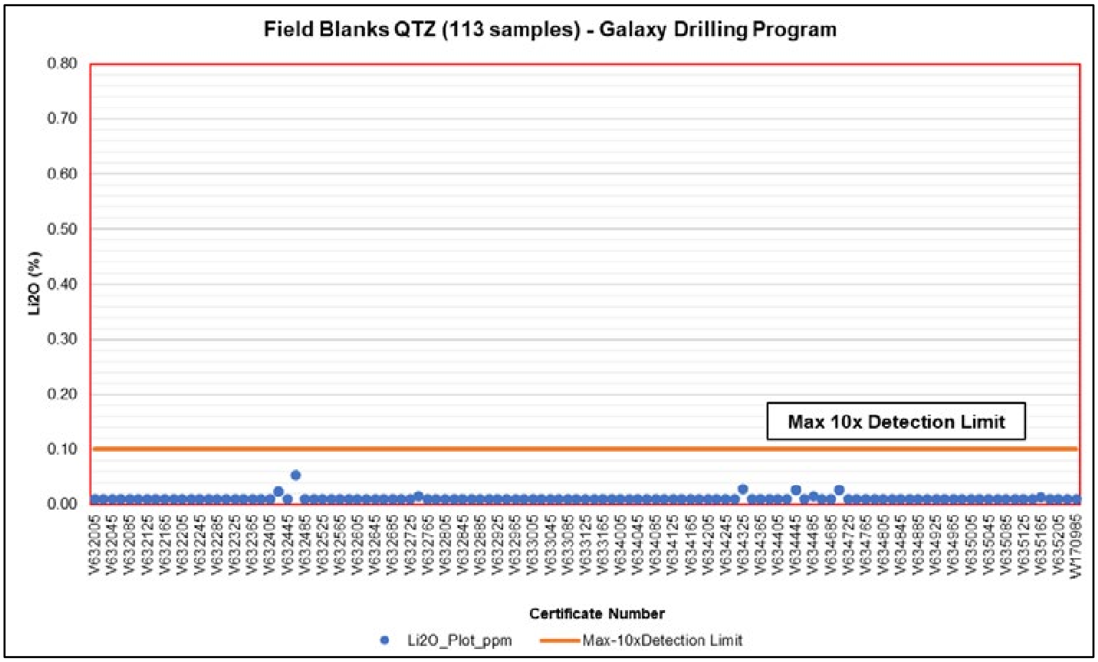
QAQC Item	No. Samples	Insertion Rate %	Expected Value
Total Sample count	9,401	-	-
Field blanks (silica sand)	539	5.7 %	<0.01 Li_2O (%)
Standard – A	33	0.3 %	2.09 Li_2O (%)
Standard – B	35	0.4 %	1.39 Li_2O (%)
Standard – C	24	0.3 %	1.13 Li_2O (%)
Field duplicates	537	5.7 %	-
Total QC Samples	1,168	12.4 %	-
Check Assays	875	9.3 %	SGS Lakefield
	90	1.0 %	Nagrom (2020)

11.3.2.1 Field Blanks

Two different sets of field blanks were inserted in the sampling stream by Galaxy. Blank samples were made of coarse silica or swimming pool filtering sand and were inserted into each sample series at a rate of one in every 20 samples prior to shipment to ALS. As the detection limit was 0.005% Li (0.011% Li_2O), the failure threshold was set at 0.11% Li_2O.

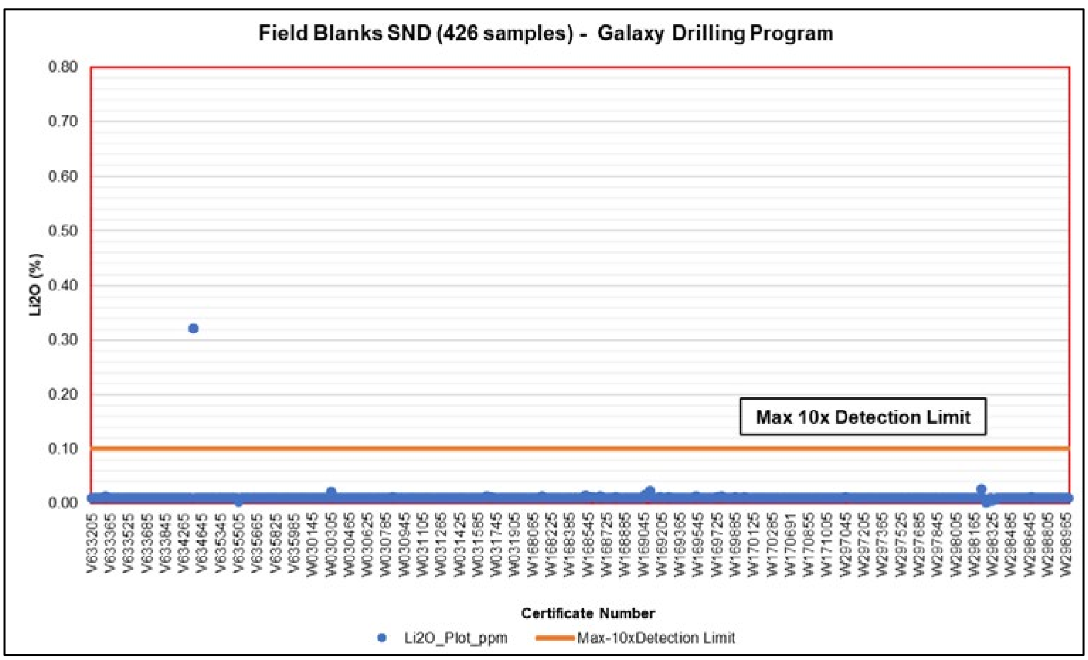
Only one sample out of the two blanks (0.2% of blanks) showed an anomalous value at 0.321% Li_2O. Investigation of quality control assays available for this batch (laboratory internal blanks and standards) shows no evidence of a batch contamination and may be due to contamination of the sand blank or a sample number mistake. It is noteworthy that all ALS internal blanks for this specific batch yield values below detection limit. No batch re-assay was warranted in this case, and the SLR QPconsiders these results to be acceptable.

Figure 11-10 and Figure 11-11 show the results of the blank analyses for the coarse silica and pool sand through time.



Source: GMS, 2022.

Figure 11-10 – Field Blanks (Coarse Silica) – ALS Val-d'Or



Source: GMS, 2022.

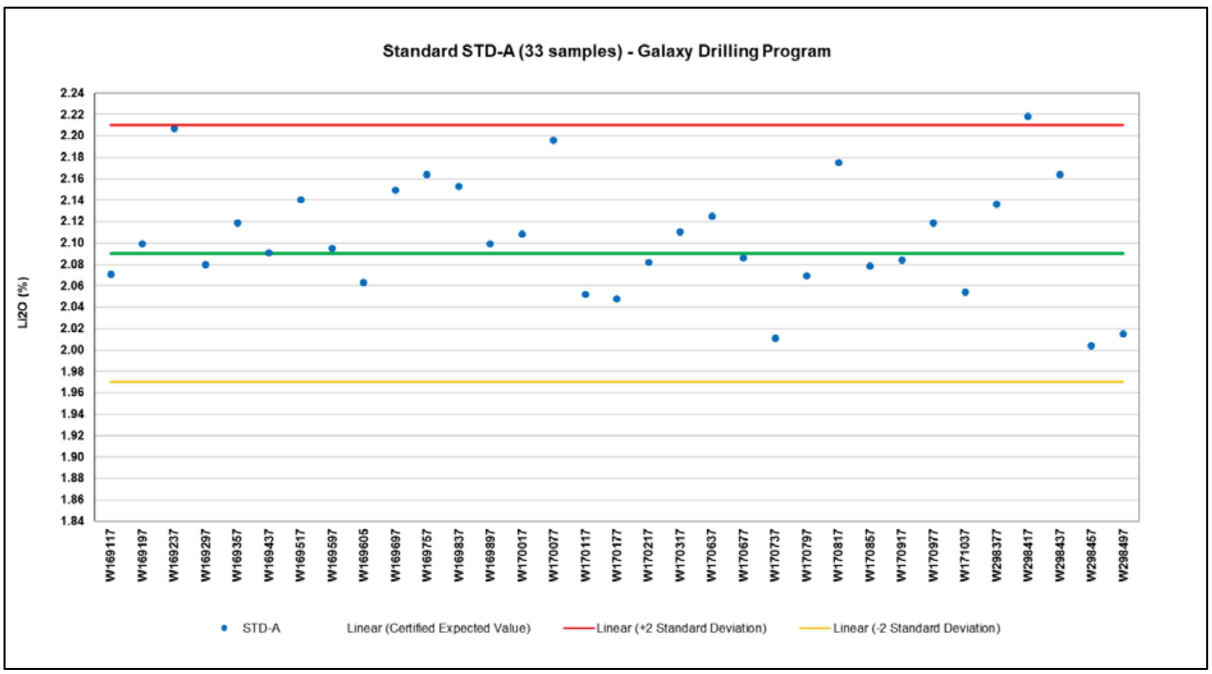
Figure 11-11 – Field Blanks (Pool Sand) – ALS Val-d'Or

11.3.2.2 Non-Certified Reference Material (Standards)

Three different standards were used by Galaxy for their quality control program: one high-grade lithium (2.09% Li_2O), one-medium grade lithium (1.39% Li_2O), and one low-grade lithium standard (1.13% Li_2O). The standards were custom-made using material from the 2012 bulk sample and were prepared and analyzed at ALS Val-d'Or following the same protocol that was used for regular samples. The standards were inserted with samples from the following boreholes: JBL17-122 to JBL17-127, JBL17-136, and JBL17-139 to JBL17-156. A standard was inserted at a rate of one in every 20 samples, alternating between the low-, medium- and high-grade standards. The standard deviation criteria returned from the initial analyses were considered to determine warning and failure intervals of each standard.

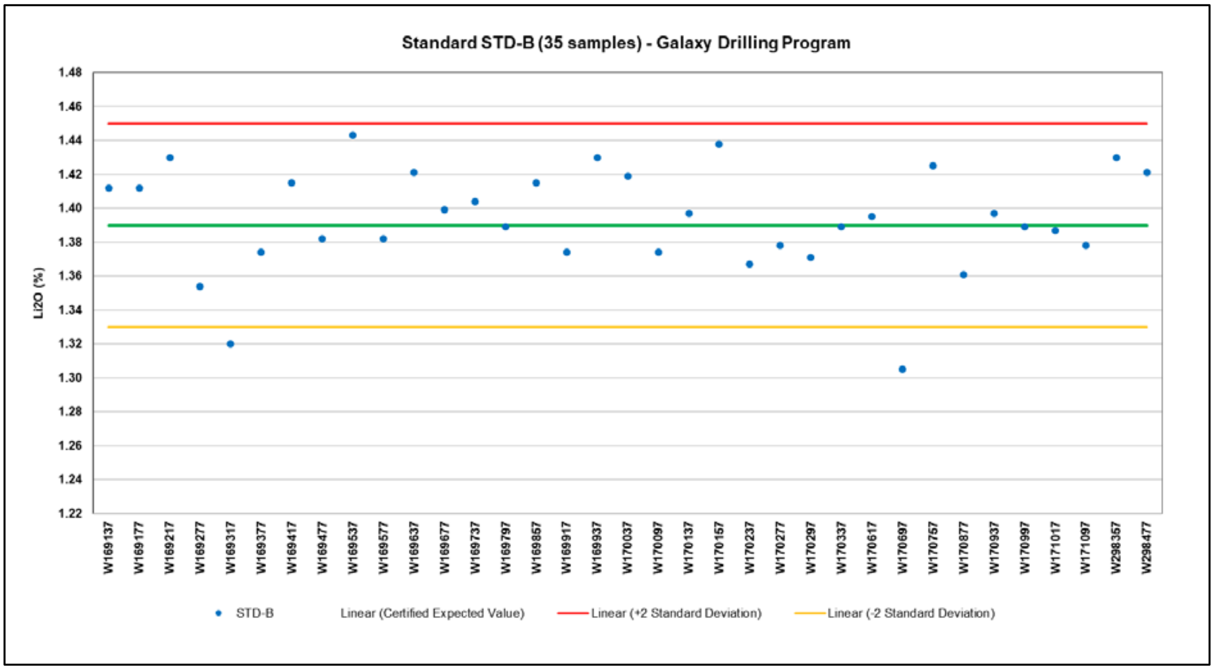
Compilation of the three standards against ±2 standard deviation is displayed in Figure 11-12, Figure 11-13, and Figure 11-14 for standards A, B, and C, respectively. A total of five standards did not pass the ±2 standard deviation and two did not pass the ±3 standard deviation. All reference materials not passing the ±2 standard deviation threshold but passing the ±3 standard deviation show no sign of contamination upon investigation of ALS internal controls (blanks and standards) and other controls put in place by Galaxy.

Two results (sample #W169617 and #W170657) show outliers that could justify a re-analysis of a portion of the batch (batch #SD17181974 and #VO18015092) pertaining to those specific standards. All other controls before or after the failed standards show acceptable values apart from one ALS Val-d'Or internal standard (SRM-181).



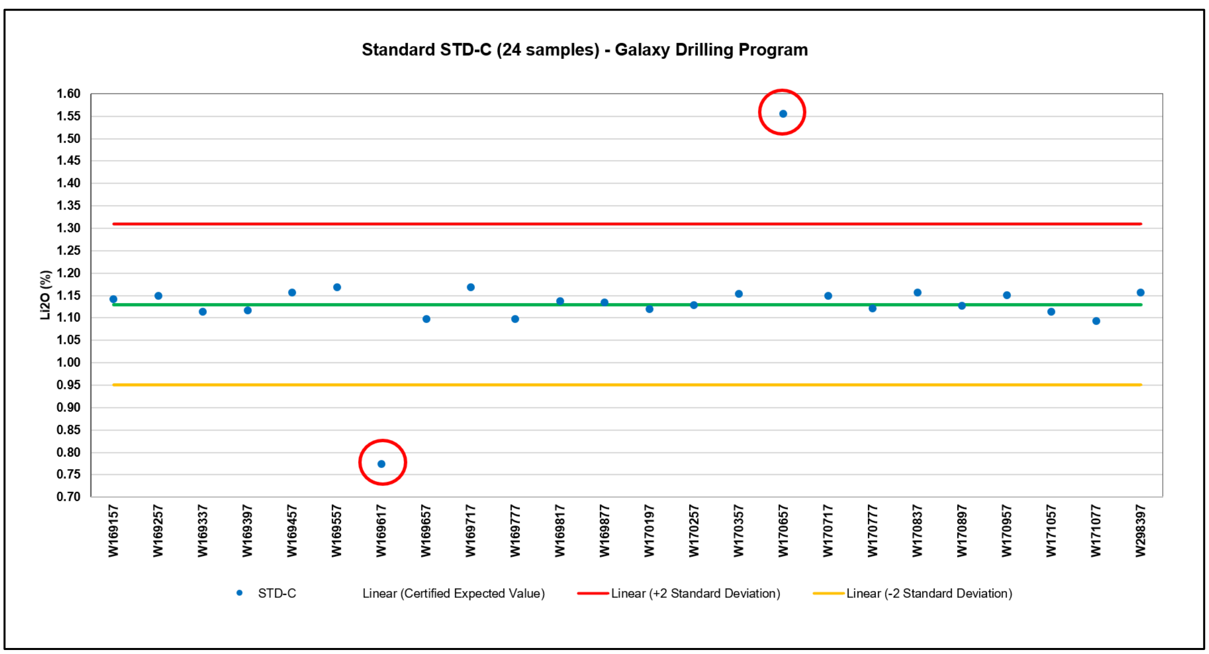
Source: GMS, 2022.

Figure 11-12 – Non-Certified Reference Material (STD-A) – ALS Val-d'Or



Source: GMS, 2022.

Figure 11-13 – Non-Certified Reference Material (STD-B) – ALS Val-d'Or

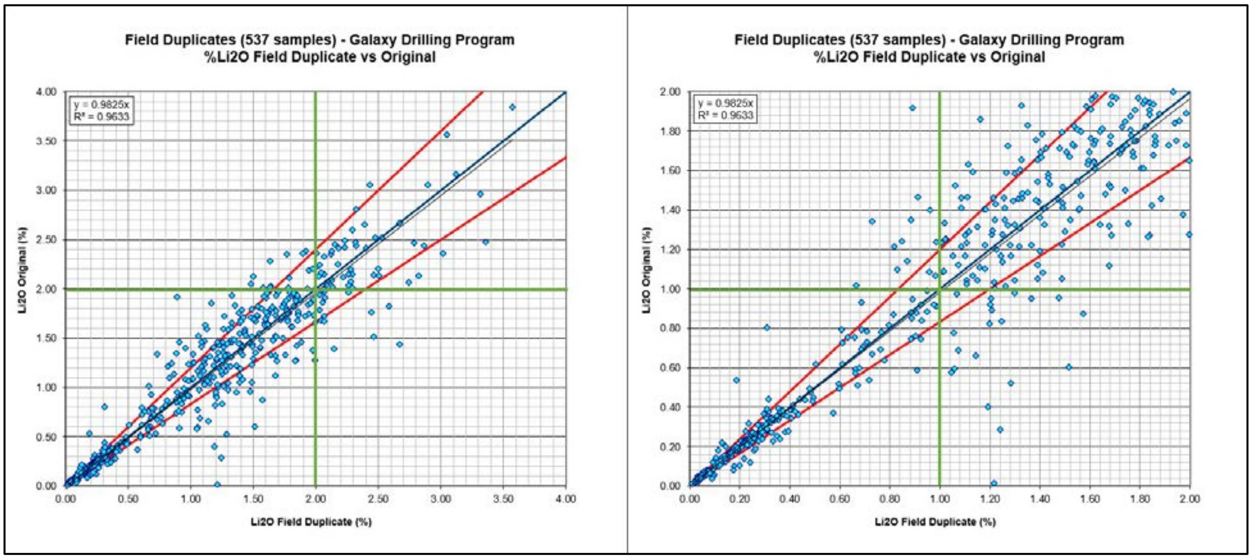


Source: GMS, 2022.

Figure 11-14 – Non-Certified Reference Material (STD-C) – ALS Val-d'Or

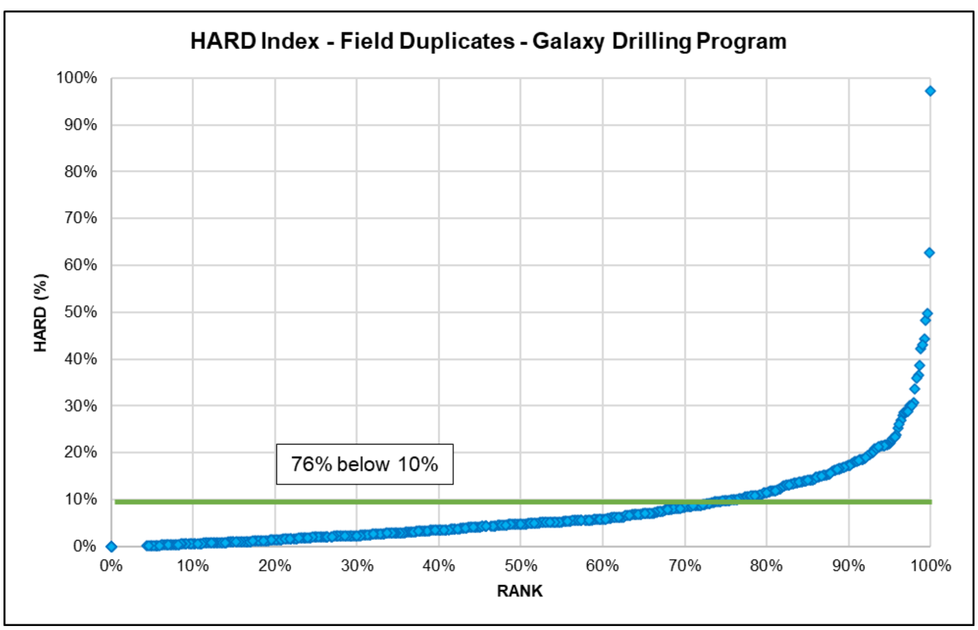
11.3.2.3 Field Duplicates

Quarter-core duplicates samples were inserted into each sample series at a rate of one in every 20 samples. Duplicates corresponded to a quarter core from the sample left behind as reference. As observed in the field duplicates during Lithium One campaign, quarter core duplicates from the Galaxy-era display a moderate variability of data with no clear positive or negative bias (Figure 11-15). HARD index compilation reinforces the reproducibility of assays, where 76% of assay pairs have a half absolute relative difference lower than 10% (Figure 11-16). As stated above, the difference between sample pairs is thought to be attributable to a certain level of nugget effect inherent to the coarse-grained spodumene mineralization in the pegmatites.



Source: GMS, 2022.

Figure 11-15 – Field Duplicate (Quarter Core) – ALS Val-d'Or Laboratory. Left – 0.00% to 4.00% Li_2O range, Right – Same Image Zoomed to 0.00% – 2.00% Li_2O range.



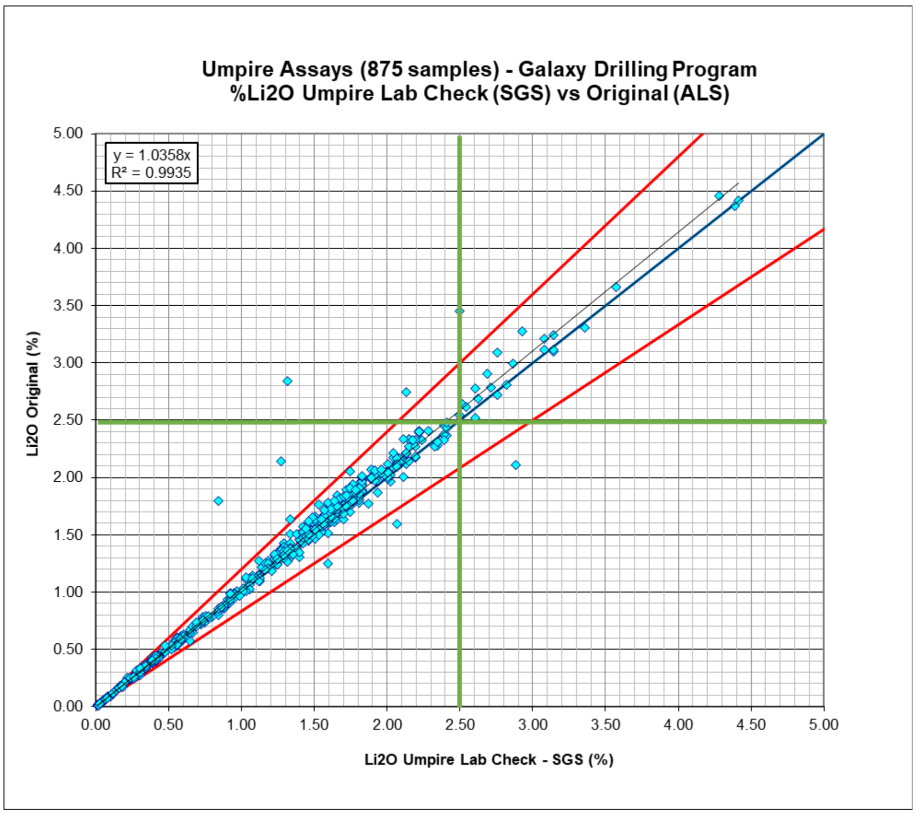
Source: GMS, 2022.

Figure 11-16 – HARD Index Plot of Field Duplicates – ALS Val-d'Or

11.3.2.3.1 Umpire/Intra-laboratory Assays

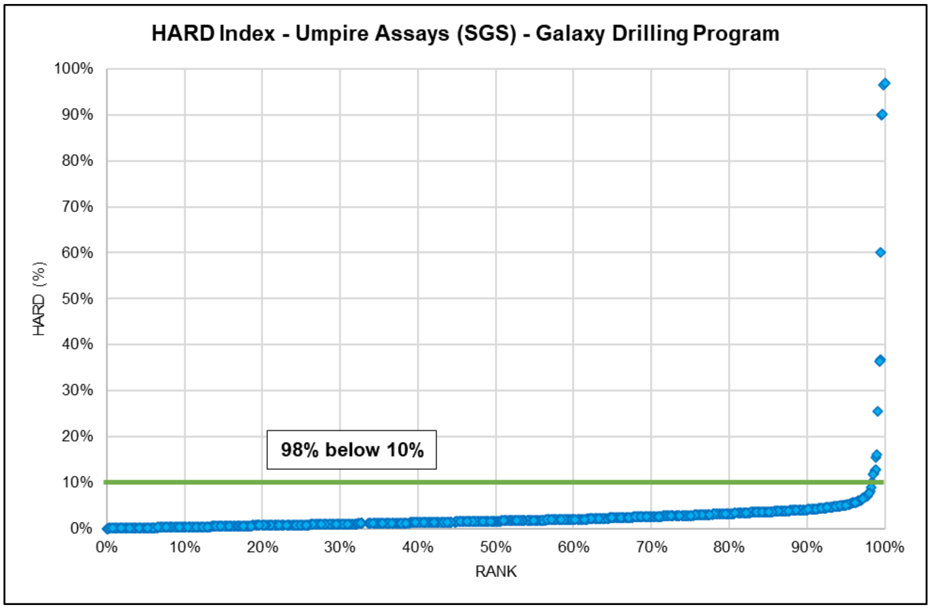
Three sets of umpire check assays (pulps) were sent to two different laboratories: SGS in 2017 and Nagrom in 2020 and 2021.

A total of 875 pulp duplicates were sent to SGS in 2017 for umpire laboratory checks. Compilation of the assays against the original data (Figure 11-17) shows a small negative bias towards SGS laboratory (-4% versus ALS) but generally a good correlation. The HARD index (Figure 11-18) shows that 98% of sample pairs have a half absolute relative difference of less than 10%. The SLR QP is of the opinion that the ALS assay results were well replicated by the SGS laboratory.



Source: GMS, 2022.

Figure 11-17 – Umpire Assays – SGS Laboratory

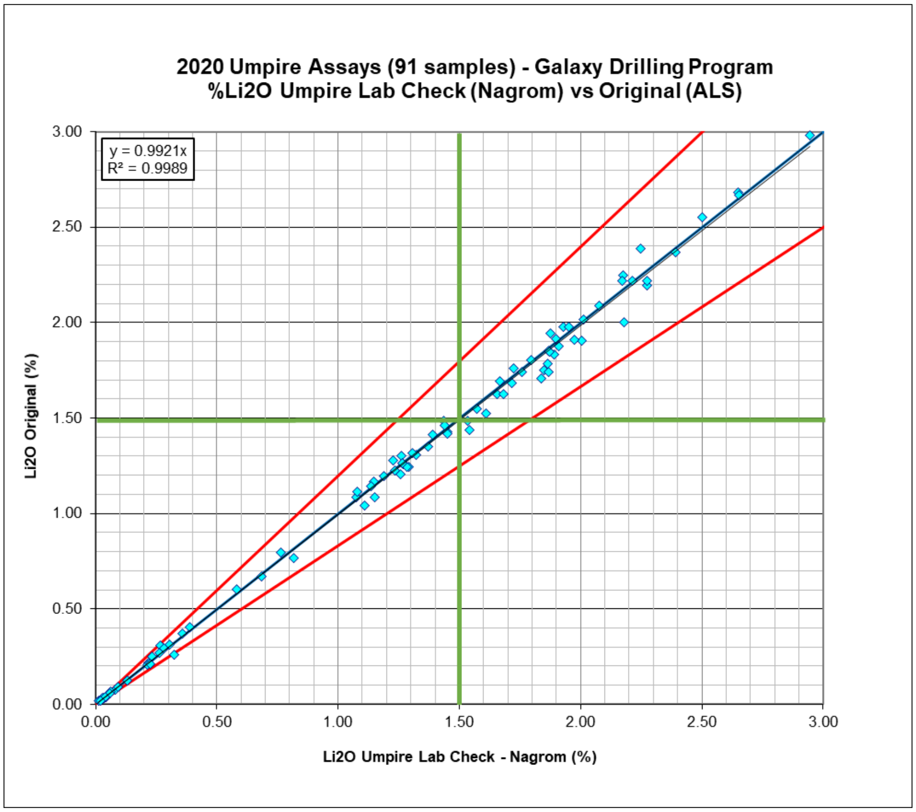


Source: GMS, 2022.

Figure 11-18 – HARD Index Plot of Umpire Assays – SGS Laboratory

In 2020, a first series of pulp samples were sent to Nagrom to evaluate a possible under- reporting of Li_2O content from ALS assays due to the use of the 4-acid digestion method, and to provide an initial indication of tantalum mineralization potential. Reanalysis by the Nagrom laboratory in was judged necessary to assess a different analytical method which has now become the industry standard for rare metal pegmatites (i.e., sodium peroxide fusion with ICP finish for a complete dissolution of lithium and tantalum compounds).

The results show that the analytical method previously used do not materially impact Li_2O content (less than 1%), as shown in Figure 11-19. However, the differences are slightly higher for samples with greater lithium content. This, and the occurrence of local tantalum concentrations, led to the recommendation of pursuing future analysis with the sodium peroxide fusion analytical method (Kneer, 2020).



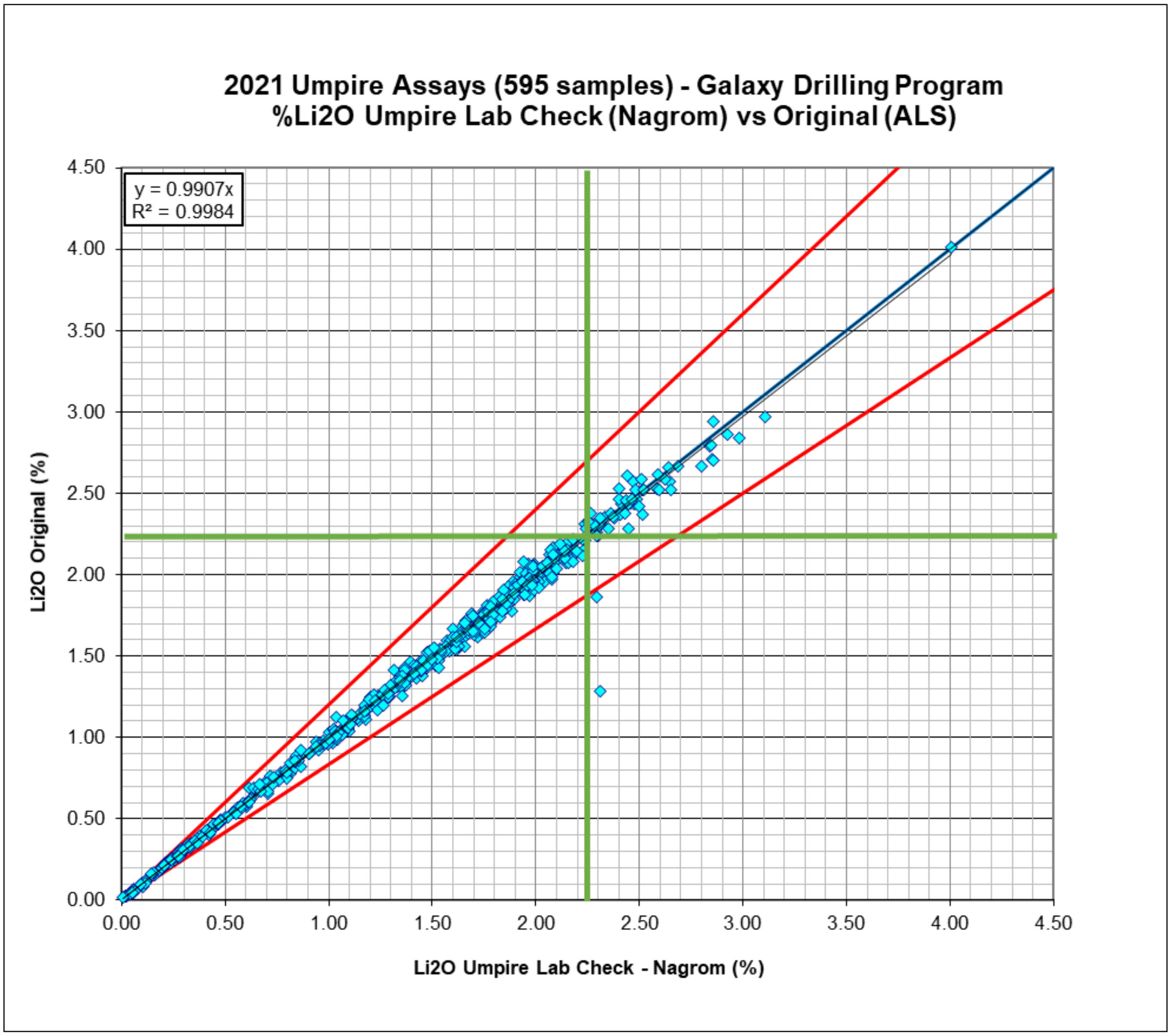
Source: GMS, 2022

Figure 11-19 – Umpire Assays – Nagrom Laboratory (2020)

In 2021, a second series of 595 pulp samples was sent to Nagrom for reanalysis. The goal of this second phase was to further investigate the potential Li_2O bias due to different analytical methods and also to gather information on potentially economic elements (tantalum, cesium, niobium, and rare earth elements (REE)). The results confirm the conclusion of the previous Nagrom re-assay campaign in 2020, that the analytical method does not materially impact the global Li_2O content (less than 1% relative difference), as shown in Figure 11-20. Two outliers are seen but represent 0.3% of the samples assayed.

As noted from the 2020 series, there is a slight bias for samples with higher lithium content. This is only observed when Li_2O concentrations are above 2.6%, in which the relative difference is 2%. This difference is judged by the SLR QP to have no material impact on the Mineral Resource estimate.

Tantalum content returned in the analyses, which are spatially located throughout the deposit, is not judged to be significant. The highest value returned was 0.03% Ta2O5 (343 ppm), with an average of grade of 0.004% Ta2O5 (41 ppm) over 595 samples.



Source: GMS, 2022.

Figure 11-20 – Umpire Assays – Nagrom Laboratory (2021)

11.3.3 GLCI 2022 and 2023 QA/QC Program

In the 2022 and 2023 drilling campaign, GLCI implemented external analytical quality control measures including the insertion of control samples (blanks, certified reference material (CRM) standards, and field duplicates) with sample batches submitted for assaying at ALS. Considering the recommendations of previous studies, a sodium-peroxide fusion with ICP-AES finish analysis route was chosen (previously a 4-acid digest) to ensure full digestion of all refractory minerals.

In addition, 194 pulp samples were also re-submitted to the SGS Mineral Services laboratory in Burnaby, British Columbia, (SGS Burnaby) for umpire check analysis.

Table 11-3 summarizes the results of the 2022 and 2023 QA/QC program.

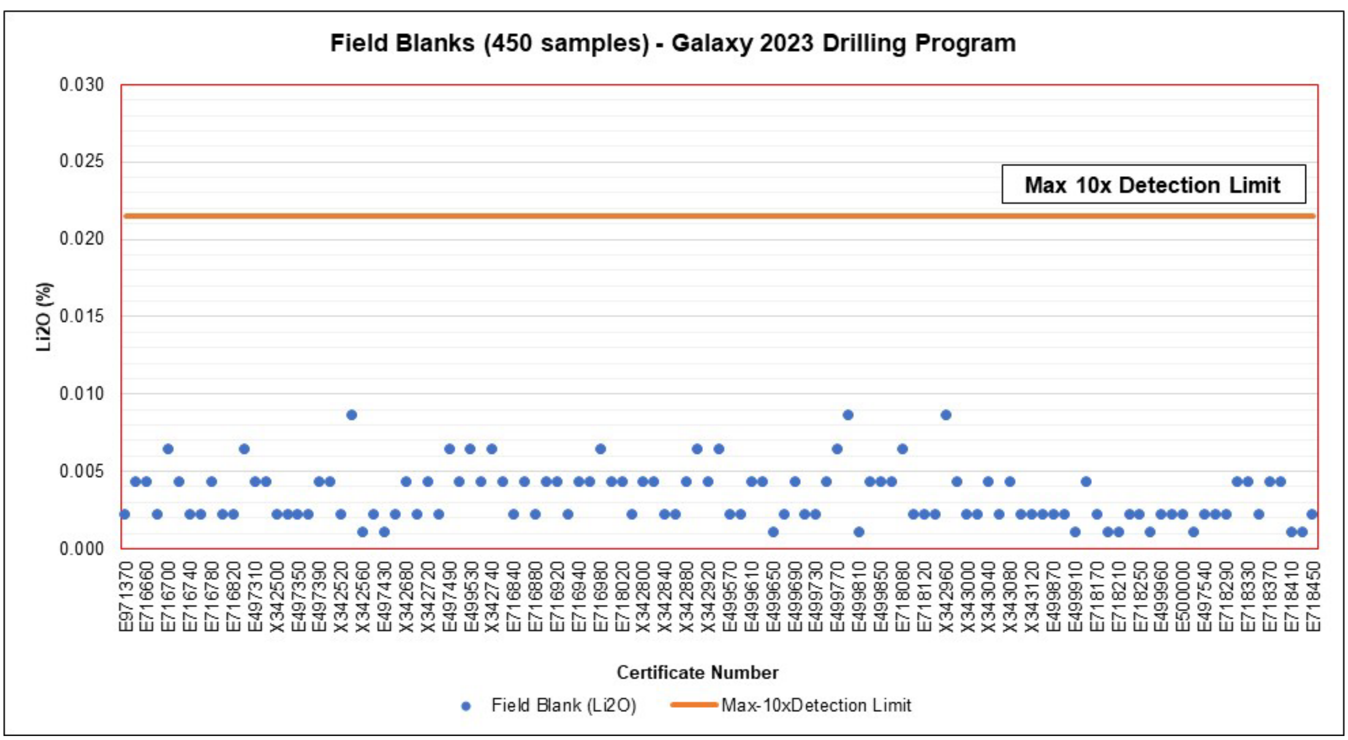
Table 11-3 – Summary of QA/QC Samples Used in the 2022 and 2023 Drilling Campaigns.

QAQC Item	No. Samples	Insertion Rate %	Expected Value (Li_2O %)	Mean Value (Li_2O %)	Warnings (±2 S.D)	Failures (±3 S.D)
Total Samples	10,095	-	-	-	-	-
Blanks	560	5.5 %	-	0.003	0	0
OREAS147	51	0.5 %	0.488	0.480	0	0
OREAS148	64	0.6 %	1.030	1.002	9	0
OREAS750	129	1.3 %	0.496	0.495	0	0
OREAS752	182	1.8 %	1.520	1.497	2	0
OREAS753	124	1.2 %	2.190	2.154	6	0
Total QC Samples	1,110	11.0 %	-	-	17	0
Check Assays	194	1.9%	-	-	0	0

11.3.3.1 Field Blanks

Coarse silica blanks were inserted in the sampling stream by GLCI during the 2022 and 2023 drilling programs at a rate of one in every 20 samples prior to shipment to ALS. As the detection limit of the analysis method was 0.001% Li (0.0022% Li_2O), the failure threshold was set at 0.022% Li_2O, considerably lower than the thresholds of previous years.

No failures were detected, and the average lithium grade of the blanks returned 0.003 Li_2O.



Source: GLCI, 2023.

Figure 11-21 – Field Blanks (Coarse Silica) for 2023 Drilling Campaign – ALS Val-d'Or

11.3.3.2 Certified Reference Material – Standards

CRM standards were obtained from OREAS Australia, sourced from the Greenbushes Lithium mine in Western Australia and the Finniss Lithium Project in the Northern Territory of Australia. The standards have a similar matrix to the Project, with spodumene being the main Li-bearing mineral with accessory muscovite, quartz, albite, and K-Feldspar.

Standard deviations and confidence limits were provided for the sodium-peroxide + ICP-AES analysis method in the original CRM certificates, which are calculated using round-robin results from 24 laboratories.

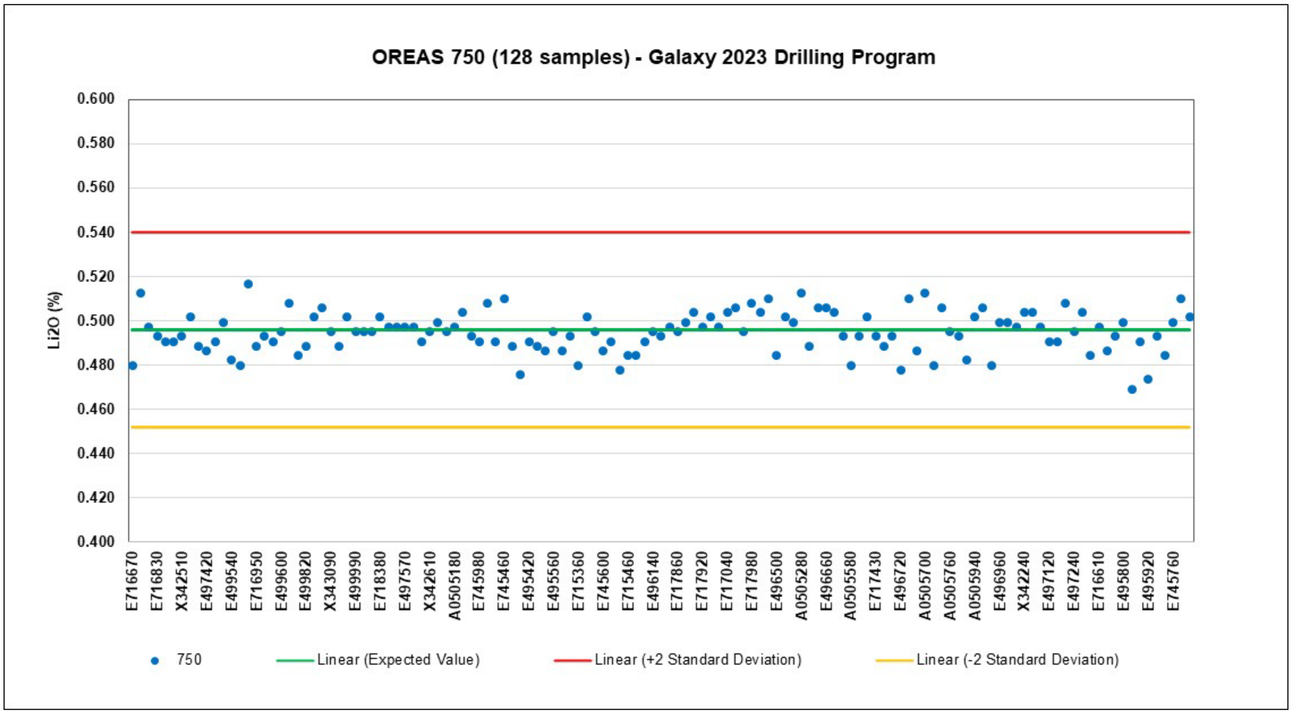
A summary of the standards used in the 2022 and 2023 drilling campaigns and their expected values and standard deviations are shown in Table 11-4.

Overall, the standards performed well with some minor warnings observed. It should be noted that OREAS148 returned results consistently lower than the expected value, by roughly 3%. Other standards returned marginally lower results than the expected values, in the order of 1% to 2%. No failures were observed.

Table 11-4 – Certified Reference Material (Standards) Statistics

Standard	Expected Value (Li_2O %)	Standard Deviation (SD)	95% Lower Confidence Limit	95% Upper Confidence Limit
OREAS147	0.488	0.023	0.477	0.500
OREAS148	1.030	0.023	1.020	1.040
OREAS750	0.496	0.022	0.485	0.506
OREAS752	1.520	0.045	1.500	1.540
OREAS753	2.190	0.050	2.170	2.210

An example of a time-series graph for the lower-grade standard (OREAS750) is shown in Figure 11-22.

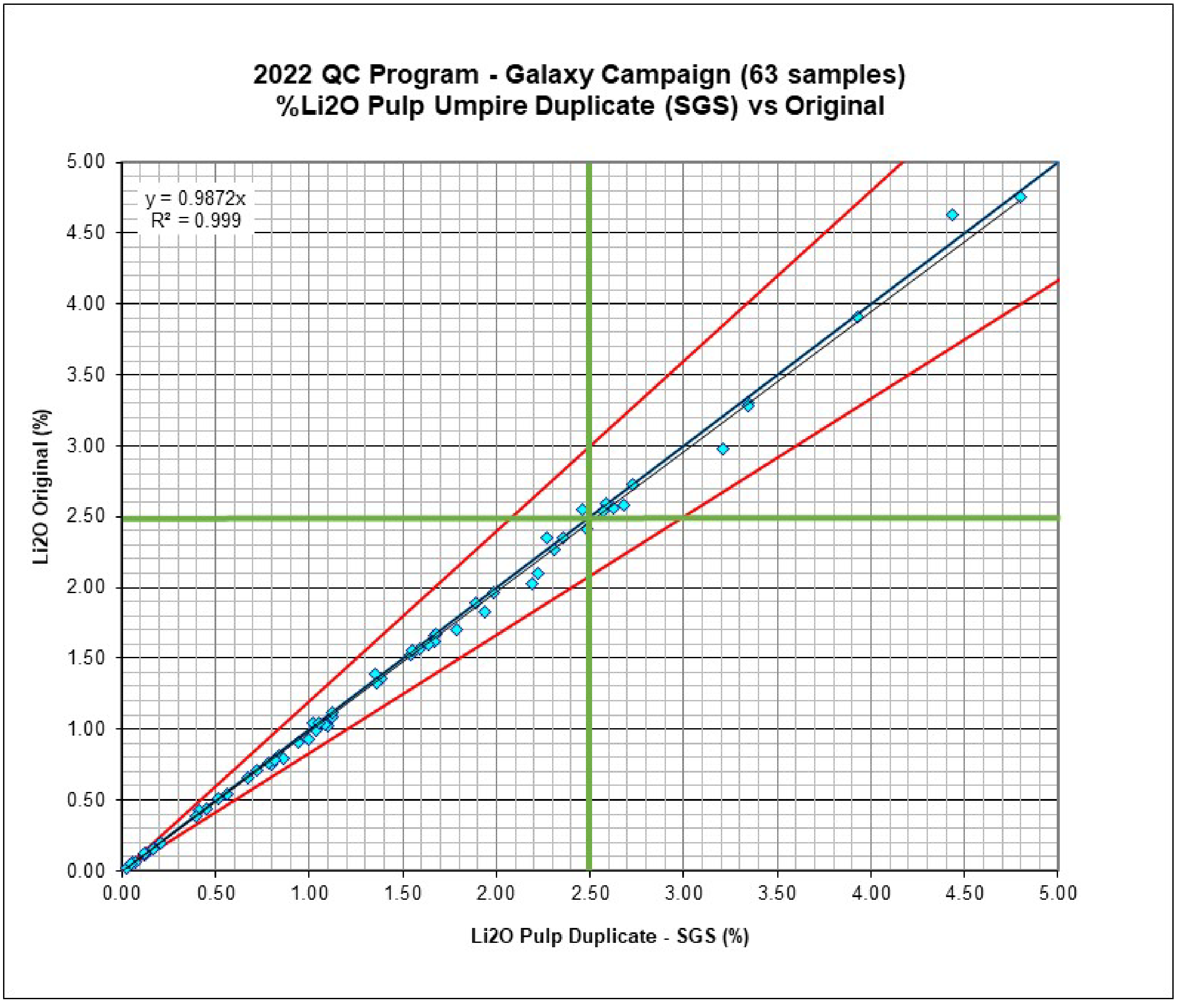


Source: GLCI, 2023.

Figure 11-22 – OREAS750 (0.488% Li_2O) Standard - 2023 Drilling Campaign

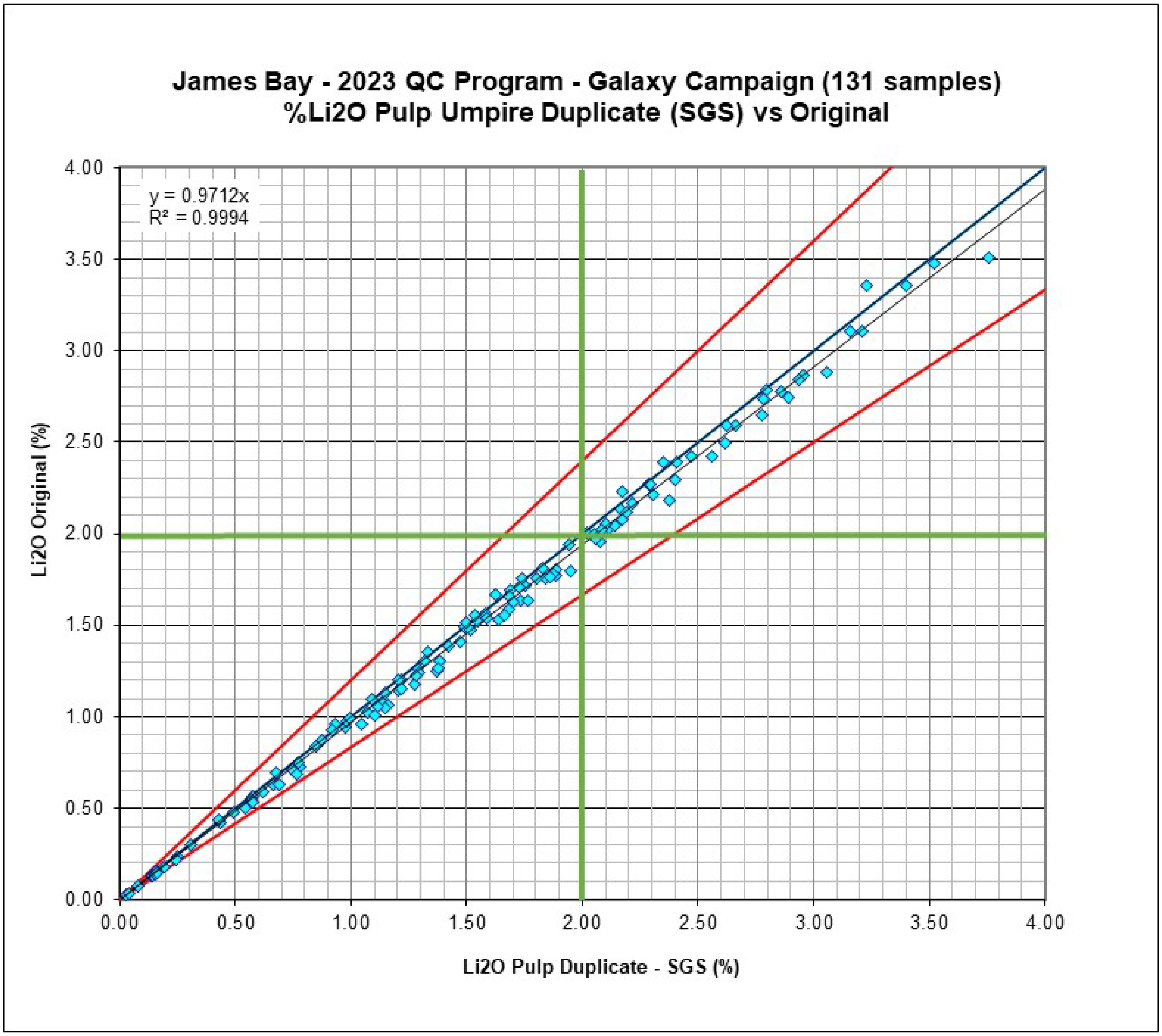
11.3.3.3 Umpire/Intra-laboratory Assays

Umpire pulp duplicates were sent to SGS Burnaby to test for any intra-laboratory bias and to further validate the assay returned by ALS Val-d'Or. The umpire assays show excellent reproducibility of the original ALS analyses. An example of results from the 2022 and 2023 drilling campaign are shown in Figure 11-23 and Figure 11-24, respectively.



Source: GLCI, 2023.

Figure 11-23 – Umpire Assays – SGS Burnaby (2022)



Source: GLCI, 2023.

Figure 11-24 – Umpire Assays – SGS Burnaby (2023)

11.4 Sample Security

Coarse reject and pulp samples are currently stored on-site in a secured facility, a dome structure located behind the km 381 truck stop on the Billy Diamond highway. Coarse rejects are stored on pallets and organised by laboratory batch. They are sealed within rice bags with security tags. The storage facility is managed by GLCI and provides all-season protection. In 2021, an inventory of all coarse rejects and pulps was completed to facilitate future resampling and metallurgical programs. The storage facility is shown in Figure 11-25.

Source: GLCI, 2023

Figure 11-25 – Pulp and Reject Storage Facility

In the SLR QP's opinion, the sample preparation, analysis, QA/QC programs, and security procedures at the James Bay Lithium Project are very good and the diamond drill and channel sampling assay results are reasonable and acceptable for use in a Mineral Resource estimate.

12. DATA VERIFICATION

Extensive data verification work has been carried out by previous owners and by Qualified Persons with SRK Consulting Inc. (SRK) related to the 2021 Preliminary Economic Assessment (GMS, 2021) and more recently by GMS related to the 2022 Feasibility Study (GMS, 2022). Past data verification work included site visits, re-surveying of collar coordinates by Corriveau, database checks against original assay certificates, external check assays at accredited laboratories, comparing results from different analytical methods, inspecting drill core and the channel sample locations.

Spodumene is easy to identify in the drill core and outcrops and the blast pits provide excellent exposures of the spodumene crystals in three dimensions.

12.1 SLR Site Visit

The SLR QP visited the property on June 6 and 7, 2023, accompanied by James Purchase, GLCI's Geology Manager. Spodumene is easy to identify in the drill core and outcrops and the blast pits provide excellent exposures of the spodumene crystals in three dimensions. The SLR QP reviewed the spodumene mineralization in drill holes JBL-17-26, JBL-17-115, JBL-17-128, JBL-23-002, JBL-23-43, and JBL-23-85. SLR found that the lithium oxide (or lithia) grades in the drill logs correlate very well with spodumene abundance. Spodumene has a theoretical Li_2O content of 8.03% and most of the drill core grades in the pegmatite mineralization viewed ranged from approximately 1% to 2% Li_2O, which is consistent with visual spodumene abundance estimates of up to approximately 25%. An example of a high grade spodumene interval in box 57 of drill hole JBL-23-85 is provided in Figure 12-1.

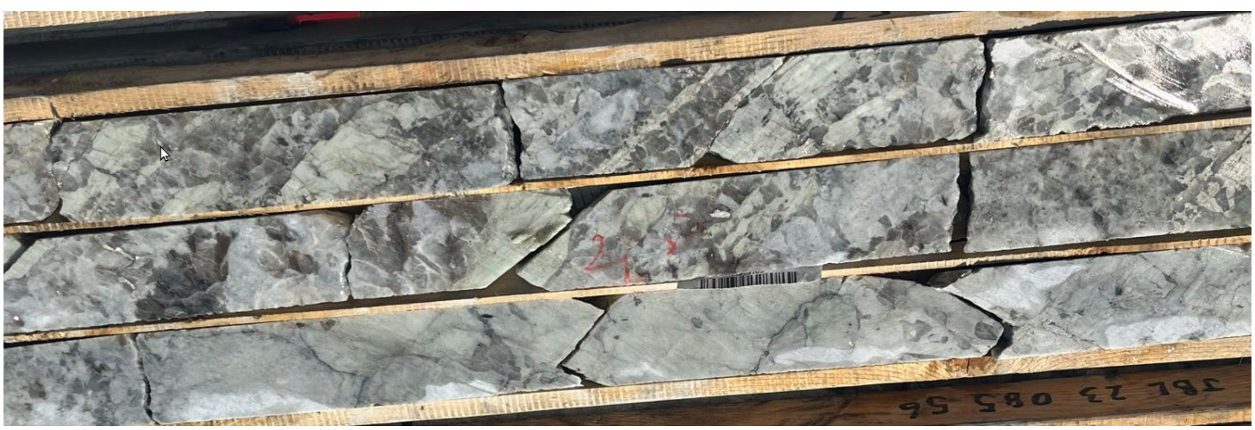


Figure 12-1 – Abundant Light Green, Coarse-Grained Spodumene in JBL-23-85

SLR inspected the channel sample locations and found that the double-bladed diamond saw did an excellent job at creating straight, continuous, and deep channels (Figure 12-2). The SLR QP is of the opinion that the channel samples are acceptable for inclusion in the resource estimate and encourages GLCI to take more samples, especially in areas scheduled to be mined in the first year or two.

Figure 12-2 – Channel Sample Across Pegmatite Outcrop

The SLR QP visited the core, pulp, and reject storage and core logging and sampling facility (Figure 12-3) that is conveniently located next to the km 318 truck stop.

Figure 12-3 – Covered Core Racks and Storage Dome

12.2 SLR Drill Hole Database Validation

Data verification of the drill hole database included manual verification against original digital sources, a series of digital queries, and a review of the QA/QC procedures and results.

SLR's review of the resource database included collar, survey, lithology, mineralization, and assay tables. Database verification was performed using tools provided within Leapfrog Geo Version 2023.1.0 software package (Leapfrog). A visual check on the drill hole Leapfrog collar elevations and drill hole traces was completed. No major discrepancies were identified.

SLR compared 23,510 assay records for lithium, given in ppm units in the resource database, against 12,953 samples from original digital laboratory analysis certificates. The analysis involved laboratories COREM Research and ALS during the drilling campaigns conducted by Lithium One and GLCI (previously Galaxy) between 2008 and 2023. The comparison revealed no significant errors. In addition, the SLR QP carried out the following:

- Completed validity checks for out-of-range values, overlapping intervals, gaps, and mismatched sample intervals. During the analysis, one drill hole was identified with one overlapping interval, and two drill holes were found to have no logging information.
- Verified the specific gravity values against the original certificate from ALS or on site measurement files and no mismatches were identified during the comparison.
- Carried out spot checks on 269 drill holes, including 127 original certificates of COREM and 120 of ALS and only two samples out of 12,953 samples compared were identified with switched grades of Lithium in ppm.
- Reviewed the conversion factor applied to the Li_ppm concentrations to ensure their consistency with the final value of Li_2O%. No errors were detected during this process.

The SLR QP is of the opinion that database verification procedures for the James Bay Lithium Project comply with industry standards and the diamond drill hole and channel sample assay results are of high quality and acceptable for the purposes of Mineral Resource estimation.

13. MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

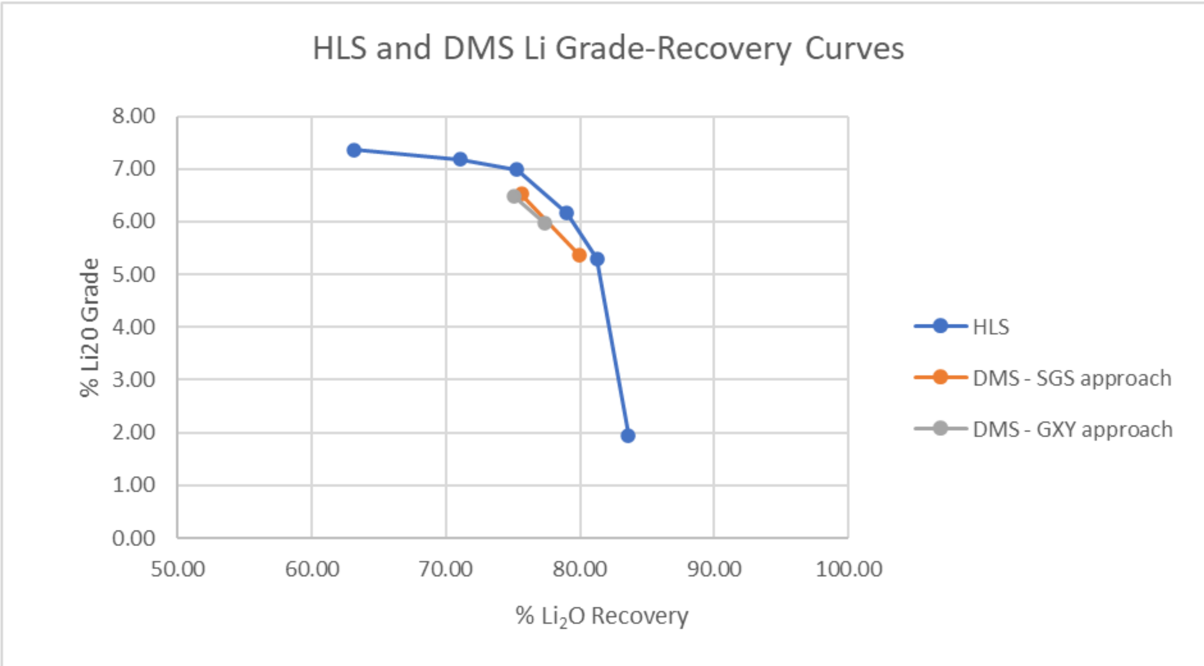
Independent laboratories SGS Canada Inc. (SGS) and Nagrom were contracted separately by Galaxy in 2011 and 2018, respectively, to undertake metallurgical testwork to support the design of the concentrator plant for the James Bay Project.

13.2 Executive Summary

The following report summarizes the metallurgical testwork performed on the James Bay Project samples between 2011 and 2019 and comprises the following:

- SGS preliminary testwork on a single sample.
- Nagrom Phase 1 testwork on several composites.
- Nagrom Phase 2 testwork on composites within the defined Early Years (EY), Mid Years (MY) and Later Years (LY) in the original mine plan.

In general, the metallurgical samples are representative of the spodumene mineralization. Additional variability testwork is planned to further investigate metallurgical performance. Results from the SGS Heavy Liquid Separation (HLS) and both Dense Medium Separation (DMS) tests (presented in Figure 13-1) were comparable, the DMS tests resulting in a sinks yield of 18.9% at 75.7% recovery of Li_2O and a grade of 6.53% Li_2O on a P_{100} 6 mm crushed sample, slightly lower than was predicted by the HLS tests, as expected. Overall results are presented in Figure 13-1.



Source: SGS, 2013.

Figure 13-1 – SGS Grade-Recovery Relationship of HLS and DMS

Nagrom Phase 1 metallurgical performance for the DMS tests (presented in Figure 13-2) were markedly lower than that achieved for the HLS tests. Further metallurgical testwork (Phase 2) was carried out including a 4 mm re-crush stage.

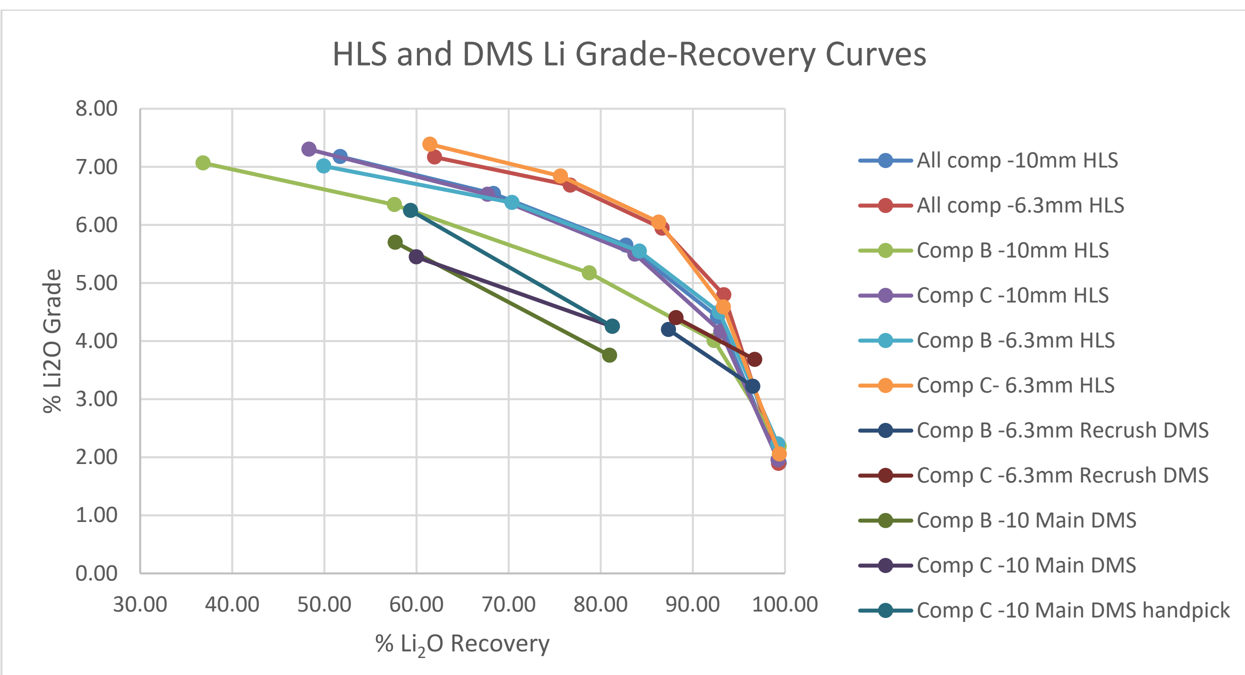


Figure 13-2 – Nagrom Phase 1 – Grade-Recovery Relationship of HLS v DMS

The combined (coarse and fine) Phase 2 DMS results (presented in Figure 13-3 and Figure 13-4) were marginally lower than the HLS results but consistent with the HLS-DMS off-set expected and experienced during the SGS HLS-DMS testwork program.

The overall (coarse and fine) DMS Li_2O recovery for the EY was 13.7% higher than that for the MY/LY due to a lower recovery in the MY/LY secondary coarse DMS “circuit”. This is attributed to a higher percentage of middlings/locked spodumene in the near-density material for the MY/LY samples.

The re-crushing of the secondary coarse DMS floats stream increased the EY overall Li_2O recovery from 69.5% to 85.7% at an overall combined final concentrate grade of 6.2% Li_2O. Comparative data for MY/LY showed an increase in overall recovery from 55.8% to 82.0% at a final concentrate grade of 6.0% Li_2O.

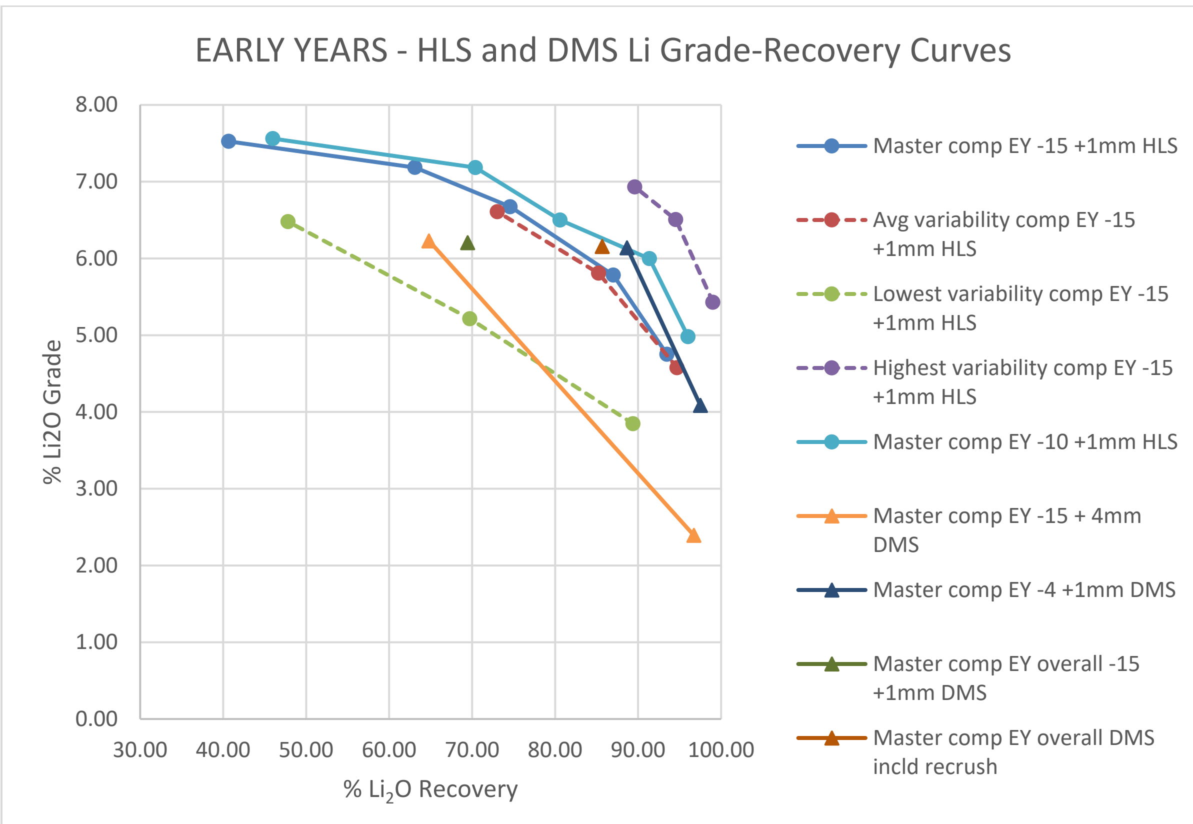


Figure 13-3 – Nagrom Phase 2 – Grade-Recovery Relationship of HLS v DMS, Early Years

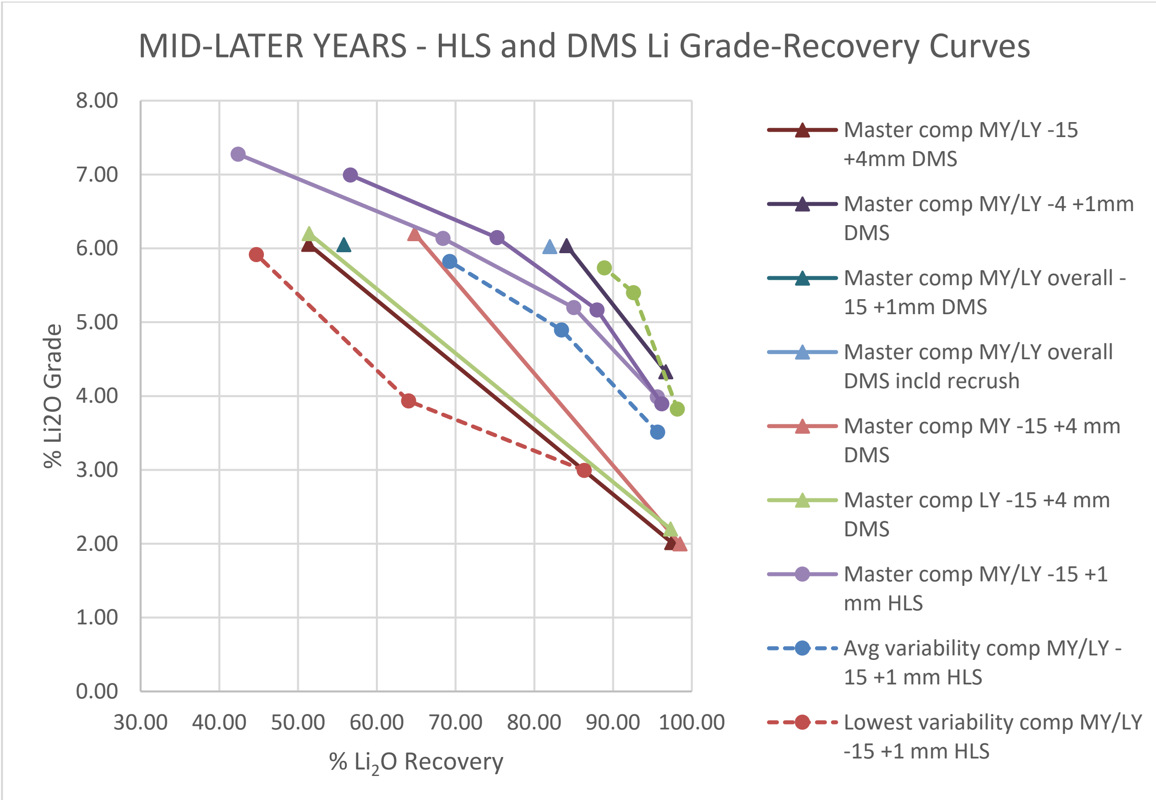


Figure 13-4 – Nagrom Phase 2 – Grade-Recovery Relationship of HLS v DMS, Mid/Later Years

The major process design criteria (PDC) based on the metallurgical testwork results (adjusted for a lower 5.6% final product grade to provide improved project economics) are presented in Table 13-1.

Table 13-1 – Process Plant Design Basis

Parameter	Units	Design Value
ROM		
Feed grade - LOM Average (6% waste dilution	% Li_2O	1.30
Production:		
Early Years (original mine schedule):		
Coarse DMS Recov. (contribution to total DMS Recov.)	% Li_2O	56.8
Fine DMS Recov. (contribution to total DMS Recov.)	% Li_2O	14.7
Re-Crush DMS Recov. (contribution to total DMS Recov.)	% Li_2O	12.6
Total DMS Recovery	**% Li_2O**	**84.1**
Overall Plant Recovery (including -1 mm fines losses)	% Li_2O	69.6
Final Concentrate Grade	% Li_2O	5.6

Parameter	Units	Design Value
Concentrate Production - nominal	kt/a	323
Mid/Later Years (original mine schedule):		
Coarse DMS Recov. (contribution to total DMS Recov.)	% Li_2O	48.6
Fine DMS Recov. (contribution to total DMS Recov.)	% Li_2O	11.1
Re-Crush DMS Recov. (contribution to total DMS Recov.)	% Li_2O	21.3
Total DMS Recovery	% Li_2O	80.1
Overall Plant Recovery (including -1 mm fines losses)	% Li_2O	66.9
Final Concentrate Grade	% Li_2O	5.6
Concentrate Production - nominal	kt/a	310
ROM FEED		
Crushing Work Index (Average)		
Early Years:	kWh/t	8.0
Mid Years:	kWh/t	8.1
Later Years:	kWh/t	7.6
UCS:		
Design	MPa	150
Crushing Work Index:		
Bond Rod Mill Work Index @ 1180 µm closing screen		
Early Years	kWh/t	14.2
Mid Years	kWh/t	12.1
Bond Ball Mill Work Index @ 106 µm closing screen		
Early Years	kWh/t	21.9
Mid Years	kWh/t	21.5
Material Properties:		
ROM SG Average:		
Early Years		2.73
Mid Years		2.70
Bulk density crushed ROM:		
Early Years		1.76

Parameter	Units	Design Value
Mid Years		1.74
Mass Design		1.75
Volume Design		1.65
CIRCUIT SPLITS & PARTICLE SIZE DISTRIBUTIONS		
Crushing circuit P100	mm	15
Crushed ore mass splits:		
P80	µm	9.4
P50	µm	4.2
-1 mm Fines	%	20.3
Li_2O deportment -1 mm	%	17.2

A detailed PDC is presented in Table 13-18.

James Bay testwork results were compared to Mt Cattlin and other Australian operations and a scale-up factor has been estimated by considering modifying factors including particle size distribution, larger equipment sizes, contamination, and data from other spodumene plants. Full-scale plant performance of Mt Cattlin and other Australian operations were compared to the James Bay testwork data. A final recovery scale-up factor of 0.85 for the early years and 0.82 for the mid/later years was adopted. Refer to Section 13.3.4.2 for more details.

DMS testwork was undertaken on ultrafine (UF) -1 +0.5 mm and -1 + 0.3 mm material for EY and MY/LY. The single stage -1 + 0.5 mm DMS tests produced concentrate grades of between 4.8% and 5.2% Li_2O and those for the -1 +0.3 mm produced concentrate grades of between 3.9% and 4.6% Li_2O. The two-stage DMS tests all achieved final concentrate grades above 6.0% Li_2O. The improved concentrate grades for two-stage DMS are attributed to a large proportion of near (cut-point) density material. The additional recovery realised from the -1 mm fraction using UF DMS has not been included in the existing PDC but will be reviewed and compared with flotation recovery for this size fraction as the Project develops.

Tailings thickening and filtration testwork was undertaken by Tenova and Outotec and dewatering using screens was undertaken with Schenck Process. A summary of Outotec's thickener testwork results were:

- 0.25 t/m^2/h flux rate
- 11.3 m/h rise rate
- 20 g/t flocculant consumption

13.3 Testwork Programs

13.3.1 SGS Testwork

A single sample weighing 14,690 kg from the James Bay Project spodumene resource grading 1.51% Li_2O was submitted in December 2011 to SGS in Lakefield, Ontario for HLS and DMS testing. The testwork was completed in February 2013.

The bulk of the sample was crushed to -6 mm and screened at 0.5 mm to remove the fines before undertaking HLS and DMS testwork on the coarse fraction. Two approaches for primary and secondary DMS were tested viz:

- Primary DMS at 2.65 SG cut-point followed by secondary DMS on the primary sinks product at 2.85 SG cut-point to produce a final sinks product (standard SGS approach).
- Primary DMS at 2.85 SG cut-point followed by secondary DMS on the primary sinks product at 2.85 SG cut-point to produce a final sinks product.

Results from the HLS and both DMS tests were comparable, the DMS tests resulting in a sinks yield of 18.9% at 75.7% recovery of Li_2O and a grade of 6.53% Li_2O. Approximately 55% of the mass was rejected as DMS floats, containing 8% of the total lithium (including the fines). The fines stream comprised approximately 26% of the total feed material and contained 16.2% of the total lithium. Further processing of the fines was recommended to improve the overall recovery but did not form part of the SGS testwork.

The Wave QP believes the reason for the comparable results from the two DMS testwork approaches are related to the relatively fine (P_{100} 6 mm) particle size distribution (PSD) which resulted in improved liberation of lithium and reduction of “middlings”/near density material. This is discussed further in Section 13.3.2 / Table 13-18.

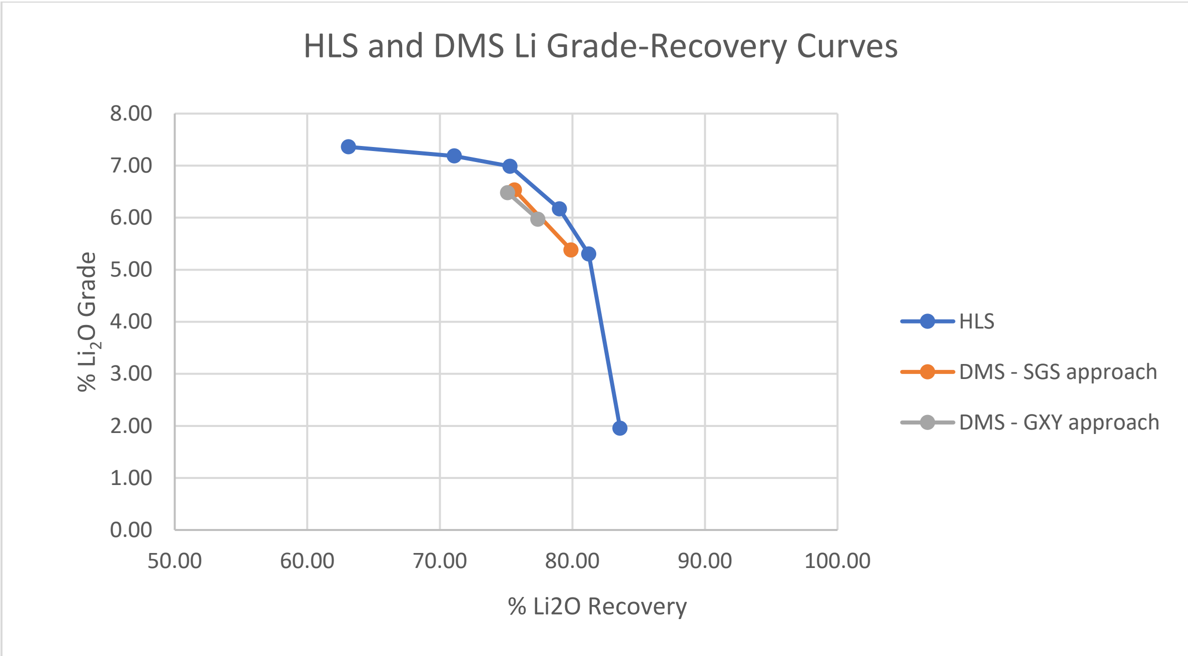


Figure 13-5 – SGS Grade-Recovery Relationship of HLS v DMS

Figure 13-5 indicates that there was little difference between the two DMS approaches, and both were comparable with the HLS results.

13.3.2 Nagrom Testwork

13.3.2.1 Preliminary Phase 1 Testwork (T2407)

Forty-one drill core samples totaling approximately 400 kg were submitted to Nagrom during 2017 for Phase 1 metallurgical testing and these were initially prepared to produce four composites viz A, B, C and D. The following metallurgical testwork was undertaken on the four composites:

- Crushing to P_{100} of 14 mm and assay by size
- Wet screening at 1 mm of P_{100} crush size of 14, 10 and 6.3 mm
- HLS and HLS microscopy
- Stream PSD
- DMS in 100 mm diameter cyclone

An additional eight samples were provided for further crushing, sizing and HLS testwork.

A summary of the testwork is provided below:

- Uniaxial compressive strength (UCS) tests result at an average of 67 MPa indicated ROM that was considered to be lower than benchmarked hard rock lithium projects.
- An abrasion index at 0.27 was also lower than benchmarked hard rock lithium projects.
- Initial crushing was undertaken at P_{100} of 10 mm and 6.3 mm with accompanying HLS testwork.
- Further crushing was undertaken at a coarser P_{100} of 14 mm on four of the 12 composites to compare HLS performance with finer crush sizes.
- A decrease in lithium deportment to sinks at 2.70 SG separation was noted as the crush size was reduced.
- Initial crushing to P_{100} of 10 mm in conjunction with re-crushing of the coarse cleaner/secondary DMS floats was recommended.
- An initial Primary DMS cut-point of 2.70 SG followed by a Secondary DMS cut-point of 2.90 SG was reported as providing the optimum lithium grade/recovery which aligned with the SGS testwork results.
- DMS testwork was undertaken on two of the 12 composites which were closest to the expected feed grade from the mine:
  - Crush size P100 of 10 mm and a re-crush of 6.3 mm on the secondary DMS floats.
  - Primary and secondary DMS cut point at 2.70 and 2.90 SG respectively.
  - Low DMS sinks grades from the 6.3 mm re-crush size or target sinks grades with lower recoveries were produced.
  - Further tests at 4.0 mm re-crush size resulted in sinks grades of 6.0% Li_2O at acceptable recoveries.
- The overall DMS100 testwork on composites B and C produced a lithium recovery of 66.3% and 65.9% respectively at a target concentrate grade of 6.0% Li_2O. These results supported a design lithium recovery of 66.0%.

The following comments relate to the Phase 1 testwork program:

13.3.2.1.1 Lithium Deportment to -1 mm vs Crush Size P100

Table 13-2 compares -1 mm lithium at varying crush sizes.

Table 13-2 – Crush Size v -1 mm Li_2O

Composite	Percent of Total Li_2O in -1 mm Fraction at Varying Crush Size P100		
#	**14 mm**	**10 mm**	**6.3 mm**
Average A to D	7.6	9.6	11.4
Average all composites	7.4	10.3	14.4

An approximate 2.9% increase in the amount of Li_2O in the -1 mm size fraction is produced when the crush size is reduced from P_{100} of 14 mm to 10 mm and a further 4.1% increase when crushing to 6.3 mm based on the average result for all composites tested, which is expected.

13.3.2.2 Decrease in Lithium Deportment to HLS Sinks at 2.70 SG Separation

Table 13-3 – Crush Size v HLS Li_2O Recovery at 2.70 SG Separation

Composite	% Li_2O Recovery at 2.70 SG Separation at Varying Crush Size P100		
#	**14 mm**	**10 mm**	**6.3 mm**
A	92.0	93.7	94.8
B	93.2	92.3	92.9
C	93.2	93.1	93.3
D	93.1	91.9	93.7
Average	92.9	92.7	93.7

There is no significant difference in HLS 2.70 SG sinks recovery when the crush size is reduced from P_{100} of 14 mm to 10 mm but a 1.0% increase in recovery when further crushing to 6.3 mm - this increase in recovery is largely driven by the results for composite A.

13.3.2.3 Further Comparison of Two DMS Testwork Approaches Undertaken by SGS

Following on from comments provided in Section 13.3.1, Table 13-4 compares HLS lithium recovery at 2.90 SG at varying crush sizes.

Table 13-4 – Crush Size v HLS Li_2O Recovery at 2.90 SG Separation

Composite	% Li_2O Recovery at 2.90 SG Separation at Varying Crush Size P100		
#	**14 mm**	**10 mm**	**6.3 mm**
A	58.3	61.5	81.4
B	52.2	57.6	70.4

Composite	% Li_2O Recovery at 2.90 SG Separation at Varying Crush Size P100		
C	63.7	67.7	75.7
D	64.1	58.1	77.2
Average	59.5	61.2	76.2

There is a marked reduction in lithium recovery at 2.90 SG between crush size P_{100} of 14/10 mm compared to 6.3 mm. Note that the average recovery at P_{100} of 6.3 mm is comparable with the 75.7% recovery achieved during the SGS DMS testwork (refer Section 13.3.1).

Using a preferred crushing size of either 14 (15) or 10 mm, the 2.85/2.85 Primary/Secondary DMS SG approach will result in markedly lower overall DMS recoveries and therefore operating a 2.65/2.85 Primary/Secondary DMS SG approach as adopted by SGS is recommended.

13.3.2.4 Total HLS Recovery at Different Crush Sizes

Table 13-5 compares the total lithium recovery at two different crush sizes relating to losses to the -1 mm fraction and HLS recovery averaged for composites A to D.

Table 13-5 – Crush Size v Li_2O Recovery at 2.90 SG Separation

Crush size P100	% Li_2O Recovery at Varying Crush Size P100		
mm	**Loss to -1 mm**	**HLS at 2.90 SG**	**Overall**
14	7.6	59.9	52.3
10	9.6	61.2	51.6
Difference (14 – 10 mm)	-2.0	-1.3	0.7

There is a marginally better lithium recovery at a crush size P_{100} of 14 mm compared to 10 mm.

13.3.2.4.1 Overall HLS Performance

Table 13-6 presents the overall HLS test results for the 12 composites at a crush size P_{100} of 10 mm and separations SG of 2.70 and 2.90.

Table 13-6 – Overall HLS Results for 12 Composites

Composites		Composites HLS Recovery and Grade Results			
#	Head Grade	2.70 SG		2.90SG	
A to K	% Li_2O	% Li_2O Recovery	% Li_2O Conc. Grade	% Li_2O Recovery	% Li_2O Conc. Grade
Average	1.54	92.7	4.4	68.4	6.5
Lowest	1.00	90.4	4.4	57.6	6.4
Highest	1.91	94.9	4.6	83.8	7.0
SD	-	1.28	0.39	8.01	0.25

An average recovery of 68.4% Li_2O at 6.5% Li_2O grade was achieved for the 12 composites tested.

13.3.2.4.2 Overall DMS Recovery

Table 13-7 presents the overall DMS recovery at a crush size P_{100} of 10 mm and re-crush of 6.3 mm

Table 13-7 – DMS Recovery and Concentrate Grade

Comp. #		Main DMS (-10 +1 mm)				Re-Crush DMS (-6.3 +1 mm)				Overall DMS	
		Primary		Secondary		Primary		Secondary		Main	Re-Crush
	Head grade %Li_2O	% Li_2O stage Rec.	% Li_2O Conc. Grade	% Li_2O stage Rec.	% Li_2O Conc. Grade	% Li_2O stage Rec.	% Li_2O Conc. Grade	% Li_2O stage Rec.	% Li_2O Conc. Grade	% Li_2O Rec.	% Li_2O Rec.
B	1.51	81.0	3.8	71.3	5.7	96.5	3.2	90.5	4.2	57.7	87.4
C	1.53	81.3	4.3	73.8	5.5	96.7	3.7	91.2	4.4	60.0	88.2
C (mica pick)	1.53	81.3	4.3	73.1	6.3	96.7	3.7	91.2	4.4	59.4	78.2
Average		81.1	4.0	72.6	5.6	96.6	3.5	90.9	4.3	58.9	87.8

A target secondary concentrate grade of 6.0% Li_2O was not achieved for either the main or re-crush DMS. Increasing the SG set-point achieved the target concentrate grade but with loss of recovery. Mica and basalt hand picking were undertaken on composite C main secondary sinks product resulting in an increase in grade from 5.5% to 6.3% Li_2O. Further re-crush tests at 4 mm were undertaken on the main secondary floats resulting in an increase in HLS concentrate grade from 6.0 to 6.5% Li_2O and 6.6% to 6.8% for composite B and C respectively. There was no observed recovery benefit for composite C at the finer crush size where an overall recovery of 65.9% Li_2O was achieved.

13.3.2.4.3 HLS and DMS Comparison

Figure 13-6 compares the grade-recovery relationships of the HLS and the DMS testwork.

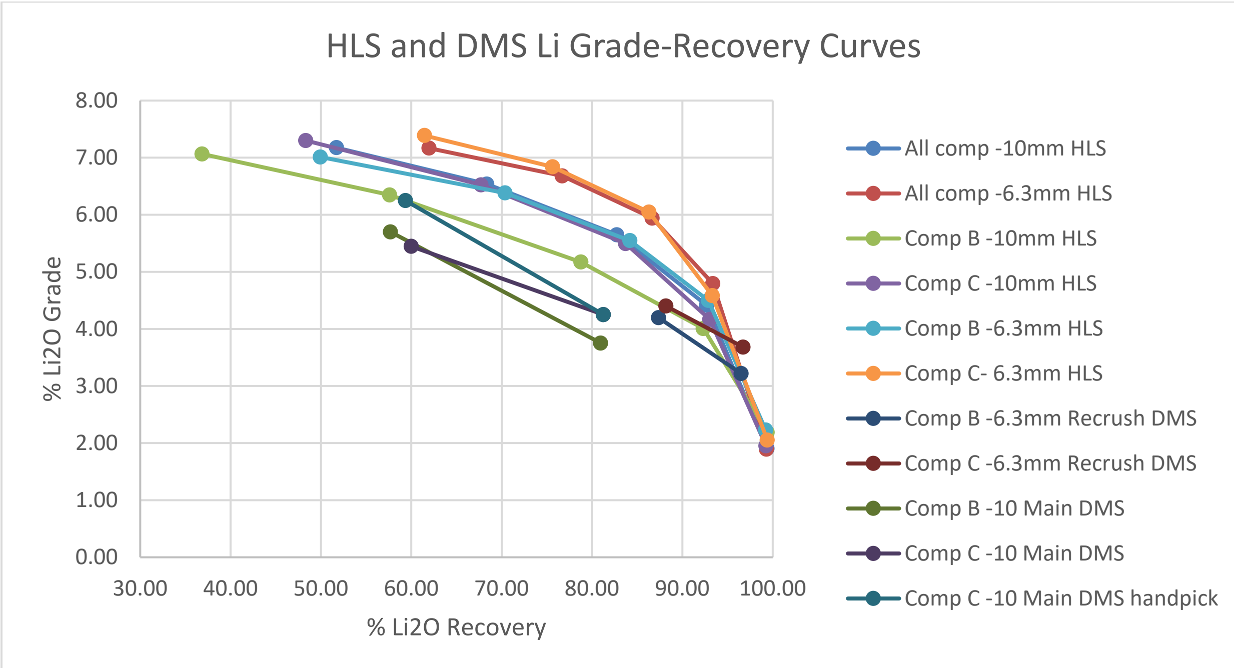


Figure 13-6 – Grade-Recovery Relationship of HLS v DMS

Data in Table 13-6, Table 13-7, and Figure 13-6 indicate that metallurgical performance for the DMS tests were markedly lower than that achieved for the HLS tests. The reason for this was unclear and further investigation was recommended for Phase 2 of the James Bay testwork on EY, MY and LY samples covering geological lithology, spodumene grain size, gangue minerals, degree of spodumene liberation etc.

13.3.2.5 Bulk Phase 2 Testwork (T2523)

Drill core samples were submitted to Nagrom during 2018 to undertake Phase 2 metallurgical testing on EY, MY and LY samples as a continuation to the earlier Phase 1 testwork. In total, 50 EY, 44 MY and 44 LY samples were submitted totaling 4,643 kg, 1,751 kg, and 1,760 kg respectively. The following metallurgical testwork was undertaken for these samples:

- ROM characterization
- Crushing to 25 mm, 15 mm, 10 mm, 6.3 mm and 3.35 mm, wet screening, HLS and assay by size
- Stage crushing of Master Composite to P_{100} of 15 mm and assay by size
    - Mineralogy
    - Bond Work Indices
    - Wet screening at 15, 4, and 1 mm

    - Reflux classification on -4 +1 mm
    - Primary and Secondary DMS250 on coarse -15 + 4 mm and fines -4 +1 mm
    - Magnetic separation on fine cleaner DMS sinks
- Variability stage 2 composites (14, 15 and 19)
    - Stage crush to 15 mm
    - Wet screening at 15 and 1 mm
    - HLS

13.3.2.5.1 ROM Characterization

Table 13-8 presents ROM characterization data for EY, MY and LY.

Table 13-8 – ROM Characterization

#		Sample			
ID	Units	Early Years	Mid Years	Later Years	Average
UCS:					
Shallow - lowest	MPa	78.9	96.2	92.4	85.7
Shallow - highest	MPa	137.4	111.3	92.4	124.4
Mid - lowest	MPa	49.8	125.7	88.4	69.1
Mid - highest	MPa	74.9	147.1	95.4	111.0
Deep - lowest	MPa	65.3	89.2	87.3	76.3
Deep - highest	MPa	134.6	96.2	87.3	115.4
Waste - lowest	MPa	81.7	48.6	197.1	65.2
Waste - highest	MPa	157.1	48.6	204.1	180.6
CWi:					
Shallow - lowest	kWh/t	7.6	8.3	9.1	8.0
Shallow - highest	kWh/t	8.0	8.3	9.1	8.6
Mid - lowest	kWh/t	6.6	-	6.8	6.7
Mid - highest	kWh/t	7.5	-	7.5	7.5
Deep - lowest	kWh/t	8.8	6.5	-	7.7
Deep - highest	kWh/t	9.8	7.4	-	8.6
Waste - lowest	kWh/t	17.4	11.0	-	14.2
Waste - highest	kWh/t	17.6	13.9	-	15.8
Bond Work Indices:					

#		Sample			
BRWi	kWh/t	14.2	12.1		13.2
BBWi	kWh/t	21.9	21.5		21.7
Bulk Density:					
(BRWi)	t/m3	1.88	1.95		1.92
(BBWi)	t/m3	1.76	1.74		1.75
Specific Gravity:					
lowest	-	2.69	2.63	2.70	2.66
highest	-	2.79	2.78	2.78	2.79
Waste - lowest	-	2.74	2.74	-	2.74
Waste - highest	-	2.77	2.77	-	2.77
SMC Tests:					
DWi	kWh/m3	12.0	12.0		12.0
Mia	kWh/t	10.8	11.0		10.9
Mib	kWh/t	6.9	7.0		7.0
Mic	kWh/t	3.6	3.6		3.6
SG		2.73	2.70		2.72
A		71.2	70.7		71.0
B		1.18	1.17		1.18
A x b		84.0	82.7		83.4
ta		0.80	0.79		0.80
SCSE*	kWh/t	7.29	7.31		7.30
Abrasion Index:					
Ai		0.26	0.26		0.26

** SCSE = SAG circuit specific energy*

The DWi and Mic both lie within the lower 12% of the SMC database indicating relatively soft ores. The A x b and SCSE values also indicate relatively soft ores.

13.3.2.5.2 Mineralogy

EY and MY/LY -15 mm samples were sent to Bureau Veritas (BV) for mineralogical investigation to determine the following:

- Quantitative XRD analysis (crystalline phases)
- QEMSCAN to determine:

- Mineral lists
- Mineral abundance in different size ranges
- Elemental deportment
- Particle and grain size distribution
- Liberation
- Locking

XRD results are presented in Table 13-9.

Table 13-9 – XRD Results

		T2523 Head Percent Mass	
Mineral	Composition	Early Years	Mid/Later Years
Quartz	SiO_2	24	22
Plagioclase	(Na, Ca) Al (Al,Si)Si_2O_8	34	36
K feldspar	$KAlSi_3O_8$	13	14
Pyroxene group - Spodumene	ABZ_2O_6	23	20
Mica group	X_2Y_4-$6Z_8O_{20}(OH,F)_4$	5	8
Chlorite group	A_4-$6Z_4O_{10}(OH,O)_8$	<1	<1

Mica group in which X is K, Na, Ca or less commonly Ba, Rb, or Cs; Y is Al, Mg, Fe or less commonly Mn, Cr, Ti, Li, etc.; Z is chiefly Si or Al but also may include Fe^{3+} or Ti.

Pyroxene and chlorite groups where A is Al, Fe^{2+}, Fe^{3+}, Li, Mg, Mn^{2+}, Ni, Zn; Z is Al, B, Fe_3+, Si.

The main lithium mineral present is spodumene; 23% and 20% by mass for EY and MY/LY respectively.

Laser ablation identified low amounts of lithium in mica (approximately 0.1% of the total lithium in each sample) and indicated muscovite with low amounts of lithium rather than lepidolite. The mica content was 5% and 8% for the EY and MY/LY respectively indicating that mica removal circuits would likely be required as part of the plant design.

Some 53% and 79% for the EY and MY/LY sample respectively was contained in the +5.6 mm fraction.

The liberation and locking data for both samples indicated that spodumene has a natural P_{80} of approximately 1 mm. However, review of the BV reports indicates that spodumene is reasonably well liberated in the -4 +2 mm size fraction which corresponds to the benefits of re-crushing the coarse secondary DMS floats stream to 6.3 mm to improve final recovery.

Appreciable spodumene association with micas was noted in the +2 mm size fraction.

13.3.2.5.3 Lithium Deportment to -1 mm v Crush Size P_{100}

Table 13-10 compares -1 mm lithium at varying crush sizes for EY, MY and LY.

Table 13-10 – Crush Size v -1 mm Li_2O

Composite	Percent of Total Li_2O in -1 mm Fraction at Varying Crush Size P100		
#	**15 mm**	**10 mm**	**6.3 mm**
Early Years:			
Average all composites	11.2	-	-
Master composite	7.8	10.0	12.0
Mid Years:			
Average all composites	11.6	-	-
Later Years:			
Average all composites	12.6	-	-
Mid/Later Years:			
Master composite	9.5	10.4	21.0

Approximately 2.2% increase in the amount of Li_2O in the -1 mm size fraction is produced when the EY ROM crush size is reduced from P_{100} of 15 mm to 10 mm which is comparable with the results from the Phase 1 testwork presented in Table 13-2. The difference for the MY/LY ROM for the corresponding data is an increase of only 0.9% Li_2O.

13.3.2.5.4 Total HLS Recovery at Different Crush Sizes

Table 13-11 compares the total lithium recovery at two different crush sizes relating to losses to the -1 mm fraction and HLS recovery for the EY Master Composite.

Table 13-11 – Crush Size v Li_2O Recovery at 2.70 SG (early years)

Crush Size P100	% Li_2O Recovery at Varying Crush Size P100		
Mm	**Loss to -1 mm**	**HLS at 2.70 SG**	**Overall**
15	7.8	74.6	66.8
10	10.0	80.6	70.6
Difference (15 – 10 mm)	-2.2	-6.0	-3.8

There is a 3.8% increase in lithium recovery at a crush size P_{100} of 10 mm compared to 15 mm based on the laboratory results produced from jaw/rolls crushing of drill core samples. However, based on typical

(Bruno simulation) PSD curves from a jaw/cone crushing circuit (following pit blasting/ROM feed material) at P_{100} of 10 mm and 15 mm, the production of -1 mm material increases from approximately 18% to 32% when operating at the finer crush size resulting in substantially higher lithium losses than predicted by the laboratory testwork crushing configuration. The results from the Bruno simulation are expected to be more representative of full-scale operation, particularly with regard to fines generation.

13.3.2.5.5 Overall HLS Performance

Table 13-12 presents the overall HLS test results for 14 EY and 34 MY/LY variability composites at a crush size P_{100} of 15 mm and separations SG of 2.70 and 2.90.

Table 13-12 – Overall HLS Results for Variability Composites

Composites		Composites HLS Recovery and Grade Results			
#	**Head grade**	**2.70 SG**		**2.90 SG**	
1 to 14	**%Li_2O**	**%Li_2O Recovery**	**%Li_2O Conc Grade**	**%Li_2O Recovery**	**% Li_2O Conc Grade**
EY					
Average	1.74	94.7	4.6	75.0	6.6
Lowest	0.50	89.4	3.1	63.5	6.0
Highest	2.10	97.3	5.3	84.4	7.0
SD	-	2.44	0.65	9.66	0.31
MY/LY					
Average	1.46	95.7	3.5	69.3	5.8
Lowest	0.72	86.4	2.4	63.0	4.3
Highest	1.87	98.2	4.4	88.9	6.5
SD	-	2.53	0.52	8.23	0.39

An average recovery of 75.0% Li_2O at 6.6% Li_2O grade (P_{100} 15 mm) was achieved for the 14 EY variability composites and an average recovery of 69.3% Li_2O at 5.8% Li_2O grade (P_{100} 15 mm) was achieved for the 34 MY/LY variability composites compared to an average recovery of 68.4% Li_2O at 6.5% Li_2O grade for the 12 composites in the Phase 1 testwork (P_{100} 10 mm). Figure 13-7 compares the grade-recovery relationships of the HLS testwork.

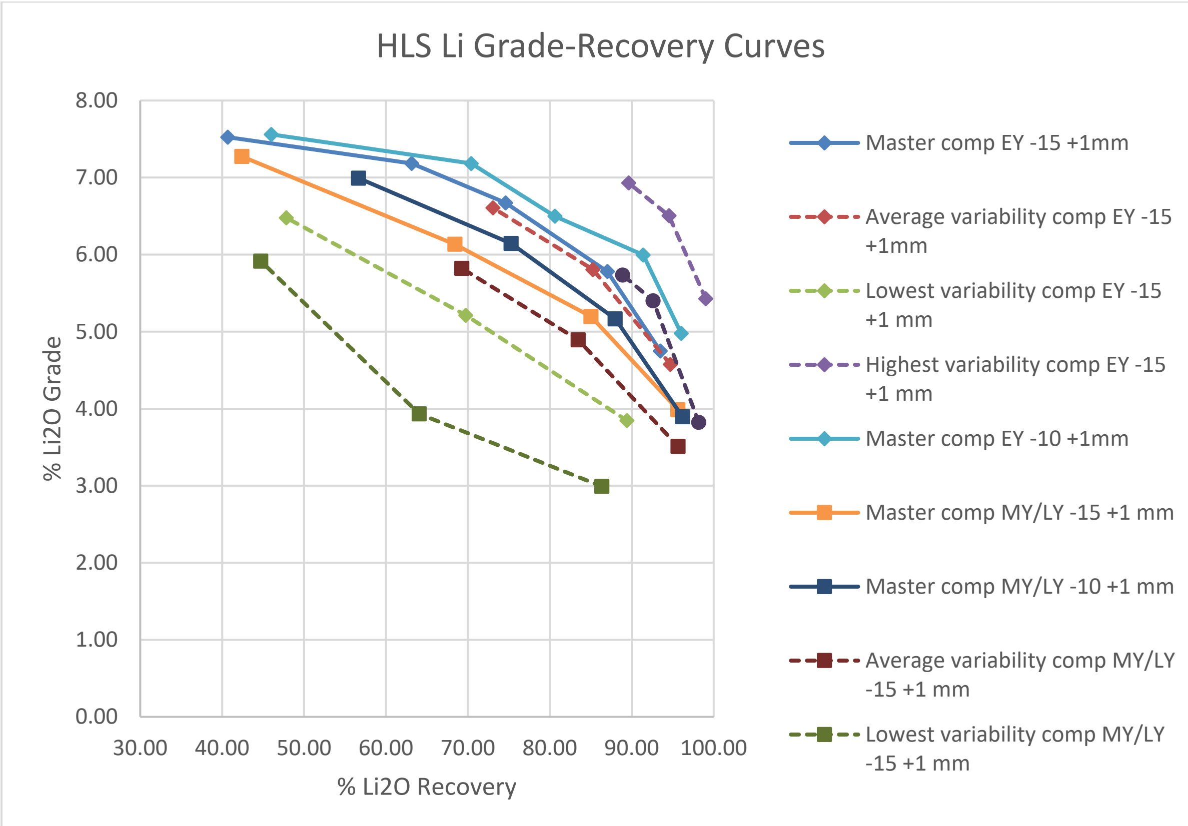


Figure 13-7 – Grade-Recovery Relationship of HLS

Data in Table 13-12 and Figure 13-7 indicate reasonable consistency between the (average) variability composites and the Master composite HLS results though the range of performance for the variability composites is quite pronounced.

13.3.2.5.6 Total DMS Recovery

Coarse DMS testwork was undertaken at a primary and secondary cut-point SG of 2.70 and 2.90 respectively and fine DMS testwork was undertaken at a primary and secondary cut-point SG of 2.70 and 2.80 respectively. Re-Crush DMS testwork initially performed at a cut-point SG of 2.80 produced a low (5.2% Li_2O) sinks grade. The test was repeated at 2.90 SG which produced a sinks grade of 5.9% (EY) and 6.0% (MY/LY).

Table 13-13 presents the coarse (-15 +4 mm) and fine (-4 +1 mm) DMS recovery for the EY, MY and LY at a crush size P_{100} of 15 mm and re-crush of 4.0 mm.

Table 13-13 – DMS Recovery and Concentrate Grade

	Coarse DMS				Fine DMS				Overall DMS		Overall DMS	
Comp.	**Primary**		**Secondary**		**Primary**		**Secondary**		**Coarse**	**Fine**	**C, F & Re-Crush**	
#	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Recov.**	**% Li_2O Recov.**	**% Li_2O Recov.**	**% Li_2O Conc Grade**
Master EY	96.7	2.4	67.0	6.2	97.5	4.1	96.4	6.0	64.8	88.7	85.7	6.2
Master MY/LY	97.5	2.0	52.7	6.1	96.7	4.3	96.1	5.9	51.4	84.1	82.0	6.0
Master MY	98.5	2.0	65.8	6.2	-	-	-	-	-	-	-	-
Master LY	77.3	2.2	52.8	6.2	-	-	-	-	-	-	-	-

An overall (coarse and fine combined) DMS recovery of 76.8% Li_2O at 6.1% Li_2O grade for EY and a recovery of 67.8% Li_2O at 6.0% Li_2O grade for MY/LY were achieved at a crush size P_{100} of 15 mm. These results compare with a total DMS recovery of 78.4% Li_2O at 5.2% Li_2O grade for the 12 composites in the Phase 1 testwork at a crush size P_{100} of 10 mm.

The overall (coarse and fine) DMS Li_2O recovery for the EY (69.5%) was 13.7% higher than that for the MY/LY (55.8%) due to a lower recovery in the MY/LY secondary coarse DMS 'circuit'. This is attributed to a higher percentage of middlings/locked spodumene in the near-density material for the MY/LY ROM and is confirmed by mineralogy/QEMSCAN testwork results which indicate that the EY samples in the +5.6 mm and +4.0 mm fractions are more liberated than the MY/LY samples. With the incorporation of a re-crush/DMS circuit the difference in overall DMS recovery between the ROM types is negligible as confirmed by the total (coarse, fine and re-crush) DMS recovery of 85.7% and 82.0% Li_2O for EY and MY/LY respectively.

The re-crushing of the secondary coarse DMS floats stream for the EY sample increased the overall Li_2O recovery from 69.5% to 85.7% (an additional 16.2% recovery) with an overall combined final concentrate grade of 6.2% Li_2O. Comparative data for MY/LY showed an increase in overall recovery from 55.8% to 82.0% (an additional 26.2% recovery) at a grade of 6.0% Li_2O.

A separate MY only composite coarse DMS test produced similar results to the EY coarse DMS tests. Likewise, a separate LY only composite coarse DMS test produced similar results to the MY/LY coarse DMS tests as presented in Table 13-13.

The fine (-4 +1 mm) DMS tests included a pre-DMS reflux classifier stage to reduce the level of mica in the DMS feed stream. Continuous up-flow classifier tests rejected approximately 32% of the mica and reduced the mica content in the fine DMS feed from 5.5% to 3.9%.

Magnetic separator testwork on the fine DMS final sinks product indicated removal of between 22% and 23% of the Fe_2O_3 at a Li_2O recovery of 96% to 99%. Future vendor testwork is planned to confirm the suitability of this equipment for upgrading the final fine DMS product.

Note that these results do not include any upgrade (optical sorting to remove waste) on the coarse DMS final sinks product.

13.3.2.5.7 HLS and DMS Comparison

Table 13-14 compares HLS and DMS sinks percent yields at a crush size P_{100} of 15 mm.

Table 13-14 – HLS and DMS Sinks Yields

Comp.	Coarse DMS						Fine DMS					
	Primary (2.70 SG)			Secondary (2.90 SG)			Primary (2.70 SG)			Secondary (2.80 SG)		
#	Sinks % Yield	% Li_2O Recov.	% Li_2O Conc Grade	Sinks % Yield	% Li_2O Recov.	% Li_2O Conc Grade	Sinks % Yield	% Li_2O Recov.	% Li_2O Conc Grade	Sinks % Yield	% Li_2O Recov.	% Li_2O Conc Grade
HLS EY	35.7	92.1	4.6	19.1	69.7	6.5	29.1	97.1	5.2	22.7	93.2	6.4
DMS EY	71.9	96.7	2.4	18.5	67.0	6.2	41.6	97.5	4.1	27.2	96.4	6.0
HLS MY/LY	41.2	95.2	3.6	16.6	60.0	5.7	30.4	96.4	4.8	23.0	91.5	6.1
DMS MY/LY	69.7	97.5	2.0	12.2	52.7	6.1	38.2	96.7	4.4	27.1	96.1	5.9

Figure 13-8 and Figure 13-9 compare the grade-recovery relationships of the HLS and the DMS testwork for EY and MY/LY respectively.

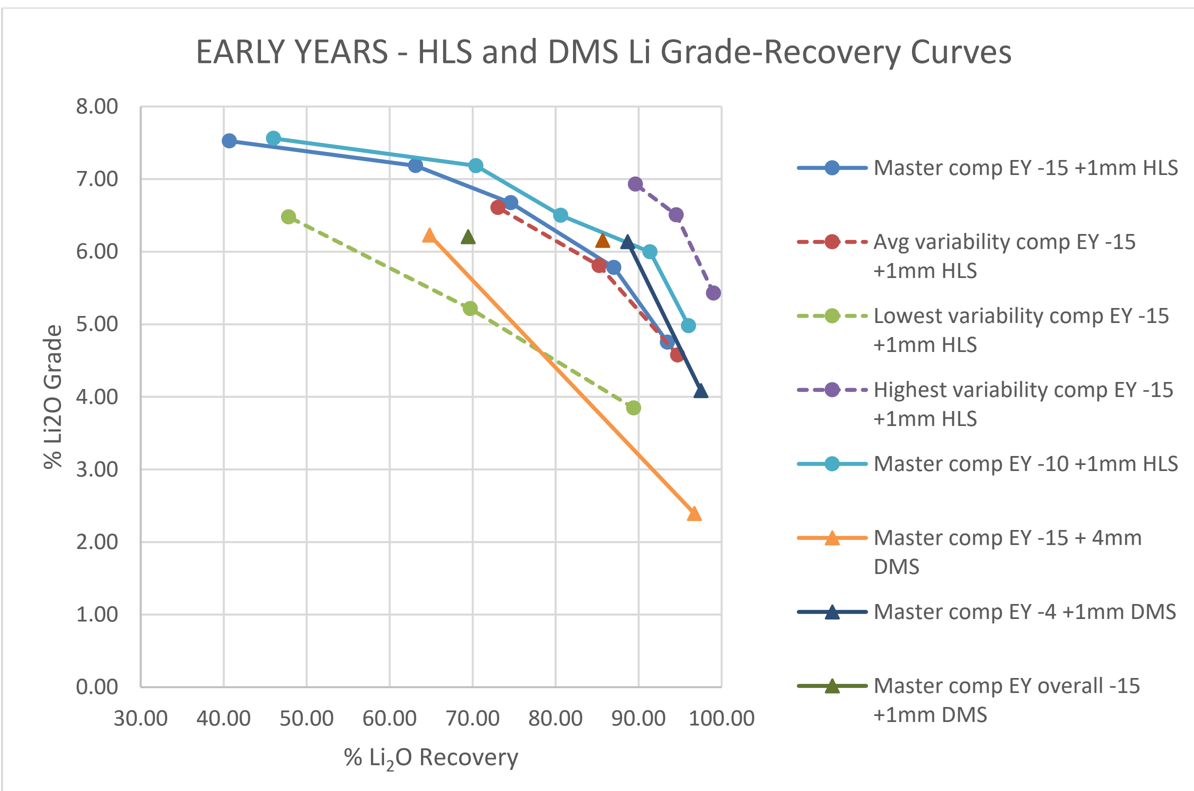


Figure 13-8 – Grade-Recovery Relationship of HLS v DMS, Early Years

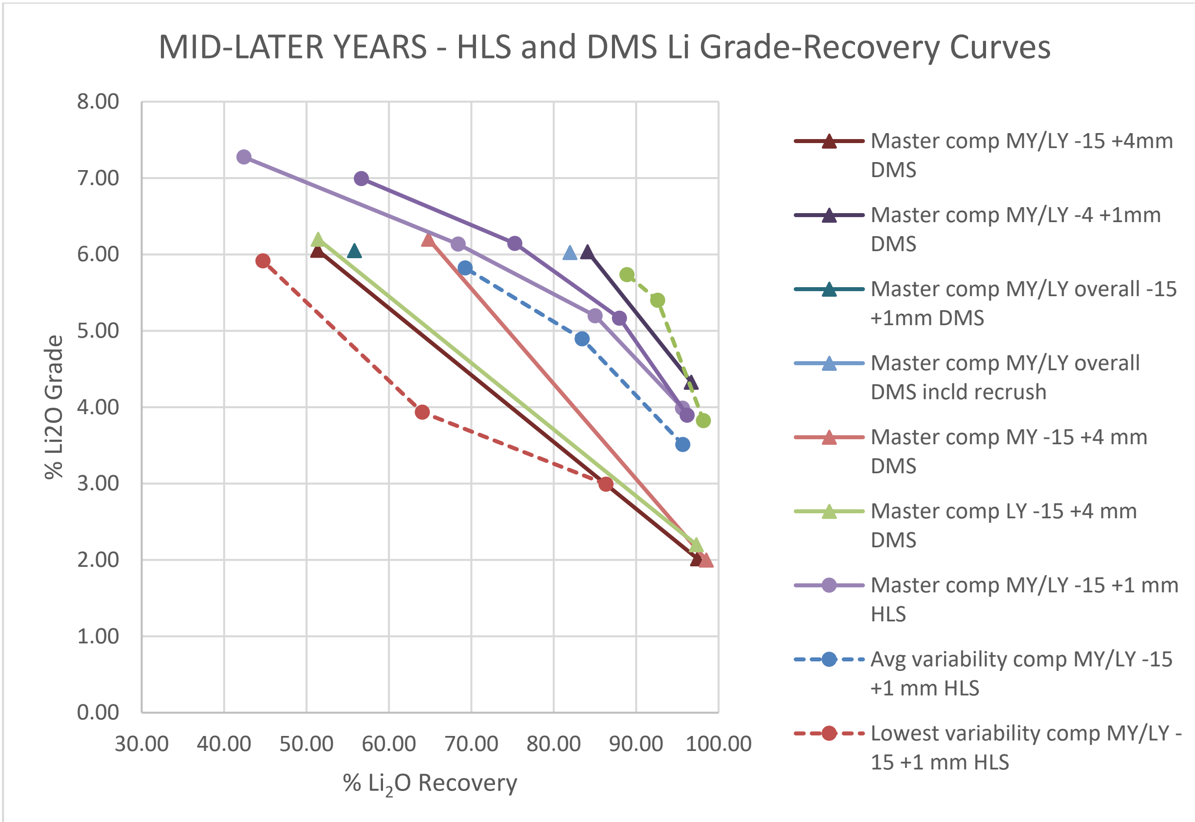


Figure 13-9 – Grade-Recovery Relationship of HLS v DMS, Mid/Later Years

Data in Table 13-13, Table 13-14, Figure 13-8, and Figure 13-9 indicate that metallurgical performance for the EY and MY/LY coarse DMS tests were markedly lower than that achieved for the HLS tests. However, the EY and MY/LY fine DMS test results were comparable with the HLS results. The combined (coarse and fine) DMS results were marginally lower than the HLS results but consistent with the HLS-DMS off-set expected and experienced during the SGS HLS-DMS testwork program. The overall DMS recovery and grade (including re-crush) for EY and MY/LY were comparable with the HLS test results.

13.3.3 Overall Testwork Comparison and Preliminary Design Criteria

Table 13-15 compares the results of the three HLS testwork programs at different crush sizes and separation SG of 2.70 and 2.90.

Table 13-15 – Overall HLS Results

		Crush Size	Average HLS Recovery and Grade Results			
Composites	**Head Grade**	**P100**	**2.70 SG**		**2.90 SG**	
#	**% Li_2O**	**mm**	**% Li_2O Recovery**	**% Li_2O Conc Grade**	**% Li_2O Recovery**	**% Li_2O Conc Grade**
SGS	1.49	6.0	81.4	5.3	75.3	7.0
Nagrom Phase 1 A to D	1.58	10.0	92.7	4.1	61.2	6.4
Nagrom Phase 1 ALL	1.54	10.0	92.7	4.4	68.4	6.5
Nagrom Phase 1 A to D	1.67	14.0	92.9	4.1	60.0	6.4
Nagrom Phase 2 Master – EY	1.68	10.0	96.0	5.0	80.6	6.5
Nagrom Phase 2 Master – EY	1.69	15.0	93.5	4.8	74.6	6.7
Nagrom Phase 2 ALL/Variability – EY	1.74	15.0	94.7	4.6	75.0	6.6
Nagrom Phase 2 Master – MY/LY	1.61	6.3	97.8	4.9	85.6	6.9
Nagrom Phase 2 Master – MY/LY	1.52	15.0	95.6	4.0	68.4	6.1
Nagrom Phase 2 ALL/Variability – MY/LY	1.46	15.0	TBC	TBC	TBC	TBC

An average recovery of 75.0% Li_2O at 6.6% Li_2O grade (P_{100} 15 mm) was achieved for the EY Nagrom Phase 2 testwork compared to an average recovery of 68.4% Li_2O at 6.5% Li_2O grade for Phase 1 testwork (P_{100} 10 mm). Comparative results for MY/LY were 68.4% Li_2O recovery at 6.1% Li_2O grade.

Table 13-16 and Table 13-17 compare the results of the three DMS testwork programs at different crush sizes.

Table 13-16 – Coarse and Fines DMS Recovery and Concentrate Grade

		Crush Size	Coarse DMS				Fine DMS				Total DMS	
Composite	**Head Grade**	**P100**	**Primary**		**Secondary**		**Primary**		**Secondary**		**Coarse**	**Fines**
#	**% Li_2O**	**mm**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Overall Recov.**	**% Li_2O Overall Recov.**
SGS*	1.63	6.0	79.9	5.4	94.6	6.5	-	-	-	-	75.6	-
Nagrom Phase 1 **	1.51	10.0	81.2	4.0	72.6	5.6	96.6	3.7	90.9	4.3	58.5	87.8
Nagrom Phase 2 – EY ***	1.78	15.0	96.7	2.4	67.0	6.2	97.5	4.2	96.4	6.0	64.8	88.7
Nagrom Phase 2 – MY/LY ***	1.56	15.0	97.5	2.0	52.7	6.1	96.7	4.3	96.1	5.9	51.4	84.1
Nagrom Phase 2 - MY	1.57	15.0	98.5	2.0	65.8	6.2	-	-	-	-	-	-
Nagrom Phase 2 - LY	1.67	15.0	97.3	2.2	52.8	6.2	-	-	-	-	-	-

** Single size range (-6 +1 mm) Primary/Secondary DMS*
*** Coarse designation is Main DMS -10 +1 mm; Fine designation is Re-Crush (Main Secondary Floats) DMS -6.3 +1 mm.*
**** Excluding Re-Crush DMS.*

Table 13-17 – Total DMS Recovery, Overall Plant Recovery and Concentrate Grade (including Re-Crush)

Composite	Crush Size P100	Total DMS		Overall Plant	
#	**mm**	**% Li_2O Recovery**	**% Li_2O Grade**	**% Li_2O Recovery**	**% Deportment Li_2O -1 mm**
SGS*	6.0	75.6	6.5	-	-
Nagrom Phase 1	10.0	72.7	6.0	66.0	9.2
Nagrom Phase 2 – EY**	15.0	85.7	6.2	76.2	11.1
Nagrom Phase 2 – MY/LY**	15.0	82.0	6.0	75.6	7.8

** Single size range (-6 +1 mm) Primary/Secondary DMS*
*** Including Re-Crush DMS.*

A total (coarse, fine and re-crush combined) DMS recovery of 83.9% Li_2O at 6.1% Li_2O grade (average EY and MY/LY) was achieved for the Phase 2 testwork. This compares to a total DMS recovery of 72.7% Li_2O at 6.0% Li_2O grade for the Phase 1 testwork and a total DMS recovery of 75.6% Li_2O at 6.5% Li_2O grade (no re-crush) for the SGS preliminary testwork.

Table 13-18 presents the preliminary Process Design Criteria for the James Bay Concentrator based on the results of the Nagrom Phase 2 metallurgical testwork (adjusted for a lower 5.6% final product grade to provide improved project economics).

Table 13-18 – Preliminary Process Design Criteria

Parameter	Units	Design Value	Comments
OPERATING SCHEDULE			
Operating schedule:			
Nominal throughput	t/a	2,000,000	
Crusher Operating schedule:			
Crushing circuit overall utilization	%	68.5	
Moisture content	%	3.0	
Crushing rate	dry t/h	333	
Crushing rate	wet t/h	352	
DMS Operating schedule:			
DMS circuit overall utilization	%	85.0	
DMS Feed rate	dry t/h	269	
ROM CHARACTERISTICS			

Parameter	Units	Design Value	Comments
Feed grade – LOM	% Li_2O	1.30	6% waste dilution
Production:			
Early Years (original mine schedule):			
Coarse DMS Recov. (contribution to total DMS Recov.)	% Li_2O	56.8	
Fine DMS Recov. (contribution to total DMS Recov.)	% Li_2O	14.7	
Re-Crush DMS Recov. (contribution to total DMS Recov.)	% Li_2O	12.6	
Total DMS Recovery	% Li_2O	84.1	
Overall Plant Recovery (including -1 mm fines)	% Li_2O	69.6	
Final Concentrate Grade	% Li_2O	5.6	
Concentrate Production - nominal	kt/a	323	
Mid/Later Years (original mine schedule):			
Coarse DMS Recov. (contribution to total DMS Recov.)	% Li_2O	48.6	
Fine DMS Recov. (contribution to total DMS Recov.)	% Li_2O	11.1	
Re-Crush DMS Recov. (contribution to total DMS Recov.)	% Li_2O	21.3	
Total DMS Recovery	% Li_2O	81	
Overall Plant Recovery (including -1 mm fines)	% Li_2O	66.9	
Final Concentrate Grade	% Li_2O	5.6	
Concentrate Production - nominal	kt/a	310	
ROM FEED			
Crushing Work Index:			
Design	kWh/t	8.0	
Early Years:			
Average	kWh/t	8.0	
Max	kWh/t	9.8	
Min	kWh/t	7.6	
SD			
Later Years:			
Average	kWh/t	7.6	
Max	kWh/t	9.1	
Min	kWh/t	6.5	

Parameter	Units	Design Value	Comments
Abrasion Index:			
Design	g	0.26	
Early Years average	g	0.26	
Mid Years average	g	0.26	
UCS:			
Design	MPa	150	
Early Years:			
Average	MPa	90.2	
Max	MPa	137.4	
Min	MPa	49.8	
Mid Years:			
Average	MPa	103.8	
SD	MPa		
Max	MPa	147.1	
Min	MPa	87.3	
Crushing Work Index (not used in design):			
Bond Rod Mill Work Index @ 1180 µm closing screen:			
Early Years	kWh/t	14.2	
Mid Years	kWh/t	12.1	
Bond Ball Mill Work Index @ 106 µm closing screen			
Early Years	kWh/t	21.9	
Mid Years	kWh/t	21.5	
SMC (not used in design):			
DWi:			
Early Years	kWh/m3	12.0	
Mid Years	kWh/m3	12.0	
A:			
Early Years		71.2	
Mid Years		70.7	
b:			
Early Years		1.18	

Parameter	Units	Design Value	Comments
Mid Years		1.17	
Mia:			
Early Years	kWh/t	10.8	
Mid Years	kWh/t	11.0	
Material Properties:			
ROM SG Average:			
Early Years		2.73	
Mid Years		2.70	
Bulk Density Crushed ROM:			
Mass Design	t/m^3	1.75	
Volume Design	t/m^3	1.65	
Early Years	t/m^3	1.76	
Mid Years	t/m^3	1.74	
ROM moisture content	%	3.0	
CIRCUIT SPLITS & PARTICLE SIZE DISTRIBUTIONS			
Crushing circuit P100	mm	15	
ROM feed basis mass splits:			
P80	mm	9.4	
P50	mm	4.2	
-1 mm Fines	%	20.3	
Li_2O deportment -1 mm	%	17.2	
Coarse secondary DMS floats re-crush size	mm	6.3	
DMS			
Circuit SG cut-points:			
Coarse Primary		2.7	
Coarse Secondary		2.9	
Fine Primary		2.7	
Fine Secondary		2.8	
Circuit sinks yield:			
Coarse Primary	%	69.7 - 71.9	
Coarse Secondary	%	17.6 - 25.7	

Parameter	Units	Design Value	Comments
Fine Primary	%	38.2 - 41.6	
Fine Secondary	%	65.4 - 71.0	
Re-Crush	%	12.1 - 14.5	
Stage DMS recovery (+1 mm):			
Coarse DMS	%	51.4 - 64.8	
Fine DMS	%	84.1 - 88.7	
Re-Crush	%	63.4 – 65.7	
Overall	%	82.0 – 85.7	

A total (coarse, fine and re-crush) DMS recovery of 85.7% Li_2O at 6.2% Li_2O grade and a recovery of 82.0% Li_2O at 6.0% Li_2O grade were achieved for the Phase 2 EY and MY/LY testwork respectively. This compares with 78.4% DMS recovery at 5.2% Li_2O grade (reportedly including re-crush) achieved during the Phase 1 testwork.

13.3.4 Testwork, Recovery Review, Scale-Up Factors and Design Recovery

13.3.4.1 Testwork Data Review

The metallurgical testwork and the results presented in this Metallurgical Testwork Report were reviewed by external consultant Jeremy Bosman of PESCO to confirm the overall plant recovery design target.

PESCO used a mass balance smoothing simulation software package called BILCO to confirm the testwork DMS and overall recovery presented in previous sections of this report.

Table 13-19 and Table 13-20 compare the testwork DMS and overall recoveries/grades for the EY and MY/LY from the Report and BILCO.

Table 13-19 – Preliminary Process Design Criteria

	Testwork				
	DMS		**-1 mm Deportment**	**Overall**	
	Recov.	**Grade**	**Li_2O**	**Recov.**	**Grade**
EY	85.7	6.2	11.2	76.1	6.2
MY/LY	82.0	6.0	7.8	75.6	6.0

Table 13-20 – Testwork Recovery and Grades – BILCO Simulation

	Testwork		
	DMS	**-1 mm Deportment**	**Overall**

	Testwork				
	Recov.	**Grade**	**Li_2O**	**Recov.**	**Grade**
EY	85.8	6.0	8.7	78.3	6.0
MY/LY	79.9	5.9	6.0	75.1	5.9

The results indicate an overall testwork recovery of 76.1% and 75.6% for EY and MY/LY, respectively, compared to the BILCO results of 78.3% and 75.1% recovery, indicating that the two methods for interpreting the testwork data are relatively close. No deleterious elements that could have a significant impact on potential eventual economic extraction have been identified.

13.3.4.2 Scale-Up to Full-Scale Plant

In order to 'translate' the overall testwork recovery into a full-scale plant recovery, the following "modifying" factors have been used:

- PSD
- DMS Scale-up factor that considers the use of larger diameter cyclones and medium contamination/viscosity challenges as well as data from other spodumene projects

The PSD created during testwork is distinctly different from that created on a mine site where for example, blasting will increase the quantity of fines produced. Nagrom Phase 2 testwork indicated that between 7% and 10% of the Li_2O reported to the -1 mm fraction compared to 15.3% for the Mt Cattlin operating plant at a similar P_{100} crush size.

Table 13-21 and Table 13-22 present the amended Li_2O deportment data for the James Bay Project based on the Mt Cattlin PSD and James Bay size by assay data.

Table 13-21 – Adjusted PSD EY

		Li_2O	Deportment		
		%	**Yield**	**Li_2O**	**Li_2O metal**
Calc. Head		1.554	100.00%	100.00%	1.554
Size (mm)					
+4		1.626	55.00%	57.55%	0.894
+1		1.586	24.70%	25.21%	0.392
-1		1.319	20.30%	17.24%	0.268

Table 13-22 – Adjusted PSD MY/LY

		Li_2O	Deportment		
		%	**Yield**	**Li_2O**	**Li_2O metal**
Calc. Head		1.383	100.00%	100.00%	1.383
Size (mm)					
+4		1.460	55.00%	58.08%	0.803
+1		1.372	24.70%	24.51%	0.339
-1		1.186	20.30%	17.42%	0.241

The PSD data indicates that the average loss of Li_2O to the -1 mm stream for the plant is 17.2% and 17.4% for EY and MY/LY respectively.

Table 13-23 presents testwork and full-scale plant performance data for Mt Cattlin, and others Australian operations and compares these with James Bay testwork data.

Table 13-23 – Mt Cattlin, Australian Operations and James Bay Scale-Up Factors

	Head Grade	Impurities	Circuits	Crush P100 (mm)		Recovery/grade %Li_2O			
	% Li_2O			**Testwork**	**Plant**	**DMS**		**Overall**	
						Testwork	**Plant**	**Testwork**	**Plant**
Mt Cattlin	1.05	Basalt & Mica	DMS only	10	14	80/6.0	75/6.0	67	56/5.9
Operation 1	0.94	Mica (no basalt)	DMS only	14	18	86/6.0	80*	76	65/6.1
Operation 2a	1.20	Basalt & mica	DMS & flotation	6.5	8	-	60/6.1	80/6.4	58/5.8
James Bay	1.40	Mica (no basalt)	DMS only	15	15	80 to 86/5.9 to 6.0	-	75 to 78/5.9 to 6.0	-

**Estimated based on Mt Cattlin DMS scale-up*

Testwork DMS recoveries for the three DMS-only Projects (Mt Cattlin, Operation 1 and James Bay) varied between 80% and 86% which translated to between 67% and 76% overall testwork recovery for Mt Cattlin and Operation 1 respectively.

Table 13-24 compares scale-up factors for Mt Cattlin, Operation 1 and James Bay

Table 13-24 – James Bay EY and MY/LY full-Scale Performance Estimate

	DMS Scale-up	Overall Scale-up
Mt Cattlin	0.94	0.80
Operation 1	0.93	0.86
James Bay	0.94	0.84

The DMS scale-up factor of 0.94 for Mt Cattlin has been calculated from actual data (75/80 testwork/plant recovery) and this factor has been used for James Bay to estimate a plant DMS recovery for EY and MY/LY. The total scale-up factor of 0.84 for James Bay has been calculated from this estimated plant DMS recovery multiplied by the +1 mm Li_2O wt% deportment. The plant DMS recovery, overall recovery and overall scale-up factors for EY and MY/LY are presented in Table 13-25.

Table 13-25 – James Bay EY and MY/LY Full-Scale Performance Estimate

	Full-scale Plant					
	DMS		**-1 mm Deportment**	**Scale-up Factor**	**Overall**	
	Recov	**Grade**	**Li_2O (Mt Cattlin)**		**Recov**	**Grade**
EY	80.4	6.0	17.2	0.85	66.5	6.0
MY/LY	74.9	5.9	17.4	0.82	61.9	5.9

As an independent check on the James Bay EY data presented in Table 13-25, the Operation 1 testwork data presented in Table 13-23 indicated a DMS testwork recovery of 86% and an overall plant recovery of 65%, which is reasonably close to the corresponding James Bay data in Table 13-20 (85.8%) and Table 13-25 (66.5%).

Based on the data presented in Table 13-25the design overall plant recovery for the James Bay Project is 66.5% for EY and 61.9% for MY/LY targeting a 6.0% Li_2O product.

However, various analyses were performed to identify the operational conditions based on the current market within the design allowance already integrated in the process plant design. Operating the James Bay processing plant to produce a final product grade target of 5.6% Li_2O compared to the testwork and basis of design of 6.0% Li_2O will markedly improve the economics of the project, by increasing the overall plant recovery to 69.6% and 66.9% for EY and MY/LY respectively. These increased recovery targets have been estimated using the James Bay variability testwork results. Further DMS testwork will need to be undertaken to confirm the achievable recovery at the lower product grade. Plant design changes (around the secondary DMS and re-crush circuits) are anticipated to be minimal and will not materially affect the capital cost and operating cost estimates of the Project.

13.3.5 -1 mm Recovery Options

The use of flotation and UF DMS for recovery of lithium for the -1 mm fraction will be further investigated in later stages of the project. Previous testwork focused on UF DMS recovery from the –1 mm material, however, a recent in-house options study showed that flotation would be the preferred route to maximise the financial benefit from this stream.

UF DMS testwork results are summarised below.

Additional DMS testwork was undertaken on the -1 mm fraction to improve the overall plant recovery.

UF DMS testwork was undertaken at the following cut-points for -1 +0.5 mm and -1 + 0.3 mm material for EY and MY/LY:

- Single stage 2.90 SG
- Single stage 2.95 SG
- Single stage 2.85 SG
- Two-stage both at 2.80 SG

The single stage -1 + 0.5 mm DMS tests produced concentrate grades of between 4.8% and 5.2% Li_2O and those for the -1 +0.3 mm produced concentrate grades of between 3.9% and 4.6% Li_2O. The two-stage DMS tests all achieved final concentrate grades above 6.0% Li_2O. The improved concentrate grades for two-stage DMS are attributed to a large proportion of near (cut-point) density material.

Table 13-26 presents the two-stage UF DMS results for the EY and MY/LY at a crush size P_{100} of 15 mm.

Table 13-26 – Ultrafine DMS Recovery and Concentrate Grade

Comp.	UF DMS -1 +0.5 mm						UF DMS -1 + 0.3 mm					
#	**Primary**		**Secondary**		**Overall**		**Primary**		**Secondary**		**Overall**	
	% Li_2O Stage Recov.	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Stage Recov.**	**% Li_2O Conc Grade**	**% Li_2O Recov.**	**% Li_2O Conc Grade**
Master EY	85.1	4.8	91.7	6.3	78.1	6.3	71.3	4.3	84.2	6.0	60.0	6.0
Master MY/LY	81.7	4.7	91.0	6.4	74.3	6.4	69.1	4.2	82.1	6.1	56.8	6.1

The additional recovery realized from the -1 mm fraction has not been included in the existing PDC but will be reviewed and reconsidered during a future Phase of the Project.

13.3.6 Optical Sorting

Optical sorting isn't being pursued for the James Bay project due to the lack of recovery improvement that this technology generated from James Bay material, as the waste is low SG metasediments compared to high SG basalt at Mt Cattlin. However, a summary of these results is shown below.

Preliminary optical sorter testwork on the EY and MY/LY final DMS product was undertaken by Steinert using a two stage 3-D laser sorting flowsheet to reject waste material. The testwork flowsheet is presented in Figure 13-10.

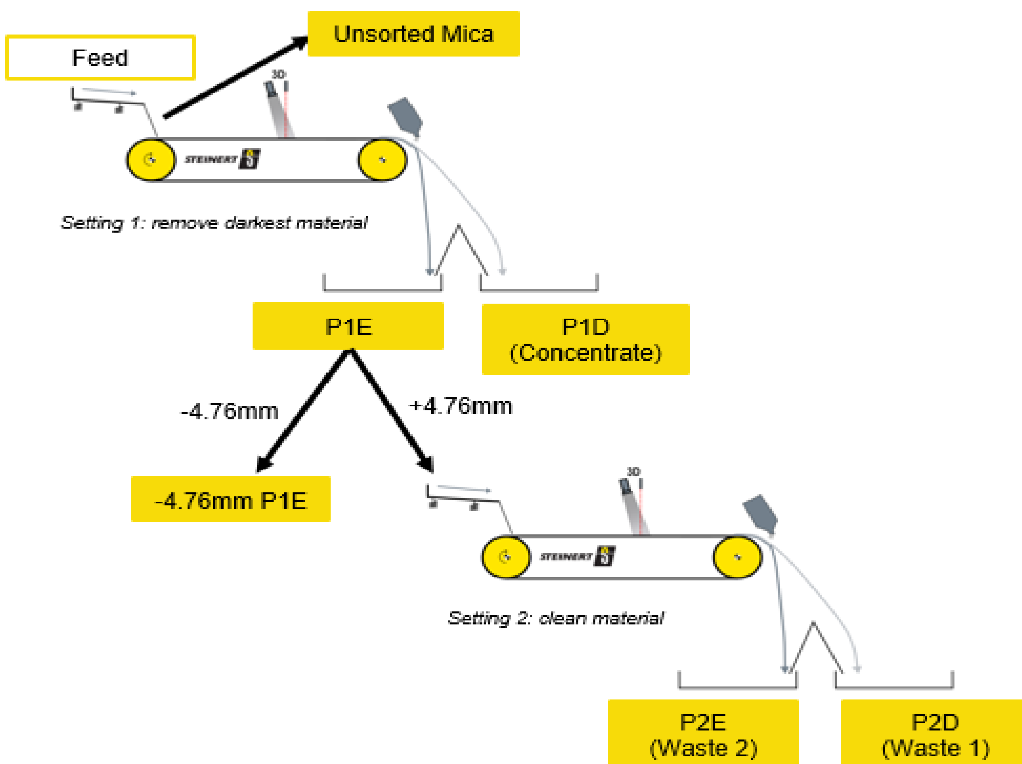


Figure 13-10 – Final Product Optical Sorting Flowsheet

Optical sorter testwork results are presented in Table 13-27 and Table 13-28.

Table 13-27 – Optical Sorter Results, Early Years

	Mass kg	Yield %	Grade % Li_2O	kg Li_2O	Stage Recovery % Li_2O	Overall Recovery % Li_2O
Feed	137.02		6.5	8.847		
Mica Recovered	1.10		2.2	0.025		
P1D +4 mm	108.00	78.82	6.7	7.208	81.5	81.5
P1D -4 mm	7.65		5.5	0.422		
P1E Total	20.27			1.192		
P1E +4 mm	8.33			0.542		
P1E – 4 mm	11.94		5.4	0.650		
P2E	7.99	95.92	6.6	0.529	97.7	6.0
P2D	0.34		3.7	0.013		
Total Product	115.99	84.65	6.7	7.737		87.5

Table 13-28 – Optical Sorter Results, Mid/Later Years

	Mass kg	Yield %	Grade % Li_2O	kg Li_2O	Stage Recov. % Li_2O	Overall Recov. % Li_2O	Grade % Contaminant	kg Contaminant	Stage Rejection % Waste	Overall Rejection % Waste
Feed	185.12		6.3	11.654			0.97	1.799		
Mica Recovered	0.66		2.7	0.018						
P1D +4 mm	146.00	78.87	6.5	9.484	81.4	81.4	0.00	0.000	100.00	
P1D -4 mm	7.77		5.5	0.431						
P1E Total	30.69			1.721				1.799		
P1E +4 mm	5.77			0.265				1.799		
P1E – 4 mm	24.92		5.9	1.457						
P2E	4.25	73.66	5.9	0.251	94.8	2.2	10.15	0.431	76.02	76.02
P2D	1.52		0.9	0.014			89.95	1.367		
Total Product	150.25	81.16	6.5	9.735		83.5	0.29	0.431		76.02

Based on these preliminary tests, Li_2O recovery was between 83.5% (MY/LY) and 87.5% (EY). Waste rejection based on MY/LY results was 76.0%.

The additional upgrade realized from optical sorting of the final product has not been included in the existing PDC but will be reviewed and factored in during the next Phase of the Project.

13.3.7 Thickening & Filtration

Tailings thickening and filtration testwork was initially undertaken by Tenova. Further testwork was undertaken by Outotec due to insufficient fines being available for the Tenova filtration tests. The results of the thickening testwork are presented in Table 13-29.

Table 13-29 – Thickening Testwork Results

Sample/Vendor	Flux Rate	Rise Rate	Feed Density	Flocculant		Underflow Density	Underflow Yield Stress	Overflow Clarity	Thickener Diameter
	$t/m^2/h$	**m/h**	**% Solids w/w**	**Type**	**Consumption (g/t)**	**% Solids w/w**	**Pa**	**Wedge - mg/L**	**m**
Combined Years									
Tenova	0.6	5.6	10.0	Nalco 83376	2.0	65.9	51	15 (wedge)	16
Early Years									
Outotec	0.25	11.3	2.2	Nalco 83372	20	>70	>550	20 – 280	12
Mid/Later Years									
Outotec	0.25	11.3	2.2	Nalco 83372	20	>70	>550	> 46 - 200	12

The flux rate indicated by the Tenova testwork at 0.6 $t/m^2/h$ was substantially higher than 0.25 $t/m^2/h$ indicated by the Outotec testwork. Based on the author's experience, the flux rate reported by Tenova is similar to that obtained in concentrate thickeners where higher solids SGs are apparent. This flux rate is considered excessive for lithium tailings.

The Tenova testwork was conducted at a feed density of 10.0% solids w/w contrary to the specified design of 2.2%. Tenova's calculated flocculant consumption at 2.0 g/t was very low and well below a more typical 20 g/t indicated by Outotec. For this reason, the Outotec data has been used for design purposes.

The results of the filtration testwork are presented in Table 13-30.

Table 13-30 – Filtration Testwork Results

Sample/Vendor	Feed Density	Filtration Rate	Cake Thickness	Filter Cake	Flocculant	Filtrate
	% Solids w/w	**kg/m2/h**	**mm**	**% Moisture**	**Consumption (g/t)**	**% Solids w/w**
Early Years						
Tenova (+0.5 mm only)		3,000	8	-	-	0.037
Outotec	56.0	756	19	9.0	20	-
Mid/Later Years						
Outotec	56.0	776	19	7.7	14	-

The Tenova filtration testwork indicated a filtration rate of 3,000 kg/m^2/h but this was obtained using only coarse/+ 0.5 mm material due to the lack of -0.5 mm material from the thickening testwork.

The filtration rate for the full stream of tailings indicated by the Outotec testwork was between 756 and 775 kg/m^2/h. For this reason, the Outotec data has been used for design purposes.

14. MINERAL RESOURCE ESTIMATES

14.1 Summary

Mineral Resources for the James Bay Lithium Project have been classified in accordance with the definitions for Mineral Resources in CIM (2014), which are consistent with S-K 1300 definitions. The Mineral Resource estimates, inclusive and exclusive of the Mineral Reserves, are presented in Table 14-1, effective June 30, 2023.

Table 14-1 – Summary of Mineral Resources –June 30, 2023

Inclusive of Mineral Reserves			
Category	**Tonnage (Mt)**	**Grade (% Li_2O)**	Contained Metal (kt Li_2O)
Measured	-	-	**-**
Indicated	54.3	1.30	**706**
Total Measured + Indicated	**54.3**	**1.30**	**706**
Inferred	55.9	1.29	**724**
Exclusive of Mineral Reserves			
Category	**Tonnage (Mt)**	**Grade (% Li_2O)**	Contained Metal (kt Li_2O)
Measured	-	-	**-**
Indicated	18.1	1.12	**204**
Total Measured + Indicated	**18.1**	**1.12**	**204**
Inferred	**55.9**	**1.29**	**724**

Notes:

1. *The definitions for Mineral Resources in CIM (2014) were followed for Mineral Resources which are consistent with S-K 1300 definitions and the JORC Code.*
2. *Mineral Resources are estimated at a raised cut-off grade of 0.5% Li_2O.*
3. *Mineral Resources are estimated using a long-term spodumene concentrate (6.0% Li_2O) price of USD1,500/t, and a CAD/USD exchange rate of 1.33.*
4. *A minimum true thickness of 2 m was used during pegmatite modelling.*
5. *Bulk density has been applied to pegmatite blocks using a regression curve with Li_2O - Bulk Density (g/cm^3) = (0.0669 x Li_2O%) + 2.603.*
6. *Mineral Resources have been declared both inclusive and exclusive of Mineral Reserves.*
7. *Mineral Resources that are not Mineral Reserves do not have demonstrated economic viability.*
8. *Mineral Resources were constrained using a Whittle pit optimization shell using the following assumptions:*
    a. *Costs: Processing: CAD 13.23/t ore, G&A, Closure, Sustaining CAPEX, Owner's cost and IBA Payments: CAD 20.69/t ore, Mining: CAD 4.82/t mined.*
    b. *Metallurgical recovery: 70.1%.*
    c. *Transport Costs: USD86.16/ t concentrate*
    d. *NSR Royalty: 0.32%.*
9. *Mineral Resources are 100% attributable to GLCI.*
10. *Numbers may not add due to rounding.*

The SLR QP is of the opinion that with consideration of the recommendations summarized in Sections 1 and 26 of this Technical Report, any issues relating to all relevant technical and economic factors likely to influence the prospect of eventual economic extraction can be resolved with further work. The SLR QP is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, political, or other relevant factors that could materially affect the Mineral Resource estimate.

14.2 Resource Database

The drilling database used in the Mineral Resource includes a total of 602 drill holes for a total of 103,228 m. All drilling was used to inform the geological modelling of the pegmatites; however, all metallurgical and geotechnical holes were removed from the estimate as they did not contain assay data. Only pegmatite intervals were sampled and assayed (including a border of two metres of wall rock), resulting in a total of 22,925 assays for 25,686 metres analysed.

In addition to the drill holes, a total of 52 channel samples representing 809 m were included in the database and used in the calculation of the Mineral Resource. The majority of the channel samples were sent for analysis, and a total of 557 assays for 789 m was used in the estimation of the Mineral Resource.

Original lithium assays were converted into Li_2O using a factor of 2.153 and expressed as percentages. Geostatistical analysis, variography, and grade estimation considers lithium assays expressed as Li_2O. All unsampled intervals were assigned a value of 0.0 Li_2O, and any assays below detection were assigned a value representing ½ the detection limit.

The collar position of each drill hole and channel sample was measured using RTK methods by an independent surveyor, although a small proportion of drill hole collars in the NW Sector were surveyed using a handheld GPS. Channel samples were projected vertically onto a high-precision LiDAR topographic surface, and surveys were recalculated to follow the topography of the outcrops. Downhole surveys were collected using either a gyroscope or EZ-TRAC downhole survey tool (provided by REFLEX) and adjusted for both magnetic declination and grid convergence.

Drill hole data was imported into Leapfrog Geo version 2022.1.1. The following validation steps were followed:

- Checked minimum and maximum values for each quality value field for errors
- Checked for gaps, overlaps, and out of sequence intervals in assays tables
- Verified downhole surveys to ensure no discrepancies exist between measured surveys and assumed data
- Replaced unsampled assay intervals as described above

No material discrepancies were found and the SLR QP is satisfied with the database used in the mineral resource estimate.

14.3 Geological Interpretation

14.3.1 Pegmatite Model

The spodumene-bearing pegmatite dikes are hosted within a 300 m-wide deformation corridor and attain up to 80 m in width and over 300 m in length. The individual pegmatite dikes generally strike south-southwest and dip moderately to the west-northwest (215°/ 60°) and present as an en-echelon dike array on the macro scale. The dikes have been traced at depth up to 500 m vertically and are open at depth.

Based on core drilling data, surface geology mapping, and outcrop channel sampling, a three-dimensional model was created for the pegmatite dikes (Figure 14-1). The three-dimensional model honours drilling data and has been adjusted at surface to honour the outcropping hanging wall and footwall contacts of each pegmatite dike. The wireframes were modelled from logged pegmatite intervals, not Li_2O grades, as a total of 67 individual pegmatite dikes in Leapfrog Geo (version 2022.1.1). The dikes were subsequently grouped based on their geographical location and orientation (dip and strike), with grouping shown in Figure 14-1. A minimum true thickness of two metres was applied to the pegmatite wireframes during modelling.

Internal waste units were also modelled where enclaves of waste rocks were observed over at least three drill holes. These internal waste units were subtracted from the pegmatite wireframes.

The three-dimensional models were allowed to extend into the air to incorporate the channel samples, however the block model was subsequently clipped to a topography surface created from a LiDAR survey post-estimation.

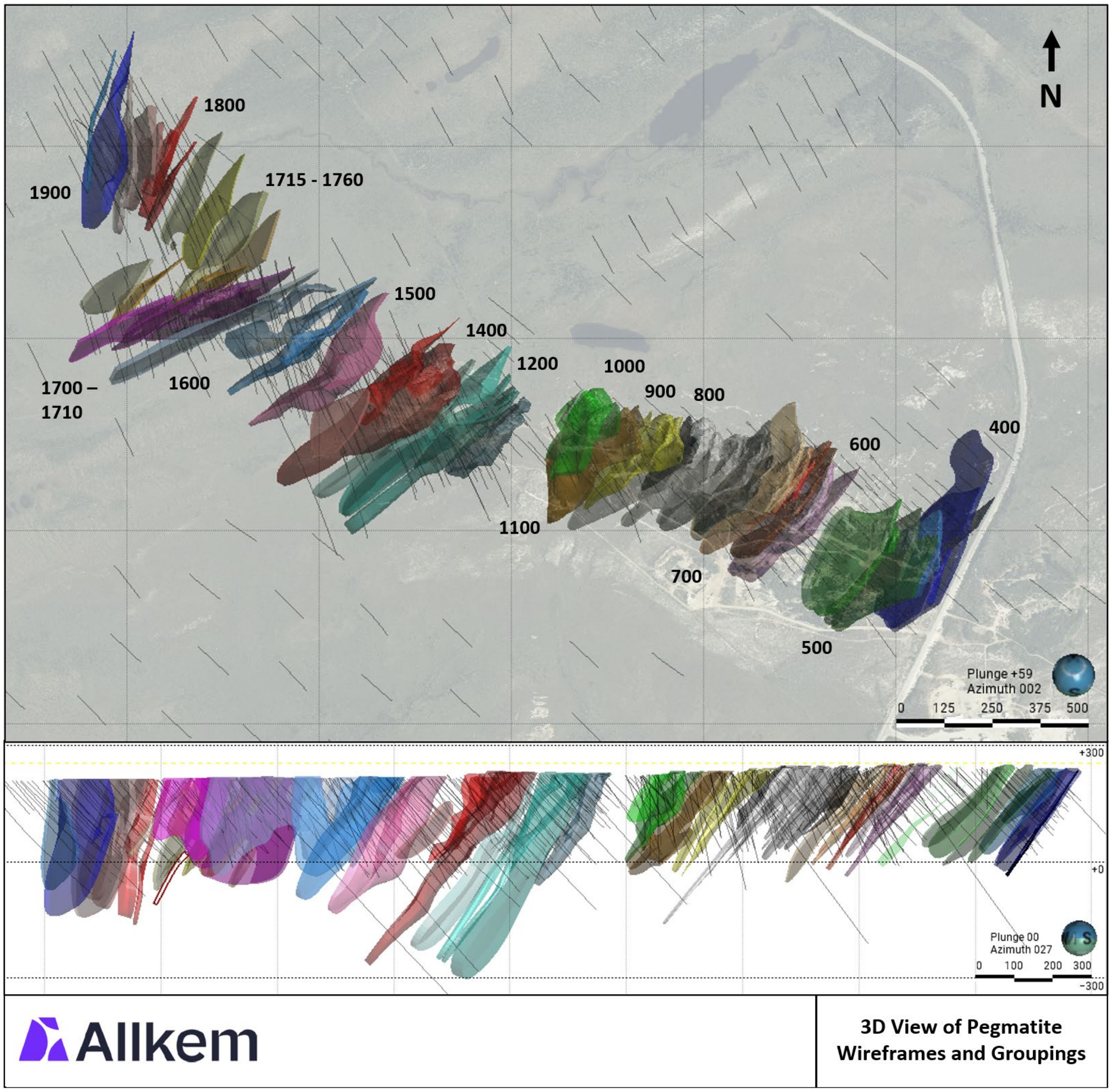


Figure 14-1 – Isometric View of Pegmatite 3D Model with Schematic Section

14.3.2 Lithological Model

A lithological model was also constructed using logging codes from drilling intervals, which includes the following units: glacial till, diabase, metasediments (paragneiss), minor occurrences of felsic porphyry sills, and a biotite-rich schist. The lithological model was used primarily to code appropriate bulk densities into the waste rock in the block model.

14.4 Resource Assays

Following the groupings outlined in Figure 14-1, descriptive statistics were produced for each pegmatite group in an attempt to understand any spatial variation in Li_2O grade and variability. The results are shown in Table 14-2. Average Li_2O% grades within the modelled pegmatites varies between 1.11% and 1.59% Li_2O and show a slight positive skewness. No extreme outliers are visible in the histogram (Figure 14-2), therefore no capping was applied.

Table 14-2 – Descriptive Statistics of Li_2O% with the Pegmatite Dike Groupings

Pegmatite Grouping	# of Assays	Length (m)	Mean (Li_2O %)	Min. (Li_2O %)	Max. (Li_2O %)	Median (Li_2O %)	Standard Deviation	Coeff. of Variation	Variance
400	619	639.2	1.13	0.002	3.39	1.17	0.74	0.66	0.55
500	730	782.0	1.11	0.011	3.55	1.14	0.73	0.66	0.54
600	593	723.8	1.39	0.009	4.24	1.45	0.68	0.49	0.47
700	1,094	1,315.5	1.35	0.030	3.77	1.42	0.63	0.47	0.40
800	1,394	1,799.5	1.31	0.005	3.92	1.40	0.67	0.51	0.45
900	463	584.5	1.18	0.013	2.91	1.29	0.68	0.58	0.46
1000	406	520.7	1.20	0.012	4.09	1.22	0.75	0.63	0.56
1100	599	803.3	1.17	0.004	4.33	1.17	0.82	0.70	0.68
1200	1842	2,335.8	1.29	0.005	3.80	1.39	0.73	0.57	0.54
1400	2,143	2,927.1	1.47	0.005	3.90	1.59	0.64	0.44	0.41
1500	1,255	1,540.2	1.40	0.006	3.90	1.58	0.71	0.51	0.51
1600	1,066	1,126.7	1.25	0.015	5.28	1.27	0.88	0.71	0.78
1700	1,449	1,782.4	1.37	0.009	5.02	1.39	0.88	0.64	0.77
1720	582	569.3	1.27	0.005	5.47	1.21	1.08	0.85	1.16
1800	1,566	1,486.5	1.43	0.013	6.35	1.48	0.88	0.61	0.77
1900	944	908.3	1.59	0.006	4.20	1.63	0.81	0.51	0.66
Outside	6,472	6,306.1	0.39	0.011	5.34	0.23	0.51	1.31	0.26

Multielement geochemistry is not available in sufficient quantities to incorporate into the Mineral Resource.

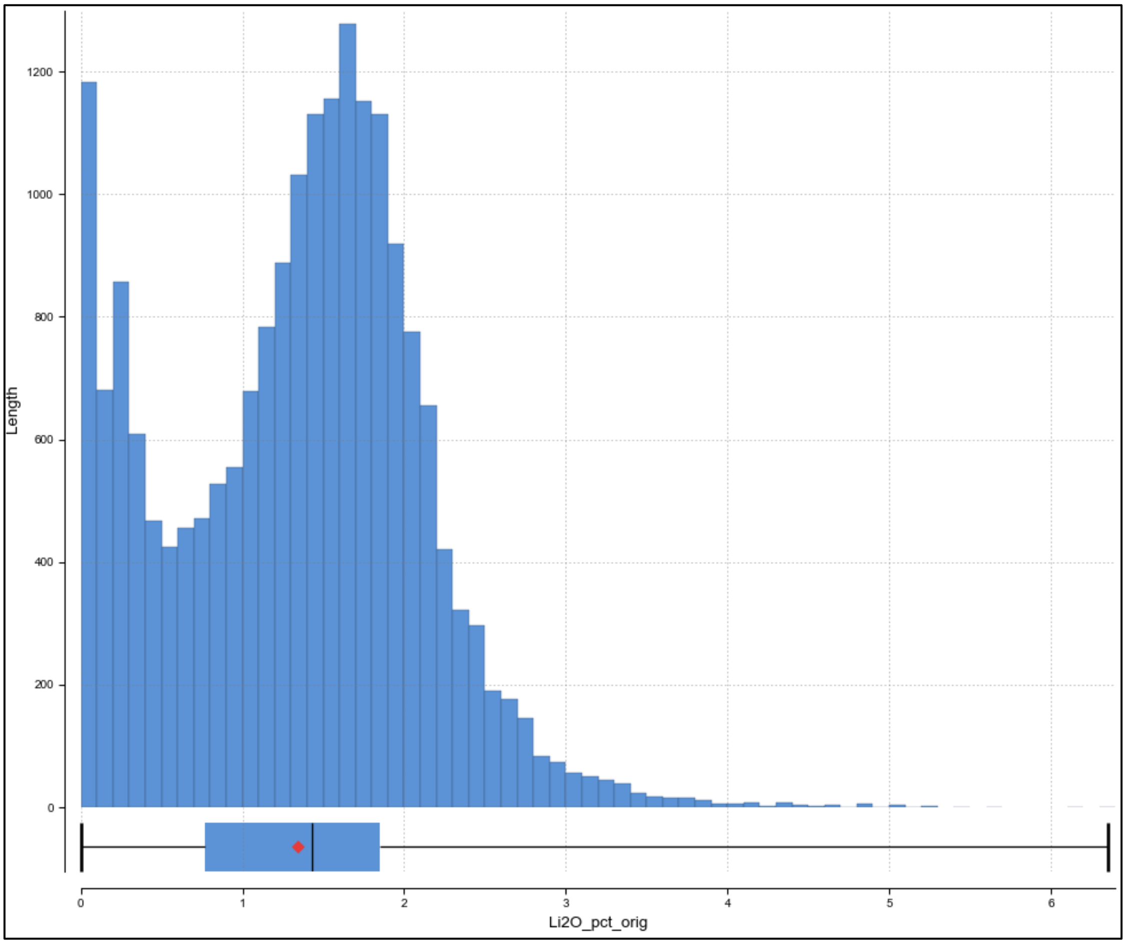


Figure 14-2 – Histogram of Li_2O % Inside Pegmatite Wireframes

14.5 Compositing

The nominal sampling interval used on the Project varied through time. Drilling campaigns in 2009 and 2017 used a typical sampling interval of 1.5 m inside the pegmatite, while honouring geological contacts. For the 2022 and 2023 drilling campaigns, the sampling interval was modified to 1.0 m inside the pegmatite, with geological contacts honoured. A histogram of sampling length is shown in Figure 14-3.

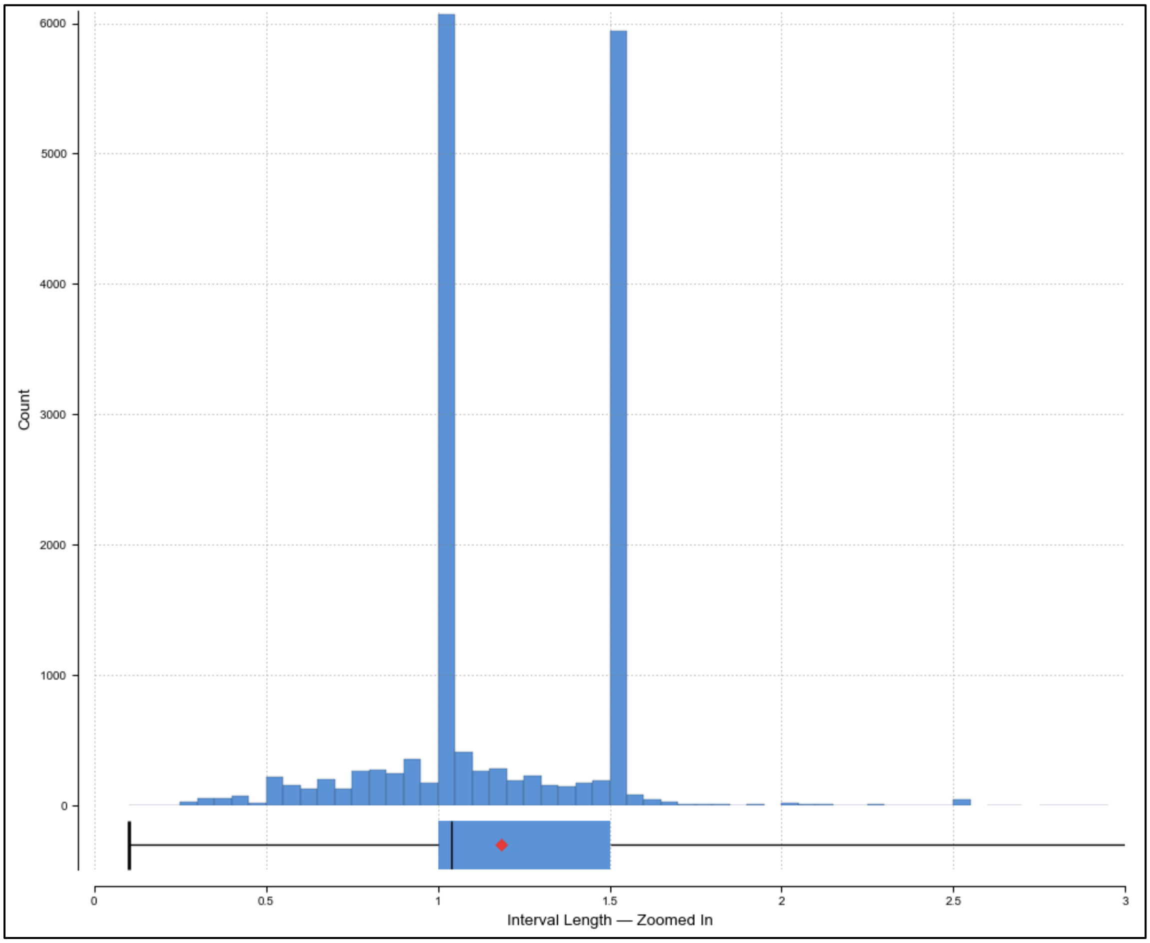


Figure 14-3 – Histogram of Sample Length (m) within Pegmatite Intervals

To avoid the division of assay intervals, the ideal composite size would be 3.0 m (a multiple of both 1.0 m and 1.5 m) however this would significantly reduce the resolution of the block model and likely result in excessive smoothing of the Li_2O grades.

A composite length of 1.5 m was chosen, based on the proposed parent block size and the open pit mining methods and selectivity. Composites were split on the pegmatite boundaries, with residuals less than 0.25 m incorporated into the previous interval. Any composites created in the waste rock and overburden were filtered out. A comparison of assay Li_2O grades and composite Li_2O grades is presented in Table 14-3.

Table 14-3 – Comparison Between Assay and Composite Statistics

Name	Assays (variable length)			Composites (1.5 m)		
	Count	**Mean (Li_2O%)**	**Coeff. of Variation**	**Count**	**Mean (Li_2O%)**	**Coeff. of Variation**
400	633	1.08	0.71	479	1.07	0.62
500	776	0.99	0.78	643	0.96	0.70
600	621	1.32	0.56	547	1.31	0.50
700	1,134	1.29	0.52	988	1.28	0.47
800	1,458	1.23	0.59	1,361	1.22	0.53
900	510	0.99	0.76	483	0.99	0.67
1000	426	1.12	0.70	390	1.11	0.64
1100	626	1.11	0.76	584	1.11	0.69
1200	1,881	1.20	0.65	1,740	1.19	0.62
1400	2,165	1.41	0.48	2,070	1.40	0.46
1500	1,275	1.34	0.57	1,095	1.33	0.53
1600	1,077	1.19	0.76	807	1.20	0.68
1700	1,461	1.35	0.66	1,258	1.35	0.58
1720	591	1.23	0.89	410	1.23	0.75
1800	1,599	1.35	0.68	1,074	1.35	0.59
1900	961	1.52	0.57	641	1.52	0.48

14.6 Trend Analysis

14.6.1 Grade Contouring

SLR built grade shells within the pegmatite wireframes. SLR did not find any obvious grade trends related to higher grade ore shoots. SLR found that the along strike continuity is similar to the down dip continuity and this observation was confirmed geostatistically for most of the variogram domains.

14.6.2 Variography

Spatial continuity was assessed using experimental variograms derived from the 1.5 m composites. Continuity directions were assessed based on the orientation of each of the pegmatite dikes and their spatial distribution. Further, numerous orientation angles were tested prior to finalizing the variogram model orientation.

There were insufficient composites in each dike to produce reliable experimental variograms, therefore, the pegmatite dikes were grouped based on orientation and geospatial location. The variogram model parameters for each group of dikes are shown in Table 14-4.

Table 14-4 – Variogram Model Summary

Variogram Domain	Direction			Nugget	Range 1 (m)				Range 2 (m)			
	Dip	**Dip Azimuth**	**Pitch**		**Sill 1**	**Major**	**Semi-major**	**Minor**	**Sill 2**	**Major**	**Semi-major**	**Minor**
400 - 410	53	285	65	0.30	0.33	50	50	4	0.370	130	150	14
420 - 550	47	285	65	0.30	0.25	50	40	4	0.450	150	90	13
560 - 730	50	290	65	0.25	0.42	55	40	4	0.330	145	125	10
740 - 820	50	282	74	0.25	0.46	40	40	4	0.290	125	125	10
830 - 850	50	298	74	0.15	0.43	40	40	5	0.420	155	85	15
860 - 880	50	287	74	0.15	0.39	45	20	5	0.462	130	90	10
900 - 910	50	292	66	0.20	0.59	20	40	5	0.210	70	50	15
1000 - 1130	58	275	66	0.15	0.70	45	25	5	0.151	150	65	11
1200 - 1240	65	310	66	0.15	0.49	40	30	5	0.280	115	90	10
1400 - 1415	52	303	70	0.20	0.33	40	27	5	0.470	190	100	10
1500 - 1600	65	310	75	0.15	0.27	40	27	5	0.580	120	100	10
1620 - 1715	75	337	75	0.25	0.45	35	27	5	0.262	125	100	13
1720 - 1800	61	285	90	0.20	0.35	55	55	5	0.264	160	120	15
1810 - 1910	80	280	90	0.20	0.41	57	55	4	0.390	145	120	10

Variogram models comprised of a nugget variance and two structures, applying the spherical model. For the thicker pegmatite dikes, nugget variances are low (15%) and the final ranges are generally 120 m to 150 m. For thinner, less continuous pegmatite dikes (400 – 550), SLR observed a higher nugget variance of 30% with similar ranges as the thicker dikes. An example of a typical variogram model is shown in Figure 14-4.

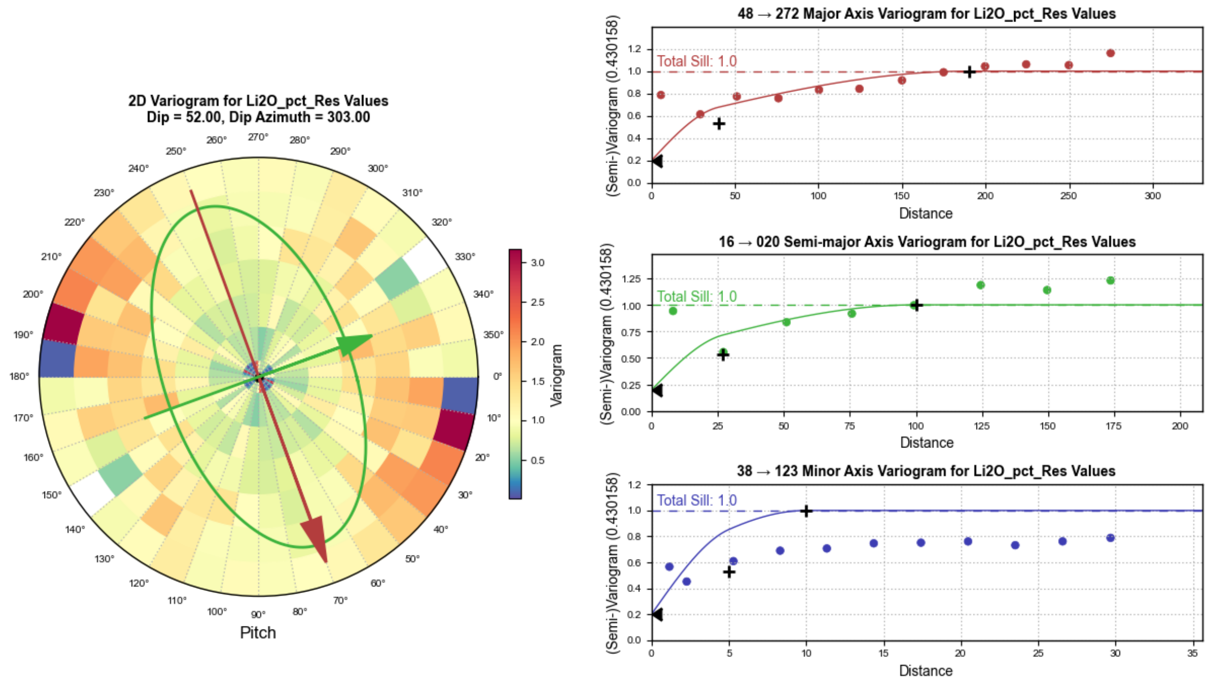


Figure 14-4 – Example of Variogram Model - 1400 domain

14.7 Search Strategy and Grade Interpolation Parameters

Table 14-5 summarizes the general estimation parameters used for the Li_2O grade estimation. In all cases, grade estimation used ordinary kriging (OK) and four passes informed by uncapped composites.

The first pass was the most restrictive in terms of search radii and number of drill holes required. Successive passes usually populate areas with sparser drilling, using relaxed parameters with generally larger search radii and less data requirements. The sensitivity of the Li_2O block estimates to changes in minimum and maximum number of data, and the number of informing drill holes was also assessed. Results from these studies show that globally the model is relatively insensitive to the selection of the estimation parameters and data restrictions mainly due to the relative uniformity of the Li_2O grade distribution.

For the first two passes, a minimum of four composites and a maximum of 12 composites were required. The search ellipse dimensions were based on variogram model ranges and represent approximately 50% and 80% of the average variogram range. For the third and fourth passes, a minimum of one composite and a maximum of 12 composites were required, with search ellipse representing 120% and 200% of the variogram range. For all passes, a maximum of three composites per drill hole was allowed.

Dynamic anisotropy based on the hanging wall and footwall contacts on the pegmatite dikes was used to locally guide the search ellipse orientation during estimation. This method ensures that the search ellipses align internal variations of Li_2O grade and provides a more locally accurate block estimate.

Hard boundaries were used as the contact between the pegmatites and the host rock was observed to be sharp.

Table 14-5 – Estimation Parameters

Pass	Major Axis (m)	Semi-major Axis (m)	Minor Axis (m)	Min. Samples	Max. Samples	Max. samples per hole
1	60	30	7	4	12	3
2	120	60	7	4	12	3
3	180	90	7	1	12	3
4	300	150	20	1	12	3

All blocks outside of the pegmatite wireframes were assigned a zero Li_2O grade. Block Li_2O grades are shown in Figure 14-5.

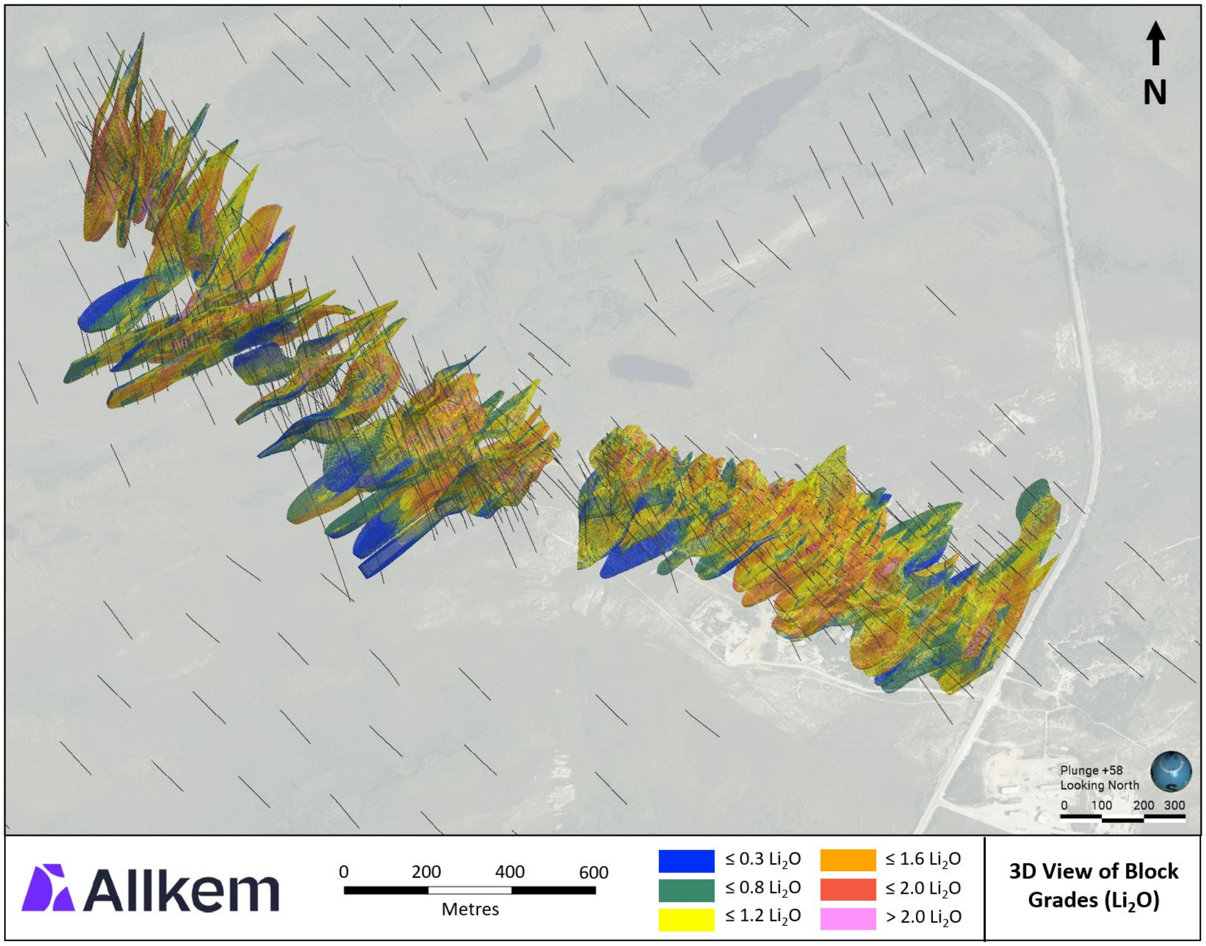


Figure 14-5 – Isometric View of Li_2O % Block Grades

14.8 Bulk Density

Bulk density data was obtained using both laboratory and in-field methods, including both pycnometer testwork on pulps representing different Li_2O grade ranges, and the water displacement method on half-core samples. A full description of these methods is provided in Section 11.2, with a summary provided below.

In 2017, a total of 92 samples half-core samples were sent to ALS laboratory in Vancouver, British Columbia, and bulk density was measured using the water displacement method (OA-GRA08) without paraffin coating. Various lithologies were selected, predominantly the host metasediments and the pegmatites. The average value of the pegmatite bulk density was 2.70 g/cm^3.

In April 2023, an additional 241 half-core samples were subject to bulk density testwork on-site using a custom-built station using the water displacement method. As in 2017, a variety of lithologies were selected, with 137 samples within the pegmatite lithology returning an average bulk density of 2.71 g/cm^3.

In June 2023, a selection of pulps (128) exclusively within the pegmatite lithology was sent to ALS for pycnometer testwork. The pulps were selected based on their Li_2O grade, which ranges between low-grade (0.1% Li_2O) to high-grade (6.4% Li_2O). The goal was to investigate if there is a linear correlation between Li_2O grade and bulk density, as spodumene exhibits a bulk density of 3.15 g/cm^3, considerably denser than the host metasediments.

Summary statistics of the available bulk density data is shown in Table 14-6 below, coded by the lithological model.

Table 14-6 – Summary Statistics of Bulk Density Measurements by Lithology

Lithology	# Samples	Minimum (g/cm^3)	Maximum (g/cm^3)	Mean (g/cm^3)	Median (g/cm^3)	Standard Deviation
Pegmatite	299	2.50	3.13	2.72	2.71	0.099
Metasediments	104	2.60	2.98	2.76	2.75	0.075
Diabase	4	3.03	3.07	3.04	3.03	0.021
Biotite Schist	31	2.62	3.02	2.89	2.90	0.076
Feldspar Porphyry	1	2.67	2.67	2.67	2.67	-

In the block model, bulk density within the pegmatite lithology was assigned using the following regression curve (as shown in Figure 11-1):

$$\text{Bulk Density (g/cm}^3\text{)} = (0.0669 \times Li_2O\ \%) + 2.603$$

Outside the pegmatite wireframes, the mean bulk densities shown in Table 14-6 were assigned into the block model by lithology. Overburden was assumed to have a bulk density of 2.2 g/cm^3.

14.9 Block Models

Criteria used in the selection of block size included the drill hole spacing, composite assay length, the geometry of the pegmatite dikes, and the anticipated open pit mining technique. A block size of 3 m (X) by 5 m (Y) by 5 m (Z) was chosen. Subblocks measuring 0.75 m (X) by 1.25 m (Y) by 1.25 m (Z) were used to honour the geometry of the modelled pegmatite dikes. Subblocks were assigned the same grade as the parent blocks. The model is rotated clockwise around the origin in the Z-axis to be parallel to the general trend of the structural corridor.

Table 14-7 – Block Model Parameters and Dimensions

Axis	Block Size (m)		Origin	Number of Parent Blocks	Rotation (°)
	Parent	**Subblock**			
X	3.00	0.75	356,200	1,134	28° clockwise
Y	5.00	1.25	5,789,700	300	
Z	5.00	1.25	280	120	

Notes: Origin is upper south-west corner of the model

A plan view of the block model extents is shown in Figure 14-6.

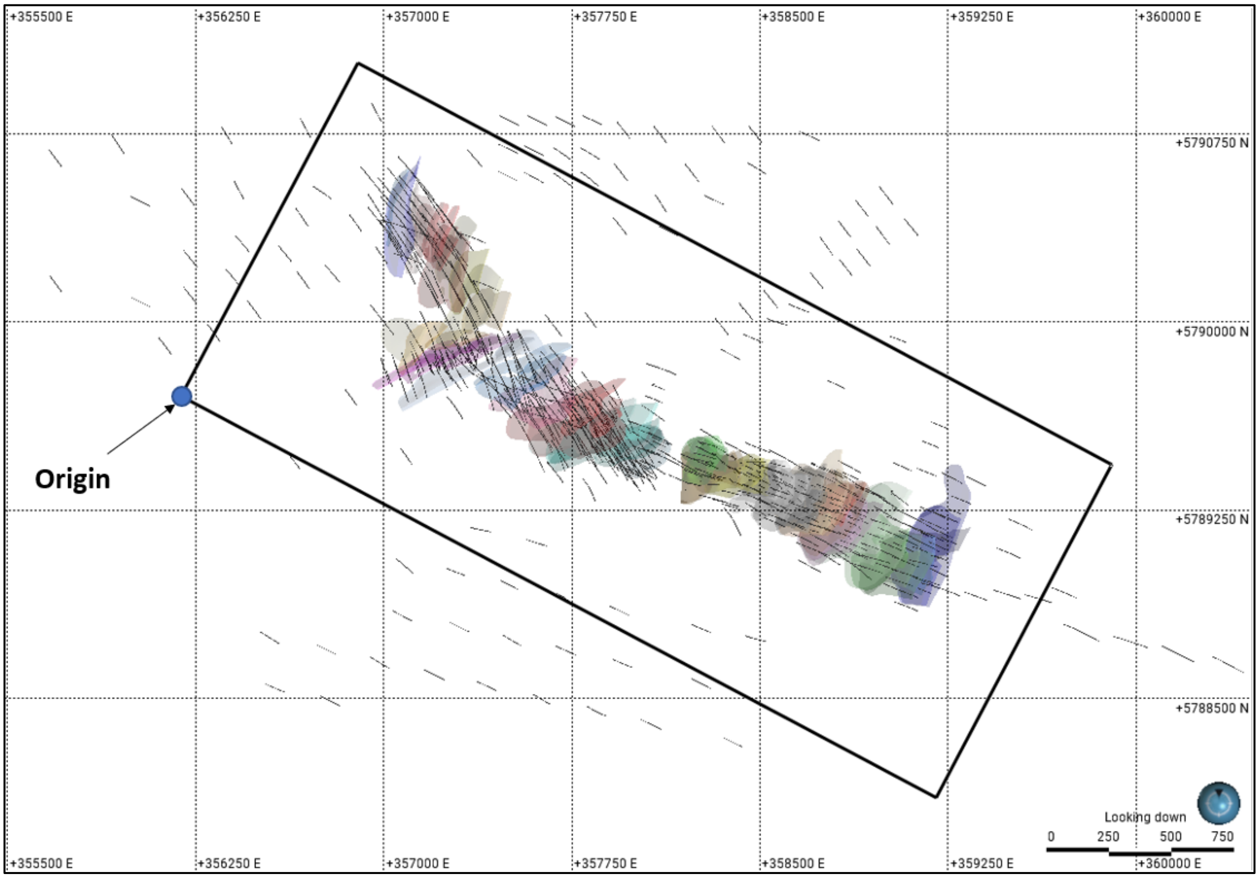


Figure 14-6 – Plan View of Block Model Extents

14.10 Cut-off Grade and Whittle Parameters

Economic parameters were derived from the 2022 Feasibility Study (GMS, 2022), with the exception of modifications made to the royalty parameters and the costs associated with the Impact Benefit Agreement (IBA), and spodumene concentrate price assumptions updated to be in-line with the long-term contractual forecasts provided by Wood Mackenzie, as summarised in Section 19. The updated cost assumptions used for the economic analysis in Section 22 are higher than those from 2022 and increase the calculated cut-off grade from 0.17% Li_2O to 0.27% Li_2O. Consequently, the SLR QP is of the opinion that using an elevated cut-off grade of 0.5% Li_2O to estimate the resource is valid, and conforms to the reasonable prospects for eventual economic extraction (RPEEE) resource definition requirement.

The economic parameters used to produce the constraining pit shell for the Mineral Resource are shown in Table 14-8. The SLR QP notes that the resource spodumene concentrate price assumption of USD 1,500/t is conservative as it is significantly lower than the Wood Mackenzie long-term price forecasts between USD 2,000/t and USD 3,000/t. Allkem has selected the USD 1,500/t spodumene concentrate price for resource reporting consistency with its Mt Cattlin mine in Australia. The SLR QP notes that the Whittle resource shell would increase in size at higher metal prices.

Table 14-8 – Economic Parameters for Whittle Pit Optimisation

Item	Unit	Value
Exchange Rate (CAD/USD)	-	1.33
Spodumene Concentrate Price (6.0% Li_2O)	USD/t conc.	1,500
Transport Costs	USD/t conc.	86.16
NSR Royalty	%	0.32
Processing Costs	CAD/t ore	13.23
G&A, Owner's cost, Closure Costs, Sustaining CAPEX, and IBA	CAD/t ore	20.69
Total Ore-based cost	CAD/t ore	33.92
Mining Cost	CAD/t mined	4.82
Metallurgical Recovery	%	70.1
Calculated Cut-off Grade	% Li_2O	0.17
Cut-off Grade[1]	% Li_2O	0.50

Notes:

11. *Although the cut-off grade has been calculated at 0.17% Li_2O, a higher cut-off grade has been adopted for the following reasons:*

a. *No metallurgical testwork exists on samples with a Li_2O % grade below 0.6% Li_2O to support the metallurgical recoveries of the calculated cut-off grade, and the mineralogical composition of low-grade material is unknown. This will be addressed in upcoming work programs scheduled for 2024.*
b. *The grade-tonnage curve demonstrates that only a relatively small tonnage is added to the Mineral Resource by lowering the cut-off grade. This is due to the relatively homogeneous nature of the spodumene mineralization within the pegmatite dikes.*

14.11 Classification

The block model was classified according to the CIM Definition Standards for Mineral Resources and Mineral Reserves (May 2014) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (November 2019). These classifications are consistent with those outlined in the JORC Code (2012) and in S-K 1300. Mineral Resources are classified into Measured, Indicated, and Inferred categories.

The block classification was based primarily on drill hole spacing, geological and grade continuity, and the average distance of composites to a given block. The block classification was subsequently manually modified to ensure a coherent, contiguous classification suitable for mine planning purposes. Within the pegmatite dike wireframes, the following criteria was used:

- No Measured Mineral Resources were identified.
- Indicated Mineral Resources were identified in areas defined by a nominal drill spacing of 50 m x 50 m.
- Inferred Mineral Resources were identified in areas defined by a nominal drill spacing of 80 m x 80 m.

The drilling, sampling and assaying methods provide sufficient confidence to classify portions of the Mineral Resource as Indicated Category. The continuity of pegmatite dikes has been demonstrated both in outcrop and drilling, and pegmatite dikes can be continuously traced between drilling sections in areas with denser drill hole coverage.

Due to the wider drill spacing and lack of outcrop in the NW Sector, this area has been classified as Inferred Category. Future work programs intend to determine the morphology of dikes in the NW Sector via infill drilling, structural geology studies, and downhole televiewer acquisition.

Block classifications are shown in Figure 14-7.

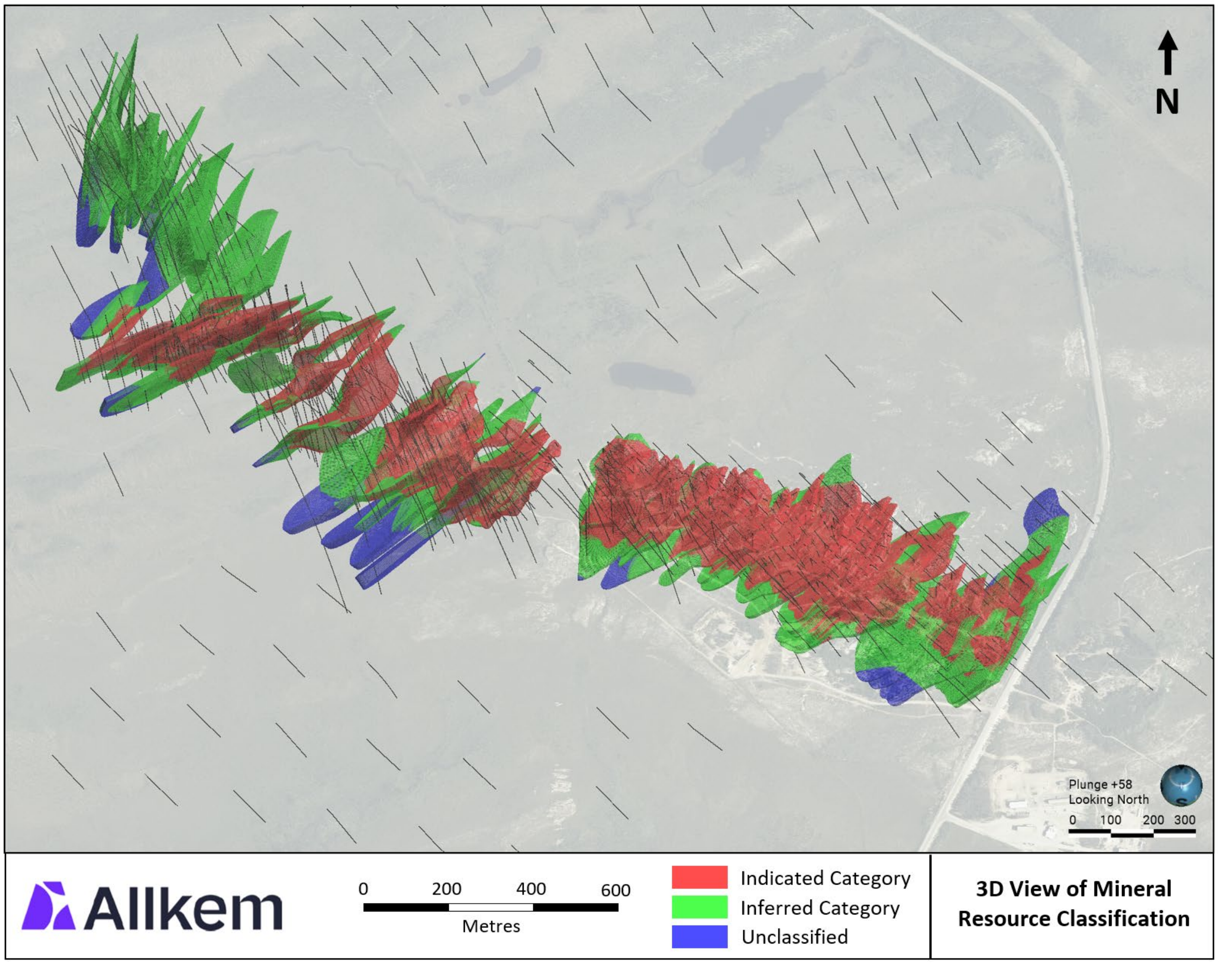


Figure 14-7 – Isometric View of Block Classification Categories

14.12 Block Model Validation

Validation of the Li_2O block grades was undertaken using both local and global methods:

- Descriptive statistics comparing mean composite and block grades on a global scale (Table 14-9)
- Swath plots interrogated comparing block and composite grades on a local scale in three dimensions
- Comparison using alterative interpolators such as inverse distance squared (ID^2) and nearest neighbour (NN) methods.

The block grades were found to be a good representation of the composite grades. The dynamic anisotropy during the interpolation process has preserved internal grade variation within the pegmatite dikes, and any internal waste has been well represented in the block model.

Table 14-9 – Block Grades vs. Composite Grades Using Blocks Categorized as Indicated and Inferred Only

Pegmatite Group	Composites		Blocks			
	No. of Comps	Mean Grade (% Li_2O)	Block Volume (m^3)	OK Mean (% Li_2O)	ID2 Mean (% Li_2O)	NN Mean (% Li_2O)
400	479	1.06	2,302,341	1.05	1.05	1.05
500	643	0.96	3,051,273	0.99	0.99	1.00
600	547	1.30	1,396,356	1.31	1.32	1.31
700	988	1.26	2,130,793	1.25	1.26	1.24
800	1,361	1.21	3,043,236	1.13	1.13	1.11
900	483	0.98	954,110	0.95	0.96	0.97
1000	390	1.11	874,232	1.00	1.00	0.98
1100	584	1.10	953,481	1.03	1.03	1.01
1200	1,740	1.17	5,584,754	1.12	1.12	1.11
1400	2,070	1.39	4,614,001	1.27	1.28	1.26
1500	1,095	1.32	3,051,485	1.27	1.28	1.27
1600	807	1.18	3,039,271	1.14	1.16	1.14
1700	1,258	1.32	2,392,745	1.26	1.27	1.26
1720	410	1.19	2,955,398	1.25	1.27	1.27
1800	1,074	1.34	5,896,335	1.33	1.34	1.32
1900	641	1.51	3,459,423	1.47	1.48	1.49
All	14,570	1.24	45,699,234	1.21	1.22	1.21

14.13 Mineral Resource Reporting

14.13.1 Comparison with Previous Mineral Resource

Since the previous Mineral Resource, an additional 306 drill holes, for approximately 51,000 m, has been conducted, of which approximately 38,000 m were dedicated to exploration and delineation drilling. The discovery of mineralization in the NW Sector has expanded the strike-length of mineralization from 2.0 km to 2.8 km, and exploration at depth has demonstrated the continuity of pegmatite dikes up to a vertical distance of 500 m.

These factors have resulted in a significant increase in the Mineral Resource estimate when compared to the previous Mineral Resource estimate (restated by G Mining in the 2022 Feasibility Study), as shown in Table 14-10.

Table 14-10 – Comparison Between the Previous Mineral Resource and the Current 2023 Mineral Resource

Mineral Resource[1]	Category	Tonnage (Mt)	Grade (% Li_2O)	Contained Metal (000 t Li_2O)
December 2021 Feasibility Study	Measured	-	-	-
	Indicated	40.3	1.40	564
	Measured + Indicated	40.3	1.40	564
	Inferred	-	-	-
2023 Mineral Resource	Measured	-	-	-
	Indicated	54.3	1.30	706
	Measured + Indicated	54.3	1.30	706
	Inferred	55.9	1.29	724
Difference (%)	Measured			
	Indicated	+35%	-7%	+25%
	Measured + Indicated	+35%	-7%	+25%
	Inferred	No Inferred Resources quoted in 2021		

Notes:

1. *Mineral Resources are reported inclusive of Mineral Reserves.*

The constraining pit shell used to report the Mineral Resource is shown in Figure 14-8. The key factors affecting the increase in Mineral Resource are discussed below:

- A combination of an increase in spodumene concentrate price and a reduction in mining and processing costs since the previous Mineral Resource has increased the depth of the constraining pit shell.

- Additional exploration and delineation drilling has extended mineralization along-strike by 800 m to the northwest and at depth, resulting in a larger footprint.
- An updated geological model has incorporated some lower-grade pegmatite dikes that were excluded in the previous Mineral Resource.

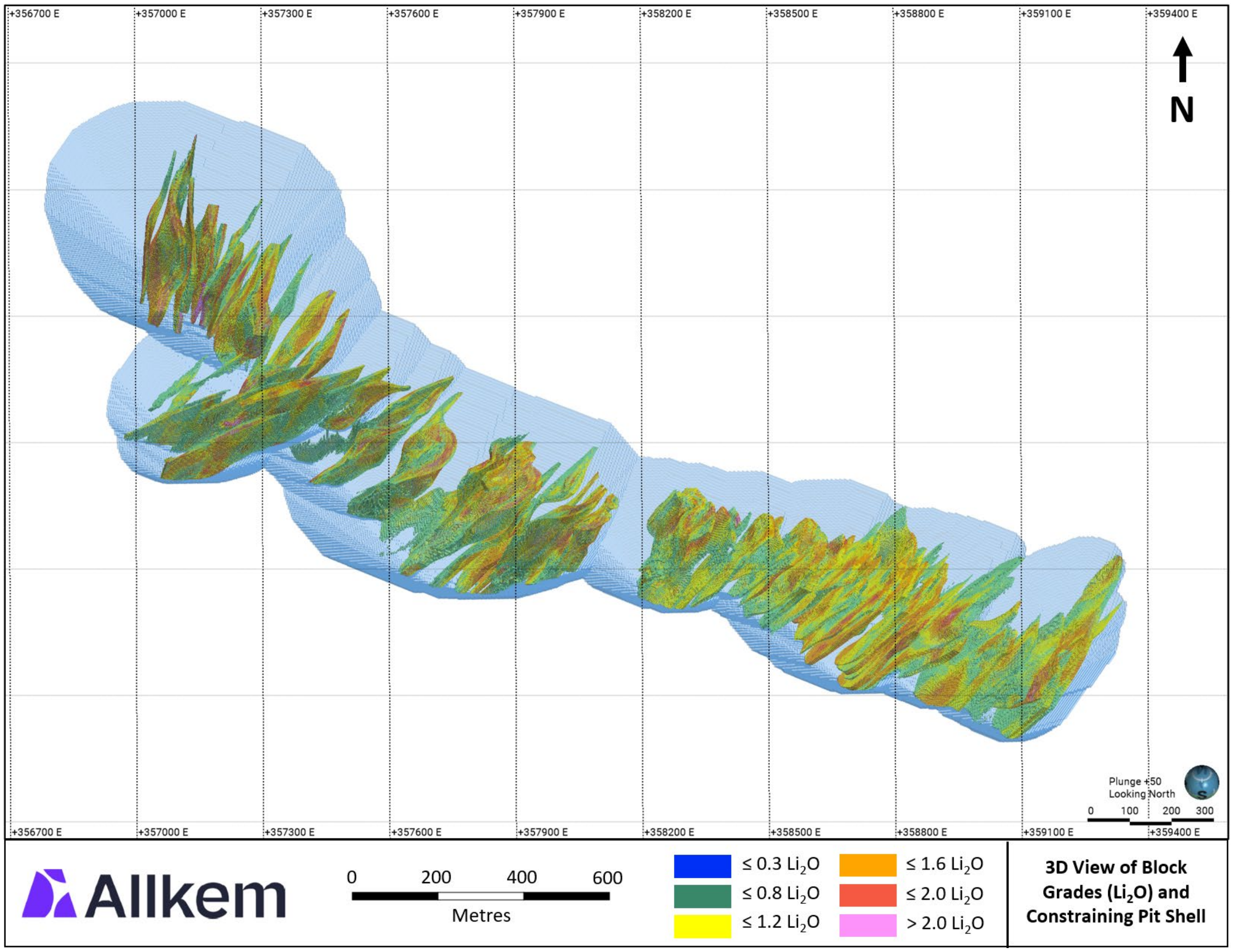


Figure 14-8 – Isometric View Looking North of the Constraining Pit Shell Used to Report the Mineral Resource

14.13.2 Grade Sensitivity Analysis

To understand the impact of a change in the cut-off grade (Li_2O %), the Mineral Resource, inclusive of Mineral Reserves, was reported within the USD1,500 spodumene concentrate price pit shell using varying lower cut-offs. The results are listed in Table 14-11 and illustrated in Figure 14-9.

Table 14-11 – Sensitivity of Indicated and Inferred Tonnage and Grades to Li_2O Cut-Off Grades

Cut-off Grade (Li_2O %)	Indicated			Inferred		
	Tonnage (Mt)	**Grade (Li_2O%)**	**Contained Metal (kt Li_2O)**	**Tonnage (Mt)**	**Grade (Li_2O%)**	**Contained Metal (kt Li_2O)**
0.16	57.6	1.25	718	59.3	1.24	736
0.20	57.4	1.25	718	59.1	1.25	736
0.30	56.6	1.26	716	58.4	1.26	734
0.40	55.6	1.28	712	57.3	1.27	730
0.50	54.3	1.30	706	55.9	1.29	724
0.62	**52.6**	**1.32**	**697**	**54.0**	**1.32**	**714**

Notes:

1. *The tonnages and grade above are for comparative purposes only and do not constitute an official Mineral Resource*
2. *Tonnage and grades are reported inside the USD 1,500/t spodumene concentrate resource pit shell.*

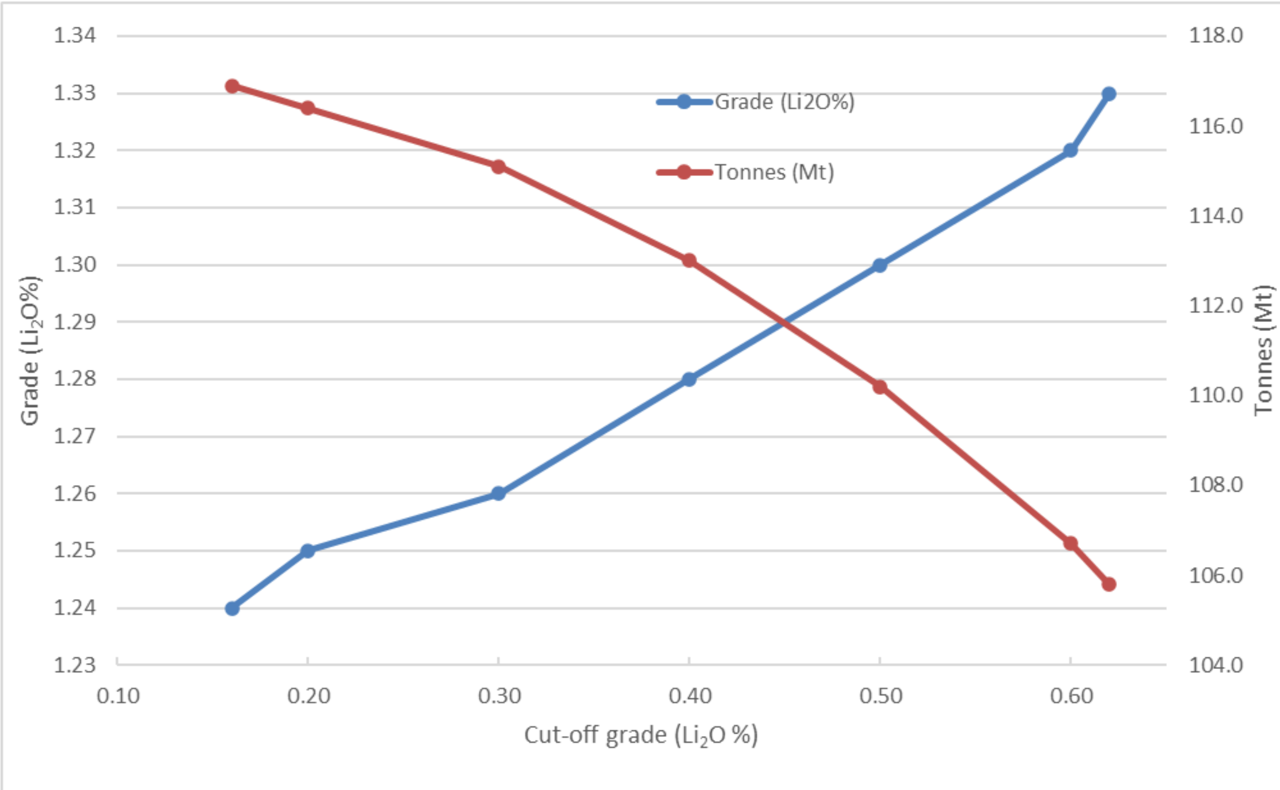


Figure 14-9 – Grade Tonnage Curve

14.14 Risk Factors That May Affect the Mineral Resource Estimate

The SLR QP is of the opinion that the Mineral Resources have been prepared to industry best practices and conform to the resource categories defined by CIM (2014).

Mineral Resources, which are not Mineral Reserves, do not have demonstrated economic viability. At the present time, the SLR QP is not aware of any environmental, permitting, legal, title, taxation, socio-political, marketing, or other relevant issues that may have a material impact on the Mineral Resource estimate.

Some risk factors that could affect the Mineral Resource estimate are discussed below.

- **Changes to the Cut-Off Grade:** The SLR QP considers this to be a very low risk item because the resource estimate is insensitive to cut-off grades in the 0.2% Li_2O to 0.6% Li_2O % range and the current resource estimate is already based on an elevated cut-off grade of 0.5% Li_2O.

- **Changes to the Whittle Inputs:** The pit shells are insensitive to spodumene concentrate prices in the US$600/t to US$2,000/t range so this represents a very minor risk item from the SLR QP's perspective.

- **Changes to the Pegmatite Shapes:** The SLR QP views this as a low risk item because the pegmatite boundaries are easy to define and model accurately in 3D.
- **Block Model Grade Estimates:** The Li_2O resource assays show good grade continuity, a uniform spatial distribution with no internal higher grade trends, and no outliers required capping. The SLR QP is of the opinion that the Li_2O grade estimates are reliable, and this is a low risk item in areas classified as Indicated.
- **Block Model Tonnage Estimates:** Bulk density values, which range from approximately 2.6 t/m³ to 3.0 t/m³, were assigned within the pegmatite wireframes using a regression equation that is a function of Li_2O grades. The SLR QP is of the opinion that the mineralization bulk density values are reliable and acceptable. The main waste rock units have sufficient bulk density support measurements but additional testwork should be completed on minor waste rock units. This is considered to be a very minor issue by the SLR QP.
- **Inferred Mineral Resources:** The Inferred areas have more uncertainty and will require more drilling prior to conversion to Indicated. The SLR QP is confident that most of the Inferred resources will get converted to Indicated with more drilling.

15. MINERAL RESERVE ESTIMATE

15.1 Summary

The Mineral Reserve estimates presented herein conform to CIM (2014) definition standards, which are consistent with S-K 1300 definitions and the JORC Code definitions, and include Indicated Mineral Resources but do not include Inferred Mineral Resources. No Measured Mineral Resources have been estimated at present. The Mineral Reserves represent the estimated tonnage and grade of ore considered economically viable for extraction, including ore dilution and provisions for losses potentially arising during mining or extraction.

The Mineral Reserve estimate for the James Bay Lithium Project is 37.3 Mt, at an average grade of 1.27% Li_2O, as summarized in Table 15-1. The Mineral Reserve (MR), effective June 30, 2023, was prepared by SLR. The open pit Mineral Reserve estimate was prepared under the guidance of Mr. Normand Lecuyer, P.Eng., Associate Principal Mining Engineer, SLR. Mr. Lecuyer is independent of Allkem and takes QP responsibility as defined in CIM (2014) for the Mineral Reserve estimate.

Table 15-1 – Summary of James Bay Open Pit Mineral Reserves – June 30, 2023

Category	Tonnage (Mt)	Lithium Grade (% Li_2O)	Contained Metal ('000) t Li_2O
Proven	-	-	-
Probable	37.3	1.27	475
Total Proven and Probable	**37.3**	**1.27**	**475**

Notes:

1. *CIM (2014) definitions were followed which are consistent with S-K 1300 definitions.*
2. *The effective date of the estimate is June 30, 2023.*
3. *Mineral Reserves are estimated using the following long-term metal prices (Li_2O Conc = USD 1,500/t Li_2O at 6.0% Li_2O) and an exchange rate of CAD/USD 1.33.*
4. *A minimum mining width of 5 m was used.*
5. *A cut-off grade of 0.62% Li_2O was used.*
6. *The bulk density of ore is variable, is outlined in the geological block model, and averages 2.7 t/m³.*
7. *The average strip ratio is 3.6:1.*
8. *The average mining dilution factor is 8.66% at 0.42% Li_2O.*
9. *Overall Metallurgical recovery is 68.9%*
10. *Mineral Reserves are 100% attributable to GLCI.*
11. *Numbers may not add due to rounding.*

Long term spodumene concentrate price assumptions are based on forecasts developed by Wood Mackenzie, a global market research group to the chemical and mining industries. For the years 2023 to 2050, Wood Mackenzie forecast a spodumene concentrate price ranging between USD 2,000/t and USD 3,000/t (real USD 2023 terms), as summarised in Section 19.

The Mineral Reserve estimate herein supersedes the Mineral Reserves reported previously in the Technical Report prepared by G Mining Services Inc. for the James Bay Lithium Project, dated October 8, 2021. The SLR QP is not aware of any known mining, metallurgical, infrastructure, permitting, and / or other relevant factors that could materially affect the stated Mineral Reserve estimates.

The Mineral Reserve considers Modifying Factors — a variety of considerations, including but not limited to, mining, processing, metallurgical, infrastructure, economic, marketing, legal, environmental, social, and governmental factors — used to convert Mineral Resources to Mineral Reserves. This demonstrates that extraction could reasonably be justified, as of the reporting time.

15.2 Resource Block Model

The resource model used for the James Bay open pit mining is a regularized block model (regularized model) that was developed by SLR in Deswik from the resource model discussed in section 14 of this report. The regularized model has block dimensions of 3 m by 5 m by 5 m. These block dimensions were selected by SLR to adequately represent the dimension of a selective mining unit appropriate for the size of the chosen loading units. For density and Li_2O grade computations, a weighted mass average method was employed, while domain and class were assessed based on the value of the largest volume.

15.3 Pit Optimization

Open pit optimization was conducted using GEOVIA Whittle software to find the best economic shape of the open pit that will guide the pit design process. The task relied on the Whittle software, utilizing the Lerchs-Grossmann algorithm.

SLR prepared a series of Whittle constrained and unconstrained pit shells, considering Indicated Mineral Resource at various lithium prices. The constrained pit shells were limited by the open pit footprint defined in the NI 43-101 Technical Report Feasibility Study for the James Bay Lithium Project, dated January 11, 2022, by G Mining Services Inc. (the 2022 FS) based on existing infrastructure constrains and pit limited defined in the Project permits. The pit shell selected for the Reserve estimate was the optimized constrained pit shell.

For this report, Indicated Mineral Resource blocks were included in the optimization.

Figure 15-1 illustrates the final pit footprint. It is noted that the new footprint is constrained by the pit optimized by G Mining during the 2022 FS.

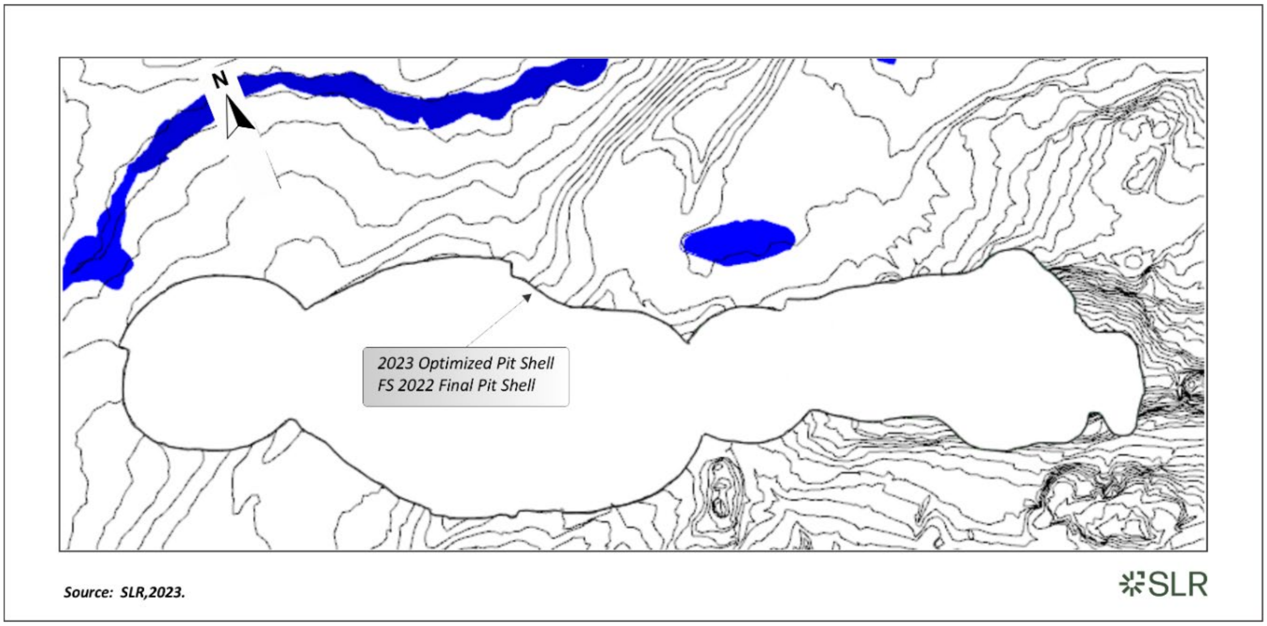


Figure 15-1 – 2023 Optimized final Pit Shell

15.3.1 Pit Slope Geotechnical Assessment

Petram Mechanica was mandated in 2018 to produce a feasibility level geotechnical assessment study to support the mine designs. The conclusions of this study have been used as inputs to the pit optimization and design process which can be found in Section 16.

The pit area is generally in the Metasediment (M1) geotechnical domain. It is understood that the M1 geotechnical domain has consistent structural properties; therefore, the pit was not divided into geotechnical sectors. It was found that no large-scale geological structures intersect the open pit mine design. Based on the stability analyses and experience with similar geotechnical domains, Petram Mechanica offered slope configuration recommendations, as summarized in Table 15-2, in addition to recommendations for the use of controlled blasting, proactive geotechnical monitoring, and geomechanical analyses. Double benching will have to be done with pre-split blasting techniques and well-controlled blasting practices will be required.

Petram Mechanica considered the overburden as a separate geotechnical domain and suggests using a 2H:1V slope with benches at both height and width of 10 m.

Table 15-2 – Final Wall Geotechnical Recommendations

Slope Parameters	
Final Bench Height (m)	20.0
Bench Face Angle (°)	75
Avg. Design Catch Bench Width (m)	9

Slope Parameters	
Inter-ramp Angle (°)	54
Overall Slope Angle (°)	48
Geotechnical Benches (m)	20

SLR is of the opinion that the Petram Mechanica slope design recommendations are reasonable and supports the recommendations to use controlled blasting techniques and geotechnical monitoring. SLR further supports the recommendation to complete additional geotechnical analyses.

Petram Mechanica recommends that a slope depressurization and dewatering program be implemented prior to mining and maintained through the life of the operation to mitigate potential issues from inflow. As part of developing the slope depressurization and dewatering program, SLR recommends that Allkem re-evaluate the pit's geotechnical parameters, taking into account the findings of the hydrogeological study conducted by Golder Associates (Golder, 2021). The study considers a general water balance and the design of site surface water management system required under an extreme event that considers a combination of a 24-hour precipitation event with a return period of 1,000 years and the snowmelt over 30 days from snow accumulation with a return period of 100 years. The water sump and pumping system required for the open pit would have a pumping rate of approximately 1,000 m^3/hr (JB1: 290 m^3/hr, JB2: 740 m^3/hr), with approximately 18% to 29% originating from underground water infiltration (Golder, 2021). In light of this, SLR recommends a thorough investigation into the potential implications of underground water infiltration on the pit design.

15.3.2 Mining Dilution and Ore Loss

A spatial calculation was conducted within the Mineral Reserve block model to assess dilution and mine loss. Each block was categorized as either ore or waste, followed by an analysis of adjacent blocks based on their categorization. In cases where an ore block was surrounded by waste blocks, the model designated a mine loss flag. Similarly, if a waste block had ore partially adjoining it, the model marked it with an external dilution flag. Complete encirclement of a waste block by ore resulted in the assignment of an internal dilution flag.

Given the rectangular configuration of each block in the Mineral Reserve block model, considering the entire block for external dilution blocks would lead to an overestimation. To ensure accurate representation and a more realistic depiction of the peripheral influence along the blocky edges of the ore deposit, external dilution values were halved.

15.3.3 Pit Optimization Parameters & Cut-Off Grade

A summary of the pit optimization parameters is presented in Table 15-3 for a nominal milling rate of 2 Mtpa based on long-term metal price assumptions and an exchange rate of CAD/USD 1.33. A lithium concentrate grading 5.6% Li_2O will be produced and sold as Spodumene. A concentrate transportation and insurance cost of USD 105.8/t has been assumed.

The mining cost of mining blocks is fixed at CAD5.70/t mined.

The overall slope angles utilized in Whittle are based on the Petram Mechanica inter-ramp angles recommended in the geotechnical assessment study with provisions for ramps and geotechnical berms. The overall slope angle in competent rock is 48° based on a designed inter-ramp angle of 54°.

The total estimated cost per tonne ore, excluding mining costs, is CAD56.3/t (USD 42.22/t), which includes processing, general and administration costs, royalties, assumed Impact Benefit Agreements (IBA), sustaining capital, and a closure cost provision. The breakeven cut-off grade was calculated to be 0.27%, however, metallurgical testwork for head grades below 0.62% Li_2O has not been completed. For the purpose of this Reserve Estimate, a diluted cut-off grade was fixed at 0.62%. Table 15-3 presents a summary of all the optimization parameters considered for this update.

The SLR QP notes that the resource spodumene concentrate price assumption of USD 1,500/t is conservative as it is significantly lower than the Wood Mackenzie long-term price forecasts between USD 2,000/t and USD 3,000/t, discussed in Section 19. Allkem has selected the USD 1,500/t spodumene concentrate price for resource reporting consistency with its Mt Cattlin mine in Australia. The SLR QP notes that using a higher spodumene concentrate price assumption would not have a material impact on the Reserves as the selected COG is constrained by the lack of metallurgical test work at lower grades.

Table 15-3 – James Bay Project Pit Optimization Parameters

Parameter	Units	2023 Update
Processing Rate	kt/y	2,000
Mining Dilution	%	Included in script
Mining Loss	%	Included in script
Plant Head Grade	% Li_2O	1.27%
Process Recovery	%	68.85%
Concentrate Grade	% Li_2O	5.6%
Contained Li_2O	kt	327.3
Concentrate Produced (@5.6%)	kt	5,844.8
Commodity Prices		
Exchange Rate	CAD/USD	1.33
LT Price Conc. @6%	**USD/t**	**1,500**
Transport & Insurance	**USD/t**	**105.8**
Unit Costs		

Parameter	Units	2023 Update
Plant	CAD/t ore	18.13
G&A, Royalties, IBA, Owner's Cost, Closure, and Sustaining Costs	CAD/t ore	38.17
Ore Based Cost	**CAD/t ore**	**56.30**
Break-even Cut-off Grade (Calculated)	%	0.27%
Fixed Cut-off Grade	**%**	**0.62%**
Mining Cost	**CAD/t mined**	**5.70**
Overall Slope Angle	Deg	47.50

15.4 Mineral Reserve Statement

The Mineral Reserve estimate is based on the final pit design (Figure 15-1), which was constrained by the footprint defined by the 2022 FS pit. The Proven and Probable Mineral Reserves are inclusive of mining dilution and ore loss. The total ore tonnage before dilution and ore loss is estimated at 34.5 Mt at an average grade of 1.35 % Li_2O. Isolated ore blocks are treated as an ore loss and represent 160 kt, less then 0.5% of total ore tonnage. The dilution around the remaining ore blocks results in a dilution tonnage of 3.0 Mt. The dilution tonnage represents 8.7% of the ore tonnage before dilution and the dilution grade is estimated from the block model and corresponds to a grade of 0.42% Li_2O. Table 15-4 presents a Resource to Reserve reconciliation.

Table 15-4– Resource to Reserve Reconciliation

Mineral Reserves by Category	Tonnage (kt)	Grade % Li_2O
Ore before ore loss and dilution	34,484	1.35
Less: Ore loss (isolated blocks)	160	0.83
Ore before mining dilution	34,325	1.35
Add: Mining dilution	2,972	0.42
Proven & Probable Mineral Reserve	37,296	1.27

The Mineral Reserve estimate for the James Bay Project is 37.3 Mt an average grade of 1.27% Li_2O. Table 15-5 summarizes the Mineral Reserve by classification.

Table 15-5 – James Bay Project Open Pit Mineral Reserve – June 30, 2023

	Tonnage (Mt)	Crude Lithium Grade (% Li_2O)
Proven	-	-
Probable	37.3	1.27
Proven + Probable	37.3	1.27

Notes:

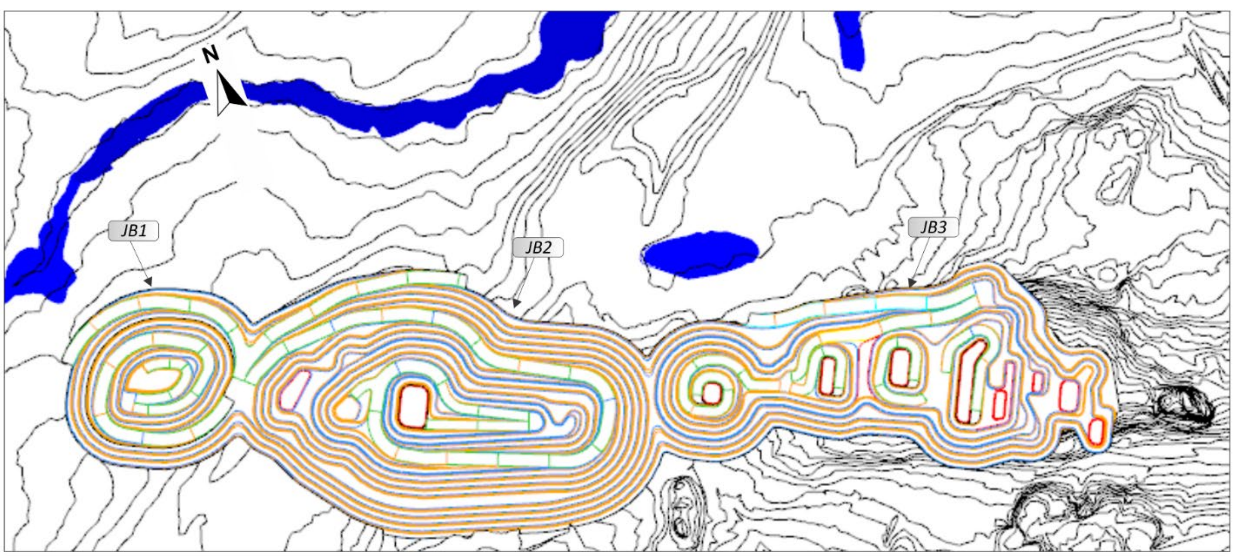
1. *CIM (2014) definitions were followed which are consistent with S-K 1300 definitions.*
2. *Effective date of the estimate is June 30, 2023.*
3. *Mineral Reserves are estimated using the following long-term metal prices (Li_2O Conc = USD 1,500/t Li_2O at 6.0% Li_2O) and an exchange rate of CAD/USD 1.33.*
4. *A minimum mining width of 5 m was used.*
5. *A cut-off grade of 0.62% Li_2O was used.*
6. *The bulk density of ore is variable, is outlined in the geological block model, and averages 2.7 t/m³.*
7. *The average strip ratio is 3.6:1.*
8. *The average mining dilution factor is 8.66% at 0.42% Li_2O.*
9. *Numbers may not add up due to rounding.*

16. MINING METHODS

16.1 Introduction

The Project is envisioned as a conventional open pit mine operation. The operational strategy involves the use of haul trucks paired with loading units, specifically 200-t class and 125-t class mining shovels for bulk and selective mining, respectively. After being extracted, ore is transported by truck to a Run-of-Mine (ROM) pad for rehandling and processing through the concentrator. Over the projected mine life of 19 years, total production is estimated at 37.3 Mt of ore and 132.7 Mt of waste, resulting in an overall life-of-mine (LOM) stripping ratio of 1:3.6 (ore to waste).

The Project comprises three phased pits: JB1, JB2, and JB3. Pit phasing is an economic strategy to prioritize higher-grade ore in the early years and postpone waste stripping. Each phase is designed to progressively have lower stripping ratios. JB1 is planned to consist of two phases, JB3 will contain four phases, and JB2 will include three phases. Figure 16-1 illustrates the final phase for all pits.



Source: GMS, 2021.

Figure 16-1 – James Bay Project Ultimate Pit

16.2 Mine Design

16.2.1 Pit Overviews and Phase Breakdowns

The pit phasing has been designed to efficiently manage mining three distinct mining areas: JB1, JB2, and JB3. Each interim phased pit requires a minimum mining width of 60 m to ensure sufficient room for the movement of mining equipment; the final phase (or the final push back to the ultimate pit wall) requires a 70-m minimum mining width. Stripping is minimized by using 10-m box cuts at the bottom of each phase.

For operations involving 100 short ton hauling trucks, most phases include both single and dual lane ramps, measuring 19 m and 25 m in width, respectively. The bottom 40 m of each phase employs single lane ramps to further minimize stripping requirements.

This phased pit design allows for individualized access within the three mining areas, ensuring optimal surface hauling and flexible scheduling. This balanced approach facilitates effective waste stripping and grade selectivity.

Figure 16-2 provides an illustration of the boundaries of each phase and pit, as well as the end of the Life of Mine (LOM) design. Table 16-1 provides a summary of the inventory for each pit by phase.

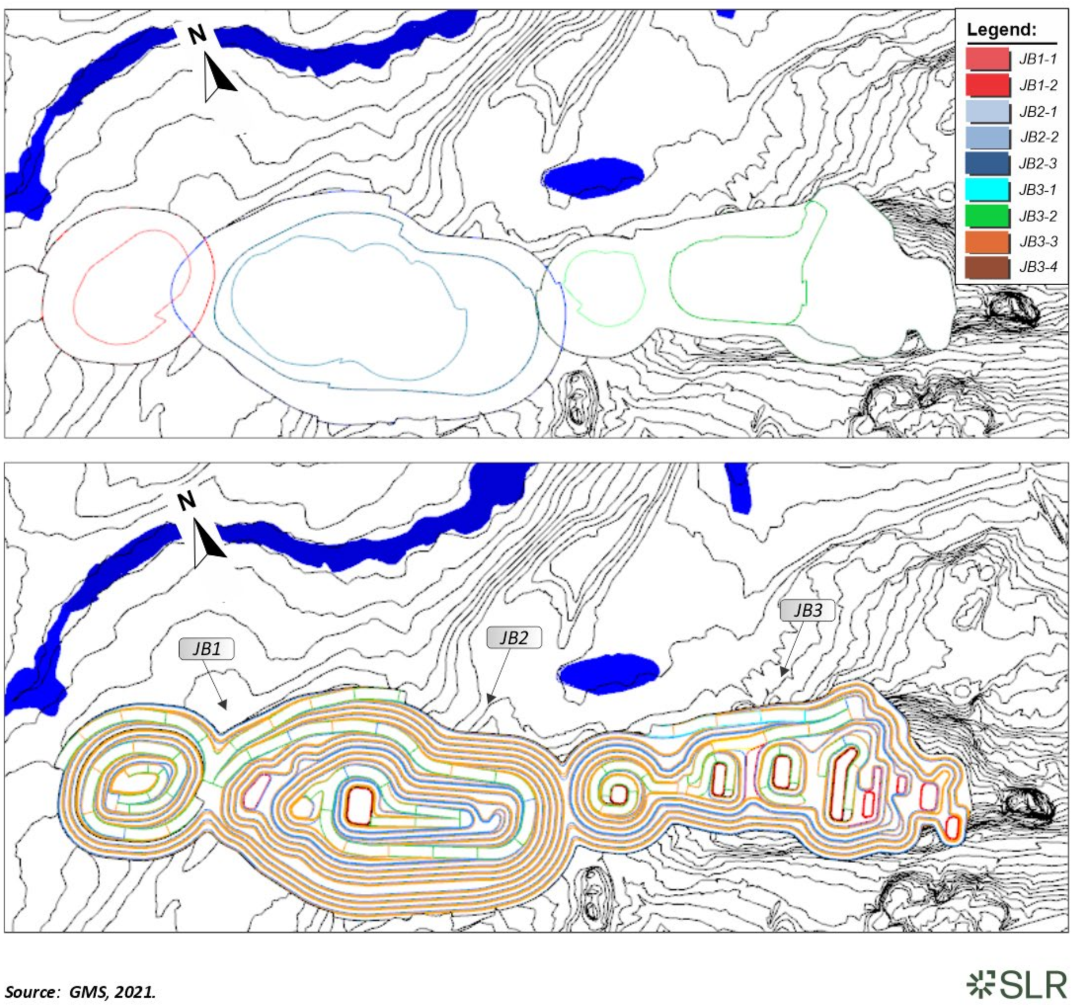


Figure 16-2 – Pit and Phase Limits

Table 16-1 – Pit and Phase Inventories

	Units	Total	JB1			JB2				JB3				
			Phase 1	Phase 2	Total	Phase 1	Phase 2	Phase 3	Total	Phase 1	Phase 2	Phase 3	Phase 4	Total
Total	000 t	169,999	4,226	16,164	20,390	19,872	33,406	48,820	102,098	1,759	5,863	13,058	26,832	47,512
Waste Tonnage	000 t	132,704	3,095	13,784	16,880	12,730	26,004	40,023	78,756	1,150	3,591	8,984	21,679	37,067
Strip Ratio	W:O	3.6	2.7	5.8	4.8	1.8	3.5	5.6	3.6	1.9	1.6	2.2	4.2	3.1
Ore Tonnage	000 t	37,296	1,131	2,379	3,510	7,143	7,402	7,134	21,679	609	2,272	4,073	5,152	12,107
Li_2O Grade	$\%Li_2O$	1.27%	1.24%	1.22%	1.23%	1.44%	1.33%	1.26%	1.34%	1.26%	1.23%	1.19%	1.10%	1.16%

16.2.1.1 JB1

JB1 is the first pit to be mined and is mined in two phases (JB1-1 and JB1-2) over the LOM. The first phase is primarily pre-stripping and designed to extract sufficient waste to meet the construction requirements during preproduction years. Ore mined during JB1-1 will be temporarily stockpiled, then rehandled when the processing plant is operational. Figure 16-3 summarizes the ore and waste distribution over the LOM by year.

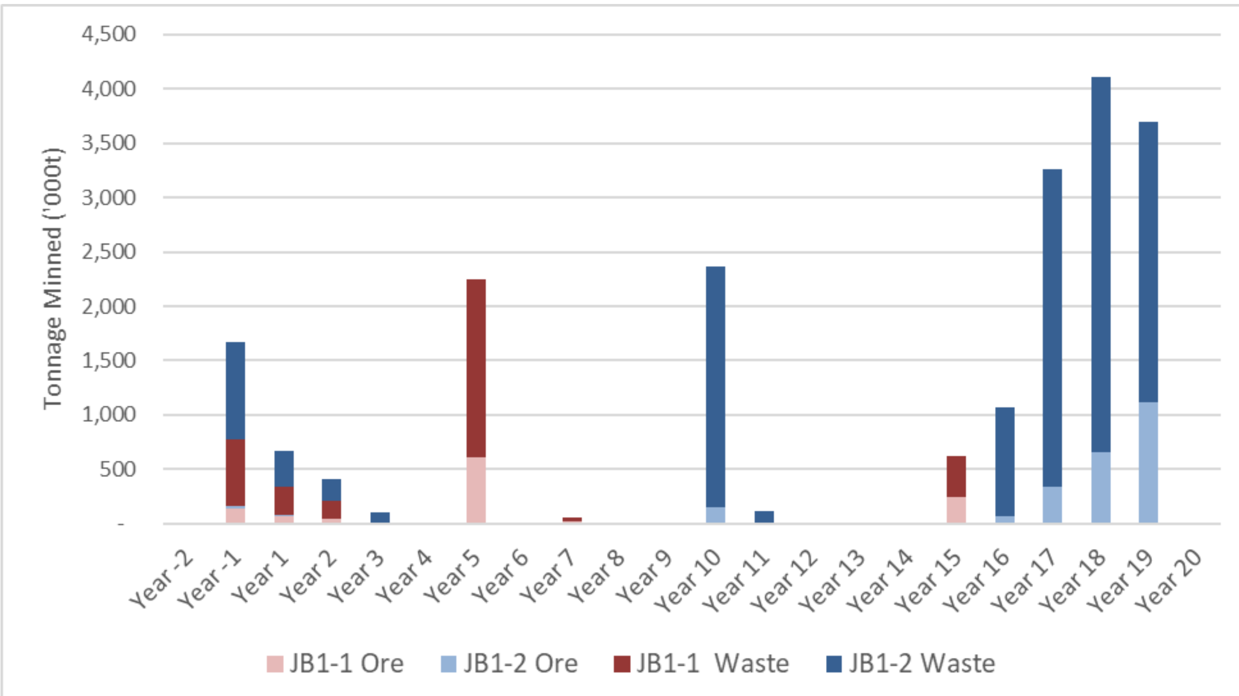


Figure 16-3 – JB1 Ore and Waste Distribution over the LOM by Year

16.2.1.2 JB2

JB2 is the largest of the three pits and links the JB1 and JB3 pits. JB2 is mined in three nested phases (JB2-1 to JB2-3), with the access ramps for each phase designed to exit on the eastern wall to minimize haulage distance to the processing plant and waste dumps. The pit phase designs use a combination of double and single lane ramps, as well as box cuts, to minimize the waste stripping requirements. Figure 16-4 provides the ore and waste distribution over the LOM by year.

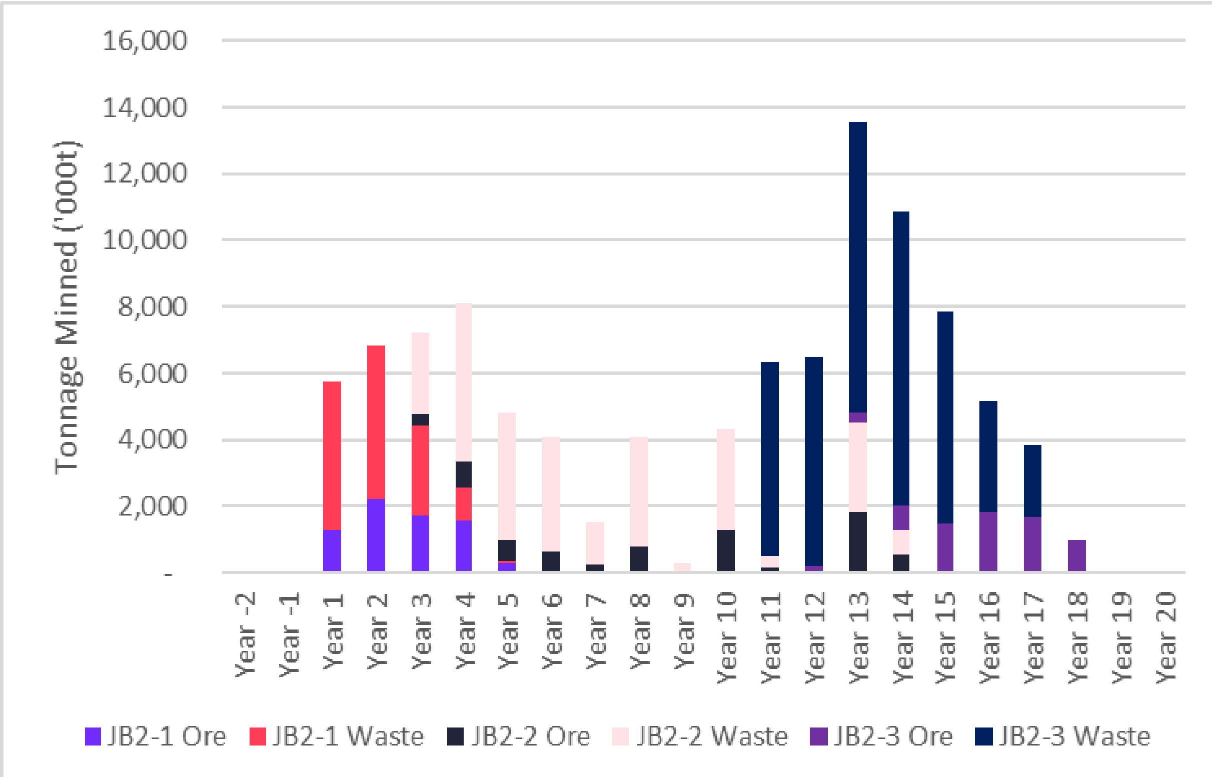


Figure 16-4 – JB2 Ore and Waste Distribution over the LOM by Year

16.2.1.3 JB3

JB3 is located to the southeast of JB2. It is a narrow pit, mined in four phases. The ore and waste distribution for the LOM by year is presented in Figure 16-5.

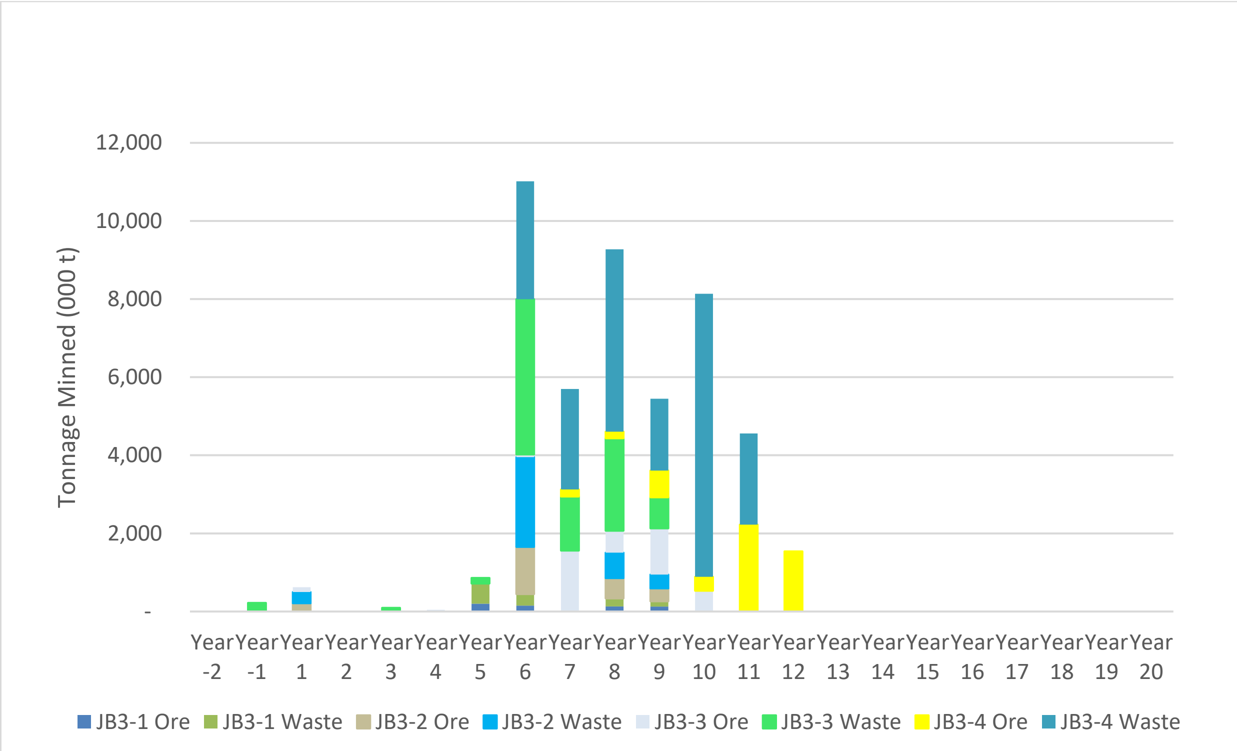


Figure 16-5 – JB3 Ore and Waste Distribution Over the LOM by Year

16.2.2 Geotechnical Parameters

16.2.2.1 Geotechnical study

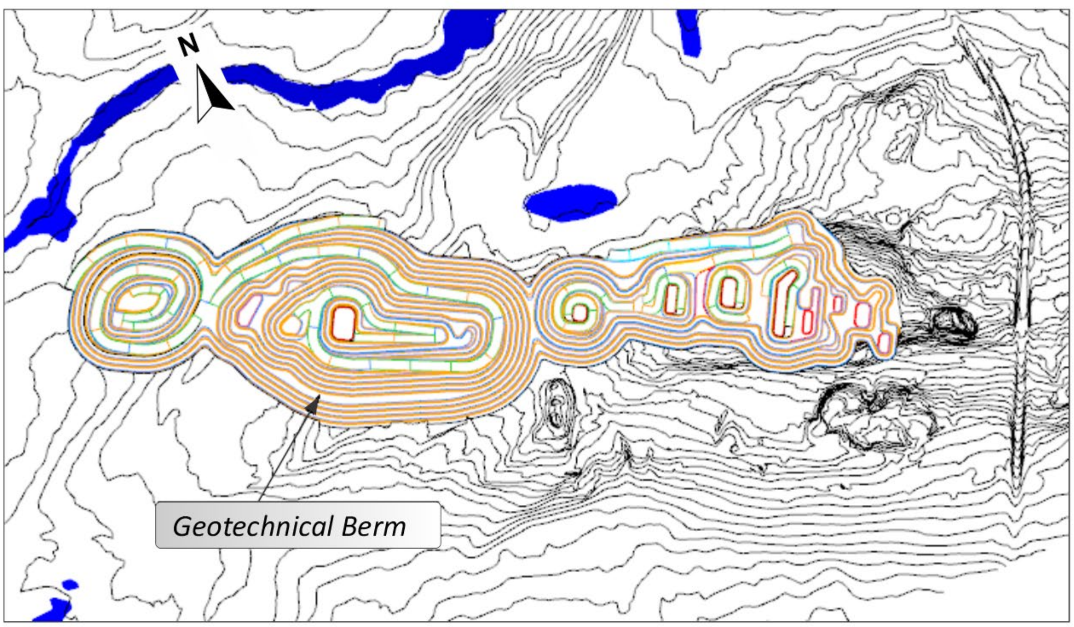
The definition of slope angle and geotechnical investigation for the Project was led by Petram Mechanica. The geotechnical model, developed in 2018, integrates several elements including the geological, structural, rock mass, and hydrogeological models, describing geotechnical domains and their key constituents:

- Geological Model: Encompasses regional geology, including tectonic setting and natural seismic activity.
- Structure Model: Details geological structures ranging from regional/mine-scale to excavation/drill core scale.
- Rock Mass Model: Evaluates rock quality designation (RQD) as per Deer, Hendron, Patton and Cording (1967), rock strength/weathering, joint strength, rock mass classification, and material properties.
- Hydrogeology Model: Includes key hydrogeological properties such as pore pressure, conductivity, and porosity, and is developed at the project scale.

From this comprehensive model, the following slope design parameters were derived:

- Nominal face height of 20 m (double benched 10-m-high benches)
- Bench face angle of 75° for in situ rock material
- Berm widths of 9 m
- Inter-ramp angle of 54°
- Overall slope angle of 48°

To mitigate the risks of overbank hazards on the pit wall and to catch debris from previous pit phases, geotechnical berms 20 m in width were designed in the central portions of JB2, where the pit wall has a vertical stack height of over 120 m. Figure 16-6 shows where these geotechnical berms were incorporated into the ultimate pit wall.



Source: GMS, 2021.

Figure 16-6 – Geotechnical Berms

The geotechnical open pit design study of the Project highlighted several important findings:

- The rock mass appears to be composed of strong, stiff material, as indicated by a review of geotechnical drill core logging and rock property testing.

- No large scale geological structures are understood to intersect the proposed open pit mine workings.

Key assumptions, risks, and opportunities were identified during the development of the slope design parameters. The main assumptions are listed:

- It was assumed that pit scale geological structures (fault or shear zones) are not present in the Project rock mass, based on the structural data provided.
- Ground water conditions were assumed to be hydrostatic and comparatively close to modeled slope surfaces (approximately 20 m for the JB1 and JB3 pits and 40 m for the JB2 pit).
- Bench design parameters assumed that careful blasting practices will be used to maintain catch capacity.

Several risks were identified that might impact the slope design parameters:

- Ground conditions might materially vary from those assumed in this study, including the identification of large geological structures during mining.
- A depressurization and dewatering program may not achieve the hydrogeological conditions assumed in the 2D slope stability models.

Opportunities to optimize the slope design parameters also exist:

- Actual ground conditions may prove materially better than those assumed in this study.
- Wall performance may exceed expected outcomes, such as little to no wedge formation on bench faces.

Given these assumptions, risks, and opportunities, Petram Mechanica recommended that a slope depressurization and dewatering program be implemented prior to mining and be maintained throughout the life of the operation. Bench stability remains predicated on dry conditions, where wedge stability may be adversely affected by elevated ground water pressures.

16.2.3 Ramp and Road Design

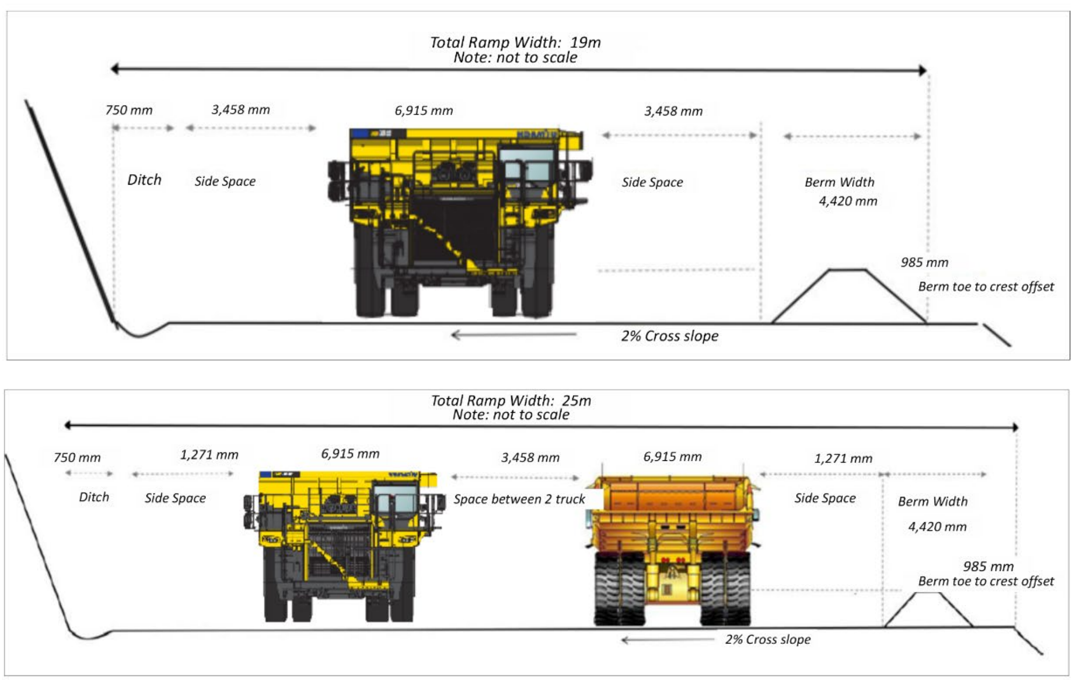
The design and placement of ramps are critical to the safe and efficient operation of the Project. The ramp designs, presented in Figure 16-7, showcase both single and double lane ramps. These designs were formulated with careful consideration of the primary haulage unit used on-site, the Komatsu HD785.

The operating width of the hauling equipment is 6.9 m. The ramp width was designed to meet or exceed the SME Standard of 3.5 times the width of the largest vehicle typically used for double lane ramps and 2.0 times for single lane ramps. As a result, the double lane ramp measures 25 m in width, and the single lane ramp 19 m. Single lane ramps are used in the final 40 m of each phase, reducing the volume of material that needs to be stripped. The ramp gradients have been established at 10%.

On the pit side of each ramp, a shoulder barrier or safety berm will be constructed of crushed rock. This essential safety feature, required whenever a drop-off exceeds three metres, will be designed at a 1.1H:1V ratio. The height of this barrier will equal the rolling radius of the largest tire using the ramp, in this instance, the truck tire's rolling radius is 1.35 m.

To prevent water accumulation on the roadways, a 2% cross slope on the ramp is planned. Further enhancing the drainage system, a ditch on the highwall side of the ramp will collect runoff from the pit wall surface and assure proper drainage of the running surface. This ditch will be 0.75 m wide.

The road design and ramp system in the pit ensure the efficient movement of mining equipment and contribute to the overall safety and effectiveness of the mining operation.



Source: GMS, 2021.

Figure 16-7 – Single and Double Lane Ramp

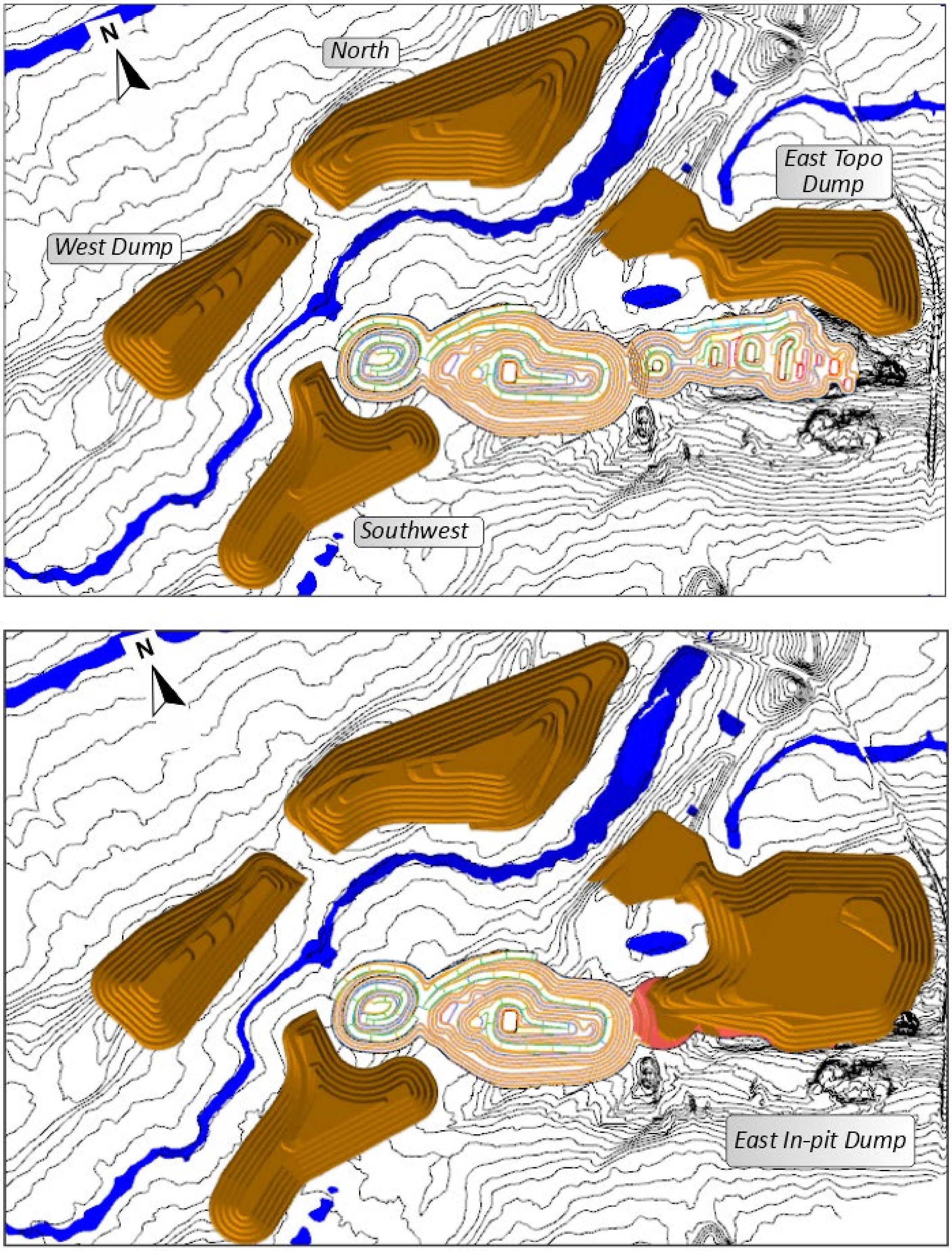
16.2.4 Overburden and Waste Rock Storage

Waste rock and tailings from the Project will be deposited using a co-disposal method involving the mixing or layering of both materials so that they are placed at the same location. The slope geometry will consist of 10 m benches with a face slope of 2H:1V with 12 m berms. The stockpile will reach an elevation of 300 m, representing a height of approximately 100 m above the surrounding natural environment.

There are a total of four waste rock and tailings storage facilities (WRTSFs), including in-pit dumping in the JB3 pit, that have been designed to fulfill the Project's anticipated waste storage requirements. The designs consider the need to minimize haulage distances from the pits while also respecting distances from active roads and rivers.

Over the LOM of the Project, approximately 6 Mt of overburden is expected to be stored in the overburden and peat storage facility (OPSF), while 127 Mt of waste rock will be stored in the WRTSFs. These materials will be mined in stages, in accordance with the mine plan, to optimize overburden removal and prevent an increase in the strip ratio during the early years of the Project.

Figure 16-8 outlines the location of each of the WRTSFs, including the in-pit dumping in JB3 pit.



Source: GMS, 2021.

Figure 16-8 – WRTSF Layouts

16.2.5 Mining Scheduling

The mining schedule and optimization for the Project were conducted using Deswik Scheduler software. This tool enables the maximization of the Net Present Value (NPV) of projects while simultaneously managing a variety of operative constraints.

The project construction starts 15 months before the startup of the processing plant and the mine pre-production phase is scheduled to commence six months before the startup of the processing plant. This pre-production period is planned to ensure smooth commissioning of mining equipment, adequate time for hiring and training personnel, and the timely delivery of waste rock required for civil works.

Throughout the LOM, the primary objectives are to maximize the discounted operating cash flow while adhering to the following conditions:

- Limiting pre-production to requirements for civil works and feed for the plant upon initiation.
- Ensuring the plant is supplied with the highest-grade ore, feeding it at a nominal capacity of 2 Mtpa.
- Restricting the vertical drop-down rate to six benches per phase per year.
- Extending the LOM as much as possible.

The resulting plan has a maximum mining rate at approximately 11 Mt in Years 13 to 15, followed by a rapid decline in mining rate until the end of mine life in year 19.

Figure 16-9 illustrates the mine production schedule by material type and stripping ratio. An increase in the stripping ratio in Year 13 can be attributed to the requirement of stripping waste from JB2-3 before reaching the orebody. As the largest of the three pits, the extra waste mined increases the stripping ratio for that year.

Figure 16-10 presents the annual mined ore tonnage by phases and pits for the LOM. To avoid production losses from excessive dead heading, no more than three phases are mined simultaneously. The JB2 pit is the only pit mined over the entire LOM. Once JB3 pit is exhausted in year 12, it is repurposed for in-pit dumping.

Material has six potential destinations. Waste rock is sent to one of the four dumps. Run-of-Mine (ROM) ore is sent to the crusher or the ROM stockpile, both located in the same area. The dewatered tailings material from the processing plant is initially directed to the North Dump, before being distributed to the other dumps. Run-of-Mine (ROM) ore is sent to the crusher or the ROM stockpile, both located in the same area.

The material extraction calculations consider specific gravities. These specific gravities include 2.7 for the pegmatite samples, 2.77 for the waste rock samples (combining all lithologies), and 2.0 for overburden. These values represent in situ material conditions before excavation.

The feed material grade ranges from 1.12% Li_2O to 1.45% Li_2O, with an average of 1.27% Li_2O. Waste rock tonnage averages at 6.9 Mt per year, peaking at 9.4 Mt in the fourteenth year and reaching a minimum of 2.6 Mt in the nineteenth year. The average stripping ratio for the LOM is 3.6.

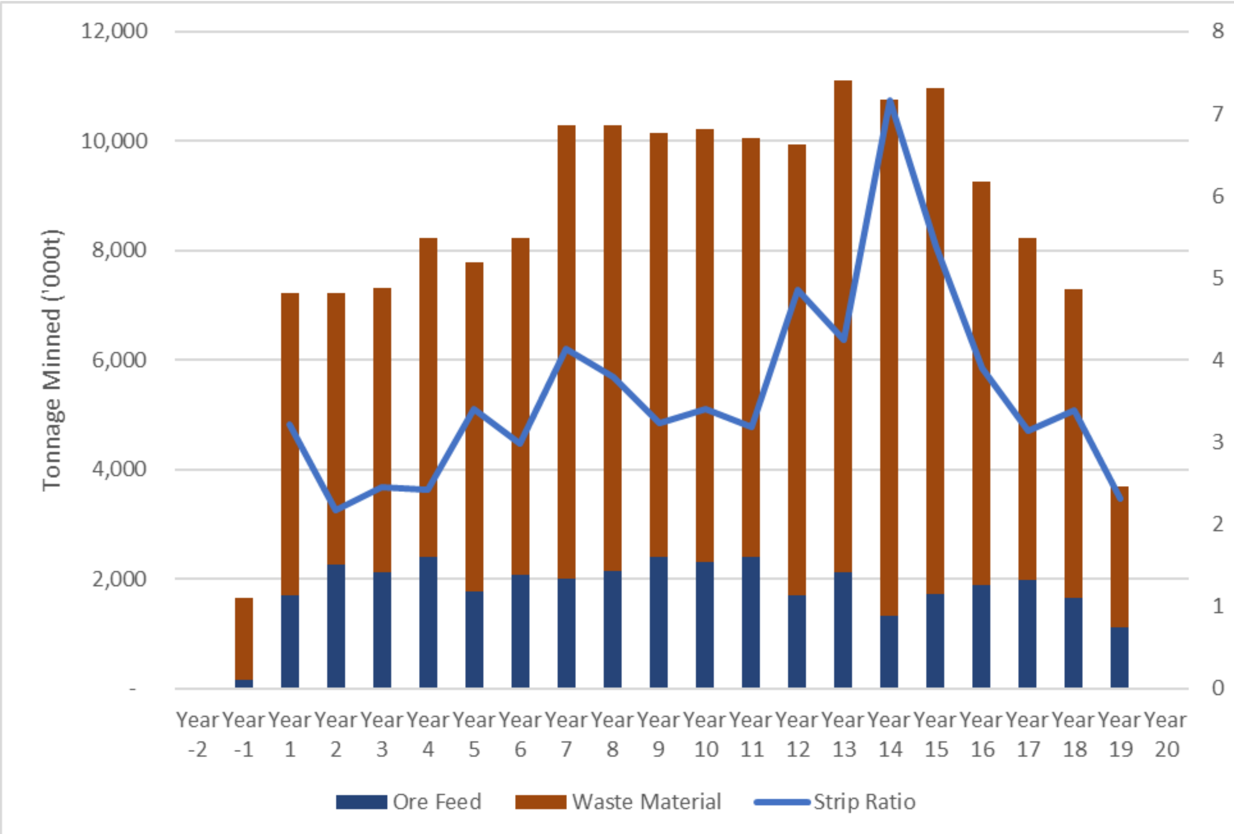


Figure 16-9 – Mine Production Schedule

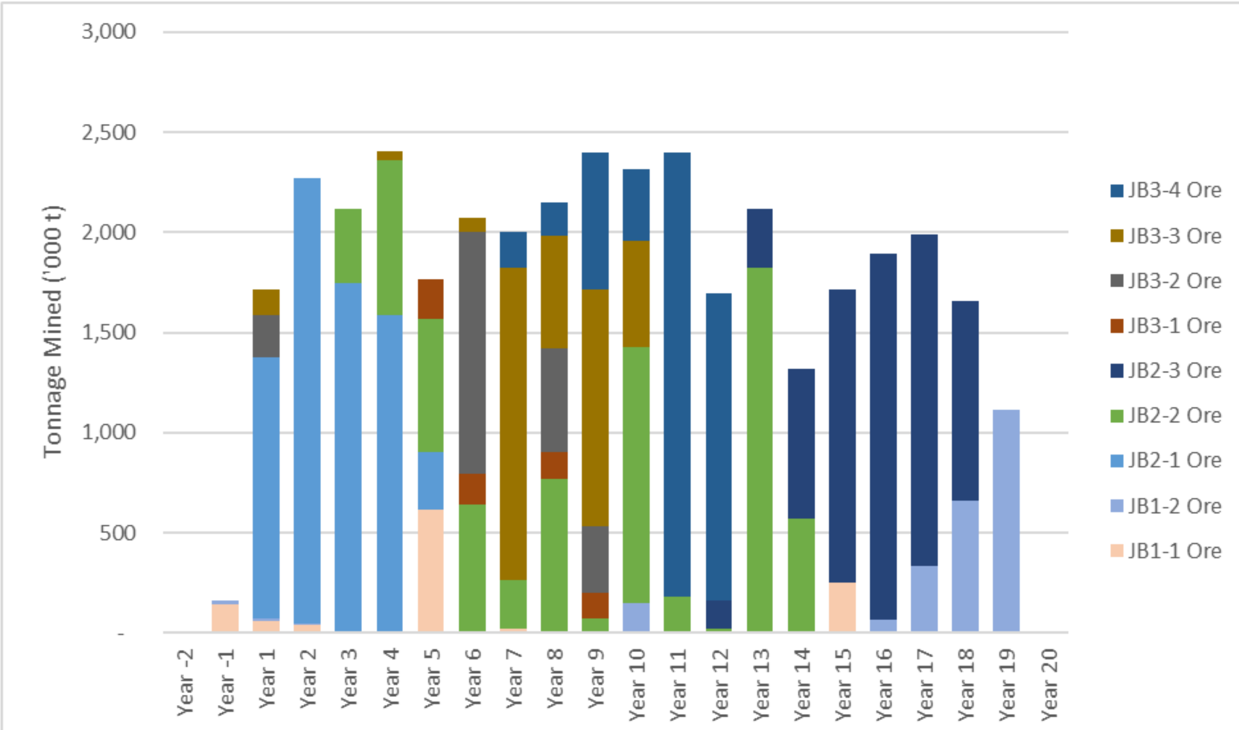


Figure 16-10 – Mine Production from Pits and Phases

16.2.6 Rock Material Transportation

The handling and transportation of both economic and non-economic rock material play a critical role in the overall efficiency and productivity of the mining operations. The proposed system for these operations involves a series of carefully engineered haul roads. These roads have been designed with specific consideration to the mine's layout, facilitating the smooth and safe movement of the necessary heavy machinery.

To accommodate the substantial weight of the proposed hauling trucks, the haul roads will be constructed with a width of 20 m. This width not only ensures the safety of the vehicles but also facilitates two-way traffic and efficient movement around the mine site. They will be built with a robust foundation, ensuring durability and stability under continuous heavy traffic.

Trucks will exit the pit area via one of the three main ramps: JB1, JB2, or JB3. This strategic routing reduces potential traffic bottlenecks and streamlines the transportation process.

Once the ore has been extracted, it will be hauled to the ROM pad where the material will be crushed and screen. After these steps, the material is transported to the crushed material stockpile in the processing plant sector. This systematic workflow is designed to ensure that the highest quality ore is reliably delivered to the processing plant.

Conversely, waste rock will be moved to the waste rock stockpiles. This process will be operational through to the end of the LOM. A systematic deposition plan is in place to manage the unloading of waste rock, where dozers will be used to contour the received material.

16.2.7 Processing Schedule

The planned processing schedule, summarized in Figure 16-11, has an annual target of 2.0 Mt of ore processed at a selected cut-off grade for the ore feed of 0.62% Li_2O. The process plant is projected to reach full operational capacity starting from Year 2.

Most of the ore is directly sourced from the pits and then systematically stockpiled on the Run-of-Mine (ROM) pad. This pad, with a capacity of 3,800 m^3 or 5,550 tonnes (loose), holds approximately one day's production.

The ore feed is transported from the ROM pad to the process plant crusher by a wheel loader. This arrangement allows for ore blending if required, optimizing the quality of the feed material. Over the LOM, it is anticipated that 37.3 Mt of ore at an average head grade of 1.27% Li_2O will be processed.

The pit phasing strategy requires the strategic use of the mine stockpile to supplement plant feed during periods when direct ore feed from the pits to the plant is less than the plant capacity. While use of the stockpile will be intermittent throughout the LOM, the stockpile's importance increases in Year 14 to fulfill the process plant requirements due to the reduced ore production in this year.

The tonnes and average grade processed by year is summarized in Table 16-2.

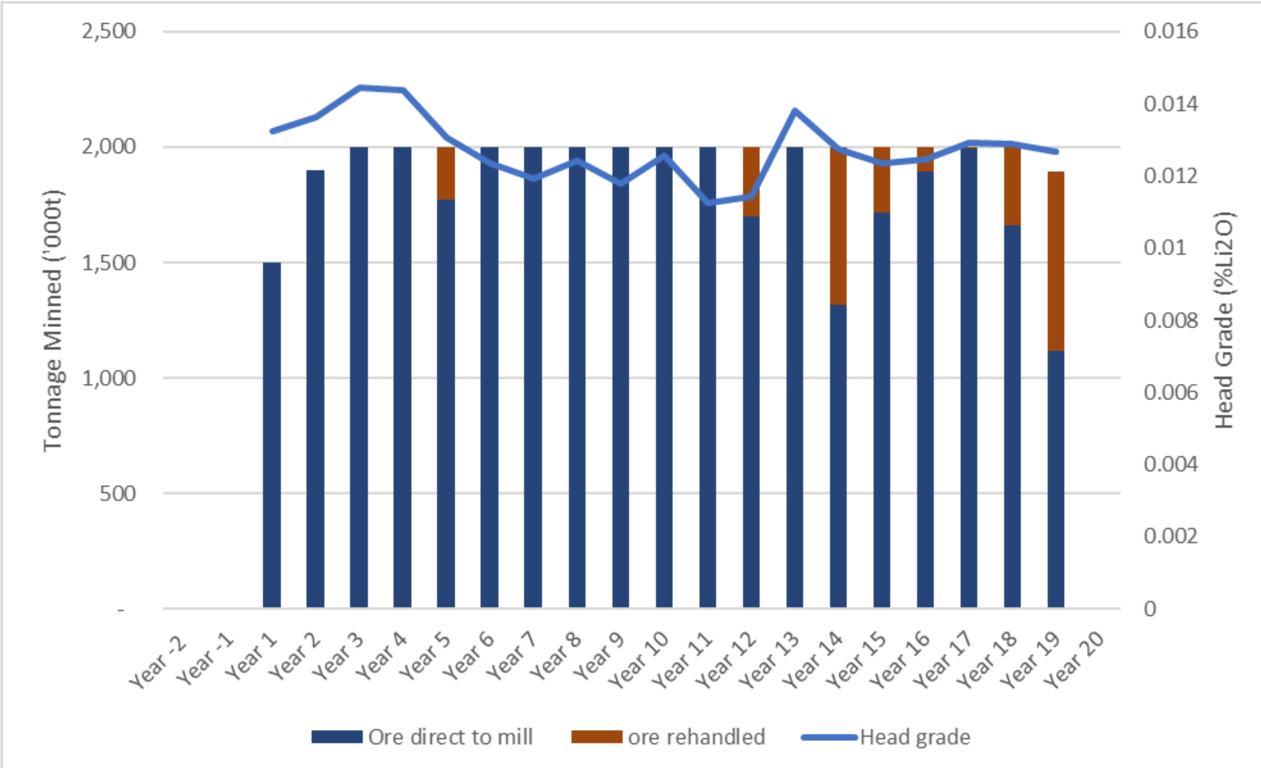


Figure 16-11 – Processing Production Schedule

Table 16-2 – Detailed Process Production Schedule

Process Plant Production Schedule	Units	Total	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19
Process Plant Rate	kt/d	5.479			3.62	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.48	5.41
Ore Milled	000 t	37,296			1,322	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,974
Head Grade	% Li_2O	1.27%			1.32%	1.36%	1.45%	1.44%	1.31%	1.23%	1.19%	1.24%	1.18%	1.26%	1.12%	1.14%	1.38%	1.27%	1.23%	1.25%	1.29%	1.29%	1.27%
Contained Li_2O	kt Li_2O	475			17.5	27.3	28.9	28.8	26.1	24.7	23.8	24.8	23.6	25.2	22.5	22.9	27.6	25.5	24.7	24.9	25.9	25.8	25.0

16.3 Mine Operation

16.3.1 General Mining Operations

Mining operations at the Project are planned to be carried out using four crews rotating on a two-week Fly In, Fly Out (FIFO) schedule. At any given time, two crews are on site (a day and night shift) carrying out active mining operations, while the other two crews are off-site.

Each shift will be 12 hours, ensuring continuous operations. A mine foreman will oversee each shift. Mine operations will be supported by the general supervisor and technical personnel during day shifts. All blasting activities will be scheduled for daylight hours.

16.3.2 General Mining Sequence

In the mining operation, the extraction and transportation of both waste and ROM (Run of Mine) materials will be carried out using typical open pit excavators and trucks. The primary loading unit will be a 200-t class excavator, while 125-t class diesel hydraulic excavators will be employed when higher mining selectivity is required.

The mining process will commence on the hanging wall of the mineral deposit for each bench and progressively move towards the resource. After extracting the Mineral Resources, any remaining waste material on the footwall will be excavated while concurrently developing a sinking ramp or access road for the next lower bench.

To ensure efficiency and optimized resource utilization, the material extraction will be sequenced and scheduled using phased pits. This phased approach facilitates a smooth transition, with lower waste stripping during the initial years and a gradual increase in later stages of the mine's life.

It has been established that a backhoe excavator is preferred over a front shovel due to its higher mining selectivity, especially concerning the unique nature of the pegmatite structures. Furthermore, the backhoe configured excavators were chosen for their increased productivity and versatility compared to front shovel excavators. A notable advantage of using the backhoe excavator is its ability to mine from the bench above without requiring additional ramp construction.

Additionally, mining along the strike direction (northeast-southwest) of the individual pegmatite swarms will allow for selective extraction of the pegmatite material, thus minimizing dilution.

The blasting operations will involve the use of bulk explosives, primarily Ammonium Nitrate/Fuel Oil (ANFO) and emulsion explosives in a 50/50 volume ratio. The selection of explosive products and accessories will be handled by a third-party contractor, who will also be responsible for their storage, mixing, and delivery to the drill holes on site.

To support the primary equipment used for mine production, secondary equipment will be utilized for various tasks, including clearing mucking areas around excavators, grading in-pit bench areas, clearing stockpile platforms, maintaining drill pads, and grading surface haul roads.

16.3.3 Grade Control and Reconciliation

Grade control plays a pivotal role in maintaining the desired feed quality, thereby reducing dilution and ensuring the successful reconciliation of mined material. To achieve these objectives, the grade control process is carefully structured into three key operation components:

- Blast Pattern Design: The blast pattern design entails defining pattern boundaries that precisely reference the contact between mineralized areas and waste material. This strategic approach helps optimize the extraction process, ensuring that the valuable mineralized zones are effectively targeted while minimizing the removal of non-mineralized waste.

- Mining Direction Method: To further enhance grade control and reduce dilution, the mining direction method will be employed. By operating the bench face in alignment with the mineral deposit's strike direction, which predominantly runs in the northeast-southwest direction, the mining operations can selectively extract the valuable pegmatite material along its strike. This tailored extraction strategy ensures that only the above cut of grade material is mined, thereby maximizing resource utilization.

- In-Field Sample Collection: An integral part of the grade control process involves the periodic collection of drill cuttings from the field, which are then sampled and analyzed at the assay lab. These field samples, extracted from production drill cuttings, serve as valuable data points for grade control and reconciliation purposes. By closely monitoring the grade variations through in-field sampling, the mining team can adjust their approach as necessary, maintaining a consistent feed quality and minimizing grade discrepancies during the reconciliation process.

16.3.4 Operation in Cold Weather

16.3.4.1 Personnel and Equipment Safety Considerations

Working outdoors in extreme winter weather area presents unique challenges, including severe cold, windchill, and the associated risks of frostbite and hypothermia. To safeguard the well-being of the staff and contractors, comprehensive procedures will be implemented to assess and mitigate these critical risks.

The extreme cold temperatures pose significant challenges to equipment functionality; mechanical breakdowns during these weather conditions can be life-threatening. To mitigate potential risks and ensure the safety of the workforce, comprehensive measures will be taken to maintain the equipment in prime working condition during extreme cold weather. Regular maintenance checks and inspections will be carried out to identify and address any issues promptly. Ensuring that equipment components are well-lubricated and operating optimally is vital for their reliability in severe cold temperatures.

- Pre-Operational Checks: Before deploying equipment, pre-operational checks will be diligently conducted to assess critical systems and confirm their suitability for operation in extreme cold.
- Adequate Heating and Storage: Equipment will be stored in insulated facilities or equipped with adequate heating mechanisms to protect against freezing and maintain the required operational temperatures.
- Trained Personnel: The staff will receive specialized training to recognize early signs of equipment malfunction related to cold weather conditions. This will enable them to take timely action, preventing potential breakdowns and ensuring their safety.

By prioritizing personnel safety and implementing meticulous equipment care, the Project aims to navigate the challenges posed by the extreme winter weather with confidence and efficiency. The commitment to proactive planning and precautionary measures underscores the dedication to the well-being of the workforce and the successful operation of the mining project in these demanding conditions.

16.3.5 Mine Equipment

Surface mining equipment requirements have been carefully determined based on the mining plan, which involves mining 10 m benches for both ore and waste. The equipment fleet is designed to meet the specific tonnage requirements outlined in the mine plan, and a conventional excavator and truck fleet will be employed to ensure optimal productivity and efficiency. It is important to note that the equipment specifications used in this report are based on Komatsu equipment.

16.3.5.1 Primary Equipment

To efficiently handle the extraction and transportation of materials, the primary equipment fleet includes a 200-t hydraulic excavator (backhoe) with a 11 m³ bucket capacity for bulk production. This excavator size has been chosen as the largest feasible option that does not compromise the selectivity required at the Project, while also being a 'high production excavator', i.e., providing the productivity and mobility to support the multi-pit operators at the Project. Complementing the excavator, a 100-t rigid frame haul truck has been carefully selected to accommodate the 11 m³ excavator bucket. With this combination, the haul truck can be efficiently loaded with five passes, taking into account assumed swelled material densities and bucket fill factors. This loading capacity falls well within the optimum range of five to seven passes, ensuring smooth material transport from the excavation sites to the designated stockpile areas. In addition to the 200-t backhoe excavator, a smaller 125-t shovel will be used. The shovel's compact size and superior selective mining capabilities will complement the larger backhoe excavator. With its 6.3 m³ bucket capacity, this shovel is well suited for extracting targeted high-grade material with precision and accuracy as well to control the limits between economic ore and mineralized material below cut-off grade, further contributing to dilution reduction efforts.

For stockpile rehandling activities, a diesel front-end wheel loader (FEL) with a 10.7 m^3 bucket has been chosen. The FEL will also be used for selective ore mining during peak production periods. The FEL is well suited to handle these requirements, offering flexibility and maneuverability in tight geometries.

16.3.5.2 Secondary Equipment

In addition to the primary mining equipment, a range of specialized secondary equipment will be deployed to provide direct support for mine production activities. The secondary equipment will be involved in various essential tasks to ensure the smooth functioning of the mining operations. These tasks include:

- Clearing spilled rock in mucking areas around excavators
- Grading of in-pit bench areas to optimize work efficiency
- Grading of stockpile platforms and clearing rocks for efficient truck unloading
- Clearing drill pads of any fly rock from previous blasts and mining operations, ensuring safe and productive drill patterns for the blasting crew
- Grading and clearing in-pit ramps and surface haul roads, addressing spill rock and snow-related issues and maintaining proper road conditions, including rut repairs and drainage management.

16.3.6 Operating Hours

Table 16-3 summarizes the gross operating hours used for subsequent equipment fleet requirement calculations. Additional delays and applied factors are described in productivity calculations for each fleet.

Table 16-3 – Equipment Usage Assumptions

	Units	Shovels	Loaders	Trucks	Drills	Ancillary	Support
Days in Period	days	365	365	365	365	365	365
Weather, Schedule Outages	days	10.0	10.0	10.0	10.0	10.0	10.0
Shifts per Day	shift/day	2.0	2.0	2.0	2.0	2.0	2.0
Hours per Shift	h/shift	12.0	12.0	12.0	12.0	12.0	12.0
Availability	%	82.0	80.0	85.0	80.0	85.0	85.0
Use of Availability	%	90.0	90.0	90.0	90.0	85.0	80.0
Utilization	%	73.8	72	76.5	72	72.25	68

	Units	Shovels	Loaders	Trucks	Drills	Ancillary	Support
Effectiveness	%	87.0	85.0	87.0	85.0	80.0	80.0
Overall Equipment Effectiveness (OEE)	%	64.2	61.2	66.6	61.2	57.8	54.4
Total Hours	h	8,760	8,760	8,760	8,760	8,760	8,760
Scheduled Hours	h	8,520	8,520	8,520	8,520	8,520	8,520
Down Hours	h	1,534	1,704	1,278	1,704	1,278	1,278
Delay Hours	h	817	920	847	920	1,231	1,159
Standby Hours	h	699	682	724	682	1,086	1,448
Operating Hours	h	6,288	6,134	6,518	6,134	6,156	5,794
Ready Hours	h	5,470	5,214	5,670	5,214	4,925	4,635

16.3.7 Drilling and Blasting

Drill and blast specifications were established 2022 FS, in which it is recommended to effectively drill a 10 m bench. For this bench height, a 165 mm blast hole size is proposed with a 5.1 m x 5.1 m pattern for ore, 5.2 m x 5.2 m for waste and overburden, and with 1.5 m of sub-drill. These drill parameters combined with a high energy bulk emulsion with a density of 1.2 kg/m^3 result in a powder factor of 0.30 kg/t for ore and 0.32 kg/t for waste. Blast holes are planned to be initiated with electronic detonators and primed with boosters.

Drilling will be done using diesel powered Sandvik DI650i S5 DTH surface drill. Blast holes will generally be drilled to depths of 11.5 m (10 m bench with 1.5 m sub-drill depth).

Table 16-4 summarizes the drill parameters that are utilized in estimating drill requirements.

Table 16-4 – Drill & Blast Parameters

Drill & Blast Parameters		Ore	Waste	OVB
Drill Pattern				
K_S: Spacing/Burden		1.00	1.00	1.00
K_B: Burden/Diameter		30.89	31.50	31.50
K_J: Subdrill/Burden		0.29	0.29	0.29
K_T: Stemming/Burden		0.59	0.58	0.58
K_H: Height/Burden		1.96	1.92	1.92
Explosive Density	g/cm^3	1.20	1.20	1.20

Drill & Blast Parameters		Ore	Waste	OVB
Hole Diameter	in	6.50	6.50	6.50
Diameter (D)	m	0.165	0.165	0.165
Burden (B)	m	5.10	5.20	5.20
Spacing (S)	m	5.10	5.20	5.20
Subdrill (J)	m	1.50	1.50	1.50
Stemming (T)	m	3.00	3.00	3.00
Bench Height (H)	m	10.0	10.0	10.0
Blasthole Length (L)	m	11.5	11.5	11.5
Pattern Yield				
Rock Density	t/bcm	2.70	2.77	1.89
BCM/Hole	bcm/hole	260	270	270
Yield Per Hole	t/hole	702	749	511
Yield Per Metre Drilled	t/m drilled	61	65	44
Explosive Column (LE)	m	8.5	8.5	8.5
Volume of Explosives/ Hole	m^3	0.18	0.18	0.18
Weight of Explosives/Hole	kg	218.37	218.37	218.37
Powder Factor	kg/t	0.31	0.29	0.43
Powder Factor	kg/bcm	0.84	0.81	0.81
Drill Productivity				
Re-drills	%	5.0%	5.0%	5.0%
Pure Penetration Rate	m/h	35.0	35.0	35.0
Overall Drilling Factor (%)	%	0.50	0.50	0.50
Overall Penetration Rate	m/h	17.5	17.5	17.5
Drilling Efficiency	t/h	1,069	1,140	778
Drilling Efficiency	holes/h	1.52	1.52	1.52

Notes:

1. *bcm: banked cubic metres*

Drill and blast configurations consider the required stand-off distances to account for fly rock, air blasts, and ground vibrations for buildings and public roads.

Légis Québec states a maximum quantity of explosives detonated within an 8 mms time frame (S-2.1, r.4, Schedule 2.6, Section 4.7.5). In the recommendation, GMS has considered the impact of this restriction to the proximity of the km 381 Truck Stop at the southern side of the mine (GMS, 2022). As a result, a small portion of the pit in the south consisting of approximately 2% of the entire ultimate pit volume will require production blasts at 5 m-high benches.

Pre-split drill and blast have been accounted for in the drill and blast requirements. The purpose of pre-split drill and blast design is to break the rock near or up to the final pit limit while causing minimal damage to the rock beyond the limit. There are a number of wall control blast techniques available to achieve this including line drilling, presplitting, trim blasting, cushion blasting and buffer blasting. The preferred method will be selected from field trials.

The drill selected for this application is the same as the production drill, capable of drilling angled holes for probe drilling and pit wall drain holes. The standardization of the drill fleet will bring some flexibility and ensure that the drilling productivity is kept at its desired level.

Blasting activities will be outsourced to an explosives provider who will be responsible for supplying and delivering explosives in the hole through a shot service contract. The mine engineering department will be responsible for designing blast patterns and relaying hole information to the drilling team.

16.3.8 Loading Equipment Specifications

The key loading equipment includes the following:

- One 200-t Class Hydraulic Excavator (Backhoe Configuration) equipped with an 11 m^3 bucket, this excavator will primarily be used in waste rock mining and bulk ROM material mining.
- A 125-t Class Diesel Hydraulic Excavators (Backhoe Configuration) with a 6.3 m^3 bucket
- Diesel Front-end Wheel Loader (FEL): This wheel loader will have a 11 m^3 bucket capacity, primarily used for stockpile rehandling and pit support as necessary.

The excavators and wheel loader will be matched with a fleet of mine trucks, each with a payload capacity of 100-t.

Table 16-5 presents the loading productivity assumptions for each loading unit.

Table 16-5 – Loading Productivity Assumptions

Loading unit		Excavator (backhoe) Komatsu PC2000	Excavator (backhoe) Komatsu PC1250	Wheel Loader Komatsu WA800
Haulage unit		Komatsu HD785	Komatsu HD785	Komatsu HD785
Rated truck payload	t	90	90	90
Heaped tray volume	m^3	64	64	64
Bucket capacity	m^3	11	6.3	11
Bucket fill factor	%	90%	90%	90%
In-situ dry density	t/bcm	2.77	2.77	2.77
Moisture	%	3%	3%	3%
Swell	%	40%	40%	40%
Wet loose density	t/lcm	2.04	2.04	2.04
Bucket Payload Rating	t	20.18	11.37	20.18
Actual load per bucket	t			
Bucket margin at 100% fill factor				
Passes (decimal)	#	4.46	7.91	4.46
Passes (whole)	#	4	8.0	5
Actual truck wet payload	t	80.70	90.97	90.79
Actual truck dry payload	t	78	88	88
Actual heaped volume	m^3	40	45	45
Payload capacity	%	87%	98%	98%
Heaped capacity	%	62%	70%	70%
Cycle time				
Hauler exchange	min	0.6	0.6	0.7
First bucket dump	min	0.1	0.1	0.1
Average cycle time	min	0.7	0.7	0.8
Load time	min	2.80	5.60	3.60
Cycle efficiency with wait time	%	75%	75%	75%
Number of trucks loaded per hr	#	16.07	8.04	12.50
Production / Productivity				

Loading unit		Excavator (backhoe) Komatsu PC2000	Excavator (backhoe) Komatsu PC1250	Wheel Loader Komatsu WA800
Productivity dry tonnes / op. hr	t/hr	1,259	710	1102
Effective hours per year	hrs/y	5,470	5,470	5,214
Dry annual production capacity	t/yr/unit	6,887,930	3,882,288	5,744,874
Number of units	#	1	1	1
Tonnes	t/yr	6,887,930	3,882,288	5,744,874

Notes:
1. *lcm – loose cubic metres*

16.3.9 Hauling

Haulage will be performed with 100-t class mine trucks. The truck hours and cycle times have been calculated with the Deswik extension Landform & Haulage (LHS) where the cycle times have been estimated for each period and all possible destinations as there are several waste storage areas.

Haul trucks are also required to transport tailings from the plant to the proposed waste and dewatered tailings stack areas. Fines and coarse tailings are stored into two separate bins to load the tailings into trucks. The same production trucks will be used to transport the tailings to their destination.

16.3.10 Equipment Fleet Requirements

Equipment fleet requirements for excavators, haul trucks, and drills for the LOM are determined based on the equipment production rates and scheduled mine plan tonnage requirements. Secondary and support equipment fleet requirements are generally factored on the number of excavators and trucks required.

16.3.11 Fleet Management System

Due to the small size of the fleet, it was not deemed beneficial enough to have the truck loading units and drills fitted with a fleet management system, considering the fixed installation costs for such a system, and the low complexity of having the mine supervisor dispatching such a small fleet. The drills will use a geolocation system.

16.3.12 Crushing Plant

The production of crushed material will be necessary, for blast hole stemming purposes, for road maintenance or spreading of road abrasive on the ramps during winter. It is assumed that the required aggregate material production will occur during summertime, with the mobilization of a contracted mobile crusher to site. Waste rock to feed the small crushing plant will come from the pit, and the material produced will be stockpiled for use throughout the year.

16.3.13 Pit Slope Monitoring

Pit slope monitoring systems are used to gather any information on micro and macro movements of the pit walls. It usually consists of strategically placed prisms that are surveyed under a controlled environment (windless, rainless and stationary). No monitoring system has been developed during this phase of the feasibility study and should be an element of focus in the Basic Engineering stage.

16.3.14 Support Equipment

All construction related work, such as berm construction and water ditch cleaning will be done by one 49-t excavator (equipped with an optional hydraulic hammer when required).

One electric-powered pit bus will transport workers to their assigned workplace and a total of 15 F150 diesel pick-ups will be purchased for all the mining departments.

Several other equipment purchases are included to support the mining activities. Also included are one boom truck (28-t crane) and one 271 HP wheel loader.

16.3.15 Road and Dump Maintenance

Waste and ore storage areas will be maintained by up to two 436 HP track dozers.

Pit operating floors and dump roads and floors will be maintained by a 496 HP wheel-type dozer.

Mine roads will be maintained by two 14-ft blade motor graders and a water/sand truck will be used to spray roads to suppress dust or spread road aggregate during winter months.

16.3.16 Mine Maintenance

The Project has not included a maintenance and repair contract ("MARC") for its mobile equipment fleet. The maintenance department and personnel requirements have been structured to fully manage this function, performing maintenance planning, and training of employees. However, reliance on dealer and manufacturer support will be key for the initial years of the project, and major component rebuilds will be supported by the original equipment manufacturer's (OEM's) dealer throughout the LOM. An evaluation of a MARC will be considered with the Basic Engineering process. Tire monitoring, rotation, and / or replacement will be carried out by a specialized contractor.

Some other equipment will also be purchased to facilitate the maintenance activities and support the operation, such as one fuel and lube trucks, a forklift, one telehandler TL943, one 80-ft diesel forklift, one fuel and lube truck, one 100-t low-boy trailer and tractor for moving the tracked equipment. Other small equipment that will be required includes a mechanic service truck, generators, compressors, light towers, welding machines, water pumps, air heaters.

16.3.17 Dewatering

It is assumed that each pit will receive 775 mm/year of rainwater and JB1, JB2, and JB3 will receive an average of 211,527 m^3/y, 449,834 m^3/y, and 196,608 m^3/y of ground water influx, respectively. Calculating from the production schedule it is estimated that a total 15.3 million m^3 of water will be pumped from all the pits over the LOM.

A total of seven submersible electric Gormann-Rupp S8D1 pumps will be bought over the mine life. Due to the staggered mining, pumps can be moved to other pits when the pit is completely mined out. In-pit pumps are placed in sumps equal to the lowest mining level and, using 12-inch insulated pipe segments, the water is pumped to surface settling ponds. It is assumed that the pumping will start with diesel pumps for the first three years, then switch to electric submersible pumps starting Year 3 due to head loss concerns.

JB2 has the highest influx of water due to exposed area, followed by JB3, and finally, JB1. In Year 12, JB3 will be mined out and will be used as an in-pit dump. It will take 3.5 years to fill it, thus a pump will continue to be needed as the pit will be continuously filled with waste rock via haul trucks.

16.4 Personnel Requirements

Table 16-6 shows the estimated mine workforce requirements over the LOM for mining operations, maintenance and supervision based on the overall equipment fleet.

The personnel requirements are based on two rosters: four days on / three days off for the senior staff positions, and 14 days on / 14 days off for the rest of the workforce. The mine workforce peaks at 160 individuals in Year 10.

Table 16-6 – Mine Manpower Requirement Summary

	Year -2	Year -1	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	**Year 12**	**Year 13**	**Year 14**	**Year 15**	**Year 16**	**Year 17**	**Year 18**
Mine - Operations	23	74	86	86	88	88	88	88	88	88	92	96	96	96	96	96	96	96	98	94
Mine - Maintenance	15	40	40	40	40	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44
Mine - Geology	2	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	9	9
Mine - Engineering	3	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Total Workforce	43	134	146	146	148	152	152	152	152	152	156	160	160	160	160	160	160	160	160	156

17. RECOVERY METHODS

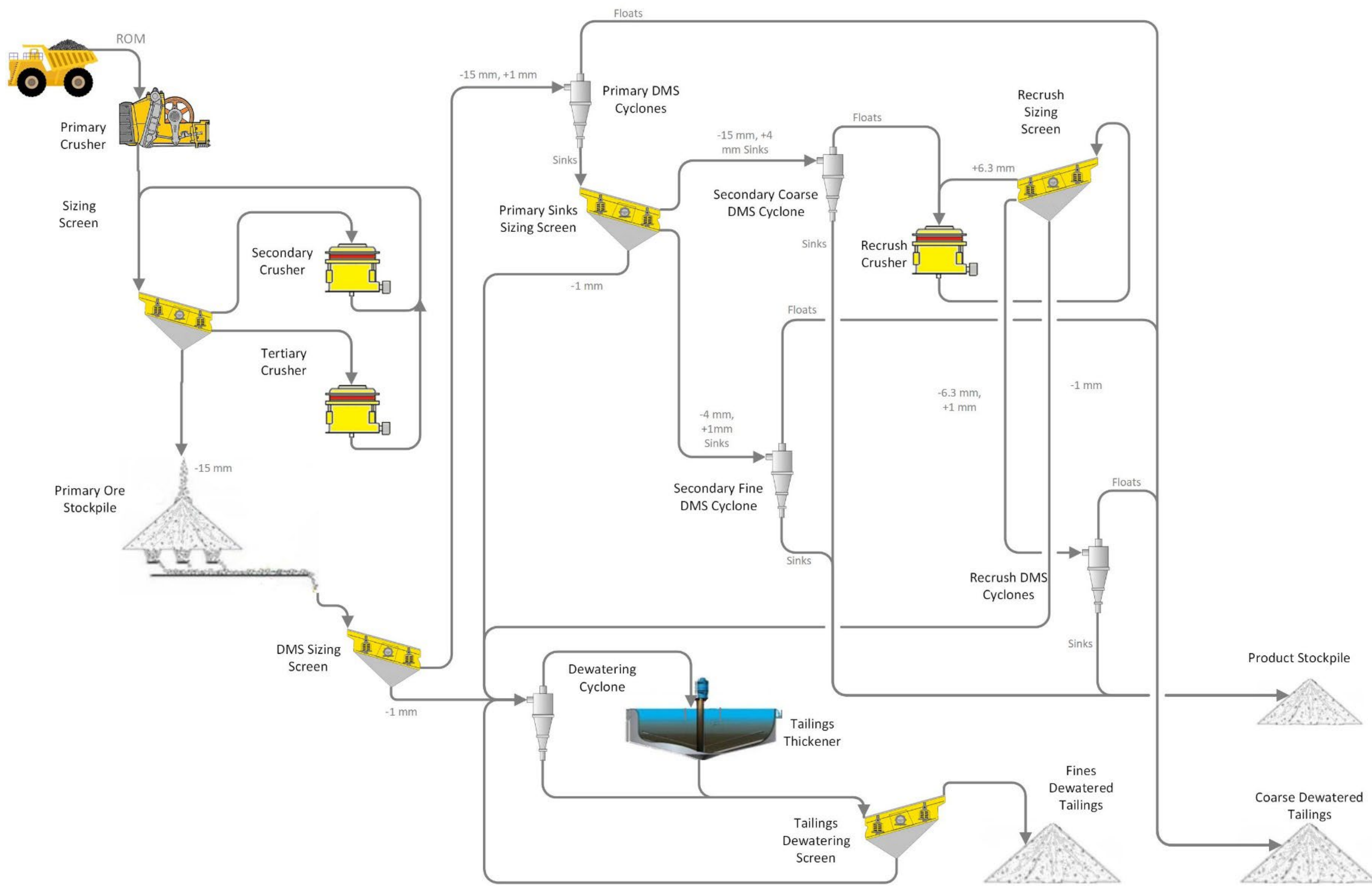
This section provides a detailed description of the processing plant planned for the James Bay Lithium Project. A process plant schematic diagram is presented in Figure 17-1.

17.1 Facility Description

The process described below was designed with the purpose of upgrading the Li_2O contained in raw pegmatite feedstock into a high grade, high quality Li_2O product with significant commercial value. Based on testwork that supports the current design criteria including detailed mass balance and operating principles, the current flowsheet will produce spodumene concentrate at a grade of 5.6% Li_2O and at a 69.6% recovery in the early years (EY) of the operation and 66.9% recovery in the mid/later (MY/LY) years.

The process consists of the following key areas:

- Run of Mine ("ROM") Pad
- Three stage crushing circuit: Crushing is carried out to reduce the particle size of the ROM and allow increased separation efficiency downstream
- Dense media separation ("DMS"): The DMS stage follows crushing and utilizes the density differences between the various minerals in the feed to separate the gangue from the material of value. See DMS section below for a detailed overview
- Fines tailings dewatering and disposal
- Coarse tailings disposal
- Reagent storage and preparation
- Concentrate handling



Source: Wave, 2023

Figure 17-1 – Process Plant Schematic Diagram

17.2 ROM Pad

17.2.1 ROM Pad Layout

Haul trucks will deliver ROM ore from the pit to either direct tip to feed the crushing circuit or the stockpile on the ROM pad where it will be reclaimed by front-end loader (FEL) to feed the crushing circuit. The pad will be sized to allow trucks to be emptied, circulate and for temporary stockpiling before the material is fed into the crusher circuit ROM bin.

The in situ specific gravity of the ROM ore is 2.73, with a swell factor of 30%. The bulk density of the mineralized material is estimated at 1.75 t/m^3. The stockpile height will be limited to that required to provide the requisite storage capacity.

A safety berm around the top of the pad will be required to prevent vehicles from falling down the steep grades and to allow segregation of contact stormwater and clean runoff stormwater.

17.2.2 Pad Drainage

The ROM pad design includes an impermeable layer. ROM pad grading will be designed to ensure a maintainable surface that is not subject to flooding or erosion. A minimum 2% downslope grading toward a design sump area will be used so that contact water can be pumped to the raw water pond to be used in the process plant.

17.3 Three Stage Crushing Circuit

The ore, either direct tipped from the haulage trucks or reclaimed from the ROM pile by a FEL is passed through a 700 mm aperture grizzly into the ROM bin. Material that does not pass through the grizzly is broken down further by a fixed rock breaker. The ore is then reclaimed from the ROM bin using a vibrating grizzly feeder of aperture 90 mm. The oversize from this vibrating grizzly is broken down by a jaw crusher.

The crushed material from the jaw crusher is fed over a sizing screen. This screen is a double deck vibrating multislope sizing screen with top deck aperture size of 38 mm and bottom deck aperture size of 15 mm. Oversize material from the top deck of the sizing screen is conveyed to a secondary cone crusher for size reduction. Oversize material from the bottom deck of the sizing screen is conveyed to a tertiary cone crusher for size reduction. Crushed material from both the secondary and tertiary crushers is combined on a conveyor and returned to conveyor feeding the double deck vibrating multislope sizing screen. Undersize material from the sizing screen is conveyed to the crushed material stockpile.

Material is recycled through the crushing circuit this way until it is below 15 mm particle size. The stockpile is covered by a 35 m high structural dome in order to protect the crushed material from outdoor weather conditions, particularly to prevent it from freezing during the colder periods.

The crushed ore is reclaimed using multiple reclaim vibrating pan feeders onto the DMS Sizing Screen Feed conveyor that is located in a tunnel under the stockpile and transfers the material to the DMS area.

17.4 DMS

DMS involves the use of a suspension medium with a high specific gravity. In this process, a Ferrosilicon (FeSi) slurry is used, known as the "correct medium". The correct medium's high specific gravity enhances the floatability of the lower density material, which contains the gangue particles. The difference in particle density creates a situation where the lighter gangue floats and the higher density material that contains the valuable minerals sinks. This separation allows the floated lower SG material to be easily removed from the process. The material previously processed through the 3-stage crushing circuit is transferred from the primary stockpile into the DMS sizing screen feed box. Process water is added to the DMS sizing screen feed box to form a slurry. From the feed box the slurry is passed over a vibrating multislope sizing screen with a deck aperture size of 1 mm.

17.4.1 Primary DMS

Oversize material (-15 +1 mm) from the sizing screen is transferred into the Primary DMS Mixing Boxes 1 and 2, where it is combined with the FeSi correct medium. The -1 mm undersize material from the DMS sizing screen is collected in a hopper and pumped to the tails dewatering cyclones.

Slurry from each of the mixing boxes is pumped separately into two separate groups of two 510 mm diameter cyclones, arranged in parallel for each mixing box. The cyclones use centrifugal force to separate the denser particles from the lower density particles. The floats and sinks from the cyclones are then processed through separate floats and sinks drain and rinse screening circuits; first through separate floats and sinks inclined static drain screens with 800 µm aperture size; then passed over separate single deck floats and sinks vibrating screens with aperture size of 800 µm. The undersize stream from both the floats and sinks drain sections is reused as correct medium.

Oversize material from the sinks screen reports to the primary sinks sizing screen which is a double deck vibrating screen. Undersize material from the primary sinks sizing screen is -1000 µm and is fed into the DMS dewatering cyclone. The top deck oversize and bottom deck oversize from the double deck screen are separated as coarse and fine material. Both are then processed through separate secondary DMS stages, the process of which is the same as the primary DMS stage.

The primary floats screen oversize reports as tailings and is discharged via tailings conveyors to the coarse tailings bin. Before the sinks and floats oversize material is discharged from the vibrating screen, the FeSi is removed by screen water sprays and recovered from the screen undersize material by magnetic separation which allows it to be recycled. This is achieved by passing the material through a magnetic separator, the resulting effluent is then sent to tailings via the DMS dewatering cyclone, and the magnetic fractions are sent through a demagnetising coil before being recycled into the circuit.

A bleed of correct medium from the correct medium head boxes containing heavier suspended particles is passed through a degrit sieve bend via a screen distributor. The sieve bend has an aperture of 600 µm. The undersize is reused as correct medium, the oversize is screened using a single deck high frequency vibrating screen with deck aperture size of 600 µm. Undersize material from this screen is directed to the dilute medium circuit, oversize is combined with coarse tailings.

17.4.2 Secondary Coarse DMS

The secondary coarse DMS circuit involves pre-mixing of the -15+4 mm primary coarse DMS sinks material with FeSi correct medium before feeding it into a 610 mm diameter cyclone. The floats and sinks from the cyclone are then processed separately through identical screening circuits; first through an inclined static drain screen with 800 µm aperture size; then a single deck vibrating screen with aperture size of 800 µm. Undersize material from the drain section of the screen from both the floats and sinks is reused as correct medium. Oversize material from the coarse sinks is collected and sent via conveyors through to the final product stockpile.

A bleed of correct medium from the correct medium head box containing heavier suspended particles is passed through a de-grit sieve bend via a screen distributor. The sieve bend has an aperture of 600 µm. The undersize is reused as correct medium, the oversize is screened using a single deck high frequency vibrating screen with deck aperture size of 600 µm. Undersize material from this screen is directed to the dilute medium circuit, oversize is collected in bulka-bags and then combined with coarse tailings.

FeSi is recovered from the secondary coarse DMS dilute medium circuit using a magnetic separator. The effluent is either processed as tailings or used to dilute the correct medium to the appropriate concentration in a hopper. The magnetic fraction is demagnetised by passing through a demagnetising coil and then reused as correct medium.

Oversize material from the secondary coarse floats screen is re-crushed in a the recrush circuit, which includes a cone crusher in closed circuit with a vibrating screen to produce a recrush material to a particle size of 6.3 mm. From here it is conveyed onto a double deck incline vibrating screen with a top deck aperture of 6.3 mm and a bottom deck aperture of 1 mm. Undersize material from the screen bottom is sent to the tailings dewatering cyclone. Bottom deck screen oversize material is sent to be processed through the re-crush DMS circuit. Top deck oversize material is combined with secondary coarse floats material and conveyed to the recrusher for size reduction.

17.4.3 Re-Crush DMS

The Recrush DMS circuit involves the pre-mixing of the recrushed -6.3+1 mm material with FeSi correct medium before feeding it into two 420-mm diameter cyclones. The floats and sinks from the cyclones are then processed separately through identical screening circuits. First through an inclined static drain screen with 800 µm aperture size, then a single deck vibrating screen with aperture size of 800 µm.

Undersize material from both the floats and sinks is reused as correct medium. Oversize material from the coarse sinks is collected and sent via conveyors through to the final product stockpile.

The recrush floats screen oversize material reports as coarse tailings and is discharged via coarse tailings conveyors to the coarse tailings bin. A bleed of correct medium from the correct medium head box containing heavier suspended particles is passed through a degrit sieve bend via a screen distributor. The sieve bend has an aperture of 600 µm. The undersize is reused as correct medium, the oversize material is screened using a single deck high frequency vibrating screen with deck aperture size of 600 µm. Undersize material from this screen is directed to the dilute medium circuit, oversize material is processed as tailings.

FeSi is recovered from the re-crush DMS process using magnetic separators. The effluent is either processed as tailings or used to dilute the correct medium to the appropriate concentration in a hopper. The magnetic fraction is demagnetised in a demagnetising coil and then reused as correct medium.

17.4.4 Secondary Fine DMS

Fine -4+1 mm sinks material from the primary DMS circuit is mixed with additional FeSi correct medium before being fed into a 350 mm fine cyclone. Underflow material (sinks) from the cyclone is screened through an inclined static drain screen with aperture size of 800 µm, where the oversize is then fed through a single deck horizontal vibrating screen with 800 µm aperture size. The undersize from the screen is recycled as correct medium. The oversize is conveyed to the final product stockpile.

Overflow material (floats) from the fine cyclone is screened through a screen circuit identical to the one described above for the cyclone underflow. The undersize material from the single deck horizontal screen is recycled as correct medium, the oversize material is collected and processed as coarse tailings.

A bleed of correct medium from the recrush circuit and the secondary fine circuit from the respective correct medium head boxes, is fed into a degrit sieve bend via a feed distributor. The sieve bend has an aperture of 600 µm. Underflow is recycled as correct medium; overflow is screened through a single deck high frequency vibrating screen with screen aperture of 600 µm. Undersize from this screen is collected and directed to the dilute medium circuit, oversize is processed as tailings.

FeSi is recovered from the secondary fine DMS process using a magnetic separator. The effluent is either processed as tailings or used to dilute the correct medium to the appropriate concentration in a hopper. The magnetic fractions are demagnetised in a demagnetising coil and then reused as correct medium.

17.5 Tailings Processing

Coarse tailings material from various areas of the plant are fed directly onto the coarse tailings bin via a transfer conveyor and from there can be discharged directly into haulage trucks and transported to the tailings stack. The sources of coarse tailíngs are listed below:

- Primary coarse DMS floats
- Primary degrit screen oversize
- Secondary fine DMS/recrush floats
- Secondary coarse degrit screen oversize (via bulka bag)
- Secondary fine/re-crush degrit screen oversize

The fines tailings stream is initially dewatered in two tails dewatering cyclones (duty/standby arrangement). Cyclone underflow reports to the fine tailings dewatering screen and the cyclone overflow to the tailings thickener feed box, where it is mixed with diluted flocculant and fed into a 13-m diameter thickener. The sources of fines tailings are listed below:

- DMS sizing screen undersize
- DMS scavenger magnetic separator effluent
- DMS dewatering cyclone overflow
- Material returned from spillage sumps
- Recrush sizing screen undersize

The tails thickener overflow is collected and re-used as process water.

The thickener underflow solids concentration is approximately 60%wt/wt and this material is fed onto the fines tailings dewatering screen for further dewatering with the tailings dewatering cyclone underflow stream. The tails dewatering screen is an incline screen that produces a screen oversize with approximately 19% moisture. The screen undersize is recycled back to the dewatering cyclone feed. The screen oversize is conveyed to the fines tailings bin and from there can be discharged directly into haulage trucks and transported to the tailings stack.

17.6 Reagents

17.6.1 Flocculant

Flocculant is used as an agglomerating medium in the tails processing area to help separate the water from the solids.

Flocculant is delivered to site in powdered form in 25 kg bags. The bags are lifted manually above the flocculant powder hopper and split. From the hopper the material is discharged into the flocculant heated cone. The powder is then transported into the flocculant mixing tank where it is mixed with raw water and homogenised by a flocculant mixing tank agitator. The resultant solution concentration is about 0.25% w/v. The solution is then stored in the flocculant storage tank.

From the storage tank, the flocculant is sent to the flocculant in-line mixer and then to the tailings thickener by dosing pumps.

17.6.2 Lime

Hydrated lime will be delivered to site in 20 kg bags, and during extended plant outages this is added as required to maintain a pH of greater than 8.5 in the FeSi sumps to prevent corrosion of the FeSi. Nominally 2 kg of hydrated lime per t of FeSi is added, and this is dependent on the initial pH of the FeSi slurry in the sump.

17.6.3 Ferrosilicon

Ferrosilicon powder will be delivered to site in either one ton or two ton bags, which will be mixed with water in a FeSi make-up system to the required slurry solids concentration for transfer to the appropriate DMS correct medium tank.

17.7 Other Consumables

Raw water is used in various areas around the plant and provides a source of gland water and fire water to be used in the event of an emergency.

Raw water from a local supply is delivered into the raw/fire water tank which is equipped with a heater to be used as required to ensure the water does not freeze during colder months. Water is discharged from the tank into two streams depending on its downstream use. In the first stream, it feeds into either of the process water tanks and it is also sent to the raw water distribution line.

Water from the tailings thickener overflow is collected in one of two process water tanks and sent through to the process water supply main. Water is also able to be recycled back into process water tanks as required.

Raw water is filtered by one of two gland water filters and collected in the gland water tank. From the gland water tank, the gland water is pumped and distributed into the gland water ring main.

17.8 Labour

Table 17-1 summarizes the personnel requirements for the processing plant.

Table 17-1 – Processing Personnel Requirements

Department	Number of Employees
Mill Administration	2
Mill Operations	35
Mill Maintenance	34
Mill Metallurgy	5
Laboratory BOOT	8
Mill Assay Laboratory	1
Labour Total	**85**

18. PROJECT INFRASTRUCTURE

The following infrastructure facilities will be required for the Project:

- North Water Management Pond (NWMP), East Water Management Pond (EWMP), and Process Plant Raw Water Pond (RWP)
- Plant substation (69 kV)
- Mine service Center including a Truck maintenance shop
- Accommodation camp, Kitchen, Recreation Center, and Reception
- Domestic Water Treatment Plant
- Sewage Treatment Plant
- Waste disposal facility
- Fuel Station
- Administration building, and emergency services facilities (fire and medical)
- Laboratory
- Mine Dry
- Propane storage and distribution facility
- Explosives storage
- Effluent Treatment Plant
- Mining material stockpiles and mine waste storage facilities will include:
- Run-of-Mine (ROM) pad.
- Dome-covered crushed ore stockpile.
- Four (4) Waste Rock and dewatered Tailings co-disposal Storage Facility (WRTSF) stockpiles
- Spodumene concentrate stockpile and building.
- Coarse and Fine Tailings bins.
- Overburden and Peat Storage Facility (OPSF).

The Run-of-Mine (ROM) stockpile, tailings bins and spodumene concentrate stockpile will be located adjacent to the process plant.

The four WRTSF stockpiles will be constructed around the open pit. The WRTSF stockpile locations were selected to minimize haul distance from the open pit. A surface water drainage network will be built to collect and convey contact water from the ROM and process plant area to the ROM sump, and from the WRTSF and OPSF to one (1) of two (2) water management ponds (WMPs) or to the open pit. The same strategy will be used to manage the surface water run-off (contact water) for all disturbed land. All contact water collected on the mine site will ultimately be transferred by gravity or by pumping to the North WMP. Excess water from the North WMP will be treated for discharge to the CE2 Creek (see Section 18.4.2).

Most on-site work and the locations of the various infrastructure and buildings will comply with the required minimal setback distance of 60 m from the high-water mark of any lake or watercourse. The exception is the haul road required to cross the CE3 Creek.

18.1 General Site Plan

The overall site plan shows the proposed mine pit, process plant, four WRTSF stockpiles, OPSF, WMPs, mining services area as well as access roads (Figure 18-1). The mine site will be accessible from the existing Billy-Diamond Highway (formerly James Bay Road), which runs along the east perimeter of the site.

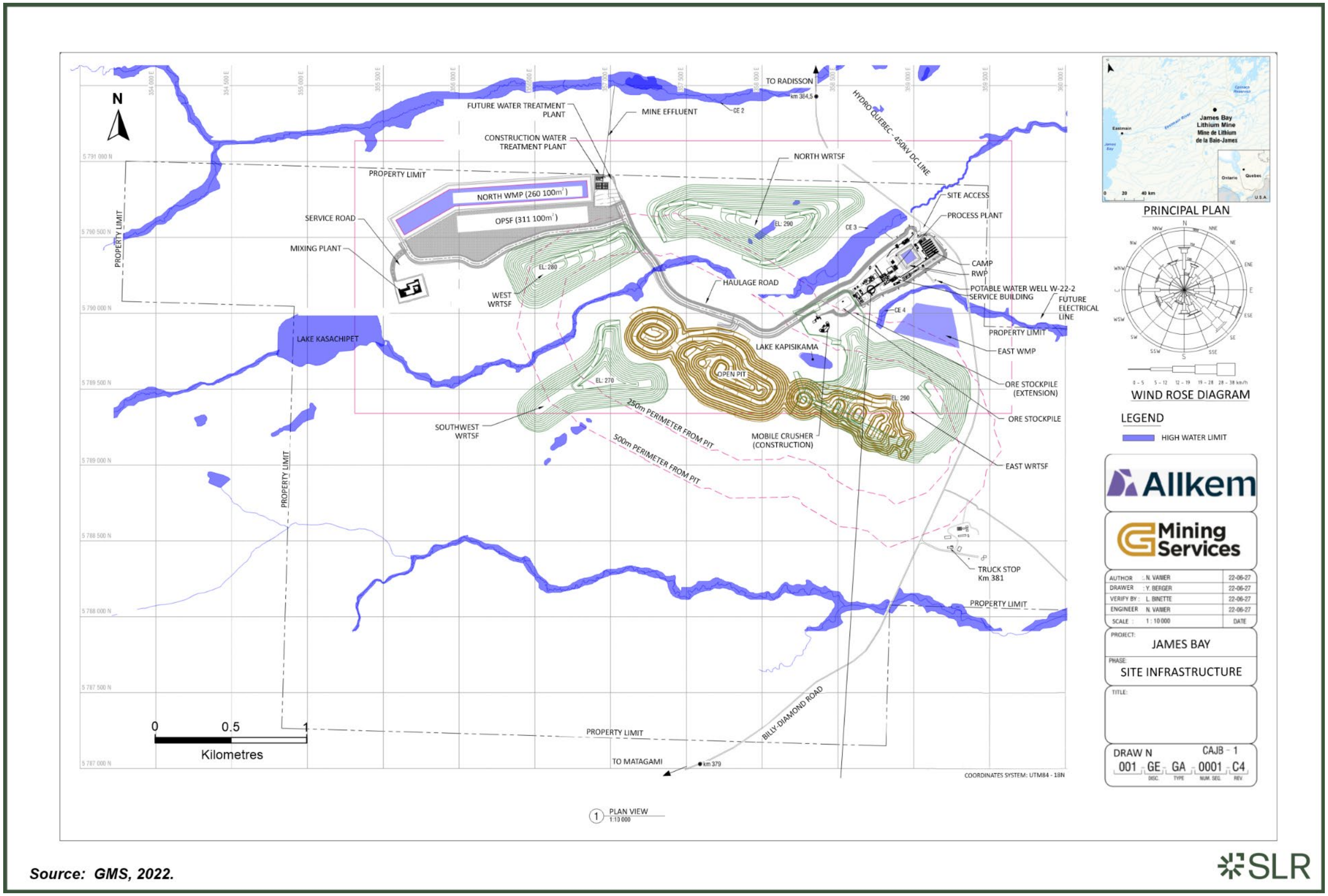


Figure 18-1 – General Site Plan

18.2 Waste Rock and Tailings Storage Facility (WRTSF)

Tailings and waste rock will be co-disposed in four stockpiles referred to as the Waste Rock and Tailings Storage Facility (WRTSF). Co-disposal of dewatered tailings and waste rock offers the following advantages:

- Free draining waste rock embankment that does not impound water.
- Waste rock embankment zones that improve the physical slope stability of the WRTSF stockpiles.
- Accelerated consolidation and improved shear strength of tailings.
- Reduced risk of embankment failure and loss of tailings containment.
- Reduced total mine waste stockpiled volume due to tailings penetrating into some of the waste rock voids.
- Reduced total footprint area for mine waste disposal facilities.
- Reduced freeze-drying, dust generation and erosion of tailings.
- Improved opportunities for progressive closure.

The storage of waste rock and dewatered tailings will be divided into four (4) distinct management stockpiles designated as the "West", "North", "Southwest (JB1)" and "East" WRTSF stockpiles as indicated on Figure 18-1.

The WRTSF stockpiles will receive waste rock trucked from the open pit and dewatered tailings trucked from the process plant. The WRTSF stockpiles have been designed to accommodate an aggregate total of 31.6 million tonnes (approximately 18.9 million m³) of dewatered tailings solids and 126.1 million tonnes (approximately 58.4 million m³) of waste rock. The East WRTSF stockpile will extend into the southeast end of the open pit after it is mined out for in-pit disposal of waste rock only (referred to as the "East Dump Extension"). Approximately 17 million m³ of waste rock will be disposed in-pit (in the southeast end of the open pit after it is mined out). The WRTSF stockpiles have been designed with associated water management infrastructure including a base drainage rock layer and perimeter water collection ditches reporting to two WMPs and/or the open pit (where water will be pumped to the NWMP). Progressive development (staged construction) of the mine waste and water management facilities has been considered in the design. Design of the WRTSF and WMPs has considered surface water management and slope stability.

The WRTSF stockpiles were designed taking into consideration the site requirements and the design criteria of *Directive 019 sur l'Industrie Minière* (MELCC, 2012) and the Guidelines for preparing mine closure plans in Québec (MERN, 2017). Hydrogeological investigation indicates that the WRTSF foundation soil has sufficiently low permeability to meet the maximum infiltration requirements of Québec Directive 019. The proposed WRTSF stockpile locations were selected to minimize haul distance from the open pit.

Figure 18-1 presents the general layout of the site and the four WRTSF stockpiles.

The WRTSF stockpiles are designed to contain two (2) waste streams: waste rock from the open pit and dewatered tailings from the process plant. The ratio of tailings to waste rock is approximately 20% tailings and 80% waste rock by dry mass (24% tailings and 76% waste rock by volume) over the LOM. Approximately 70% of the tailings stream will be classified as coarse tailings (>1 mm) and approximately 30% classified as fine tailings (<1 mm). During the first five years of mine operation all of the fine tailings will be deposited in a single, designated cell within the North WRTSF stockpile for potential future reprocessing. All tailings will be dewatered and compacted into cells within one of the four WRTSF stockpiles. Fine tailings will be prevented from migrating through the external waste rock embankment slopes or base drainage layer by transition rockfill and coarse tailings filter zones. Co-disposal of tailings and waste rock was selected to reduce life cycle cost, improve stockpile slope stability and allow for progressive reclamation. The construction of the WRSTF stockpiles will include a waste rock base drainage layer, perimeter access roads, non-contact water diversion (where required), perimeter contact water collection ditches and sumps. Runoff from the WRTSF stockpiles will be collected by perimeter ditches and conveyed to the WMPs or to the open pit, where water will be pumped to the NWMP. The WMPs will have associated emergency spillways and water pumping infrastructure. From the NWMP, the contact water will either be pumped to the process plant for reuse or treated and discharged to the environment.

18.2.1 Geometry and Location

The WRTSF stockpiles are located within the Project site limits and positioned around the open pit to reduce waste rock haul distance. The WRTSF stockpiles have a combined footprint of approximately 186.7 ha. Table 18-1 summarizes the proposed geometry of the WRTSF stockpiles. The design of the four (4) WRTSF stockpiles considered applicable regulations and current government recommendations, including *Directive 019 sur l'Industrie Minière* (MELCC, 2012) and the Guidelines for Preparing Mine Closure Plans in Québec (MERN, 2017). One of the criteria is that mine waste management facilities must be located 60 m from the high-water mark of natural water courses and water bodies.

Table 18-1 – Summary of WRTSF Geometries and Attributes

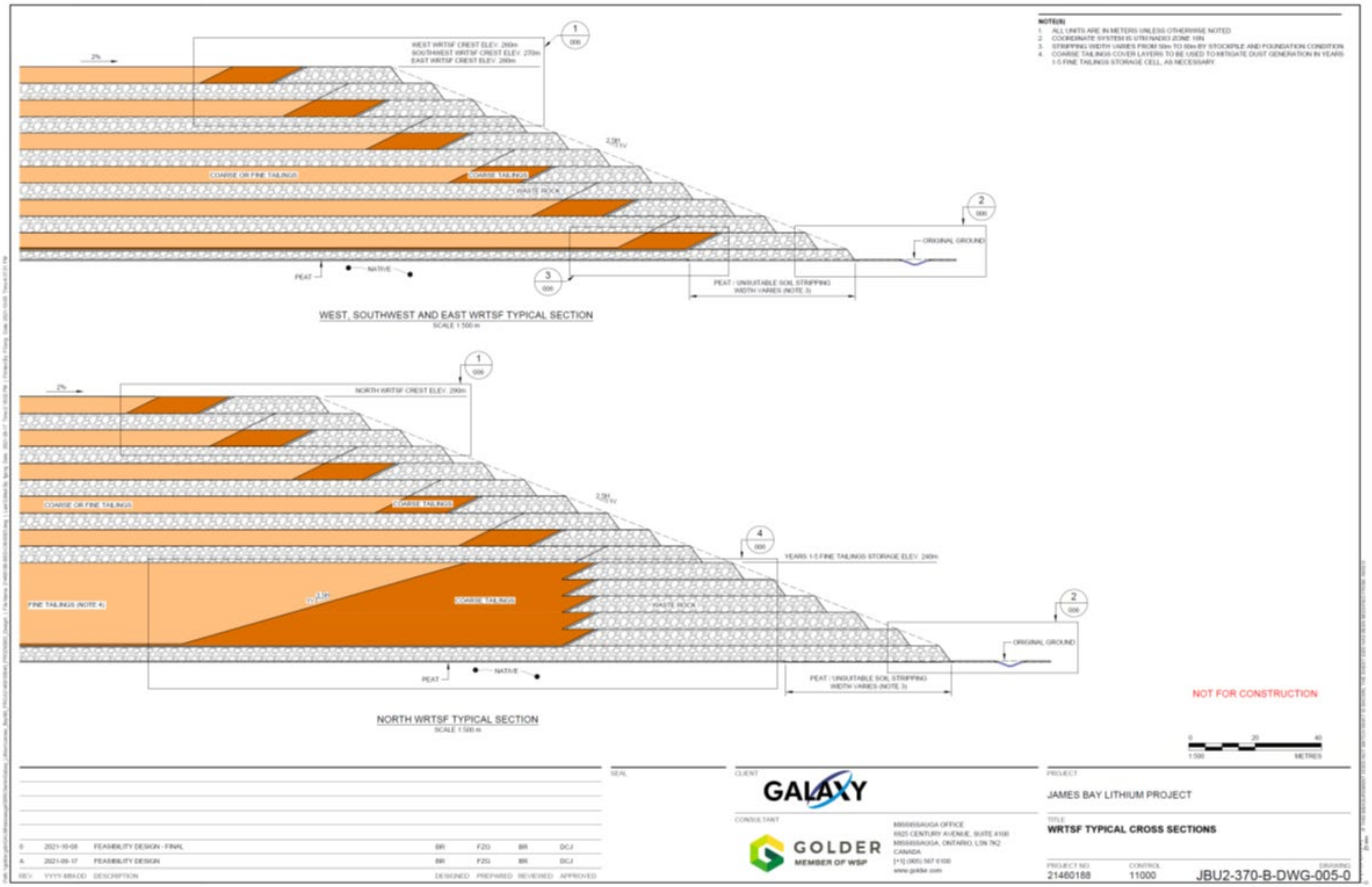
WRTSF	Ultimate Footprint Area (ha)	Ultimate Crest Elevation (masl)	Maximum Final Height (m)	Slope Overall Grade (X H:1V)
West	25.4	280	73	2.5
North	54.4	290	83	2.5

WRTSF	Ultimate Footprint Area (ha)	Ultimate Crest Elevation (masl)	Maximum Final Height (m)	Slope Overall Grade (X H:1V)
Southwest (JB1)	33.8	270	61	2.5
East	73.1	290	74	2.5

The foundation soils beneath the proposed WRTSF stockpiles primarily consist of granular non-cohesive sand and silt till deposits, with some areas having an upper deposit of low plasticity clayey silt. Based on available investigation data, infiltration rates beneath the WRTSF stockpiles are predicted to be lower than 3.3 L/m^2/day (WSP, 2021), indicating that a geomembrane liner will not be required beneath the WRTSF stockpiles in accordance with Québec Directive 019. Slope stability of the WRTSF slopes has been confirmed based on available geotechnical investigation in the proposed WRTSF areas.

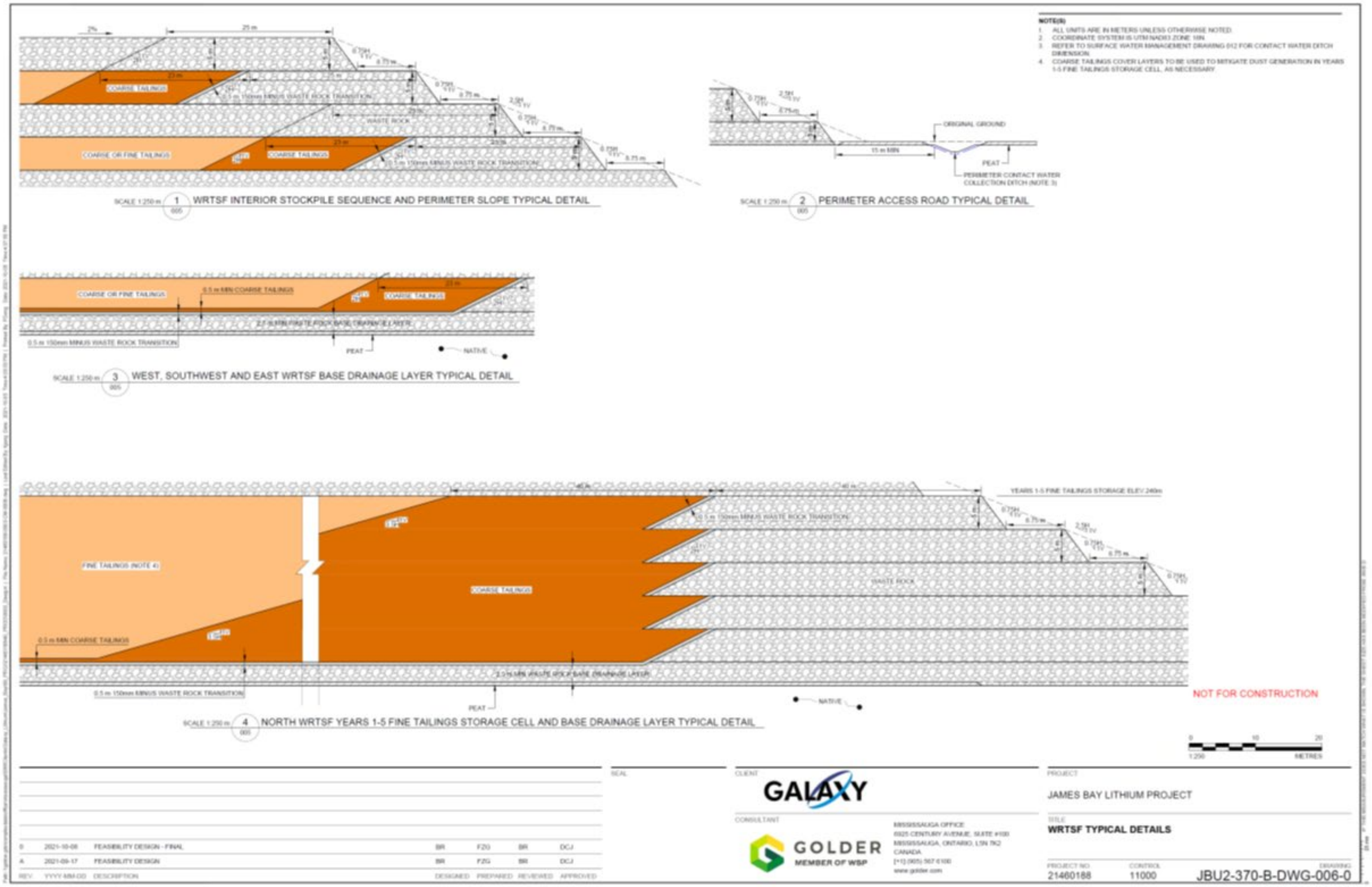
In general, the WRTSF embankment slopes will have an overall grade of 2.5H:1V. The WRTSF embankment slopes will be upstream raised, with 5 m high angle of repose (0.75H:1V) waste rock benches, each having a crest width of 25 m. Tailings and waste rock will be stockpiled upstream of the perimeter waste rock embankment slope in alternating layers to promote drainage. For tailings layers, the area immediately upstream of the waste rock embankment slope will consist of coarse tailings, to provide suitable foundation for future raising of the embankment slope, with both fine and coarse tailings stockpiled interior to this area. A minimum 2.5 m thick waste rock drainage layer will be provided at the base of the WRTSF stockpiles. Transition layers of select/processed waste rock followed by coarse tailings will be placed above the base waste rock drainage layer and on the upstream slopes of the perimeter waste rock embankment at tailings storage areas to provide filter compatibility and prevent the migration of fine tailings. Typical cross-sections of the WRTSF embankment slopes are shown in Figure 18-2 with details shown in Figure 18-3.

During construction of the WRTSF stockpiles, peat and organic topsoil will be stripped from a 50 to 80 m width (depending on WRTSF foundation conditions and slope stability) beneath each WRTSF toe to improve external embankment slope stability. This material will be temporarily stored downstream of the WRTSF footprints and used immediately to progressively reclaim the completed lower slopes of the WRTSF stockpiles or hauled to the OPSF.



Source: Golder, 2021

Figure 18-2 – Typical WRTSF Cross-Sections



Source: Golder, 2021

Figure 18-3 – WRTSF Details

18.2.2 Proposed Equipment

For development of the WRTSF stockpiles, a combination of off-highway trucks (for hauling waste rock and tailings), hydraulic excavators or loaders (for loading waste rock into trucks), fine and coarse tailings bins to load tailings into trucks, bull dozers (for spreading waste rock and tailings in lifts in the WRTSF stockpiles) and compactors (to compact tailings and waste rock in the WRTSF) will be required.

18.2.3 Tailings Properties

It is estimated that the amount of tailings produced will be approximately 85% of the tonnage of ROM processed due to mineral (i.e., lithium concentrate) recovery. The estimated annual tailings tonnage over the currently proposed life of mine is presented in Table 18-2.

Table 18-2 – Annual ROM Production, Tailings, Waste Rock and Overburden

Year	ROM Processed (t)	Tailings Generated (t)	Waste Rock Mined (t)	Overburden Mined (t)
-2	0	0	0	0
-1	0	0	759,367	742,318
1	1,321,667	1,123,417	3,647,329	1,872,120
2	2,000,000	1,700,000	4,912,796	39,538
3	2,000,000	1,700,000	4,393,790	801,909
4	2,000,000	1,700,000	5,510,435	323,311
5	2,000,000	1,700,000	5,921,673	91,847
6	2,000,000	1,700,000	6,123,117	45,323
7	2,000,000	1,700,000	7,690,069	607,756
8	2,000,000	1,700,000	8,149,363	0
9	2,000,000	1,700,000	7,749,359	0
10	2,000,000	1,700,000	7,807,933	85,626
11	2,000,000	1,700,000	7,665,916	0
12	2,000,000	1,700,000	6,913,117	1,333,195
13	2,000,000	1,700,000	8,973,817	11,969
14	2,000,000	1,700,000	9,449,486	0
15	2,000,000	1,700,000	9,241,477	0
16	2,000,000	1,700,000	7,377,971	0
17	2,000,000	1,700,000	6,247,356	0
18	2,000,000	1,700,000	5,637,316	0

Year	ROM Processed (t)	Tailings Generated (t)	Waste Rock Mined (t)	Overburden Mined (t)
19	1,973,979	1,677,882	2,577,175	0
Total	37,295,646	31,701,299	126,748,861	5,954,912
Bulk Density (t/m³)		1.67	2.16	1.8
Total Volume (m³)		18,982,814	58,680,028	3,308,285

James Bay Lithium Mine Project tailings samples were geochemically characterized (WSP, 2018a) and are non-potentially acid generating (non-PAG) (see Section 18.2.7.3 for further tailings geochemistry discussion). The tailings will be separated into coarse (>1 mm) and fine (<1 mm) streams during processing, prior to filtering and disposal in the WRTSF, with an anticipated distribution of approximately 70% coarse tailings and 30% fine tailings (by mass). The coarse tailings are anticipated to consist of fine gravel to medium sand sized particles, with a maximum particle size of 15 mm and having a grain size distribution of approximately 45% gravel and 55% sand sized particles. The fine tailings are anticipated to consist of medium sand to silt sized particles with a grain size distribution of approximately 98% to 84% sand sized particles (4.75 mm to 0.075 mm) and 2% to 16% fines (<0.075 mm).

The moisture content of the dewatered tailings from the process plant was estimated by Wave to be 5% and 15% by total mass for the coarse and fine tailings, respectively. For the tailings to achieve long term strength parameters and not be susceptible to liquefaction, it is critical that the tailings be sufficiently dewatered to permit adequate compaction during placement in the WRTSF stockpiles. For the purposes of calculating placed tailings volume in the WRTSF stockpiles, a dry density of 1.7 t/m³ and 1.6 t/m³ has been assumed for the coarse and fine tailings, respectively. This corresponds to void ratios of 0.61 and 0.71 (coarse and fine tailings) for a tailings' specific gravity of 2.73. Confirmation of the optimum water content and dry density of the placed tailings will be required during the next phase of study.

18.2.4 Waste Rock Properties

The anticipated amount of waste rock produced during each year of mine operation was provided by SLR and the tonnage is presented in Table 18-2 (above).

Waste rock was previously geochemically characterized (WSP, 2018a) and determined to be non-PAG but metal leaching over the short-term only (see Section 18.2.7.1 for further waste rock geochemistry discussion). The waste rock is expected to consist of particles ranging from 50 mm to a maximum of 1000 mm in diameter with a D50 of about 250 mm (average size). The unit weight of compacted waste rock in the WRTSF stockpiles was assumed to be 2.16 t/m³. The moisture content of waste rock excavated from the open pit and hauled to the WRTSF stockpiles was estimated to be 3% by weight.

18.2.5 Design Criteria

The WRTSF and WMP embankments were classified using the Canadian Dam Association (CDA) "Dam Safety Guidelines" (2013) and "Application of Dam Safety Guidelines to Mining Dams" (2019). Hazard classification determines the design criteria for slope stability, design floods and design earthquake levels. The WRTSF and WMP embankments were classified as having a "Significant" consequence of failure because there is no downstream population at risk (i.e., temporary workers only), failure would not result in significant loss of important fish or wildlife habitat and restoration or compensation of fish or wildlife habitat is expected to be possible. In accordance with Québec's Directive 019, the design earthquake annual exceedance probability (AEP) was defined as 1/2,475 years, which exceeds the CDA requirement of between 1/100 and 1/1000 for a "Significant" dam hazard classification during operation and satisfies the CDA requirement of 1/2,475 post-closure. The 1/2,475 AEP design earthquake for the James Bay Lithium Mine Project site has an associated Peak Ground Acceleration (PGA) value of 0.038 g obtained from the National Building Code of Canada seismic hazard database (NRCC, 2015).

Table 18-3 summarizes minimum Factor of Safety (FoS) values for WRTSF embankment slope stability recommended in applicable CDA Guidelines and Québec's Directive 019. For mine closure, reclamation of the WRTSF surface will be required. The Guidelines for Preparing Mine Closure Plans in Québec (MERN, 2017) recommend minimum FoS values consistent with those outlined in Table 18-3.

Table 18-3 – Minimum Factors of Safety for WRTSF Slope Stability

Loading Condition	Minimum Factor of Safety
Short-term	1.3
Long-term	1.5
Pseudo-static	1.1
Post-earthquake (where applicable)	1.3

Slope stability results are presented and discussed in the Mine Waste Front End Engineering Design Report (Golder, 2021). Stability criteria for the overall WRTSF embankment slopes were satisfied.

18.2.6 Development Plan

Tailings and the waste rock will be co-disposed within the WRTSF, with dewatered tailings placed and compacted into cells contained within a waste rock embankment. Table 18-4 presents the cumulative production volumes of waste rock and tailings over the life of the Project, using dry density parameters discussed earlier. Table 18-4 also designates which WRTSF will receive tailings during each year of mine operation and the WMP that will collect contact water.

Table 18-4 – Waste Rock and Tailings Volumes by Year

Year	Waste Rock Volume (m^3)	Tailings Volume (m^3)	Coarse Tailings Volume (m^3)	Fine Tailings Volume (m^3)	WRTSF Receiving Tailings	WRTSF Receiving Waste Rock	WMP Receiving Runoff from Active WRTSF
-2	0	-	0	0			
-1	351,559	-	0	0	-	North	-
1	1,688,578	673,511	459,833	213,678	North	North	North WMP
2	2,274,443	1,019,185	695,838	323,347	North	North	North WMP
3	2,034,162	1,019,185	695,838	323,347	North and West	North and West	North WMP
4	2,551,127	1,019,185	695,838	323,347	North and West	North and West	North WMP
5	2,741,515	1,019,185	695,838	323,347	North and West	North and West	North WMP
6	2,834,776	1,019,185	695,838	323,347	West	East and West	North WMP and East WMP
7	3,560,217	1,019,185	695,838	323,347	East	Southwest and East	North WMP and East WMP
8	3,772,853	1,019,185	695,838	323,347	Southwest and East	Southwest and East	North WMP and East WMP
9	3,587,666	1,019,185	695,838	323,347	Southwest and East	Southwest and East	North WMP and East WMP
10	3,614,784	1,019,185	695,838	323,347	Southwest and East	North, Southwest and East (JB3 in-pit)	North WMP and East WMP
11	3,549,035	1,019,185	695,838	323,347	North, Southwest and East	North, Southwest and East (JB3 in-pit)	North WMP and East WMP
12	3,200,517	1,019,185	695,838	323,347	North and South	North, Southwest and East (JB3 in-pit)	North WMP and East WMP
13	4,154,545	1,019,185	695,838	323,347	North	North, Southwest and East (JB3 in-pit)	North WMP and East WMP
14	4,374,762	1,019,185	695,838	323,347	North	North, Southwest and East (JB3 in-pit)	North WMP and East WMP
15	4,278,462	1,019,185	695,838	323,347	North	North, Southwest and East (JB3 in-pit)	North WMP and East WMP
16	3,415,727	1,019,185	695,838	323,347	Southwest and East	Southwest and East (JB3 in-pit)	North WMP and East WMP
17	2,892,294	1,019,185	695,838	323,347	East	East	North WMP and East WMP
18	2,609,869	1,019,185	695,838	323,347	East	East	North WMP and East WMP

Year	Waste Rock Volume (m^3)	Tailings Volume (m^3)	Coarse Tailings Volume (m^3)	Fine Tailings Volume (m^3)	WRTSF Receiving Tailings	WRTSF Receiving Waste Rock	WMP Receiving Runoff from Active WRTSF
19	1,003,137	999,924	682,688	317,236	East	East	North WMP and East WMP
Total	58,490,029	18,999,575	12,971,764	6,027,811	-	-	-

The following is a summary of development and operation of the WRTSF and WMPs:

Pre-Production (Year -1): Under the proposed development plan, the North WMP will need to be constructed in the pre-production period (i.e., Year -1). Waste rock mined during the pre-production period will be used to construct the base drainage layer and initial waste rock perimeter embankment slopes for the North WRTSF stockpile. Overburden from pit stripping, North WRTSF foundation preparation and site development will be placed in the OPSF with runoff being collected in the NWMP.

Start-up and Fine Tailings Segregation (Years 1 through 5): In Years 1 through 5 of mine operation, waste rock placement will occur at both the North and West WRTSF stockpiles, including construction of the perimeter embankment slopes and West WRTSF base drainage layer. Fine tailings will be placed within a single large interior cell at the North WRTSF, provided to accommodate potential future reprocessing of the fine tailings. Coarse tailings will be placed in North WRTSF as required to support the fine tailings cell, with surplus material placed within the West WRTSF. Overburden from the West WRTSF foundation preparation will be placed in the OPSF. Contact water from the North and West WRTSF and the OPSF will be collected in the NWMP. The East WMP will need to be constructed prior to the end of Year 5 (i.e., prior to development of the East WRTSF in Year 6).

Potential Fine Tailings Reprocessing (Years 6 through 10): During Years 6 through 10 of mine operation, waste rock, coarse tailings and fine tailings will be placed within the West, Southwest and East WRTSF stockpiles, including construction of the waste rock perimeter embankment slopes and Southwest and East WRTSF stockpiles base drainage layers. No placement is anticipated in the North WRTSF during this period in order to maintain the fine tailings stockpiled during Years 1 through 5 accessible for potential reprocessing. The West WRTSF is anticipated to reach its ultimate design limits during this period. Overburden from the Southwest and East WRTSF foundation preparation will be placed in the OPSF. Contact water from North and West WRTSF stockpiles and the OPSF will continue to be collected in the NWMP. Contact water from the Southwest WRTSF stockpile will drain to the open pit where it will be pumped to the NWMP. Contact water from the East WRTSF stockpile will drain to the EWMP (to the north), and to the open pit (to the south) where it will be pumped to the NWMP.

Years 11 through 16: During Years 11 through 16 of mine operation, waste rock, coarse tailings and fine tailings will be placed within the North, Southwest and East WRTSF stockpiles, including continued construction of the waste rock perimeter embankment slopes. Development of the North WRTSF will continue above its single large interior fine tailings cell (after the fine tailings have either been reprocessed or deemed un-economical). The North and Southwest WRTSF stockpiles are anticipated to reach their ultimate design limits during this period. In-pit filling of JB-3 with waste rock will occur during this period. Contact water from the WRTSF stockpiles and OPSF will continue to be collected in the NWMP, EWMP or open pit where it will be pumped to the NWMP.

Years 17 through 20: During the final years of mine operation, waste rock, coarse tailings and fine tailings will be placed within the East WRTSF, extended above the infilled open pit JB-3 ("East WRTSF extension"). There will also be some waste rock placement in the other WRTSF stockpiles to cover any exposed tailings and achieve the required external waste rock embankment slopes. Runoff from the OPSF, West WRTSF and North WRTSF will drain to the NWMP. The EWMP will continue to collect contact water from the north and east sides of the East WRTSF. Runoff from the Southwest WRTSF and south side of the East WRTSF will continue to drain to the open pit and be pumped to the NWMP.

After the planned footprint of each WRTSF stockpile has been developed to the full extent (i.e., completion of the base waste rock drainage layer), waste rock will then be used to construct perimeter embankment slopes, internal haul roads and alternating drainage layers, to accommodate internal tailings disposal in successive lifts across the entire WRTSF plateau surface to the maximum elevations outlined in Table 18-1, and as per the typical geometry illustrated on Figure 18-2 and Figure 18-3.

Initial WRTSF footprint development, including drainage layer construction and lower perimeter berm raise construction, will have to be carried out carefully to prevent localized failure of any underlying clayey soil foundation, where present. Clayey soil layers encountered during geotechnical investigations of the foundations of the WRTSF stockpiles were relatively thin. Excess pore water pressure in the foundation soils resulting from WRTSF fill placement are expected to partially dissipate over the duration of the WRTSF development. The development and dissipation of excess pore water pressures will be monitored during construction. Should excess pore water pressure locally exceed anticipated levels, stockpile operations will be temporarily relocated to a different area or to a different WRTSF stockpile, allowing additional time for excess pore pressure dissipation. Stability analyses indicate that a 2.5 H:1V overall slope will provide stable external WRTSF slopes. The foundation consolidation assessment, benching design and inter-bench slopes for progressive development of the WRTSF stockpiles should be further optimized during the next phase of study, following completion of additional site characterization work (e.g., field investigation and laboratory testing). The ultimate WRTSF development plan is illustrated on Figure 18-1.

18.2.7 Geochemical Characterization

18.2.7.1 Waste Rock

Four main lithologies were targeted for the geochemical characterization of waste rock: one pegmatite waste rock unit (I1G), gneiss (M1) and banded gneiss units (M2) and one unit of mafic volcanic rock (V3) which included the basalt unit (V3B). The economic material is associated with spodumene, which occurs in large crystals in pegmatite intrusions and is also part of unit I1G. A total of 81 samples were tested for static parameters, including modified acid base accounting (MABA), available metal content and Toxicity Characteristic Leachate Procedure leaching test was performed on all the samples for which the available metal content exceeded criteria "A" in the *Guide d'intervention - Protection des sols et réhabilitation des terrains contaminés* (Beaulieu, 2016) to determine the mobility of inorganic analytes.

The results of the static MABA testing indicated a total sulphur concentration of less than 0.3% for all the waste rock samples of units I1G and V3B, therefore a non-PAG classification is applicable under D019. However, 30% of the samples of unit M1 and 50% of the samples of unit M2 are classified as potentially acid generating (PAG) under D019, and waste rock of these lithologies is therefore considered PAG. The leachable species identified in the testing include As, Ag, Ba, Cd, Cu, Mn, Ni, Pb, Zn. The results of these analyses show that all the waste rock is not considered "High risk" under the D019, however, the waste rock is leachable under this same directive according to the toxicity characteristic leaching procedure (TCLP), synthetic precipitation leaching procedure (SPLP), and CTEU-9 results.

Kinetic testing has been performed on a representative mix of waste rock which will be stored in the WRTSF. Two columns of waste rock (waste rock saturated and waste rock with dry cycles) were tested prior to the static testing. The columns are classified Non-PAG but leachable for Ag, As, Ba, Cu, Mn, Hg, Pb and Zn. Metal leaching occurred only in the short-term (up to 14 weeks in the testing period) and metals concentrations decreased/stabilised in the long-term.

18.2.7.2 Ore (Pegmatite)

The results of the MABA static test indicated that 79% of the samples are considered non-PAG and 21% are considered PAG under D019. Leachable species identified include Ag, As, Cd, Cu, Hg, Ni, Pb and Zn.

When compared to the criteria in Table 1 of Appendix II of D019, the results of these analyses show that the pegmatite samples analyzed would not be considered "High risk" materials. However, the material (96% of the samples) is considered leachable under the same directive.

18.2.7.3 Tailings

MABA static tests were performed on 12 tailings samples, and total sulfur concentrations were less than 0.3% in all. All samples are therefore classified as non-PAG under D019.

Twelve (12) tailings samples were analyzed for total metal content, and all exceeded at least one of criteria "A" in the 'Guide d'intervention'. A leaching test was therefore performed on the 12 samples to determine the mobility of inorganic analytes. The results showed that none of the criteria in Table 1 of Appendix II of D019 were exceeded; the risk of the analyzed tailings is therefore not classified as "high risk." However, all the samples analyzed showed exceedances of the RES criteria in the *Guide d'intervention – Protection des sols et réhabilitation des terrains contaminés* (Beaulieu, 2016) for cadmium, copper, manganese, and zinc. One sample (8% of the total samples) also exceeded the RES criterion for mercury.

Therefore, according to applicable regulations, the tailings which will be generated on the site would be considered non-PAG, not as High Risk under Directive 019, and leachable for cadmium, copper, manganese, mercury, and zinc.

Kinetic testing has been performed on a representative mix of tailings which will be stored in the WRTSF. One column of tailings (Tailings with dry and saturated cycles) was tested prior to the static testing. The column is classified Non-PAG but leachable for Ag, As, Ba, Cu, Mn, Hg, Pb, and Zn. Metal leaching occurred only in the short-term (up to 14 weeks in the testing period) and metals concentrations decreased/stabilised in the long-term.

18.2.7.4 Conclusion

It is concluded that, in general, the chances of PAG development within the WRTSF (i.e., waste rock and tailings) is very low. Contact water (i.e., runoff) from the WRTSF will be collected in perimeter collection ditches and WMPs. It is anticipated that water treatment will be required to discharge collected contact water from the North WMP. Effluent from the North WMP should be monitored for total suspended solids (TSS) and the above-mentioned potential contaminants. A groundwater monitoring system (i.e., monitoring wells) will be required downstream of the WRTSF to monitor groundwater quality.

18.3 Overburden and Peat Storage Facility (OPSF)

Site preparation work, including pre-stripping for the open pit, and excavation of the WMPs, will generate overburden soil materials to be managed and stockpiled. The bulk of overburden stripping will be stored in the OPSF located immediately north of the West WRTSF stockpile. The potential for local temporary stockpiling of overburden material adjacent to the WRTSF and WMP downstream slopes to aid in future reclamation should be considered during detailed engineering.

Details regarding the design of the OPSF are contained within the Mine Waste Front End Engineering Design Report (Golder, 2021).

Organic soils (primarily peat) and non-organic mineral soil waste are to be stored separately in distinct zones within the OPSF to achieve stable slopes and to support potential reuse at closure. The OPSF will be located immediately upstream of the North WMP, with the overall surface drainage directed to the latter. The granular material (sand) is not leachable as per static testing. However, clay/silt material seems leachable, as per static testing, for Ba, Cu, Pb, Mn and Zn. Runoff from the OPSF will be managed (collected) in the same way as the WRTSF.

It is estimated that the OPSF will need to store a total of approximately 4.1 Mm^3 of waste materials (7.3 Mt at 1.8 t/m^3), of which approximately 1.2 Mm^3 is anticipated to be organic topsoil and peat. The total storage capacity of the OPSF considers an assumed 0.9 Mm^3 of overburden materials that will be utilized for progressive reclamation of the WRTSF stockpiles over the LOM. A total storage capacity of approximately 2.8 Mm^3 is anticipated to be required in the OPSF through the end of Year 3. The OPSF will be developed in a phased approach, with Phase 1 being constructed to manage overburden waste generated from Years 1 to 3 of development and Phase 2 for the remaining balance of the LOM.

The main features of the OPSF design are as follows:

- The OPSF will have a 16 m wide perimeter waste rock haul road toe berm. Peat will be excavated from a 15 m wide strip around the perimeter of the OPSF. The perimeter haul road will be constructed at the toe of the OPSF for access prior to waste deposition. The haul road will also act as a toe berm for slope stability purposes. The haul road / toe berm is proposed to be constructed of waste rock with dimensions of 16 m width and 4 m height.

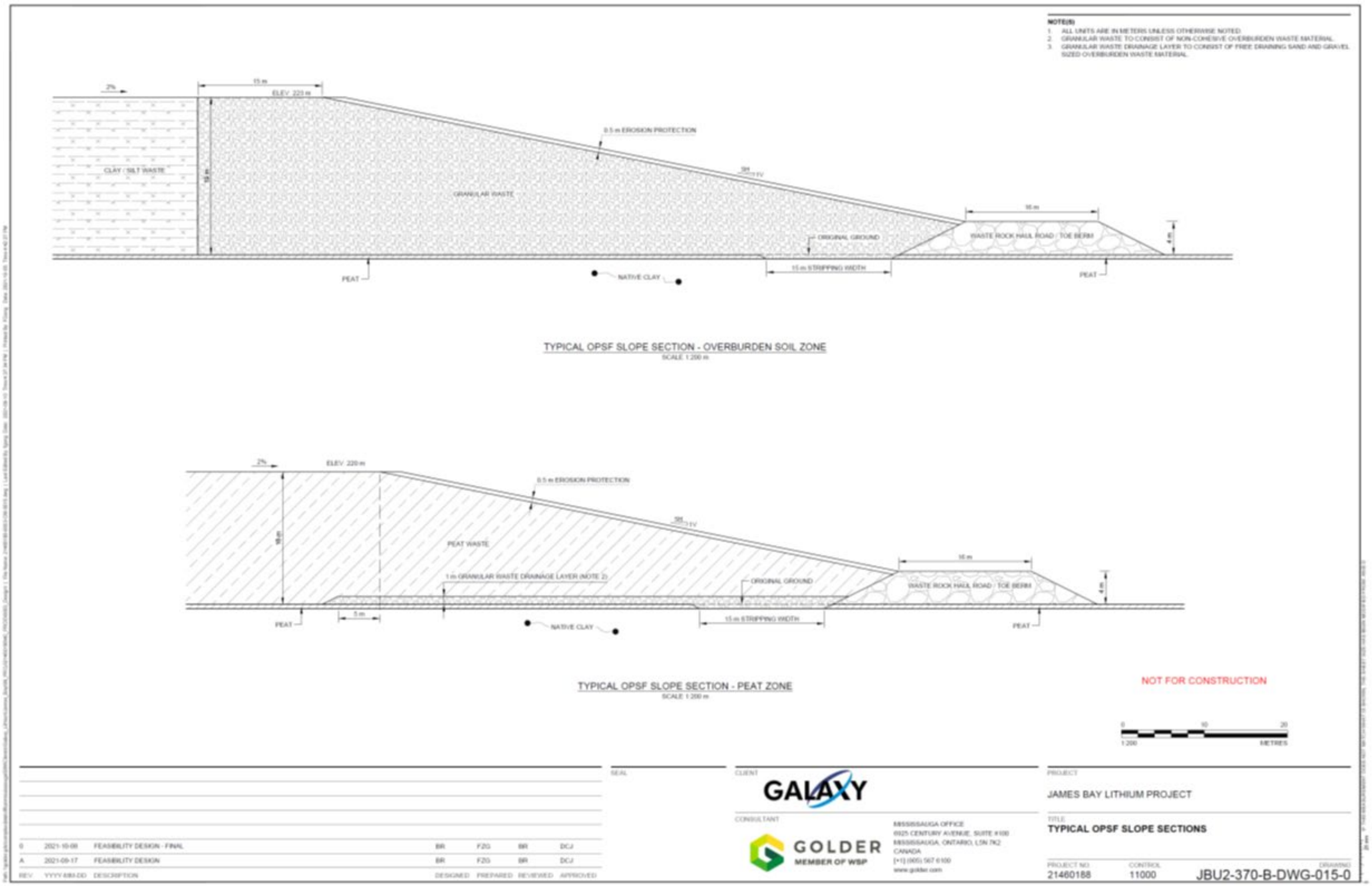
- The slope of the OPSF has been designed at 5H:1V, to a maximum design crest elevation of 223 m (19 m max. height). The slope will be protected with a layer of waste rock erosion protection material. The OPSF will be zoned with fine grained clay / silt waste material being stored internally and granular waste peripherally. The finer clay / silt waste is to be stored a minimum 15 m offset from the slope crest to maintain stability.

- The peat waste will be stored in its own designated area at the east end of the OPSF, separate from the mineral soil overburden waste (clay / silt and granular materials), to a maximum design crest elevation of 220 m (16 m max. height). A 1.0 m thick granular waste base drainage layer will be provided beneath the peat waste perimeter slope, extending a minimum 5 m interior of the ultimate crest, to provide drainage of excess pore water pressure expected to develop in the underlying foundation clay layers. Monitoring of excess pore water pressures generated in the underlying clay foundation materials during operations will be important to ensure design criteria for slope stability remain satisfied.

- The OPSF will include perimeter ditches at the east and west limits to drain water from the OPSF to the North WMP.

Typical OPSF cross-sections for peat and overburden mineral soils are illustrated on Figure 18-4.

The quantity of peat and overburden soil waste generated is based on the mining plan and construction quantity estimates. The OPSF design is flexible and can accommodate an increase or decrease in storage volume. If additional storage is required, the portion of the southern perimeter of the OPSF which immediately abuts the West WRTSF could be raised with an upper bench or the OPSF could be expanded south to the area immediately west of the West WRTSF.



Source: Golder, 2021

Figure 18-4 – OPSF Slope Sections

18.4 Clean Water Diversion and Contact Water Management

18.4.1 Process Plant Water Demand: Operational Procedures

For mining facilities in Northern Québec, where the norm is to maintain a surplus of water, the concerns and risks associated with low water reserves can be mitigated with well-defined operational procedures and controls. The following are recommended:

Commissioning of the mine should occur following the spring melt period (late May to early June), when sufficient runoff is produced to meet operational needs without requiring supplemental water sources. The risks due to inadequate water reserves can be further mitigated by completing construction of the North WMP during the summer prior to plant start-up, allowing for an accumulation of stormwater.

Additional quantities of water should be reserved in the North WMP prior to the onset of winter to account for losses due to surficial ice formation for a prolonged period (typically from November to May) where precipitation ceases to augment reserves.

The design of the North WMP considers a minimum water reserve for the process plant supply in case of a late spring freshet equal to 60 days of water demand (21,600 m^3 at 15 m^3/h plant water demand).

The results from the water balance model (Golder, 2021) determined that the NWMP can meet the process plant make-up water requirements. The annual water balance is positive even during dry historical years, and the process plant demand could be supplied by the site runoff and pit dewatering flows. Effluent is expected to be discharged to the environment even under dry scenarios. During the next phase, a water management protocol should be developed to further assess the potential risks associated with a prolonged dry season or prolonged winter period and identify viable options to ensure a constant supply of water.

18.4.2 Water Management Infrastructure

All runoff water generated by precipitation which falls on areas impacted by mining activities is considered "contact water". Contact water will be collected and retained for settling of sediment and treatment prior to being released to the environment. The current study assumes that an effluent treatment plant will be required. The primary components of the contact water management system include the following:

- North and East WMPs
- Sumps at the process plant area, open pit, and south of the North WRTSF
- ROM pad Pond
- Camp Pond

- Contact water ditches and associated sumps
- Non-contact water diversion berms
- Effluent treatment plant

The WMPs primarily collect contact water from the WRTSF and OPSF. The site-wide water balance and the sizing of the WMPs have been updated for the Front End Engineering Design Report (Golder, 2021). The North WMP will serve as the main retention basin for all contact water from the WRTSF and remainder of the site (i.e., water drained by gravity or pumped from sumps at the process plant area, open pit, haul roads, explosives magazine and East WMP) with the exception of runoff from the ROM pad. Runoff from the ROM pad will be directed to the ROM pad Pond and will preferentially be used to supply the process plant. Storm water from the process plant area, haul roads, explosives magazine and other mine infrastructure will be contained and directed to the North WMP.

The North WMP will also serve as main source of raw water to the process plant (in addition to runoff water from the ROM pad). The water used for process plant will be pumped in an underground and/or above ground piping network using dedicated sump pumps located in the basin. A reserve of water will be maintained to ensure a steady, year-round supply. Excess water in the North WMP will be treated and discharged to the environment (to CE-2 Creek) at a controlled effluent point.

The ROM pad Pond will be lined with HDPE geomembrane liner (to be designed during future phases).

Non-contact water will be diverted by a diversion berm around the OPSF to minimize the quantity of contact water being managed in the WMPs and avoid mixing of natural water with contact water.

Effluent criteria from the Directive 019 and the Metal and Diamond Mining Effluent Regulations (MDMER) will apply to the North WMP discharge point at creek CE-2. All contact water will be contained and treated prior to discharge.

The basis for the sizing of the WMPs is described below.

18.4.2.1 WMP Design Criteria

Regulatory Criteria: Design Flood Management

As specified in *Directive 019 sur l'industrie minière*, all impoundment dikes with water retention associated with tailings storage facilities must be designed to allow the containment (storage) of the design flood event, defined as the contact water volume generated by a 30-day snowmelt from a snow accumulation with a return period of 100 years, combined with the contact water volume generated by a 24-hour rainfall event with a return period of 1,000 years. The WMPs design will allow the containment of the design flood for each staging interval.

Regulatory Criteria: Freeboard

A freeboard of 1.0 m from the design flood maximum water level and the dike crest will be maintained as recommended by *Directive 019 sur l'industrie minière*.

Regulatory Criteria: Inflow Design Flood

As specified in *Directive 019 sur l'industrie minière*, both WMPs will have an emergency spillway designed to safely convey a probable maximum flood (PMF), estimated based on the probable maximum precipitation (PMP).

Operational Criteria: Winter Availability of Process Water

Sufficient process water is to be available under ice cover (assumed to be 1.5 m thick) for the winter months. Plant demand has been estimated by Wave at 15 m^3/h to be continually available for processing requirements.

18.4.2.2 Input Data

Weather Data

Table 18-5 provides the extreme weather data pertinent to the estimation of the design flood, which are estimated based on historical climate data statistics from the La Grande Rivière Airport weather station, located approximately 160 km north from the project site.

To consider the impact of climate change, design of water management structures (e.g., spillways, ditches, culverts and ponds) utilized the 24-hour design storm event based on historical climate statistics which was increased by 18%, as recommended by the Province of Québec *Ministère de l'Environnement et de la Lutte contre les Changements Climatiques* (MELCC, 2020).

Table 18-5 – Extreme Event Statistics Considered for the Preliminary Design of Water Management Infrastructure for the James Bay Lithium Project

Data Description	Unit	Value
100-Year 24-Hour Rainfall	mm	95.3
1,000-Year 24-Hour Rainfall	mm	121.2
100-Year Snow Accumulation	mm of Water Equivalent	350.0
Probable Maximum Precipitation	mm	389.4

* Source. Golder, 2021.

18.4.3 Design Assumptions

The following assumptions were used for sizing the WMPs:

The estimation of the design flood volume considers the following volumetric runoff coefficients based on the designer experience on similar projects:

- 0.55 for the WRTSF and OPSF.
- 0.80 for the open pit.
- 0.65 for haul roads.
- 0.70 for the ROM pad, process plant, explosives magazine and effluent treatment plan areas.
- 1.0 (no losses) for the pond area.

The dead storage (volume beneath the pump's intake) of the WMPs is assumed to be negligible.

18.4.3.1 WMP Design Configuration

Contact water from the WRTSF and OPSF will be collected in perimeter ditches that drain to either the North WMP, East WMP or open pit mine. Water collected in the East WMP and open pit mine will be pumped to the North WMP. The North WMP must be constructed prior to commencement of operations (i.e., Year -1). Construction of the East WMP must be constructed prior to Year 6 (i.e., completed in Year 5) when construction of the East WRTSF commences.

The North WMP is located in a low ground flat area with the natural topography elevation around 200 masl. The Dimensions of the North WMP are approximately 1,430 m x 145 m. The dimensions of the East WMP are approximately 400 m x 300 m. Both WMPs will be excavated with low-height dikes constructed around the perimeter to balance cut and fill as much as practical. The estimated storage volumes and corresponding crest elevations for the North WMP and the East WMP are summarized in Table 18-6.

Figure 18-5 illustrates the plan view of the North and East WMPs and perimeter water collection ditches. Figure 18-6 presents the typical cross-section of the East WMP and North WMP dikes and the perimeter water collection ditch.

Table 18-6 – Design of the North and East Water Management Ponds

Description	North WMP	East WMP
Required Water Storage Volume (m^3)	1,220,000	180,000
Dike Crest Elevation (masl)	206.2	213.0

A deterministic water balance model for the project site was developed, which simulated the mine operation under 45 years of historical climate conditions (Golder, 2021). The results from the wide water balance model indicate that the average monthly effluent discharge from the North WMP to CE-2 Creek varies from about 62,000 m^3/month for Year 1 to about 116,700 m^3/month for Year 12, with a monthly peak discharge of about 458,300 m^3/month (625 m^3/h) in July of Year 19. Table 18-7 presents the estimated monthly effluent discharge volumes from the North WMP to CE-2 Creek for operational Year 19.

Figure 18-7 presents the calculated North WMP monthly average, minimum and maximum storage volumes for the 45 climate realizations of the balance model (Golder, 2021).

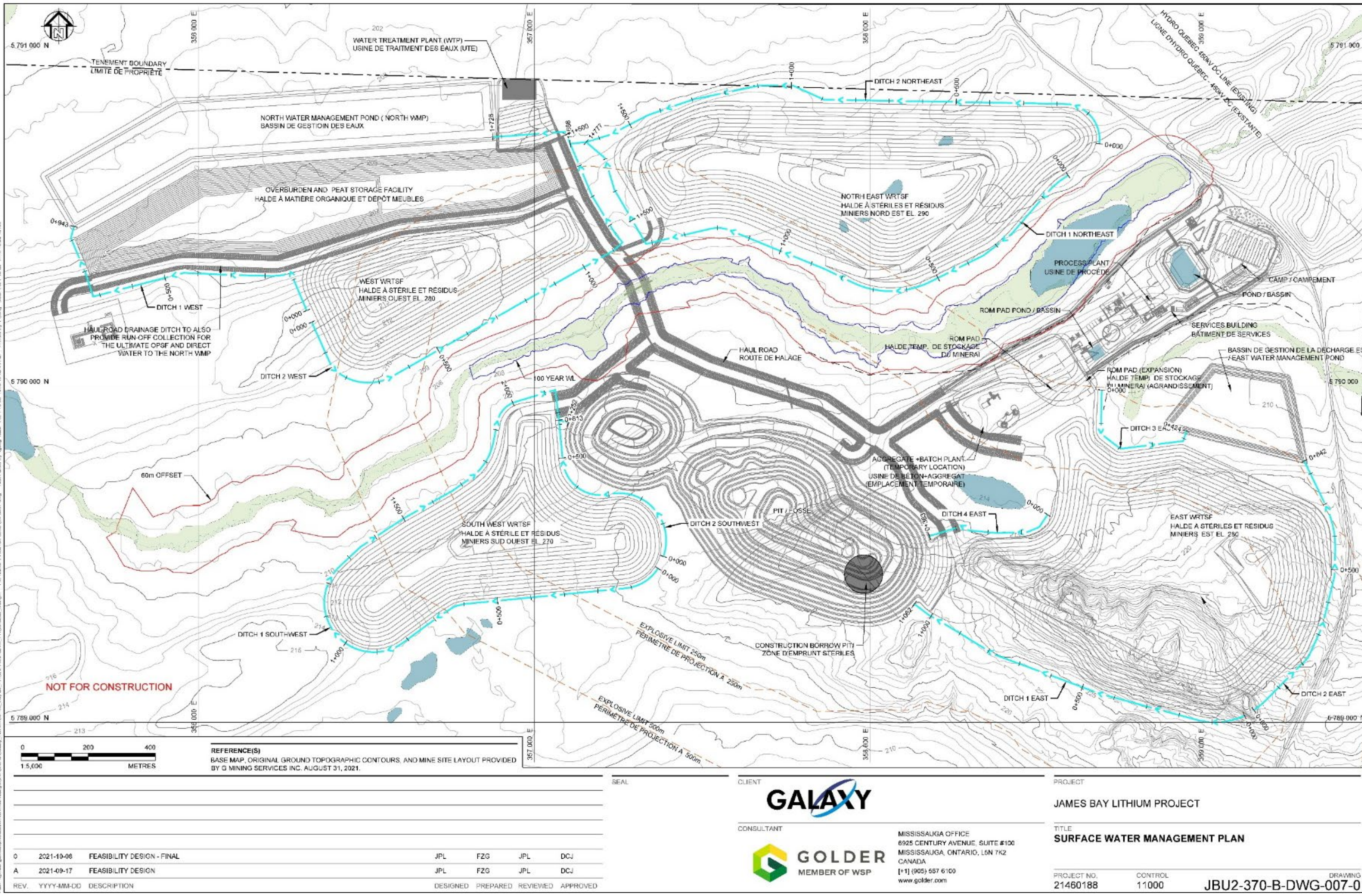
Table 18-7 – Year 19 Monthly Effluent Discharge Rate from the North Water Management Pond to CE2 Creek

Month	Effluent Discharge Rate Based on 45 Climate Realizations (m^3)		
	Average	**Minimum[1]**	**Maximum[1]**
January	62,750	59,140	73,920
February	65,050	59,140	73,920
March	65,050	59,140	73,920
April	71,950	59,140	443,530
May	1,640	0	44,350
June	209,650	0	443,530
July	268,420	14,780	458,320
August	102,830	29,570	206,980
September	225,710	73,920	428,750
October	165,260	0	384,390
November	6,900	0	14,780
December	59,790	44,350	73,920

Source. Golder, 2021

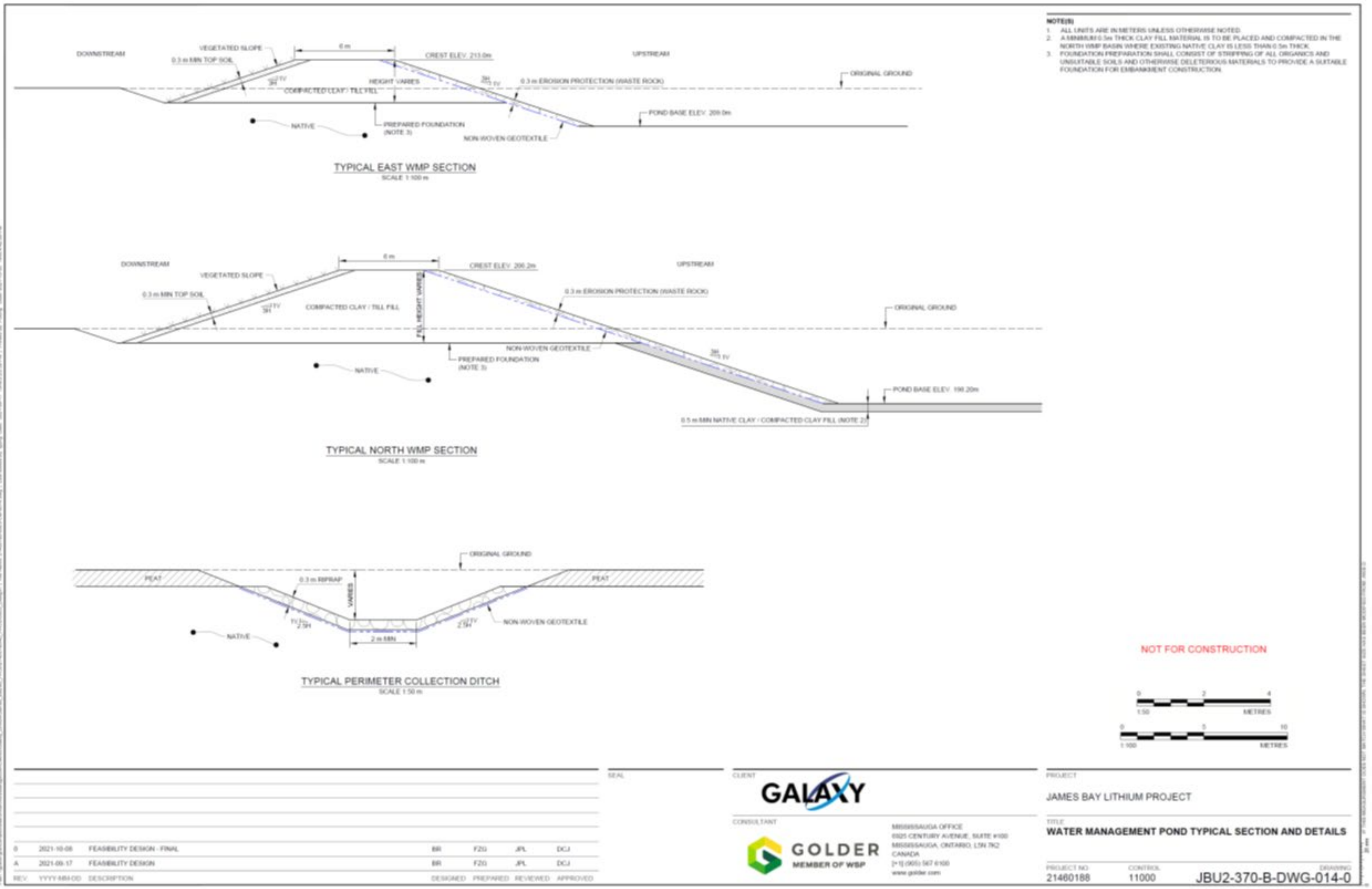
Notes:

1. *Minimum or maximum values for the different months do not occur in the same climate realization.*



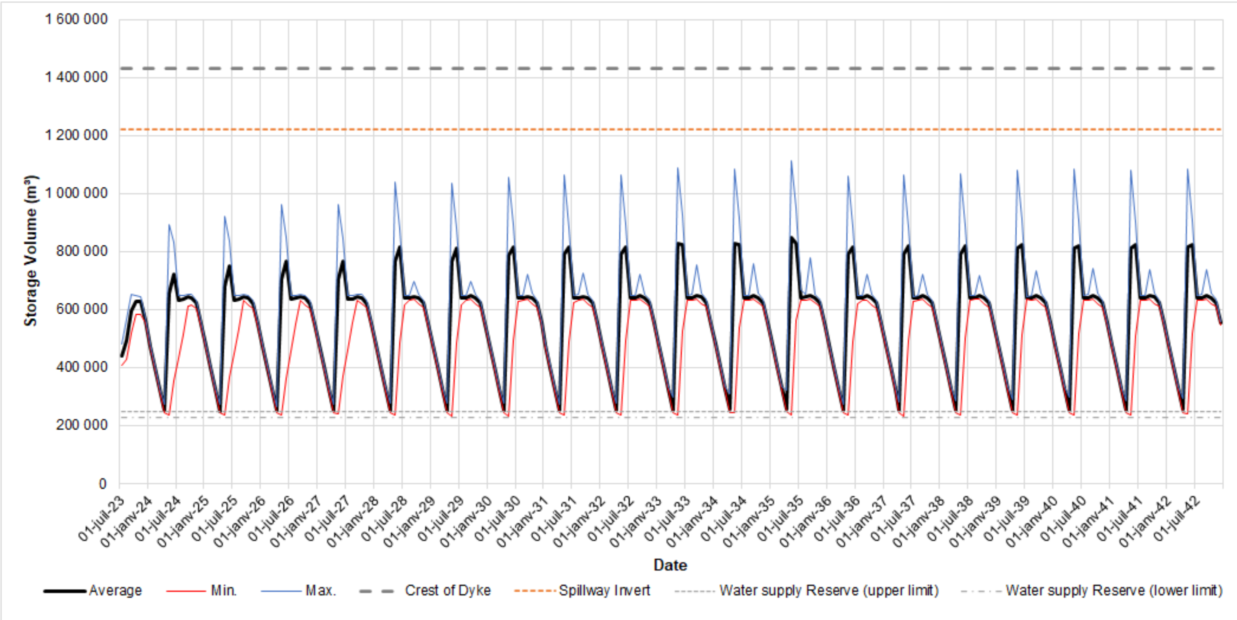
Source: Golder, 2021

Figure 18-5 – Surface Water Management General Arrangement Plan



Source: Golder, 2021

Figure 18-6 – Water Management Pond Typical Sections



Source: Golder, 2021

Figure 18-7 – Monthly North Water Management Pond Water Volume

18.4.3.2 Stormwater Network Design Criteria

As per the overall water management strategy, surface water infrastructure will be built to collect seepage and runoff from the WRTSF and OPSF, which includes 10 collections ditches, sumps (one south of North WRTSF and two in open pit) and associated pump/pipeline systems. The 10 collection ditches collectively will have a total length of about 11.7 km.

As recommended by *Directive 019 sur l'industrie minière*, collection ditches and sumps around WRTSF and OPSF were designed to manage a 100-year design flood without overflow to the environment.

The design of collection ditches considered a minimum freeboard of 0.5 m above the maximum water level. Collection ditches will have a trapezoidal section with side slopes of 2.5H:1V, and will be armoured with rip-rap to protect the ditch against erosion.

18.5 Fresh Water and Potable Water

18.5.1 Fresh Water

The fresh water will come from water wells located nearby and will be transported by above ground heat traced piping to the potable water treatment plant. Two parallel pumps will be installed in a pump house, one pump on duty and one on duty or standby mode to accommodate peak demand flows.

18.5.2 Potable Water

Potable water treatment plant will be fed continuously by fresh water. Buffer tanks will be installed. The potable treatment plant includes a filtration system module, reverse osmosis module, ultraviolet module and chlorination module. A distribution pump will ensure the supply of the potable water throughout the various buildings. The potable water treatment system is modular and additional filtration modules can be added in future years.

18.6 Roads

The following plant roads were considered in the study:

- Site Entrance West to the Billy-Diamond Highway (formerly James Bay Road) (12 m wide, unpaved)
- Explosives magazine and North Water Management Service Pond access road (6 m wide, unpaved)
- Haul roads to different deposition sites (including the ROM pad (20.1 m minimum wide, unpaved)
- Haul road from tailings loadout, Mine service Center and Fuel Bay Access near the processing plant to the WRTSF and Main Haul Road (20.1 m minimum wide, unpaved)
- In-plant roads for light vehicles, delivery and concentrate trucks.

18.7 Earthworks and Buried Services

Planned earthworks include construction of plant pads designed to allow collection and discharge of contact stormwater to the process plant raw water pond. Plant pads will consist of base surface of natural screened material (MG-112) surface on a natural granular subbase.

Perimeter contact water ditches and proper grading on the process plant platform are provided on the plant earthwork pads. The natural topography facilitates gravitational drainage of the surface water to a main event pond on the process plant. (Process Raw Water Pond)

Buried services include the following:

- Stormwater pumping network piping.
- Electrical cable.
- Potable, raw and fire Water piping.

- Glycol\Water piping.
- Sewage piping system.
- Propane piping in specific areas.
- Diesel piping in specific areas.

Some of those services, notably around the camp facilities will be construct above ground with heat tracing and proper associated insulation.

18.8 Power and Control

18.8.1 Power Supply

The process plant and supporting infrastructures will be powered by Hydro-Québec's (HQ) 69 kV overhead distribution system. The 69 kV transmission line is relayed through Hydro-Québec's Muskeg substation and ultimately fed by the Némiscau substation located about 100 km southwest of the Project site. An overhead transmission line extension was built by Hydro-Québec and is ready to connect to the plant substation from the 69 kV line (L-614) located 11 km south of the Project site.

The 69 kV power supply is limited to a capacity of 7.84 MVA due to the sensitivity of the upstream network.

All essential power loads will be supported with emergency power supply available from the emergency diesel generators, in the event of loss of grid power supply.

The estimated plant peak demand load is 12.8 MW, with an average demand load of 8.7 MW. Peak loading figures during operation are expected to be lower considering the loads will not all run concurrently; Furthermore, dual energy heating of site buildings will be employed to reduce electrical loads by up 2.5 MW to meet the limited capacity of the HQ power line.

18.8.2 Plant Substation

The 69 kV distribution line will enter the substation via a dead-end structure. There will be one set of outdoor disconnect switches to isolate the plant from Hydro-Québec's system, and another further down the line to isolate the metering equipment. The plant substation will send real time data back to the utility and will be capable of remote tripping through a live tank circuit breaker. There will be a single 10/13 MVA oil filled power transformer which steps down the 69 kV to a 4.16 kV switchgear for distribution to the plant. Voltage regulation will be installed for +10/-15% to compensate for the line losses in the supply.

The substation relays, SCADA equipment, communications panel and battery charger systems will be housed in a control building within the substation fence. Power factor correction equipment will be installed to improve the plant power factor as required by Hydro-Québec. In addition, since there is a communication over power line carrier on the 69 kV line, the plant substation is required to be equipped with a resonant circuit.

18.8.3 Electrical Distribution

The main electrical distribution from the plant substation will be a 4.16 kV radial network to the plant and supporting facilities. The voltage will be stepped down to 600 V at each area by 1.5 and 2.5 MVA dry type distribution transformers. The loads from the different facilities are shown in Table 18-8. In case of power outage, a load shedding scheme will be developed to keep all essential loads fed from the same buses and supported by two 1.825 MW at 600 V diesel generators. Dedicated main switchgear will be specified for emergency power. The switchgear in the main sub station is split on two buses with tie breaker for emergency power. There will be electrical rooms throughout the site; at main sub station, DMS, crushing, water treatment, truck shop and camp. The other electrical rooms will be integrated to the building's envelope.

Table 18-8 – Electrical Load Summary

Description	Power Demand	
	Peak (MW)	**Average (MW)**
Crushing	1.960	1.792
DMS	6.488	4.392
Water Infrastructures	0.320	0.165
Balance-of-Plant (BOP)	3.398	1.930
Total Power Demand (MW)	12.166	8.279
Total Power Demand (MWA @ 0.95PF)	12.806	8.715

Power and control cables will be standardized to stranded copper, aluminium armoured, XLPE insulated, 90 deg rated, PVC sheathed cables (TECK type). Stranded aluminium conductors could be considered for larger conductor. Cables will be installed on aluminium cable trays whenever possible, segregated by their voltage levels in accordance with CSA standards.

All motors will be connected to 4.160V and 600 V Motor Control Centers. Standard motor starting methods will be limited to Direct Online, Soft-Start Starter and Variable Frequency Drives. Lighting, heat tracing and other small power loads will be fed at appropriate voltage of 600 V or 120-208V.

18.8.4 Lighting

Plant lighting will be standardized to LED fixtures designed for industrial applications. Lighting levels will be designed to meet Canadian Occupational Health and Safety Regulations, outlined below in Table 18-9. All emergency lighting will be connected to the emergency panels and boards, or it will have battery pack or UPS back-up. Emergency lighting shall be installed in the following areas: all egress routes, stair towers, control rooms and diesel generator areas.

Table 18-9 – Plant Lighting

<table>
<tr><th>Location</th><th>Area Description</th><th>Lighting Level (lx)</th><th>Colour (K)</th></tr>
<tr><td rowspan="9">Outdoor</td><td>Conveyor Walkway (open)</td><td>50</td><td rowspan="9">3000K</td></tr>
<tr><td>Stair Towers, Elevated Platforms (outdoor)</td><td>100</td></tr>
<tr><td>Work Areas (with vehicle traffic)</td><td>100</td></tr>
<tr><td>Building Entrance/Exit (all buildings)</td><td>50</td></tr>
<tr><td>Substation Area</td><td>50</td></tr>
<tr><td>Tank Area</td><td>50</td></tr>
<tr><td>Stockpile Area</td><td>10</td></tr>
<tr><td>Perimeter Fence – Camps</td><td>10</td></tr>
<tr><td>Plant Roads and Parking Area</td><td>10</td></tr>
<tr><td rowspan="6">Indoor</td><td>High Bay - Process Plant</td><td>300</td><td rowspan="6">5000K</td></tr>
<tr><td>High Bay – Warehouses</td><td>300</td></tr>
<tr><td>12 ft Ceiling – General</td><td>300</td></tr>
<tr><td>Task Areas</td><td>500</td></tr>
<tr><td>Control Rooms</td><td>300</td></tr>
<tr><td>Stair Towers, Elevated Platforms</td><td>100</td></tr>
</table>

18.8.5 Control System

The Plant Control System (PCS) is responsible for monitoring all plant equipment and instruments, and for the control of all motor starters. Vendor PLCs might be used for control of certain vendor packages within the plant and will typically only send monitoring and status information to the PCS.

The Operator Control Stations (OCS) located in the control rooms allow processes to be started, controlled, monitored, and shut down through the PCS.

Plant PLC processor racks will be in switch rooms except for vendor package PLCs which may be located in field control panels. The PLC hardware and associated code will be divided according to the process areas in a logical manner.

The Main Plant SCADA system hardware shall include a redundant master – follower IO server pair of rack mount SCADA computers located in a communications rack in or near the plant control room. The computers and the control room network equipment shall be powered by a rack mount UPS. Each SCADA computer shall have dual screens. If required, additional SCADA computers will be clients to the main redundant SCADA servers.

18.9 Communications (including IT / IS Interfaces)

Broadband connection will be provided by the local communications vendor, EEYOU Communications Network, via single-mode fibre optic cables. These fibre optic cables will be trenched approximately 2.4 km to the process plant from the km 381 Truck Stop, the closest node. The service will be redundant, low latency, between 1 Mbps to 2 Gbps.

Ethernet communications within the plant facilities to locations outside of the switch room / control room building shall be interconnected with a multimode fibre optic self-healing ring/mesh. Communications within buildings and panels shall be radial (star) copper CAT6E communications with RJ45 connections. Connections to distant equipment be by single mode fibre optic cable.

The production/processing facilities will be connected to the local site communications network via ethernet links interconnected throughout the production/processing plant buildings.

A dedicated mobile radio system will ensure mobile communication for operations staff and mobile plant equipment, over the mine site and production/processing plant facilities.

18.10 Fuel and Propane Supply

A diesel storage and dispensing facility will be installed and commissioned as soon as practically possible. Until such time, fuel requirements will be sourced from the km 381 Truck Stop. For larger requirements (for example bulk earthworks) the Project will need to set-up temporary storage facilities and manage fuel deliveries.

Once the fuel storage and dispensing facility has been installed and commissioned, Galaxy will coordinate the deliveries to site and dispense fuel for all site requirements. All fuel usage will be back charged to the contractors.

The fuel system storage, unloading and distribution facilities will provide uninterrupted diesel fuel supply to the operations and maintenance fleet and equipment. This facility will consist of 3 – 45,180 L self-bunded distribution tanks and 3 – 49,949 L storage tanks with a total storage capacity of 285,387 L.

The stored diesel amount for 14 days supply of site operation. The design and layout ensure that the mine truck/machinery does fuel on one side of the facility and the light vehicle on the other side.

One propane storage and distribution facility will be installed to provide propane heating for the construction/operations camp. The installation of the camp propane storage facility will be installed and commissioned in time to provide heating to the camp.

For the construction phase, temporary gas-fired heaters for the process buildings (and any other heating requirements) will be used until the plant permanent HVAC installations have been completed.

A second propane storage and distribution facility is planned close to the DMS building. This propane source will be used for the glycol loop boilers that will provide heating energy to the HVAC system (air make up) for the DMS building, the Mine service Center and the admin building, during winter.

A third propane storage and distribution facility is planned close to the primary crusher. This propane source will be used for heating the building during cold months of winter.

All propane storage and distribution facilities will be supplied and owned by the propane supplier. All deliveries of propane to the Project site will be coordinated by the construction team and Galaxy.

18.11 Waste Disposal (Industrial and Camp)

18.11.1 Waste Sources

WSP carried out a preliminary design study (REF:171-026562-01 Engineering Brief – Residual Materials Management) to recommend a suitable waste management plan for the Mine.

It is estimated that 1,015 metric tonnes of residual waste materials will be generated yearly from the planned construction, mine operations and resident workers. A laydown is planned for the waste disposal and sorting. Waste sources include recyclable materials, food waste, hazardous household waste, waste oil, grease and oily water, construction debris and residual hazardous waste.

18.11.2 Treatment and Management

The waste management plan includes collecting, sorting, stabilization, compaction of all generated waste and transport to an offsite waste treatment facility. This plan will ensure that no environmental footprint is left on site nor require the need for post-mine-closure waste management. Special attention must be paid to leachate such as oil, grease, and various fluids, which may contaminate the soil and water table. This waste will be stored in an impervious container with liquid retention capacity. A composter mixer is planned to be built during operation year 1 for the compostable material such as food and cardboard. The compost will be shipped out of site once sufficient quantity and quality is achieved.

Waste disposal by landfill and incineration was considered. However, this was deemed unsuitable given the small volume of residual materials generated, the significant initial capital investment required, the development of operating systems and the environmental monitoring as required by the MELCC.

Only minor infrastructure will be required for waste management activities on site, namely suitable storage bins, and associated mobile equipment. All infrastructure will be compliant with Québec legal requirements related to waste management and hazardous materials management.

18.12 Sewage

18.12.1 Design Requirements

The Project plans to develop a camp with a maximum capacity of 382 people during the construction phase, and a capacity of 238 people during operations. The planned accommodations must be provided with a domestic sewage treatment system in compliance with government regulations. WSP carried out a preliminary study to determine the sewage treatment system capacity, to identify feasible treatment technologies and to direct subsequent steps leading to the final choice of technology (Ref: WSP: 171-02562-01 Mine Site Wastewater Treatment System – Engineering Brief).

The sewage treatment system is designed to service the cafeteria and the accommodation camp during the construction phase. Additionally, the system will be designed to service the process plant, Mine service Center, administration building sanitary for the operations phase.

Sanitary wastewater from the plant facilities will be collected and conveyed to a sewage treatment plant (STP) using an aboveground piping network within enclosed structures. The STP will be located within the site accommodation camp area. STP solids waste removal will be by a specialised pump truck service as required. The treated water discharge point is at the CE3. The water will be transported by above ground heat traced piping.

The estimated capacity of the sewage treatment system was determined as follows:

Construction Phase:

Number of people: 382

Total flow – camp: 382 people x 200 L/per/d= 76,400 L/d

Total flow – cafeteria: 12 L/meal x {(382 x 1.0) + (382 x 0.2) + (382 x 1.0)} = 10,084.8 L/d

Operations Phase:

Number of people: 238

Total flow – camp, process plant facilities with sanitary blocks: 238 people x 200 L/per/d = 47,600 L/d

The flow generated by the cafeteria (10,084.8 L/d) will be used for the sizing of the grease trap (required for kitchen wastewater). The grease trap will have a volume of 14,800 L and will be installed during the construction Phase and remain in place for the operations phase.

18.13 Fire Protection

The Fire Protection Design Basis defines the fire detection and protection system for the concentrator plant, including the fire water supply, fire main, automatic sprinkler system and the fire alarm system for all electrical rooms and other high-risk areas. Detection and protection system will be implemented in various buildings in accordance with the insurer requirements. The plant fire protection system will provide “fit-for-purpose” fire safety solutions in-line with the level of risk and business interruption potential through a fast, reliable, and practical automatic fire detection and alarm system, a site wide fire water storage, pumping and reticulation system, fire hydrants, hose stations, automatic wet pipe sprinkler systems and potable fire extinguishers.

The system shall be compliant with the statutory requirements of the National Building Code of Canada, Québec Safety Code, ULC standards, NFPA standards and FM data sheets. The final design will meet the insurance requirements in terms of maintaining a safe and secure workplace.

Piping will be above and under ground and will be routed throughout the building and the “utilidor.” Pumps are located in a weathertight enclosure exterior to the DMS building. The fire/raw water tank is located outside, the volume reserved for fire water is 560.5 m3, the tank will be insulated, and two heaters will keep the water to the required temperature.

18.14 Security

To help safeguard physical and human assets, the concentrator plant will include physical access control, means to identify, and control individuals who enter and exit the facility, track movements of building occupants and assets, and control access to restricted areas. A guard house and fence will be located at the entrance of the site, near the highway. The final design will meet the regulatory and insurance requirements in terms of maintaining a safe and secure workplace.

18.15 Accommodations

Until the construction camp accommodation has been commissioned, temporary accommodation facilities will be available at the km 381 Truck Stop. In addition to fuel, the truck stop also has suitable messing facilities and a general store. However, accommodation at the truck stop is limited to approximately 40 beds. The provision of trailer accommodation may be required by some early works contractors until the construction camp is ready for use.

The Camp dorms for the operation of the mine will be sized for 238 personnel and a temporary construction camp addition will be required for the duration of the construction, sized for 144 additional personnel. For the construction camp, priority will be given to initially install the camp modules for 144 personnel. There will be accommodation for a total of 382 personnel at the peak of construction and then be downsized for operations to accommodate 238 operations personnel. The camp will consist of the following:

Permanent Facilities:

- Kitchen complex suitable for 238 personnel
- Camp office and welcome center
- Laundry complex
- Recreational center and gym
- Wastewater treatment plant
- Potable water storage tanks and distribution
- Propane storage and distribution
- Food storage
- Arctic "Utilidor" from the camp to the admin building, will be built during year 2 of operation.
- Temporary Facilities – to be demobilized after construction:
- Construction camp 144-man camp - to be demobilised at construction completion.

18.16 Product Warehousing

Site warehousing/stores will be designed to provide a minimum storage time of four (4) weeks supply for production/process plant consumables. An insulated fabric dome will be installed near the truck shop and process plant. This dome will store major and critical part for the mine vehicle/machinery and process plant equipment. Food storage will be installed near the camp to allow easy access.

18.17 Mining Infrastructure

The mining infrastructure will include the following:

- Mine service Center & wash bay (for maintenance and repair of equipment)
- Administration building
- Assay Laboratory

- Explosive magazine
- Emulsion transfer and distribution facility
- Mine Dry

18.17.1 Mine service Center (Truck shop) and Wash Bay

The Mine service Center (truck shop) will be located near the process plant. the mining machinery and truck will have easy access to the truck shop via large road. A fully lighted parking with electricity plugs for bloc heater will be adjacent to the truck shop. The truck shop includes three service bay, one light vehicle bay, one maintenance/welding bay and one wash bay. A lubricant and grease compartment will include the various oil and grease which will be distributed with fixed piping and pumps. The Mine service Center will also include office space, tools storage and a mezzanine with lunchroom, restroom. This building will also include a compressed air system, an overhead crane, and an HVAC system. The HVAC system will be powered by electricity most of the time. Heating will be provided by a propane heated glycol loop coming from the DMS building system. This building will be made of steel structure, prefabricated sandwich wall and roof, also it will be insulated to minimize heat loss.

18.17.2 Administration Building

The administration building will be located close to the DMS building and built in the second year of operation. The admin building will include offices, meeting room electrical room, sanitary, IT server and a lunchroom. This building will be a prefabricated style building. The HVAC system will be powered by electricity most of the time. Heating will be provided by a propane heated glycol loop coming from the DMS building system.

18.17.3 Assay laboratory

The assay laboratory will be located close to the DMS building. The assay lab will be built, owned and operated by a subcontractor during an initial contractual period of 5 years, and then transferred to the owner. A concrete pad will be supplied by the owner and Services like potable water and electricity will have to be provided.

18.17.4 Mine Dry

The Mine dry will be located close to the camp. The mine dry facility will be able to accommodate 200 men and 30 women. The facility will include a dirty side with drying stalls, a clean side with lockers and benches, gang showers with individual dividers and curtains, and a laundry rooms with industrial washers and dryers.

18.17.5 Explosive Magazine

The explosive magazine will consist of two explosive magazines, one dedicated for the storage of 25,000 kg 1.1D class explosives (pre-split packaged explosives and boosters) and another magazine for the storage of 75,000 detonators classified 1.1B. Their respective sizes are 8’ x 12’ x 7’ for the 1.1D class explosives and 12’ x 24’ x 7’ for the 1.1B detonators.

18.17.6 Emulsion Transfer and Distribution Facility

The management and supply of the explosives needed for mining operations will be provided by a certified sub-contractor; however, all permit requests for its use will be made by Galaxy in compliance with the Federal Explosives Act and the Provincial Act Respecting Explosives.

No emulsion will be made on site and all emulsion will be transported from the sub-contractor’s closest plant in accordance with applicable laws and regulations to the mine site. The emulsion will be transported from the explosives storage and manufacturing facilities to the open pit via a Mobile-Mixing Unit (MMU) whereas the boosters and detonators will be transported via a pickup truck in accordance with applicable laws and regulations.

18.18 Process Plant Building

The process plant will include the following buildings:

- Crushing and Screening building.
- Primary ore storage dome.
- DMS building Metallurgical lab.
- Workshop (and storage).
- Lunchroom, locker and sanitary.
- Tailings handling facility.
- Concentrate storage and handling.

18.18.1 Crushing and Screening Building

The crushing and screening building will screen, sort and crush ore and will house the primary crusher and related equipment. A conveyor will carry out the final crushed ore to the crushed ore stockpile storage building (dome). The building will be a steel structure, with prefabricated sandwich wall and roof, and insulated to minimize heat loss. An overhead crane will facilitate maintenance activity. A dust collection system will be installed. The HVAC system will be powered by electricity most of the time. Propane will be used during the coldest days of the year to manage proper electricity grid operation.

18.18.2 Ore Storage Dome

The ore storage dome will store ore between the crushing stage and the DMS process stage. At the base of the dome, an underground reclaim/chute system will allow the ore to be metered onto a conveyor to be transferred from under the stockpile to the DMS process building. The underground concrete chamber which provides support to the reclaim chutes and feeders will be accessible by a secondary staircase located beside the dome. The main form of access to the concrete chamber will be via the conveyor access way. The ore storage dome will be made of steel structure and steel cladding. This building will not be heated or ventilated except for of a unit heater inside the chute and conveyor concrete chamber.

18.18.3 DMS Building

The DMS building will house the main process equipment. It will also include a metallurgical lab, a workshop (include storage) and personnel facility. A large vehicle drive through will be located in between the process equipment side and the workshop and reagent side. The building will be made of steel structure, prefabricated sandwich wall and roof, also it will be insulated to minimize heat loss. A main DMS building overhead crane will facilitate maintenance activity. A second overhead crane will be installed in the workshop and reagent areas. The HVAC system will be powered by electricity most of the time. Propane will be used during the coldest days of the year to manage proper electricity grid operation. The personnel facility will include lunchroom, locker and sanitary.

18.18.4 Tailings Handling Facility

The tailings handling facility will be located adjacent to the DMS on the heavy vehicle side. Tails handling will consist of two bins, one for coarse tails and one for fine tails. The bins will be elevated for direct loading into the dump trucks which will then haul to the WRTSF. The bins will be provided with "clam shell" type gates with facilities to collect excess water. Each bin will be heat-traced to minimise the potential for freezing of the contents. Each bin will have an overflow chute and concrete bunker at ground level, where an FEL can collect the dumped material and load trucks, if required.

18.18.5 Concentrate Storage and Handling

The concentrate storage and handling facility will be adjacent to the DMS. A large semi truck will enter the building via a drive though access way, a front-end loader will load trucks as required and the trucks will transport concentrate product off-site. The building will be made of steel structure, prefabricated sandwich wall and roof, also it will be insulated to minimize heat loss. The HVAC system will be powered by electricity.

18.19 Existing Infrastructure

18.19.1 Billy-Diamond Highway

The Project site is conveniently located adjacent to a major paved roadway, The Billy-Diamond Highway (formerly James Bay Road), which connects the Project site and the community of Matagami. This road was originally built in 1970 to accommodate transportation of heavy equipment for a large Hydro-Québec project. It is maintained by the SDBJ, an organization created by the province of Québec to foster the development of the James Bay area.

Billy-Diamond Highway (formerly James Bay Road) specifications:

- Total length: 620 km
- 2 asphalt paved lanes - 3.65 m width each
- 2 gravel shoulders – 3 m width each
- Total width: 13.3 m
- Posted speed limit: 100 km/h
- Design capacity of bridges: 500 tonnes

18.19.2 Truck Stop

The SDBJ also operates a truck stop, named “Relais Routier km 381” located across the road from the Project site. It is equipped with a gas station, temporary accommodations, cafeteria, general store, rental meeting rooms and a vehicle mechanic. SDBJ has regular operating staff on site throughout the day. Fibre optic internet is provided by the local vendor, EEYOU Communications Network. Potable water is supplied by a local water treatment system.

The “Relais Routier km 381” has been serving as accommodations for Project staff during the Project exploration phase.

18.19.3 Airport

The Eastmain airport (130 km from the Project site) will be used to transport contractors and workers from southern Québec. Upgraded operating equipment such as de-icing equipment and a fueling station will be required. Instrumentation and procedures will need to be improved to mitigate flight cancellations due to bad weather conditions.

18.19.3.1 Ownership and Governance

The airport is the property of Transport Canada who has awarded a 5-year contract to the Cree Nation of Eastmain Council for management of the airport (beginning in April 2019). Although Transport Canada has ownership of the airport infrastructure, any modification will have to be supported by the Eastmain Band Council and the Grand Council as the land on which the airport is built is designated as a Category 1A ancestral land by the James Bay and Northern Québec Agreement, which reserves the land to the exclusive use and benefit of the Cree population.

CARS (Community Aerodrome Radio Stations) communicates weather information for flights. As in all northern communities, the presence of a radio operator is not always ensured. This person reports to the Band Council. This irregular service could have an impact on the efficient exploitation of Galaxy's flights.

18.19.3.2 Project Parameters and Summary

The airport upgrade assessment is based on the following parameters:

- The expected operating life of the mine is 19 years.
- The beginning of the construction of the mine is planned 3 to 6 months after ESIA approval is received.
- The operation of the mine (pre-production) is expected to start 13 months after beginning of construction,
- During construction, at peak approximately 345 workers are estimated to be on site on 14 days in and 14 days out rotation.
- During the operation phase, between 150 and 180 workers will be on site based on a 14/14 schedule, and a 4/3 schedule for managerial staff.
- OCTANT Aviation carried out a review of the required equipment and issued a report. The following summarizes the assessment of the existing infrastructure:
- Fuel: no aviation fuelling system is installed or available. This equipment needs to be installed to avoid refuelling stops.
- De-icing: truck-towed de-icing equipment is available.
- Instrument approaches: the airport has LNAV approaches that are not the most modern. Currently, approach minimums fluctuate between 416 and 478 feet. To maximize the likelihoods of successful landings, it would be imperative to implement LPV approaches. Instrument

procedures will need to be improved to minimize the number of aborted landings. The proximity of the airport to James Bay and Eastmain River increases the formation of fogbanks in the area.

- Electric or gas-powered ground power unit (GPU).

The equipment could be provided either by the company responsible for ground handling or by the air carrier and reimbursed contractually. This cost is captured as a CAPEX for the study.

18.19.4 Concentrate Trucking and Transhipment

Concentrate will be loaded into 85 t trailers at the plant stockpile by front-end loaders. Loading time at the site is restricted to 45 minutes to allow each driver to complete a round trip per day. The product will be transported via the Billy-Diamond Highway (formerly James Bay Road) to Matagami for transhipment.

The concentrate will be offloaded at Matagami Transhipment Terminal and stockpiled for loading onto railcars. The storage, maintenance, tariffs and loading of the concentrate onto the trains will be subcontracted to the “Cour de Transbordement de Matagami” (Matagami transhipment yard).

18.19.4.1 Rail Transport

The railcars transporting the product from Matagami station to either the Port of Trois-Rivières or Québec will be operated by CN Rail, which currently services Matagami. Two trips a week will be required for product transport based on 35 railcars per train for an estimated 29-day cycle for loading, transit, unloading and return.

Railcars will be 52’-6” mill gondolas with an open top, solid bottom, fixed ends, 2,791 ft^3 capacity. The maximum payload for the rail is 89.91 t. Fibreglass railcar covers with automatic locks will be used.

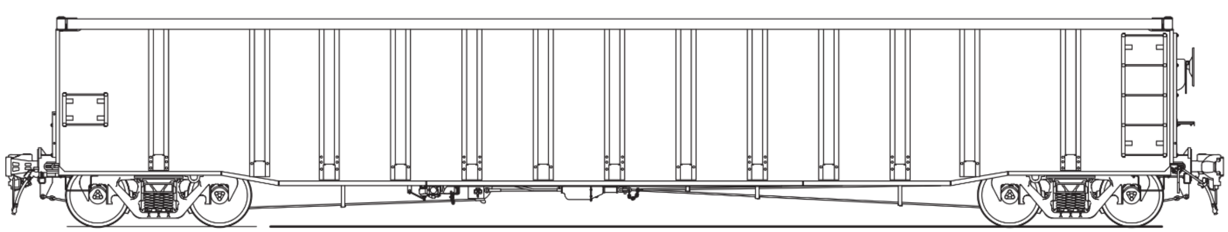


Figure 18-8 – Typical 52' Open Gondola

19. MARKET STUDIES AND CONTRACTS

The information on the lithium market is provided by Wood McKenzie, a prominent global market research group to the chemical and mining industries. Wood Mackenzie, also known as WoodMac, is a global research and consultancy group supplying data, written analysis, and consultancy advice to the energy, chemicals, renewables, metals, and mining industries.

Supplementary comments are provided by the Allkem internal marketing team based on experience with lithium product marketing.

19.1 Overview of the Lithium Industry

Lithium is the lightest and least dense solid element in the periodic table with a standard atomic weight of 6.94. In its metallic form, lithium is a soft silvery-grey metal, with good heat and electric conductivity. Although being the least reactive of the alkali metals, lithium reacts readily with air, burning with a white flame at temperatures above 200°C and at room temperature forming a red-purple coating of lithium nitride. In water, metallic lithium reacts to form lithium hydroxide and hydrogen. As a result of its reactive properties, lithium does not occur naturally in its pure elemental metallic form, instead occurring within minerals and salts.

The crustal abundance of lithium is calculated to be 0.002% (20 ppm), making it the 32nd most abundant crustal element. Typical values of lithium in the main rock types are 1 to 35 ppm in igneous rocks, 8 ppm in carbonate rocks, and 70 ppm in shales and clays. The concentration of lithium in seawater is significantly less than the crustal abundance, ranging between 0.14 ppm and 0.25 ppm.

19.1.1 Sources of Lithium

There are five naturally occurring sources of lithium, of which the most developed are lithium pegmatites and continental lithium brines. Other sources of lithium include oilfield brines, geothermal brines, and clays.

19.1.1.1 Lithium Minerals

- Spodumene [$LiAlSi_2O_6$] is the most commonly mined mineral for lithium, with historical and active deposits exploited in China, Australia, Brazil, the USA, and Russia. The high lithium content of spodumene (8% Li_2O) and well-defined extraction process, along with the fact that spodumene typically occurs in larger pegmatite deposits, makes it an important mineral in the lithium industry.
- Lepidolite [$K(Li,Al)_3(Si,Al)_4O_{10}(OH,F)_2$)]is a monoclinic mica group mineral typically associated with granite pegmatites, containing approximately 7% Li_2O. Historically, lepidolite was the most widely extracted mineral for lithium; however, its significant fluorine content made the mineral

unattractive in comparison to other lithium bearing silicates. Lepidolite mineral concentrates are produced largely in China and Portugal, either for direct use in the ceramics industry or conversion to lithium compounds.

- Petalite [$LiAl(Si_4O_{10})$] contains comparatively less lithium than both lepidolite and spodumene, with approximately 4.5% Li_2O. Like the two aforementioned lithium minerals, petalite occurs associated with granite pegmatites and is extracted for processing into downstream lithium products or for direct use in the glass and ceramics industry.

19.1.1.2 Lithium Clays

Lithium clays are formed by the breakdown of lithium-enriched igneous rock which may also be enriched further by hydrothermal/metasomatic alteration. The most significant lithium clays are members of the smectite group, in particular the lithium-magnesium-sodium end member hectorite [$Na0.3(Mg,Li)_3Si_4O_{10}(OH)_2$]. Hectorite ores typically contain lithium concentrations of 0.24%-0.53% Li and form numerous deposits in the USA and northern Mexico. As well as having the potential to be processed into downstream lithium compounds, hectorite is also used directly in aggregate coatings, vitreous enamels, aerosols, adhesives, emulsion paints and grouts. Lithium Brines

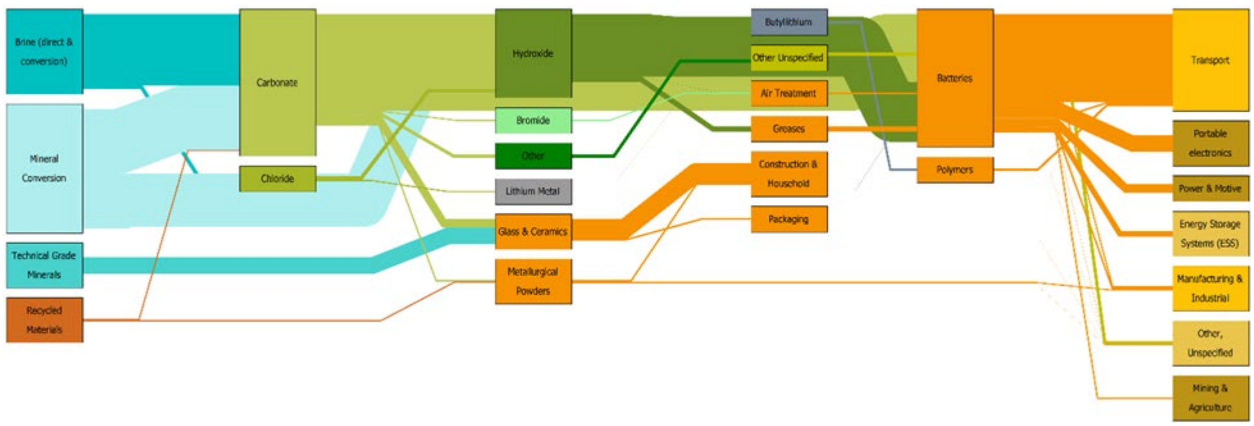
Lithium-enriched brines occur in three main environments: evaporative saline lakes and salars, geothermal brines, and oilfield brines. Evaporative saline lakes and salars are formed as lithium-bearing lithologies which are weathered by meteoric waters form a dilute lithium solution. Dilute lithium solutions percolate or flow into lakes and basin environments which can be enclosed or have an outflow. If lakes and basins form in locations where the evaporation rate is greater than the input of water, lithium and other solutes are concentrated in the solution, as water is removed via evaporation. Concentrated solutions (saline brines) can be retained subterraneously within porous sediments and evaporites or in surface lakes, accumulating over time to form large deposits of saline brines.

The chemistry of saline brines is unique to each deposit, with brines even changing dramatically in composition within the same salar. The overall brine composition is crucial in determining a processing method to extract lithium, as other soluble ions such as Mg, Na, and K must be removed during processing. Brines with a high lithium concentration and low Li:Mg and Li:K ratios are considered most economical to process. Brines with lower lithium contents can be exploited economically if evaporation costs or impurities are low. Lithium concentrations at the Atacama Salar in Chile and Hombre Muerto Salar in Argentina are higher than the majority of other locations, although the Zabuye Salt Lake in China has a more favourable Li:Mg ratio.

19.1.2 Lithium Industry Supply Chain

Figure 19-1 below shows a schematic overview of the flow of material through the lithium industry supply chain in 2021. Raw material sources in blue and brown represent the source of refined production and technical grade (TG) mineral products consumed directly in industrial applications.

Refined lithium products are distributed into various compounds displayed in green. Refined products may be processed further into specialty lithium products, such as butyllithium or lithium metal displayed in grey. Demand from major end-use applications is shown in orange with the relevant end-use sectors shown in yellow.



Source: Roskill – Wood Mackenzie

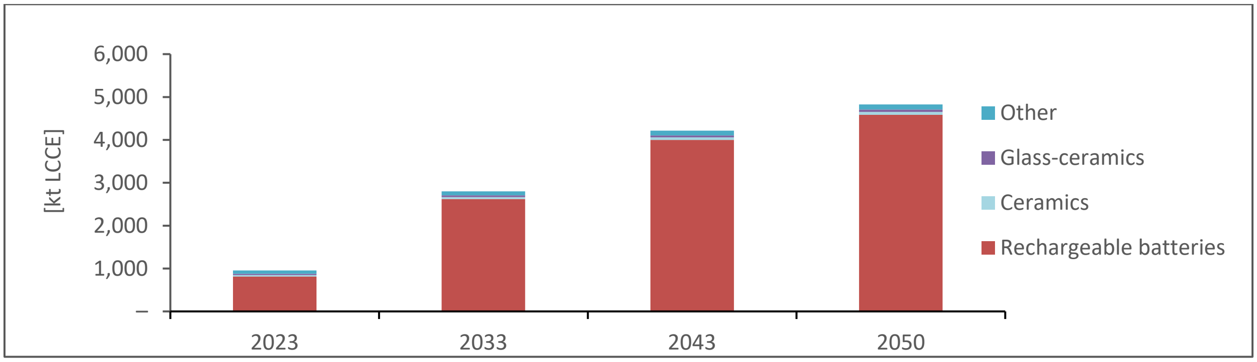
Figure 19-1 – Lithium Industry Flowchart, 2021

Lithium demand has historically been driven by macro-economic growth, but the increasing use of rechargeable batteries in electrified vehicles over the last several years has been the key driver of global demand. Global demand between 2015 and 2021 has more than doubled, reaching 498.2 kt lithium carbonate equivalent (LCE) with a compound annual growth rate (CAGR) of 16.8% over the period. Adding to this growth, in 2022, global lithium demand is expected to increase by 21.3% to 604.4 kt LCE as demand for rechargeable batteries grows further. Over the next decade, global demand for lithium is expected to grow at a rate of 17.7% CAGR to 2,199 kt in 2032.

19.1.3 Global Demand for Lithium

Lithium demand has traditionally been used for applications such as in ceramic glazes and porcelain enamels, glass-ceramics for use in high-temperature applications, lubricating greases, and as a catalyst for polymer production. Between 2020 and 2022, demand in these sectors rose steadily by approximately 4% CAGR. Growth in these applications tend to be highly correlated to industrial activity and macro economic growth. Wood Mackenzie forecasts the combined growth of lithium demand from industrial markets is likely to be maintained at approximately 2% per annum from 2023 to 2050.

Rechargeable batteries represent the dominant application of lithium today representing more than 80% of global lithium demand in 2022. Within the rechargeable battery segment, 58% was attributed to automotive applications which has grown at 69% annually since 2020. This segment is expected to drive lithium demand growth in future. To illustrate, Wood Mackenzie forecasts total lithium demand will grow at 11% CAGR between 2023 and 2033: of this lithium demand attributable to the auto-sector is forecast to increase at 13% CAGR; whilst all other applications are forecast to grow at 7% CAGR. Growth is forecast to slow in the following two decades as the market matures. Figure 19-2 shows the global demand for lithium by end use and the forecasted growth.



Source: Wood Mackenzie, Q1 2023 Outlook.

Figure 19-2 – Global Demand for Lithium by End Use, 2023 – 2050 (kt LCE)

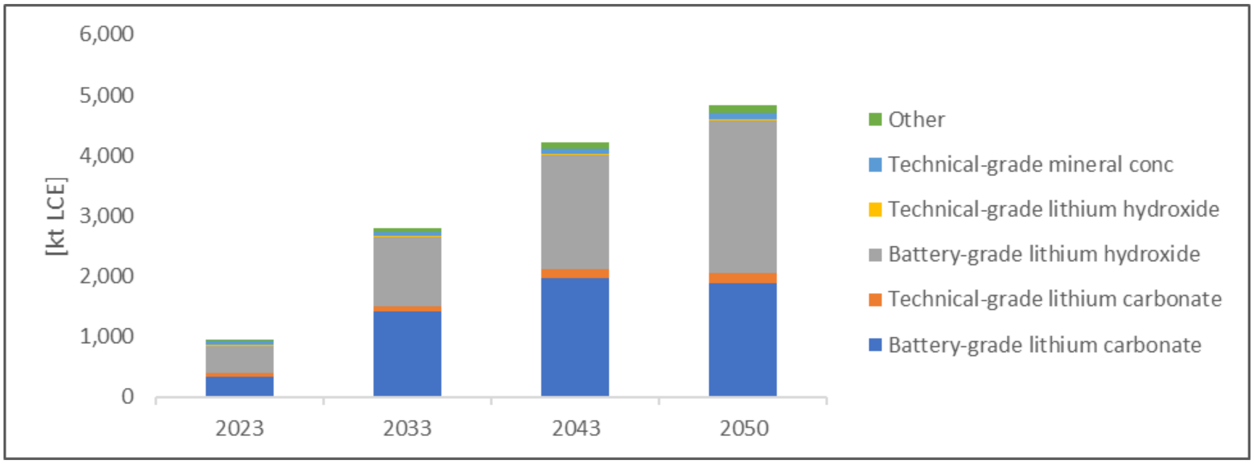
Lithium is produced in a variety of chemical compositions which in turn serve as precursors in the manufacturing of its end use products such as rechargeable batteries, polymers, ceramics, and others. For rechargeable batteries, the cathode, an essential component of each battery cell, is the largest consumer of lithium across the battery supply chain. Demand profiles for lithium carbonate and hydroxide is determined by the evolution in cathode chemistries. The automotive industry mainly uses nickel-cobalt-manganese oxide (NCM) and nickel-cobalt-aluminium oxide (NCA) cathodes, often grouped together as “high nickel”; and lithium iron phosphate (LFP) cathodes. High nickel cathodes consume lithium in hydroxide form and generally has a higher lithium intensity; whilst LFP cathodes mainly consume lithium in carbonate form and lithium content is lower. LFP cathodes are predominantly manufactured in China.

Lithium in the form of lithium hydroxide and lithium carbonate collectively accounted for 90% of refined lithium demand in 2022. These two forms are expected to remain important sources of lithium in the foreseeable future reflecting the share of the rechargeable battery market in the overall lithium market (Figure 19-3). The remaining forms of lithium include technical grade mineral concentrate (mainly spodumene, petalite and lepidolite) used in industrial applications accounting for 7% of 2022 demand; and other speciality lithium metal used in industrial and niche applications.

Lithium products are classified as ‘battery-grade’ (BG), which is typical for use in rechargeable battery applications, and ‘technical-grade’ (TG), which is primarily used in industrial applications. TG lithium carbonate can also be processed and upgraded to higher purity carbonate or hydroxide products.

Lithium hydroxide is expected to experience exponential growth on the back of high-nickel Li-ion batteries. Demand for BG lithium hydroxide is expected to grow at 10% CAGR from 2023 to 2033 to reach 1,133 kt LCE in 2033, up from 450 kt LCE in 2023. Wood Mackenzie predicts lithium hydroxide to be the largest product by demand volume in the near term. However, growth of LFP demand beyond China may see BG lithium carbonate reclaim its dominance.

Wood Mackenzie forecasts LFP cathodes will increase its share of the cathode market from 28% in 2022 to 43% by 2033. This drives growth in lithium carbonates demand. Wood Mackenzie predicts lithium carbonate demand will grow at 14% CAGR between 2023 and 2033; slowing as the market matures. Figure 19-3 shows the global demand for lithium by product and their forecast growth.



Source: Wood Mackenzie, Q1 2023 Outlook.

Figure 19-3 – Global Demand for Lithium by Product, 2023 – 2050 (kt LCE)

19.1.4 Market Balance

The lithium market balance has shown high volatility in recent years. A large supply deficit resulted from historical underinvestment relative to strong demand growth in electric vehicles (EVs). The rise in prices over the last few years has incentivised investment in additional supply. However, the ability for supply to meet demand remains uncertain given the persistence of delays and cost increases across both brownfield and greenfield developments.

For BG lithium chemicals, Wood Mackenzie predicts the market will remain in deficit in 2024. In 2025, battery grade chemicals are expected to move into a fragile surplus before falling into a sustained deficit in 2033 and beyond. Notably, technical grade lithium chemicals may be reprocessed into battery grade to reduce the deficit. However, capacity and ability to do so is yet unclear.

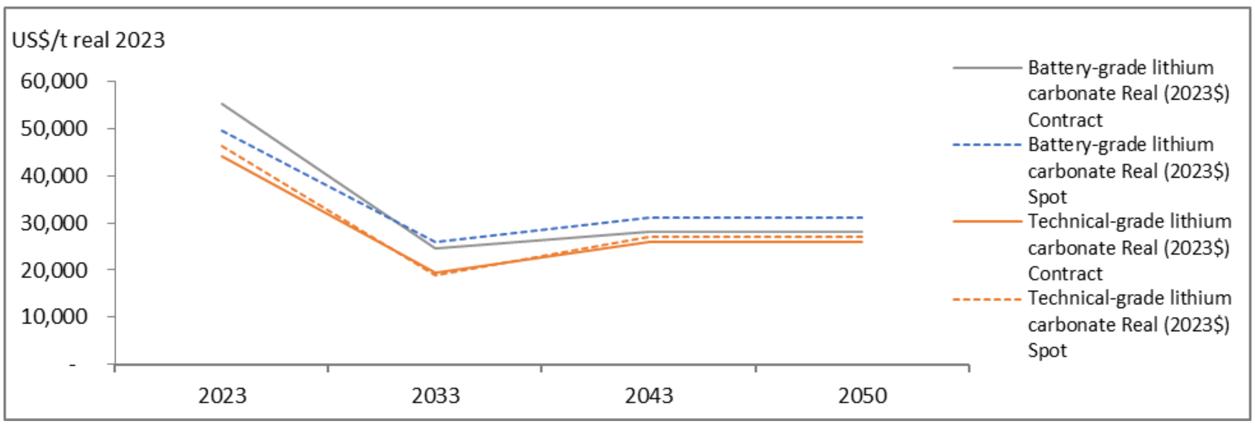
19.2 Lithium Prices

Lithium spot prices have experienced considerable volatility in 2022 and 2023. Prices peaked in 2022, with battery grade products breaching USD 80,000/t. However, spot prices fell significantly during the Q1 2023 before stabilising in Q2 2023. A combination of factors can explain the price movements including the plateauing EV sales, slowdown of cathode production in China; and destocking through the supply chain, partially attributed to seasonal maintenance activities and national holidays.

Contract prices have traditionally been agreed on a negotiated basis between customer and supplier. However, in recent years there has been an increasing trend towards linking contract prices to those published by an increasing number of price reporting agencies (PRA). As such, contracted prices have tended to follow spot pricing trends, albeit with a lag.

19.2.1 Lithium Carbonate

Continued demand growth for LFP cathode batteries will ensure strong demand growth for BG lithium carbonate. This demand is expected to be met predominantly by supply from brine projects. Given the strong pricing environment, a large number of projects have been incentivised to come online steadily over the coming years. Wood Mackenzie forecasts prices to decline as additional supply comes online. However, Wood Mackenzie forecasts a sustained deficit in battery-grade lithium chemicals to commence from 2031. Over the longer term, Wood Mackenzie expects prices to settle between USD 26,000/t and USD 31,000/t (real USD 2023 terms). Figure 19-4 shows the price outlook of Lithium Carbonate.



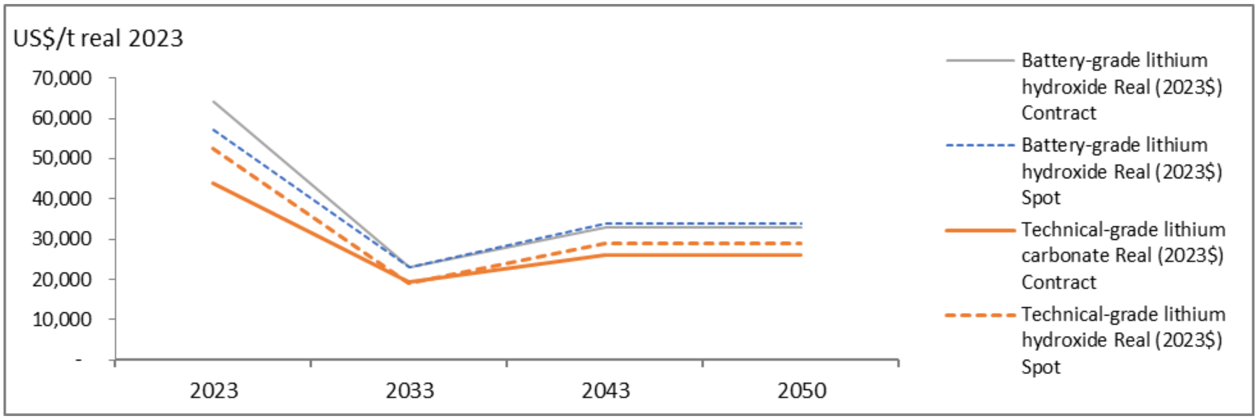
Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-4 – Lithium Carbonate Price Outlook, 2023 – 2050

Notably, the market for BG carbonates is currently deeper and the spot market more liquid than hydroxide due to the size and experience of its main market of China. In addition, BG carbonates are used in a wider variety of batteries beyond the EV end use. TG lithium carbonate demand for industrial applications is forecast to grow in line with economic growth. However, TG lithium carbonate lends itself well to being reprocessed into BG lithium chemicals (either BG carbonate or BG hydroxide). The ability to re-process the product into BG lithium chemicals will ensure that prices will be linked to prices of BG lithium chemicals.

19.2.2 Lithium Hydroxide

The market for BG lithium hydroxide is currently small and relatively illiquid compared to the carbonate market. Growth in high nickel cathode chemistries supports a strong demand outlook. Most BG lithium hydroxide is sold under long term contract currently, which is expected to continue. However, contract prices are expected to be linked to spot prices and therefore are likely to follow spot price trends albeit with a lag. Over the longer term, Wood Mackenzie expects hydroxide prices to settle at between USD 25,000/t and USD 35,000/t (real USD 2023 terms). Figure 19-5 shows the lithium hydroxide price outlook.



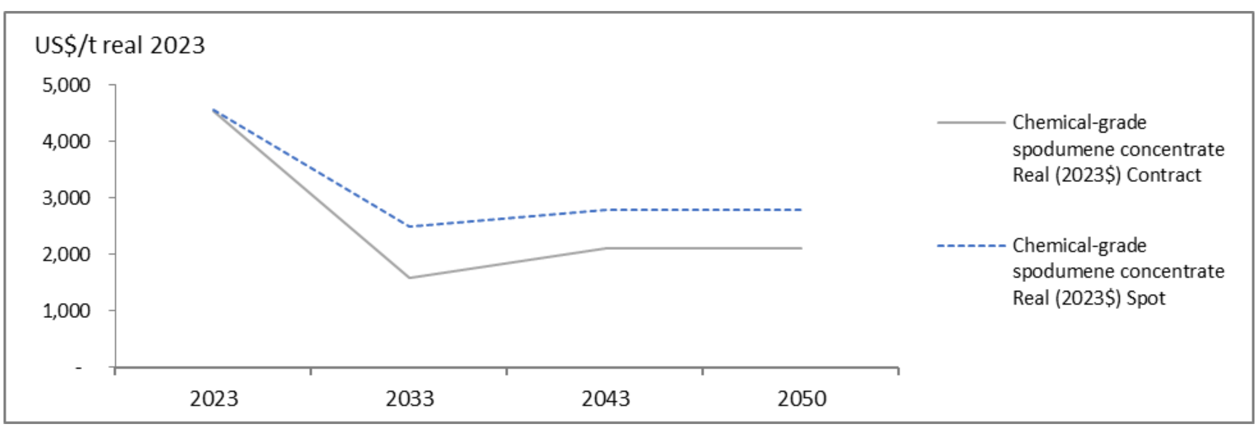
Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-5 – Lithium Hydroxide Price Outlook, 2023 – 2050

19.2.3 Chemical-grade Spodumene Concentrate

In 2022, demand from converters showed strong growth resulting in improved prices. After years of underinvestment, new capacity has been incentivised and both brownfield and greenfield projects are underway. Notably, these incremental volumes are observed to be at a higher cost and greater difficulty, raising the pricing hurdles required to maintain supply and extending timelines for delivery.

Wood Mackenzie forecasts a short period of supply volatility in the years to 2030, moving from surplus to deficit, to surplus before entering into a sustained deficit beyond 2031. Reflecting this dynamic, prices are expected to in line with market imbalances. Wood Mackenzie forecasts a long-term price between USD 2,000/t and USD 3,000/t (real USD 2023 terms) as can be seen in Figure 19-6.



Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-6 – Chemical-grade Spodumene Price Outlook, 2023 – 2050

19.3 Contracts

As of the date of this Technical Report, Allkem has no existing commercial offtake agreements in place for the sales of lithium concentrate, lithium carbonate, or lithium hydroxide (collectively, "lithium products"), from the James Bay Project. Allkem is having discussions with potential offtake customers for the Project. These discussions are expected to advance to negotiations throughout the course of the Project in line with the Project execution schedule.

19.4 Market Risk and Opportunities

19.4.1 Price Volatility

Recent pricing history demonstrates the potential for prices to rise and fall significantly in a short space of time. Prices may be influenced by various factors, including global demand and supply dynamics; strategic plans of both competitors and customers; and regulatory developments.

Volatility of prices reduces the ability to accurately predict revenues and therefore cashflows. At present, Allkem's agreements include index-based or floating pricing terms. In a rising market, this results in positive cashflows and revenues; in a falling market the financial position of the company may be adversely impacted. Uncertainty associated with an unpredictable cashflow may increase funding costs both in debt and equity markets, and may therefore impact the Company's ability to invest in future production. Conversely, a persistently stronger pricing environment may also permit self-funding strategies to be put into place.

19.4.2 Macroeconomic Conditions

Allkem produces lithium products which are supplied to a range of applications including lithium-ion batteries, the majority being used within the automotive sector and energy storage systems; industrial applications such as lubricating greases, glass and ceramics; and pharmaceutical applications. Demand for these end uses may be impacted by global macroeconomic conditions, as well as climate change and related regulations, which in turn will impact demand for lithium and lithium prices. Macroeconomic conditions are influenced by numerous factors and tend to be cyclical. Such conditions have been experienced in the past, and may be experienced again in future.

19.4.3 Technological Developments within Battery Chemistries

The primary growth driver for lithium chemicals is the automotive battery application, which accounts for more than 60% of demand today. Technology within automotive cathodes and cathode chemistries are continuously evolving to optimise the balance between range, safety, and cost. New "Next Generation" chemistries are announced with regularity, which carries the risk that a significant technology could move the automotive sector away from lithium-ion batteries. On a similar note, new technologies could also increase the intensity of lithium consumption. For example, solid state and lithium metal batteries could require more lithium compared to current lithium-ion battery technology. Despite the potential for technological innovations, the impact to the lithium market over the short-medium term is expected to be limited given the extended commercialisation timelines and long automotive investment cycles which are a natural inhibitor to rapid technological change.

19.4.4 Customer Concentration

Allkem is currently exposed to a relatively limited number of customers and limited jurisdictions. As such, a sudden significant reduction in orders from a significant customer could have a material adverse effect on its business and operating results in the short term. In the near term, this risk is likely to persist. As the battery supply chain diversifies on the back of supportive government policies seeking to establish localised supply, in particular in North America and Europe, there will be scope to broaden the customer base, however, the size of automakers, the concentration in the automobile industry, and the expected market growth will entail high-volume and high-revenue supply agreements. This risk is closely monitored and mitigative actions are in place where practicable.

19.4.5 Competitive Environment

Allkem competes in both the mining and refining segments of the lithium industry presently. Allkem faces global competition from both integrated and non-integrated producers. Competition is based on several factors such as product capacity and scale, reliability, service, proximity to market, product performance and quality, and price. Allkem faces competition from producers with greater scale; downstream exposures (and therefore guaranteed demand for their upstream products); access to technology; market share; and financial resources to fund organic and/or inorganic growth options. Failure to compete effectively could result in a materially adverse impact on Allkem's financial position, operations, and ability to invest in future growth. In addition, Allkem faces an increasing number of competitors: a large number of new suppliers has been incentivised to come online in recent years in response to favourable policy environment as well as higher lithium prices. The strength of recent lithium price increases has also incentivised greater investment by customers into substitution or thrifting activities, which so far have not resulted in any material threat. Recycling will progressively compete with primary supply, particularly supported by regulatory requirements, as well as the number of end-of-life battery stock that will become available over the next decade as electric vehicles or energy storage systems are retired.

19.5 Conclusion

Wood Mackenzie, also known as WoodMac, is a global research and consultancy group supplying data, written analysis, and consultancy advice to the energy, chemicals, renewables, metals, and mining industries. It is the SLR QP's opinion that the long term pricing assessment indicated in this section is deemed suitable for economic assessment of the Project at the current level of study.

Market analysis will continue to evolve during the project development phase. It is recommended that Allkem continue with ongoing market analysis and related economic sensitivity analysis.

Risk factors and opportunities in technological advancements, competition, and macroeconomic trends should be reviewed for relevancy prior to major capital investment decisions. Remaining abreast of lithium extraction technology advancements, and potential further testwork or pilot plant work may provide opportunities to improve the Project economics.

20. ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL OR COMMUNITY IMPACT

20.1 Environmental Policy

According to its Environmental Policy (March 2017 Rev 1, Ref. 00-EXE-POL-0006), GLCI is committed to conducting their activities in an environmentally responsible manner. From a starting point of compliance with all applicable regulations, GLCI applies a management system that ensures the application of the environmental standards to their products, services and processes.

20.2 Regulatory Review Status

The mining industry in Québec is subject to federal and provincial regulations and environmental review processes. In addition, the Project is located within the territory governed by the James Bay and Northern Québec Agreement (JBNQA).

An Environmental and Social Impact Assessment ("ESIA") was prepared in 2017 and submitted to the authorities in 2018. An environmental review process aiming at optimizing the project was conducted following this submittal. A second version of the ESIA, addressing these changes, was submitted to the authorities in July 2021 (WSP, 2021).

20.2.1 Federal Regulations and Permitting

The federal environmental assessment process, under the Canadian Environmental Assessment Act (2012), was initiated in October 2017 and completed with the approval of the ESIA in January 2023. The Decision Statement, establishing the conditions GLCI must comply with, was received from the Minister of Environment and Climate Change on January 16, 2023. The ESIA, Decision Statement and other related documentation is available on the Impact Assessment Agency of Canada ("IAAC") registry at https://aeic.gc.ca/050/evaluations/exploration?projDocs=80141.

In addition to the ESIA approval, other federal authorizations are required, such as:

- Authorization from the Minister of Fisheries and Oceans under paragraphs 34.4(2) (b) and 35(2)(b) of the Fisheries Act.
- Approval from the Minister of Transport under paragraphs 23(1) and 24(1) of the Canadian Navigable Waters Act.

20.2.2 Provincial Regulations and Permitting

The ESIA was prepared according to Section 153 of the Environmental Quality Act (EQA) which embeds any mining project in the process described in the Regulation respecting the environmental and social impact assessment and review procedure applicable to the territory of James Bay and Northern Québec (CQLR, c.Q-2, r.25). In parallel to the federal assessment process, the provincial environmental assessment process was initiated in October 2017. As part of the ESIA review by the Committee of the James Bay and Northern Québec Agreement (COMEX), several rounds of questions and comments were completed. The project is pending approval from the provincial authorities as of July 2023. The ESIA and related documentation is available on the COMEX registry at https://comexqc.ca/en/fiches-de-projet/projet-de-de-lithium-baie-james-galaxy-lithium-canada-inc/.

After ESIA approval, the Project will be subjected to Section 22 of the EQA, pursuant to which an authorization is required for activities that may result in a change to the environment. Each activity such as earthworks in wetlands, mining, concentration, tailings management and water management may be subjected to different authorizations. The applications to the Québec *Ministère de l'Environnement, de la Lutte contre les changements climatiques, de la Faune et des Parcs* (MELCCFP) need to be accompanied by sufficiently comprehensive studies to address the requirements of Directive 019 applicable to the Mining Industry, as well as the MELCCFP's EQA section 22 application form requirements.

Any application for an authorization involving works in wetland will have to be accompanied by a compensation program. Such a program has been developed for the Project area. The nature of the program is to be determined by agreement between the proponents, the authorities and the Cree Nation.

Other permits, authorizations, approvals and leases from the Québec's *Ministère des Ressources naturelles et des Forêts* (MRNF), the MELCCFP, the Québec Building Agency (*Régie du Bâtiment, "RBQ"*), the Eeyou Istchee James Bay Regional Government (EIJBRG) and Québec's National Police Force (*Sûreté du Québec*) for various Project components or activities on the Project site are required, such as:

- Approval of tailing storage facilities and concentration plant locations (Mining Act, s.240 & 241)
- Surface leases ("Demande d'utilisation du territoire public", Act respecting the lands in the domain of the State, s.47)
- Mining lease (Mining Act, s.101)
- Tree clearing (Mining Act, s.213 & Sustainable Forest Development Act)
- Sand pit exploitation (Mining Act, s.140 & Regulation respecting the regulatory scheme applying to activities on the basis of their environmental impact, s.117)

- Municipal Building Permits
- High-risk petroleum products containment installation (Safety Code, s.120 & Construction Code, Chap. VIII, s.8.01)
- Explosive storage (Regulation under the Act respecting explosives, Division II)

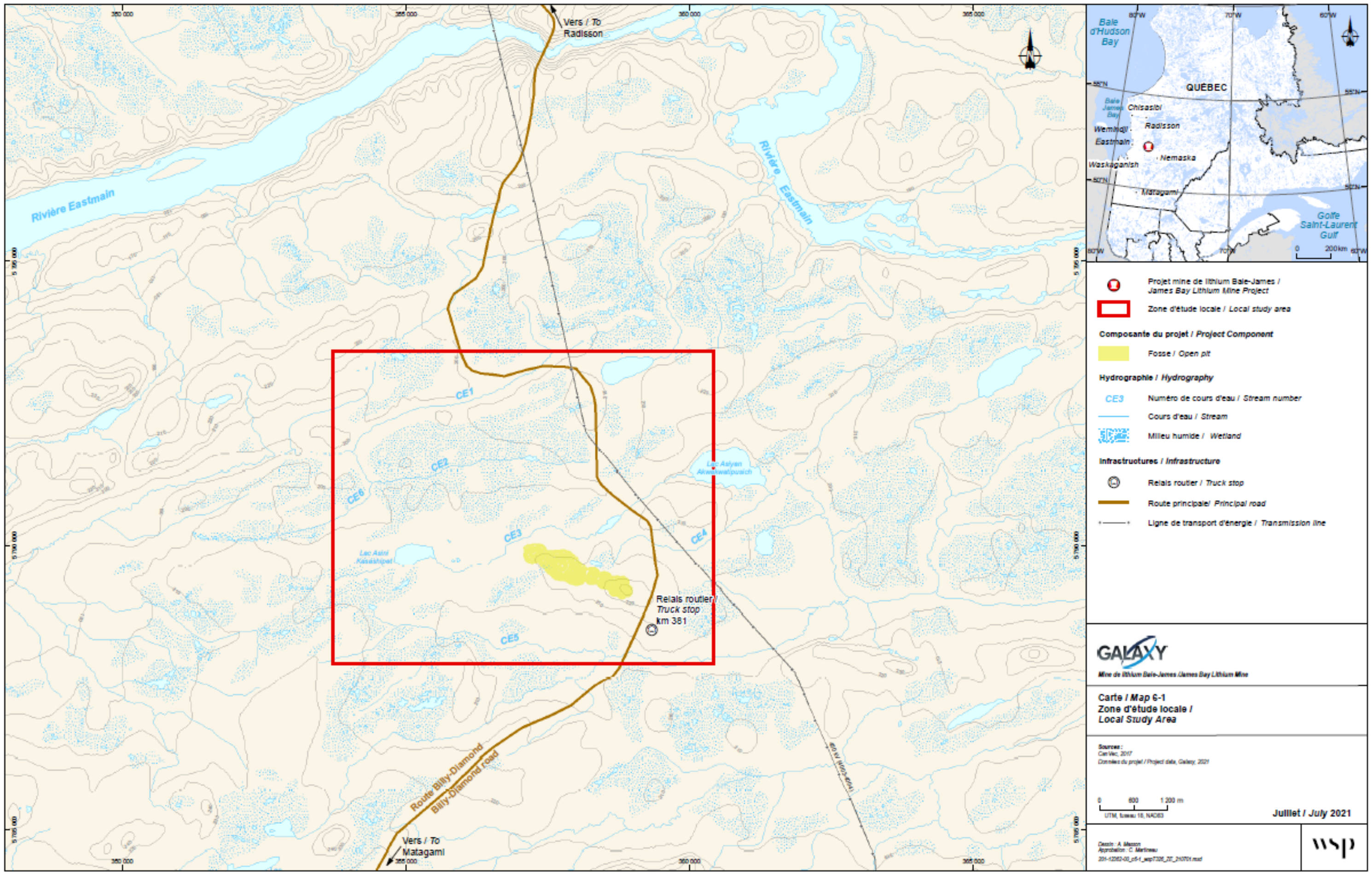
The required applications will be filed during the Project's development, when appropriate. A permit register coherent with the Project construction schedule has been developed by GLCI. Each governmental body (MELCCFP, MRNF, EIJBRG, RBQ) was consulted by GLCI to confirm what activities require a permit, as well as confirm application requirements.

Except for wood cutting permits required for exploration activities, and approval of the concentration plant, North-East and South-West storage facility locations, no other permit, lease or certificate application has been granted as of July 2023.

20.3 Environmental Impact Assessment

In 2017, various studies were undertaken to update a former data collection from 2011 to obtain necessary baseline information required to assess the Project's impacts as part of the ESIA. Other complementary baseline studies were conducted in 2019 and 2020.

Different study areas were identified for the ESIA and its associated baseline studies. Most studies have been conducted inside the "local study area" which include areas that are impacted by the mine development, including the infrastructure's location (Figure 20-1). Larger study areas have been defined for components such as waterfowl, air quality, Cree land use, noise (modelling), air quality (modelling, including greenhouse gases), hydrogeology and human health since the potential impacts extend out of the property and/or are associated with potential cumulative effects on the receiving environment. Chapters 6 and 7 of the ESIA describes respectively the receiving environment and the environmental impact assessment.



Source: WSP, 2021

Figure 20-1 – Local Study Area for Environmental Components

20.3.1 Physical Environment

The information related to climate and physiography is available under Section 5 of this document.

20.3.1.1 Geochemistry

Geochemical characterizations were completed on waste rock, tailings, ore, and soils that will be manipulated and stored during the operations at the mine. The main objectives of these studies are to assess the material's acid generating potential, its metal leaching potential and to determine the possibility of using waste rock as construction material. These geochemical studies are summarized below:

Waste Rock

Four main lithologies were submitted to static testing, namely barren pegmatite, gneiss, banded gneiss and mafic volcanic/basalt. Kinetic testing was also performed on composite waste rock material. The results of these kinetic tests demonstrate that waste rock is considered Non-Potential Acid Generating ("Non-PAG"). Some metal leaching that exceeded the criteria applicable for resurgence to surface water (RES) was encountered during the first weeks of testing, but all metals complied with the RES criteria after week 14.

Diabase

An important diabase dike occurs in the middle of the pit, south side. Kinetic testing was performed to evaluate the geochemical characteristics of diabase rock coming from a dike in the mining deposit and considered as potential road construction material. The results of these kinetic tests demonstrate that diabase is considered Non-PAG. Some metal leaching exceeding the RES criteria was encountered for the first weeks of testing, but all metals complied with the RES criteria after week 13, except for mercury concentrations that were still occasionally above the RES criterion up to the end of the test. No clear tendency was observed for mercury concentrations throughout the test.

Tailings

A total of 12 tailings samples were submitted to static testing. Kinetic testing was also performed on tailings. The results of this kinetic test show that tailings are considered Non-PAG. Metal leaching above the RES criteria was encountered for the first weeks of testing, but all metals complied with RES criteria after week 14, except copper that was still occasionally over the RES criterion up to week 28. Management of tailings is discussed in Section 18 of this document.

Ore

A total of 28 samples of pegmatite were submitted to static testing. Kinetic testing was also performed on pegmatite material. The results of this kinetic test show that pegmatite is considered Non-PAG. Some metal leaching exceeding the RES criteria was encountered during the first weeks of testing, but all metals complied with the RES criteria after week 13, except for mercury concentrations that were still occasionally above the RES criterion up to the end of the test. No clear tendency was observed for mercury concentrations throughout the test.

Soils

A total of eight samples (two clay and six sand samples) were submitted to static leaching tests. Both clay samples results exceeded the RES criteria for copper, lead and zinc. One of these two samples also exceeded the RES criterion for manganese. No exceedance of the RES criteria was noted for sand samples.

An additional sampling campaign was conducted in March 2023 on the waste rock, unconsolidated and granular material that will be used for construction to determine their acid generation and metal leaching potential. The results from this campaign are pending.

20.3.1.2 Soil Quality

A natural background levels ("NBL") assessment was realized on the soils located in the study area. This study was conducted within the framework of the Project environmental baseline to address provincial and federal requirements associated with the ESIA.

The establishment of the NBL followed a methodology approved by the provincial government and the United States Environmental Protection Agency ("EPA"). Soil samples were analysed for all metals and the NBL were calculated based on a statistic analysis for the following parameters: aluminium, barium, calcium, hexavalent chromium, iron, lithium, magnesium, manganese, potassium, titanium and vanadium1. Results show that the NBL calculated is lower than the generic criterion 'A' (background level) from the provincial guidelines for barium, hexavalent chromium (CrVI) and manganese, except for hexavalent chromium in the gravelly sand unit where it exceeds the 'C' criteria (industrial use) of the same guidelines. For all the other parameters analysed, no criteria are defined in the guidelines. Based on further soil sampling and analysis for CrVI in 2020, there is no indication at this stage that there is a hexavalent chromium problem on the site.

1NBL were calculated only for parameters for which more than 50% or more than 10 samples were above the detection limit to be statistically representative.

In July 2017, an Environmental Site Assessment ("ESA") – Phase I was performed on the property located on the west side of the Billy Diamond Highway, at km 381, to identify real or potential soil contamination risks that could be caused by past or current activities on the site or its immediate vicinity. Several major risks of contamination for the site were identified, namely:

- Landfilled residual materials at the remote local landfill (*lieu d'enfouissement en territoire isolé* (LETI)).
- Piles of wood-treated poles.
- Possible incineration of residual materials in the LETI.

A soil characterization (ESA – Phase II) was then conducted within the LETI area and demonstrated the contaminated state of the land and groundwater in this area.

20.3.1.3 Hydrogeology

The assessment of hydrogeological conditions at the Project site was carried out using data collected in the 2017, 2018, 2020 and 2021 investigation campaigns. Compiled data allowed to determine the different hydrogeological units, assessing hydraulic properties and piezometry as well as groundwater quality. All collected data and hydraulic properties were used to develop the conceptual model to carry out hydrogeological 3D modelling.

The outcome of the study helped assess the potential impacts of the pit dewatering on groundwater and propose an appropriate monitoring plan. Modelling results show that once operation activities are completed, the groundwater table drawdown will be nil at approximately 2 km east of the pit. For the south and west sectors, the drawdown will be almost nil at 500 to 900 m from the pit walls. In the northwest sector, the retention basin will create a slight local increase in the groundwater level of about 0.5 m. According to the modifications on the hydrogeological regime, the results also show that the impact on lakes and watercourses will involve a decrease in average overall flow between 0 and 2%. Groundwater contribution to the base flow of watercourse CE4 will become very low and Lake Kapisikama, located less than 200 m from the pit, will be impacted and will no longer be supplied by groundwater as of Year 4.

20.3.1.4 Groundwater Quality

Results from the sampling campaigns showed that the groundwater in the area has significant concentrations of calcium and magnesium bicarbonate. Since the hardness of the receiving medium is low (less than 10 mg/l), the applicable criteria for some metals are very restrictive. Applicable criteria (RES) or threshold were exceeded for one or the other of the following metals: silver, barium, copper, manganese and zinc. Results for all other metals are below the RES criteria. The drinking water criteria were exceeded for the following metals: aluminum, arsenic and manganese.

Groundwater natural background levels were established from the samples taken from wells distributed in the study area. The parameters for which a background level has been determined are aluminum, arsenic, barium, copper, iron, lithium, manganese and zinc.

Groundwater modelling results indicate that the maximum daily percolation rate of 3.3 L/m^2 set by Directive 019 will be respected under the waste rock and tailings piles as well as under the two water management basins. Modelling of dissolved metal transport also shows that the groundwater quality protection objectives will be met.

20.3.1.5 Hydrology

The study area is located within the Eastmain River watershed which covers an area of 46,000 km^2 including many lakes and rivers. Six watercourses (CE1 to CE6) are found within the limits of the local study area. The CE1, CE2 and CE6 watercourses flow west toward the Miskimatao River and then onto the Eastmain River, whereas C3, C4 and C5 flow east, but also join up to the Eastmain River.

Watersheds of the watercourses CE2, CE3, CE4 and to a lesser degree CE5 will be impacted due to the presence of the mine infrastructures. Because it will receive the mine effluent, the CE2 stream flow will increase. A rise in water levels from 3 to 13 cm is expected during the baseflow periods of summer and winter, downstream from the outlet. For the CE3 stream, a slight decrease of 1 to 3 cm is expected for baseflow and annual-average water levels, and a decrease of up to 7 cm is expected during the flood period. The CE4 stream water levels will decrease by 2 to 9 cm from the junction with the Billy-Diamond Road to its connexion to Asyian Awkawkatipusich Lake. During baseflow periods, the decrease in flow is such that it is expected that there will be no more flow but simply pooling water, with water level maintained by the hydraulic controls present in the stream. Kapisikama Lake will gradually dry up as mining progresses, starting Year 4.

20.3.1.6 Surface Water and Sediment Quality

Water sampling was carried out monthly from June to November 2017 to document annual variability of surface water quality at nine sampling stations in the study area located within the Eastmain River watershed. Sediment sampling was first conducted in September 2017 at the same sampling stations. Two additional sediment sampling campaigns were conducted in September 2019 (for sulphur content at the same stations), and in July 2020, where two additional sampling stations located downstream from the planned discharged point for the mining effluent were characterized. Water and sediment results were compared to recommended federal and provincial criteria for quality evaluation.

The waterbodies in the project area are natural and are not affected by any forms of pollution that originate directly from human activity. Measurements taken on site showed that pH and dissolved oxygen values were low and that the surface water is very acidic. The nature of the soil and the vegetation are the main causes of these conditions. Although the concentrations of a few trace elements were higher than the recommended criteria in the surface water samples, they were within natural range for Canadian surface waters. Some sediment samples exceeded the criteria for different metals, but they are also within the range of the possible natural conditions.

20.3.1.7 Air Quality

Modelling of the air dispersion was conducted to assess the potential impacts of the Project (mobile and stationary emission sources) on ambient air quality. Results of the modelling were compared with the Canadian Ambient Air Quality Standards ("CAAQS"), the provincial Clean Air Regulation ("CAR") and the provincial criteria for parameters such as total particulates ("PMT"), fine particulates (PM2.5), carbon monoxide ("CO"), nitrogen dioxide ("NO_2") and sulphur dioxide ("SO_2"). Since no air quality sampling has been conducted on the Project site, the air quality baseline has been established using initial concentrations (background) suggested in the air modelling provincial guidelines for mining projects in northern Québec (*Guide d'instructions – Préparation et réalisation d'une modélisation de la dispersion des émissions atmosphériques – Projets miniers*).

The modelling results indicated emissions of nitrogen dioxide exceeding the CAAQs and silica dust exceeding the provincial criteria at some sensitive receptors. Some modifications to the blasting program, to truck and heavy equipment characteristics and dust collecting systems were made to reduce these potential emissions. In addition, GLCI intends to implement a dust management plan, through appropriate mitigation measures and supported by the ambient air quality monitoring program, to minimize the project's impacts on air quality.

20.3.1.8 Noise

Field data collection for noise was completed between June and October 2011[2]. Noise data was collected with a sound level meter at seven different locations within and around the study area, following standards outlined in the provincial guidelines (Directive 019) for the mining industry. All background levels monitored were under the guideline criteria for Zone IV (non-sensitive area), which is 70 dBA for both day and night periods. However, on the land of an existing dwelling in an industrial zone and established in accordance with municipal regulations in force at the time of its construction, the criteria are 50 dBA at night and 55 dBA during the day.

A noise modelling study considering all the facilities and mobile equipment for the Project, as well as sensitive receptors, was conducted as part of the ESIA. Modelling results show that noise levels during construction and operation will comply with the guidelines criteria for day and night periods. General

2 Given that the land use and activities in the Project area have not changed since 2011, the data collected is still considered relevant.

mitigation measures will however have to be implemented by GLCI to minimize the effects of the Project on the ambient noise environment.

20.3.1.9 Artificial Light at Night

A study was conducted to document the luminous environment surrounding the Project area. Results show that the Project's site is in an area where the clarity of the sky is almost optimal. The only artificial light emitter in the study area is the km 381 Truck Stop on the Billy Diamond Highway, which is associated with a low-light zone. However, the light quickly fades after a few kilometres and gives place to a sky clarity of very good quality.

Modelling was conducted to assess the impact of future facilities on artificial nocturnal light. Results show that expected changes in the brightness of the sky will have very little effect in the sky glow. The effects will only be visible near lit areas. Changes will be barely perceptible on all other sensitive receptors in the study area, including permanent Cree camps, and on the uses of the territory (traditional or otherwise).

20.3.2 Biological Environment

20.3.2.1 Flora and Wetlands

Vegetation inventories were conducted to characterize and delineate land and wetland plant groups, validate the presence of threatened or vulnerable plant species (or species likely to be designated) as well as species of traditional interest. Across the study area (3,677 ha), terrestrial environments cover 18.2% (668 ha), wetlands 78.6% (2,891 ha), hydric environments (including lakes and streams) 2.0% (74 ha), and anthropogenic environments 1.2% (44 ha). Even if ecosystems have adapted to forest fire dynamics over the past decade (2005, 2009 and 2013), successive forest fires have modified the composition of the vegetation cover in the short and medium terms.

Wetlands are composed of open peatlands, shrub peatlands and wooded peatlands which largely dominate the landscape of the study area. Environments surveyed presented typical characteristics of wetlands and peatlands found across the James Bay territory. Based on a conservative assessment, about 43.3% of land from the Abitibi and James Bay lowlands are covered with wetlands. According to this assessment, the study area contains a greater proportion of wetlands than the regional level.

No species at risk or invasive species were identified during inventories. Up to 27 plants of interest to the Cree were also identified: five tree species, 16 shrub species, five herbaceous species and one nonvascular species. For the most part, the medicinal plants observed during inventories are common in the study area and in this part of Québec.

The apprehended impacts on vegetation are mainly related to the destruction and modification of natural habitats. These impacts are caused by deforestation and excavation, necessary for land preparation and the construction of temporary or permanent infrastructures. Work required to develop the future mining infrastructures will result in the transformation of approximately 145 hectares of terrestrial and 305 hectares of wetlands.

A wetland compensation plan is currently being developed, which will be submitted for approval by the federal and provincial authorities.

20.3.2.2 Terrestrial Fauna and Avifauna

Wildlife inventories were conducted in 2011, 2012, 2017 and 2018 to document fauna in the study area. Inventories were led for herpetofauna, avifauna, chiroptera, small and large mammals. Forest fires that struck the area in the last decade have profoundly changed habitats in terms of vegetation cover and food availability. These phenomena caused death or flight of most of wildlife species.

Opportunistic observations of herpetofauna in potential habitats were conducted since no species at risk was foreseen in the study area. The four species identified are largely spread across Québec’s territory.

Various field surveys confirmed the presence of 53 bird species. Most of them are common and largely distributed across habitats at these latitudes in Québec. Of these species, two species at risk were surveyed: the nighthawk (*Chordeiles minor*) and the rusty blackbird (*Euphagus carolinus*). Availability of their habitats is not at risk in the surrounding environment near the study area or across Québec.

Survey results indicate very low density of chiroptera (68 crossings) and identity three out of four species potentially present in the study area (the big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), and a chiroptera of the *Myotis* genus). The scarcity of mature forest due to forest fires may be the cause of chiroptera’s weak presence in the study area. Habitat of higher quality for species at risk are found in the surrounding environment of the study area.

The small mammal survey identified eight species in 2011 and two species in 2017. One species at risk was identified, the yellow-nosed vole (*Microtus chrotorrhinus*), but its habitat seems to have disappeared between 2011 and 2017.

Large mammal inventories confirmed the presence of moose (*Alces alces*). Black bear (*Ursus americanus*) and grey wolf (*Canis lupus*) have also been seen by Cree and km 381 Truck Stop personnel in recent years.

Regarding the caribou (woodland and migratory of the Leaf River Herd) (*Rangifer tarandus caribou*), which is protected at both federal and provincial levels, no individuals or signs of their presence were observed, even if the species distribution could be in the study area. The presence of migratory caribou in the area is marginal as its preferential habitat (mature forest) is absent.

Habitat loss and fragmentation are the main direct impacts of the project on wildlife. These impacts will lead to a change in the natural behavior of large wildlife and their movements. Accidental mortalities of large fauna could also occur during collisions with vehicles.

20.3.2.3 Aquatic Fauna

Fish sampling was conducted in 2012 and 2017 in four streams and four lakes. Fish density was low in streams. None of the species recorded are listed on the federal Species at Risk Act or likely to be vulnerable or endangered in Québec. The Yellow perch was only captured in the Kapisikama Lake. Its population seems completely isolated from the rest of the water network.

Physical characteristics of all streams were similar featuring U channel, meandering through peatlands and floodplains, fine particles substrate, low flow and an acidic pH. Even though these characteristics are not optimal for salmonids, it did not seem to affect brook char settlement in watercourses. Watercourses sheltered between two and six fish species.

No potential spawning grounds were found for brook char in watercourses of the study area. In CE5 Creek, its floodplain may be used as potential spawning grounds for northern pike. The floodplain of the Asiyan Akwakwatipusich Lake may also provide potential spawning grounds for this species.

In September 2019, a total of 20 brook char were collected in the CE1 and CE2 watercourses to analyse the mercury content in their flesh. All the samples analysed were below the MELCCFP criterion related to fish consumption recommendations.

Regarding benthic communities, 48 species were identified at four sampling stations in July, September and October 2017. Communities were mainly composed of insects for all three sampling campaigns.

Fish habitat loss is the main impact resulting from project activities. A fish habitat compensation plan is currently being developed and will be submitted for approval by the federal and provincial authorities.

20.3.3 Social Environment

20.3.3.1 Political Context

The Project is located in the Nord-du-Québec administrative region on the territory of the Eeyou Istchee James Bay Regional Government (EIJBRG), which, as of 2014, entirely replaced the James Bay Municipality. The municipality covers just over 275,000 km2 and is governed equally by both the Cree and Jamesian people.

Northern Québec is governed by the James Bay and Northern Québec Agreement (JBNQA) and the Agreement Concerning a New Relationship between the Government of Québec and the Cree of Québec, also referred to as the Paix des Braves (French for “Peace of the Braves”). The land regime introduced by the JBNQA is an important element in territorial use. It divides the James Bay territory into Category I, II and III lands. The Project is on Category III land on which the Cree have exclusive rights to trap fur animals and have certain benefits in the field of outfitting.

The “Plan Nord” is a provincial economic development strategy initiated by the government in 2011 to provide numerous incentives to develop the natural resources extraction sector in the north of the province. The Plan Nord supports and promotes projects in the North to generate economic activity and to create and maintain jobs in the area covered by the Plan Nord. La Grande Alliance

The “La Grande Alliance” is a memorandum of understanding for collaboration and consolidation of socio-economic ties between the Cree Nation and the Québec government to connect, develop and protect the territory. This long-term economic development plan for the Eeyou Istchee region is valued at CAD4.7 billion and is to be spread over a period of thirty years. It provides for the extension of the rail network by around 700 kilometers, the construction of hundreds of kilometers of new roads and power lines, the creation of a deep-water port, the electrification of certain industrial projects, the formation of a local workforce and the creation of a network of protected areas.

20.3.3.2 Land Use for Traditional Purposes

The Cree Nation of Eastmain is located 130 km West of the proposed Project site. The Cree community of Eastmain is impacted by the Project with respect to traplines located near the Project site (RE1, RE2, RE3, VC33 and VC35). The Project site is located on the RE2 trapline. Most activities conducted on this trapline are located near the Eastmain River, which is outside the proposed Project site. Marginal activities are also carried out along on both sides of the Billy Diamond Highway. They include moose and goose hunting, beaver trapping, fishing, wood cutting, and blueberry picking. A small camp, snowmobile trails and goose ponds set by the tallyman are located near the Project.

20.3.3.3 Infrastructure

A truck stop owned and managed by the *Société de développement de la Baie-James* (“SDBJ”) is in the study area, at km 381. The truck stop provides lodging, restaurant, meeting room and mechanical repair services. A convenience store, laundry room, cafeteria, motel, two garages and a service station are also part of the complex. Two secondary roads are located within the study area: one south-east of the project area, which provides access to the transmission line corridor of the 4003-4004 circuit, and another along the pegmatite hill, in the south, which stops at the remote landfill (“LETI”).

The LETI is located near the future open pit and is associated with the operations of the truck stop. The LETI site has been used for the management of residual materials since 1983. Until 2011, residual materials transported to site were buried in trenches, but these are now incinerated in containers and buried.

20.3.3.4 Archaeology

An archaeologic inventory of areas presenting high archaeological potential was conducted in July 2021. No archaeological evidence was revealed during the visual inspection and inventory (Arkéos, 2021).

According to the knowledge acquired as part of the Eastmain-1 Hydro Québec Complex Development Project, human occupation in the region dates from 4600 to 4100 BP. Besides, a prehistoric archaeological site is known at the site of km 381Truck Stop. The territory has been occupied and harnessed by First Nations since prehistoric times, and even today, the study area and its immediate surroundings encompass sections, of varying sizes, of Eastmain traplines.

20.3.3.5 Landscape

A landscape inventory and analysis were performed to assess the impact of the Project on the landscape and in the visual field of the observers. The study area is divided into five types of landscape units based on the homogeneity of the permanent elements of the landscape and the visual characteristics that prevail: valley, plain, plateau, powerline, road.

20.4 Surveillance and Monitoring Program

As presented in the ESIA and required as part of the federal and provincial authorization process, an environmental surveillance and monitoring program will ensure that work carried out complies with laws, policies and regulations in effect, commitments and obligations of the proponent, plans and specifications, and mitigation measures that were presented in the ESIA to minimize the Project's effects. In addition, an environmental surveillance and monitoring program will verify the proper functioning of equipment and facilities and manage any environmental changes caused by the Project.

20.4.1 Construction

Regular surveillance will be carried out by GLCI during the construction. The surveillance program will include inspection of the construction site, documentation control, report preparation and communications.

Operation procedures are being developed to document and follow all construction activities, construction site observations, decisions regarding non-conforming situations, corrective actions, observed results of these actions, and preventive measures put in place to ensure that these non-conforming situations do not occur again.

During the construction phase of the Project, the social monitoring program will namely include the monitoring of socioeconomic conditions within the Eastmain community as well as the monitoring of the quality of life and well-being for the population of the Eastmain community.

20.4.2 Operations

Several monitoring programs are currently being developed in consultation with concerned First Nations and relevant authorities. These programs namely concern the monitoring of groundwater quantity and quality, surface water quantity and quality, sediment quality, air quality, noise and vibrations, vegetation (including wetlands and invasive alien plant species), wildlife, traditional food, land use.

Social monitoring will also be performed during the operation phase of the Project. The social monitoring program will namely include:

- Monitoring of socioeconomic conditions within the Eastmain community.
- Monitoring of land and resource uses for traditional purposes.
- Monitoring of the quality of life and well-being for the population of the Eastmain community.

20.5 Closure and Rehabilitation

A closure plan was submitted to the MRNF/authorities in accordance with article 232.1 of the Mining Act for approval prior to the filing of the mining lease application. The closure plan was developed according to the guidelines for preparing mine closure plans in Québec (MERN, 2017) and with the objective of:

- Eliminating unacceptable risks to health and ensure the safety of persons.
- Limiting the production and spread of substances liable to harm the receiving environment and, in the long term, aim to eliminate all forms of maintenance and follow-up.
- Restoring the site to a visually acceptable condition for the community.
- Restoring the infrastructure site to a state compatible with future use.

20.5.1 Post Closure Monitoring Program

A follow-up study of the physical stability of the structures, chemical quality of drainage and return of vegetation will be carried out after the cessation of mining activities.

The environmental post-closuring monitoring will be conducted for a period of 11 years whereas the agronomic monitoring and monitoring of the physical stability of the structures will be conducted for a period of 8 years following the 3-year rehabilitation period.

20.6 Socio-economic

GLCI established a stakeholder consultation and engagement process as part of its project acceptance activities, which allowed GLCI to gather information, questions and expectations of local communities and stakeholders. Mitigation measures were proposed based on the consultation process.

GLCI signed a Preliminary Development Agreement ("PDA") with the Cree Nation of Eastmain, Grand Council of the Cree and Cree Nation Government dated on March 15, 2019. This PDA is to be replaced by an Impact Benefit Agreement ("IBA") before project construction.

20.6.1 Public Consultation

To reach the largest number of people in the James Bay area, in 2011-2012 and in 2017-2018, GLCI met with a wide reach of Jamesian stakeholders including, municipal administration, economic development, land use and planning, and natural resources. Here are the main regional organisations interviewed:

- Eeyou Istchee James Bay Regional Government (EIJBRG)
- Société de développement économique de la Baie-James (SDBJ)
- Administration régionale Baie-James (ARBJ)
- Ville de Matagami
- Service Québec, Nord-du-Québec
- Centre de formation professionnelle de la Baie-James (CFPBJ)
- Table jamésienne de concertation minière (TJCM)

Jamesian stakeholders expressed support for responsible mining development in their region, but also voiced the importance of establishing positive working relationships, regional socioeconomic benefits, and carefully considered environmental protection planning and monitoring.

Stakeholder concerns, expectations and recommendations regarding the Project were recorded throughout the consultation process. A summary of the concerns and expectations is shown in Table 20-1 below.

Table 20-1 – Summary of Stakeholders' Concerns and Expectations

Topic	Stakeholders' Concerns and Expectations
Concentrate Processing	○ Environmental impact from the processing. ○ Consideration of processing the spodumene on EIJB land.
Environmental	○ Impact of disturbances on the environment and risk of drinking contaminated water during construction and operation.

Topic	Stakeholders' Concerns and Expectations
	○ The effects of the mining project on land integrity. ○ Compliance with the new regulation to protect peatland.
Sustainable Development	○ Intention of the promoter to participate in the region's economic development.
Land Use	○ Impact of commuting on the James Bay community (fewer economic spin-offs, loss of job opportunities, loss of residents in the Nord-du-Québec region, etc.). ○ The site of the mine's administrative and operating hub. ○ Logistics of worker transportation.
Jobs and Labour	○ Employee retention problems in the administrative region of Nord-du-Québec. ○ Giving due consideration to Cree workers. ○ The mining project's impact on small business owners or service providers.
Training	○ Consideration to use the region's vocational training centres/establishments. ○ Training in time for construction/operation.
Economic Spin-offs	○ Concerns regarding the lack of economic spin-offs for the region. ○ The need to obtain year-round air service.
SDBJ Facilities	○ Effects on SDBJ infrastructure and services. ○ Risk of contaminating the drinking water supply at the km 381 truck stop.
Billy-Diamond Highway (formerly the James Bay Road)	○ Impact of the mining project and the associated increase in traffic on the road's integrity. ○ Concerns regarding the weight-bearing capacity of the Billy-Diamond highway.
Leadership	○ Fear that GLCI will not use its mining expertise to assume a leadership role and set the tone for other junior companies that will develop projects in the region.

GLCI has already responded to all concerns, expectations and recommendations voiced by the James Bay and Cree stakeholders. GLCI's responses are detailed in the ESIA consultation log or its review in 2021.

Since the submittal of the 1st version of the ESIA in October 2018, communication and engagement with Project stakeholders have continued and will be ongoing through life of project. No particular preoccupations and concerns have however been expressed since the submittal of this ESIA in 2018 and 2021.

20.6.1.1 Consultation of Indigenous Peoples

Meetings were organized with the Eastmain Cree community to inform and consult stakeholders concerned by this mining development. These meetings were primarily aimed at socioeconomic stakeholders, RE1, RE2, RE3, VC33 and VC35 tallymen, the users of the territory of these traplines, and members of the Eastmain community. RE2 trapline is the most impacted. Meetings were also organized with Waskaganish and Waswanipi where community members, designated senior community officials and tallymen were consulted.

GLCI conducted interviews in Eastmain with stakeholders from various sectors relating to the economy, the socio-cultural aspects, health, hunting, fishing, trapping, quality of the surrounding environment, and from focus groups.

GLCI also hosted community presentations to share project information, organized individual and group sessions with stakeholders, posted updates on the James Bay Project website and maintains direct contact with community members on a regular basis, including the RE2 Tallyman. Here is a list of the main stakeholder interviewed in the consultation process:

- Cree Nation Government (CNG)
- Cree School Board (CSB)
- Cree Board of Health and Social Services of James Bay
- Cree Human Resources Department
- Apatisiiwin Skills Development (ASD)
- Cree Women of Eeyou Istchee Association (CWEIA)
- Cree Nation of Eastmain (CNE) and its community
- Cree Nation of Waskaganish and its community
- Cree Nation of Waswanipi and its community
- Local Cree Trappers Association (CTA)
- Wabannutao Eeyou Development Corporation (WEDC)

Communications with the Cree community has been maintained since the submittal of the first version of the ESIA in October 2018. Meetings were held in 2019 with Cree stakeholders. Although the 2020 Covid-19 sanitary crisis have limited the consultations activities, some were held by using videoconferencing platforms in 2020 and 2021. The changes made to the project design were presented during the consultations conducted in 2021.

Concerns, expectations, and recommendations regarding the Project were recorded throughout the consultation process. A summary of the concerns and expectations expressed by the Cree community is shown in Table 20-2.

Table 20-2 – Summary of Cree Community's Concerns and Expectations

Topic	Cree Community's Concerns and Expectations
Environment	○ The impact of disturbances (dust, noise, vibration, odours, etc.) on fauna and flora as well as on water and air quality. ○ The risks of contaminating the territory's resources. ○ Effect of cumulative impacts from hydroelectric and mining developments on the Eastmain territory.
Employment	○ Prioritization of Cree workers. ○ Impacts of the mining project on the workforce of the community and its services. ○ Access to employment for women, including single mothers.
Training	○ Fear that the Cree workforce is not sufficiently qualified to obtain jobs on the mining site.
Work and Culture	○ Presence of obstacles that could hinder Cree workers, such as the French language requirement, racism, sexual harassment between workers, and GLCI's expectations regarding professionalism and ethical standards.
Communication	○ Lack of knowledge of mining operations and problems. ○ Fear of not being well informed or of not having a proper understanding of the issues related to the proposed mine project.
Business and Partnerships	○ Implementation of a business model that will contribute to enriching the community while respecting its culture and values. ○ Possibility of forming partnerships between the company and the Eastmain community.
Economy	○ Concerns about the boom–bust phenomenon and its effects.
Traditional Activities	○ The mining project's impact on hunting, fishing and gathering activities. ○ Impact on the quality of resources produced by traditional activities. ○ Work schedule constraints on workers' traditional activities.
Traffic, Transportation and Rails	○ Increased road traffic and resulting accelerated degradation of road infrastructures, security issues. ○ Impact on the environment in the event of a spill. ○ Surveillance of transportation of chemicals.
Km 381 Truck Stop	○ Impact of the mining project on the infrastructures of the Km 381 Truck Stop and on the quality of drinking well water from the well. ○ Possibility of relocating the km 381 Truck Stop.
Worker' camp	○ Handling of cultural problems. ○ Management of problem related to alcohol and drug consumption.
Exportation of lithium in Nord-du-Québec	○ Impact of all mining projects involving the exploitation of lithium on the Eastmain territory.
Benefits	○ Fear of not receiving the promised benefits or that no part of GLCI's profits will be reinvested in the community.
Health and social problems	○ Risk of an increase in emergencies, in problems related to alcoholism and substance abuse. ○ Increase of cases of cancer due to the presence of contaminants in the

Topic	Cree Community's Concerns and Expectations
	environment. ○ Problems related to increased revenue. ○ The effect of Cree workers' working schedules on families and on community values. ○ Possible rise in the number of children placed in foster or other care and of seniors left unsupported because their loved ones are absent. ○ Possibility that the mining company might exert pressure on local health services and social services by using them.
Environmental monitoring and tracking	○ Ensure adequate environmental monitoring and tracking.
Site rehabilitation	○ Presence of contaminants following the mine site rehabilitation phase. ○ Residual footprint of mine site.

20.6.1.2 Stakeholder Commitment

GLCI is committed to developing sustainable relationships with stakeholders to maximize social and economic benefits, while managing and mitigating environmental impacts. The relationship between GLCI and stakeholders will be maintained throughout the life of the Project.

GLCI will establish several monitoring committees through the IBA. Also, as required under the Québec Mining Act (Section 101.0.3) (Chapter M13.1), a monitoring committee will be created prior to the mine<s construction and will remain active throughout its life, until the works provided for in the mining site rehabilitation and restoration plan are fully completed. These committees will foster the participation of the communities involved in the project's execution.

20.6.2 Population and Economy

In 2016, the nine Cree communities comprising the EIJB were home to 17,141 residents, while the population of the James Bay community was 14,232 residents. The Cree community of Eastmain consisted of 866 people in 2016, which placed it in seventh position (from a demographic standpoint) among the Cree communities on the EIJB territory.

The population residing in the Cree communities is very young. In 2016, close to a third of the Cree population was aged 14 and under. In 2019, the average age of the Jamesian population was 41.1 years, which is similar to the situation in Québec.

According to the Institut de la statistique du Québec (ISQ), the population of Cree communities should continue to grow in the years to come. From 2016 to 2041, the population should increase by 30.5%, to reach 22,600 people. On the other hand, the Jamesian population should see a demographic decrease of 6% for the same period and reach a count of 13,412 people in 2036 (ISQ, 2014).

The structure of the Cree economy is mainly driven by tertiary sector activities, particularly in band councils, education and health institutions. However, Traditional hunting, fishing and trapping activities remain important in the Eeyou Istchee Baie-James communities.

In the last half of 2017, among the 51 occupations in demand in the Nord-du-Québec region, six were associated with the mining sector: underground production and development miners, mining and quarrying supervisors, work site and industrial mechanics, geology and mineralogy technicians, mining technicians (Emploi-Québec, 2017).

20.6.2.1 Eastmain Community

Economic activities in Eastmain are primarily related to the following sectors: service, restaurant, transportation (including airport management), construction (three companies), trapping, and to a lesser extent, trade and outfitters sectors (GCC, 2021).

The Cree Hunters and Trappers Income Security Program is designed to encourage the Crees to continue their traditional hunting, fishing or trapping activities by providing income support to participants. For the 2017-2018 period, the ISP participation rate was 8% in Eastmain compared to 13.4% for all Cree communities.

The Wabannutao Eeyou Economic Development Corporation (WEDC) mandate is to foster the development of businesses in the community. The organization also manages various businesses in the community.

20.6.2.2 Jamesian Communities

The Jamesian economy is largely dependent on the energy, mining, and forestry sectors.

The experienced labor force related to the primary sector remains more numerous in proportion than in the rest of Québec. Machinery rental represents a large part of the activities of Jamesian construction companies. The construction and transportation contracts come mainly from mining and forestry companies, but have mainly boomed during the hydroelectric projects of Eastmain-1 and Eastmain-1-A-Sarcelle-Rupert.

20.6.3 Workforce Issues

Workforce related issues and concerns are being gathered throughout the engagement and consultation process, including the Cree Women's Association of Eeyou Istchee. A full time Human Resource team will be hired in the future to further manage Human Resource and Workforce issues, including a Cree Human Resource Coordinator.

Training and Education initiatives will be ongoing throughout the life of the project. The approach will not be static and will require careful management by the Human Resource Department to maximize benefits to the local communities and the region. Since May 2022, different meetings have taken place with the Cree Nation of Eastmain (CNE), the Appisiiwin Skills Development (ASD), the Wabannutao Eeyou Development Corporation (WEDC), and the Cree School Board (CSB) to begin the creation of a training strategy.

21. CAPITAL AND OPERATING COSTS

21.1 Basis of Estimates

The capital expenditures (CAPEX) and operating expenditures (OPEX) of the Project were estimated at a feasibility study level and should provide further guidance for the project implementation phase. The estimate parameters are as follows:

- Target accuracy initial capital costs: +15% / -10%
- Target accuracy sustaining capital costs: +15% / -10%
- Target accuracy operating costs: +15% / -15%
- Estimate period: Q3 2023
- Estimate currency: Canadian Dollars (CAD)

The estimate was developed for the 2022 FS based on the GMS standard commodity coding structure for mineral projects. A work breakdown structure (WBS) was developed for the Project to organize the estimate in a logical structure based on function and location. Table 21-1 presents WBS Level 1.

Table 21-1 – WBS Level 1

WBS L1	Description
001	All Site General
100	Infrastructure
200	Power & Electrical
300	Water & Tailings Management
400	Surface Operations
500	Mining (Open Pit)
600	Process Plant
700	Construction Indirect
800	General Services - Owner's Costs
900	Pre-Prod, Start-Up, Commissioning & Contingency

The operating cost estimate was broken down as follows:

- Mining (drill and blast, load and haul, geology, maintenance, dewatering, other)
- Processing (crushing and screening, storage and reclaim, DMS, concentrate handling, tailings handling, ore feed, maintenance, other)

- Services (health and safety, environment, laboratory, warehouse, other)
- Administration and other (office, camp, other)

OPEX are inclusive of labour, consumables, power, and maintenance materials, as well as general and administration (G&A) costs.

21.1.1 General

The mining capital and operating cost estimates were developed by GMS and SLR to include the mine mobile equipment, i.e., primary, secondary, support, auxiliary and ancillary equipment, as well as pre-production mine development.

Mining infrastructure, including haul roads, mine facilities, and explosives storage, and processing plant CAPEX were developed by GMS.

The capital and operating cost estimates for the process plant were developed by GMS with input from Wave (including processing plant design, bulk quantities and equipment lists).

The tailings and overall site water management capital and operating cost estimates were developed by GMS with input from WSP.

Costs pertaining to the upgrade of the Eastmain airport and the overhead power line and associated upgrade of existing facilities were provided by Octant and Hydro-Québec, respectively.

The road between the Project site and Matagami and the railroad between Matagami and Trois-Rivières or Quebec City are adequate for the transportation needs of the Project, except at the Project site entrance, which needs modifications to the Billy Diamond Road highway. Those modifications will be part of the Provincial Billy Diamond Road refurbishment project, managed by SDBJ and part of the costs are assumed by the Project within the capital cost estimate.

The initial CAPEX estimate includes all Project direct and indirect costs to be expended during the implementation phase of the Project. The initial CAPEX estimate covers the period from the Pre-approval date by Allkem of this report, when detailed engineering would commence, to the successful completion of the Plant commissioning phase. Any costs expended beyond the Plant commissioning phase are captured with the sustaining CAPEX, or OPEX. Various studies phases, testwork, and preliminary engineering, as well as permitting activities, are excluded from the estimate as these are considered sunk cost.

SLR has reviewed the cost estimates developed by GMS, including updates from the 2022 FS, and considers them reasonable.

21.1.2 Mining

The CAPEX estimate reflects an owner-managed project delivery model.

Most of the mining equipment fleet are already purchased. The CAPEX estimate is based on the firm prices.

All the mining equipment purchase costs are captured in WBS Area 500.The equipment pricing includes the base machine with several required options, tires, fire suppression systems in most cases, and assembly and commissioning when required.

The direct costs include all operating costs for equipment such as fuel, electricity, maintenance parts, operators, and consumables (tires, explosives, etc.). Indirect costs consist of the labour costs for mine supervision, management, and technical support.

Equipment freight costs are presented in WBS Area 800.

21.1.3 Processing Plant and Infrastructure

The physical conceptual design is prepared in accordance with the WBS where all the tasks and areas were developed in enough detail to establish a class 3 estimate based on the American Association of Cost Engineers (AACE). A general contingency of 6.2% was generated using a Monte Carlo analysis.

The process plant costs were established by obtaining prices for more than 85% of the process and ancillary equipment from multiple suppliers. Detailed material take-offs (MTOs) were prepared for all bulk materials, i.e., concrete, primary and secondary steel, architectural items, cable trays, electrical cables, instruments, and piping (steel and HDPE). Prices were obtained for most of the bulk material packages.

Quotes were obtained for all prefabricated buildings, including the Ore Stockpile Dome and the Warehouse, and quotations were obtained for the Camp. The ore reclaim conveyor tunnel cost was based on a quotation from a specialized manufacturer. The cost of the main electrical sub-station was based on prices obtained from the selected supplier.

The MTOs for earthworks, including the WRTSF, are based on physical material take-offs from detailed design prepared by WSP. Unit costs are based on quotations received.

Quotations were received for the sewage treatment plant and other ancillary buildings, and temporary / construction infrastructure. The remaining equipment and material costs were based on budgetary bid processes, quotes, consultant’s historical data and in-house databases, or benchmarked from previous projects. The power supply costs are based on Hydro-Québec’s published “Rate L”.

21.2 Capital Cost Estimates

The capital cost estimate summary is presented in Table 21-2.

Table 21-2 – Capital Cost Summary

Capital Expenditures	CAD million
001 – All Site General	1.9
100 - Infrastructure	62.9
200 - Power and Electrical	60.5
300 - Water	36.4
400 - Surface Operations	11.2
500 - Mining Open Pit	43.1
600 - Process Plant	112.7
700 - Construction Indirect	97.9
800 - General Services	45.6
900 -Start-up, Commissioning	6.8
990 - Contingency	29.8
Total	**508.7**

Notes:
1. Numbers may not add up due to rounding.

The following assumptions apply to the capital cost estimate:

- All equipment and materials will be new.
- The labour rate build-up is based on the statutory laws governing benefits to workers.
- Fuel Cost: CAD 1.31/L
- Electricity Cost: CAD 0.049/kWh
- Foreign exchange rate: CAD 1.33/USD.
- Work week of seven days at 10 hours per day
- Rotation schedule of fourteen days of work followed by fourteen days of rest and relaxation (R&R)
- Single shift per day
- Labour rates are fully burdened, i.e., inclusive of salaries, fringe benefits, fees, funds, premiums,

- Employers' participation to various plans as well as income tax, and are based on the Labour Decree in effect in the Province of Québec
- Labour rates are representative of the rates prepared by the ACQ (Association de Construction du Québec) for work performed in the Heavy Industry field of activity in remote areas or with camp & catering services. It should be noted that the first weekly 40 hours are paid at regular time while the remaining 30 hours are paid at double the base salary.
- Source of aggregate, adequate for fill/backfill, for specific locations, is located outcropping the pit, in the JB1 portion.
- Concrete is based on a mix of precast concrete and cast in place.
- On site concrete mixing is based on ready mix concrete bags.
- Structural design will not be modified as a result of further geotechnical studies.
- Transfer of tailings to the TSF will be via 100t haul trucks.
- No provision for rework or repair of equipment and material delivered to site.
- No rework to field-erected and installed equipment and material.
- The estimate assumes no concrete work will require heating, i.e., concrete works will occur between the months of June and October.
- Estimate assumes no shortage of skilled trades worker throughout the entire construction phase.
- No provision for potential increase in salaries necessary to attract skilled trades workers.
- Construction contractors' facilities will be located within a maximum of five minutes' walking distance from any working point for the whole duration of the Project implementation.
- The construction site will be accessible 24 hours daily and seven days weekly, with sufficient and adequate safety supervision.
- No allowance for time and material type construction contracts
- Permanent administration offices will be built in second years of operations and construction offices will be purchased by the project and used as administrative offices until then.
- Estimate assumes transportation will be via chartered flights and bussing services between Eastmain airport and site.

Exclusions (CAPEX)

- Escalation (or de-escalation) is excluded from the CAPEX and is part of the financial model.
- Cost relating to certain agreements with third parties.
- Cost relating to financing and interest.
- Cost for pre-start-up operations and maintenance training.
- Goods and Services Tax as well as Provincial Sales Tax.
- Risk provision, including costs pertaining to mitigation plans.
- Work stoppage resulting from labour dispute.
- Work stoppage resulting from community relations dispute.
- Work stoppage resulting from inadequate camp and catering service.
- Any and all scope changes.
- Delays resulting from:
    - o Permitting issues
    - o Project financing
- Allowance for negative impact of a schedule deviation.

Figure 21-1 and Table 21-3 present the main variances in CAPEX estimate between this update and the 2022 FS.

Table 21-3 – Main Variance between 2023 CAPEX Estimate and 2022 FS Estimate

Discipline	2023 Update	2022 FS	Delta	Cause of Delta (CAD million)			
				Price Inflation ($)	Scope Change /Addition ($)	Growth ($)	Under estimation ($)
Labor & Bulk	115.6	60.9	54.8	24.3	18.0	2.4	10.1
Equipment	84.6	62.8	21.9	6.9	13.1	1.9	-
Fuel	7.2	5.2	2.0	2.0	-	-	-
Camps	16.9	8.1	8.85	8.9	-	-	-
Hydro Quebec	18.4	12.5	5.91	5.9	-	-	-
Indirects & G&A	138.7	135.7	3	1.5	1.1	0.4	-
Total Initial CAPEX	**381.5**	**285.1**	**96.4**	**49.4**	**32.3**	**4.7**	**10.1**

Notes:
1. *Numbers may not add up due to rounding.*
2. *The actual sum represents only a part of the entire CAPEX to show the Main Variance only*

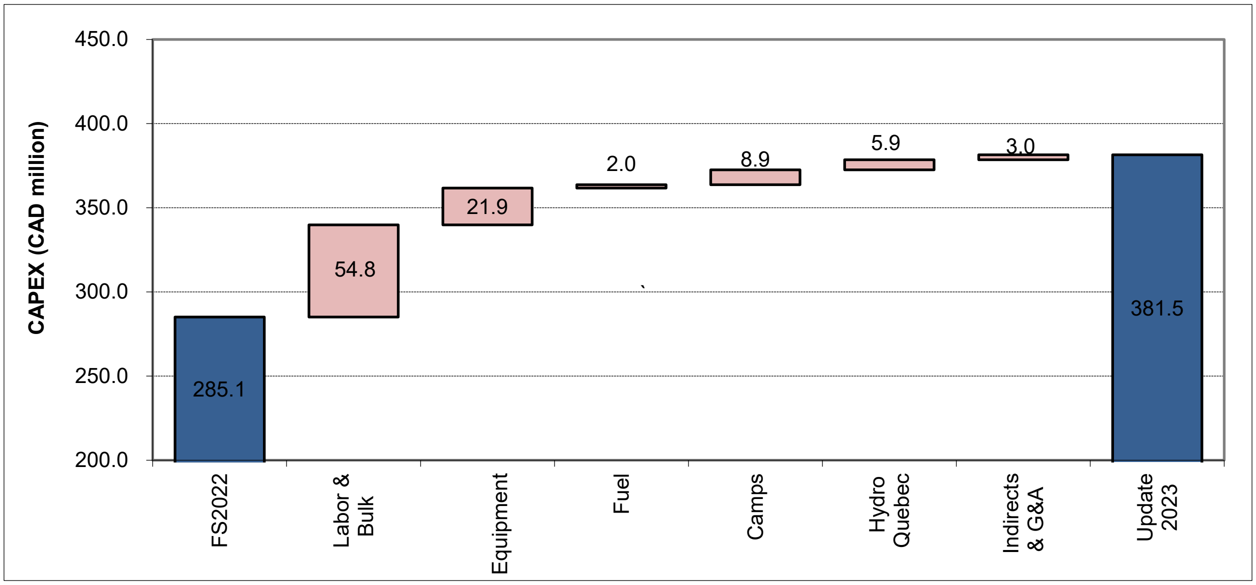


Figure 21-1 – Waterfall Chart showing Main Variances between 2023 CAPEX Estimate and 2022 FS Estimate

21.2.1 100 – Infrastructure

A capital expenditures summary for infrastructures is presented in Table 21-4. The main infrastructures of the mine are notably the road accesses, truck shop and blasting buildings, all permanent administrative buildings, camp, process plant, fuel storage, and any off-site residences.

Table 21-4 – Infrastructures Capital Expenditures

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
001 - All site General	**1.93**	
COMEX CONDITION (35,000 m^3 @ $110) delivered to site		1.93
101 - Upgrade entrance Billy Diamond (SDBJ)	**1.00**	
101 - Upgrade entrance Billy Diamond (SDBJ)		1.00
110 - Roads and Fencing	**1.86**	
111 - Deforestation		0.60
112 - Process plant access & Service Roads (Cancelled)		0.00
113 - Explosive magazine Access Road		0.47
114 - Camp platform		0.01
115 - Site Drainage & Trenches		0.00
116 - Fencing		0.71
118 - Firewalls		0.08

120 - Mine Infrastructure		18.94
121 - Mine Maintenance Facilities (TruckShop, Offices, Washbay)		16.61
126 - Explosive magazine		2.32
127 - Emulsion Building		0.00
130 - Support Infrastructure	**9.00**	
132 - Site Guard House		0.14
134 - Warehouse		1.59
135 - Laydown		0.14
136 - Boiler Room & Glycol Loop		2.65
137 - Assay Lab		0.31
138 - Mine Dry		3.70
139 - Firehall		0.47
140 - Camp Facilities	**24.56**	
140 - Camp Facilities Earthworks		1.02
141 - Camp dorms		19.56
142 - Kitchen		2.16
144 - Laundry		0.40
145 - Recreational Room		1.42
146 - Recycling / Sort Facility		0.00
147 - Domestic Waste		0.00
160 - Process Plant Infrastructure	**1.22**	
162 - Work Shop (Included in DMS building)		0.75
163 - Metallurgical Lab (Included in DMS Building)		0.44
165 - Mill office		0.03
170 - Fuel Systems Storage	**3.09**	
170-Fuel Systems Storage		0.00
171 - Fuel Depot & Distribution		2.13
172 - Propane Facility		0.96
190 - Offsite Facilities	**3.20**	
191 - Offsite Offices		0.00
192 - Concentrate Storage and Handling - Matagami		0.50
193 - Transport of concentrate - Road		0.00
194 - Transport of concentrate - Rail		1.76
195 - Concentrate Storage and handling – Port		0.00

196 - Eastmain Airport Upgrade		0.94
100 - INFRASTRUCTURE	62.87	

21.2.2 200 – Power and Electrical

A summary of the capital expenditures for electrical and communications is presented in Table 21-5.

Table 21-5 – Power Supply and Communications Capital Expenditures

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
210 - Main Power Generation	**32.25**	
211 - Offsite Substation		4.92
212 - Power Transmission Line		20.26
213 - Site Main Substation		7.07
220 - Secondary Power Generation	**8.28**	
221 - Emergency Power Generation		8.28
230 - Water Management Electrical Room	**1.45**	
231 - ETP area Distribution		1.45
240 - Service Electrical Room	**3.41**	
241 - Camp E-room (241-ER-001)		1.72
242 - Admin Building E-Room		0.00
243 - Truckshop E-Room (243-ER-001)		0.84
244 - Fuel Bay E-Room (244-ER-001)		0.09
245 - Dry Building E-Room (245-ER-001)		0.77
250 - Mine Electrical Rooms	**0.25**	
253 - Explosive Magazine E-Room		0.25
260 - Process Plant Electrical Rooms	**9.43**	
261 - Crushing Electrical Room		3.14
262 - DMS Circuit Electrical Room		6.29
264 - Tailings Electrical Room (Cancelled, moved to 231)		0.00
270 - O/H Distribution Line	**2.21**	
271 - O/H Distribution Line		2.21
280 - Automation Network	**0.73**	
281 - Automation Network		0.61

282 - Process Monitoring System		0.12
290 - IT Network & Fire Detection	**2.49**	
291 - IT Network		0.69
292 - Process Control Room & Mill Office		0.11
293 - Fire Detection Network		1.04
294 - Security Network		0.14
295 - Server Room		0.16
296 - Mine Communication System & Tower		0.36
200 - POWER & ELECTRICAL	60.50	

21.2.3 300 – Water Management

The CAPEX estimate for WBS Area 300 - Water and Tailings Storage Facility is presented in Table 21-6. The potable water supply is provided from the wells. Effluent and surface water management primarily consists of the mine waste stock collection water ponds, ditches, and water management pumps and pipelines.

Table 21-6 – Water Capital Expenditures

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
310 - Fresh Water Intake / Wells	**0.66**	
311 - Fresh water Intakes		0.65
312 - Mine Wells		0.01
320 - Water Ponds and Water Management	**16.54**	
320 - Water Ponds and Water Management		2.46
321 - WMP - Foundation Preparation		7.54
322 - WMP - Perimeter Embankment Construction		2.42
323 - Process Plant Water Management Pond		2.52
324 - North Water Management Pond		1.59
330 - Potable Water (Cost Code Account)	**1.33**	
340 - Sewage (Cost Code Account)	3.09	
350 - Fire Protection (Cost Code Account)	5.77	
360 - Effluent Water Treatment	5.63	
370 - Waste Rock and Tailings Storage Facility (WRTSF)	2.09	
371 - WRTSF - Foundation Preparation		0.95
372 - WRTSF - Base Drainage/Seepage Collection		0.05

373- WRTSF - Shear Key		0.00
374 - WRTSF - Water Collection Ponds		0.00
375 - WRTSF - Diversion Channels		0.85
376 - WRTSF - Perimeter Embankments		0.25
380 - Overburden and Peat Storage Facility (OPSF)	**1.24**	
381 - OPSF - Peat Storage Retention Dyke		0.57
382 - OPSF - Foundation Preparation (for Geotechnical Slope Stability)		0.00
383 - OPSF - Perimeter Embankment (see mining roads)		0.67
300 - WATER & TAILINGS MANAGEMENT	36.35	

21.2.4 400 - Surface Operation

The Surface Operations CAPEX consist mainly of the Capital Expenditure for the acquisition of the mobile equipment required for the surface operation (site services), General Services departments, and Process Plant, along with the operating costs for this equipment during the construction phase. It also includes the cost for setting up a batch plant and an aggregate plant on site for the construction period. Costs are a mix of budgetary pricing and firm quotations received from suppliers. The equipment pricing includes, when applicable, tires, transport to the Project site, assembly, and commissioning. A summary for the capital expenditures for surface mobile equipment is presented in Table 21-7

Table 21-7 – Surface Mobile Equipment Expenditures

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
410 - Surface Operations Equipment	**6.33**	
413 - Surface Mobile Equipment		3.62
415 - Process Plant Mobile Equipment		2.48
417 - Small Repairs, Radio-Equipment Mount, Writing, First Aid Kit		0.23
480 - Aggregate Plant	**4.82**	
400 - SURFACE OPERATIONS	**11.15**	

21.2.5 500 - Mining

21.2.5.1 Mine Infrastructure

Equipment costs are mostly based on firm quotes/contracts major equipment. For ancillary equipment, costs were obtained from firm quotations/contract and/or from cost databases when firm quotes were not available.

Equipment purchases costs include the machine cost, assembly, and training. Primary equipment includes the drill-load-haul equipment. Secondary equipment includes the dozers and graders. Ancillary equipment includes the remaining support equipment such as water truck, utility excavators, maintenance vehicles, light vehicles, pumps, light towers, computers, and radios.

Table 21-8 – Mining Capital Expenditures

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
540 - Mine Infrastructure	**7.07**	
541 - Haul Road		7.07
550 - Mine Equipment	**31.09**	
551 - Primary Mining Equipment		16.57
552 - Secondary Mining Equipment		4.63
553 - Ancillary Mining Equipment		2.03
554 - Other Equipment		5.30
555 - FMS/Dispatch/Equipment Communication Systems		1.81
556 - Truckshop Tools		0.75
560 - Mining Blasting	**4.96**	
Mining Blasting		4.96
500 - MINING (Open Pit)	**43.12**	

21.2.6 600 – Process Plant

The capital cost estimates for the processing areas are presented in Table 21-9.

Table 21-9 – Processing Capital Expenditures

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
601 - Site prep/ Road / Berms		4.80
603 - UG Services		0.03
604 - ROM pad & MSE wall		3.85
605 - Final Grading		1.46
610 - Crushing & Reclaim	**38.39**	
611 - Primary Crusher		16.62
612 - Secondary & Tertiary Crushers		10.12

613 - Ore Reclaim & Stockpile		11.66
620 - DMS (Dense Medium Separation) Building	**40.12**	
621 - Primary DMS Circuit		29.89
622 - Secondary DMS Circuit		2.57
623 - Recrush DMS Circuit		7.66
630 - Concentrate Handling and Storage	**7.30**	
640 - Tailings Handling	9.66	
641 - Tailings Thickener		1.78
642 - Coarse Tailings, Handling and Storage		3.70
643 - Fine Tailings, Handling and Storage		4.18
650 - Reagents (Cost Code Account)	**1.16**	
651 - Flocculant System		0.73
652 - Ferrosilicon (FeSi)		0.43
690 - Process Plant Services	**5.94**	
691 - Plant Air (w/ instrument air)		0.89
692 - Process Water		2.93
693 - Raw Water		1.10
694 - Gland Water		0.49
695 - Emergency Water (Safety Showers)		0.53
600 - PROCESS PLANT	112.71	

21.2.7 700 – Construction Indirect Costs

Construction Indirect Costs are presented in Table 21-10.

Table 21-10 – Construction Indirect Capitals

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
710 - Engineering, CM, PM	**24.12**	
711 - EPCM		22.27
713 - Surveying		0.55
715 - QAQC		1.30
720 - Construction Offices, Facilities & Services	**7.86**	
721 Construction Offices / Trailers		1.57

725 - Camp Construction Temporary Facilities		3.67
726 - Concrete Batch Plant		0.31
727 - Site Toilets / Ablution Units		0.61
728 - Construction Temp Power Distribution		1.46
729 - Construction Temp water and piping network		0.24
730 - Shops	**0.14**	
730 - Allowance for temporary truckshop/shop		0.10
737 - Lifting Equipment		0.04
740 - Construction Equipment & Tools	**11.71**	
741 - Owned Equipment		0.17
742 - Equipment Rentals		9.58
743 - Rental Equipment		1.02
745 - Construction Tools and Consumables		0.94
760 - Energy	**11.94**	
761 - Fuel		9.60
762 - Propane		2.14
763 - Electricity		0.19
780 - Contractor Indirects	**37.16**	
790 - External Engineering	**4.97**	
700 - CONSTRUCTION INDIRECT	**97.90**	

21.2.8 800 – General Services – Owner's Costs

General Services -Owner's Costs are presented in Table 21-11.

Table 21-11 – General Services Owner's Cost

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
810 - G&A Departments	**1.96**	
815 - Security		0.80
817 - IT & Telecommunications Service		1.16
819 - Project Control (included in 818)		0.00
820 - Logistics / Taxes / Insurance	**21.11**	
821 - Out of Country - Inland Freight		0.74

822 - Sea Freight (Estimated 16-03-2023)		1.51
823 - Air Freight		0.50
824 - In-Country Freight (Estimated 13-07-2023)		14.06
825 - Customs, Taxes and Duties		4.30
830 - Operating Expenses	**15.05**	
831 - Camp Opex		6.57
832 - Travel & Transportation		6.53
833 - Surface Support		1.39
834 - Surface Mobile Eq Operating Costs (Road Maintenance)		0.29
838 - Operations Office Services		0.19
839 - Operations Warehouse Services		0.09
840 - Environment, Community and Permitting	**1.59**	
842 - Site Team		0.15
843 - Waste Disposal (General, Recycling, Hazardous)		1.35
848 - Fees to Ministries		0.09
850 - Health and Safety	**3.98**	
851 - Site Team		2.96
852 - PPE - Construction		0.25
855 - Training		0.03
856 - Medical expenses		0.38
857 - Health and Safety Equipment and systems		0.36
860 - Site Insurance: construction, All risk and Marine Cargo	**1.87**	
800 - General Services - Owner's Costs	**45.56**	

21.2.9 900 – Preprod, Start-up, Commissioning

Preproduction, start-up, and commissioning costs are presented in Table 21-12.

Table 21-12 – Preprod, Start-up, Commissioning

Capital Expenditures	WBS Level 2 Summary (CAD million)	WBS Level 3 Detail (CAD million)
910 - Mining Pre-Prod	**0.23**	
912 - Training		0.02
915 - Mobile Equipment Radio-Equip Mounting Costs		0.22

950 - Process Plant Pre-Prod	**2.53**	
951 - Process Plant Pre-Prod		1.15
952 - Vendor Reps		1.38
960 - First Fill, Spares & Consumables	**4.02**	
961 - Spare Parts Capital		2.13
962 - Spare Parts Commissioning		1.09
965 - First Fill (reagents, grease & oil)		0.80
900 - Pre-Prod, Start-up, Commissioning & Contingency	**6.79**	

21.2.9.1 Mining Pre-production

The following assumptions apply to the Mining CAPEX estimate:

- Mining cost estimate is based on an Owner-operated scenario,
- Process Plant start-up is defined as the beginning of production period (year 1).
- Pre-production period for mining related activities is estimated to be 15 months for Drill & Blast and 12 months for Load and Haul.
- Capital costs do not account for depreciation or salvage value at the end of the equipment life.

Mining operating costs during the construction phase (pre-production operating costs) have been estimated at CAD 9.6 million. Those costs have been excluded from the CAD 508.66 million initial CAPEX but are to be expended during construction. Pre-production work includes clearing and topsoil removal from an area within the pit footprint as well as the mining (drilling, blasting, loading, and hauling) of pit material in preparation of the process plant start-up. The waste material mined during pre-production will be used as construction material for site set-up (roads, platforms, etc.) whenever possible.

21.2.9.2 Process Plant Pre-Production

Plant Pre-Production costs during the construction phase (pre-production operating costs) have been estimated at CAD 7.87 million. Those costs have been excluded from the CAD 508.66 million initial CAPEX but are to be expended during construction.

21.2.9.3 Other Pre-production

Other Pre-Production costs such as training and consulting services during the construction phase (pre-production operating costs) have been estimated at CAD 5.2M. Those costs have been excluded from the CAD 508.66 million initial CAPEX but are to be expended during construction.

21.2.9.4 G&A Pre-Production

The G&A costs linked to the Pre-production mining and process activities have been estimated at CAD 16.6 million. Those costs have been excluded from the CAD 508.66 million initial CAPEX but are to be expended during construction.

21.2.9.5 Contingency

The CAPEX estimate contingency was evaluated using a Monte Carlo approach and is presented in Table 21-13. Contingency was not applied to the OPEX estimate.

Table 21-13 – Contingency

Area	Total (CAD million)
Total CAPEX before contingency	**478.88**
990 - Contingency (6.2%)	29.79

21.2.10 Sustaining Capex

Sustaining CAPEX consists of the following items:

- The purchase of additional new mine equipment required to increase production and equipment's major repairs
- An additional Truck shop bay within the Mine Service Center to accommodate additional mining trucks
- Construction of additional water ponds and ROM pad extension during the operation.

Sustaining capital is presented in Table 21-14.

Table 21-14 – Sustaining Capex

	Total k CAD	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19
Owners cost & Deferred & Sustaining CAPEX	**253,840**	**54,940**	**20,651**	**42,676**	**14,657**	**15,855**	**5,688**	**2,459**	**3,893**	**11,154**	**18,972**	**5,928**	**9,599**	**2,799**	**7,706**	**15,864**	**17,589**	**3,238**	**157**	**16**
All site General	1,925			1,925																
Mine Infrastructure	**2,122**			**2,122**																
Recycling / Sort Facility	**230**			**230**																
Arctic Corridor (between Camp & Admin Building)	**886**			**886**																
O/H distribution line	**66**			**66**																
Water Ponds and Water Management	**2,580**					**2,580**														
Water Ponds and Water Management YR2	**5,570**		**5,570**																	
Effluent Water Treatment	**22,000**			**22,000**																
Waste Rock and Tailing Storage Facility (WRTSF)	**13,848**		**6,924**	**6,924**																
Overburden and Peat Storage Facility (OPSF)	**4,003**		**2,001**	**2,001**																
Mining (Open Pit)	**113,240**		**965**	**1,286**	**2,855**	**3,073**	**5,688**	**2,459**	**3,893**	**11,154**	**18,972**	**5,928**	**9,599**	**2,799**	**7,706**	**15,864**	**17,589**	**3,238**	**157**	**16**
Site Prep/Road/Berms	**1,906**		**953**	**953**																
ROM pad & MSA wall	**1,795**		**898**	**898**																
Camp facilities	**45**			**45**																
Basin Nord et OPSF	**16,923**				**8,462**	**8,462**														
Earthworks Contractor Indirect	**8,001**		**2,400**	**2,400**	**2,400**	**800**														
Electrical Spares Transfo	**1,000**	**1,000**																		
Others	**4,700**	**940**	**940**	**940**	**940**	**940**														
Owner Costs	**20,000**	**20,000**																		
Post commissioning Repair/Refurbishment	**33,000**	**33,000**																		

21.3 Operating Cost Estimate

The operating cost estimate (OPEX) includes mining, process, G&A, and product transport from the mine site to the port facility, which will be in either Quebec City or Trois-Rivières, Québec. Operating costs are summarized in Table 21-15.

Table 21-15 – Operating Costs Summary

Item	Total Cost (CAD million)	Unit Cost CAD/t Processed
Mining	969.3	26.0
Processing	676.0	18.1
G&A, Royalties, IBA, Sustaining, and Closure	1,389.2	37.3
Concentrate Transportation	841.2	22.6
Total	**3,875.7**	**103.9**

Notes:
1. Numbers may not add up due to rounding.

Table 21-16 shows a summary of the annual production and Table 21-17 shows a detailed LOM operating costs including mining, processing, G&A, Royalties, IBA, Sustaining Capex, Closure costs, and concentrate transportation.

Figure 21-2 presents the variance in direct operating costs estimate between the FS 2022 and the current estimate by category.

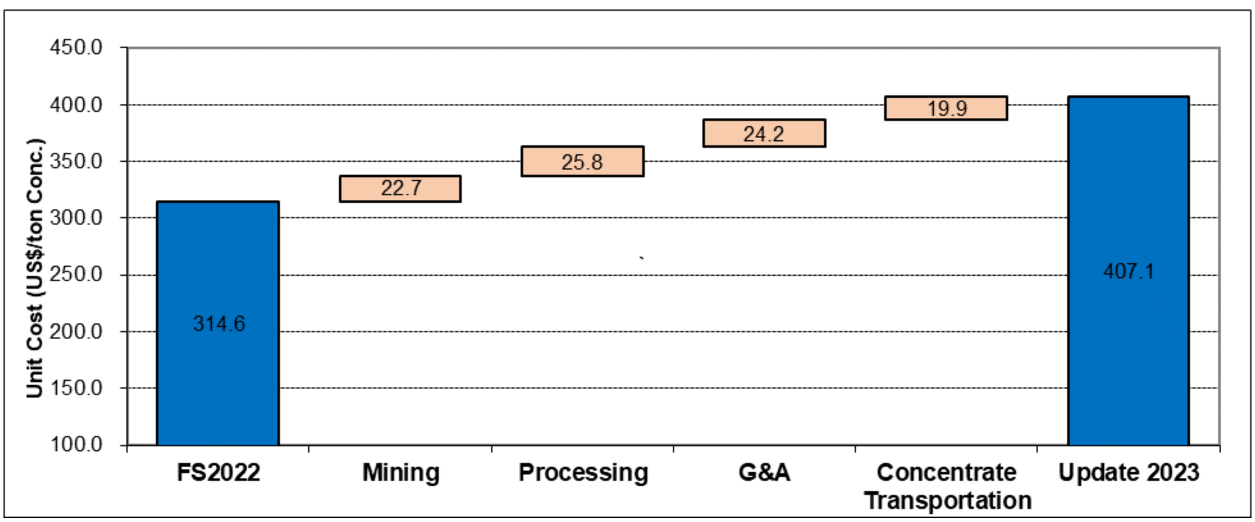


Figure 21-2 – Total cash costs Increase by Category (USD/t Conc.)

Table 21-16 – Annual Production

Tonnes (kt)	Total Pre-Prod	Total Prod	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19
Mined	**1,666**	**168,334**	-	1,666	7,234	7,224	7,311	8,240	7,783	8,240	10,299	10,300	10,149	10,210	10,068	9,944	11,104	10,767	10,960	9,270	8,240	7,298	3,693
Processed	**-**	**37,296**	-	-	1,322	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	1,974
Concentrate (dry)	**-**	**5,845**	-	-	216	339	359	358	323	299	287	301	282	308	270	274	343	317	307	310	322	320	311

Table 21-17 – Total Operating Costs Summary (CAD million)

Description	Total	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19-Y20
Mining	969	42	42	42	47	45	47	59	59	58	59	58	57	64	62	63	53	47	42	21
Processing	676	24	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
G&A, Royalty, IBA, Sustaining, Closure	1,389	82	66	100	69	66	19	58	59	64	76	65	68	67	71	77	79	67	70	167
Concentrate Transportation	841	31	49	52	51	47	43	41	43	41	44	39	39	49	46	44	45	46	46	45
Total OPEX	3,876	179	193	230	204	193	146	195	198	199	215	198	201	217	214	221	213	197	194	269
Total Cost/t Processed	104	135	96	115	102	97	73	98	99	100	107	99	101	108	107	110	107	98	97	136
Total Cost/t Concentrate (dry)	663	827	569	639	570	598	489	681	658	707	697	733	735	632	677	719	689	612	605	865

21.3.1 Mining Operating Costs Summary

The mine operating costs are estimated from first principles for all mine activities. Equipment hours required to meet production needs of the LOM plan are based on Deswik LHS simulations over the LOM. Each piece of equipment has an hourly operating cost which includes operating and maintenance labour, fuel and lube, maintenance parts, tires (if required), and ground engaging tools (if required).

The average mining cost during operations is estimated at CAD 5.70/t mined including re-handling costs. This operating cost estimate excludes capital repairs which are treated as sustaining capital.

Hauling is the major mining cost activity representing 19.0% of total costs, followed by blasting (10.9%), loading (7.9%), and mine maintenance administration (7.6%).

Labour is the dominant cost, by element, representing 46.0% of total costs, followed by fuel (17.6%), maintenance parts (10.3%), and bulk explosives (9.9%).

The mining OPEX is estimated to be CAD 25.99/t processed or CAD 165.84/t of spodumene concentrate produced.

21.3.2 Processing Plant Operating Cost Summary

The processing plant operating cost estimate includes mining, crushing, and DMS circuits and is based on a ±15% level of accuracy, utilizing budgetary quotations as available, supplemented by GMS database estimates, recent experience in the lithium industry, and Allkem's Mt Cattlin facility. The processing OPEX includes operating and maintenance labour, power, fuel, and indirect charges associated with the processing plant. In the processing OPEX is also allocated 50% of the maintenance and operation of the Genset to fulfil the power requirements. Based on these cost assumptions, inclusions and exclusions,

The OPEX is estimated to be CAD 18.13/t processed or CAD 115.66/t of spodumene concentrate produced.

21.3.3 General Services and Owner's Operating Cost Summary

General Services include general management, accounting and finance, IT, environmental and social management, human resources, supply chain, camp, surface support, health and safety, security and operating cost of the various supply chain equipment. In General Services is also allocated 50% of the maintenance and operation of the Genset to fulfill the power requirements. In most cases, these services represent fixed costs for the site as a whole. The General Services costs exclude certain costs such as transport of concentrates but for the purpose of this report, it was included as part of the G&A the payment of Royalties, IBA, Sustaining Capex and Closure costs.

The General Services OPEX including all the costs explained in the previous paragraph is estimated to be CAD 37.25/t processed or CAD 237.70 /t of spodumene concentrate produced.

21.3.4 Concentrate Transportation Operating Cost Summary

Concentrate transport cost has been estimated at CAD 141.05/t concentrate (wet). The product transport cost was based upon updated budgetary proposals for the logistics chain to the port: i.e., product road transport via trucks from site to Matagami, transhipment at Matagami, rail transport to the port, port storage and handling. Rental of the train wagons and their covers are included in the product transport costs. The study is based on cost FOB Trois-Rivières or Quebec City as the end users are not yet defined by Allkem. From any one of the two ports, Allkem can service North America, Europe, and Asia. Ocean freight is excluded from the shipping cost.

Table 21-18 shows a summary of the unit costs per tonne of concentrate transported.

Table 21-18 – Unit Cost per Tonne Summary

Concentrate Transportation Costs (CAD/t)	Unit Cost
Trucking (mine site to transload)	51.94
Transload operations	11.00
Rail transport	45.08
Rail car and cover rental	2.64
Port (Trois-Rivières or Quebec City)	30.39
Total Cost/t Concentrate Transported (wet)	141.05

22. ECONOMIC ANALYSIS

SLR completed an economic analysis of the Project using the assumptions presented in this Technical Report. This section summarizes the key financial and operational metrics. The evaluation focuses on the commercial viability of spodumene production, encompassing projected revenues, royalty obligations, operational and capital expenditures, sustaining capital, salvage value, as well as closure and reclamation costs. Additionally, this analysis considers taxation implications and provides forecasts for net Project cash flows.

The financial analysis has been conducted in real terms (without adjusting for inflation factors), and is presented in Canadian dollars for the year 2023. Assumptions related to project financing or equipment leasing have been deliberately omitted, as the evaluation is based on a 100% equity financing model.

The temporal frame of reference for the economic evaluation commences from Year -2, marking the onset of the 18-month pre-production capital expenditure (CAPEX) phase that includes engineering and procurement activities. Costs associated with exploration and any supplementary project studies are excluded from this financial analysis.

Key performance indicators, such as Net Present Value (NPV) and Internal Rate of Return (IRR), have been calculated on an annual basis to provide a standardized measure of the Project's economic feasibility.

A summary of the base case scenario, including essential financial metrics and assumptions, is presented in Table 22-1.

Table 22-1 – Base Case Scenario Results

Item	Unit	Value
Pre-Tax NPV @ 8%	million CAD	3,919.4
Pre-Tax IRR	%	62.2
Pre-Tax Payback Period	years	1.38
After-Tax NPV @ 8%	million CAD	2,244.3
After-Tax IRR	%	45.4
After-Tax Payback Period @ 8%	years	1.71

SLR completed a sensitivity analysis, which indicated that the Project is economically robust against fluctuations in initial capital expenditures and mining operational costs, within the acceptable tolerances dictated by feasibility study estimates. The Project exhibits heightened sensitivity to the mineral head grade followed by the market price volatility for spodumene, which poses a more significant risk to its long-term economic sustainability.

22.1 Cautionary Statement

The economic analysis is based on forward looking information as defined under Canadian securities law. The results depend on inputs that are subject to several unknown risks, uncertainties, and other factors and may differ materially from those presented here. Forward-looking statements in this section include, but are not limited to, statements with respect to:

- Currency exchange rate fluctuations
- Proven and Probable Mineral Reserves that have been modified from Measured and Indicated Mineral Resource estimates
- Future prices of spodumene concentrates
- Estimated costs and timing of capital and operating expenditures
- Changes to interest rates, tax rates or applicable laws
- Proposed mine and process production plan
- Projected mining and process recovery rates
- Cash flow forecasts
- Assumptions as to closure costs and closure requirements
- Assumptions as to Royalties and IBA agreements
- Assumptions as to environmental, permitting, and social risks; and
- Ability to maintain the social license to operate

22.2 Assumptions / Basis

The key assumptions influencing the economics of the Project include:

- Spodumene price at 6% Li_2O (FOB Canada). This price is adjusted to a concentrate at 5.6% Li_2O with an estimate penalty of USD 10/t of concentrate for every 0.1% under 6.0% Li_2O
- Canadian dollar to United States dollar exchange rate (CAD/USD)
- Diesel price in CAD/L

22.2.1 Spodumene Price

The price forecasts for spodumene concentrate at 6% Li_2O were based on projections from the 2023 lithium market study prepared by Wood Mac presented in Section 19 and is presented here as a weighted average. The spodumene prices used in the base case scenario are detailed in Table 22-2.

Table 22-2 – Spodumene Concentrate Pricing Forecast

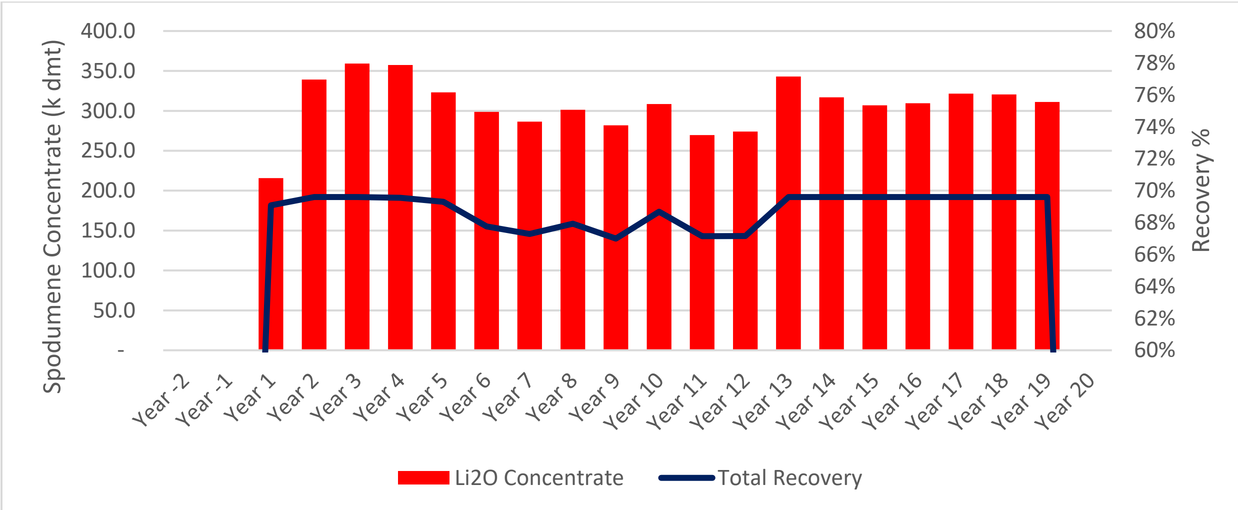
Item	Unit	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11-Y19	Avg
Concentrate Price @ 5.60% Li_2O (FOB Canada)	USD/t	1,819	2,589	2,284	1,926	1,614	1,642	1,624	1,553	1,479	1,714	2,007	1,922

22.2.2 Currency Exchange Rates

The base case Canadian dollar exchange rate for economic evaluation is CAD/USD 1.33. Most operating costs are estimated in CAD; the USD-denominated spodumene revenue is converted to CAD.

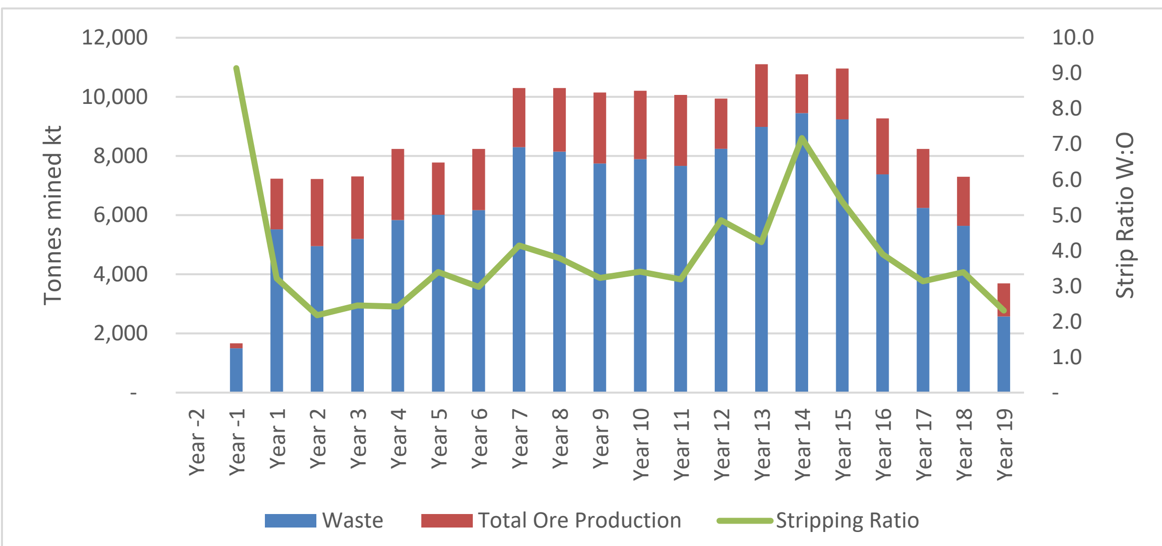
22.2.3 Spodumene Concentrate Production and Revenues

Spodumene concentrate production over the Project life is 5,845 kt with an average annual spodumene concentrate production of 308 kt. The Spodumene concentrate gross revenue during operations is CAD 14,980 million. This study assumes an owner mining operation. The spodumene recovery rate is based on the results of the metallurgical testwork programs done by SGS Canada Inc. and Nagrom in 2011 and 2018, respectively. The weighted average overall plant recovery during the LOM is 68.9%. The concentrate production is summarized in Figure 22-1. The annual mine and mill production is summarized in Figure 22-2, Figure 22-3, and Table 22-3.



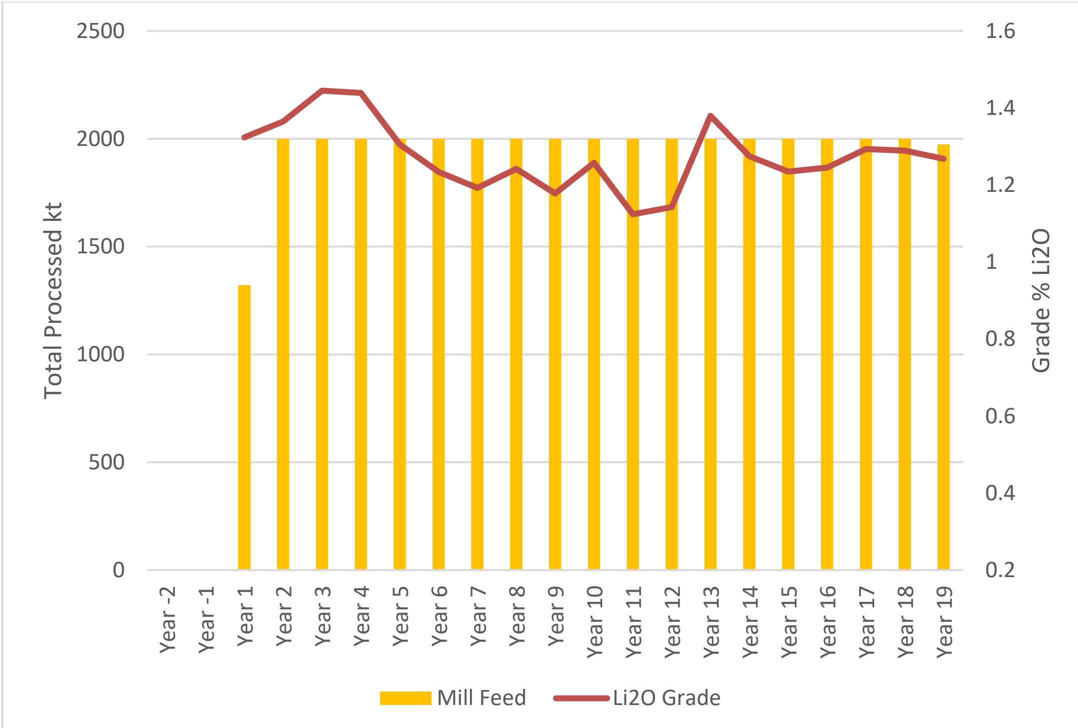
Source: SLR, 2023

Figure 22-1 – Annual Spodumene Concentrate Production



Source: SLR, 2023

Figure 22-2 – Mine Production Profile



Source: SLR, 2023

Figure 22-3 – Mill Production Profile

Table 22-3 – Annual Mine and Mill Production Summary

Description	Total	Y-2	Y-1	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15	Y16	Y17	Y18	Y19	Total
Mill Production																							
Tonnage Processed	kt	-	-	1322	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	1974	37,296
Head Grade	%	-	-	1.32	1.36	1.45	1.44	1.31	1.23	1.19	1.24	1.18	1.26	1.12	1.14	1.38	1.27	1.23	1.25	1.29	1.29	1.27	1.27
Contained Li_2O	kt Li_2O	-	-	17.49	27.30	28.90	28.78	26.11	24.68	23.85	24.84	23.56	25.15	22.48	22.86	27.60	25.50	24.70	24.90	25.87	25.79	25.03	475.38
Contained Li	kt Li	-	-	8.14	12.71	13.39	13.38	12.16	11.46	11.11	11.53	10.93	11.68	10.48	10.63	12.81	11.85	11.46	11.59	12.03	11.98	11.69	221.01
Recovery	%	-	-	69.08	69.60	69.60	69.56	69.30	67.76	67.29	67.93	66.99	68.68	67.14	67.16	69.60	69.60	69.60	69.60	69.60	69.60	69.60	68.80
Recovered Li_2O	kt Li_2O	-	-	12.1	19.0	20.1	20.0	18.1	16.7	16.0	16.9	15.8	17.3	15.1	15.3	19.2	17.7	17.2	17.3	18.0	17.9	17.4	327.3
Recovered Li	kt Li	-	-	5.6	8.9	9.3	9.4	8.4	7.8	7.5	7.8	7.3	8.1	7.1	7.2	8.9	8.3	8.0	8.1	8.4	8.3	8.1	152.5
Concentrate	kt Li	-	-	216	339	359	358	323	299	287	301	282	308	270	274	343	317	307	310	322	320	311	5,845
Concentrate Grade	% Li_2O	-	-	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60	5.60
Mine Production																							
Waste	kt	0	1,502	5,519	4,952	5,196	5,834	6,014	6,168	8,298	8,149	7,749	7,894	7,666	8,246	8,986	9,449	9,241	7,378	6,247	5,637	2,577	132,704
Ore	kt	0	164	1,715	2,271	2,116	2,406	1,769	2,071	2,002	2,151	2,400	2,317	2,402	1,698	2,118	1,318	1,718	1,892	1,993	1,661	1,116	37,296
Total Mined	kt	0	1,666	7,234	7,224	7,311	8,240	7,783	8,240	10,299	10,300	10,149	10,210	10,068	9,944	11,104	10,767	10,960	9,270	8,240	7,298	3,693	169,999
Strip Ratio	W:O	-	9.14	3.22	2.18	2.46	2.42	3.40	2.98	4.15	3.79	3.23	3.41	3.19	4.86	4.24	7.17	5.38	3.90	3.14	3.39	2.31	3.56

22.3 Royalties

The project royalties and the final pit layout are illustrated in Figure 4-5. The cash flow model considers the ore mined subject to royalties as per the following percentages.

- 0.50% NSR royalty previously held by Gérard Robert, which was subsequently sold to Ridgeline Royalties Inc (orange).
- 1.50% NSR royalty previously held by Resources d'Arianne Inc., subsequently sold to Lithium Royalty Corp (purple). Galaxy has the right to buyback 0.5% of the NSR for C$500,000, reducing the royalty to 1.00%.

22.4 Operating Cost Summary

Operating costs include mining, processing, general services (includes G&A, IBA, royalties, closure, and sustaining cost), and concentrate transportation. Detailed operating cost budgets have been estimated from first principles based on detailed wage scales, consumable prices, fuel prices and productivities. Table 22-4 summarizes the Project LOM operating cost estimates.

Table 22-4 – LOM Operating Cost Summary

Description	Total (Million CAD)
Mining	969
Processing	676
General Services	1,389
Concentrate Transportation	841
Direct Op. Cost	3,876
Unit Op. Cost (CAD/t Conc.)	663

22.5 Capital Expenditures

The capital expenditures include initial capital expenditures (CAPEX) as well as sustaining capital to be spent after commencement of commercial operations.

22.5.1 Initial Capital

The CAPEX for Project construction, including processing, mine equipment purchases, , infrastructure, and other direct and indirect costs is estimated to be CAD 508.7 million. The total initial Project capital includes a contingency of CAD 29.8 million which is 6.2% of the total CAPEX. The low contingency is justified by the fact that 75% of purchase orders and contracts have been awarded and Power supply contract from Hydro Quebec has already been executed. The initial capital excludes pre-production cost.

22.5.2 Sustaining Capital Expenditures

Sustaining capital is required during operations for post commissioning activities, additional equipment purchases, mine equipment capital repairs, mine civil works, and additional infrastructure relocation. The sustaining capital is estimated at CAD 253.8 million. Table 22-5 summarizes the sustaining capital cost.

Table 22-5 – Sustaining Capital Summary

Sustaining Capital Cost (million CAD)	
001 - General	1.9
100 - Infrastructure	3.2
200 - Power and Electrical	1.1
300 - Water	52.7
500 - Mining	113.2
600 - Process Plant	11.7
Others	70.0
Total Sustaining CAPEX	253.8

22.5.3 Working Capital

Working capital requirements were estimated based on 30-days accounts receivable, 30-days inventory, and 30-days accounts payable and other current liabilities.

22.5.4 Reclamation and Closure Costs

Reclamation and closure costs include infrastructure decommissioning, site preparation and revegetation, maintenance, and post closure monitoring. The reclamation cost is spent over two years at the end of operations. The total reclamation and closure cost is estimated at CAD 124.7 million, as summarized in Table 22-6. For the effect of the economics assessment, this cost was included as part of the General Services costs.

Table 22-6 – Closure Cost Estimate

Closure Cost (million CAD)	
Closure Cost	86.9

Closure Cost (million CAD)	
Monitoring and Studies	23.3
Contingency	14.6
Total	124.7

22.5.5 Taxes

The current Canadian tax system applicable to Mineral Resource Income was used to assess the annual tax liabilities for the Project. The Project is subject to three levels of taxation including provincial mining tax, provincial income tax, and federal income tax. Allkem will pay approximately CAD 4,280.8 million in tax payments over the life of the Project.

22.5.5.1 Provincial Mining Tax (Quebec Mining Tax)

The marginal tax rates applicable under the recently proposed mining tax regulations in Québec (Bill 55, December 2013) are 16%, 22%, and 28% of taxable income and are dependent on the profit margin. Quebec offers a 10% processing allowance rate for operations that upgrade a mine product to a commercial product within the province; it is assumed this rate would be applicable to the Project.

22.5.5.2 Federal and Provincial Income Taxes

The federal and provincial income taxes have both been estimated from an identical taxable income which is arrived at by deducting the Québec mining tax and various tax depreciation allowances. The federal income tax rate is 15% while the Québec income tax rate is 11.5%. The total federal income tax is estimated at CAD 1,287.5 million and the provincial income tax at CAD 980.2 million.

A summary of provincial and federal taxes paid is presented in Table 22-7.

Table 22-7 – Tax Summary

Tax Summary	Total (million CAD)
Québec Mining Tax	2,028.6
Québec Income Tax	980.2
Federal Income Tax	1,278.6
Total	4,287.5

22.6 Project Financing

The economic model excludes any Project debt or equipment financing and is assumed to be 100% financed through equity for the purposes of the Report.

22.7 Economic Results

The main economic metrics used to evaluate the Project consist of net undiscounted after-tax cash flow, net discounted after-tax cash flow or NPV, IRR, and payback period. The discount rate used to evaluate the present value of the Project corresponds to the weighted average cost of capital (WACC). The discount rate represents the required rate of return that an investor would expect based on the risks inherent in achieving the expected future cash flows. An 8% discount rate was applied to the cash flow to derive the NPV for the Project on a pre-tax and after-tax basis.

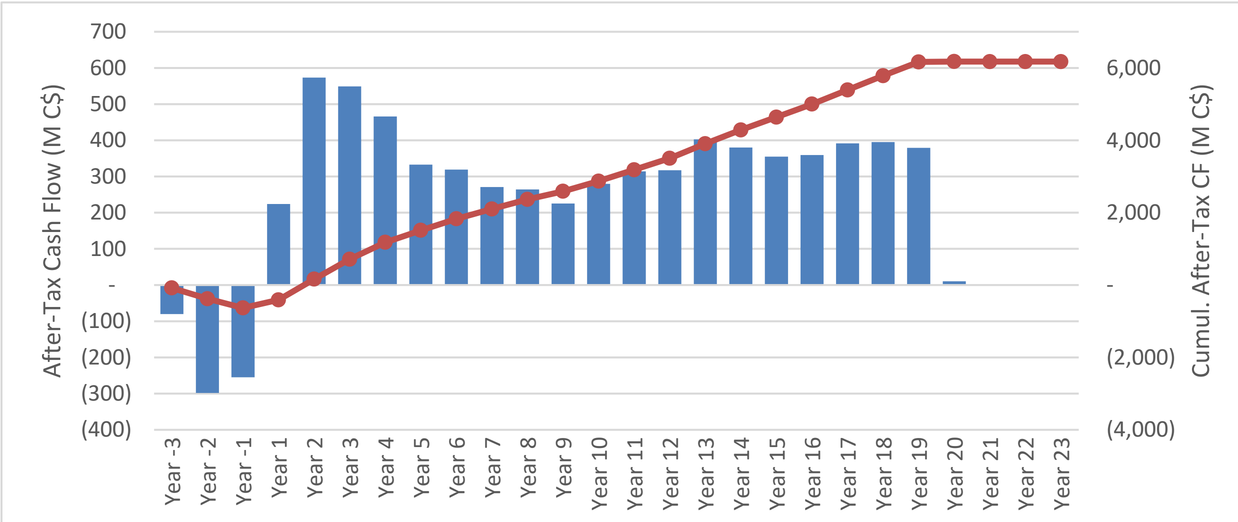
A summary of the Project economic results is presented in Table 22-8 and the annual Project cash flows are presented in Table 22-9. The total after-tax undiscounted cash flow over the Project life is CAD 6,144 million, and after-tax NPV 8% is CAD 2,238 million. The after-tax Project cash flow results in a 1.7-year payback period from the commencement of commercial operations with an after-tax IRR of 45.3%.

Figure 22-4 illustrates the after-tax cash flow and cumulative cash flow profiles of the Project under the base case scenario with a discount rate of 8%. The intersection of the after-tax cumulative cash flow with the horizontal zero line represents the payback period, measured from the start of the Project construction which is not the start of commercial production. The total net revenue derived from the sale of spodumene concentrate at 5.6% Li_2O was estimated at CAD 14,980 million ,which includes an estimated penalty of USD 10 per tonne concentrate for every 0.1% under 6.0% Li_2O.

Table 22-8 – Project Base Case Economic Results Summary

Production Summary (Life-of-Mine)	
Tonnage Mined (000 t)	169,999
Ore Processed (000 t)	37,296
Strip Ratio (W:O)	3.6
Spodumene Concentrate (000 dmt)	5,845
Metal	**Li_2O**
Head Grade (% Li_2O)	1.27
Contained Metal (000 t Li)	221
Recovered Metal (000 t Li)	152
Cash Flow Summary	**million CAD**
Gross Revenue	14,980
Mining Costs	-969

Production Summary (Life-of-Mine)	
Processing Costs	-676
Concentrate Transportation	-841
G&A Costs, IBA, and Royalties	-1,011
Total Operating Costs	-3,497
Operating Cash Flow	**11,483**
Initial CAPEX	-509
Pre-Production Operating Costs (Capitalized)	-39
Sustaining CAPEX	-254
Total CAPEX	-802
Salvage Value	0
Closure Costs	-125
Interest and Financing Expenses	0
Taxes (mining, prov. & fed.)	-4,287
Before-Tax Results	
Before-Tax Undiscounted Cash Flow (million CAD)	10,462
NPV 8% Before-Tax	3,919
Project Before-Tax Payback Period	1.38
Project Before-Tax IRR	62.2%
After-Tax Results	
After-Tax Undiscounted Cash Flow	6,175
NPV 8% After-Tax	2,244
Project After-Tax Payback Period	1.71
Project After-Tax IRR	45.4%



Source: SLR, 2023

Figure 22-4 – After-Tax Cash Flow

Table 22-9 – Project Cash Flow Summary

Cash Flow Summary	Total	Y -3	Y -2	Y -1	Y 1	Y 2	Y 3	Y 4	Y 5	Y 6	Y 7	Y 8	Y 9	Y 10	Y 11	Y 12	Y 13	Y 14	Y 15	Y 16	Y 17	Y 18	Y 19
Revenue	**14,980**	-	-	-	523	1,171	1,094	918	695	654	620	624	556	705	721	733	918	848	821	828	860	857	832
Transport Costs	(841)	-	-	-	31	49	52	51	47	43	41	43	41	44	39	39	49	46	44	45	46	46	45
Mining Costs	(969)	-	-	-	42	42	42	47	45	47	59	59	58	59	58	57	64	62	63	53	47	42	21
Process Costs	(676)	-	-	-	24	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36	36
G&A (incl. royalties +IBA)	(1,011)	-	-	-	26	45	56	53	49	13	55	55	52	56	58	58	64	62	60	61	63	63	62
Total Operating Costs	(3,497)	-	-	-	(123)	(171)	(186)	(189)	(177)	(139)	(192)	(194)	(187)	(195)	(191)	(191)	(213)	(206)	(204)	(195)	(193)	(187)	(164)
Operating cash flow	11,483	-	-	-	401	1,000	907	729	519	514	429	430	368	510	530	542	705	642	617	633	668	670	668
Investment Capital	(479)	(78)	(187)	(200)	(14)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Contingency	(30)	-	(12)	(17)	(1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sustaining Capital	(254)	-	-	-	(55)	(21)	(43)	(15)	(16)	(6)	(2)	(4)	(11)	(19)	(6)	(10)	(3)	(8)	(16)	(18)	(3)	(0)	(0)
Salvage Value																							
Change in Working Capital	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taxes	(4,287)	-	-	-	(59)	(355)	(320)	(262)	(186)	(192)	(157)	(161)	(136)	(198)	(207)	(213)	(284)	(259)	(248)	(254)	(269)	(269)	(257)
Closure Costs	(125)	-	-	-	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(6)	(105)
Excess Cash Flow	10,462	(80)	(298)	(255)	283	928	869	728	519	511	428	425	361	478	522	531	687	639	602	613	661	664	646
Free Cash Flow	10,462	(80)	(298)	(255)	283	928	869	728	519	511	428	425	361	478	522	531	687	639	602	613	661	664	646
After-Tax Cash Flow	6,175	(80)	(298)	(255)	224	573	549	466	333	319	271	264	225	280	314	317	403	380	355	359	391	395	389
Cumul After-Tax Cash Flow		(80)	(378)	(633)	(409)	164	713	1,179	1,512	1,831	2,102	2,366	2,591	2,871	3,186	3,503	3,905	4,285	4,640	4,999	5,391	5,786	6,165

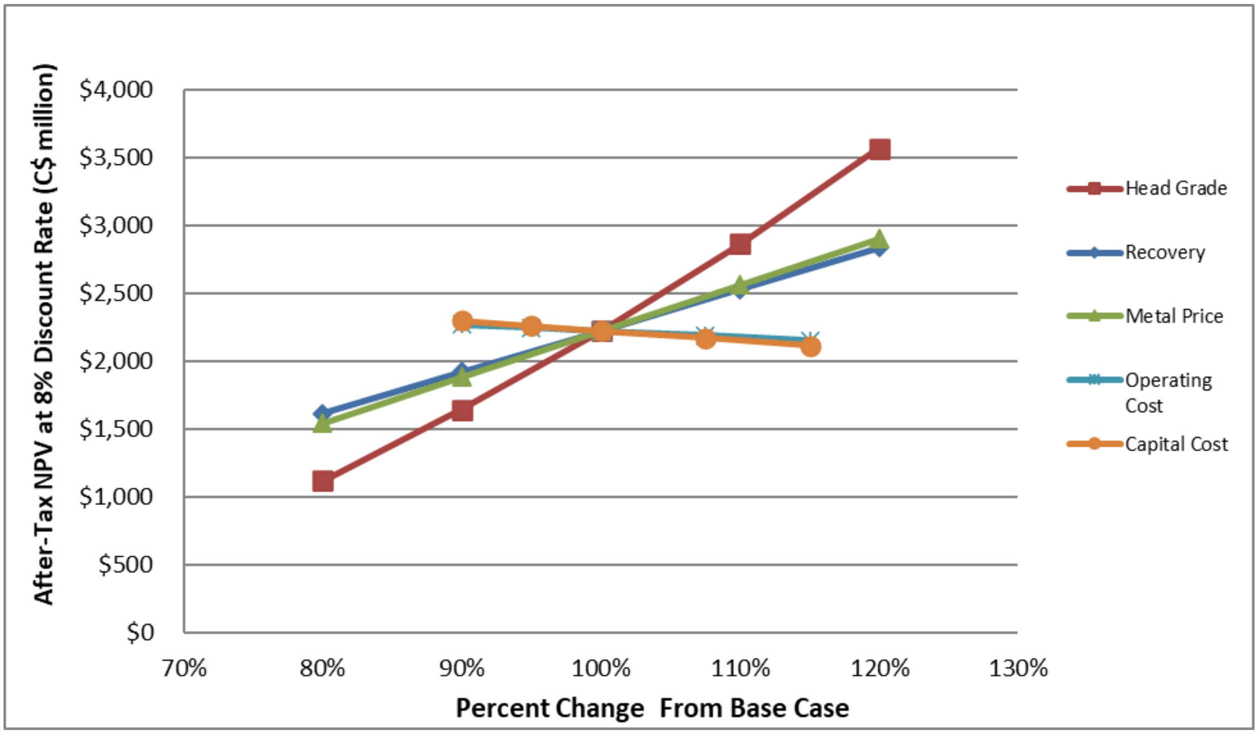
Notes:

1. *Non-GAAP measure.*
2. *Numbers may not add due to rounding.*

22.8 Sensitivity Analysis

SLR completed a sensitivity analysis to assess the impact on the Project's NPV and IRR of changes in head grade, recovery, spodumene price, pre-production initial CAPEX, and operating costs. Figure 22-5. Illustrates the sensitivity of the after-tax NPV, at a discount rate of 8%, for these variables.

Of the input variables considered, variances in head grade have the largest impact on the NPV. Spodumene price and impacts on recovery have the second and third largest impact, respectively. The Project is least sensitive to operating costs (mining cost, processing cost and G&A cost) and initial production CAPEX.



Source: SLR, 2023

Figure 22-5 – Sensitivity Analysis on the NPV 8% After-Tax

Table 22-10 to Table 22-12 present the different sensitivity analysis for the Project for Metal Price, Head Grade, and Operating Costs.

Table 22-10 – Sensitivity Analysis on Spodumene Price Variation

Li_2O Metal Price USD/t Conc. @ 6%	After-Tax NPV at 8% **(million CAD)**
$1,617	$1,561
$1,820	$1,903
$2,022	$2,244
$2,224	$2,584
$2,426	$2,925

Table 22-11 – Sensitivity Analysis on Operating Costs

Operating Cost (CAD/t milled)	After-Tax NPV at 8% **(million CAD)**
56.25	$2,291
59.38	$2,268
62.50	$2,244
67.19	$2,209
71.88	$2,174

Table 22-12 – Sensitivity Analysis on Total CAPEX Cost Variation

Total Capital Cost (C$ M)	After-Tax NPV at 8% **(million CAD)**
919	$2,318
970	$2,281
1021	$2,244
1097	$2,189
1174	$2,134

23. ADJACENT PROPERTIES

There are no mining projects in the vicinity of the James Bay Lithium Project.

The Project is surrounded by mineral exploration companies or individual prospectors. Of these, the most relevant claimholder to the James Bay Lithium Project is Osisko Baie James S.E.N.C, who entered into an Option Agreement on the Anatacau West project with Brunswick Exploration in November 2022.

The Anatacau West project is adjacent to the east of the Cyr 2 showing, and hosts outcropping spodumene-bearing pegmatite mineralization that was drill tested by Brunswick in 2023.

Figure 23-1 shows surrounding claimholders, effective as at June 9, 2023.

The SLR QP has not independently verified this information and this information is not necessarily indicative of the mineralization at the James Bay Lithium Project.

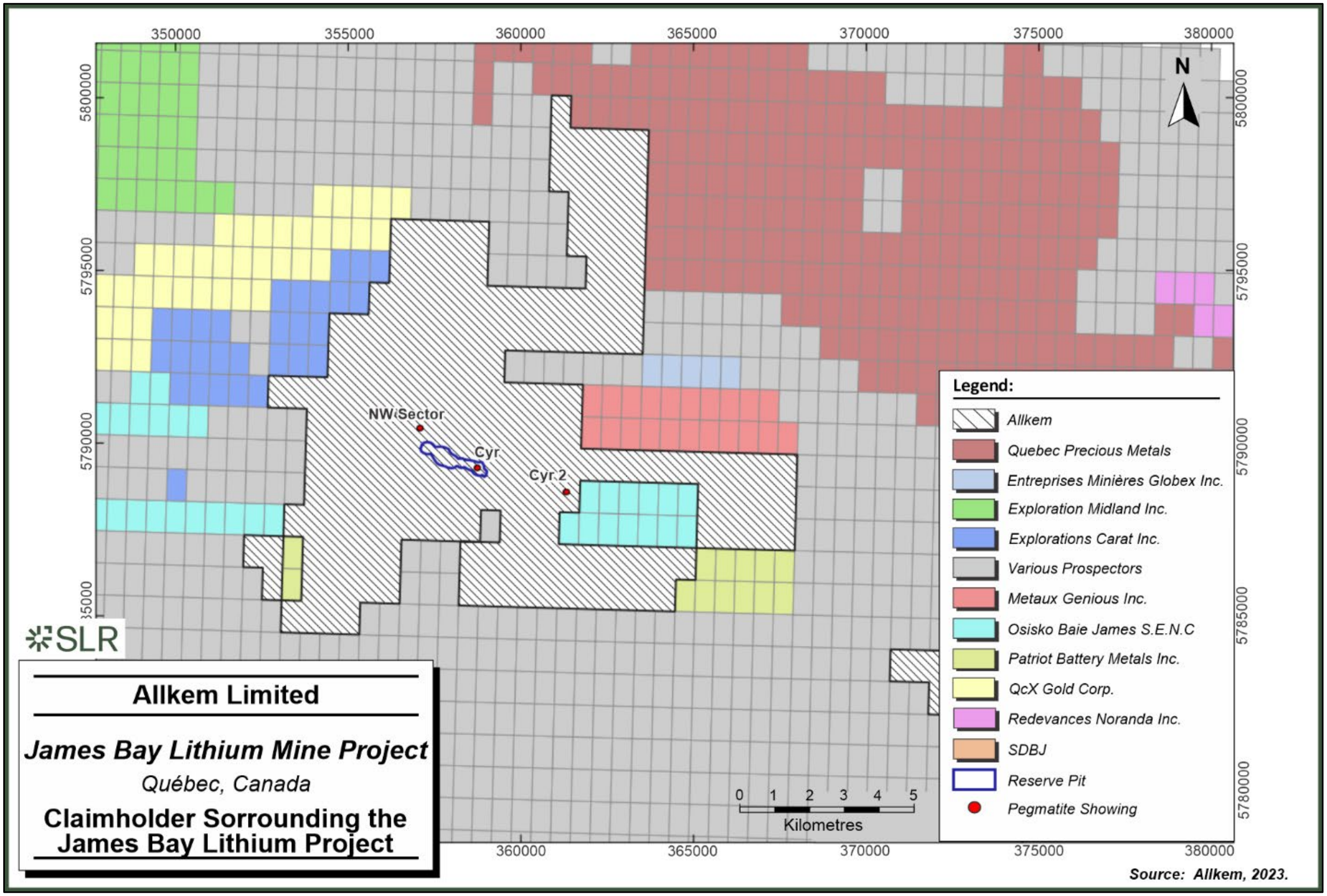


Figure 23-1 – Claimholders Surrounding the James Bay Lithium Project

24. OTHER RELEVANT DATA

24.1 Introduction

This section describes the proposed development of the Project and describes the next stages of the Project; the sequencing of activities with milestones, and includes as an attachment a level-3 project planning.

The development plan assumes normal project execution conditions based on the nature of the business, location of the Project, inputs availability, etc. The proposed plan uses global project working criteria for similar industries and considers the specifics of the Project in terms of size, location, logistics, availability of resources, etc. Each stage is planned with enough contingency in terms of duration to minimize disturbances, which may occur during implementation, thereby affecting subsequent steps.

24.2 Project Overview

24.2.1 Project Objectives

To align with GLCI's business and project objectives, the Project delivery objectives are to:

- Meet or exceed GLCI's HSE, community, and project execution standards.
- Deliver the Project within the approved budget and approved milestones and schedule dates.
- Conform to statutory requirements and GLCI's commitments regarding licenses and approvals.
- Achieve the mining rate and lithium production as nominated in the design criteria.
- Leave a positive impact on the community.

24.2.2 Project Stages

The major subsequent stages of the Project are as follows:

- Basic Engineering Phase (18 months)
  - Provide engineering required to support the preparation of permits.
  - Progress engineering to about 80% for the Processing Area to support a Class 3 CAPEX estimate as defined by the Association of the Advancement of Cost Engineers (AACE).
  - Obtain firm price bids for key mechanical and electrical equipment, including long-lead items and be in position for award to obtain vendor data for detailed engineering.
  - Commitment to off-site utilities required to maintain the schedule.
- Execution (19 months)

- To start immediately upon obtaining ESIA approval and construction permits.
- Obtain Financial Investment Decision (FID) following the approval of ESIA.
- Develop the detailed engineering for construction.
- Perform the procurement & contracting activities required for the Project.
- Execute the full construction of the Project.
- Perform the commissioning and start-up of the process plant.
- Execute the ramp-up to commercial production.

24.2.2.1 Project Implementation Steps

Figure 24-1 illustrates the main steps of the Project implementation:

- Basic engineering to finish by Q4 2023
- Detailed engineering and procurement including long lead items to start by Q4 2023
- Site preparation work
- Construction
- Pre-production (mine stripping work)
- Commissioning & start-up
- Commercial production start (including ramp up)

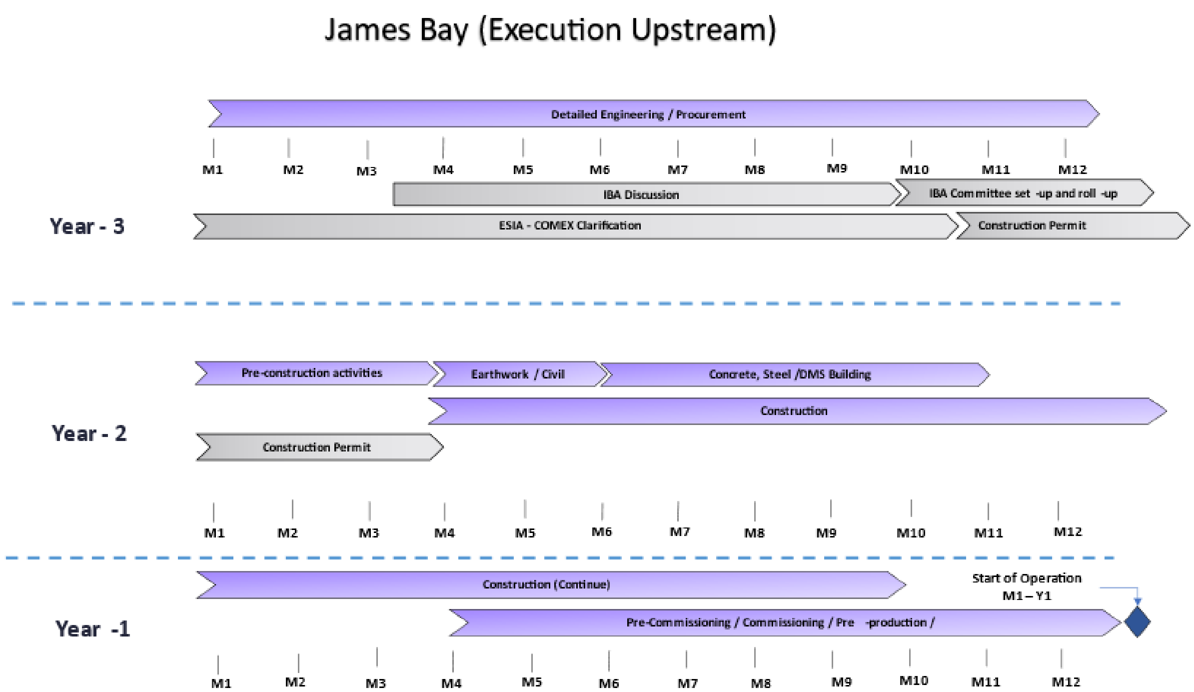


Figure 24-1 – Project Development Phases & Milestones

24.3 Project Delivery Strategy

For the Execution Phase, GLCI will implement the project delivery strategy described below:

- All the procurement and contracting activities will be managed directly by the Project team.
- GLCI will implement an integrated team approach for construction management to carry out the Project`s construction activities. An Owner's Integrated Team organization will be put in place combining GLCI, main consultants, and contractors to perform all technical / operational functions in-house and manage the required contractors to build the Project facilities. In this approach, the contractors will be involved as early as possible with the detailed engineering and constructability development.

24.3.1 Primary Strategy

The Project will be delivered using an Integrated Team approach. GLCI Team will manage and deliver the project and will incorporate resources within the GLCI's Team project for project specific positions such as project management, procurement, construction/site management, etc.) coming from a specialized firm. They will act as GLCI Team representatives and function will not be duplicated.

GLCI will hire key positions that will remain after the completion of the Project, i.e., future operation as technical (geology, mining, processing, waste rock and tailings management, etc.) and other functions (Contract, Finance, HR, etc.).

24.3.2 Engineering

Basic and detailed engineering will be performed by retaining engineering firms with knowledge in specific fields as:

- Geology
- Mining Engineering
- Process Plant
- Waste Rock, Tailings, and Water management
- Site / General Infrastructure (non-process)

24.3.3 Purchasing

Standard purchasing of equipment will be performed from global vendors and suppliers. Organizations with local technical offices (Quebec, Canada, North America, etc.) will be favoured in view of obtaining support for commissioning and operation.

24.3.4 Construction

Various contractors will be hired following tender process based on an established contracting strategy described in Table 24-1. Some engineering will be incorporated into construction packages such as Design, supply and Install (e.g., Fuel Bay) and / or design / supply scope of work (e.g., buildings).

The Project will supply most of the materials free issue to the contractors.

Table 24-1 presents a summary of contracting strategies developed for the study.

Table 24-1 – Contracting Strategies Summary

No.	Contract	Scope	Type of Packages
EW-C001	Earthworks & Underground Services	All earthworks and U/G services during Early Works and construction to include: ○ Excavation, backfilling and leveling of the plant platform at the level of the infrastructure layer. ○ Preparation, management and maintenance of granular material borrow pits. ○ Supply and installation of all culverts on site ○ Installation of the Macaferri MSE Wall ○ Excavation and preparation of all Water Management Ponds	Build
EW-C002	Tree Clearing	All tree clearing during Early Works including removal and disposal of all debris associated to this work to the appropriate location.	Services
CI-P001	Concrete Supply	Supply of all concrete during construction.	Build
ST-P019	Structural Steel	Preparation of steel fabrication and erection drawings, procurement of material and fabrication for the DMS building internal structural steel (secondary)	Design & Supply
ST-P002	Structural Steel	Preparation of steel fabrication and erection drawings, procurement of material, fabrication and installation of the Primary Crusher building	Supply and build
ST-P004	Structural Steel	Preparation of steel fabrication and erection drawings, procurement of material, fabrication and installation of the DMS and concentrate buildings	Supply and build
MC-C501	SMPEI - DMS	Structural, Mechanical, piping, electrical and instrumentation works for: ○ DMS building (excluding building shell) ○ Workshop/Reagent Storage ○ Tailings loadouts ○ Concentrate storage building	Build
MC-C502 / MC-C504	SMPEI – Crusher, Truckshop & Infrastructure	Mechanical, piping, electrical and instrumentation woks for: Crushing & Screening Crushed Ore Stockpile and Reclaim Mine Service Area All mining infrastructures (Water Treatment Plant)	Build
MC-C503	Fuel Bay	Design, Supply, assembly, site installation and commissioning of petroleum equipment including the main fuel depot and the powering emergency generators.	Design, supply and install
AR-P001	Site Fencing	Fencing during Early Works and Construction including the Substation.	Supply and build
AR-P009	Permanent Camp	Single-occupancy dorm complex and all required service buildings	Design, supply and

No.	Contract	Scope	Type of Packages
			install
ST-P001	Crushed Ore Stockpile Dome	Supply of material and services for the Crushed Ore Stockpile Dome including engineering, procurement, fabrication, and supervision during installation.	Design and Supply
AR-P008	Warehouse Fabric Shelter	Design, manufacture, supply, installation and commissioning of the steel and canvas building.	Design, supply and install
CI-P017	Corrugated Steel Tunnels	Design, manufacture and supply the tunnel structures, including the design of the foundations according to the geotechnical study.	Design and Supply
MC-C001	HVAC	HVAC for all process and non-process buildings except Camp	Design, supply and install
MC-C002	Fire Protection & Detection	Fire detection for all process and non-process buildings except Camp	Design, supply and install
EL-P001	Main HV Sub-Station, E-Room, Emergency Power	Design and Supply of fully equipped substation to energize the site from a power supply of 69 kV to a step-down voltage of 4.16kV.	Desing & Supply
IN-C020	Fiber Optic Installation	Design, Supply & Installation of Fiber Optic for tele-communication	Design, supply and install
EL-P002	Distribution Line	Excluded from Scope; by Hydro-Quebec	Design, supply and install
AR-P004	Structural Steel	Design, manufacture, supply and install of the truck shop excluding civil works and MPEI. (Building only)	Design, Supply and build
MC-P112	Propane Storage & Vaporization	Engineering, design, supply and workshop prefabrication of propane storage facilities and related equipment	Supply and install
SE-Z002	Rental of Scaffolding	Rental of all scaffolding for process and non-process building	Supply and install
SE-Z016	Mobile construction equipment	All non-contractor-supplied construction equipment such as scissor lifts, forklifts, bobcats etc.	Supply
GE-S005	Water Treatment Plant	Temporary water treatment plant during construction	Supply
MC-P303	Sewage Treatment Plant	Sewage treatment plant for the entire site	Supply
GE-S003	Explosives Supply & Services	Explosives Supply and Services for the construction phase as well as the operation of the mine.	Supply and Service
GE-S007	Surveying	Surveying services	Service
SE-Z009	QA, QC	Quality assurance during construction	Service
SE-Z010	Catering / House Keeping	Supply of meals to construction workers on site and for house keeping	Service
GE-S001	Security	Site security and gate keeping	Service

No.	Contract	Scope	Type of Packages
SE-Z012	Offices	Temporary offices for construction, medical and security	Service
MC-P302	Potable Water Treatment Plant	Design and Supply of a Potable Water Treatment Plant to provide such water in all buildings of the mine	Design & Supply
GE-S004	Waste Management Services	Management of the Common Waste and Residual Hazardous Materials for the mine	Service

To promote employment and involvement of the Cree enterprises within the project, packaging will consider the capabilities of Cree enterprises on the James Bay territory and efforts will be made to structure the package to encourage Cree enterprises to submit proposals.

24.4 Project Execution Schedule

To further develop the high-level schedule agreed during the 2022 FS, a proposed level 3 Project Execution Schedule was developed including the complete scope of the Project from the completion of the 2022 FS to the completion of the ramp-up.

A more detailed execution schedule was further developed during the Basic Engineering Phase. Back-end activities included within pre-commissioning and ramp-up should be developed during the execution phase by the Commissioning Team.

Equipment lead times were obtained from vendor proposals received during the 2022 FS phase and Basic Engineering phase (for the Process Plant equipment) and are considered in the schedule.

24.4.1 Introduction

The purpose of this section is to present in detail the Project Execution Schedule developed as the approach for the Project Execution Plan.

GLCI has established the Project executing strategy per sequence below:

- Basic Engineering
- Award of remaining packages
- Permit preparation
- Obtain ESIA
- Detailed engineering phase and award of long lead items and critical construction packages
- GLCI Owner’s Team (self-perform execution with Integrated Team approach)

- Commercial production.

24.4.2 Execution Strategy

After completion of the FS phase, the Project will be executed as follows:

<u>Basic Engineering (“BE”) Phase</u>: To progress engineering and construction permit preparation to reach “Ready for Construction” status. The BE Phase includes the following scope:

- Engineering required to support the preparation of construction permit applications for the work planned in 2022.
- Progress engineering to about 30% to support a Class 2 CAPEX estimate.
- Obtain firm price bids for key mechanical and electrical equipment, including long-lead items and be in position to award orders to obtain vendor data required for detailed engineering.

<u>Execution Phase</u>: Comprising detailed engineering, procurement and construction, this phase covers the completion of the required detailed engineering for the construction phase of the Project, the award of all purchase orders and contracts for all the identified packages and the execution of the construction activities. The Execution Phase will only be started after the FID.

24.4.3 Key Milestones

Following the High-Level Plan agreed, the High-Level Project Milestones and dates as extracted from the Primavera schedule are presented in Table 24-2.

Table 24-2 – High-Level Project Milestones

Milestone	Date
Basic Engineering Phase - Start	August 2021
Award Turnkey Contract to Hydro Quebec	September 2021
Construction Start	3 to 6 months after ESIA approval
Permanent Camp Fully Available	6 to 9 months after construction starts
Power Line Completion by HQ (Excluding Substation Connexion)	Q3 2023
Project Main Substation Completion and Energized	5 to 6 months after construction starts
DMS Building - Mechanical Completion	13 months after construction starts
Start Dry Commissioning	14 months after construction starts
Wet Commissioning Completion	16 months after construction starts

24.4.4 Permits

All legal requirements and permits must be obtained before starting any construction work. The Execution Schedule shows all the permits to be obtained by GLCI. Every permit in the schedule has been linked to the appropriate construction activities.

Also, an IBA program is in development and should be signed by Cree Nation prior to get the ESIA approval.

The permits are grouped in two categories:

- Provincial permits, with the following involved Authorities: MELCCFP, MRNF, EIJBRG, RBQ and the National Police Force (Table 24-3).
- Federal permits, with the following ministries: Fisheries and Oceans Canada (DFO), Transport Canada (TC) and Natural Resources Canada (NRCan) (Table 24-4).

Table 24-3 – Provincial Permits

Permit Name	Authority
Approval of tailing storage facilities and concentration plant locations	MRNF
Surface lease ("Demande d'utilisation du territoire public")	MRNF
Mining lease	MRNF
Tree clearing	MRNF
Sand pit exploitation	MRNF
Authorization - Site preparation (earthworks) & road construction	MELCCFP
Authorization - Utilities (fresh water and sewage)	MELCCFP
Authorization - Contact water treatment plant & oil-water separators	MELCCFP
Authorization - Waste rock extraction	MELCCFP
Authorization - Process plant construction	MELCCFP
Authorization - Site-wide water extraction	MELCCFP
Authorization - Electrical line impact on wetlands	MELCCFP
Authorization - Tailings hoppers	MELCCFP
Authorization - Mine and process plant operation	MELCCFP

Permit Name	Authority
Municipal Building Permits	EIJBRG
High-risk petroleum products containment installation	RBQ
Explosive storage	SQ (National Police Force)

Table 24-4 – Federal Permits

Permit Name	Ministry
Notification of work on non-scheduled waterway	TC
Application for exemption – Drying of Kapisikama Lake and CE4	TC
Application for authorization – Fish habitat loss	DFO
Explosive fabrication	NRCan

24.4.5 Critical Path

The critical path for the Project Execution Schedule is driven by the ESIA approval, which is a pre-requisite of obtaining the main construction permit (Certificate of Authorization). The critical path for Project Execution is listed:

- Signed IBA and ESIA
- Temporary Camp at Truckstop 381
- Mobilization of the earthworks and concrete Contractor
- Construction of the permanent camp
- Construction and completion of the of the DMS building facilities, including its foundations, building erection, cladding / roofing, mechanical and piping installation, electrical & instrumentation installation, and pre-operational verifications.
- Plant dry commissioning
- Plant wet commissioning
- Plant ramp-up.

A near critical activity is the availability of accommodations for the construction workforce. Temporary accommodations will need to be available to do the early works, including the construction of the permanent camp which will be driven by the FID.

24.4.6 Construction Sequence

This section will outline the high-level execution sequencing constraints that were evaluated to determine the execution schedule baseline for the Execution Phase.

During the Basic Engineering phase, GLCI will start the preparation of all the identified early work permits required to start construction woks on site. These early works permits will need to be completed prior to the first mobilization to site.

Once the early work permits are secured, the first contractors to mobilize will be: Tree clearing, earthworks, MPEI for the temporary services including permanent services required for the camp, and permanent camp installation. It is critical that the clearing contractor cut the trees before the migratory bird nesting tree-cutting ban. As the clearing activities continue, the earthworks will follow behind to do the grubbing and stripping of the topsoil and organics and stockpile the material in designated areas for future remediation works. Temporary water management catchments and ditches will also be developed as the civil works continues in the process plant pad development, mine pit, as well as the tailings management footprint.

After the early civil works are completed, the process plant concrete foundation works will begin by Year -2 for the DMS building and the crushed ore stockpile Dome, followed by their respective erection and building closing to allow installation works (mechanical, piping, electrical & instrumentation) inside the buildings during the winter season. All other concrete foundation works will be until Year -1. Construction will be continuous until commissioning activities begin.

24.4.7 Winter Construction

To mitigate downtime during the winter and loss of productivity the following considerations were included in the execution schedule.

The concrete foundations work for the process plant are, for the most part, scheduled to be built during the summer and fall months. The construction sequence for the process plant assumed that the foundations of the DMS buildings and the erection of the buildings, roofing and cladding will be completed before the onset of winter to allow installation works to continue inside the building, sheltered from inclement weather. Priority will also be given to erect the COS Dome and the truck shop / warehouse buildings for additional all-weather storage for the winter months.

24.4.8 Site Laydown Requirements

The need for large site laydown and indoor storage will be minimal as the majority of the material will be purchased in advance of the construction and stored at a storage facility in Val d'Or. Once mobilized to the site the contractors will requisition the materials required for their scope of work for the storage facility and delivered to the site in a timely manner to allow a continuous installation.

At the Val d'Or storage facility, any goods or equipment which can be stored outdoor will be placed in an on-site outdoor lay down area, ideally to be located near the storage warehouse. The outdoor lay down area will have to be on level ground, with all snow removed done prior to the delivery of goods and equipment. A typical lay down area would normally have a surface of 10,000 m^2 (e.g., 100 m x 100 m).

Both the offsite and site lay down area and the storage warehouse must obtain the necessary permits for the storage of hazardous materials, as applicable. The required security, protective and handling equipment should be available to allow for the temporary storage of hazardous materials whenever necessary.

The Project will implement a preservation plan to ensure that all equipment is preserved and maintained as per manufacturer recommendations for the stored equipment in Val d'Or and at the site.

24.4.9 Camp Requirements

Fuel and limited accommodation (30 beds capacity to be dedicated to the Project) are available at the "Relais Routier km 381" Truck Stop, a facility located 1 km from the property. For the initial phase of construction, a temporary camp was setup with a second phase to follow once the construction permit will be issued to increase the accommodation capacity to 136 beds with an additional dining room.

Currently 144 beds are estimated to be required to principally accommodate the workforce for tree clearing, earthworks, temporary services installation, main camp installation, concrete works to be completed in Year -2, and the start of the DMS building erection.

A single permanent camp with 238 bed capacity will be built and utilized for both the construction phase and operations phase of the James Bay Lithium Project. The permanent camp will be completed to its full capacity by Year -2.

The Preliminary Construction Manpower Forecast is shown in Figure 24-2.

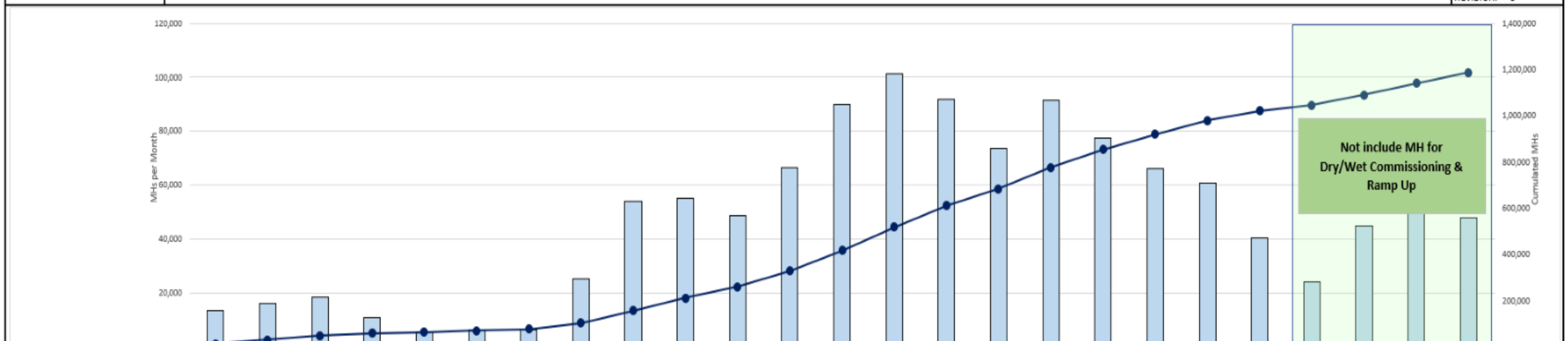
# Man-Month	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25
JB-EW.Earthwork	0	0	2	16	0	0	0	44	40	56	51	62	118	72	28	33	32	35	47	56	29	1	14	30	27
JB-CO.Concrete Work	0	0	0	0	0	0	0	1	29	26	22	52	44	35	43	21	8	0	0	0	0	0	0	0	0
JB-AR.Architectural	0	0	0	0	0	0	0	0	0	0	0	3	16	28	23	11	3	1	0	0	0	0	0	0	0
JB-ST.Structural Steel	6	10	9	0	0	0	0	0	7	1	7	23	32	57	24	2	28	39	13	0	0	0	0	0	0
JB-MP.Mechancial & Piping Installati	0	0	0	0	0	0	0	0	29	23	15	12	4	35	56	60	89	53	46	27	2	1	1	0	0
JB-EI.Electrical & Instr. Wrks	4	7	6	0	0	0	0	1	17	22	20	11	20	32	74	65	73	48	31	32	18	1	1	0	1
Total Direct Cost	10	17	17	16	0	0	0	46	122	128	115	163	234	259	248	192	233	176	137	115	49	3	16	30	28
JB-PM.Project Management	5	13	10	2	0	0	0	5	11	17	15	26	31	32	31	23	29	26	23	15	7	3	0	0	0
JB-HQ.HQ Tranmision Line	0	0	0	0	0	0	0	0	0	0	0	0	8	18	0	0	0	0	0	0	0	0	0	0	0
JB-SE.SC Environmental	1	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
JB-SC.SC-Permanent Camp	14	1	0	0	0	0	0	0	31	24	17	9	0	0	0	0	0	0	0	0	0	0	0	0	0
JB-SD.SC-Drilling Campain	13	13	28	17	19	22	22	22	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
JB-FN First Nation	3	7	5	1	0	0	0	1	3	4	4	6	7	7	7	5	6	5	5	4	1	1	0	0	0
JB-SS Support Services	3	7	5	1	0	0	0	1	3	4	4	6	7	7	7	5	6	5	5	4	1	1	0	0	0
JB-Pre-Production Staffing	0	0	0	0	0	0	0	13	13	12	12	18	18	19	18	26	35	49	54	68	79	76	136	138	133
Total Indirect Cost	39	41	48	21	19	22	22	43	67	62	53	66	72	84	64	60	77	86	88	92	89	82	136	138	133
Total DC + IC	49	58	65	37	19	22	22	89	189	190	168	229	306	343	312	252	310	262	225	207	138	85	152	168	161

Accommodation Availability	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25
Actual Rooms 14 pax - DSDBJ	14	14	14	14																					
New Trayler #01 (68 pax)	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
Temporary Camp New Trayler #02 (68 pax)				68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68	68
Permanent Camp - Phase 1										38	38	38	38	38	38	38	38	38	38	38	38	38	38	38	38
Permanent Camp - Phase 2											100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Permanent Camp - Phase 3													100	100	100	100	100	100	100	100	100	100	100	100	100
Total Beds Available	82	82	82	150	136	136	136	136	136	174	274	274	374	374	374	374	374	374	374	374	374	374	374	374	374

Mining Services

GALAXY PROJECT
PROJECT'S MAN-HOURS HISTOGRAM

Date: 2023-08-02
Source: P6 File
Revision: 0



	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	Month 13	Month 14	Month 15	Month 16	Month 17	Month 18	Month 19	Month 20	Month 21	Month 22	Month 23	Month 24	Month 25
Month Man-Hours	13,422	16,090	18,615	10,781	5,499	6,379	6,488	25,232	54,063	55,057	48,886	66,630	90,100	101,257	91,836	73,838	91,607	77,346	65,984	60,680	40,399	24,272	44,970	50,042	47,935
Cumulative Man-Hours	14,010	30,100	48,715	59,496	64,995	71,374	77,862	103,094	157,157	212,214	261,100	327,730	417,830	519,087	610,923	684,761	776,368	853,714	919,698	980,378	1,020,777	1,045,049	1,090,019	1,140,061	1,187,996

Source: GMS, 2023

Figure 24-2 – Preliminary Construction Manpower Forecast

The Construction Manpower Forecast was developed to reflect the manpower required for the different construction contracts, Drilling Campaign and Pre-Production team. The forecast accounts for the Hydro Quebec construction workforce requirements.

Most major construction contracts will be awarded to regional contractors using local personnel whenever possible. The schedule assumes that there are no skilled labour restrictions.

24.4.10 Scheduling Software

The software used to develop the schedule was Primavera P6 Project Management, Release 16.2. The P6 scheduling options used for this project are listed below:

- Use of expected finish dates
- Total float is calculated as: Total Float = Late Finish – Early Finish
- Define critical activities as those having a total float less than or equal to 0 days
- When using lags between activities, the associated calendar to the lag is the predecessor activity calendar.
- Positive lags are used in the schedule logic in start-to-start, finish-to finish or finish-to-start relationships where appropriate. Negative lags and/or start-to-finish relationships are not used in accordance with industry best practices.

24.4.11 Project Calendars

Four different calendars were used in the schedule, assigned to every activity based on the type of work associated as shown in Table 24-5.

Table 24-5 – Project Calendars

Calendar	Description	Type of Activity
Office Calendar	40 hours per week (8 h a day) from Monday to Friday.	Applies to Engineering, Procurement, Contracting, Permitting and off-site activities.
Construction Calendar	70 hours per week (10 h a day 7 days a week) considers Quebec Construction Vacation time	Applies to Construction & Commissioning Activities.
Fabrication & Delivery	70 hours per week (10 h a day 7 days a week)	Applies to all Fabrication and Delivery activities.
Construction – Out of Bird Nesting Season	70 hours per week (10 h a day 7 days a week) No work allowed from May 1st to August 15th each year	Applies to tree-clearing which is not allowed during the bird nesting season.

24.4.12 Constraints

The following project constraints were considered in developing the schedule:

- The Execution Phase cannot start prior to the GLCI FID.
- Tree-cutting activities cannot be carried out during the nesting period, which is from May 1 to August 15 every year.
- Concrete pouring for building foundations is not to be performed during the winter season.
- Limited availability of accommodations at site.
- The Project includes some Wetlands, where digging and excavation need to be performed during winter periods when the ground is frozen.

24.4.13 Assumptions

24.4.13.1 General Assumptions

- At the end of the Basic Engineering Phase, GLCI's Stage Gate review will be performed, to be followed by the FID.
- All the required permits for construction (including early works) will be available on time.
- Project funding will be in place when required.
- Early award of the Turnkey Contract to Hydro Quebec for the construction of the power line to the Project's site has been completed on October 2021.
- Required temporary accommodations to be installed at the Truck Stop (Relais 381) will be ready and available on time to allow the start of the early works.
- Construction package by Hydro Québec has been executed and completed in a timely manner.
- Permanent electrical power supply will be available on time to start commissioning.

24.4.14 Engineering

- Basic Engineering Phase:
  - The main purpose of the BE Phase is to develop the engineering level sufficiently to obtain firm quotations for the equipment and bring the Project to "Ready for Construction" status.
  - If necessary, the detailed engineering required to prepare the purchase of long lead items and critical packages will be prioritized.

- Execution Phase:
  - Each engineering contractor will finalize and issue all the detailed engineering deliverables required for construction on time.

24.4.15 Procurement

During the Basic Engineering Phase, firm prices and confirmed lead times will be obtained for most equipment, especially long lead items. This will allow to increase the precision level of the information and support the FID.

The following assumptions were considered when developing the Project Execution Schedule:

- The preparation of the required documentation for all equipment and material procurement will be done by GMS.
- Most of the technical recommendations for key equipment packages and contracts are to be completed before the FID.
- Purchase orders and contracts will be issued/signed by GLCI only after the FID is done.

24.4.16 Construction

In general, construction activities will be executed by the selected contractors according to the contracting strategy and following the construction sequence established in the Execution Schedule. However, early works will be required upfront at the start of the main construction works. The contracts indicated below are identified as required for these early works. As such, they will need to be awarded and executed immediately after the FID is made:

- Tree Clearing: To clear the designated areas by cutting trees, vegetation, and roots removal.
- Earthworks Contract: The scope of this contract is to perform the overall earthwork at the Project site. This contract is required to start site preparation works, including the construction of the roads and the platforms pads / underground facilities to build the Project. The contract must include the WRTSF facilities construction as well as water management related works.
- Batch Plant Contract: Required to supply concrete for the pouring of the foundations, equipment bases, slabs, etc. for the entire project needs.
- Temporary Camp Contract: To provide the temporary lodging required to start the early works and provide supplementary accommodation during the peak construction periods.

- Permanent Camp Contract: The plan is to house the construction workers as soon as possible in the permanent camp, which will accommodate the future mining and plant personnel. As a result, the camp's construction should be prioritized.
- Fencing: To install a proper fence at the property's perimeter.
- Temporary Site Services: To provide temporary services to support early works, temporary power supply, and electrical distribution for construction.
- Communication & Internet Services: To acquire and setup the proper site communications infrastructure to be used by the Project starting at the construction phase and throughout the Project's operation phase.

No Construction Schedule Risk Analysis was performed as part of the FS phase.

24.4.16.1 Pre-Commissioning & Commissioning Assumptions

Detailed activities for pre-commissioning and commissioning will be further developed by the Commissioning Team during the BE and will be integrated in the project schedule.

Pre-commissioning and commissioning will only start after permanent power is available on site.

25. INTERPRETATION AND CONCLUSIONS

The objective of this Technical Report is to disclose the current Mineral Resources and Mineral Reserves for the Project and evaluate the economic viability of the Project.

25.1 Interpretation and Conclusions

25.1.1 Mineral Resources

Following a site visit, data verification, and validation, the SLR QP confirms that the exploration data and geological interpretation are sufficiently reliable to support geological modelling and mineral resource estimation.

As of August 2023, a total of 67 individual pegmatite dikes have been identified within the deposit. The pegmatite dikes are located within a "deformation corridor" that has been identified in drilling and outcrop along a strike length of over five kilometres. The dikes present as en-echelon orientations, varying in length from 200 m to 400 m, and perpendicular to the strike of the deformation corridor. The dikes have been traced to depths of up to 500 m vertically from surface and are mostly open at depth. The dikes range in thickness from a few metres to over 50 m. Spodumene is the dominant lithium-bearing mineral identified within the pegmatites.

The current Mineral Resource estimate has increased significantly and now includes 54.3 Mt at 1.30% Li_2O in the Indicated category, and an additional 55.9 Mt at 1.29% Li_2O in the Inferred category. A description of the major factors contributing to the changes between the December 2021 MRE and the June 2023 MRE are:

- Addition of 36,220 m of exploration and delineation drilling over two drilling campaigns since the last mineral resource update, increasing the extent of pegmatite dykes by 800 m to the north-west.
- Changes in resource classification, notably the addition of tonnage associated with the pegmatites discovered in the NW Sector in the Inferred category.
- Changes in economic assumptions resulting in a deeper optimized pit shell (updated mining and processing costs, updated spodumene concentrate sale price).
- Reduction of the reporting cut-off to align with new economic assumptions and metallurgical considerations.
- An updated geological model has incorporated some lower-grade pegmatite dikes that were excluded in the previous Mineral Resource.

The SLR QP is of the opinion that there is very good potential to increase the resource with more drilling in the future.

25.1.2 Mining and Mineral Reserves

SLR prepared a series of Whittle constrained and unconstrained pit shells, considering Indicated Mineral Resources at various lithium prices. The constrained pit shells were limited by the open pit footprint defined in the NI 43-101 Technical Report Feasibility Study for the Project, dated January 11, 2022, by GMS based on existing infrastructure constrains and pit limited defined in the Project permits.

The total ore tonnage before dilution and ore loss is estimated at 34.5 Mt at an average grade of 1.35 % Li_2O. Isolated ore blocks are treated as an ore loss and represent 160 kt, less then 0.5% of total ore tonnage. The dilution around the remaining ore blocks results in a dilution tonnage of 3.0 Mt. The dilution tonnage represents 8.7% of the ore tonnage before dilution and the dilution grade is estimated from the block model and corresponds to ta 0.42% Li_2O. Finally, the Mineral Reserve estimate for Project is 37.3 Mt, at an average grade of 1.27%. The overall stripping ratio is 3.6:1 (tonnes waste to tonnes ore) and a total of 132.7 Mt of waste material will be moved over the mine life of approximately 19 years. SLR notes that the cut-off grade considered was increased to 0.62% from the economical CoG because the metallurgical testwork supporting recoveries below 0.6% were not completed at the date of this report.

The ultimate pit design contains three phases, each containing between two and four internal phases. Benches are 10 m high, with a general berm width of 9 m. It is planned that mining will be carried out utilizing an equipment fleet including 11-m^3 and 6.3-m^3 bucket diesel hydraulic excavators (backhoe configuration), and up to nine 100-t rigid frame haul trucks, two 10.7-m^3 front end loaders, two drills, and secondary equipment such as track dozers, wheel dozers, graders, and water trucks.

25.1.3 Mineral Processing and Metallurgy

SGS and Nagrom were contracted in 2011 and 2018, respectively, to undertake metallurgical testwork. SGS's scope was for preliminary test work (HLS and DMS) on a single sample. Nagrom's test work was for two phases: Phase 1 for several composites and Phase 2 for ROM within defined Early Years, Mid Years and Later Years.

For this Study, it is determined that the Project is amenable to conventional DMS processing method. The cut-point SGs are 2.70 and 2.90 for coarse (-15+4 mm) Primary and Secondary DMS, respectively. The cut-point SGs are 2.70 and 2.80 for fine (-4+1 mm) Primary and Secondary DMS, respectively.

The processing plant consists of crushing, screening, DMS, and dewatering circuits. The 66.5% overall plant recovery in the design for the Early Years is equivalent to 80.4% total DMS recovery (assuming 20.3% mass and 17.2% Li_2O deportment in the -1 mm in the plant feed) with an average grade of 6.0% Li_2O. This allows for a scale-up factor when transitioning from laboratory to a full-scale operating plant.

The 61.9% overall plant recovery in the design for the Mid-Later Years is equivalent to 74.9% total DMS recovery (assuming 20.3% mass and 17.4% Li_2O deportment in the -1 mm in the plant feed) with an average grade of 5.9% Li_2O. This allows for a scale-up factor when transitioning from laboratory to a full-scale operating plant.

Based on the data presented above, the design overall plant recovery for the James Bay Project is 66.5% for EY and 61.9% for MY/LY targeting a 6.0%. Li_2O product.

Following the improvement in the lithium market, the design for the James Bay processing plant is now targeting to produce a final product grade target of 5.6% Li_2O compared to the testwork and basis of design for the PEA of 6.0% Li_2O, as this will markedly improve the economics of the Project by increasing the overall plant recovery to 69.6% and 66.9% for EY and M/LY, respectively.

25.2 Project Risks

The James Bay Project stage risk profile was categorized into areas, as presented in Table 25-1.

Table 25-1 – Risk Areas

Risk Area	Description
Pre-Execution Risks:	These relate to risks associated with the development of the Project through the Engineering phases to achieving the final investment decision
Execution Risks:	These relate to risks associated with delivering the approved project (detailed design, procurement, mobilization, construction, commissioning and hand-over).
Operational Risk:	This relates to the risks once the Project is handed over to operations and production commences (including ramp-up to full production).

The predominant issues seen as potential risks to project viability are summarized by area. These risks are considered standard at the FEED phase of a project.

25.2.1 Geology

Some minor uncertainty exists regarding the geological-metallurgical model (grade, contamination, etc.). Targeted technical studies are planned to improve the model.

25.2.2 Processing

The process plant design uses similar flowsheets and experience from Allkem's Mt Cattlin existing operation. However, considering the worldwide lithium industry challenge in the last decade regarding achieving design throughput and ramp-up to full production on an established timeframe, medium risks exist and will be addressed during the subsequent study / engineering phases.

25.2.3 Waste Rocks and Tailings

Dewatered tailings and waste rocks will be contained together within four co-disposal facilities (WRTSF). These dry stack facilities do not store water and are considered low risk compared to traditional tailings impoundment built with dams and various embankments.

Third party reviews and discussions took place with specialists and the designers to identify and recommend actions to be implemented that will help to mitigate any potential risk related to the WRTSF. The current design is said to be robust and judged suitable to build safe structures that will contain tailings and waste rock.

Furthermore, additional studies and detailed specific design/procedures/methodologies are currently ongoing or will be implemented in the subsequent phases. For instance, additional fine and coarse tailings testing is being carried out to confirm or better define their geotechnical properties (e.g., soil water characteristics curves, Rowe cell, hydraulic conductivity, density, triaxial, etc.) under certain constraints.

Similarly, additional site investigation was carried out early this year to better characterize the ground foundation beneath the footprints of the WRTSF and adjacent facilities. More specifically, this investigation confirms the type of soil present and the thickness of the overburden. The investigation also allowed the collection of additional clay samples that are currently being tested at University of Sherbrooke (e.g., critical state evaluation, triaxial, consolidation, etc.). These tests results would confirm or would allow adjustment of parameters used into the geotechnical analysis.

Additional design review will be conducted with specialists to better manage the risk associated with the quality of the infrastructure design, the construction, monitoring and long term surveillance.

25.2.4 Project Execution

Cost and schedule overruns are common in mining industry projects in general. Engineering progress after the study phases and sound execution planning are proposed to mitigate these cost and schedule risks.

The Project schedule assumes that all permits have been obtained as planned. Delays in permitting will delay the Project schedule and, likely, result in increased project costs.

25.2.5 Risk Management Plan

In line with Galaxy Risk Standard requirements, the Project will develop a Risk Management Plan ("RMP") during its next phase. The James Bay Project RMP will detail how the Project team will coordinate the various risk activities (financial, design, construction, etc.) and ensure that control actions are tracked and closed out so that risks are maintained in line with Galaxy's expectations. The purpose of the plan is to document how the Owner's team (together with the contractors) will meet its risk management objectives by identifying, understanding, implementing, monitoring and controlling project development risks.

The RMP will be maintained for the duration of the Project and the performance against the RMP KPIs will be a routine project reporting parameter to the Project executive team. The risk management process has ensured that key risks and opportunities associated with the Project have been identified early in the project and will be used going into the subsequent steps of the Project to provide the Project team (James Bay Project team, contractors, etc.) with a common understanding of the risk drivers and ensure appropriate focus on the required and appropriate risk controls.

In conclusion, while there is still risk assessment and evaluation work to be undertaken throughout the development of the project design, execution, and hand-over to operations, there are no risk issues that have been identified at the previous risk analysis sessions. Therefore, based on the work conducted to date, the Project team and the Wave QP are of the opinion that there is no reason on a risk basis that the James Bay Project should not progress to its next stage.

26. RECOMMENDATIONS

26.1 Mineral Resources

In reviewing the geological and block model constructed for the Project, the SLR QP makes the following recommendations:

- Conduct the following drilling and sampling programs:
  - An infill drilling and channel sampling program in the NW Sector to convert Mineral Resources currently in the Inferred category to Indicated category.
  - Infill drilling at depth to convert any blocks of Inferred category within the new RPEEE pit shell to Indicated category.
  - Step-out exploration drilling to the north-west with the objective of discovering new pegmatites beneath thin glacial overburden.
- Update the surface geology map with more detailed lithological and structural mapping.
- Carry out a test reverse circulation grade control drilling program in the starter pit area.
- Investigate extent of sericite altered spodumene mineralization near diabase dikes.
- Try to define the bounding structures that control the pegmatite locations and extents.
- Carry out metallurgical testwork on lower grade mineralization in the 0.15% Li_2O to 0.5% Li_2O range to investigate potential to lower the current cut-off grade in the future.

The SLR QP is unaware of any other significant factors and risks that may affect access, title, or the right or ability to perform the exploration work recommended for the Project.

26.2 Mining and Mineral Reserves

The SLR QP offers the following recommendations with regard to mining:

- As currently planned, develop a slope monitoring program and a ground control management plan for the operations phase.
- Complete additional studies on dilution and ore recovery factors to inform mining operations decisions regarding the trade-off between productivity and selectivity.
- Refine the open pit mining schedule to maximize profitability.
- Conduct additional hydrogeological studies to improve water ingress estimates and dewatering strategy. Monitor ground water conditions and assess predicted conditions against actual conditions for the Ultimate Wall design (during the operations phase).

- Reduce risk from the external waste dilution by further testing of potential deleterious elements (e.g., Fe_2O_3).
- Investigate potential of economic but lower grade Li_2O mineralization (<0.6%) by confirming metallurgical response.

26.3 Mine Waste and Water Management

26.3.1 Geotechnical Investigation

The WSP QP offers the following recommendations related to geotechnical investigations:

- Conduct additional geotechnical investigation and laboratory testing to further delineate and characterize the foundation materials at the waste rock and tailings co-placement storage facilities (WRTSF), overburden and peat storage facility (OPSF) and water management pond (WMP) areas. The laboratory testing should focus on further strength (direct simple shear) testing and consolidation (oedometer) testing of clayey soil foundation materials.
- Conduct additional geotechnical investigation in the process plant area to support detailed design of the foundations and to improve the accuracy of bulk earthworks capital expenditure estimates. Investigation should include provisions for rock coring to confirm bedrock hydrogeological conditions, cone penetration tests (CPT), particle size distribution (PSD) evaluation, direct simple shear testing, and one-dimension consolidation (oedometer) testing on select soil samples.
- Carry out geotechnical investigations to identify and/or confirm potential granular borrow sources.

26.3.2 Mine Waste Storage Facilities

The WSP QP recommends the following additional validation to refine the detailed design of the WRTSF, OPSF and WMPs, in addition to the geotechnical investigations:

- Assess static and cyclic liquefaction susceptibility of WRTSF foundation soils, including post-liquefaction stability analysis.
- Consider staged consolidation and slope stability analysis, given the presence of undrained foundation conditions.
- Carry out laboratory testing to determine the filterability (dewatering) and geotechnical (shear strength) characteristics of the tailings.

- Carry out geotechnical laboratory testing of the waste rock, including strength and durability testing.
- Re-evaluate the WRTSF site selection and footprints considering water management criteria. For example, interim collection of runoff/drainage from the Southwest and East WRTSFs in the open pit mine may not be the most energy efficient strategy (e.g., water pumping cost) and could impact mining operations during the spring or extreme rainfall events.
- Conduct optimization and further evaluation of the proposed WRTSF designs and construction staging based on the findings of the geotechnical site investigations.
- Validation for the WRTSF filling plan methodology (i.e., optimization of filtered tailings and waste rock co-disposal details). Tailings and waste rock mixing tests should be carried out to evaluate interface shear strength, filter compatibility and seepage characteristics. In addition, field trials can be carried out during operations to assess opportunities for efficient co-mingling of the tailings with waste rock.
- Develop an instrumentation and monitoring program for construction and operation of the WRTSF with established threshold alert levels and appropriate response framework.
- Review the mine plan and material balance to confirm availability of construction materials for development of the WRTSFs over the life of mine, including pre-production and closure periods.
- Conduct condemnation drilling for the WRTSF sites to verify the absence of mineralization.
- Advance mine closure planning for the WRTSF and OPSF.

26.3.3 Water Management

The WSP QP recommends the following studies related to water management to support future detailed design:

- Update the site-wide water management strategy and the water balance model once the design of the effluent treatment system is completed, considering the operational requirements of the effluent treatment plant.
- Further consider liner requirements, minimizing excavation, and dam height during optimization of the WMP designs.
    - Complete a trade-off study evaluating geosynthetic versus clay lining for the WMP dams and North WMP basin. In particular, confirm if the existing clay overburden material is suitable for WMP dam construction and/or if it can be dried to a moisture content suitable for construction.
- Complete a dam breach and inundation study to support the WMP dam classification.

- Perform a more detailed flood study based on improved topographic mapping for the CE-3 Creek, considering spring and summer fall extreme events, and potential risk of blockage of the James Bay Road culvert by ice or debris.
- Refine the design of the water management infrastructure based on improved site topographic survey data.
- Confirm water treatment requirements for effluent discharge.

26.4 Processing and Metallurgy

The Wave QP recommends the following additional testwork and studies for Processing:

- Review treatment options for fines (-1 mm) tailings and complete a trade-off study to establish the best option for increasing Li_2O recovery/economics outcome.

26.5 Environment

The WSP QP offers the following recommendation related to the environment:

- Conduct fish sampling in the proposed WRTSF and WMP areas to confirm fish presence/absence in the waterbodies of interest that may be impacted by the proposed development.

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28. DATE AND SIGNATURE PAGE

This report titled "Technical Report Summary on the James Bay Lithium Project, Québec, Canada", with an effective date of June 30, 2023, was prepared and signed by:

(Signed) ***Luke Evans***

Dated at Toronto, ON
September 29, 2023

Luke Evans, M.Sc., P.Eng., ing

(Signed) ***Jeremy Ison***

Dated at Perth, Australia
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29. CERTIFICATES OF QUALIFIED PERSONS

SLR Consulting (Canada) Ltd.
55 University Ave., Suite 501, Toronto, ON M5J 2H7

September 29, 2023

I, Luke Evans, M.Sc., P.Eng., ing, as an author of this report entitled “Technical Report on the James Bay Lithium Project, Québec, Canada” with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1. I am Global Technical Director – Geology Group Leader, and Principal Geologist with SLR Consulting (Canada) Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.

2. I am a graduate of University of Toronto, Ontario, Canada, in 1983 with a Bachelor of Science (Applied) degree in Geological Engineering and Queen’s University, Kingston, Ontario, Canada, in 1986 with a Master of Science degree in Mineral Exploration.

3. I am registered as a Professional Engineer and a Consulting Engineer in the Province of Ontario (Reg. #90345885) and as a Professional Engineer in the Province of Quebec (Reg. # 105567). I have worked as a professional geologist for a total of 39 years since my graduation. My relevant experience for the purpose of the Technical Report is:

    - Consulting Geological Engineer specializing in resource and reserve estimates, audits, technical assistance, and training since 1995.
    - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements.
    - Senior Project Geologist in charge of exploration programs at several gold and base metal mines in Quebec.
    - Project Geologist at a gold mine in Quebec in charge of exploration and definition drilling.
    - Project Geologist in charge of sampling and mapping programs at gold and base metal properties in Ontario, Canada.

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 visited the James Bay Lithium Project on June 6 to 7, 2023.

6. I am responsible for Sections 1.1, 1.21 to 1.2.4, 1.2.6, 1.3.1, 2 to 4, 6 to 12, 14, 23, 25.1.1, 25.2.1, 26.1, and contributions to Section 27 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, Sections 1.1, 1.21 to 1.2.4, 1.2.6, 1.3.1, 2 to 4, 6 to 12, 14, 23, 25.1.1, 25.2.1, and 26.1

in the Technical Report, for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 29th day of September 2023,

(Signed) ***Luke Evans***

Luke Evans, M.Sc., P.Eng., ing

CERTIFICATE OF QUALIFIED PERSON

QV1- Level 3, 250 St Georges Tce, Perth
Western Australia 6000

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Western Australia 6850

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To Accompany the Report entitled:

"Technical Report on the James Bay Lithium Project, Québec, Canada"

I, Jeremy Ison, B. Eng. Metallurgical Engineering, as an author of this report entitled "Technical Report on the James Bay Lithium Project, Québec, Canada" with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1. I am currently employed as Principal Process Engineer with Wave International Pty Ltd in an office located at Level 3, 250 St Georges Terrace, Perth WA 6000.
2. I have graduated from the South Australian University of Technology with a B. Eng. in Metallurgical Engineering in 1991.
3. I am a Fellow of the Australian Institute of Mining and Metallurgy (Membership Number 107238).
    - I have practiced my profession continuously in the mining industry since my graduation from university.
    - I have been involved in mining operations, engineering and financial evaluations for over 30 years, including testwork management, process design, metallurgical manager and consulting activities across a broad range of minerals.
4. I have read the definition of "qualified person" set out in the National Instrument 43-101 (NI 43-101") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I did not visit the site of the James Bay Lithium project.
6. I am responsible for the preparation of sections and sub-sections: 1.2.5, 1.2.8, 1.3.4, 13, 17, 25.1.3, 25.2.2, 26.4 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. My prior involvement with the property that is the subject of the Technical Report includes being a Principal Process Engineer during; Value Engineering, PEA, FEED and Detailed Design stages of the project.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

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10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report sections and sub-sections: 1.2.5, 1.2.8, 1.3.4, 13, 17, 25.1.3, 25.2.2, 26.4, in the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 29th day of September 2023

(Signed and Sealed) Jeremy Ison

Name: Jeremy Ison, B. Eng. in Metallurgical Engineering
Title: Principal Process Engineer
Company: Wave International

SLR Consulting (Canada) Ltd.
55 University Ave., Suite 501, Toronto, ON M5J 2H7

September 29, 2023

I, Normand L. Lecuyer, P.Eng., ing., as an author of this report entitled "Technical Report on the James Bay Lithium Project, Québec, Canada" with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1. I am Associate Principal Mining Engineer with SLR Consulting (Canada) Ltd, of Suite 501, 55 University Ave., Toronto, ON M5J 2H7.
2. I am a graduate of Queen's University, Kingston, Canada, in 1976 with a B.Sc. (Hons.) degree in Mining Engineering.
3. I am registered as a Professional Engineer in the provinces of Ontario (Reg. #26055251) and Québec (Reg. #34914). I have worked as a mining engineer for a total of 42 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Review and report as a consultant on numerous exploration and mining projects around the world for due diligence and regulatory requirements.
   - Vice-President Operations for a number of mining companies.
   - Mine Manager at an underground gold mine in Northern Ontario, Canada.
   - Manager of Mining/Technical Services at a number of base-metal mines in Canada and North Africa.
   - Vice-President Engineering at two gold operations in the Abitibi area of Quebec, Canada.
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 have not visited the James Bay Lithium Project.
6. I am responsible for 1.2.7, 1.2.10, 1.2.12 (Mining), 1.2.13, 1.3.2, 15, 16, 19, 21.1.2, 21.2.5, 21.3.1, 22, 25.1.2, and 26.2 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 Sections 1.2.7, 1.2.10, 1.2.12 (Mining), 1.2.13, 1.3.2, 15, 16, 19, 21.1.2, 21.2.5, 21.3.1, 22, 25.1.2, and 26.2, for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 29th day of September, 2023,

/s/ Normand L. Lecuyer **Normand L.**

Lecuyer, P.Eng., ing.

CERTIFICATE OF QUALIFIED PERSON

QV1- Level 3, 250 St Georges Tce, Perth
Western Australia 6000

PO Box 7085, Cloisters Square
Western Australia 6850

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To Accompany the Report entitled:

"Technical Report on the James Bay Lithium Project, Québec, Canada"

I, Robin Frank Macaskill, B. Eng. Mechanical Engineering, as an author of this report entitled "Technical Report on the James Bay Lithium Project, Québec, Canada" with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1. I am currently employed as Chief Operating Officer and Principal Mechanical Engineer with Wave International Pty Ltd in an office located at Level 3, 250 St Georges Terrace, Perth WA 6000.
2. I have graduated from the University of Pretoria with a B. Eng. in Mechanical Engineering in 1995.
3. I am a chartered professional engineer with the Institution of Engineers Australia (Membership Number 2966036).
    - I have practiced my profession continuously in the petro-chemical and mining industry since my graduation from university.
    - I have been involved in consulting engineering in the mining industry for over 20 years, including minerals process plant design and consulting activities across a broad range of minerals.
4. I have read the definition of "qualified person" set out in the National Instrument 43-101 (NI 43-101") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101.
5. I did not visit the site of the James Bay Lithium project.
6. I am responsible for the preparation of sections and sub-sections: 1.2.9, 1.2.12 (Process), 21.3.2 – 21.3.4 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. My prior involvement with the property that is the subject of the Technical Report includes being a Principal Process Engineer during; Value Engineering, PEA, FEED and Detailed Design stages of the project.
9. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1.

CERTIFICATE OF QUALIFIED PERSON

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Western Australia 6000

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10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Technical Report sections and sub-sections: 1.2.9, 1.2.12 (Process), 21.3.2 – 21.3.4, in the Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated this 29th day of September 2023

"Original signed and sealed by Robin Frank Macaskill"

Name: Robin Frank Macaskill, B Eng (Mechanical), MIEAust CPEng, NER, MBA, GAICD
Title: COO, Principal Mechanical Engineer
Company: Wave International Pty Ltd

CERTIFICATE OF QUALIFIED PERSON – PIERRE GROLEAU

I, Pierre Groleau, P.Eng., as an author of this report entitled "Technical Report on the James Bay Lithium Project, Québec, Canada" with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1. I am a Senior Principal with WSP Canada Inc., with an office located at 7250 Rue du Mile-End, 3rd Floor, Montreal, QC, H2R 3A4, Canada.
2. I am a graduate of École Polytechnique de Montréal with a Bachelor of Applied Science in Geological Engineering, undergraduate in 1994, Master in 1996.
3. I am registered as a Professional Engineer in the Province of Quebec (Reg.# 117455). I have worked as a consulting engineer for a total of 27 years since my graduation. My relevant experience for the purpose of the Technical Report is:
   - Hydrogeology, Environmental Studies and Permitting, Social or Community Impact
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 site of the James Bay Lithium project. The requirement for a site visit is not applicable to me.
6. I am responsible for Sections 1.2.11, 1.3.5, 20, and 26.5 of the Technical Report.
7. I am independent of the Issuer, the Vendor and the James Bay Lithium Project as described in Section 1.5 of the National Instrument 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 43-10. The part of the Technical Report for which I am responsible has been prepared in compliance with this Instrument.
10. At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Sections of Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated September 29, 2023

/signed and sealed/

Pierre Groleau, P.Eng. (QC)

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CERTIFICATE OF QUALIFIED PERSON – DARRIN JOHNSON

I, Darrin Johnson, P. Eng., as an author of this report entitled "Technical Report on the James Bay Lithium Project" with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1) I am a Senior Principal Geotechnical Engineer at WSP Canada Inc. with an office located at 6925 Century Avenue, Mississauga, ON, L5N 7K2, Canada.

2) I am a graduate of Queen's University in Kingston, Ontario with a Bachelor of Applied Science in Civil and Geotechnical Engineering, Undergraduate in 1996, Masters in 1998.

3) I am registered as a Professional Engineer in the Province of Ontario (License Number: 90474396). I have worked as a geotectchnical engineer for a total of 25 years since my graduation. My relevant experience for the purpose of the Technical Report is:

   - geotechnical engineering related to tailings and mine waste management.

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 site of the James Bay Lithium project. The requirement for a site visit is not applicable to me.

6) I am responsible for Sections 1.3.3.1, 1.3.3.2, 18.2, 18.3, 18.4.2 (water management pond geotechnical design), 25.2.3 and 26.3 of the Technical Report.

7) I am independent of the Issuer, the Vendor and the James Bay Lithium Project as described in Section 1.5 of the National Instrument 43-101.

8) My prior involvement with the property that is the subject of the Technical Report is as follows: Waste Rock Tailings Storage Facility and Overburden Peat Storage Facility Value Engineering and Preliminary Economic Assessment.

9) I have read National Instrument 43-101. The Sections of the Technical Report for which I am responsible have been prepared in compliance with this Instrument.

10) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the Sections of Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated 29th day of September 2023.

Signed and Sealed

Darrin Johnson, P.Eng. (ON)
WSP Canada Inc.

CERTIFICATE OF QUALIFIED PERSON – JOAO PAULO LUTTI

I, Joao Paulo Lutti, P. Eng., as an author of this report entitled "Technical Report on the James Bay Lithium Project, Québec, Canada" with an effective date of June 30, 2023, prepared for Allkem Limited, do hereby certify that:

1) I am a Principal Water Resources Engineer at WSP Canada inc. with an office located at 1600 Rene-Levesque Blvd. West, 16th Floor, Montreal, H3H 1P9 Canada.

2) I am a graduate of *Universidade Catolica de Minas Gerais* - Brazil with a B.Sc. in Civil Engineering, Undergraduate in 2003.

3) I am registered as a Professional Engineer in the Province of Quebec (Reg.# 5031697). I have worked as a consulting Engineer for a total of 19 years since my graduation. My relevant experience for the purpose of the Technical Report is:

   - Water resources engineering related to planning and design of drainage infrastructure for clean water diversion and contact water management.

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 site of the James Bay Lithium project.

6) I am responsible for sections 1.3.3.3 and 18.4 (clean water diversion and contact water management) of the Technical Report.

7) I am independent of the Issuer, the Vendor and the James Bay Lithium Project applying the test set out in Section 1.5 of NI 43-101.

8) My prior involvement with the property that is the subject of the Technical Report is as follows: Water Management Pond and Site-wide Water Balance for the Preliminary Economic Assessment.

9) I have read NI 43-101. The sections of the Technical Report for which I am responsible has been prepared in compliance with this instrument.

10) At the effective date of the Technical Report, to the best of my knowledge, information, and belief, the sections of Technical Report for which I am responsible, contain all scientific and technical information that is required to be disclosed to make the Technical Report not misleading.

Dated 29th day of September 2023.

/signed and sealed/

Joao Paulo Lutti, P.Eng. (QC)

CERTIFICATE OF QUALIFIED PERSON

To Accompany the Report entitled:

"Technical Report on the James Bay Lithium Project, Québec, Canada", prepared for Allkem Limited effective as of June 30, 2023 (the "Technical Report").

I, Joël Lacelle, do hereby certify that:

1) I am Vice President, Engineering and Construction for G Mining Services Inc. ("GMS") with an office at D-200, 7900 Taschereau Blvd, Brossard, Québec, J4X 1C2.
2) I have graduated from University of Sherbrooke, Canada with a BA.Sc. in Electrical Engineering in 1988.
3) I am a Professional Engineer registered with the Ordre des ingénieurs du Québec, licence no. 99461.
4) I have been involved in mining operations, engineering, and construction for over 30 years, including design and build of all type of infrastructures such as power plant and transmission line, roads, buildings, and all surrounding services. This has included work at the Lundin Gold - Fruta del Norte Project, the Stornoway Diamond Project and work on other pre-feasibility and feasibility studies.
5) I have read the definition of "qualified person" set out in the National Instrument 43-101 ("NI 43-101") and certify that by reason of my education, affiliation with a professional association and past relevant work experience, I fulfil the requirements to be a qualified person for the purposes of NI 43-101.
6) I visited the Project September 25,2023.
7) I am responsible for the preparation of Sections 1.2.9, 1.2.12 (excluding Process and Mining OPEX), 5, 18.1, 18.5 – 18.19, 21.1.1, 21.2 (excluding 21.2.5 and 21.2.6), 24, 25.2.4, and 25.2.5 of the Report.
8) As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections and sub-sections of the Technical Report listed in item 7 above contain all scientific and technical information that is required to be disclosed to make these sections and sub-sections of the Technical Report not misleading.
9) I have had prior involvement with the property that is the subject of the Technical Report during the Feasibility Study.
10) I have read NI 43-101 and believe that the sections and sub-sections of the Technical Report listed in item 7 above have been prepared in accordance with NI 43-101.
11) I have read and understand NI 43-101 and I am considered independent of the issuer as defined in section 1.5 of NI 43-101 Rules and Policies.

Dated this 29th day of September, 2023,

/signed and sealed/

Joël Lacelle, P.Eng.
VP, Engineering and Construction
G Mining Services Inc.