Sal de Vida Project
Salar del Hombre Muerto
Catamarca, Argentina
NI 43-101 Technical Report

GUNN METALLURGY
Consulting to the Minerals Industry

MONTGOMERY & ASSOCIATES

Ausenco

Prepared for:

Galaxy Lithium (Sal de Vida) S.A.
(A member of the Allkem group of companies)

Effective Date:

31 March 2022

Prepared by:

Michael Rosko, M. Sc., P.Geo.
Michael Gunn, B. App. Sc., FAusIMM
Scott Weston, P.Geo.

IMPORTANT NOTICE

This report was prepared as a National Instrument 43-101 Technical Report for Galaxy Lithium (Sal de Vida) S.A. (a member of the Allkem group of companies). The quality of information, conclusions, and estimates contained herein is consistent with the level of effort involved in the contributor services, based on i) information available at the time of preparation, ii) data supplied by outside sources, and iii) the assumptions, conditions, and qualifications set forth in this report. This report is intended for use by Galaxy Lithium (Sal de Vida) S.A. and subject to terms and conditions of its contract with its contributors. Except for the purposed legislated under Canadian provincial and territorial securities law, any other uses of this report by any third party is at that party´s sole risk.

FORWARD LOOKING STATEMENT

Certain information and statements contained in this section and in the Report are "forward looking" in nature. Actual events and results may differ materially from those described in the forward-looking statements as a result of a variety of risks, uncertainties and other contingencies including business, economic, political, competitive and social factors.

Forward-looking statements include, but are not limited to, statements with respect to the economic and study parameters of the Project; Brine Resource and Brine Reserve estimates (including, but not limited to, geological interpretation, grades, extraction and mining recovery rates, hydrological and hydrogeological assumptions); the cost and timing of any development of the Project; the proposed mine plan and mining methods; dilution and extraction recoveries; processing method and rates and production rates; projected metallurgical recovery rates; infrastructure requirements; capital, operating and sustaining cost estimates; the projected LOM and other expected attributes of the Project; the net present value (NPV) and internal rate of return (IRR) and payback period of capital; capital estimates and operating costs; commodity prices; the timing of the environmental assessment process; changes to the Project configuration that may be requested as a result of stakeholder or government input to the environmental assessment process; government regulations and permitting timelines; estimates of reclamation obligations; requirements for additional capital and environmental risks.

All forward-looking statements in this Report are necessarily based on opinions and estimates made as of the date such statements are made and are subject to important risk factors and uncertainties, many of which cannot be controlled or predicted. Material assumptions regarding forward-looking statements are discussed in this Report, where applicable. In addition to, and subject to, such specific assumptions discussed in more detail elsewhere in this Report, the forward-looking statements in this Report are subject to the following general assumptions:

- There being no significant disruptions affecting the timelines for exploration, development and operation of the Project;
- The availability of certain consumables and services and the prices for power and other key supplies being approximately consistent with assumptions in the Report;
- Labour and materials costs being approximately consistent with assumptions in the Report;
- Permitting and arrangements with stakeholders being consistent with current expectations as outlined in the Report;
- All environmental approvals, required permits, licences and authorizations being obtained from the relevant governments and other relevant stakeholders within the expected timelines indicated in the Report;

- No material changes in applicable royalties, foreign exchange or tax rates (including tax treatment) applicable to the Project;
- The availability of financing for planned development activities (if required).

The production schedules and financial analysis annualized cash flow table are presented with conceptual years shown. Years shown in these tables are for illustrative purposes only. If additional mining, technical, and engineering studies are conducted, these may alter the Project assumptions as discussed in this Report and may result in changes to the calendar timelines presented and the information and statements contained in this Report.

CERTIFICATE OF QUALIFIED PERSON

Michael J. Gunn

I, Michael J. Gunn, am an independent consultant with Gunn Metallurgy, located at 58 Deerhurst Road, Brookfield Qld, in Brisbane, Queensland, Australia, 4069.

This certificate applies to the technical report titled “Sal de Vida Project, Salar del Hombre Muerto, Catamarca, Argentina, NI 43-101 Technical Report” with an effective date of 31 March 2022 (the “Technical Report”).

I graduated from the University of New South Wales with a bachelor’s degree in Applied Science (Metallurgy) in 1975. I am a registered Fellow of the Australasian Institute for Mining and Metallurgy, member number 101634.

I have practiced my profession for 46 years. I have been directly involved in the testwork, design, commissioning, operation and management of numerous process plants, including the extraction of lithium from salar brines, and the technical review of many lithium and potash projects.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.

I have been involved with the Sal de Vida project during the period from 2021 to the present. I have not visited the Sal de Vida project area in the Salar del Hombre Muerto; however, I am familiar with the region having spent significant time in the similar Olaroz and Cauchari area to the north.

I am responsible for Sections 1.11, 1.14-1.17, 1.19–1.23, 1.24, 1.25, 3.5, 3.6, 13, 16-19, 21, 22, 25.1, 25.8–25.10, 25.12–25.17 and 27 of the Technical Report.

I am independent of Allkem and Galaxy Lithium as independence is described in Section 1.5 of NI 43-101. I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that instrument and certify that by reason of my education and past relevant work experience, I fulfill the requirements to be a Qualified Person for the purposes of NI 43-101.

As of the effective date of the Technical Report, to the best of my knowledge and the information provided, the sections of 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 the 20th day of May of 2022

Original “signed” by Michael J. Gunn

Michael J. Gunn
B.App.Sc.(Metallurgy), FAusIMM

CERTIFICATE OF QUALIFIED PERSON

Michael Rosko

I, Michael Rosko, am a registered member of the Society for Mining, Metallurgy and Exploration, member number 4064687, am employed as a Principal Hydrogeologist with Montgomery & Associates Consultores, Limitada, located at Avenida Vitacura 2771, Office 404, Las Condes, Santiago de Chile.

This certificate applies to the Technical Report titled “Sal de Vida Project, Salar del Hombre Muerto, Catamarca, Argentina, NI 43-101 Technical Report” with an effective date of 31 March 2022 (the “Technical Report”).

I graduated from the University of Illinois with a bachelor’s degree in geosciences in 1983, and from the University of Arizona with a master’s degree in geosciences in 1986. I am a registered professional geologist in the states of Arizona (25065), California (5236), and Texas (6359). I am a Registered Member of the Society for Mining, Metallurgy and Exploration, member #4064687.

I have practiced my profession for 36 years. I have been directly involved in design of numerous exploration and production well programs in salar basins in support of lithium exploration, and estimation of the lithium resources and reserves for many other lithium projects in Argentina and Chile.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.

I, Michael Rosko have been involved with the Sal de Vida project during the period from 2009 to present. I have visited the Sal de Vida project in Salar del Hombre Muerto during the course of the program, April 5–10, 2010, August 11–16, 2010, January 16–26, 2011, June 22–28, 2011 and August 15–20, 2011. Most recently, I have visited the property on April 13, 2018; representatives of Montgomery & Associates have been involved in ongoing field work in 2020 and 2021. During the 2020-2021 time period, the QP was not able to travel to Argentina from Chile during the construction of the production wells due to extreme travel restrictions imposed by both Chile and Argentina dur to the Covid pandemic.

I am responsible for Sections 1.3–1.10, 1.12, 1.13, 1.24, 1.25, 3.2, 4.1–4.9, 4.13, 5–12, 14, 15, 25.1–25.7, 25.17, 26.1–26.2.2, 26.3, 26.3.1, 26.3.2, and 27of the Technical Report.

I am independent of Galaxy Lithium as independence is described by Section 1.5 of NI 43-101.

I have read NI 43–101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument and certify that by reason of my education and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of 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 20th day of May of 2022

Original “signed and sealed” by Michael Rosko

Michael Rosko, M.Sc. CPG 25065
Montgomery & Associates Consultores Limitada

CERTIFICATE OF QUALIFIED PERSON

Scott Weston

I, Scott Weston, P. Geo., certify that I am employed as Vice President of Business Development Hemmera Envirochem Inc., a wholly owned subsidiary of Ausenco Engineering Canada ("Ausenco"), with an office address of 4515 Central Boulevard, Burnaby, BC, V5H 0C6, Canada.

This certificate applies to the technical report titled "Sal de Vida Project, Salar del Hombre Muerto, Catamarca, Argentina, NI 43-101 Technical Report" with an effective date of 31 March 2022 (the "Technical Report").

I graduated from the University of British Columbia, Vancouver, BC, Canada, in 1995 with a Bachelor of Science, Physical Geography, and from Royal Roads University, Victoria, BC, Canada, in 2003 with a Master of Science, Environment and Management. I am a Professional Geoscientist of Engineers and Geoscientists British Columbia; 124888.

I have practiced my profession for 25 years. I have been directly involved in the review of environment, social and permitting for projects of similar nature in South and North America.

As a result of my experience and qualifications, I am a Qualified Person as defined in National Instrument 43-101 Standards of Disclosure for Mineral Projects (NI 43-101) for those sections of the Technical Report that I am responsible for preparing.

I have not visited the Sal de Vida project site.

I am responsible for Sections 1.1, 1.2, 1.18, 1.24, 1.25, 2, 3.1, 3.3, 3.4, 4.10–4.12, 20, 25.1, 25.11, 25.17, 26.2.3, 26.3.3 and 27 of the Technical Report.

I am independent of Galaxy Lithium as independence is described by Section 1.5 of NI 43-101.

I have read NI 43-101 and the sections of the Technical Report for which I am responsible have been prepared in compliance with that Instrument and certify that by reason of my education and past relevant work experience, I fulfill the requirements to be a "qualified person" for the purposes of NI 43-101.

As of the effective date of the Technical Report, to the best of my knowledge, information and belief, the sections of 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 20th day of May of 2022.

Original "signed and sealed" by Scott Weston

Scott Weston, P. Geo.

Contents

TABLES

FIGURES

1 SUMMARY

1.1 Introduction

Michael Rosko, Scott Weston, and Michael Gunn participated in the preparation and review of the NI 43-101 Technical Report (the Report) based on the results of a feasibility study for Stage 1 (2021 Feasibility Study) and a pre-feasibility study for Stages 2 and 3 (2021 Pre-Feasibility) prepared on the Sal de Vida Project (the Project) for Galaxy Lithium (Sal de Vida) S.A. (Galaxy), a wholly owned subsidiary of Allkem Ltd. (Allkem). Allkem, formerly known as Galaxy Resources Ltd., is the new name of Orocobre Ltd. after its merge with Galaxy Resources Ltd.

The report provides an update to the Sal de Vida Project, which includes increasing capacity from 10 kilotonne per annum (ktpa) to 15 ktpa for Stage 1 at feasibility level and consolidates Stages 2 and 3 from the 2021 FS (10.7 ktpa each) into a single expanded 30 ktpa lithium carbonate equivalent (LCE) stage. This is a long-term total production capability of 45 ktpa of Lithium Carbonate at pre-feasibility level.

Capital and operating costs presented in the report have been scaled up for the long-term total production of 45 ktpa of Lithium Carbonate. The Stage 1 wellfields, brine distribution, evaporation ponds, waste (wells and ponds) cost estimates are Class 2 ±10%, and the process plant & infrastructure cost estimates are Class 4 +30% / -20%. The scaled costs for Stage 2 are Class 4 +30% / - 20% with no escalation of costs in the context of long-term product pricing estimates.

Resources and Reserves have been updated as a result of the production well drilling campaign, and there is greater knowledge of the basin and Project expansion. The capital and operating costs have been updated, and the Environmental Impact Report (Environmental Impact Assessment) was approved.

1.2 Terms of Reference

This report has been prepared in accordance with NI 43-101 Standards of Disclosure for Mineral Projects and with the requirements of Form 43-101 F1.

The current Reserve Estimate presented in this report has been prepared in accordance with the 2019 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines, and the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (2014 CIM Definition Standards). The estimates also incorporate guidance provided in the 2011 Ontario Securities Commission (OSC) document entitled OSC Staff Notice 43-704 – Mineral Brine Projects and National Instrument 43-101 Standards of Disclosure for Mineral Projects (2011 OSC Staff Notice).

Units used in the report are metric units unless otherwise noted. Monetary units are in United States dollars (US$) unless otherwise stated. The monetary unit for Argentina is the Argentinean peso (AR$).

The Sal de Vida Project will be developed in two stages to reach an annual production of 45,000 tonnes per annum (tpa) of lithium carbonate. A feasibility study was completed for Stage 1 and a pre-feasibility study for Stage 2. The Report covers all stages of the Sal de Vida Project.

1.3 Project Setting

The Sal de Vida Project is located approximately 1,400 kilometres (km) northwest of Buenos Aires, Argentina, within the Salar del Hombre Muerto in the Province of Catamarca, 650 km from the city of Catamarca via Antofagasta de la Sierra and 390 km from the city of Salta via San Antonio de los Cobres.

The nearest villages are Antofagasta de la Sierra in Catamarca Province, 145 km south of the Project site, and San Antonio de los Cobres in Salta Province, 210 km north of the Project site.

The main route to the Project site is from the city of San Fernando del Valle de Catamarca via National Route 40 to Belen, and provincial route 43 through Antofagasta de la Sierra to the Salar del Hombre Muerto. The road is paved all the way to Antofagasta de la Sierra and continues unpaved for the last 145 km to Salar del Hombre Muerto. This road is well maintained and serves Livent Corporation's Fenix lithium operations, Galan Lithium Ltd.'s Hombre Muerto Project and Galaxy's Sal de Vida Project.

The shortest route to site is from Salta via San Antonio de los Cobres. The access road is paved for the first 75 km to San Antonio de los Cobres and continues unpaved for 215 km to the Salar del Hombre Muerto. The total distance between the city of Salta and the Sal de Vida Project is 390 km. International cargo could use a combination of ports in the Buenos Aires region of Argentina and the Antofagasta region of Chile. For the purposes of the 2021 Feasibility Study, two Chilean ports were selected. The Port of Antofagasta is an inbound port and could be used by Galaxy for the import of 50% of the soda ash requirements. The Port of Angamos is an outbound port and could be used by Galaxy for lithium carbonate export via the Pacific Ocean.

The Project is located in the Puna ecoregion of the Altiplano where the climate is extremely cold and dry. Rainfall is generally restricted to the summer months (December to March). Solar radiation is intense, especially during the summer months of October through March leading to high evaporation rates. The area is extremely windy; wind speeds of up to 80 kilometres per hour (km/h) have been recorded during the dry season. Operations are planned to be conducted year-round.

The Project is located in a flat plain at an altitude of about 4,000 m. Two major perennial streams feed the salar from the south, the Río de los Patos and the Rio Trapiche. Vegetation in the Puna is sparse, reflecting the high-altitude desert environment, and consists of low woody herbs (0.40 – 1.5 m), grasses, and cushion plants. There is no vegetation on the salar itself.

1.4 Mineral Tenure, Surface Rights, Water Rights, Royalties, and Agreements

All of Sal de Vida Project's mining tenement interests are held by Galaxy.

Galaxy currently has mineral rights over 26,253 ha at Salar del Hombre Muerto, which are held under 31 mining concessions.

The Argentine Mining Code (AMC) sets out rules under which surface rights and easements can be granted for a mining operation. The AMC provides the mining right holder with the right to exploit the mineral from the granted area. In the event that there is a superficial land holder over the area, the mining right holder must indemnify the land holder. All of Galaxy's tenements sit on fiscal land with no private land holders.

Water use rights may be acquired by permit, by concession, and, under laws enacted in some Provinces, through authorization.

Galaxy has acquired the following mining easements through legal and judicial processes:

- Water easements: granted on July 4, 2013, under File No 04/2013. A petition for a new water easement for exclusive use was filed on September 8, 2016, and was granted on December 23, 2020, under File No 66/2016;
- Camp easements: granted on May 17, 2017, under File No 166/2011;

- Infrastructure and service easements: granted on July 4, 2013, under File No 18/2013. A petition for a new infrastructure and services easement for exclusive full use over the mining property was filed on September 20, 2019, and was granted on December 23, 2020, under File No 94/2019.

All the mining concessions for the Sal de Vida Project were secured under purchasing agreements with pre-existing owners and claimants. In some cases, sellers retained usufruct (a legal right accorded to a person or party that confers the temporary right to use and derive income or benefit from someone else's property) rights and commercial rights (third-party rights) for the development of ulexite (borates) at surface. The transfer deeds establish that the lithium property holder, Galaxy, has priority over these rights. Galaxy has retained the option to buy out any of these rights if it considers it necessary at any point in time.

As per Federal Mining Investment law, Provincial royalties that can be levied are limited to no more than 3.5% of the mine head value of the extracted ore, which can be approximated as the sales price less direct cash costs related to exploitation (excluding fixed asset depreciation).

The Project is not subject to any known environmental liabilities other than those actions and remedies indicated in the Environmental Impact Study Approval.

1.5 Geology and Mineralization

The Sal de Vida deposit is a brine system. The salar system in the Hombre Muerto basin is considered to be typical of a mature salar. Several salars in the lithium triangle contain relatively high concentrations of lithium brine due to the presence of lithium-bearing rocks and local geothermal waters associated with Andean volcanic activity. Such systems commonly have a large halite core and are characterised by having brine as the main aquifer fluid at least in the centre and lower parts of the aquifer system. The Hombre Muerto basin has an evaporite core that is dominated by halite. Basin margins are steep and are interpreted to be fault controlled. The east basin margin is predominantly Pre-Cambrian metamorphic and crystalline rocks. Volcanic tuff and reworked tuffaceous sediments, together with tilted Tertiary rocks, are common along the western and northern basin margins. In the Sal de Vida Project area, the dip angle of Tertiary sandstone is commonly about 45˚ to the southeast. Porous travertine and associated calcareous sediments are common in the subsurface throughout the basin and are flat lying; these sediments appear to form a marker unit that is encountered in most core holes at similar altitudes. Several exploration boreholes located near basin margins completely penetrated the flat-lying basin-fill deposits, and have bottomed in tilted Tertiary sandstone, volcanic tuff, and/or micaceous schist.

Fine-grained lacustrine deposits are common throughout the exposed basin floor of Salar del Hombre Muerto. These deposits are interpreted to have low hydraulic conductivity. Tertiary sediments along the west and north basin boundaries exhibit drainable porosity, and conceptually approximate “low-flow” boundaries that are expected to contribute brine to the basin-fill deposit aquifers. Metamorphic and crystalline bedrock along the east basin margin is expected to have low hydraulic conductivity and should approximate a “no-flow” groundwater boundary during extraction of brine from basin-fill deposit aquifers by pumping wells.

The most notable source of fresh water to Salar del Hombre Muerto is the Río de los Patos drainage that enters the basin from the southeast. The low vertical permeability of the salar sediments, combined with the density difference between surface water inflow and deep brine, restrict the vertical circulation of fresh water entering the salar from the Río de los Patos.

Sal de Vida’s brine chemistry has a high lithium grade, low levels of magnesium, calcium and boron impurities, and readily upgrades to battery-grade lithium carbonate. Dense brine was observed as the interstitial fluid at all depths in the basin, typically increasing brine density with depth. Other chemical constituents including lithium and potassium generally also increase linearly with density, although the exact relationships vary somewhat throughout the basin. For this reason, the pattern observed for density also applies to total dissolved solids (TDS) and other brine constituents.

Long-term hydrological pump testing under operating conditions has demonstrated excellent brine extraction and aquifer recharge rates to support the production design basis. Results of core drilling indicate that basin-fill deposits in Salar del Hombre Muerto can be divided into hydrogeological units that are dominated by six lithologies, all of which have been sampled and analysed for both drainable porosity and brine chemistry, except for a micaceous schist unit. No brine samples were obtained from the micaceous schist.

The knowledge of the hydrogeological systems is sufficient to support Brine Resource and Brine Reserve estimation.

1.6 History

The Project was established in 2009 by a consortium of Canadian and Korean shareholders of which Lithium One, a public company listed on the Toronto Stock Exchange, was the lead partner. Work completed by Lithium One included ground magnetic geophysical surveys, trenching and sampling, drilling, completion of a Brine Resource estimate, a preliminary economic assessment (PEA), and a feasibility study assuming production of lithium carbonate and potassium chloride.

Galaxy gained control over the Project in 2012 following a takeover of Lithium One. Since that date, Galaxy has completed core drill programs, short-term and constant-rate pumping tests, mining and process studies, constructed pilot ponds and operated a pilot plant, updated Brine Resource and Brine Reserve estimates, updated risk assessments, conducted baseline studies, completed an Environmental Impact Report, estimated and refined and capital and operating costs, prepared two feasibility study updates (one in 2018 and the second in 2021), and obtained the DIA permit to construct and operate Stage 1.

1.7 Exploration

In 2009, mineral exploration began on the Salar del Hombre Muerto with three shallow pit campaigns performed by Lithium One, the first being completed in support of due diligence to acquire the Project and the two subsequent campaigns to obtain data on near-surface geology, subsurface water levels, brine chemistry and physical parameters throughout the Project. Multiple geophysical campaigns were completed for subsurface interpretations including gravity, vertical electric soundings and transient electromagnetic surveys. A gravity survey was conducted by Galaxy in 2021 to estimate the depth to bedrock in the salar.

1.8 Drilling

Drilling was conducted in several phases. These were broken out into Phase 1 to 6, with Phase 1 commencing in 2009, and Phase 6 East Wellfield development during the period 2020 to 2021. A total of 40 brine well, core, and reverse circulation (RC) drill holes (5,570 m) have been completed as of the Report's effective date (

Table 1-1).

Unwashed and washed drill cuttings from the exploration and RC wells were described and stored in labelled plastic cutting boxes. Core was described at 1-m intervals. Downhole geophysical logging was completed for the Phase 4 to Phase 6 programs and consisted of resistivity and spontaneous-potential surveys, with three wells having in addition magnetic-resonance, spectral gamma ray, and image logs. Recovery percentages of drill core were recorded for each core hole; percent recovery was excellent for most of the samples obtained, except for weakly cemented, friable clastic sediments. Drill hole collars were located using differential global positioning system (GPS) instruments, or hand-held portable GPS equipment.

Table 1-1: Drill Summary Table

Drilling Phase	Duration	Note	Comments
Phase 1	2009 to early 2011	Core holes	Nine conventional core holes. Core was logged, recovery recorded, and the holes were analysed for drainable porosity and brine chemistry. Results from Phase 1 indicated that basin-fill deposits in Salar del Hombre Muerto could be divided into hydrogeological units dominated by five lithologies, all of which had been sampled and analysed for drainable porosity.
		Brine exploration wells	Six small diameter shallow wells were completed and one well (SVH10_04B) was used for pilot plant brine supply. Work included geological control with cutting sampling and lithological description and physical-chemical analysis of brine samples.
Phase 2	2011	Core holes	Six core holes. The measured depth to water below the land surface was 3 m for all wells. Analytical results for drainable porosity and brine chemistry are available for all core holes. For each core hole, electrical conductivity and temperature were measured at 2 – 5 m intervals using an Aquatroll 200 downhole electrical conductivity probe. Using the results from the downhole electrical conductivity profiles, it was possible to identify raw-water influences in the upper part of four core holes.
		Brine exploration wells	Nine brine exploration wells and one reverse circulation (RC) well. Short-term pumping tests were completed on brine exploration wells SVWW11_02 and SVWW11_04 to SVWW11_13.
Phase 3	2012	Brine exploration wells	Five wells. Short-term (24-hour) pumping tests were conducted at each well. The pumping rate was measured using a Krohne magnetic flowmeter. Water-level measurements were taken using both electric water level sounders, and non-vented in-situ LevelTroll pressure transducers/dataloggers. Water level recovery after pumping was measured for all wells for a period of time at least equal to the pumping period. Distance from pumped wells to observation well ranged from 25 – 130 m. Drawdown data were analysed for aquifer transmissivity. The results confirmed potential for production in the western and eastern areas. A recommendation was made to perform 30-day pumping tests in both areas and confirm the viability for long-term production.
Phase 4	2017	Brine exploration wells	One well completed. Activities included geological wireline logging with spontaneous-potential, long and short induction, sample splitting, lithological descriptions, and downhole brine sampling. Results from this well confirmed that the tested zone had production potential and a recommendation was made to perform a 30-day pumping test in this area and confirm the viability for long-term production.
Phase 5	September 2018 to March 2019	Brine exploration wells	Two wells completed. Short-term pumping tests conducted. Brine samples were obtained at regular intervals from the discharge pipeline. Drawdown and recovery data were analysed. The laboratory results support the interpretation that the wells may have been perforated in both the upper freshwater aquifer and the lower brine aquifer. This program provided geological and brine chemistry data that were used to characterise the southeastern area.

Drilling Phase	Duration	Note	Comments
Phase 6	Commenced in Q4 2020. Finalized in Q4 2021.	Production wells	Eight production wells constructed and tested in the east sub-basin. Eight wells completed. Activities included geological wireline logging with spontaneous-potential, long and short induction, borehole magnetic resonance, spectral gamma ray and lithological descriptions. Short-term (36-72hour) pumping tests were conducted at each well. The pumping rate was measured using a Rosemount magnetic flowmeter and a v-notch tank. Water-level measurements were taken using both electric water level sounders, and non-vented Solinst® Levelogger pressure transducers/dataloggers. Water level recovery after pumping was measured for all wells for a period of time at least equal to the pumping period. Distance from pumped wells to observation well ranged from 6.74 – 2,438 m. Drawdown data were analyzed for aquifer transmissivity. This program was planned to develop the first production wellfield to provide brine to the evaporation ponds as part of the process to concentrate and obtain lithium from the brine.
	Commenced in Q4 2021. Finalized in Q1 2022.	Fresh water well	One freshwater well completed, located southeast area of the properties. Activities included geological wireline logging with long and short resistivities, conductivity, gammaray, temperature. Data from pumping test are still pending.

1.9 Sampling

Porosity samples were collected during 2010, 2011, and 2012 from intact HQ (63.5 mm core diameter) and NQ (47.6 mm) size core. In addition to the depth-specific brine samples obtained by drive points during coring, brine samples used to support the reliability of the depth-specific samples included analyses of brine centrifuged from core samples, brine obtained from low-flow sampling of the exploration core holes, brine samples obtained near the end of the pumping tests in the exploration wells, and brine samples obtained during reverse-circulation air drilling. Porosity analyses were conducted by Core Laboratories, which has ISO 9000:2008 accreditations. The laboratory is independent of Galaxy. Brine chemistry samples were analysed by Alex Stewart, a laboratory that has extensive experience in analysing lithium-bearing brines. Alex Stewart is accredited to ISO 9001 and operates according to Alex Stewart Group standards that consistent with ISO 17025 methods at other laboratories. The laboratory is independent of Galaxy. Selected duplicate samples were sent to the University of Antofagasta, Chile, as part of the quality assurance and quality control (QA/QC) procedure. The University of Antofagasta laboratory is not ISO certified, but has extensive experience in the analysis of brines of samples submitted from all over South America. The laboratory is independent of Galaxy. The ACME Santiago laboratory (ACME) was also used for check analysis. The laboratory is ISO 9001 certified and independent of Galaxy. Duplicate samples were also sent to ALS Chemex in Mendoza for check analyses. The ALS Chemex laboratory is ISO 17025 and ISO 9001:2000 accredited. These samples were transferred from the ALS Chemex preparation facility in Mendoza to the laboratory facility in Santiago for analysis. The laboratory is independent of Galaxy.

Neither porosity (core) nor chemistry (brine) samples were subjected to any further preparation prior to shipment to participating laboratories. After the samples were sealed on site, they were stored in a cool location, and then shipped in sealed containers to the laboratories for analysis.

The laboratory analytical procedure for drainable porosity was conducted using a centrifuge method. After drainable porosity measurements had been completed, the centrifuge plug samples were analysed for total porosity. Physical parameters, such as pH, conductivity, density, and TDS were directly determined from the brine samples. Analysis of lithium, potassium, calcium, sodium and magnesium was achieved by fixed dilution of filtered samples and direct aspiration into atomic absorption (AA) or inductively coupled plasma (ICP) instruments.

Analytical quality was monitored through the use of randomly inserted quality control samples, including standard reference materials (SRMs), blanks and duplicates, as well as check assays at independent laboratories. Each batch of samples submitted to the laboratory contained at least one blank, one low-grade SRM, one high-grade SRM and two sample duplicates. Approximately 38% of the samples submitted for analysis were quality control samples.

All data were transferred into a central data repository managed by Galaxy personnel. The database was originally located in Denver, Colorado and later synchronised with a data repository in the Galaxy offices in Argentina, and a separate data repository at Montgomery and Associates' offices in Tucson, Arizona. Field data were transferred by field personnel into customised data entry templates. Field data were verified before being uploaded into the Access database using the methodology of crosschecking data between field data sheets and Excel tables loaded in the server. Data contained in the templates were loaded using an import tool, which eliminated data reformatting. Data were reviewed after database entry. Laboratory assay certificates were directly loaded into the Access database, using an import tool. Quality control reports were automatically generated for every imported assay certificate and reviewed by to ensure compliance with acceptable quality control standards. Failures were reported to the laboratory for correction. The drainable porosity and chemistry data to support the Brine Resource estimates were verified. These verifications confirmed that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for Brine Resource estimation purposes.

Sample collection, preparation, analysis and security for the drill programs are in line with industry-standard methods for brine deposits. Drill programs included Quality Assurance/Quality Control (QA/QC measures. QA/QC program results do not indicate any problems with the analytical programs. The Qualified Person (QP) is of the opinion that the quality of the analytical data is sufficiently reliable to support Brine Resource and Brine Reserve estimation.

1.10 Data Verification

Initial data verification was completed in support of technical reports on the Project. These verifications confirmed that the analytical results delivered by the participating laboratories and the digital exploration data are sufficiently reliable for the purpose of Brine Resource estimation.

Montgomery and Associates personnel verified the drainable porosity and chemistry data used for the Brine Resource estimates. These verifications support that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for the Brine Resource and Brine Reserve estimations outlined in this Report.

Verification by QP comprises field exploration and drilling and testing activities, including descriptions of drill core and cuttings; laboratory results for drainable porosity and chemical analyses, including quality control results; and review of surface and borehole geophysical surveys.

1.11 Metallurgical Testwork

1.11.1 Laboratory Tests

Galaxy conducted a series of internal and external testwork programs to determine the feasibility of producing battery-grade (BG) lithium carbonate. A conventional brine flowsheet was initially investigated that used standard industry unit operations for lithium brine processing. The initial design also included a potash plant for production of saleable potassium chloride, processed from the salts precipitated in the muriate solar ponds. Testwork in support of more detailed designs included evaporation rate dynamics, liming and concentration pathway testwork, applications of solvent extraction (SX), ion exchange (IX), softening, and crystallisation of lithium carbonate from the brines, process review and testwork programs to determine the most appropriate extractant for boron removal, bench-scale testwork for calcium and magnesium removal with sodium carbonate (Na_2CO_3), and IX scoping tests. This work showed that a primary-grade (PG) lithium carbonate could be produced from a 2.2 wt% Li brine, at a larger scale than bench work. The testwork also provided some insight into optimal conditions and the flowsheet arrangement.

The Australian Nuclear Science and Technology Organisation (now ANSTO Minerals; ANSTO) was contracted to provide ongoing validation testwork to support the 2021 Feasibility Study, in two work phases. Site brine samples were produced on-site for ANSTO testwork by evaporating wellfield brine in 6-m pans. The testwork was performed using 2.2 wt% Li evaporated brine samples. The first phase resulted in a simplified process flowsheet and recommended that the effect of liming as an impurity removal step be investigated. The ANSTO Stage 2 testwork was performed on a combination of synthetic and site-produced evaporated brines, targeting a range of lithium concentrations. The flowsheet was further modified to place liming between the two stages of evaporation ponds, rather than before or after. Additional work completed included flowsheet validation testwork, 'locked-cycle' testwork (replicating the inclusion of anticipated recycle streams) with site reagents, investigation into liming temperature, and solid – liquid separation assessment for liming, softening and crystallisation.

1.11.2 Piloting

In 2020 and 2021 Galaxy conducted a total of seven pilot "runs" using the purpose-built pilot ponds and pilot plant to validate laboratory testwork and explore operational considerations. Run 1 used synthetic brine for commissioning of the pilot plant with subsequent runs using site brine that had been evaporated from the pilot ponds. The pilot ponds consisted of 31 ponds of various sizes arranged in five strings (17 ha in total). Each string was used for a different activity or purpose.

In 2020 the ponds were primarily used for evaporation of raw brine for the pilot plant. The brine for Runs 2 and 3 was evaporated batchwise in Strings 4 and 5 to a lithium concentration of 0.7%, then consolidated into a single small pond, R5, to minimise further evaporation as it was processed through the liming plant. Following liming, the brine was evaporated to a 1.2% lithium concentration in another small pond, R4, before being transferred to storage tanks to feed the softening circuit. Strings 2 and 3 were used later in the year for batch evaporation, to produce 0.7% brine for 2021 piloting — Runs 4, 5, and 6. One of the smallest ponds, R3, was used for pilot plant waste storage. One of the largest ponds, H11, was filled with brine to build up a salt layer suitable for harvesting tests.

In 2021, Strings 4 and 5 were repurposed for a continuous pond operation to give the team experience in modelling and controlling a continuous system. Strings 2 and 3 were consolidated into a single pond and used to feed the liming plant for the Run 4 pilot plant operation when the concentration approached 0.7% Li. Small pond R4 was once again used to evaporate the brine post-liming, this time to a concentration 1.7%. Establishment of a salt layer continued in H11 throughout the year by keeping the pond topped up with brine.

In 2022, the continuous pond operation was expanded to include Strings 2 and 3 in a production style operation targeting a fixed concentration of 1.0% Li in the small storage pond B2. Salt harvesting was conducted in H11, which will produce the data for a report detailing the amount and composition of the entrained brine recovered and the properties of the harvested salt.

The pilot ponds are subject to routine surveys in which the levels of the brine and salt beds are measured. The temperature profile across the time of day is recorded to create a monthly profile. Pond samples are laboratory analysed for ion concentrations when needed to track the concentration path. Site evaporation rates are also measured using Class A Pans for validation of predicted evaporation rates and evaporation pond modelling parameters. Results so far have been consistent with expectations and have been used to inform the design of the commercial ponds.

Tests conducted in the pilot plant in 2020 included:

- Liming: the process included lime slaking, the liming reaction and solid – liquid separation to remove the solids produced. Only on-specification limed brine was produced, validating the laboratory testwork. A filter press cycle time of 40 min was achieved. The impact of commercial lime quality on slaking temperature and magnesium removal was examined, highlighting the impact of poor-quality lime on process control. Thickener data were obtained, validating the settling properties of the liming solids.
- Softening: caustic addition was followed by sodium carbonate addition in a series of cascading tanks, and the resulting slurry was filtered to remove the solids. Reduction of calcium and magnesium exceeded predictions. Excellent filtration performance, with cake moisture levels around 50% versus the expected 70%. Some of the solids exist as fine particulates which can pass through the filter press cloths. If not immediately filtered with a cartridge filter or similar, these solids can re-dissolve and re-introduce calcium and magnesium to the liquor. This highlights the importance of effective removal of fines immediately following press filtration and informed the large-scale plant design. Off-specification softened brine can be re-treated to bring the brine back to specification.
- Crystallization: brine was heated to 70°C and sodium carbonate was added to precipitate lithium as lithium carbonate, which was recovered by filtration. Over 600 kg of washed lithium carbonate cake was produced at approximately 30% moisture, after processing 17 m^3 of softened brine. Product quality depends strongly on having a stable process. Short circuiting, blockages and stopping/starting can cause major process upsets and reduce product quality. Validation of and improvement over laboratory testwork, with technical grade (99.5% lithium carbonate) achieved whenever the process was stable.

The pilot plant produced a variety of samples suitable for additional testwork. This testwork was conducted at external vendors' facilities and the results informed the design of the plant for optimum operational efficiency.

Toward the end of pilot Run 3 in 2020, several hypotheses were tested to understand their impact on the product quality. Results obtained during these tests indicated an improvement in product quality. This hypothesis was then confirmed in a controlled laboratory environment and showed that with minor circuit modifications, achieving a lithium carbonate product that meets industry specification for BG lithium carbonate was possible. High-grade product from Run 3 achieved BG specification in all elements except for calcium and magnesium.

Pilot plant operations in 2021 involved the implementation and testing of the circuit modifications necessary to achieve BG specification. The tests conducted included:

- Liming: Liming was shown to be effective across a broad range of feed concentrations, from 0.4% to 0.8% Li, demonstrating that the process is operationally robust. The limed brine produced by Run 4 liming was returned to the evaporation ponds for evaporation to 1.7% Li and used for all subsequent pilot plant runs.
- Softening: Three different softening operations were performed in 2021 as part of Runs 5–7, implementing a candle filtration step after the plate-and-frame filter to remove very fine solids and ion exchange columns post-filtration to remove and residual dissolved Ca and Mg. These operations demonstrated successful softening using 1.7% feedstock and optimised the product purity and recovery of the circuit by way of

dilution, reagent addition strategies and improved filtration. Ion exchange was also demonstrated to be effective to reduce Ca and Mg concentrations to <1 mg/L.

- Crystallisation: Three different crystallisation operations were performed in 2021 as part of Runs 5 – 7, with the softened brine from each run diluted to match the lithium tenor of 2020 operations. These operations involved an improved heating profile across the circuit, the improvement of centrifuge operation and product washing, and the testing of heat exchanger equipment and particle size control strategies. The operations demonstrated that BG lithium carbonate can be produced consistently with a flat circuit temperature profile between 80 and 86°C, efficient displacement washing within the centrifuge, a seed recycle ratio of 20 – 50% of total solids, proper mixing within reactor tanks and control over particle size by use of attritioning tanks, screening and/or cut size of cyclones.

The pilot program demonstrated that consistent production of BG lithium carbonate can be produced with the Sal de Vida process. It also allowed the site team to develop experience in evaporation ponds and process plant operation while testing a variety of equipment and instrumentation for suitability in the industrial plant.

1.12 Brine Resource Estimation

The deposit type is a brine aquifer within a salar basin. Brine deposits differ from solid phase industrial mineral deposits by virtue of their fluid (dynamic) nature. Because of the mobility the brines, the flow regimes and other factors such as the hydraulic properties of the aquifer material are just as important as the chemical constituents of the brine in establishing a Brine Resource estimate.

Resource estimation methods to characterise in-situ brine deposits must include two key components: characterisation of mineral grade dissolved in the brines, and characterisation of the host aquifer drainable porosity that contains the mineral to be estimated. The key parameters of brine mineral grade and drainable porosity were analysed and used to estimate the Measured, Indicated, and Inferred Brine Resources.

1.12.1 Estimation Methodology

To estimate total amount of lithium in the brine, the basin was first sectioned into polygons based on location of exploration drilling. Each polygon block contained one core drill exploration hole that was analysed for both depth-specific brine chemistry and drainable porosity. Boundaries between polygon blocks were generally equidistant from the core drill holes. The total area of polygon blocks used for resource estimates is about 160.9 square kilometres (km^2). Within each polygon shown on the surface, the subsurface lithological column was separated into lithologic units. Each unit was assigned a specific thickness and was given a value for drainable porosity and average lithium content based on laboratory analyses of samples collected during exploration drilling.

The estimated resource for each polygon was the sum of the products of saturated lithologic unit thickness, polygon area, drainable porosity, and lithium content. The resource estimated for each polygon was independent of adjacent polygons. Hydrogeological units within each polygon with lithium content less than cut-off grade were not included in the lithium resource estimates. A cut-off grade of 500 mg/L of lithium was used. This value was an early, conservatively large estimate that was selected prior to determining the current economic cut-off grade of 200 mg/L. Because very little of the brine in the basin has lithium grades less than 500 mg/L, lowering the cut-off grade to 200 mg/L to increase the estimated resource was considered unnecessary. To classify a polygon as Measured or Indicated, the following factors were considered:

- Level of understanding and reliability of the basin stratigraphy;
- Level of understanding of the local hydrogeologic characteristics of the aquifer system;

- Density of drilling and testing in the salar and general uniformity of results within an area.

Based on the current understanding of the hydrogeological system of the Salar de Hombre Muerto, the additional data on brine occurrence and chemistry, the relative consistency of the hydrogeological and chemical data, and confidence in the drilling and sampling results achieved to date, there were sufficient grounds to classify the polygons on the east side as Indicated Brine Resources.

1.12.2 Brine Resource Statement

Brine Resources are reported inclusive of those Brine Resources converted to Brine Reserves. Brine Resources that are not Brine Reserves do not have demonstrated economic viability. The current Brine Resource estimate for the Sal de Vida Project is summarised in Table 1-2. The estimate has an effective date of 1 April 2022. The Qualified Person for the estimate is Mr. Michael Rosko, P.Geo., an employee of Montgomery and Associates.

Table 1-2: Summary of Measured, Indicated, and Inferred Brine Resources (28 February 2022)

Category	Million Tonnes Lithium	Million Tonnes Equivalent Li_2CO_3
Measured	0.47	2.487
Indicated	0.70	3.743
Total Measured and Indicated	**1.17**	**6.230**
Inferred	0.12	0.621

Note: Table prepared by Montgomery and Associates, 28 February 2022. Cut-off grade: 500 mg/L lithium. Qualified Person Michael Rosko, P.G., General Manager, Montgomery and Associates, 2022. The estimate is reported inclusive of those Brine Resources converted to Brine Reserves.

Factors that may affect the Brine Resource estimate include: locations of aquifer boundaries; lateral continuity of key aquifer zones; presence of fresh and brackish water which have the potential to dilute the brine in the wellfield area; the uniformity of aquifer parameters within specific aquifer units; commodity price assumptions; changes to hydrogeological, metallurgical recovery, and extraction assumptions; density assignments; and input factors used to assess reasonable prospects for eventual economic extraction.

1.13 Brine Reserve Estimation

1.13.1 Numerical Modelling

The 3D numerical model was constructed using the Groundwater Vistas interface Version 7 (Environmental Simulations Incorporated (ESI) software and was simulated using the control volume finite difference code Modflow USG-Transport. The active model domain encompasses the clastic sediments and evaporite deposits that comprise the Salar del Hombre Muerto as well as the upgradient alluvial deposits and the Río de los Patos sub-basin. The extent of the active model domain covers an area of about 383 km^2. The active model domain was designed to be extensive enough to adequately incorporate zones of recharge associated with the Río de los Patos and minimize the influence of applied boundary conditions on the production well simulation.

Vertically, the domain was divided into 12 model layers, each of which consisted of a variable number of cells depending on the presence of low permeability bedrock or lack of exploration data at depth. Thicknesses of the model layers range from 10 – 60 m, and each layer, other than the basal layer, was of a constant thickness. The base of the active model domain was set based on current interpretation of depth to basement (Section 9), considering the location of the Tertiary basement in the western part of the model and the Precambrian basement in the eastern part of the model. Local layers of clays based in stratigraphy information from drilled wells in the East zone of the basin (east projected wellfield) was also incorporated in the model.

The numerical model was designed to simulate changes in solute concentration during pumping that are likely to occur due to influx of fresh water to the future production wells. TDS in the brine and freshwater were defined as the only solute components in the numerical model to represent the concentration–water density relationship and freshwater–brine interface. The linear relationships with TDS were used to estimate concentrations in pumped brine from the wellfield simulation. Due to the physical relation between TDS and density, it is recommended to model this quantity instead of directly Lithium grade.

The numerical model boundary conditions were designed to be consistent with the conceptual baseline water balance, assuming average natural long-term hydrologic conditions, where inflows (recharge from precipitation and snowmelt) are approximately equivalent to outflows (evaporative discharge) and no production pumping occurs in the salar. The numerical model assumed a dissolved TDS concentration of 1,500 mg/L for inflow at the recharge cells. Similar to the simulated recharge, modelled TDS concentrations in the water derived from the Río de los Patos sub-basin were set to 1,500 mg/L.

The general head boundary was set to equal the average elevation of the surface water in Laguna Catal (3,965 m elevation), and the conductance was specified based on the distance between Laguna Catal and the southwest limit of the active domain as well as the hydraulic conductivity and saturated cell volume. The evapotranspiration (EVT) package was used in cells of the salar to simulate evaporation from three distinct zones including soil, vegetation, and open water. The zone representing open water evaporation was specifically applied in the Laguna Verde area. Hydraulic properties were assigned based on the hydrogeological unit and were adjusted throughout the calibration in specific zones according to the conceptual range.

Prior to the simulation of future brine production, the numerical model was calibrated to verify assigned model parameters such as hydraulic conductivity and storage. The numerical groundwater model was initially calibrated to average, steady-state conditions using the available average on-site field measurements of water levels in observation wells. A transient model calibration was conducted to better represent the aquifer’s response to pumping. Following the steady-state and transient calibrations, the numerical groundwater model was used to simulate future brine extraction from the East and Southwest Wellfields.

The Stage 1 pumping from the East Wellfield is expected to produce 15,000 t of LCE per year while Stage 2 will generate an additional 30,000 t of LCE per year (totalling 45,000 t of LCE per year), with active pumping from both wellfields. Due to seasonal changes in pond evaporation and maintaining the lithium carbonate target for each stage, the modelled production pumping rates are time-variable on monthly and annual timeframes. The process efficiency is assumed to be 70% and the expected life of mine (LOM) is 40 years.

Together with lithium, the pumped brine is projected to contain significant quantities of potassium, magnesium, calcium, sulphate, and to a lesser degree, boron. These constituents must be removed from the brine to enable effective retrieval of the lithium. The numerical groundwater flow model simulates concentrations for these deleterious elements based on linear relationships between their measured values and measured values of TDS. These relationships were developed for each wellfield by establishing a correlation between these components using data from samples collected during pumping tests and from depth-specific core hole samples in the wellfield areas. Projected TDS concentrations were converted to estimated magnesium, sulphate, and boron concentrations using empirically-developed equations. Even though direct elements modelling could be possible, it is recommended to model TDS as solute because this quantity is physically related to density.

1.13.2 Estimation Methodology

The Brine Resource was estimated using a polygonal method, using hydrogeological aquifer units, bounded by concession boundaries and depth-drilled and sampled, and key input parameters of drainable porosity and lithium grade. Because a lithium brine is a fluid resource and moves within the aquifer, traditional mining methods of estimating a Brine Reserve from a more detailed subset of the same method are not feasible because of the aquifer mechanics associated with production wellfield pumping. Additional aquifer hydraulic properties are required to estimate the Brine Reserve.

The industry-accepted method for simulating removal of aquifer fluid (fresh water or brine) is to use a numerical groundwater flow model to simulate wellfield pumping. The model can be used to estimate water level drawdown associated pumping (local and regional) and also to determine maximum pumping rates, sustainability of wellfield pumping, and in the case of modelling lithium brines, the average lithium grade of the brine over time. Polygonal estimates or 3D block models do not have the capability of doing this type of simulation.

Although the numerical model used to estimate the Brine Reserve for this Project is not a direct subset of the polygon method, the conceptual hydrogeological model (hydrogeologic units, parameters, and chemistry) determined during the Brine Resource estimation, was used to construct the framework of the numerical groundwater flow model. In addition to these initial parameters, aquifer boundary conditions, basin recharge and discharge, estimates, hydraulic conductivity and storativity obtained from aquifer testing, and other parameters were included in construction of the numerical model. Finally, the model was calibrated against data obtained in the field to improve reliability of the simulations. Although the numerical model is not a direct subset of the Resource model, it is an enhanced and more robust tool for the Brine Reserve estimation. After 6 years of pumping, simulations show that pumped brine comes exclusively from the Measured and currently Indicated polygons areas. At the end of production well construction and testing (planned for late 2021), the Indicated Resource in the East Wellfield area may be upgraded to Measured reflecting an increased confidence for the designation of the Proven Reserve.

The total lithium to be extracted from the proposed Southwest and East Wellfields was calculated for a total period of 40 years. The model projections used to determine the Brine Reserve, which assumed increasing pumping from both wellfields, indicate that the proposed wellfields should be able to produce a reliable quantity of brine at an average annual rate of approximately 13,890 m^3/d (about 161 L/s) in the case of the East Wellfield and 28,710 m^3/d in the case of Southwest Wellfield (about 332 L/s). The average grade at start-up calculated from the initial model simulations used to estimate the Brine Reserve is expected to be about 810 mg/L of lithium; average final grade after 40 years of pumping is projected to be 742 mg/L of lithium. Depending on how the wellfields are ultimately operated, these rates and grades may be different.

The average TDS content of brine was estimated for each pumping cycle for each wellfield. After estimating the total lithium content for each time step and summing the amounts of lithium projected to be pumped during those time steps, a total mass of unprocessed lithium to be pumped from the wellfields was estimated. Total mass values in 1,000-kilogram units (tonnes) of lithium were then converted to LCE units. Therefore, the amount of lithium in the brine supplied to the ponds in 40 years of pumping are estimated to be about 2.49 Mt LCE, assuming no losses during processing. Modelling results indicate that during the 40-year pumping period, brine will be diluted by fresh and brackish water, so the pumping rates increase slightly with time to meet the anticipated LCE tonnes per year for each wellfield.

1.13.3 Brine Reserve Statement

During the evaporation and concentration process of the brines, there will be anticipated losses of lithium. Therefore, because the total amounts provided in Table 1-3 do not include anticipated loss of lithium due to process losses and leakages, those values cannot be used for determination of the economic Brine Reserve. The amount of recoverable lithium in the brine feed is calculated to be about 70% of the total brine supplied to the ponds. Table 1-4 gives results of the Proven and Probable Brine Reserves from the initial two wellfields when these percent estimated processing losses are factored. Table 1-5 gives results of the Proven and Probable Brine Reserves from the two proposed wellfields in terms of total brine pumped and average grade. Conversion factor used in the tables is:

$$Lithium\ mass\ x\ 5.323\ =\ Lithium\ Carbonate\ mass$$

The Brine Reserve estimate may be affected by the following factors:

- Changes in recoverable lithium estimates based on chosen processing method.
- Assumptions regarding aquifer parameters used in the groundwater flow model for areas where empirical data does not exist.
- Estimated vertical hydraulic conductivity values which partially control the amount of anticipated future dilution in areas where fresh water overlies brine.

Table 1-3: Total Projected Lithium and Lithium Carbonate Pumped (not factoring in process losses)

Time Period	Years	Active Wellfield	Lithium Total Mass (Tonnes)	Li_2CO_3 Equivalent (Tonnes)
1	1 – 2	East	8,052	42,857
2	3 – 40	East + Southwest	458,975	2,443,027
Total			**467,027**	**2,485,884**

Table 1-4: Summary of Estimated Probable and Proven Brine Reserves (31 March 2022)

Reserve Category	Wellfield	Time Period (Years)	Lithium Total Mass (Tonnes)	Li_2CO_3 Equivalent (Tonnes)
Proven	East	1 – 6	16,908	90,000
Proven	Southwest	3 – 8	33,817	180,000
Total Proven		**1 – 8**	**50,725**	**270,000**
Probable	East	7 – 40	95,828	510,074
Probable	Southwest	9 – 40	180,365	960,045
Total Probable		**7 – 40**	**276,193**	**1,470,118**
Total Proven and Probable		**40**	**326,919**	**1,740,119**

Note: Table prepared by Montgomery and Associates, 2022. Assumes 500 mg/L Li cut-off, 70% Li process recovery. Qualified Person Michael Rosko, P.G., General Manager, Montgomery and Associates, 31 March 2022.

Table 1-5: Projected Pumped Brine and Grade of Brine Reserves

Reserve Category	Wellfield	Time Period (Years)	Projected Total Brine Pumped (m^3)	Projected Average Grade Li (mg/L)
Proven	East	1 – 6	30,735,453	786
Proven	Southwest	3 – 8	59,325,003	814
Total Proven		**1 – 8**	**90,060,456**	**805**
Probable	East	7 – 40	184,440,674	743
Probable	Southwest	9– 40	326,624,728	790
Total Probable		**7 – 40**	**511,065,402**	**773**
Total Proven and Probable		**40**	**601,125,858**	**778**

Note: Table prepared by Montgomery and Associates, 2022. (*) Average grade Li for the 40 years. Qualified Person Mike Rosko, P.G., General Manager, Montgomery and Associates, 2022.

1.14 Mining Methods

Brine operations are not conventional mining operations — the resource is recovered by pumping from deep wells rather than recovering the mineral as a solid ore. The East Wellfield will be located directly above the east sub-basin of the Salar del Hombre Muerto, over the salt pan. The brine distribution will traverse the salar towards to where the evaporation ponds will be located. The production plant will be sited adjacent to Stage 1´s evaporation ponds that will be directly situated to the south on colluvial sediments. The waste disposal areas will surround the evaporation ponds to the north, east, and southeast.

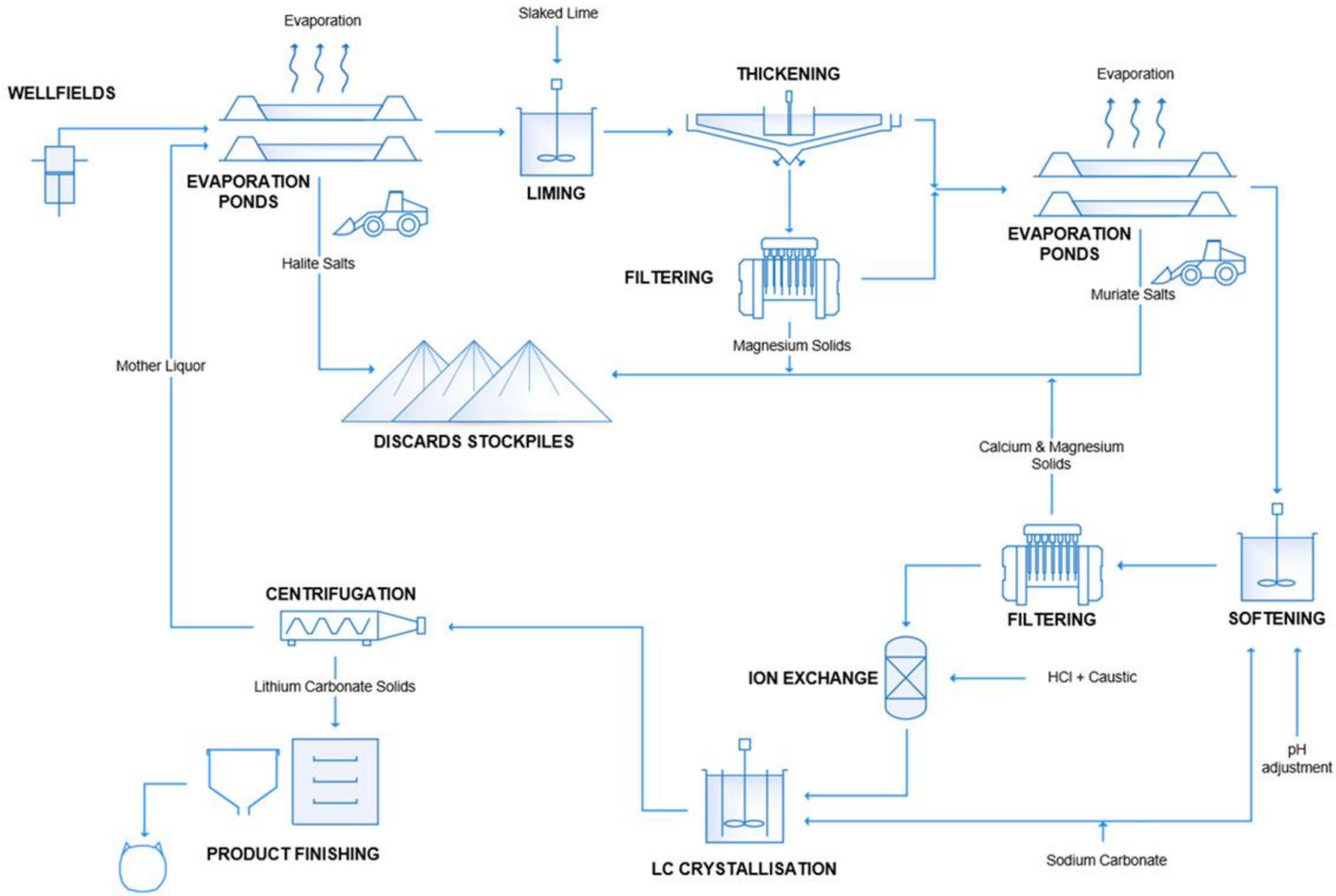
1.131.15Mobile equipment will be required for plant and pond operations. Some transport services would be supplied to Galaxy under contract with local companies; however, in most cases the equipment would be owned and operated by Galaxy. Galaxy will provide fuel and servicing for all vehicles, with the exception of reagent and product logistics.

1.15 Recovery Methods

The recovery process of lithium from the brine is summarised below and presented in a flowsheet in Figure 1-1.

The process will commence with brine extracted from wells extending to a depth of up to 280 m into the salar. Brine will be pumped to a series of evaporation ponds, where it will be evaporated and processed at the onsite lithium carbonate plant. Project facilities are divided into four main areas including wellfield and brine distribution, evaporation ponds, the lithium carbonate plant and waste tailings disposal stockpiles.

Figure 1-1: Sal de Vida Simplified Process Flow Diagram

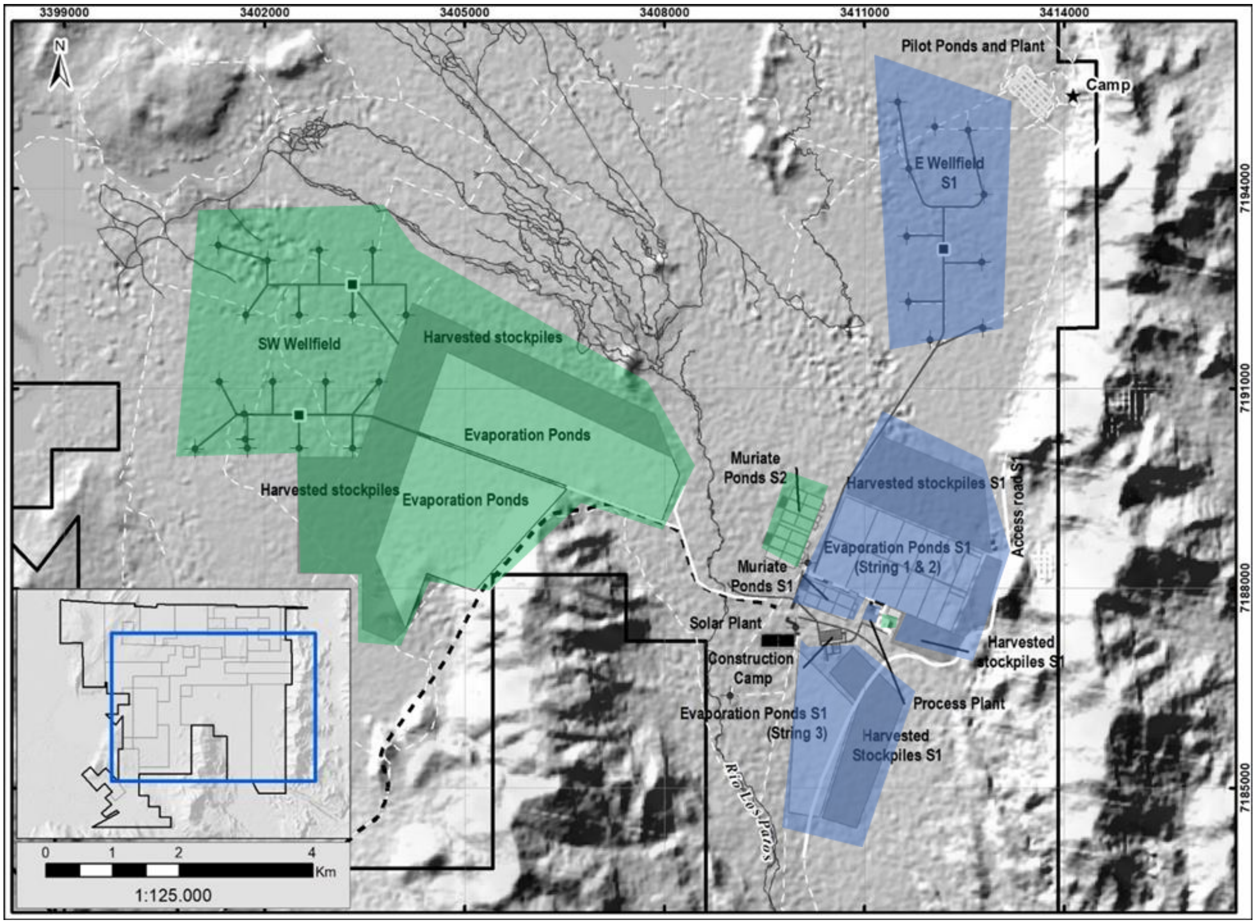


Note: Figure prepared by Galaxy, 2020. LC = lithium carbonate.

The LOM operation, developed in two stages (Figure 1-2), will consist of:

- Wellfield and brine distribution;
- Solar evaporation ponds;
- Production plant (liming and lithium carbonate plant);
- Waste disposal.

Figure 1-2: Sal de Vida Project Layout Plan



Note: Figure provided by Allkem, 2022. Blue areas represent Stage 1, green areas Stage 2 facilities.

The wellfields will be located directly above the Salar del Hombre Muerto over the salt pan, with minimal infrastructure residing on the surface. The brine distribution systems will traverse the salar to where the evaporation ponds will be located. The production plant will be located adjacent to the evaporation ponds on colluvial sediments. The waste disposal areas will surround the evaporation ponds.

All production wells will be connected through pipelines to a booster station that will be situated in a central position to the wellfield. The solar evaporation pond system will consist of a series of halite and muriate evaporation ponds, which will concentrate brine for feeding to the lithium carbonate plant. Evaporation will result from the combination mostly of solar radiation, wind, temperature and relative humidity. The evaporation area required was calculated based on the modelled and experimentally defined evaporation rates and the well flow rates.

Halite ponds will be arranged in strings which will operate in parallel to increase the salt concentration beyond the saturation point of sodium chloride (NaCl), that will precipitate as halite solids and collect at the bottom of the ponds. Each string will contain six cells plus a buffer pond with the flow moving in a south easterly direction from one pond to the next in series. The muriate ponds will be located adjacent to the halite ponds and process plant. The muriate pond system will consist of a muriate buffer pond, two strings of muriate ponds operating in parallel with two cells each, and brine storage ponds. Brine will flow from one pond to the next in series. The system will also include a mother liquor buffer pond located proximal to the process plant.

Weirs will be used to transfer brine between the same pond types. The connection between ponds through weirs will allow for a constant natural flow from one pond to the next and will keep the same brine level in all ponds, reducing pump usage. Since the brine transferred between ponds is saturated, the weirs will have to be periodically cleaned to reduce salt accumulation. For brine transfers over longer distances (i.e., between halite and muriate ponds) pumping will be required. The road system will connect all facilities and provide access to the working areas. Roads, ramps, and causeways will be designed based on the vehicle types that will be used.

The process facility will be located in an area adjacent to the muriate ponds, and will consist of a lithium carbonate plant, with a liming plant and associated plant infrastructure, such as the power station, fuelling and workshops.

When the brine reaches a suitable lithium concentration (8.9 g/L, 0.7wt%), it will be stored in liming plant buffer ponds, designed to store brine and handle all seasonal variations in the brine flow. The evaporated brine will be fed into the process plant liming circuit, where it will be combined with a slaked lime ($Ca(OH)_2$) slurry in a series of agitated mixing tanks, increasing pH and precipitating magnesium as magnesium hydroxide, as well as removing other unwanted elements from the brine, such as boron and sulphates. The limed brine will be pumped to solid – liquid separation equipment (thickeners and press filters), to separate the precipitated solids from the lithium-concentrated brine. Solids will be separated and pumped to a discard facility adjacent to the evaporation ponds. The limed brine will be fed to another series of evaporation ponds and will be further concentrated, exceeding the saturation point of potassium chloride (KCl) and causing it to precipitate together with the NaCl as a mixture of halite and sylvite salts (muriate). A small amount of gypsum ($CaSO_4 \cdot 2H_2O$) will also be precipitated.

The concentrated brine will be sent back to the process plant, where it will be softened to remove the remaining magnesium ions as well as the calcium. Brine will be heated, then enter a group of six softening mixing tanks, operating in series, where it will be mixed, in turn, with sodium hydroxide and sodium carbonate. The softening circuit will start with the addition of sodium hydroxide (NaOH), which will convert the dissolved magnesium into magnesium hydroxide ($Mg(OH)_2$) solids, followed by the addition of sodium carbonate (Na_2CO_3) to convert the dissolved calcium into calcium carbonate ($CaCO_3$). The solids will once again be separated and discarded.

The brine and precipitated solids will be subject to a solid – liquid separation stage, to remove all solid contaminants, using press filters and polish filters. The resultant filtered brine is pumped through a typical ion exchange circuit (IX) consisting of three columns in a lead-lag-regeneration configuration to remove trace magnesium and calcium ions that may still be present in the brine. Hydrochloric acid (HCl) and NaOH or water will be used for stripping and regeneration.

The lithium-concentrated brine will be sent to storage tanks to feed the crystallisation stage. Solid contaminants will be sent to a filter cake tank to be re-pulped with the liming area waste/discards and then sent to the discard facility.

The crystallization stage will consist of further heating of the brine, prior to feeding it to a group of four crystallisation mixing tanks that will operate in series. Sodium carbonate will be added to precipitate lithium carbonate as a solid and the slurry will feed a thickener. The mother liquor in thickener overflow, which is a solution with a high carbonate and low contaminant content, will feed the mother liquor tank and will be reused in several process stages. The thickener underflow will feed a crystallisation cyclone cluster, to further remove solution from the final product. The cyclone cluster overflow will be returned to the crystallisation mixing tanks. The cyclone cluster underflow, which is the precipitated lithium carbonate, will be sent to a centrifuge stage, consisting of two centrifuges operating in series in batch mode, for solution content reduction and product washing. The final washed, low-moisture content product will be fed to the bagging/packing stage.

The bagging/packing stage will consist of a hollow screw conveyor that will reduce the temperature of the final product and will feed a product storage bin. The bagging system will fill labelled maxi bags (or big bags) with solid lithium carbonate.

The waste disposal facility will consist of halite, muriate, and co-disposal stockpiles surrounding the halite ponds. All waste/discards from the process will be appropriately treated, stockpiled and stored to comply with corporate and environmental requirements.

The key process consumables will consist of raw water, steam, compressed air, lime, sodium carbonate, and caustic soda.

1.16 Project Infrastructure

Non-process infrastructure will include:

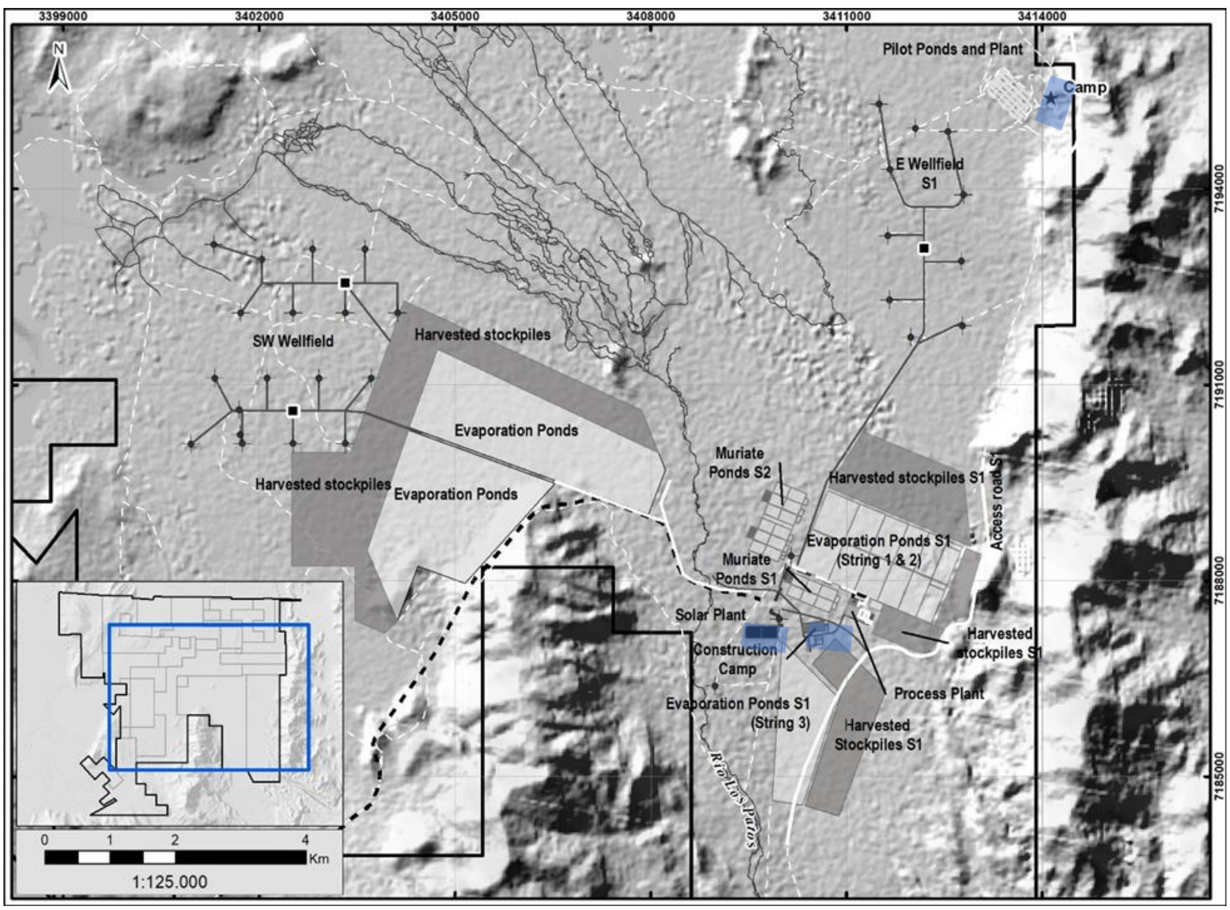
- Raw water and reverse osmosis (RO) water;
- Demineralised water;
- Power generation and distribution;
- Fuel storage and dispensing;
- Construction camp to accommodate up to 600 people;
- Sewage treatment plant;
- Fire protection system;
- Buildings;
    - Process plant buildings;
    - Reagent storage and preparation building;
    - Product storage building;
    - Maintenance workshop;
    - Equipment storage;
    - Vehicle workshop;
    - Boiler building;
    - Site access security control;

- Administration offices;
- Canteen;
- First aid building;
- Electrical and control rooms;
- Other buildings.

- Site roads, causeways and river crossings;
- Communications and control system;
- Steam generation and water heating;
- Compressed air system;
- Drainage system.

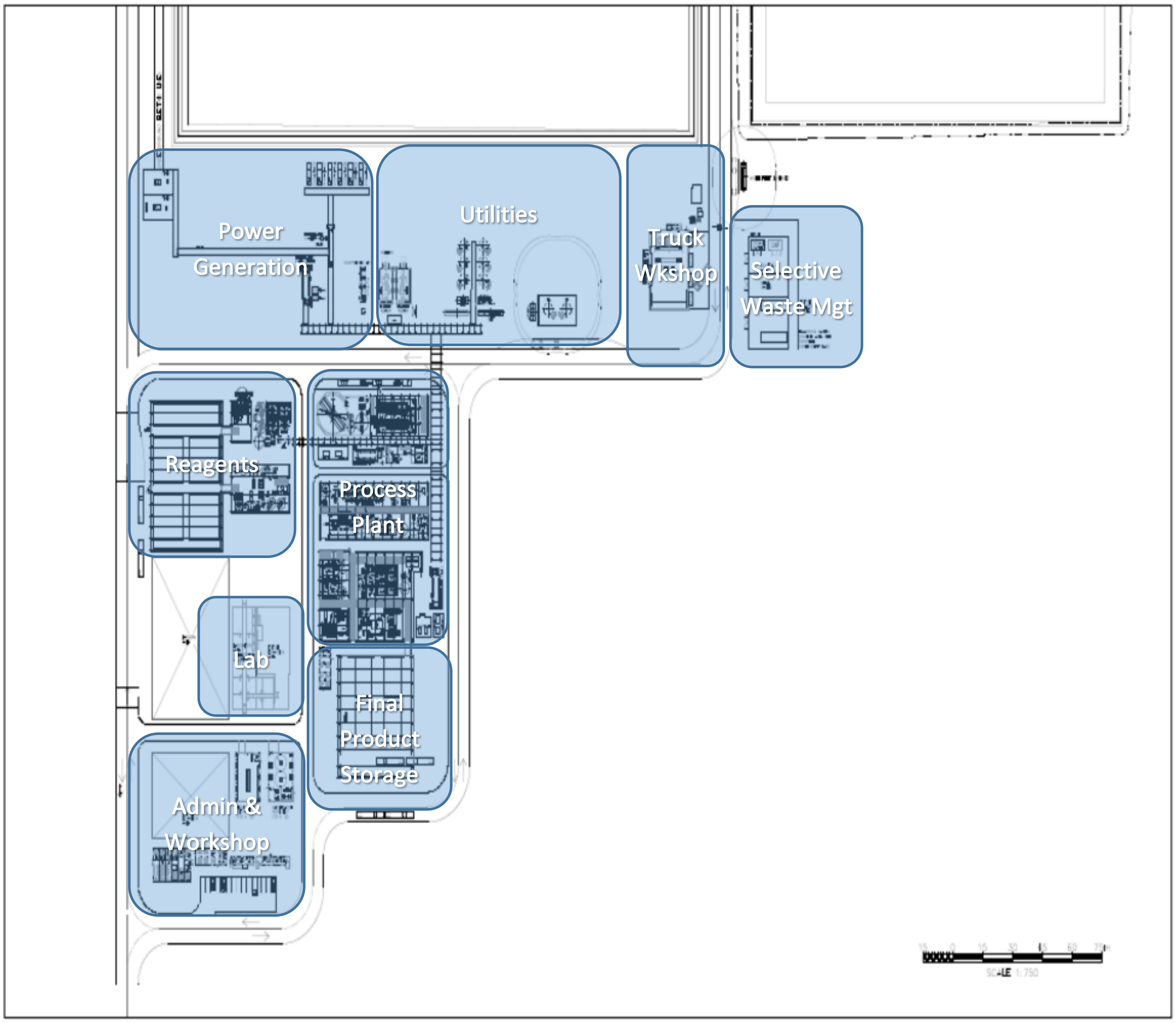
Figure 1-3 shows the Project layout in concept, with the main infrastructure and Figure 1-4 shows a close-up of the process plant area and its main infrastructure facilities.

Figure 1-3: Non-Process Infrastructure Layout Plan



Note: Figure provided by Galaxy, 2021. Blue areas highlight the main non-process infrastructure.

Figure 1-4: Process Area Infrastructure



Note: Figure provided by Galaxy, 2021.

Site roads will be designed to meet usage requirements. Since the salar is prone to flooding during the rainy season, suitable road embankments and culverts will be constructed to allow permanent access. The road elevation will be enough to maintain the roads as operable throughout normal weather conditions. The main access road connecting site with the national road network traverses the Río de los Patos and the Río Aguas Calientes. Two river crossings are required to enable inbound/outbound logistics.

All operations buildings will be made of corrugated steel enclosures and modular steel structures. Buildings will include the process plant area, reagent preparation, product storage, maintenance and vehicle workshops, gatehouse, first aid, and administration offices.

Tango 01 is the name given to the Sal de Vida Project accommodation camp. Tango 01 can host up to 330 people and is currently used by Galaxy staff and contractors principally for exploration work, pilot operations and early works. The Tango 01 camp will serve as the operations camp for all stages of the Sal de Vida Project. The Tango 01 camp was originally designed for modular expansion. A construction camp with capacity to accommodate up to 600 people will be established early in the construction phase of the Project. The number of beds may vary in the early construction stages. The construction camp will be located next to the process plant area. Buildings will be pre-manufactured by the supplier.

All raw water will be sourced from well SVWF12_19 and pumped to the process plant and distributed as applicable to the various applications requiring fresh water. A supplementary well will be drilled in the vicinity as a back up. Raw water for camp will be trucked in 30-t trucks from the process plant on an as-required basis. A reverse osmosis (RO) system will be used to treat the water.

Power generation will consist of a centralized power generation centre located in the process plant area combining diesel and solar generation, and overhead powerline distribution to power the geographically-isolated facilities as wells, booster station, camp, etc. Fuel will be trucked to site by the vendor and stored in two principal locations, one at camp and one at the process plant. Reagents will be delivered in 1-t bulk bags on 28-t flatbed trucks.

1.17 Markets Studies and Contracts

1.17.1 Market Studies

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.

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 517.2 kt LCE with a compound annual growth rate (CAGR) of 17.0% over the period. Adding to this growth, in 2022 global lithium demand is expected to increase by 21.6% to 628.8 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 14.0% CAGR to 2,334 kt in 2032.

Lithium demand is forecast to increase by 17.7% CAGR in the period 2022 to 2032, reaching a total of 2,199 kt LCE in 2032. Lithium demand is predominantly derived from the expected build-out of battery production, with 3,370 GWh capacity required across all end-use applications by 2032. This is primarily driven by growing demand for electric vehicles, government policies facilitating a lower emission future, as well as greater choice for consumers as electric vehicle (EV) manufacturers bring more models online. The rechargeable battery segment will see a growth of 28% from 2021 to 2022. The largest driver within the rechargeable battery segment is from automotive where growth between 2021 and 2031 is forecast at 19% CAGR. Stationary energy storage (ESS) will grow at 18.7% CAGR in the same period. Wood Mackenzie forecast that total lithium demand in rechargeable batteries in 2031 will reach 1,834 kt LCE, up from 362 kt LCE in 2021.

Growth is forecast to slow down in the following two decades as the market matures. From 2030 to 2040, total demand growth of 6.9% CAGR is forecast, followed by 2.2% CAGR from 2040 to 2050. Total demand is forecast to reach 3,262 kt LCE in 2040 and 4,061 kt LCE in 2050.

Lithium carbonate is the most widely consumed product, finding application in rechargeable batteries, ceramics, glass-ceramics, glass, metallurgical powders, aluminum and other uses. Demand for BG and technical-grade (TG) lithium carbonate was 263.0 kt LCE in 2021, with BG now accounting for 42.3% of total refined lithium compound demand and TG 10.5%.

The rapidly growing use of lithium-iron-phosphate (LFP) chemistries for cathode will result in strong growth for BG lithium carbonate. LFP cathodes are expected to be fastest growing cathode chemistry, increasing its share of the from 30% to 47% by 2050, as the Chinese market continues to expand and LFP cathode increasingly become the material of choice for a large number of EV-makers. This will correlate to a growth in lithium carbonate demand of 10.9% CAGR between 2022 and 2032. Over the forecast period, demand for lithium carbonate is expected to grow at 6.2% CAGR, from 255.2 kt LCE in 2022 to 1,381 kt LCE by 2050.

The world's lithium is supplied by primary production from hard rock mineral mines (spodumene, lepidolite, petalite), continental lithium brines and reprocessing (upgrading) of lithium carbonates. Lithium recycling currently contributes to a very small proportion of global supply (<1%) but as the industry matures and recycling technology develops, supply from recycling will play an ever-increasing role in global supply.

Mineral concentrates are the world's largest source of lithium and is forecast to continue growing to 1,163 kt LCE by 2032 up from an estimated 359 kt LCE in 2022. Growth in mineral concentrate supply is forecast to slow down slightly and result in total output of 1,131 kt LCE by 2040 and 1,047 kt LCE by 2050. Australia will continue to be the largest supply of mineral concentrate with spodumene ore being the primary source of its lithium.

Supply from mineral concentrate will be supplemented by increasing production from brine resources where expansions and new projects in South America will add significant supply to the market. Wood Mackenzie forecast an annual growth rate of supply from brine of 12.5% CAGR 2020 – 2030 reaching 626 kt LCE by 2030. Growth is forecast to slow down to an annual growth rate of 1.0% CAGR 2030 – 2040 to reach 693 kt LCE by 2040 and 781 kt LCE by 2050 at 1.2% CAGR 2040-2050.

Wood Mackenzie estimates that BG lithium carbonate accounted for approximately 32% of global lithium supply in 2021, the largest of the lithium chemical products. However, by 2024, BG lithium hydroxide is expected to be the largest product in terms of volume supplied to the market. Supply of BG lithium hydroxide, as the final product, will show the strongest growth at 17% over the next decade to reach levels of 920 kt LCE per year by 2032.

Supply from current operations and upcoming projects is insufficient to meet the increasing demand. The global interest in the transition towards lower-emission transportation has facilitated many new projects to supply lithium chemicals both from mineral concentrate and brine.

Wood Mackenzie's base case view show that the overall lithium chemical market registered a minor supply deficit in 2021, despite increasing production of lithium chemicals from both brine and minerals. Following a smaller deficit expected in 2022, growing supply is expected to shift the market into surplus from 2023 onward which will continue to grow to a peak of 230.9 kt LCE in 2026. As growth in demand outpaces new supply in the late 2020s, a supply deficit will emerge from 2029. The forecast supply deficit will continue to grow and reach a peak in 2049 at 1,321.0 kt LCE.

Lithium prices continue to outperform expectation in 2022. In 2021, spot prices for lithium carbonate and lithium hydroxide almost quadrupled to reach prices around US$30,000/t, and in the first quarter of 2022, spot prices have breached the US$50,000/t mark for both BG lithium carbonate and BG hydroxide.

While supply has been growing, it has been struggling to keep up with strong demand from the EV sector. In 2021, we saw incentives implemented across Europe that boosted EV sales and spurred stronger lithium demand. At the same time, we saw EV sales in China return to record levels that further boosted demand, especially for BG grade lithium carbonate used in LFP cathodes.

Despite the short-term imbalance in the market, it is difficult to find justification in the market fundamentals for the price increases we have seen in the spot market. Part of the additional demand is likely created by every link in the supply chain boosting inventories slightly to create a buffer against supply chain delays. The aggregated additional demand for lithium will therefore be substantial and could have contributed to the market sentiment.

Demand for BG lithium carbonate is set to exhibit strong growth due to the increasing use of LFP cathode chemistries in LiB batteries. This demand is likely to be met primarily with supply from brine projects. As there are a large number of brine projects entering production in the coming years the longer-term outlook for BG lithium carbonate is more subdued but remains very positive.

As demand growth seen in 2021 starts to slow and new supply enters the market over the next few years, prices are expected to gradually decline to around US$15,000/t by the mid-2020s. As demand continues to grow, a larger deficit will emerge towards the end of the decade and contract prices will trend towards a long-term price of around US$19,000/t.

Demand for TG carbonate from industrial sectors is forecast to grow in line with economic growth, TG lithium carbonate, however, lends itself very well to be reprocessed into BG lithium chemicals. This is an established process occurring in Chile, US, China and soon in Japan. The ability to re-process the product into BG lithium chemicals will ensure that prices will increase in line with prices of BG lithium chemicals.

1.17.2 Contracts

As of the date of this Technical Report, Galaxy has no existing commercial offtake agreements in place for the sale of lithium carbonate from the Sal de Vida Project.

Allkem is having discussions with potential customers for the Sal de Vida Project. In line with the Sal de Vida Project execution schedule, these discussions are expected to advance to negotiations throughout the course of the Sal de Vida Project.

Orocobre Ltd. (now Allkem) and Galaxy Resources Ltd. have been active participants in lithium markets since 2012 and have been a seller in both lithium concentrate (“concentrate” or “spodumene”) and lithium chemicals markets due to past and present operations.

At present, Allkem is the operating joint venture partner of Olaroz lithium carbonate facility and operator of the Mt Cattlin spodumene mine and concentration project. Allkem produces lithium carbonate and concentrate which is sold to various customers in Asia.

1.18 Environmental, Permitting, and Social Considerations

Environmental baseline studies were performed in the Sal de Vida Project area during a number of field seasons starting in 1997. Study areas included water quality evaluations of the salar and surface waters, water chemistry, water baseline studies, flora, fauna, limnology, phytoplankton, paleontology, archaeology, air quality, noise, soils, geology, geomorphology, hydrogeology, hydrology, climate, landscape, ecosystem characterization, and socioeconomic considerations.

Galaxy has an approved Environmental Impact Assessment (DIA[1]), Resolution SEM[2]256/2014, which enables Galaxy to construct and operate the Sal de Vida Project within the constraints of the issued permit. This approval is included in Galaxy's DIPGAM[3] file E4220/2013 (The Galaxy file with the Secretary of Mining of Catamarca Province) for the proposed Sal de Vida operations. The DIA submission includes, and its approval generates, a series of commitments and obligations. Obligations and commitments consist of, but are not limited to, schedules, investment commitments, corporate social responsibility obligations, environmental monitoring and audits, and safety conditions. Breaches of these commitments and obligations may result in sanctions, fines, project suspensions and, after an administrative procedure, in the cancellation of the environmental permit. The DIA update submitted on March 1, 2021, was approved on December 20, 2021, by the Provincial Ministry of Mining pursuant to RESOL-2021-781-E-CAT-MMRes and includes the brine distribution system, 320 ha of evaporation ponds, the latest flowsheet and lithium carbonate plant, and onsite infrastructure for Stage 1 of the Project. The early works including the East Wellfield were previously approved in the application filed February 22, 2019.

Construction and operation of the pilot-stage evaporation ponds, the modular pilot plant, the Tango 01 camp required Galaxy to develop several environmental management plans. An Environmental Emergency Response Plan was also developed for the construction process. An Environmental Management Plan (EMP) for the construction and operations stages was developed in 2020 – 2021. The EMP follows the guidelines and specifications stipulated in Argentine Law No. 24,585 Environmental Legal Framework for Mining Activity; the International Council on Mining and Metals Principles, the International Finance Corporation (IFC) Environment, Health and Safety Guidelines for Mining, and other international standards. This covers aspects such as aquifer management, mining, hazardous and domestic wastes, chemicals and reagents, biological considerations and energy.

Galaxy has developed a Mine Closure Plan according with the legal requirements at the feasibility level, when the Project advances to the next stage, which is the detailed engineering level, this Plan will be revised.

The Closure Plan covers the measures and budget required to rehabilitate the site where the Sal de Vida Project activities will be performed, ensuring the physical stability of the site. The Project's LOM will be developed, ensuring the physical and chemical stability of each of the mining components susceptible to generating negative impacts and establishing the appropriate conditions to ensure that the development and completion of the mining project are in accordance with the one established in current legislation.

The closure strategy for the Sal de Vida Project describes the general closure objectives and details the assumptions that have been made based on current knowledge.

The overall objective for closure of the Sal de Vida Project is to ensure that the final post-closure landscape is safe, stable, and sustainable in the long term.

Subsequently, an Initial Closure Plan will be developed during the Operation Stage, including a detailed cost estimate. This will be reviewed as the Project progresses to update design and operational changes and evaluate the results of progressive closure.

Toward the end of life of the Project, the Final Closure Plan will be prepared. Once it is executed, maintenance, monitoring, and post-closure follow-up reports will be prepared and submitted.

[1] DIA, for its acronym in Spanish; Environmental Impact Statement.
[2] SEM, for its acronym in Spanish; State Mining Secretary.
[3] DIPGAM, for its acronym in Spanish; Provincial Directorate of Mining Environmental Management.

The scope of the Closure Plan includes: the mine site and external infrastructure (culvert over rivers, roads outside the mining concession, site vehicles).

Mine closure and cleanup of the Sal de Vida Project site is assumed to take 2 years and an additional 10 years of environmental monitoring will be considered.

In addition to the environmental permits, +20 key permits will be required for the construction and operations phases, covering aspects such as reagents, easements, infrastructure construction and operations, mobile equipment usage, consumables such as fuel and gas, waste disposal, effluent discharge, and communications. Galaxy currently holds a permit to extract raw water, a groundwater permit, and before the expiration of the groundwater permit in force will apply for the definitive water concession according to Water Provincial Law No. 2577.

Antofagasta de la Sierra department consists of the towns of El Peñón, Antofalla, Los Nacimientos, Ciénaga La Redonda and Antofagasta Village, which are scattered rural towns. Antofagasta Village is the departmental capital, being a unique third category municipality.

The closest settlement to the Project is Ciénaga La Redonda, which is located approximately 5 km by road from Galaxy's Tango 01 camp. The Kolla-Atacameña community of Antofalla, located 70 km southwest of the Project site, is the only officially recognized native community within the department of Antofagasta de la Sierra. There are also communities that claim to be indigenous and/or descendants of native peoples within the Project area.

Galaxy has a Community Relations Plan (CRP) in place, which has specified programs to ensure a sustainable operation within the regional and local communities. The programs set out commitments that include timeframes and schedules where appropriate and are aligned with Galaxy's four-pillar focus for social initiatives and projects within its sustainability framework, such as education and employment, sustainable development and culture, health and well-being, and infrastructure.

1.19 Capital Cost Estimate

Capital and operating cost estimates were prepared using AACE International guidelines:

- Stage 1:
    - Wellfields, brine distribution, evaporation ponds, waste (wells and ponds): Class 2 ±10%;
    - Process Plant and Non-Process Infrastructure: Class 4 +30% / -20%;
- Stage 2:
    - Class 4 +30% / -20%.

Cost estimates are based on first quarter 2022 pricing. Sunk costs, including all costs prior to 1 January 2021, were excluded from the estimate.

The capital cost estimate was broken into direct and indirect costs.

- Direct costs: costs that can be directly attributed to a specific direct facility, including the costs for labour, equipment, and materials. Includes items such as plant equipment, bulk materials, specialty contractor's all-in costs for labour, contractor indirect costs, construction, and materials, labour costs for facility construction or installation;

- Indirect costs: costs that support the purchase and installation of the direct costs, including temporary buildings and infrastructure; work areas; temporary roads, walkways and parking areas; temporary utilities; transportation facilities; weather protection; general purpose scaffolding; cribbing; minor temporary construction, general and final site cleanup; manual labour training and testing; security; medical; soil and other testing; survey; and operation and maintenance of facilities, camp construction, operation and maintenance costs, engineering, procurement, construction and project management costs (EPCM); costs associated with the travel, accommodation and overheads, etc.; third party consultants, Owner's costs, and contingency.

The capital costs are summarized in Table 1-6. Direct capital costs total US$645 M, indirect costs are estimated at US$149 M and Pre-production CapEx at US$108 M, for an overall capital cost estimate to develop two stages of the Sal de Vida Project of US$902 M.

Table 1-6: Direct Capital Cost Estimate for Stages 1 & 2 by Area

	Stage 1 (US$ M)	Stage 2 (US$ M)	Stages 1&2 (US$ M)
Development CapEx	**271**	**523**	**794**
Direct Costs	**221**	**424**	**645**
General Engineering & Studies	12	13	25
Wellfields & Brine Distribution	13	26	38
Evaporation Ponds, Waste, & Tailings	62	184	246
LiCO Plant & Reagents	119	181	300
Utilities	4	7	12
Infrastructure	12	13	25
Indirect Costs	**50**	**99**	**149**
Owners Cost	17	17	33
Contingency	15	63	78
Other	17	20	37
Pre-Production Costs	**37**	**71**	**108**
Government, Community, Environment	1	1	2
On-site Infrastructure	5	10	15
Owners Cost	31	60	91
Grand total	**308**	**594**	**902**

1.20 Operating Cost Estimates

Reagents represents the largest operating cost category (42%) over the site cash cost. Energy represents the second largest cost category (30%) followed by reagents (13%). Other cost inputs such as camp services, and consumables represent a relatively small proportion of the total operating cost. The operating cost estimate excludes indirect costs such as distributed corporate head office costs for corporate management and administration, marketing and sales, exploration, Project and technical developments, and other centralised corporate services.

Table 1-7 provides a summary of the estimated annual cost by category for a nominal year of operation. No inflation or escalation provisions were included. The aggregate average annual free on board (FOB) cash operating costs for the Project is estimated to be approximately US$148 M per year.

Table 1-7: Operating Cost Summary

	Stage 1		Stage 2		Stages 1 & 2	
Description	**Per Tonne (US$/t)**	**Annual (US$ M)**	**Per Tonne (US$/t)**	**Annual (US$ M)**	**Per Tonne (US$/t)**	**Annual (US$ M)**
Reagents	1,314	20	1,314	39	1,314	59
Labour	700	11	255	8	403	18
Energy	943	14	943	28	943	42
General and Administrative (G&A)	250	4	202	6	218	10
Consumables & materials	269	4	268	8	268	12
Site cash costs	**3,477**	**52**	**2,981**	**89**	**3,146**	**142**
Transport and port	134	2	133	4	133	6
FOB cash operating costs	**3,612**	**54**	**3,113**	**93**	**3,279**	**148**

Note: FOB = Free on board at port Angamos, Chile.

1.21 Economic Analysis

The financial evaluation is based on a discounted cashflow (DCF) model. The DCF approach involves projecting yearly estimated revenues and subtracting yearly estimated cash outflows such as operating costs including production costs, G&A costs, and associated maintenance costs, initial and sustaining capital costs, taxes and royalties to obtain the estimated net annual free cash flows. These net cash flows are discounted back to the valuation date using a real, after-tax discount rate of 10%, and then summed to determine the NPV at the 10% discount rate (NPV10) of the Project. The 10% discount rate reflects Galaxy's estimated weighted average cost of capital. There are no additional Project or country-specific risk factors, or adjustments considered. For the purposes of discounting, the model assumes that all revenues, operating and capital costs, taxes, and resulting free cash flows occur at the end of each month.

The DCF model is constructed on a constant fourth quarter 2020 US$ basis and none of the inputs or variables are escalated or inflated. For discounting purposes, January 1, 2021, is considered to be the first period (valuation date). All cash expenditures related to the Project before this date have been excluded. The primary outputs of the analysis are NPV10; IRR; payback period; annual earnings before interest, taxes, depreciation, and amortization (EBITDA); and annual free cash flow (FCF), all on a 100% Project basis

The financial model is based on the following key Project assumptions:

- The production schedule (annual brine production, pond evaporation rates, process plant production, ramp-up schedule), plant recoveries, lithium grades, and operating, capital and closure costs;
- A 40-year operating life;
- Operating costs from wellfields, evaporation ponds, process plant, waste removal, site-wide maintenance and sustaining costs, environmental costs, onsite infrastructure and service costs and all labour costs including contractors;
- Product sales are assumed to be FOB Angamos, Chile.

The production schedule by product is summarized in Table 1-8. Average annual lithium carbonate production is anticipated to be 44,654 t from an average annual wellfield head grade of 0.067% Li and average annual evaporation pond feed grade of 1.7% Li.

Table 1-8: Production Schedule – Stages 1 and 2

Production Li_2CO_3	Unit	2021	2022	2023	2024	2025	2026	2027	2028	Total LOM
Battery-grade	tpa	0	0	3,528	10,534	19,055	33,019	36,000	36,099	**1,428,941**
Technical-grade	tpa	0	0	882	2,633	4,764	8,255	9,000	9,025	**357,235**
Total	**tpa**	**0**	**0**	**4,410**	**13,167**	**23,819**	**41,274**	**45,000**	**45,123**	**1,786,177**

Note: tpa = tonnes per annum

Base case price assumptions and exchange rate assumptions used in the economic analysis reflect the Company's long-term evaluation assumptions and are shown in Table 1-9. In the financial model, all estimated lithium carbonate prices, operating costs, capital costs, and resulting outputs are reported in US$. However, portions of the costs are assumed to be priced in local currency, the AR$. As a result of the exposure to the exchange rate between the AR$ and US$, the AR$:US$ exchange rate was considered in the sensitivity analysis. The ultimate foreign exchange exposure will depend largely on sourcing decisions made during the construction period.

Table 1-9: Sal de Vida Lithium Product Price Forecast

Selling Prices Li_2CO_3	Unit	2021	2022	2023	2024	2025	2026	2027	2028	Total LOM
BG	US$/t	0	0	39,724	23,761	17,850	14,850	12,850	10,850	**18,025**
TG	US$/t	0	0	37,045	27,582	23,850	17,850	15,850	14,850	**14,260**
Total	**US$/t**	**0**	**0**	**39,188**	**24,526**	**19,050**	**15,450**	**13,450**	**11,650**	**17,272**

The Corporate Tax Rate is set at 35%.

The base case economic analysis assumes 100% equity financing and is reported on a 100% Project ownership basis.

The key outcomes include:

- The Project is expected to support a production rate of 44.7 ktpa of lithium carbonate for approximately 40 years, producing approximately 1,786 kdmt of saleable product;
- Saleable product is expected to be BG (80%) and TG (20%);
- Pre-tax net present value is US$3,036 M at an 10% discount rate;
- Post-tax net present value is US$1,863 M at an 10% discount rate;
- At full production rates, the Project is estimated to generate average annual revenues of US$798 M and operating cash flow before interest and tax of US$557 M;
- The LOM operating cost is estimated at US$3,279/t Li_2CO_3 produced;
- Funding requirements peak at US$670 M (Project and working capital).

The key outcomes are summarized in Table 1-10.

Table 1-10: Key Outcomes

Economics Summary	Units	Total
Production - total	tonnes	**1,786,177**
Production - average	tpa	**44,654**
Life of Mine - from first production	years	**40**
Development Capital Costs	US$ M	**794**
Pre-Production Capital Costs	US$ M	**108**
Operating Costs	US$/t LC	**3,280**
Average Selling Price	US$/t LC	**17,272**
Annual Revenue	US$ '000	**798,270**
Annual Free Cash Flow (pre-interest, tax)	US$ '000	**557,335**
Annual Free Cash Flow (post-interest, tax)	US$ '000	**357,348**
Net Present Value (10% pre-tax)	US$ '000	**3,036,236**
Net Present Value (10% post-tax)	US$ '000	**1,862,564**
Internal Rate of Return (pre-tax)	%	**44%**
Internal Rate of Return (post-tax)	%	**33%**
Payback from project commencement	years	**3.75**

Note: LC = lithium carbonate

1.22 Sensitivity Analysis

A sensitivity analysis was performed on production, commodity price, capital costs and operating costs.

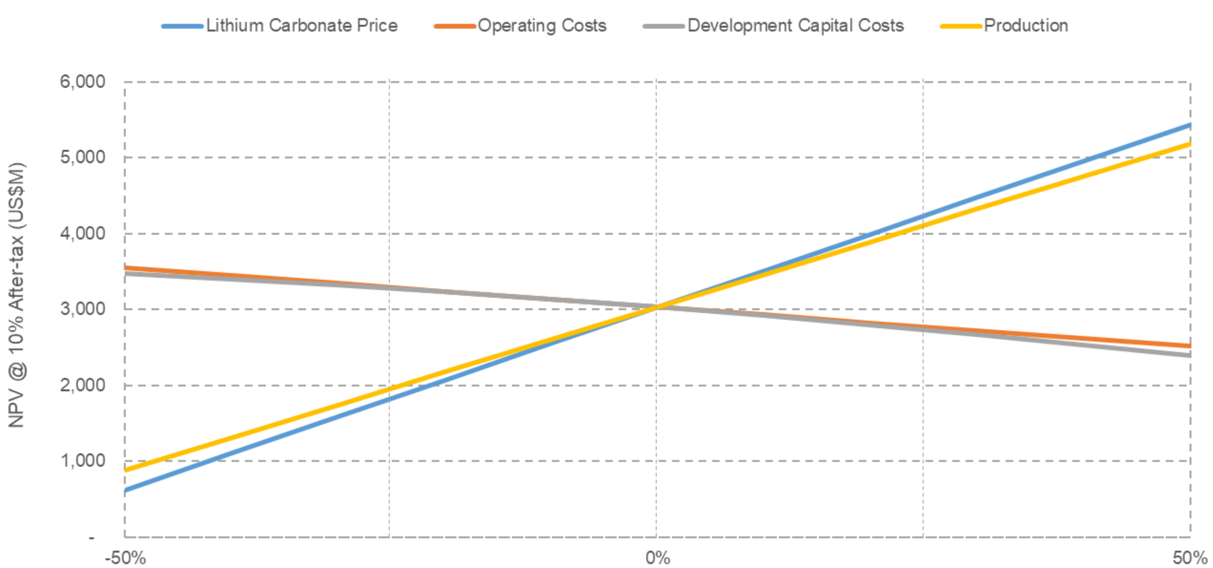
Table 1-11 shows the impact of changes in key variables on the Project's post-tax net present value.

Figure 1-5 shows the sensitivity to price, cash, development capital costs and production.

Table 1-11: Project Net Present Value Post-tax Sensitivity Analysis

Driver Variable	NPV @ 10% Pre-tax (US$ M)				
	-20%	-10%	Base	10%	20%
Lithium Carbonate Price	2,074	2,555	**3,036**	3,517	3,998
Operating Costs	3,244	3,140	**3,036**	2,933	2,829
Development Capital Costs	3,237	3,141	**3,036**	2,924	2,803
Production	2,175	2,606	**3,036**	3,466	3,896

Figure 1-5: Spider Plot Net Present Value Sensitivities



Note: Figure provided by Galaxy, 2022.

1.23 Risks and Opportunities

1.23.1 Risks

A Project risk workshop was held in February 2020 and was subsequently updated in a risk assessment process was conducted on March 21, 2021. This identified a broad spectrum of hazards which provides a reasonable representation of the current Project risk profile, with a focus on the initial stage of the Project. The overall risk profile is currently driven by Project delivery, and financial/ operational performance issues, which is to be expected of a brine project at the feasibility stage. This is consistent with the Project management team's expectations for a feasibility-stage study, given the industry's history with medium-sized project delivery, and the inherent uncertainty as to how a number of key risks in these areas can to be managed.

The Sal de Vida Project had ~70 risks identified for areas of focus in the Project risk register. The key risks to Project viability can be summarized as:

- Galaxy activities fail to meet health, safety, environmental, community (HSEC) or CSR expectations;
- Loss of community support for the Project;
- Project capital cost increases significantly (e.g., productivity, incomplete engineering, poor estimation, Project delays, poor Project controls, changing market conditions);
- Plant unable to achieve name plate production within expected timeframes;
- Plant fails to achieve the production metrics (e.g., throughput, utilization, recovery, product quality);
- Changes to the Argentinian financial/regulatory framework (e.g., taxation, new legislation, import/ exports, inflation);
- Increased complexity of the design (BG, automation, late changes to the design) impacting the rate of engineering, procurement of long leads, commissioning etc.;
- Performance of selected contractors (schedule, cost, quality, remote operations);
- COVID-19 or similar impacting the Project (cost, schedule, outbreak on site);
- Ability to meet all required stakeholder conditions (e.g., local employment, environmental).

The existing risk controls and those that will be implemented during the implementation/ operations phases are broadly defined in the relevant risk register and will be enhanced as the register is revisited throughout the Project delivery phase and into the operational phase. These controls are predicted to be appropriate for further risk reduction; however, ongoing effort will be required to ensure the delivery of all required controls to achieve acceptable risk levels within the Project, and that these risks are well-understood. This risk/reward evaluation will need to be reviewed at each key Project stage.

1.23.2 Opportunities

Strategically, the two staged approach allows prudent de-risking of the development, by adopting experience from Stage 1 into later stages. It is expected that the subsequent stage will not commit significant funds until the previous stage production is proven. Additionally, it is expected that Stage 2 delivery costs from continuity of people, systems and processes, engineering efficiencies and targeted allocation of contingency may provide upside. The PFS level does not accommodate these synergies but they are expected as engineering advances.

The estimated Brine Resources and Brine Reserves summarized in this Report may have upside potential for tonnage increases, based on results from the ongoing production well drilling, and aquifer testing of the recently-constructed Eastern wellfield production wells.

Currently, the area that includes the East Wellfield is designated as Indicated. Even though the conceptual understanding of this area is very good, this designation is based on the fact that aquifer tests have previously been conducted at only two wells in the area. The 2020 – 2021 production well program for this area will increase aquifer understanding and could result in Brine Resource confidence category upgrades.

The Southwest Wellfield is currently considered to be very conservatively categorized as Inferred because only information from failed borehole SVH10_05 exists for that area. Borehole SVH10_05 could not be completed because of flowing brine conditions in a highly transmissive, and nearly uncemented sand and gravel unit. Good quality brine was confirmed in the area, but measurements equivalent to other boreholes used to characterize the Brine Resource were not possible. With additional drilling and testing in the area, there is potential to upgrade the Brine Resource confidence category.

Two of the already-drilled production wells have reached bedrock at about 220 meters below land surface (m bls), and one has been drilled to over 300 m bls without reaching bedrock. Previous exploration drilling allowed for a maximum depth of the Brine Resource to about 170 m bls. These deeper drill holes have upside potential to extend the limit of the Brine Resource estimates at depth.

The Brine Resources are reported above a 500 mg/L Li cut-off. Many of the brine players in the industry use a 200 mg/L Li cut-off. Should Galaxy elect to lower the cut-off, there is potential for additional lithium carbonate content to be estimated as part of the Brine Resources. Changing the cut-off grade will have no impact on the Brine Reserve because all of the production wells associated with the Brine Reserve are being designed to avoid capturing this lower lithium grade brackish water. If the Project continues past the current projected 40-year mine life, lower-grade brine and brackish water have potential to be economic in the future.

1.24 Interpretation and Conclusions

Under the assumptions described in this Report, the Project shows positive economics.

1.25 Recommendations

A two-phase work program is recommended. The first phase consists of additional exploration and data collection activities, water usage permitting, and environmental studies. The second work phase, which is partly dependent on the exploration and data collection activities will include revisions to the numerical flow model, additional pilot-plant testing, and engineering studies.

1.25.1 Recommendations Phase 1

1.25.1.1 Exploration

Exploration should be conducted to better identify and potentially demonstrate additional extractable brine in other parts of the basin. Favourable exploration results represent Project upside potential. Investigations shall include:

- Geophysical surveys: perform gravity and magnetic surveys over the east, south and west sub-basins to supplement the existing surveys;
- Core drilling: test the west sub-basin at a depth below 150 m to reach bedrock;

- Downhole sampling of wells 25 and 26 in the southern portion of the tenements;
- Perform additional 30-day pumping tests to identify potential for new wellfields and provide calibration targets.

This program is estimated at US$2.5 M.

1.25.1.2 Water Permits

Fresh water is critical for the development and operation of the Sal de Vida Project. The Sal de Vida Project currently has a temporary water permit in force until the water concession request is granted. A water concession for the LOM was submitted according to applicable legal framework, this will provide more certainty for operations. Galaxy provided all the necessary freshwater monitoring information to the provincial Water Authority , as established by local regulation, to support such application.

No budget estimate is provided as it has been assumed that the necessary monitoring and application steps will be completed by Galaxy staff.

1.25.1.3 Solar Plant & Renewable energy Permits

The Sal de Vida Project is currently working in obtaining the environmental and social permits for the renewable energy project. An IIA will be submitted according to applicable legal framework.

1.25.1.4 Environmental Studies

Liquid and solid (snowmelt) precipitation in the basin is estimated at 129 mm/a, or as a volumetric rate, at 39,780 m^3/hr. Using 5 – 20% of the annual volumetric precipitation, an estimated range of precipitation recharge is likely between 1,980 – 7,920 m^3/hr (Montgomery and Associates, 2020). The current best estimate for groundwater recharge at this area is considered to be 5,400 m^3/hr; however, whenever the recharge estimate is used, it is recommended that a sensitivity analysis for recharge rates as low as 1,980 m^3/hr, or as high as 7,920 m^3/hr also be run. If these sensitivity analyses identify a risk, then a more focused investigation may be required to assess the chance of a having a recharge below or above a specific value (Montgomery & Associates, 2020).

The most significant finding with respect to phytobenthos in the 2011 study (ERM, 2011) was the presence of a large number of species that are typical of high-altitude wetlands, and are not yet categorized as indicators, which diminished the significance of the indices obtained. Intensive and joint surveys of the physicochemical parameters and the algal species should be carried out to determine the relative abundance of the different species assemblages.

Collection of quarterly streamflow measurements along the Río de los Patos at multiple locations should be conducted in order to improve its representation in the numerical model and better evaluate the gaining and losing reaches of the river.

Monitoring of water levels and water chemistry data from wells and surface water should be conducted to provide additional data for numerical modelling purposes.

This program is estimated at US$250,000.

1.25.2 Recommendations Phase 2

1.25.2.1 Numerical Modelling

A revision to the numerical flow model should be completed when information from the Recommendations Phase 1 work is available.

Results of the gravity and magnetic surveys should be used to reinterpret the structural model with the inclusion of all existing core holes.

A sensitivity analysis should be completed on the updated steady-state and transient calibration models as well as the predictive model based on potential changes in the anisotropy of hydraulic conductivity, and the extension of the deeper, more permeable units, along with other important model parameters such as effective porosity and dispersivity.

Modelling lithium and other elements of interest as distinct solutes in the model could be conducted, rather than relying on the best fit linear curves with TDS. This could further improve confidence in the model predictions and will allow for the determination of extracted concentrations of other solutes that are not well correlated to TDS (e.g., magnesium and sulphate);

The deeper portions of the numerical model should be updated with improved information on the brines at depth, including the hydraulic conductivity and storage zones;

Model calibration in the Río de los Patos sub-basin should be updated, depending on the streamflow measurement data.

Recommended future work includes:

- A sensitivity analysis on the updated steady-state and transient calibration models as well as the predictive model based on potential changes in the anisotropy of hydraulic conductivity, and the extension of the deeper, more permeable units, along with other important model parameters such as effective porosity and dispersivity;
- A detail analysis of flow units and low conductivity clay barriers, including lateral extension over the modeled area. This will further improve decisions on future drillings locations and screened zones, understanding of the connectivity with shallower aquifers and surface, and estimate drawdown effects over time;
- Modeling Li and other elements of interest as distinct solutes in the model, rather than relying on the best fit linear curves with TDS. This will further improve confidence in the model predictions and will allow for the determination of extracted concentrations of other solutes that are not well correlated to TDS (e.g., magnesium and sulfate);
- Upon additional deeper drilling, updating the deeper portions of the numerical model with improved information including the hydraulic conductivity and storage zones;
- Collection of quarterly streamflow measurements along the Río de los Patos at multiple locations in order to improve its representation in the numerical model and better evaluate the gaining and losing reaches of the river;
- Continued monitoring of water levels and water chemistry data from wells and surface water;

- Further improvement of the model calibration in the Río de los Patos sub-basin if a detailed evaluation of freshwater extraction is needed;
- Further vertical refinement of the upper model layer to better represent evapotranspiration and changes in water density at the surface;
- Recalibration of the flow model after at least 1 year of production wellfield pumping and monitoring.

This program is estimated at US$250,000.

1.25.2.2 Engineering Studies

Engineering-related recommendations include:

- Advance detailed engineering of the process plant and non-process infrastructure of Stage 1;
- Proceed with FEED and Detailed engineering of Stage 2;
- Complete the energy trade-off study considering renewable power from a photovoltaic farm;
- Evaluate potential connection to the gas pipeline that is located 20 km away from the Project;
- Perform a geotechnical investigation to confirm the suitability of the ground for the Stage 2 evaporation ponds.

This program is estimated at US$8 M.

1.25.2.3 Environmental Studies

Environmental-related recommendations include:

- Identify potential gaps in environmental baseline studies in those areas where Stage 2 and Stage 3 infrastructure is likely to be developed: to consult with Engineering /Project Manager if Sal de Vida will have three stages (Stage 1, 2, and 3) or only two Stages — Stage 1 (15,000 TPA de LCA) and Stage 2 (for 30,000 TPA LCA) in the western part of the Los Patos Delta;
- Undertake geotechnical, hydrological, biodiversity and engineering studies of the river crossing between the Plant and Stage 2 infrastructure;
- Establish the alternative analysis study for sustainable localization for the different Project components for Stage 2 and consider the environmental risks for each area;
- Develop understanding of closure considerations and include resulting environmental design criteria in feasibility-level design of infrastructure;
- Advance environmental permitting for Stage 2 of the Project; (this implies the entire process of creating an IIA and approval of a new DIA which could take more than 1 year);
- Re-size energy consumption resources to ensure idem supply for drinking water, aggregates, etc.;
- Investigate water re-use technology, and other technologies that will allow reduction of the carbon footprint;
- Update the study of potential accumulative and residual impacts integrating Stage 2 (synergy);

- Update the environmental offset or compensations if residual impacts are generated;
- Emphasize scaling the capacity of the Solar Plant to produce clean energy for the stage with the greatest production and the benefits this would imply;
- Develop closure cost estimate for Stage 2 of the Project. This must be included in the Mine Closure Plan update;
- Work using international guidelines and standards;
- Consider the social aspects in communicating the work and voluntary commitments in the development of suppliers and local staffing.

2 INTRODUCTION

2.1 Introduction

Michael Rosko, Scott Weston, and Michael Gunn participated in the preparation and review of the NI 43-101 Technical Report (the Report) based on the results of a feasibility study for Stage 1 (2021 Feasibility Study) and a pre-feasibility study for Stages 2 and 3 (2021 Pre-Feasibility) prepared on the Sal de Vida Project (the Project) for Galaxy Lithium (Sal de Vida) S.A. (Galaxy), a wholly owned subsidiary of Allkem Ltd. (Allkem). Allkem, formerly known as Galaxy Resources Ltd., is the new name of Orocobre Ltd. after its merge with Galaxy Resources Ltd.

The report provides an update to the Sal de Vida project, which includes the economic impact of increasing capacity from 10 kilotonne per annum (ktpa) to 15 ktpa for Stage 1 at a feasibility level. The report consolidates Stages 2 and 3 from the 2021 FS (10.7 ktpa each) into a single expanded 30 ktpa LCE stage at a pre-feasibility level.

Capital and operating costs presented in the report have been scaled up for the long-term total production of 45 ktpa of Lithium Carbonate. The Stage 1 wellfields, brine distribution, evaporation ponds, waste (wells and ponds) cost estimates are Class 2 ±10%, and the process plant & infrastructure cost estimates are Class 4 +30% / -20%. The scaled costs for Stage 2 are Class 4 +30% / - 20% with no escalation of costs in the context of long-term product pricing estimates.

Resources and reserves are/have been updated as a result of the production well drilling campaign, and there is greater knowledge of the basin and Project expansion potential. The capital and operating costs and the process development discussion are revised, presenting more recent work that indicates the potential for production of battery grade lithium carbonate product rather than technical grade. The Environmental Impact Report (Environmental Impact Assessment) was approved.

The Sal de Vida Project is located approximately 1,400 km northwest of Buenos Aires, Argentina, within the Salar del Hombre Muerto in the Catamarca Province (Figure 2-1).

2.2 Terms of Reference

The report was prepared in accordance with the Canadian disclosure requirements of National Instrument 43-101 (NI 43-101) and in accordance with the requirements of Form 43-101 F1. The report was prepared in accordance with NI 43-101 Standards of Disclosure for Mineral Projects.

The current Reserve Estimate presented in this report has been prepared in accordance with the 2019 Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines, and the 2014 CIM Definition Standards for Mineral Resources and Mineral Reserves (2014 CIM Definition Standards). The estimates also incorporate guidance provided in the 2011 Ontario Securities Commission (OSC) document entitled OSC Staff Notice 43-704 – Mineral Brine Projects and National Instrument 43-101 Standards of Disclosure for Mineral Projects (2011 OSC Staff Notice).

Units used in the report are metric units unless otherwise noted. Monetary units are in United States (US$) unless otherwise stated. The monetary unit in Argentina is the Argentinean peso (AR$).

Figure 2-1: Project Location Plan

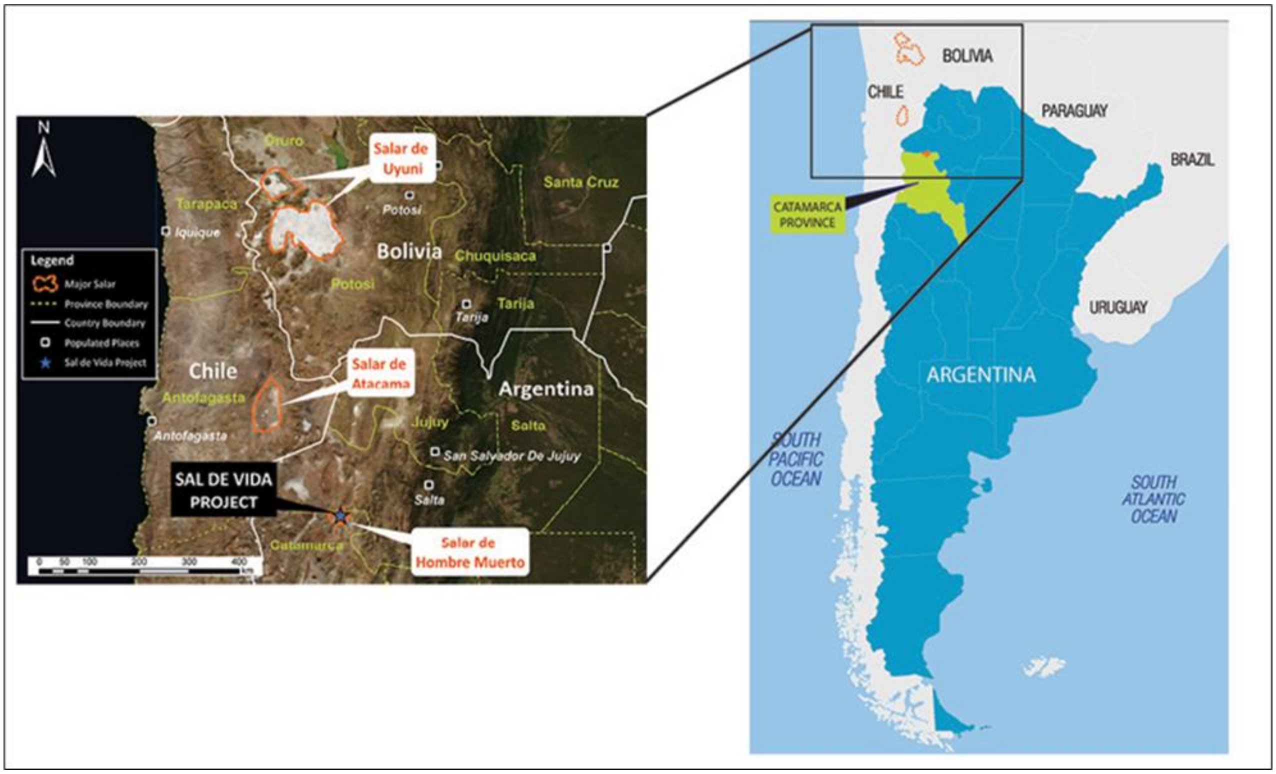


Figure courtesy of Galaxy, 2018.

2.3 Qualified Persons

The following serve as the qualified persons for this Report as qualified persons are defined in National Instrument 43-101, Standards of Disclosure for Mineral Projects, and in compliance with Form 43-101F1:

- Mr. Michael Rosko, M.Sc., Principal Hydrogeologist, Montgomery & Associates Consultores Limitada;
- Mr. Michael Gunn, B.App.Sc., Consulting Processing Engineer;
- Mr. Scott Weston, P.Geo, Vice President, Business Development, Hemmera.

2.4 Site Visits and Scope of Personal Inspection

Mr. Rosko has been involved with the Sal de Vida Project during the period from 2009 to present and has visited the Project in Salar del Hombre Muerto during the course of the program. Mr. Rosko visited the Project from April 5 to 10, 2010, August 11 to 16, 2010, January 16 to 26, 2011, June 22 to 28, 2011 and August 15 to 20, 2011. Most recently, he visited the property on April 13, 2018, and has had representatives of Montgomery & Associates involved in ongoing field work during the years 2020 and 2021.

2.5 Effective Dates

Brine Resource estimate have an effective date of 28 February 2022.

Brine Reserve estimate have an effective date 31 March 2022.

The overall effective date of this Report is the effective date of the financial analysis that supports the Mineral Reserves, which is 31 March 2022.

2.6 Information Sources and References

The major reference for the Report are:

- Sal de Vida Feasibility Study for Stage 1 (May 2021);
- Sal de Vida Pre-Feasibility for Stages 2 and 3 (May 2021);
- Sal de Vida Pre-Feasibility for Stages 2 Update (May 2022);
- Galaxy Resources Ltd, 2021, Sal de Vida Feasibility Study Report. Report prepared by Galaxy, 623 pages.

Reports and documents listed in Section 2.7, Section 3, and Section 27 of this Report were also used to support preparation of the Report.

2.7 Previous Technical Reports

The following Technical reports were filed on the Sal de Vida Project:

- Houston, J., and Jaacks, J., 2010. Technical Report on the Sal De Vida Lithium Project Salar de Hombre Muerto Catamarca, Argentina. Report prepared for Lithium One, effective date 5 March 2010.
- Rosko, M., and Jaacks, J., 2011. Inferred Resource Estimate for Lithium and Potassium Sal de Vida Project Salar del Hombre Muerto Catamarca-Salta, Argentina. Report prepared by Montgomery and Associates for Lithium One, effective date 25 April 2011.
- Kelley, R.J., Burga, E., Lukes, J., 2011. NI 43-101 Technical Report for: Preliminary Assessment and Economic Evaluation of the Sal de Vida Project Catamarca & Salta Provinces, Argentina. Report prepared by Worley Parsons for Lithium One, effective date 18 November 2011.
- Rosko, M., and Jaacks, J., 2012. Measured, Indicated and Inferred Lithium and Potassium Resource, Sal de Vida Project Salar del Hombre Muerto Catamarca-Salta, Argentina. Report prepared by Montgomery and Associates for Lithium One, effective date 7 March 2012.
- Rosko, M., Sanford, A., Riordan, J. and Talbot, B., 2021. Sal de Vida Project, Salar del Hombre Muerto, Catamarca, Argentina, NI 43-101 Technical Report. Report prepared for Galaxy Resources Ltd., effective date 28 May 2021.

2.8 List of Acronyms and Units of Measurement

Table 2-1: Acronyms and Abbreviations

Abbreviation	Definition
AA	atomic absorption
AACE	Association for the Advancement of Cost Engineering
AISC	all-in sustain cost
AMC	Argentina Mining Code
Andina	Andina Perforaciones S.A.
BG	battery-grade
CAGR	compound annual growth rate
CAPSA	Compañía Argentina de Perforaciones S.A.
CIM	Canadian Institute of Mining, Metallurgy and Petroleum
CRP	Community Relations Plan
DCF	discounted cashflow
DIA	Environmental Impact Assessment (*Declaración de Impacto Ambiental*)
EIR	Environmental Impact Report
Energold	Energold Drilling Inc.
ERH	Evaluation of Hydric Resources (*Evaluación de Recursos Hidricos*)
ESS	stationary energy storage
EV	electric vehicles
EVT	evapotranspiration
FEED	Front End Engineering Design
FOB	free on board
G&A	General and Administrative
GBL	gamma-butyrolactone solvent
GHB	general head boundary
GIIP	Good International Industry Practice
GLSSA	Galaxy Lithium (Sal de Vida) S.A.
GRI	Global Reporting Initiative
Hidroplus	Hidroplus S.R.L.
HSECMS	Health, Safety, and Environmental Management System
ICP	inductively coupled plasma
IRR	Internal rate of return
IX	ion exchange
KCl	potassium chloride
Kr	hydraulic conductivity in the radial (horizontal) direction
Kz	hydraulic conductivity in the vertical direction
LC	lithium carbonate
LCE	lithium carbonate equivalent
LFP	lithium-iron-phosphate
Li	lithium

Abbreviation	Definition
LOM	life of mine
MCC	motor control centre
NVP	net present value
OSC	Ontario Securities Commission
OIT	Operator interface terminal
PG	Primary-grade
PPA	power purchase agreement
QA/QC	quality assurance/quality control
QP	Qualified Person
RO	reverse osmosis
RC	reverse circulation
SRM	standard reference material
SX	solvent extraction
TDS	total dissolved solids
TG	technical-grade
VFD	variable frequency drive

Table 2-2: Units of Measurement

Abbreviation	Description
°C	degrees Celsius
%	percent
AR$	Argentinean peso
US$	United States dollar
dmt	dry million tonnes
g	grams
GWh	Gigawatt hours
ha	hectare
hr	hour
kg	kilogram
L	litres
L/min	litres per minute
L/s	litres per second
L/s/m	litres per second per metre
kdmt	thousand dry metric tonnes
km	kilometre
km^2	square kilometres
km/hr	kilometre per hour
ktpa	kilotonne per annum
kVa	kilovolt amp
M	million

m	metres
m^2	square metre
m^3	cubic metres
m^3/hr	cubic metres per hour
m bls	meters below land surface
m btoc	meters below top of casing
m/d	metres per day
min	minute
mm	millimetre
mm/a	millimetres annually
mg	milligram
Mt	million tonnes
MVA	megavolt-ampere
ppb	parts per billion
t	tonne
s	second
tpa	tonnes per annum
µm	micrometre
µS	microSeimens
V	volt
w/w	weight per weight
wt%	weight percent

3 RELIANCE ON OTHER EXPERTS

3.1 Introduction

The QPs have relied upon the following other expert reports, which provided information regarding mineral rights, surface rights, and royalties.

3.2 Mineral Tenure, Surface Rights, and Royalties

The QPs have not independently reviewed ownership of the Project area and any underlying mineral tenure, surface rights, or royalties. The QPs have fully relied upon, and disclaim responsibility for, information derived from Galaxy and legal experts retained by Galaxy for this information through the following document:

- Allende & Brea Legal Opinion on Galaxy's Mining Properties (December 2020).

This information is used in Section 4 of the Report. The information is also used in support of the Brine Resource estimate in Section 14, the Brine Reserve estimate in Section 15, and the financial analysis in Section 22.4.

3.3 Environmental

The QPs have not independently reviewed the baseline survey data collected. The QPs have relied upon information derived from Galaxy and experts retained by Galaxy for this information through the following documents:

- ERM, 2011. *Línea de Base Ambiental y Social en el Salar de Hombre Muerto*;
- Regalado, C.D., 2019. *Informe de Impacto Ambiental, Actualización — Proyecto Sal de Vida*;
- Ausenco & OWN (Open Work Nature), 2021. *Informe de Impacto Ambiental, Actualización - Proyecto Sal de Vida*;
- Galaxy. 2021. Technical Report: Mine Closure. Sal de Vida Lithium Project Salar del Hombre Muerto Catamarca, Argentina;
- Knight Piésold Argentina Consultores S.A. 2021. *Monitoreo de Humedales Proyecto "Sal de Vida" Salar del Hombre Muerto*;
- Montgomery and Associates, 2021. *Balance Hídrico de Línea de Base. Proyecto Sal de Vida. Salar del Hombre Muerto, Catamarca, Argentina. Galaxy Lithium (Sal de Vida) S.A*.

This information is used in Section 19 of the Report. The information is also used in support of the Brine Resource estimate in Section 14, the Brine Reserve estimate in Section 15, and the financial analysis in Section 22.

3.4 Social and Community Impacts

The QPs have not independently reviewed the social and community impacts of the Project. The QPs have relied upon information derived from Galaxy and experts retained by Galaxy for this information through the following documents:

- ERM, 2011. *Línea de Base Ambiental y Social en el Salar de Hombre Muerto*;
- Galaxy, 2020. Updated Social Baseline Report; and

- Ausenco & OWN (Open Work Nature), 2021. *Actualización del Informe de Impacto Ambiental*.

This information is used in Section 19 of the Report. The information is also used in support of the Brine Resource estimate in Section 14, the Brine Reserve estimate in Section 15, and the financial analysis in Section 22.

3.5 Markets

The QPs have not independently reviewed marketing considerations and commodity price assumptions relevant to the Project. The QPs have fully relied upon, and disclaim responsibility for, information provided by Galaxy and experts retained by Galaxy for this information through the following document:

- Lithium Market Report prepared by Wood Mackenzie, 2022 for Allkem.

This information is used in Section 19 of the Report. The information is also used in support of the Brine Resource estimate in Section 14, the Brine Reserve estimate in Section 15, and the financial analysis in Section 22.

The QPs consider it appropriate to rely on information provided by Wood Mackenzie on market information and commodity price forecasts because the company is a specialist advisory firm providing global consulting services to lithium producers, lithium purchasers, investors, and governments, with a specific focus on the lithium ion battery, electric vehicle (EV), and energy storage supply chains. Wood Mackenzie's areas of corporate focus include industry and market analysis, price assessments and forecasts, and expert consulting services.

3.6 Taxation

The QPs have not independently reviewed taxation considerations relevant to the Project. The QPs have fully relied upon, and disclaim responsibility for, information derived from Galaxy and experts retained by Galaxy for this information.

This information is used in Section 22 of the Report. The information is also used in support the Brine Reserve estimate in Section 15.

4 PROPERTY DESCRIPTION AND LOCATION

4.1 Introduction

The Project is located 650 kilometres (km) from the city of Catamarca via Antofagasta de la Sierra and 390 km from the city of Salta via San Antonio de los Cobres. The Project centroid coordinates are X = 3404892,11 Y = 7191251,49 (Gauss Kruger, POSGAR 2007, Zone 3).

4.2 Property and Titles in Argentina

4.2.1 Mining Title

The basic statute that governs mining activity in Argentina is the National Mining Code, National Law 1919 (AMC). The Argentinean Constitution recognizes the provincial or federal original ownership of the minerals located within their jurisdictions and the AMC establishes a non-discretionary system under which mining rights are awarded to private entities and/or individuals, which are equivalent in rights to private ownership and constitutes a complete and different property of the land of which it underlays. Regardless the state of nature of the mineral (solid, liquid or gaseous), the AMC considers three categories of mines, being the lithium classified as a metalliferous substance included in the first category of mines. The AMC recognizes the private entities right to explore and develop deposits and freely dispose of the minerals extracted within the area of the concession, as well as the right to transfer such rights without any previous government discretional approval. These regulations create the legal framework that governs the relationship between the government and miner (through an exploration permit or a mining concession), and between the miner and third parties.

Key parameters of the AMC include:

- Mining properties form a different property from the surface ownership where they are located (either regarding fiscal or private land).
- Any individual or legal entity with capacity to legally purchase and own a real estate property may petition and own a mining right.
- The original ownership of a mining right is acquired through a legal concession granted for limited (in case of an exploration permit) or unlimited (in case of an exploitation concession) time and only subject to the compliance of certain maintenance conditions as set by the AMC.
- There is provincial jurisdiction regarding mining police, administrative authority and in environmental matters.

The AMC governs the rights, obligations, and procedures referring to the exploration, exploitation, and use of mineral substances.

There are two main mining rights that can be awarded under the AMC:

- Exploration permits ("cateo"): cateos grant the applicant an exclusive right to explore a specific area (maximum 10,000 ha) for a certain period (maximum 1500 days). No exploitation can be undertaken, but any exploratory method is acceptable as long as the method is consistent with a previously approved Environmental Impact Study.
- Exploitation concessions (from "manifestacion de descubrimiento" to "mina"): exploitation concessions are acquired by means of a "legal concession" granted by the Mining authority (Mining Authority) under

the provisions of the AMC. The exploitation concession has no time limit. There are different ways of acquiring an exploitation concession:

- By discovering minerals as a consequence of exploration activity within a cateo;
- When minerals are discovered by accident; that is, without a cateo (e.g., the area is free of previous exploration permits) or exploitation concessions;
- When an exploitation right has been declared and registered by the Mining Authority as "vacant" due to a non-compliance with the requirements settled by law by a third party.

The discoverer must also indicate an area which does not exceed twice the maximum possible extension of an exploitation concession, within which the exploration works will be conducted, and mining claims ("pertenencias") will be confined to. This area includes the discovery site and would remain unavailable until a survey is duly approved and authorized. When filing an application, it is customary to refer to the exploration permit within which the discovery is located, so that any overlap with existing rights is already anticipated. Any area of land within which boundaries the holder of a mining concession is allowed to conduct exploration and or exploitation works is called a "claim". Each claim of a lithium or borates deposit is 100 ha. The exploitation concessions do not expire, but are subject to the fulfilment of certain specific conditions or obligations known as "amparo minero". This includes payment of a mining fee; and completion of an investment plan:

- Mining fee (canon): the AMC requires a titleholder to pay an annual fee per claim, which is periodically fixed as required by federal law. If the payment is not made within two months of the claim expiration date, the concession is terminated ipso facto. In the case of lithium claims, the fee is currently AR$8,000;
- Investment plan: within one year from the date of request of the legal survey (irrespective of the mining property being surveyed or not), the applicant/concessionaire must submit to the Mining Authority an estimate of a 5-year plan and amount of capital investment that it intends to perform in connection with:
    - The execution of mining works;
    - The construction of camps, buildings, roads and other related works;
    - The acquisition of machinery, stations, parts and equipment, indicating its production or treatment capacity.

In accordance with the provisions of Article 217 of the AMC, the investment for a mining property cannot be less than 300 times the annual fee that corresponds to such mining property, based on its category and the number of claims, provided that such investment is fully completed within five years from its filing. An amount not lower than 20% of the estimated aggregate amount must be invested in each of the first two years.

A sworn statement on the compliance status of the investments must be submitted to the Mining Authority within three months of the expiration of each annual period.

The Mining Authority in each Province has the ability to:

- Enact the Mining Procedure Code (for example, Provincial Law No. 2233 in Catamarca Province), which must follow AMC guidelines;
- Award mining rights and control its compliance in accordance with the AMC and applicable Procedure Code provisions.

Although each Mining Authority awards and controls the mining rights within its territory, in practice the Mining Authority must strictly follow AMC guidelines, as every procedural step is clearly detailed in the AMC.

4.2.2 Surface Rights

The AMC sets out rules under which surface rights and easements can be granted for a mining operation, and covers aspects including land occupation, rights-of-way, access routes, transport routes, rail lines, water usage and any other infrastructure needed for operations.

For private property, compensation must be paid to the affected landowner in proportion to the amount of damage or inconvenience incurred; however, no provisions or regulations have been enacted as to the nature or amount of the compensation payment.

For instances where no agreement can be reached with the landowner, the Mining Authority and/or the competent court pursuant to the applicable procedure shall resolve the conflict.

For fiscal property (national or provincial ownership) the AMC rule that the surface rights and easements should be granted for a mining operation without compensation.

The AMC provides the mining right holder with the right to expropriate at least the required property up to a maximum of one claim.

4.2.3 Water Rights

Typically, Provincial water authorities:

- Issue water usage permits, including usage purpose, amount of water required, how the water is to be delivered to the end-user, and any infrastructure requirements;
- Establish a priority system for the permits, based on the type of water consumption;
- Govern the duration of issued permits;
- Levy usage fees based on the amount of water consumed/used.

Water use rights may be acquired by permit, by concession, and, under laws enacted in some Provinces, through authorization. Revocable permits for water use can be granted for a specific purpose. A grant (concession) is typically awarded for a time period that is based on the intended use; however, some permits concessions can be granted in perpetuity.

4.2.4 Fraser Institute Policy Perception Index

The QPs used the Investment Attractiveness Index from the 2020 Fraser Institute Annual Survey of Mining Companies report (the Fraser Institute survey) as a credible source for the assessment of the overall political risk facing an exploration or mining project in the Province of Catamarca, Argentina.

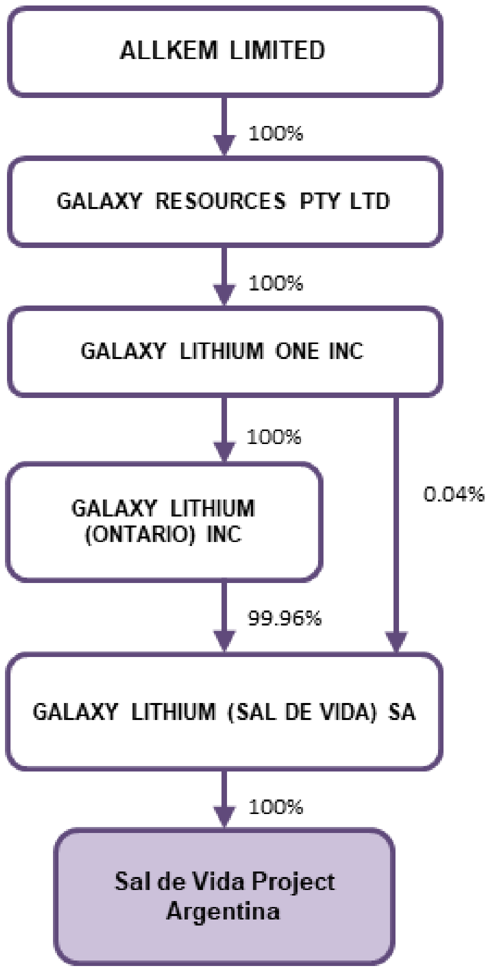
The QPs used the Fraser Institute survey because it is globally regarded as an independent report-card style assessment to governments on how attractive their policies are from the point of view of an exploration manager or mining company senior management, and forms a proxy for the assessment by the mining industry of the political risk in the Province of Catamarca, Argentina. In 2020, the rankings were from the most attractive (1) to the least attractive jurisdiction (77), of the 77 jurisdictions included in the survey.

The Province of Catamarca, Argentina ranked 44 out of 77 jurisdictions in the attractiveness index survey in 2020, 45 out of 77 in the policy perception index, and 44 out of 77 in the best practices mineral potential index.

4.3 Ownership

All of Galaxy's mining tenement interests in the Sal de Vida Project are held by Galaxy Lithium (Sal de Vida) S.A., which is a wholly owned subsidiary of Galaxy Resources Ltd. (Australia) which is owned by Allkem Ltd., as shown in Figure 4-1.

Figure 4-1: Galaxy Lithium Ownership Structure



Note: Figure courtesy of Galaxy, 2021.

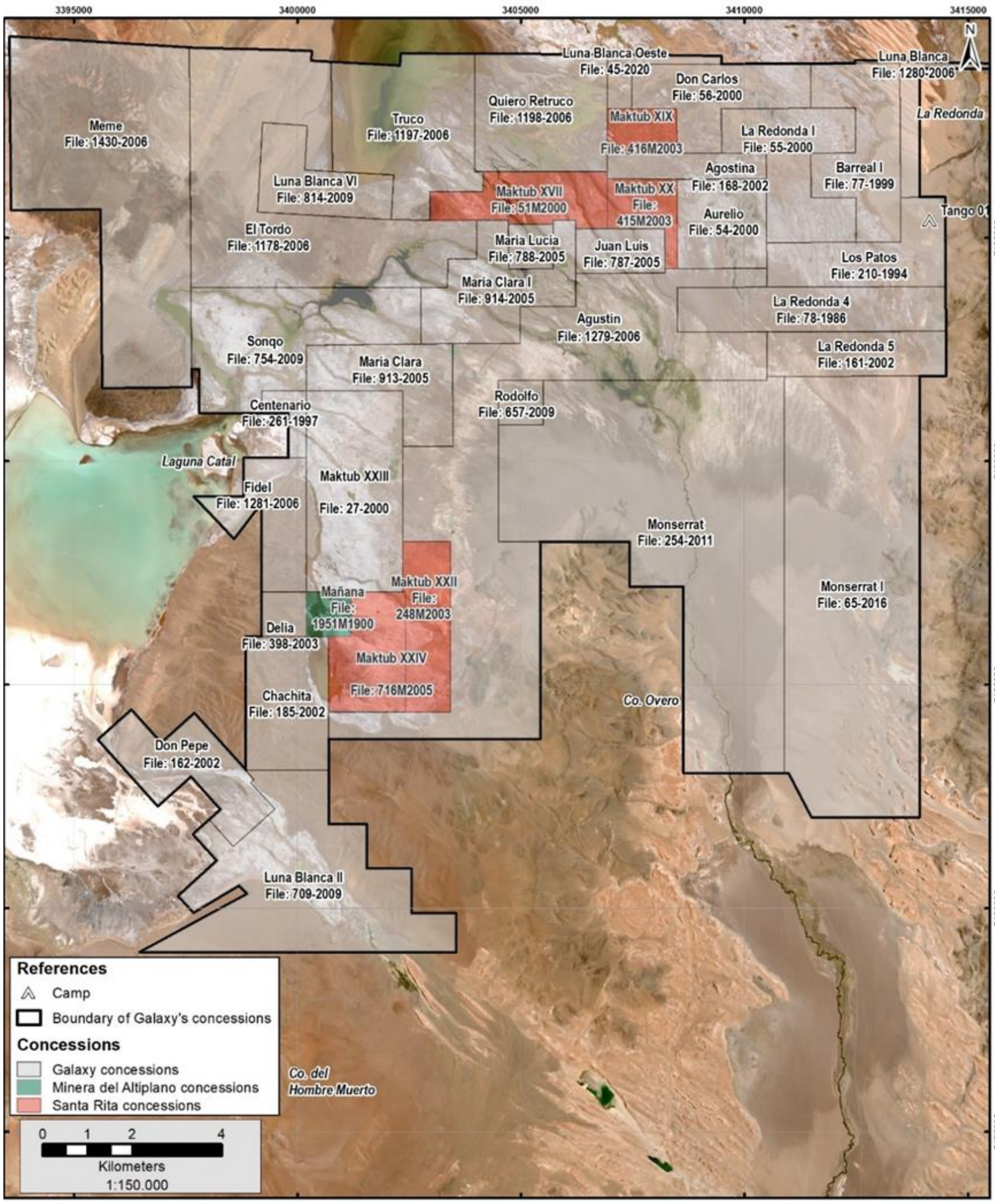
4.4 Mineral Tenure

Galaxy currently has mineral rights over 26,253 ha at Salar del Hombre Muerto, which are held under 31 mining concessions (Table 4-1). All concessions are in good standing with all statutory annual payments (mining canon) and reporting obligation up to date. The canon should be paid in advance and in equal parts in two semesters, which will expire on 30 June and 31 December each year. Claim locations are shown in Figure 4-2.

Table 4-1: Sal de Vida Mining Concessions

No.	File	Tenement	No.	File	Date of Last Annual Canon Payment
1	78-1986	La Redonda 4	1986	599.39	December 31, 2021
2	210-1994	Los Patos	1994	499.89	December 31, 2021
3	261-1997	Centenario	1997	89.18	December 31, 2021
4	77-1999	Barreal 1	1999	599.49	December 31, 2021
5	27-2000	Maktub XXIII	2000	968.78	December 31, 2021
6	54-2000	Aurelio	2000	399.66	December 31, 2021
7	55-2000	La Redonda I	2000	599.45	December 31, 2021
8	56-2000	Don Carlos	2000	499.10	December 31, 2021
9	161-2002	Redonda 5	2002	399.73	December 31, 2021
10	162-2002	Don Pepe	2002	499.56	December 31, 2021
11	168-2002	Agostina	2002	205.30	December 31, 2021
12	185-2002	Chachita	2002	553.84	December 31, 2021
13	398-2003	Delia	2003	99.90	December 31, 2021
14	787-2005	Juan Luis	2005	199.98	December 31, 2021
15	788-2005	Maria Lucia	2005	99.81	December 31, 2021
16	913-2005	Maria Clara	2005	479.20	December 31, 2021
17	914-2005	Maria Clara 1	2005	593.82	December 31, 2021
18	1178-2006	El Tordo	2006	1864.96	December 31, 2021
19	754-2009	Sonqo	2009	987.63	December 31, 2021
20	1198-2006	Quiero Retruco	2009	775,22	December 31, 2021
21	1197-2006	Truco	2006	956,97	December 31, 2021
22	1279-2006	Agustin	2006	2828.37	December 31, 2021
23	1280-2006	Luna Blanca	2006	160,83	December 31, 2021
24	1281-2006	Fidel	2006	409.53	December 31, 2021
25	1430-2006	Meme	2006	2298.13	December 31, 2021
26	657-2009	Rodolfo	2009	100	December 31, 2021
27	709-2009	Luna Blanca II	2009	1530.60	December 31, 2021
28	814-2009	Luna Blanca VI	2009	399.25	December 31, 2021
29	65-2016	Montserrat I	2016	2949.62	December 31, 2021
30	254-2011	Montserrat	2011	3499.99	December 31, 2021
31	45-2020	Luna Blanca Oeste	2020	105.88	December 31, 2021

Figure 4-2: Claim Location Map



Note: Figure courtesy of Galaxy, 2021.

4.5 Surface Rights

Sal de Vida is located within fiscal lands owned by the Province of Catamarca with no private land holders. According to the Royalty Agreement (see Section 4.9), the Government of Catamarca agreed that if any change or amendment to the legal status of such fiscal lands is introduced which results in GLSSA being obligated to pay any amount for the use, occupation of or damages to such lands to any person, entity or government, any amount payable under such changes or amendments, after approval from the province shall be deducted from the Additional Contribution and (where necessary) the CSR Contribution to be paid by GLSSA.

4.6 Water Rights

Water permits are discussed in Section 20.5. According to the Royalty Agreement (see Section 4.9), the Governor of the Province agrees to grant the relevant water concession applied for by GLSSA in accordance with Section 7 of the Provincial Water Law No. 2577, as amended.

4.7 Easements

Galaxy acquired the following mining easements through legal and judicial processes:

- Water easements: granted on July 4, 2013, under File No 04/2013. A petition for a new water easement for exclusive use was filed on September 8, 2016, and was granted on December 23, 2020, under File No 66/2016;
- Camp easements: granted on May 17, 2017, under File No 166/2011;
- Infrastructure and service easements: granted on July 4, 2013, under File No 18/2013. A petition for a new infrastructure and services easement for exclusive full use over the mining property was filed on September 20, 2019, and was granted on December 23, 2020, under File No 94/2019.

4.8 Third-party Rights

All the mining concessions for the Sal de Vida Project were secured under purchasing agreements with pre-existing owners and claimants. In some cases, sellers retained usufruct rights (a legal right accorded to a person or party that confers the temporary right to use and derive income or benefit from someone else's mining property) and commercial rights (third-party rights) for the development of ulexite (borates) at surface (Table 4-2).

The transfer deeds establish that the lithium property holder, Galaxy, has priority over these rights. Galaxy has retained the option to buy out any of these rights if it considers it necessary at any point in time.

Table 4-2: Ulexite Usufruct and Commercial Rights

Owner	Mining Concession	Type of Right
Mendieta Ricardo Carlos	Centenario	Usufruct right
	Chachita	Usufruct right
Rafaelli	Don Pepe	Usufruct right
	La Redonda 4	Usufruct right
	La Redonda 5	Usufruct right
Avanti S.R.L.	Agostina	Usufruct right
Maktub Compañía Minera S.R.L.	Juan Luis	Commercial right
	Maria Clara	Commercial right
	Maria Clara 1	Commercial right
	Maktub XXIII	Commercial right
	Maria Lucia	Commercial right
	Meme	Commercial right

Owner	Mining Concession	Type of Right
	Truco	Commercial right
	Quiero Retruco	Commercial right

4.9 Mining Royalties

Pursuant to Law 4757 (as amended), Catamarca Mining royalty is limited to 3% of the mine head value of the extracted ore, which consist in the sales price less direct cash costs related to exploitation (excluding fixed asset depreciation, the "Mining Royalty").

On December 20, 2021, GLSSA and the Governor of the Province of Catamarca subscribed a Royalties Commitment Deed (the "Royalty Agreement"), pursuant to which GLSSA agrees to pay to the Province of Catamarca a maximum amount of 3.5% of the "net monthly revenue" from the Project, as follows:

- The "Mining Royalty" will be paid as indicated by the provincial Royalty Regime;
- An "Additional Contribution" of 3.2% less the Mining Royalty and the applicable water canon; and
- 0.3% shall be paid as a "CSR Contribution".

The validity of the Royalty Agreement is subject to the approval of the Legislature of the Province of Catamarca, which is in due course to be obtained.

The payment of Mining Royalty is due once the commercial production of the Sal de Vida Project commences and the payment of the Additional Contribution and CSR Contribution is due once the Province of Catamarca (through the relevant authority) grants GLSSA the relevant water concession pursuant to Section 7 of the Water Law No. 2577, as amended.

The Additional Contribution and CSR Contribution will be paid through a Trust, pursuant to provincial legislation to be enacted.

The 3.5% maximum amount shall be the maximum amount payable by GLSSA to the province of Catamarca, for any reason whatsoever, for the whole life of the Project (including any expansions).

The "net monthly revenue" will be calculated by reference to the amounts invoiced by GLSSA each month for the sale of lithium products produced from the Project, and for the Mining Royalty, less (i) any taxes, duties, levies included on those invoiced amounts and (ii) any sales reimbursement.

The Additional Contribution made to the Trust shall be used exclusively for conducting investment projects, infrastructure works, and productive development within the area where the Project is located and, specifically, within the direct (Department of Antofagasta) and indirect (Department of Belén and Santa María) zones of influence of said Project.

The CSR Contribution shall be used exclusively for conducting investment projects, infrastructure works and productive development within the site area where Project is located and, specifically, within the direct zone of influence (Department of Antofagasta).

4.10 Permitting Considerations

Permitting considerations are discussed in Section 1.

4.11 Environmental Considerations

The Project is not subject to any known environmental liabilities. There has been active ulexite mining within the boundaries of the existing land agreement, but the operations are limited to within 5 m of the surface and will reclaim naturally fairly quickly. All ulexite activities are dormant in the area as a result of the low ulexite prices and there is no indication of reactivation.

Environmental considerations are discussed in Section 1.

4.12 Social License Considerations

Social licence considerations are discussed in Section 1.

4.13 Comments on Property Description and Location

The QP notes that:

- Legal opinion provided supports that Galaxy currently holds an indirect 100% interest in the Sal de Vida Project through its subsidiary Galaxy Lithium (Sal de Vida) S.A.;
- Legal opinion provided supports that the mineral tenures held are valid and sufficient to support declaration of Brine Resources and Brine Reserves;
- The AMC sets out rules under which surface rights and easements can be granted for a mining operation. In instances where no agreement can be reached with the landowner, the AMC provides the mining right holder with the right to expropriate the required property up to a limited minimum surface. Water use rights may be acquired by temporary permits, by permanent concessions, and, under laws enacted in some Provinces, through authorization;
- Galaxy currently has approved water permits; see Section 20.5;
- A number of the mining concessions are subject to usufruct rights for ulexite;
- The QP is not aware of any significant environmental, social, or permitting issues that would prevent future exploitation of the Sal de Vida Project, other than as discussed in this Report.

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

5.1 Accessibility

The main route to the Project site is from the city of Catamarca via national route 40 to Belen, and provincial Route 43 through Antofagasta de la Sierra to Salar del Hombre Muerto. The road is paved all the way to Antofagasta de la Sierra and continues unpaved for the last 145 km to Salar del Hombre Muerto. This road is well maintained and serves Livent Corporation's Fenix lithium operations, Galan Lithium Ltd.'s Hombre Muerto Project and Galaxy's Sal de Vida Project.

The shortest route to the Project site is from Salta via San Antonio de los Cobres. The access road is paved for the first 75 km to San Antonio de los Cobres and continues unpaved for 215 km to Salar del Hombre Muerto. The total distance between the city of Salta and the Sal de Vida Project is 390 km. Provincial Route 51 is a well-maintained road and is used by a number of mining projects. The drive time is approximately 6 hours in a four-wheel drive vehicle or 10 hr by heavy vehicle or bus.

5.2 Climate

The Project is located in the Puna ecoregion of the Altiplano, where the climate is extremely cold and dry. The warmest months are January and February, with average temperatures of 11.6°C and 10.9°C respectively. The coolest month is July, with an average temperature of 1.6°C.

Solar radiation is intense, especially during the summer months of October through March, leading to high evaporation rates. Average annual evaporation in the Salar de Hombre Muerto is estimated at 2,710 mm.

Rainfall is generally restricted to the summer months (December to March). Based on weather data collected in 2001, the annual precipitation from 1992 to 2001 averaged 77.4 mm.

The area is extremely windy; wind speeds of up to 80 km/h have been recorded during the dry season.

Operations are planned to be conducted year-round.

5.3 Local Resources and Infrastructure

The nearest villages are Antofagasta de la Sierra in the Province of Catamarca, 145 km south of the Project site, and San Antonio de los Cobres in the Province of Salta, 210 km north of the Project site. Antofagasta de la Sierra has an estimated population of 1,200 people and the village has basic services. San Antonio de los Cobres has an estimated population of 5,000 inhabitants with greater services including medical facilities, border patrol (Gendarmería Nacional), and schools.

The closest powerline, a 330-kVA line, is located 140 km north of the Sal de Vida Project, oriented southeast–northwest, and supplies power to Chile. Based on the distance to the Sal de Vida Project and the estimated capital requirements for accessing this network in the 2021 Feasibility Study, Galaxy assumed that site-generated power is the preferred option.

The Argentine train network is well established and connects the major cities and ports. However, the system is currently not fully functional, and many lines are derelict. The Ferrocarril Belgrano line is located 100 km to the north of the Salar del Hombre Muerto. It consists of a narrow-gauge railway connecting with the Chilean railway network Ferronor to reach the Pacific Ocean. Livent reinstated the Pocitos–Antofagasta link which is used to ship product and import reagents. The Chilean section regularly services the Escondida and Zaldivar mines. A public airstrip is located in Antofagasta de La Sierra and a private airstrip is located at Livent's Salar del Hombre Muerto operations.

International cargo for Sal de Vida could use a combination of ports in the Buenos Aires region of Argentina and the Antofagasta region of Chile. The Ports of Antofagasta and Angamos consist of deep-water port facilities serving the mining industry in northern Chile. The Port of Antofagasta is an inbound port and could be used by Galaxy Lithium to import 50% of the soda ash requirements. The Port of Angamos is an outbound port and could be used by Galaxy Lithium to export lithium carbonate via the Pacific Ocean. The Ports of Rosario, Campana and Buenos Aires consist of large port facilities serving multiple industries in Argentina's main economic hubs.

Additional information on infrastructure that may be available to the Project, and which will be required for Project operations, is provided in Section 18.

5.4 Physiography

The Project is located in a flat plain at an altitude of about 4,000 m.

Vegetation in the Puna is sparse, reflecting the high-altitude desert environment, and consists of low woody herbs, grasses, and cushion plants. There is no vegetation on the salar.

Two major perennial streams feed the salar from the south, the Río de los Patos and the Río Trapiche. The Río de los Patos drains about 79% of the total salar catchment area, and the Rio Trapiche drains approximately 8%.

There are no protected area or natural reserves in the Sal de Vida Project area. Within the baseline environmental study area there are two reserves, Los Andes Reserve in the Province of Salta and the Laguna Blanca Biosphere Reserve in the Province of Catamarca. The Sal de Vida Project is 75 km south of the Los Andes Reserve and 35 km north of the Laguna Blanca protected area.

5.5 Comments on Accessibility, Climate, Local Resources, Infrastructure, and Physiography

Any future mining operations are expected to be operated year-round.

There is sufficient suitable land available within the mineral tenure held by Galaxy for infrastructure such as waste disposal, process plant, and related mine facilities.

A review of the existing power and water sources, manpower availability, and transport options indicates that there are reasonable expectations that sufficient labour and infrastructure will be available to support exploration activities and any future mine development.

6 HISTORY

6.1 Exploration History

A summary of the Project exploration history is provided in Table 6-1. Details of the exploration activities are discussed in Section 9.

Table 6-1: Exploration History

Operator	Date	Comment
Lithium One	2009 – 2012	• Obtained mineral tenure • Established an operating base on the salar • Conducted exploration drilling and Brine Resource estimates • Ran a pilot plant with a 20 L/batch capacity between 2011 and 2012 • Completed a preliminary economic assessment (PEA) • Completed a feasibility study assuming production of lithium carbonate and potassium chloride
Galaxy	2012	• Obtained Project interest through acquisition of Lithium One
	2012 – 2018	• Core drill programs • Short-term and constant-rate pumping tests • Assessment of Project scientific and technical design requirements • Mining and process studies • Technical studies in support of infrastructure and transport options • Updated Brine Resource estimates • Capital and operating cost estimates • Updated risk assessments • Prepared baseline studies and an Environmental Impact Report
	2018	• Sold the northern portion of its then tenement package to POSCO • Completed a feasibility study assuming production of lithium carbonate and potassium chloride
	2019 – 2021	• Conducted geotechnical surveys and detailed topography • Constructed and operated 20 ha of pilot ponds and plant • Built a 330-person camp • Completed exploration drilling of untested areas in the southern portion of the tenement package • Updated engineering, capital and operating cost estimates • Completed a feasibility study assuming production of BG, TG, and PG lithium carbonate • Completed Stage 1 production wells drilling • Obtained the DIA permit to construct and operate Stage 1

6.2 Production

No formal production of lithium carbonate has occurred from the Project area. The only production of lithium carbonate has been from pilot plant operations.

7 GEOLOGICAL SETTING AND MINERALIZATION

7.1 Introduction

Information in this section is summarized from the 2021 Feasibility Study. The presentation is a summary of the key geological and hydrological characteristics of the Project area.

7.2 Regional Geology

The regional geological setting is Altiplano Puna plateau, an area of uplift that began during the middle to late Miocene (10 – 15 Ma). Red-bed sediments formed during the early to middle Miocene in areas of structural depressions. During the middle to late Miocene, a combination of thrust faulting, uplift and volcanism led to the sedimentary basins becoming isolated. The Cordilleras and major watersheds bound the Puna area to the west and east. Sedimentation in these basins began with the formation of alluvial fans at the feet of the uplifted ranges and continued with the development of playa sandflats and mudflat facies.

In basin areas, the watersheds are within the basins; there are no outlets from the basins. Ongoing runoff, both surface and underground, continued solute dissolution from the basins and concentration in their centres where evaporation is the only outlet. Evaporite minerals occur both as disseminations within clastic sequence and as discrete beds.

7.3 Project Geology

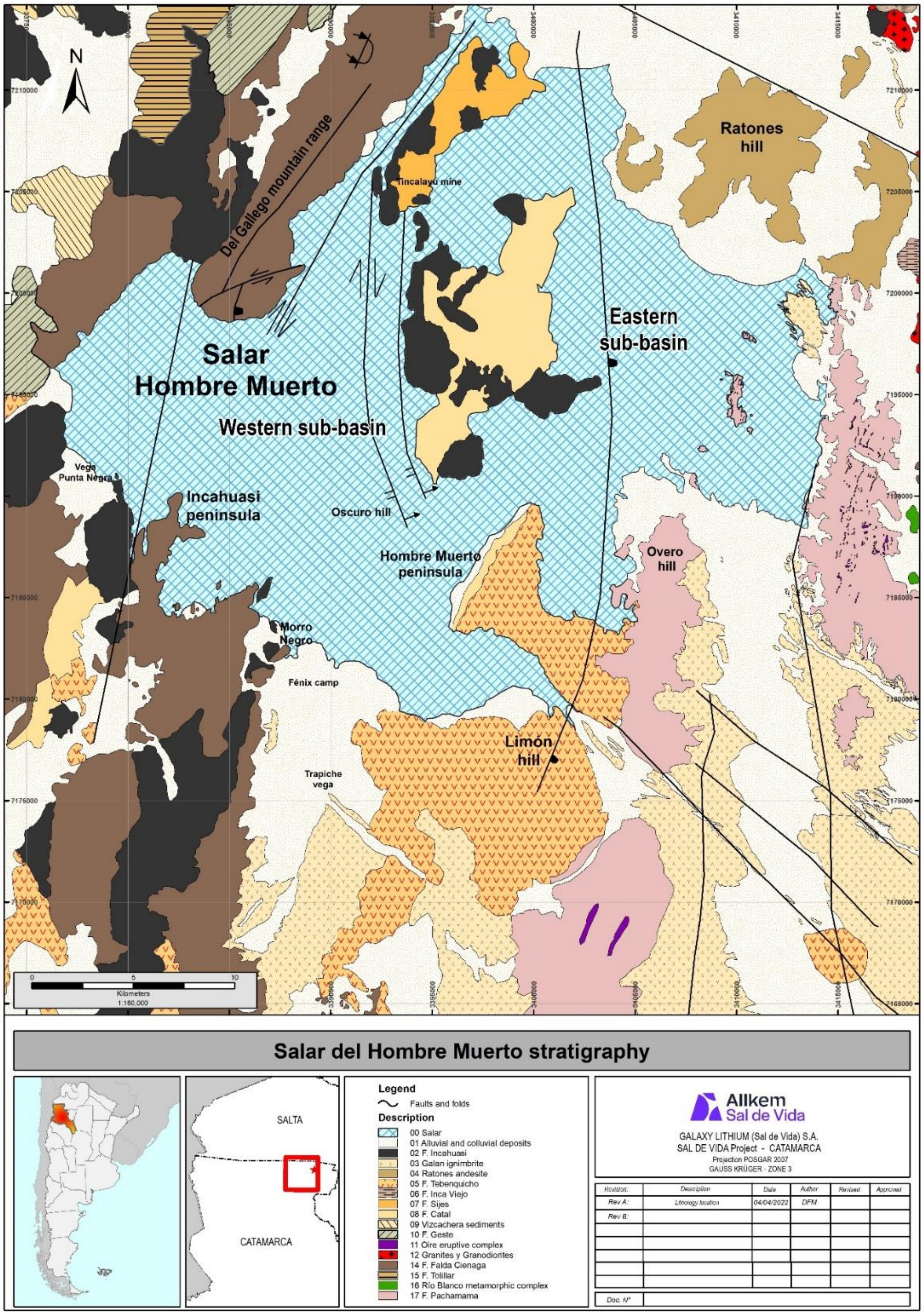
The lithologies in the Project area are summarized in Table 7-1 and shown in Figure 7-1.

Table 7-1: Lithology Table

Unit	Age	Description	Note
Quaternary	Flows dated at 0.754 ± 0.2 Ma	Clastic sediments, evaporites and basaltic lava flows	
Cerro Galan Volcanic Complex	2.56 ± 0.14 Ma	Dacitic ignimbrites	Widespread occurrence in the area, and forms the eastern border of the salar
Ratones Andesite	7.1 ± 0.2 Ma	Andesites	Volcano and flows
Tebenquicho Formation	14 ± 5 and 11 ± 1 Ma	Dacites and andesites	Crop out in the southern border of the salar
Sijes Formation	5.86 ± 0.14 Ma	Clastic sediments and evaporitic rocks	Contains Rio Tinto's Tincalayu borate deposit
Catal Formation	Age date ranges from 15.0 ± 0.2 Ma and 7.2 ± 1.4 Ma	Conglomerate with sandstone, and interbedded with ignimbrite flows and volcaniclastic rocks	
Vizcachera Formation		Conglomerates, sandstone, and red clays with gypsum	
Geste Formation	Middle Eocene	Conglomerates and red sandstones	
Falda Cienega Formation	Ordovician	Greywacke, tuff and volcaniclastic sandstone	Widespread along the eastern flank of the salar
Tolillar Formation	Lower Paleozoic	Volcaniclastic sandstone with subordinate sandstone beds	Crop out along the northwestern border of the salar

Unit	Age	Description	Note
Pachamama Formation	Neoproterozoic	Metamorphic sequence, consisting of schist and migmatites interbedded with metamorphic limestone and amphibolites	Located along the East flank of the Hombre Muerto salar

Figure 7-1: Project Geology Map



Note: Figure prepared by Galaxy Lithium, 2022.

7.4 Deposit Description

7.4.1 Introduction

Playa (salar) basins typically display closed topography and interior drainage. Generally, no significant groundwater discharges from these basins as underflow. All groundwater discharge that occurs within the basin is by evapotranspiration, which is a combination of direct evaporation and transpiration from vegetation. Surface waters that flow into the basin are either directly evaporated or enter the groundwater circulation system and are subsequently evaporated. The evaporation concentrates solutes, and over time, highly concentrated brines are produced.

Within the salar, the brine concentration is typically most concentrated in the centre of basin, within the evaporite core. Groundwater tends to be more diluted along the margins where fresh water enters the basin and becomes more brackish as the freshwater mixes with brines.

Salar basin locations and basin depths are typically structurally controlled but may be influenced by volcanism that may alter drainage patterns. Basin-fill deposits within salar basins generally contain thin to thickly bedded evaporite deposits in the deeper, low-energy portion of the basin, together with thinly- to thickly-bedded low-permeability lacustrine clays.

Coarser-grained, higher permeability deposits associated with active alluvial fans are commonly observed along the edges of the salar. Similar alluvial fan deposits, associated with ancient drainages, may occur buried within the basin-fill deposits. Other permeable basin-fill deposits that may occur within salar basins include pyroclastic deposits, ignimbrite flows, lava-flow rocks, and travertine deposits.

Several of the salar brines of Chile, Argentina, and Bolivia contain relatively high concentrations of lithium, likely due to the presence of lithium-bearing rocks and local geothermal waters associated with Andean volcanic activity. The conceptual model for the Hombre Muerto basin, and for its brine aquifer, is based on exploration of similar salar basins in Chile, Argentina, and Bolivia.

7.4.2 Hombre Muerto Basin

The salar system in the Hombre Muerto basin is considered to be typical of a mature salar. Such systems commonly have a large halite core and are characterised by having brine as the main aquifer fluid at least in the centre and lower parts of the aquifer system. Conceptual hydrogeological sections were prepared incorporating the results of exploration drilling. The Hombre Muerto basin has an evaporite core that is dominated by halite. Basin margins are steep and are interpreted to be fault-controlled. The east basin margin is predominantly Pre-Cambrian metamorphic and crystalline rocks belonging to Pachamama formation. Volcanic tuff and reworked tuffaceous sediments, most likely from Cerro Galan complex, together with tilted Tertiary rocks, are common along the western and northern basin margins. In the Sal de Vida Project area, the dip angle of Tertiary sandstone is commonly about 45º to the southeast. Porous travertine and associated calcareous sediments are common in the subsurface throughout the basin and are flat lying; these sediments appear to form a marker unit that is encountered in most core holes at similar altitudes. Several exploration boreholes located near basin margins completely penetrated the flat-lying basin-fill deposits, and have bottoms in tilted Tertiary sandstone, volcanic tuff, and micaceous schist.

Fine-grained lacustrine deposits are common throughout the exposed basin floor of Salar del Hombre Muerto. These deposits are interpreted to have low hydraulic conductivity. Tertiary sediments along the west and north basin boundaries exhibit drainable porosity, and conceptually approximate “low-flow” boundaries that are expected to contribute brine to the basin-fill deposit aquifers. Metamorphic and crystalline bedrock along the east basin margin is expected to have low hydraulic conductivity and should approximate a “no-flow” groundwater boundary during extraction of brine from basin-fill deposit aquifers by pumping wells.

The most notable source of fresh water to the Salar del Hombre Muerto is the Río de los Patos drainage that enters the basin from the southeast. Depth specific sampling from core holes in this area show brackish water from the water table to around 60 m depth, and brine concentrations comparable to other parts of the basin below 80 m depth. Because field data in this area are sparse, the density profile of the aquifer is uncertain in the farthest southeast part of the property where aquifer water quality may have a future effect on long-term pumping of the proposed East Wellfield.

Hydraulic conductivity in the vertical direction of groundwater flow (Kz) is typically less than hydraulic conductivity in the horizontal direction (Kh). For layered sediments, such as occur in the Salar del Hombre Muerto, the ratio Kz/Kh is commonly 0.01 or less (Freeze and Cherry, 1979). The low vertical permeability of the salar sediments, combined with the density difference between surface water inflow and deep brine, restrict the vertical circulation of fresh water entering the salar from the Río de los Patos.

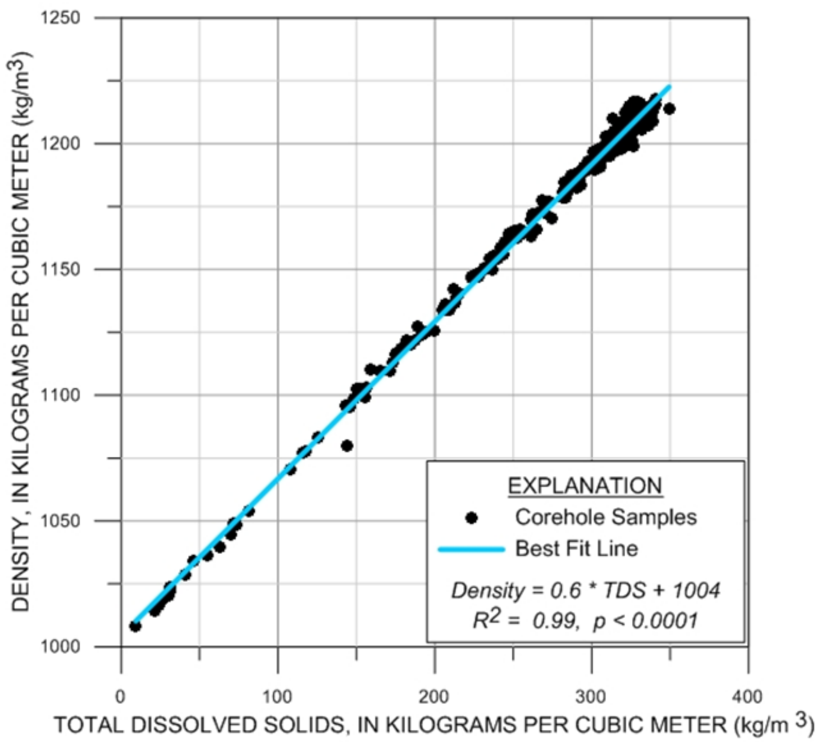
Density is typically observed to increase with depth. Fresh or brackish waters are observed within the uppermost 50 m of the aquifer in some locations, typically near the margins of the salar and in the south where the Río de los Patos enters the basin. Results of exploration activities suggests that most of the brackish and fresh water in the system stays in the upper part of the aquifer system, partly because it is less dense, and also because fine-grained lacustrine sediments restrict downward flow. It is possible that there is some deeper fresh water input into the basin, but no fresh or brackish water zones have been observed at depth in any of the exploration holes.

Sal de Vida’s brine chemistry has a high lithium grade, low levels of magnesium, calcium and boron impurities and readily upgrades to battery grade lithium carbonate. Dense brine was observed as the interstitial fluid at all depths in the basin, typically increasing brine density with depth. In addition, although there is no borehole data currently to support this, it is anticipated that dense brine will also be located in the lower parts of the older rock units that form the margins of the basin.

Previous work within the Salar del Hombre Muerto basin has shown that brine concentration and chemistry vary both laterally within the salar basin and vertically through the basin sediments. As can be seen in Figure 7-2, there is a strong positive linear relationship between the density of the brine and the amount of total dissolved solids (TDS).

Other chemical constituents including lithium and potassium generally also increase linearly with density, although the exact relationships vary somewhat throughout the basin. For this reason, the pattern observed for density also applies to TDS and other brine constituents.

Figure 7-2: Relationship Between Total Dissolved Solids and Density for Groundwater Samples



Note: Figure prepared by Montgomery and Associates, 2018.

7.4.3 Hydrogeological Units

Long-term hydrological pump testing under operating conditions has demonstrated excellent brine extraction and aquifer recharge rates to support the production design basis. Results of core drilling indicate that basin-fill deposits in Salar del Hombre Muerto can be divided into hydrogeological units that are dominated by six lithologies, all of which have been sampled and analysed for both drainable porosity and brine chemistry, except for the micaceous schist. No brine samples were obtained from the micaceous schist. The predominant lithologies, metres drilled, and number of analyses are summarized in Table 7-2. It is worth noting that evaporite type rock is more predominant in the north part of the basin, currently lying under Posco mining concessions, purchased to Galaxy in 2017.

For brine estimation purposes, travertine, tuff, and dacitic gravel were grouped together based on similar drainable porosity and expected similar hydraulic conductivity. The grouping is not based on geological similarities.

Table 7-2: Sample Data from Exploration Core Holes for Hydrogeological Units

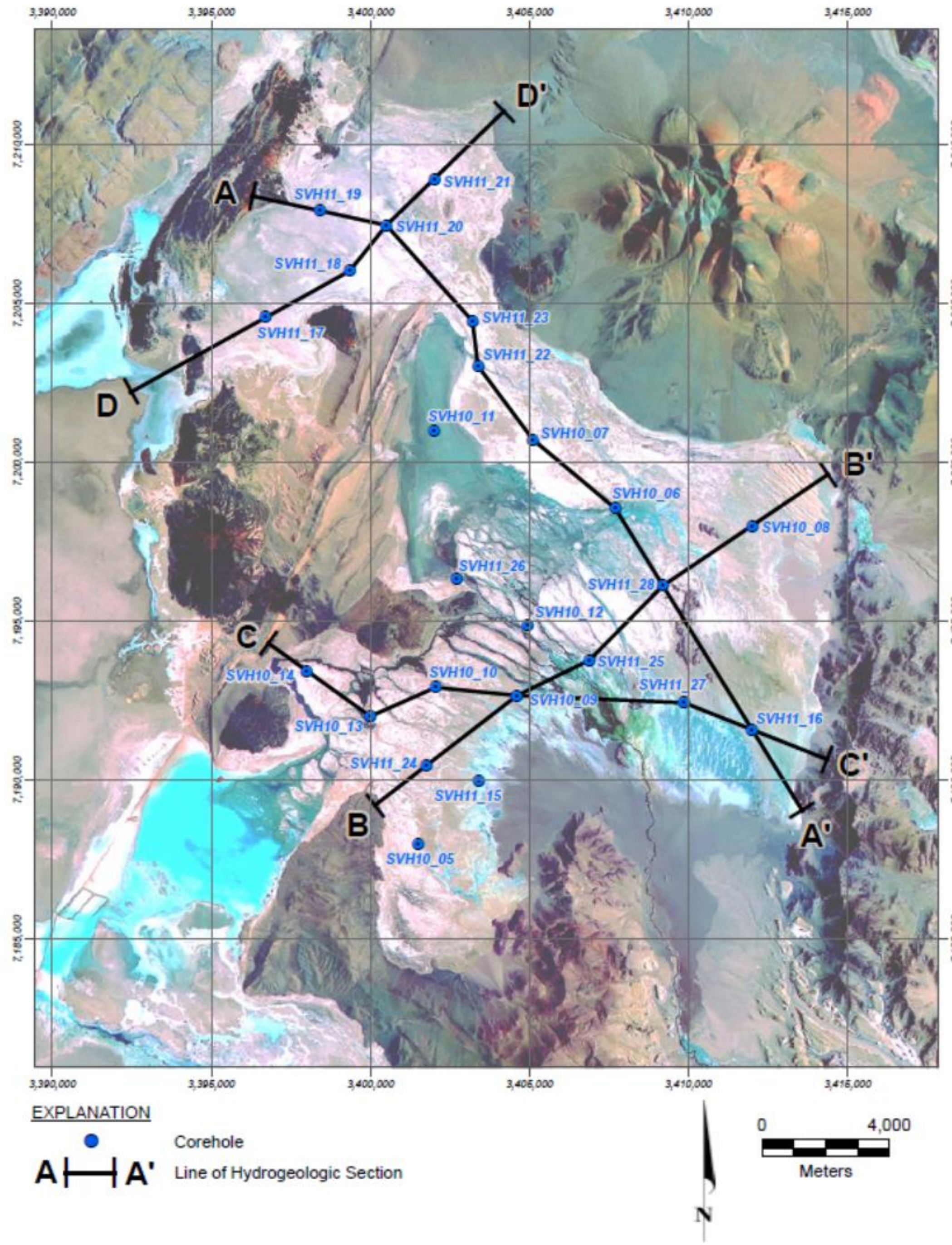
Predominant Lithology of Hydrogeological Unit	Metres of Lithological Unit Described	Number of Drainable Porosity Analyses	Number of Brine Chemistry Analyses
Clay	285.2	24	15
Halite, gypsum, or other evaporites	1,127.1	100	130
Silt and sandy or clayey silt, and siltstone	449.6	50	48
Sand, silty sand, and sandstone	1,072.2	109	129
Travertine, tuff, and dacitic gravel	238.8	25	30
Micaceous schist	10	1	0
Total	**3,182.9**	**309**	**352**

Correlations of DDH holes have been performed to infer the lateral continuity of the different lithologies over the salar. Figure 7-3 is a plan view showing the location of the vertical cross-sections provided in Figure 7-4 to Figure 7-7. It is worth noting that cross-section D-D' (Figure 7-7) actually lies over Posco mining concessions purchased from Galaxy in 2018. The same situation occurs with the north extension of cross-section A-A' starting at approximately Well- SVH10_06 heading north (Figure 7-4). Most of the evaporitic descriptions in Table 7-2 occur in those Posco-held concessions.

7.5 Comments on Geological Setting and Mineralization

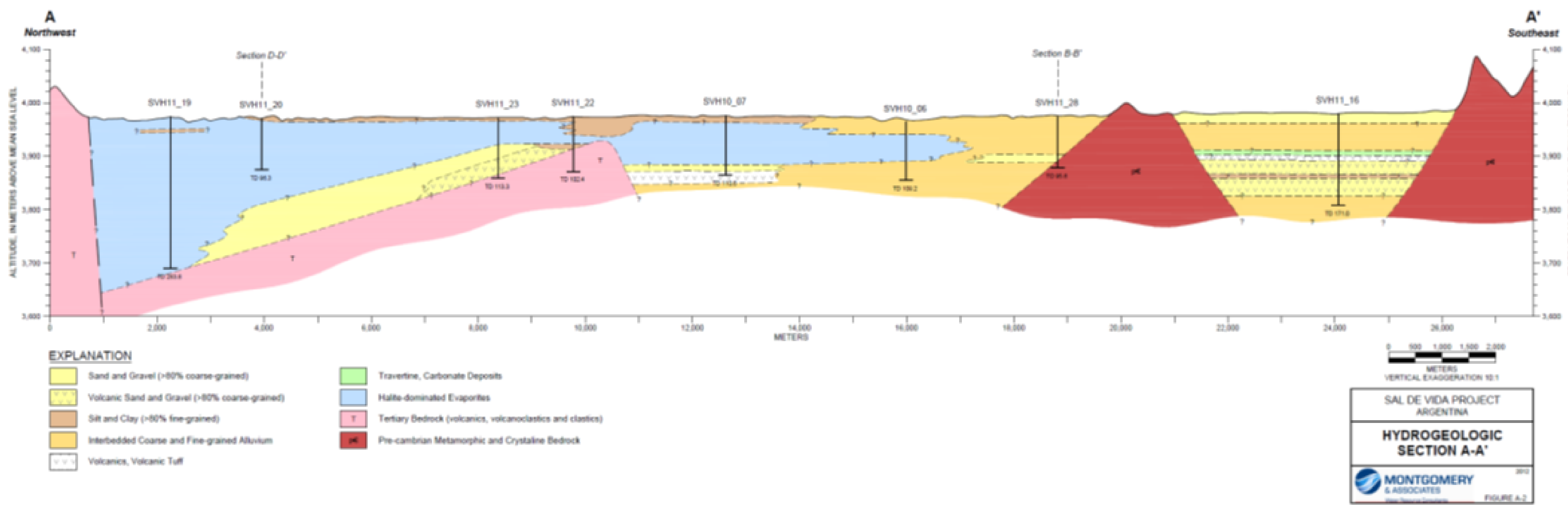
The knowledge of the geological setting of the salar and the associated hydrogeological systems is sufficient to support the Brine Resource and Brine Reserve estimation. Phase 6 drilling of the eight production wells confirms the conceptualized geological setting and location of brine-bearing salar sediments. New lithologic data from cuttings and geophysical surveys confirms lithium-rich brine mineralization.

Figure 7-3: Hydrogeological Cross-Section Location Plan



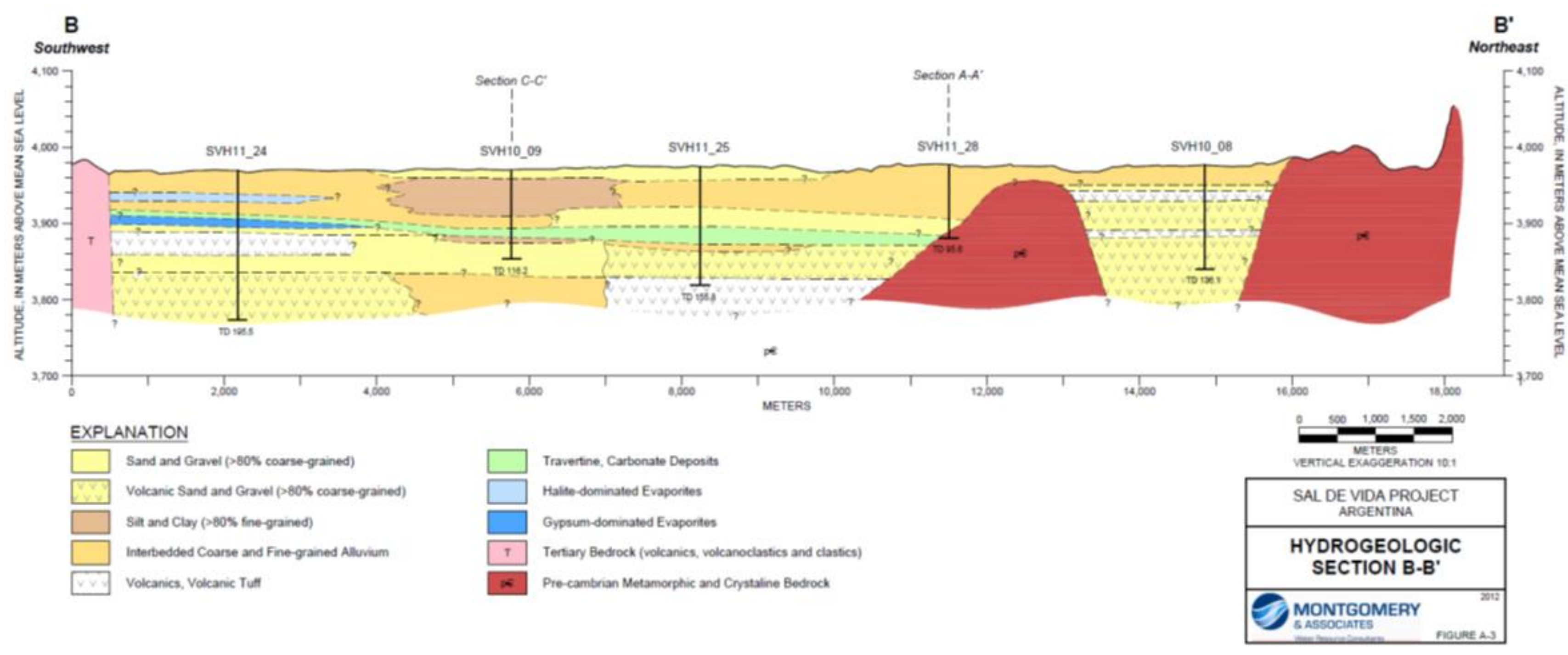
Note: Figure prepared by Montgomery and Associates, 2012.

Figure 7-4: Hydrogeological Cross-Section A–A’



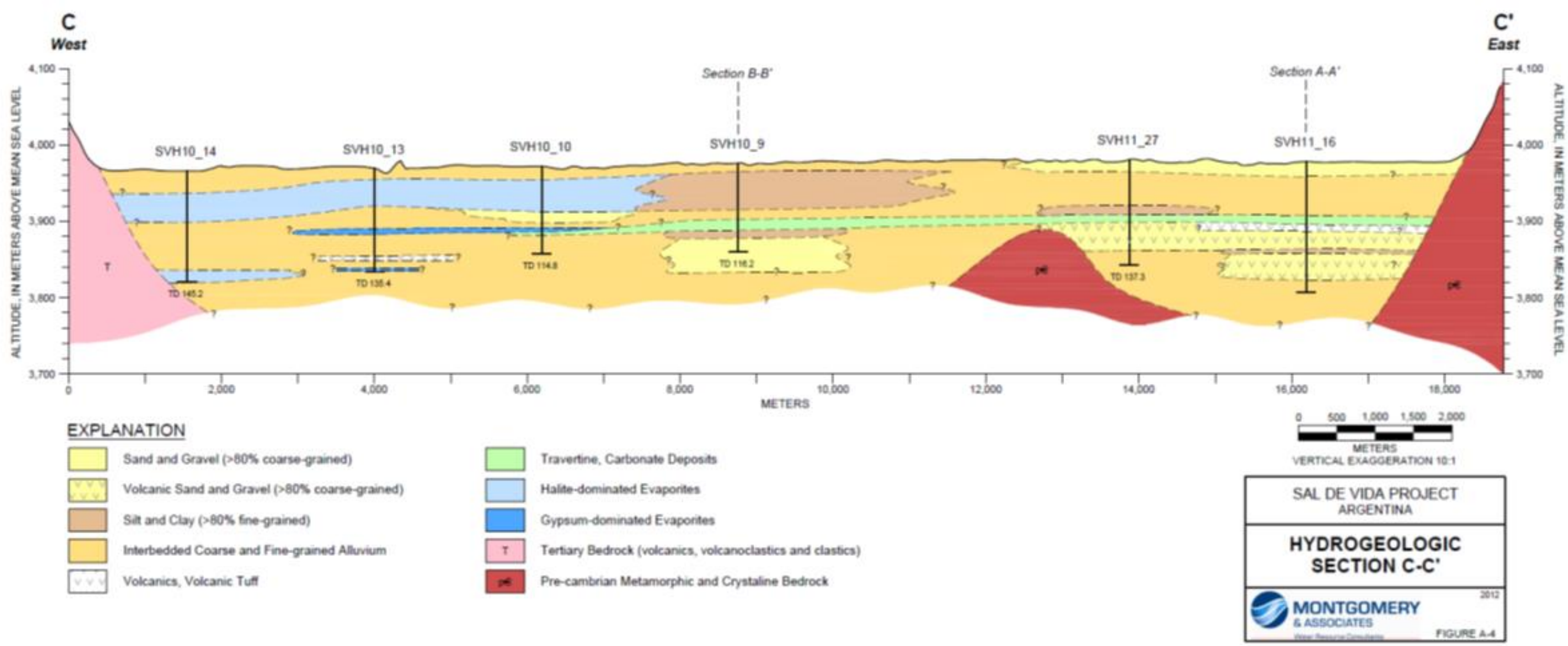
Note: Figure prepared by Montgomery and Associates, 2012.

Figure 7-5: Hydrogeological Cross-Section B–B’



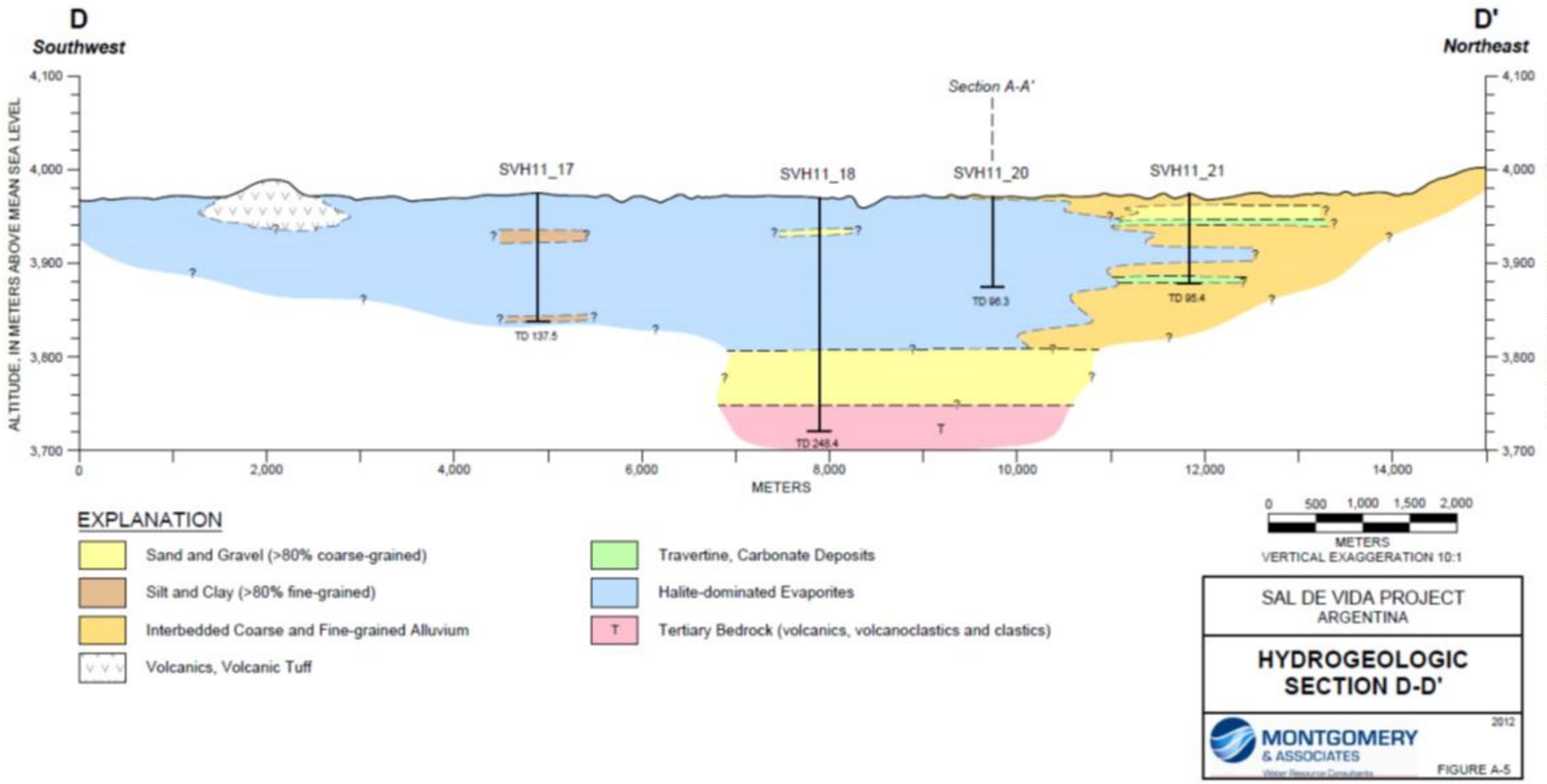
Note: Figure prepared by Montgomery and Associates, 2012.

Figure 7-6: Hydrogeological Cross-Section C–C'



Note: Figure prepared by Montgomery and Associates, 2012.

Figure 7-7: Hydrogeological Cross-Section D–D'



Note: Figure prepared by Montgomery and Associates, 2012.

8 DEPOSIT TYPES

8.1 Deposit Model

The deposit model is summarized from Munk et al. (2016) and Houston et al. (2011).

Lithium is found in four main types of deposits:

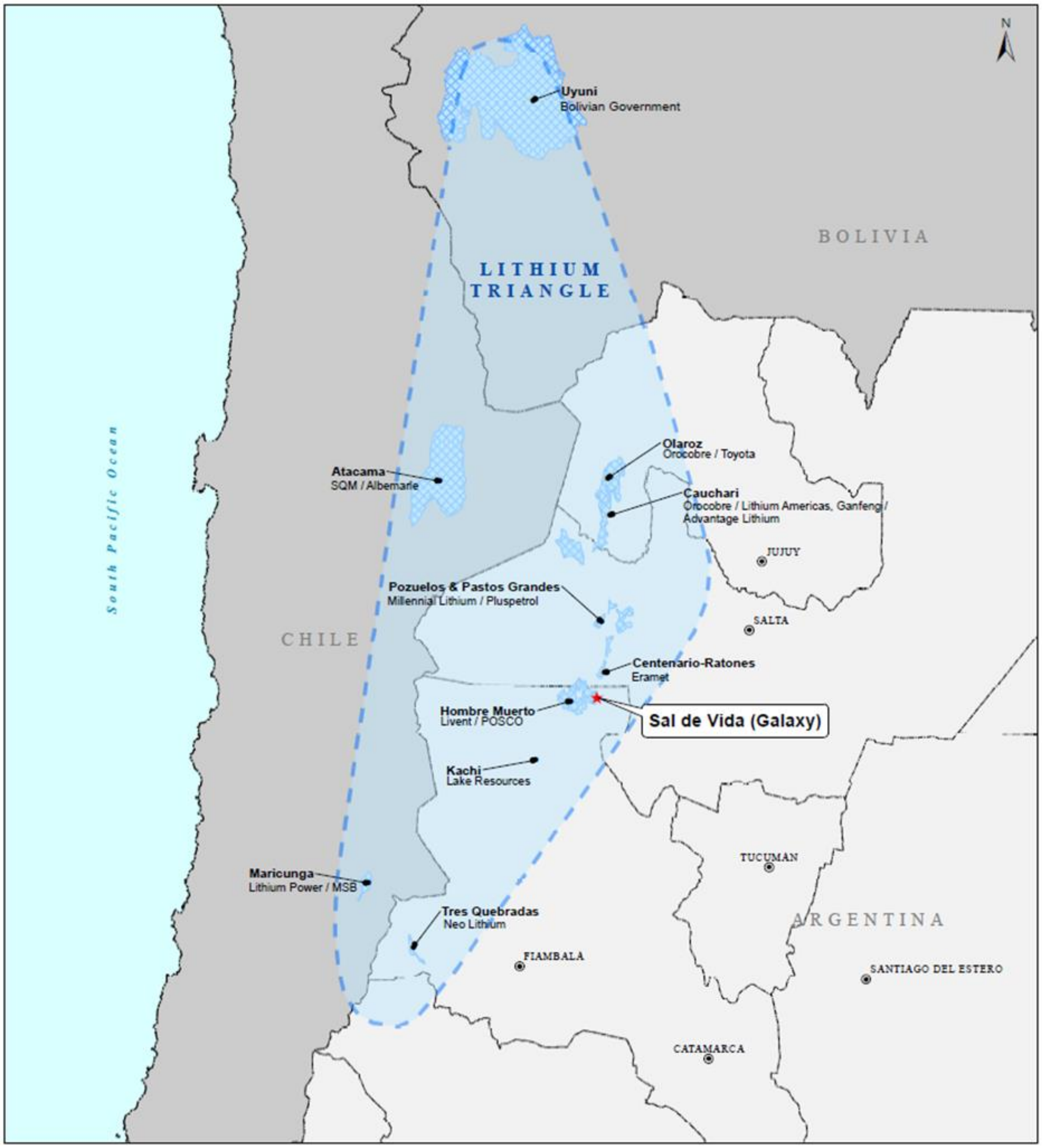
- Pegmatites;
- Continental brines;
- Hydrothermally-altered clays;
- Oil-petroleum deposits within salty and brine waters underneath hydrocarbons reservoirs.

Continental brine deposits typically share the following characteristics:

- Located in semi-arid, arid, or hyper-arid climates in subtropical and mid-latitudes;
- Situated in a closed basin with a salar or salt lake. Salars or salt crusts are common where brines exist in subsurface aquifers;
- Occur in basins that are undergoing tectonically-driven subsidence;
- Basins show evidence of hydrothermal activity;
- Have a viable lithium source (e.g., high-silica volcanic rocks, pre-existing evaporites and brines, hydrothermally-derived clays, and hydrothermal fluids). The nearly 5,900-m-high resurgent dome of the Cerro Galán caldera may be an important recharge area for Salar del Hombre Muerto at ~4,000 m elevation;
- Have an element of time-stability to allow the leach, transport, and concentration of lithium in continental brines.

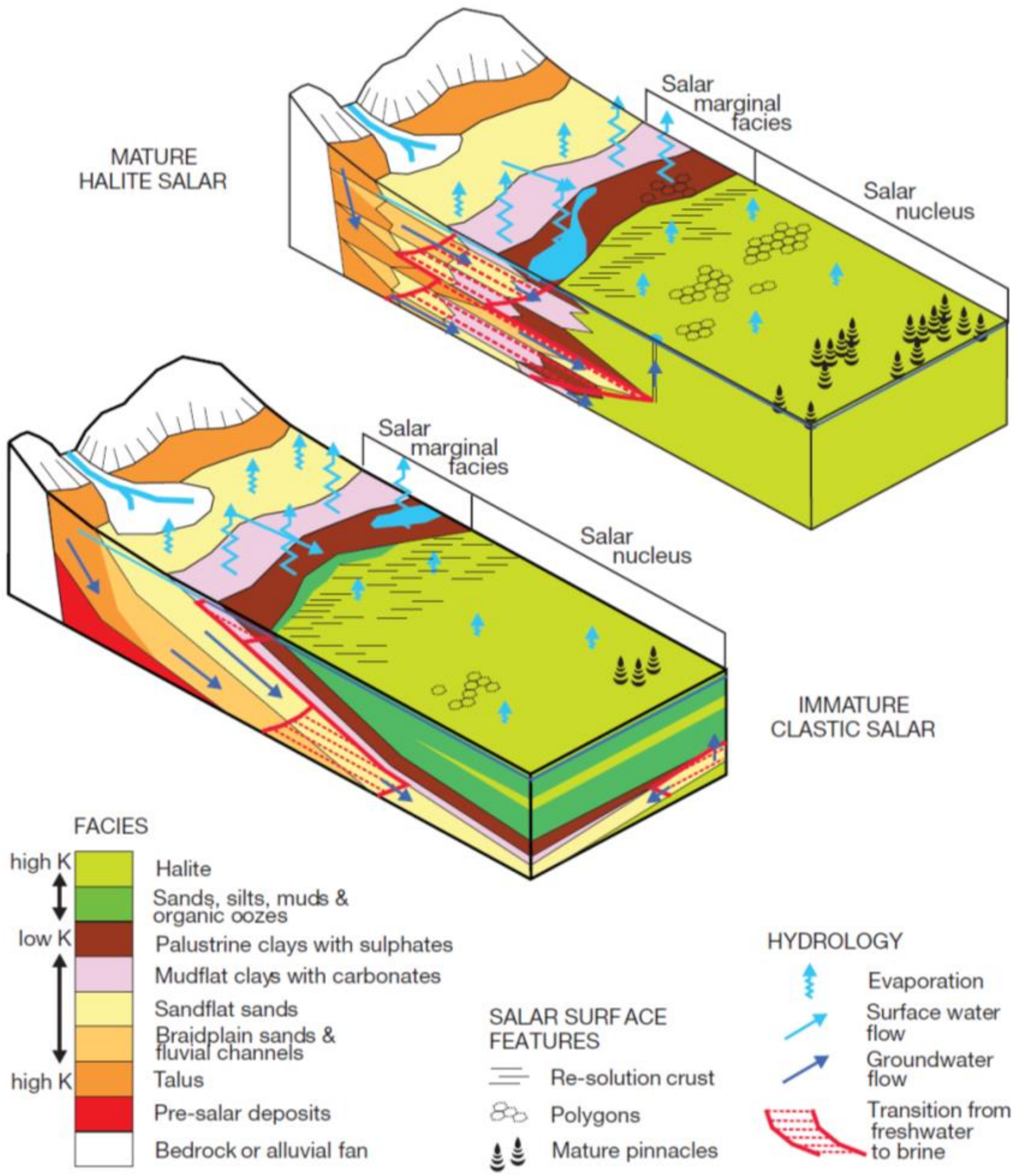
The majority of important lithium-rich brines are located in the “lithium triangle” of the Altiplano–Puna region of the Central Andes of South America (Figure 8-1) and are classified either as “immature clastic” or “mature halite” (Figure 8-2) types.

Figure 8-1: Lithium Triangle



Note: Figure courtesy of Galaxy, 2020.

Figure 8-2: Schematic Showing Immature Clastic and Mature Halite Salars



Note: Figure from Houston et al. (2011).

These salar classifications are based on:

- The relative amount of clastic versus evaporite sediment;
- Climatic and tectonic influences, as related to altitude and latitude;

- Basin hydrology, which controls the influx of fresh water. The immature clastic classification refers to basins that generally occur at higher (wetter) elevations, contain alternating clastic and evaporite sedimentary sequences dominated by gypsum, have recycled salts, and a general low abundance of halite.

The mature halite classification refers to salars in arid to hyper-arid climates that reach halite saturation and have a central halite core.

Houston et al. (2011) note that a key input is the relative significance of aquifer permeability which is controlled by the geological and geochemical composition of the aquifers. Munk et al. (2016) observe that immature salars may contain easily extractable lithium-rich brines simply because they are comprised of a mixture of clastic and evaporite aquifer materials that have higher porosity and permeability.

In the Salar del Hombre Muerto, a mature sub-basin exists to the west as a result of moderately evolved brines decanting from an immature eastern sub-basin over a subsurface bedrock barrier (Houston et al., 2011).

A conceptual model for brine development is provided in Figure 8-3.

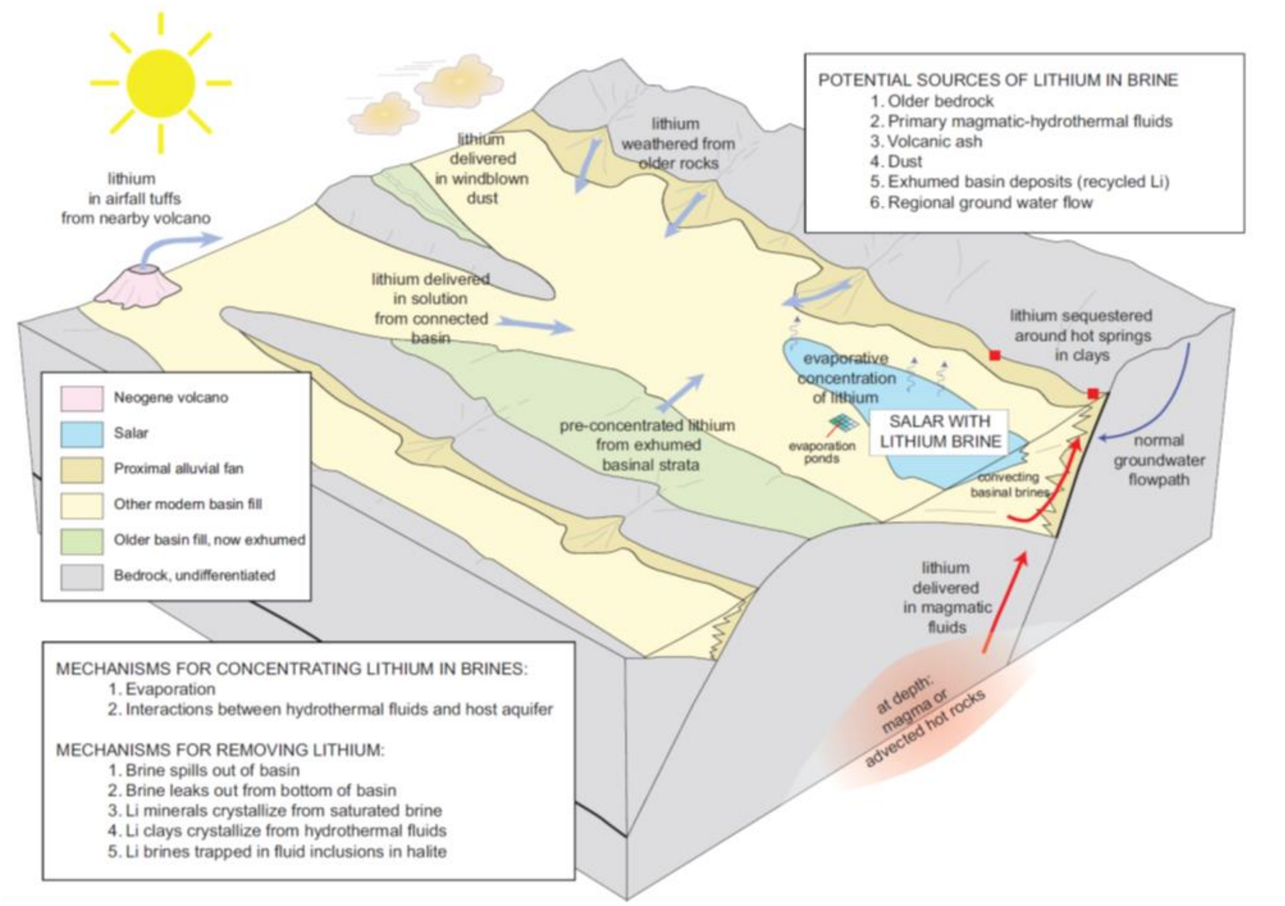
Economically-extractable lithium brines typically contain a minimum of 100 mg/L Li, and more commonly 250 mg/L or more Li, whereas the inflow waters may only contain lithium in the range of 1 – 10 mg/L or less. The combined effects of evaporation and precipitation of evaporite minerals must concentrate inflow waters by many orders of magnitude and the time-integrated flux of water through the basin must be sufficient to create a lithium brine deposit that contains sufficient total lithium to be economic, irrespective of lithium concentration.

8.2 Comments on Deposit Types

The Sal de Vida deposit shares the six common characteristics of a brine system, as outlined by Munk et al., (2016).

In the QP’s opinion, the brine system deposit model would be a reasonable basis for the design of additional exploration programs.

Figure 8-3: Schematic Brine Deposit Model Similar to the Sal de Vida Project



Note: Figure from Munk et al., 2016.

9 EXPLORATION

9.1 Grids and Survey

Four generations of topographic surveys were completed (Table 9-1). The 2012 survey was conducted by former owner Lithium One, where the remaining three surveys were conducted by Galaxy Lithium. The two 2020 surveys were used to locate drill collar locations and to provide sufficiently accurate data for engineering design purposes.

Table 9-1: Topographic Surveys

Operator/Contractor	Purpose	Date	Note
PDOP-Topografía Minera de Salta	Drill collar geo-referencing	2012	Survey tied-in to survey station P.A.S.M.A. (Instituto Geográfico Nacional, Red de Apoyo al Sector Minero Argentino) Punto 08-008 (Vega del Hombre Muerto) of the Argentine grid, using POSGAR 94 with Gauss–Kruger projection
Galaxy/PDOP-Topografía Minera de Salta	Drill collar geo-referencing	2020	Survey tied-in to the Instituto Geográfico Nacional (IGN) network using the Salta (UNSA), Tinogasta (TGTA) and Alumbrera (ALUM) stations as well as to Galaxy's three survey stations
Galaxy/Grupo Territorio – Ingeniería, Agrimensura y Ambiente	Engineering design	2019 – 2020	East and south zone drone flights covering 4,500 ha. Nine flight plans covering ~500 ha each, which were processed individually and stitched together using ArcGIS Desktop Advanced 10.8 software. Quality control points were measured every 200 – 350 m with the GPS units. Data were obtained and processed using the GEOIDE-Ar16 gravimetric geoid model developed by IGN and Trimble Navigation Standards. Final data were converted to AutoCAD for engineering.
Galaxy/Enzo Lotta Servicios de Agrimensura	Construction	2021	Southwest zone drone flights covering 2,595 ha. Quality control points were measured every 250 – 300 m with the GPS instrumental. Results were presented with a DEM in tif format, contour lines with equidistance every 20 cm and 50 cm, in ".shp" and CAD format.

9.2 Geophysical Surveys

A number of geophysical surveys have been completed and are summarized in Table 9-2.

The gravity survey locations are shown in

Figure 9-1, the vertical electric sounding point locations in

, transient electromagnetic survey profile line locations in Figure 9-3, and 3D reinterpretation of depth to basement rock at Sal de Vida Project is shown in Figure 9-4 and Figure 9-5.

Table 9-2: Geophysical Surveys

Operator/ Contractor	Survey Type	Date	Note
Quantec Ltd.	Gravity	2009, 2010	96 linear km across the eastern sub-basin to provide information on bedrock by density. Results suggested that the deepest part of the basin was in the centre of the western sub-basin, where salar deposits may be as much as 380 m thick.
Geophysical Exploration and Consulting S.A.	Vertical electrical sounding	2010	Conducted to investigate brackish or raw water–brine interface conditions beneath the margins of the Hombre Muerto basin, along alluvial fans, and adjacent to the Río de los Patos. Data interpretations suggest that highly-conductive material, possibly brine, is present beneath alluvial fans along the basin margins. The following resistivity ranges were used for brackish water/salt water- bearing formations and brines: 1 ohm-metre (ohm-m) < apparent resistivity < 15 ohm-m: brackish water-bearing formations; apparent resistivity < 1 ohm-m: sea water, geothermal fluids and brine-bearing formations.
Quantec Geoscience Argentina S.A.	Transient electro-magnetic	2018	127 measurements in five profiles. The acquired data are of high quality, and the inversion results provide a good representation of the subsurface resistivity distribution to depths ranging from approximately 100 – >400 m, varying in association with the conductivity. The surveys detected resistivity ranging from <1 ohm- m to approximately 1,000 ohm-m. Several conductive zones of resistivity of <1 ohm-m were detected.
Mira Geoscience	3D Gravimetry	2021	Objective of Project was to generate a revised depth to basement interpretation of gravity data for the Sal de Vida area in Argentina, using geologically constrained 3D gravity forward modelling and inversion techniques. Interpretation was constrained by supporting data, including outcrop, drilling, transient electromagnetics (TEM), and DC resistivity soundings (Vertical Electric Soundings, VES). All supplied data were imported and registered in GOCAD Mining. Data compiled comprised is: • Topographic data • Geological maps showing basement outcrop • Interpreted cross-sections • Drill data, including petrophysical data on drillhole samples (density and porosity) • Surface sample petrophysical data (Sharpe, 2010). • Geophysical data • TEM • VES • Gravity

Figure 9-1: Location of Year 2021 Gravity Survey Lines

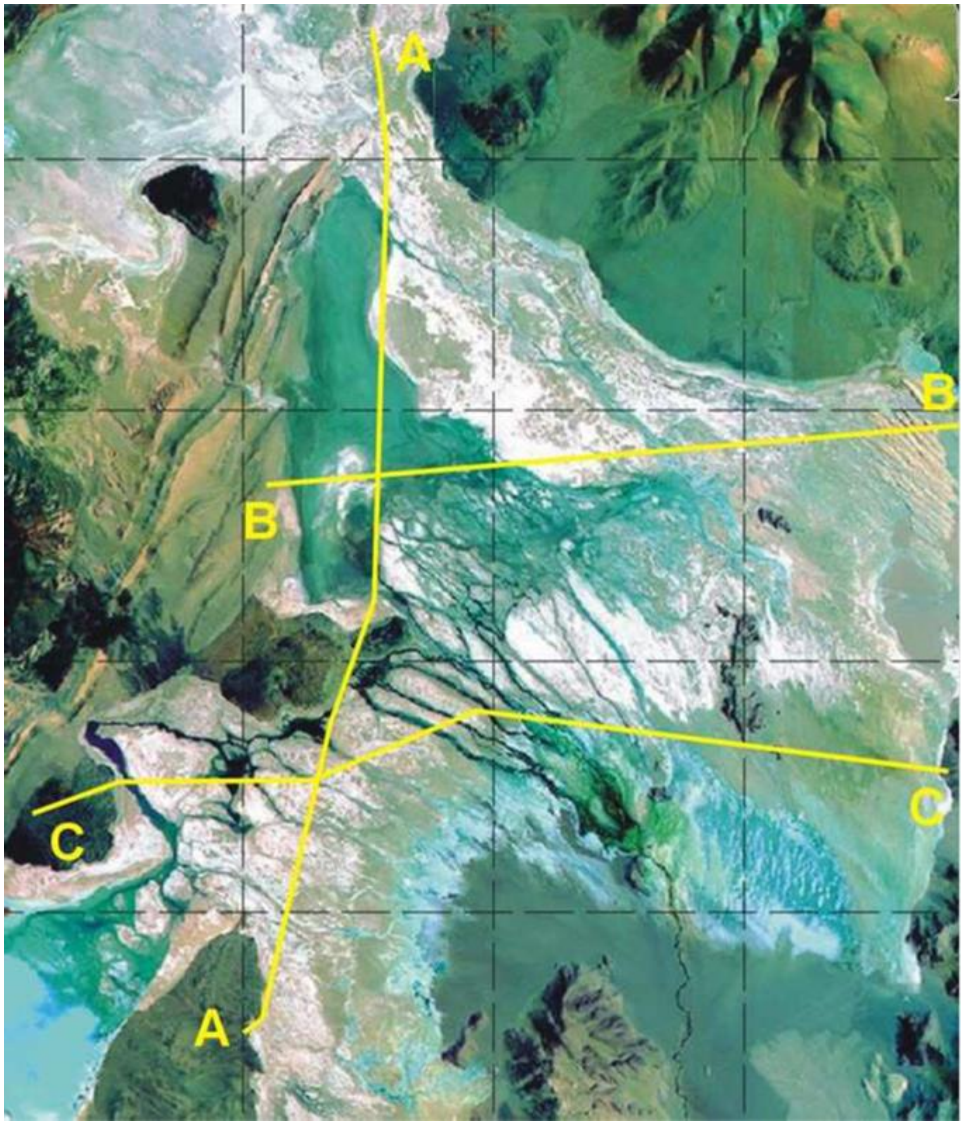
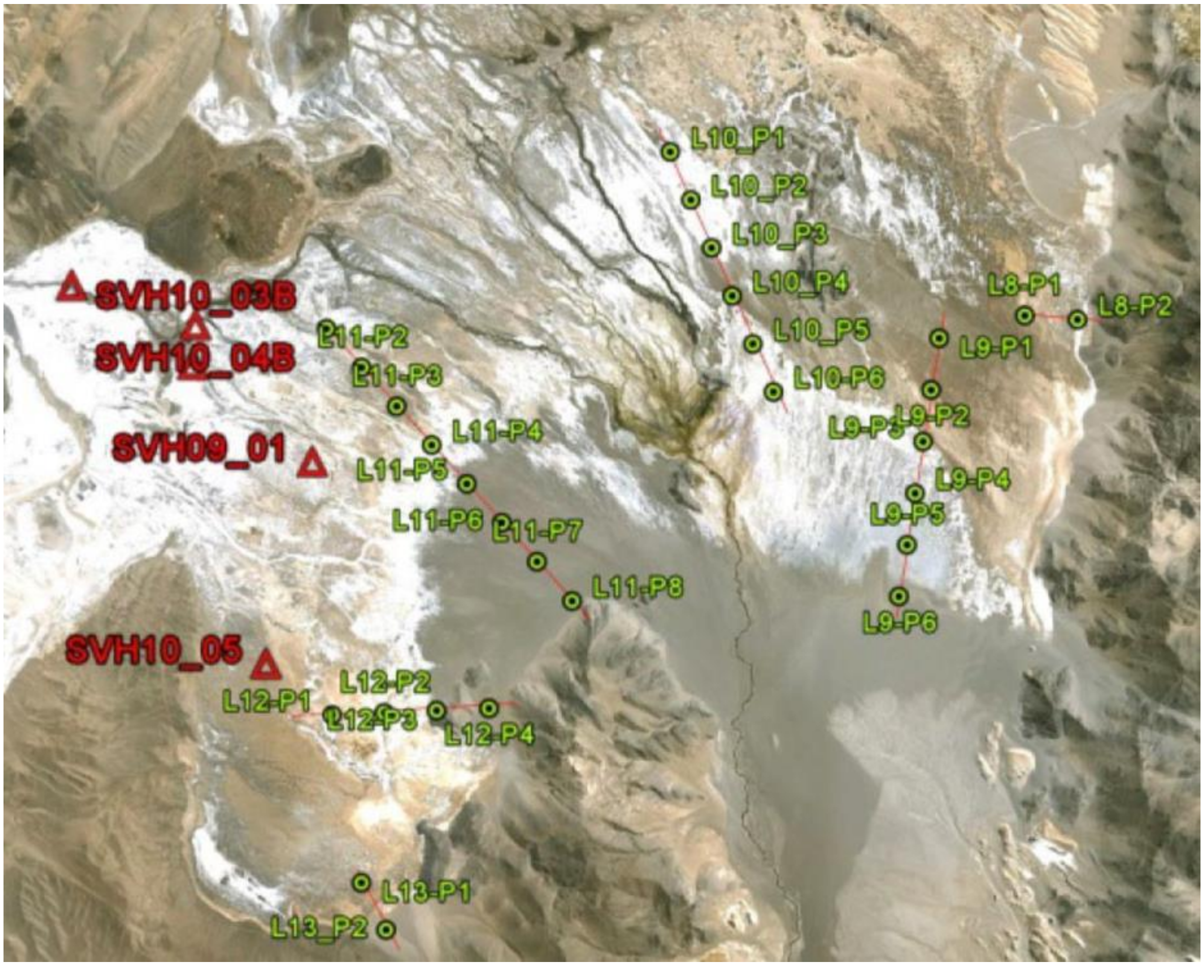
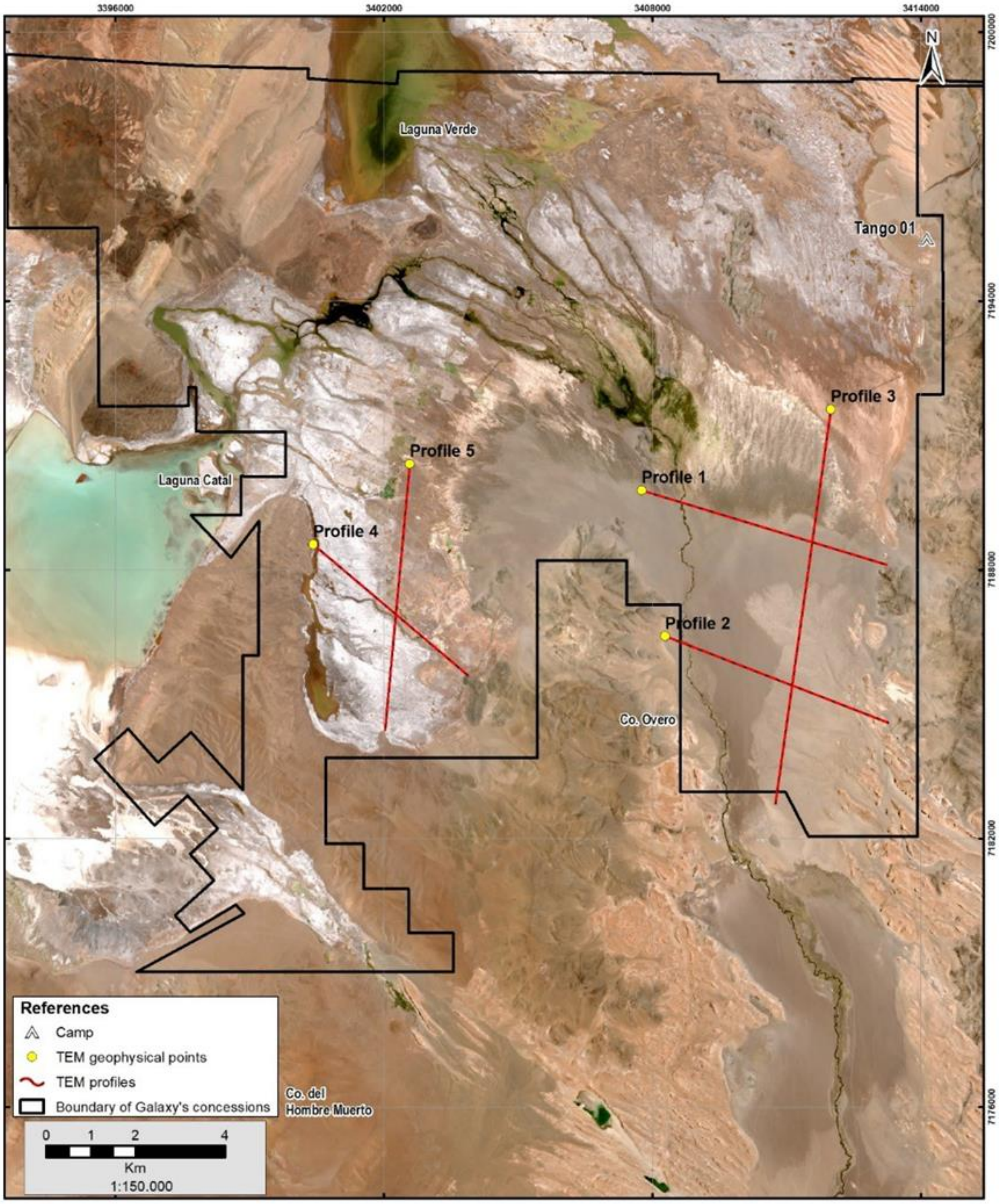


Figure 9-2: Location Map, Vertical Electric Sounding Points



Note: Figure from GEC Geophysical Exploration & Consulting S.A., 2010. Green represents VES readings and red proposed drill holes. Red triangles represent core holes.

Figure 9-3: Location Map, Transient Electromagnetic Survey Profiles

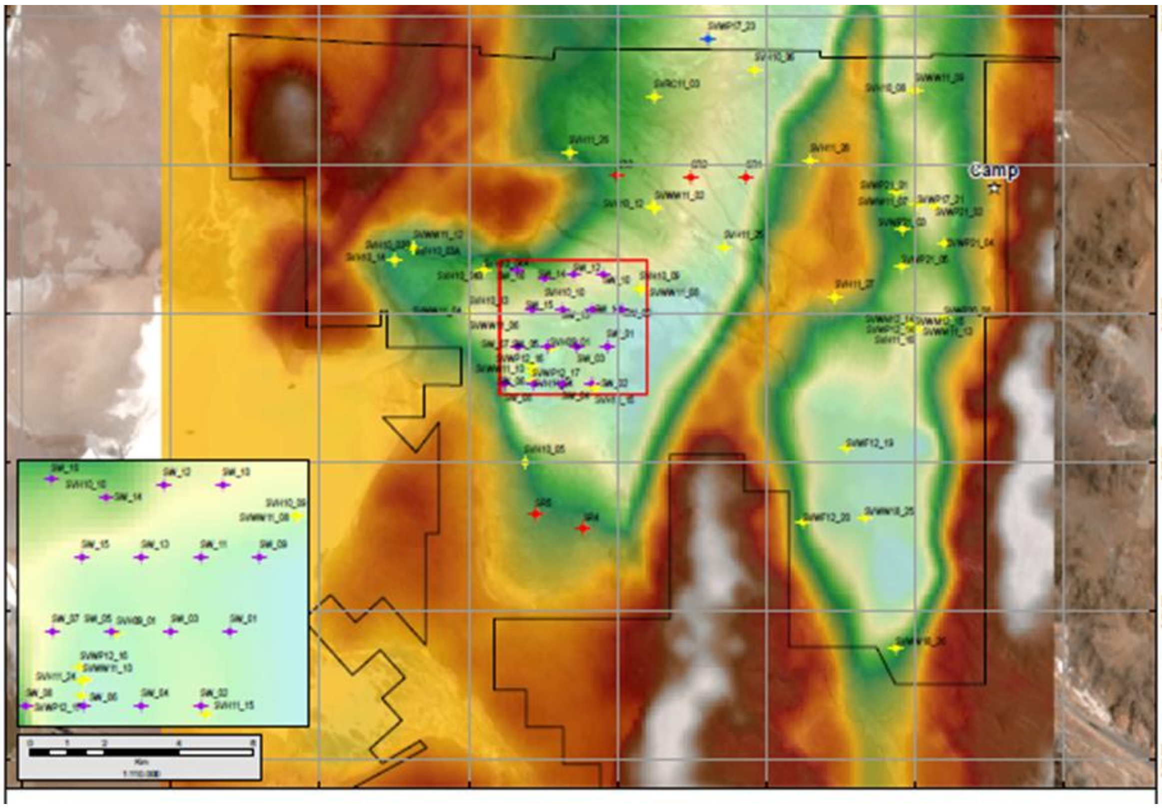


Note: Figure courtesy of Galaxy, 2021; based on Quantec 2018 report

Prior to the drilling of the eight production wells in the east wellfield in year 2021, most of the drillholes at Sal de Vida have not encountered basement rock. Only transient electromagnetic and vertical electric sounding surveys have occurred to approximate depth to bedrock. Due to the uncertainty of depth to bedrock, Galaxy contracted Mira Geoscience to interpret depth to basement using interpretation of available supporting data. Coordinate system used in this project was POSGAR, Argentina Zone 3, and interpretation and model development were carried out in GOCAD Mining Suite, which consists of a 3D forward modelling and inversion algorithm for gravity and magnetic data that operates on a geological model. The data compiled in this 3D Model project included:

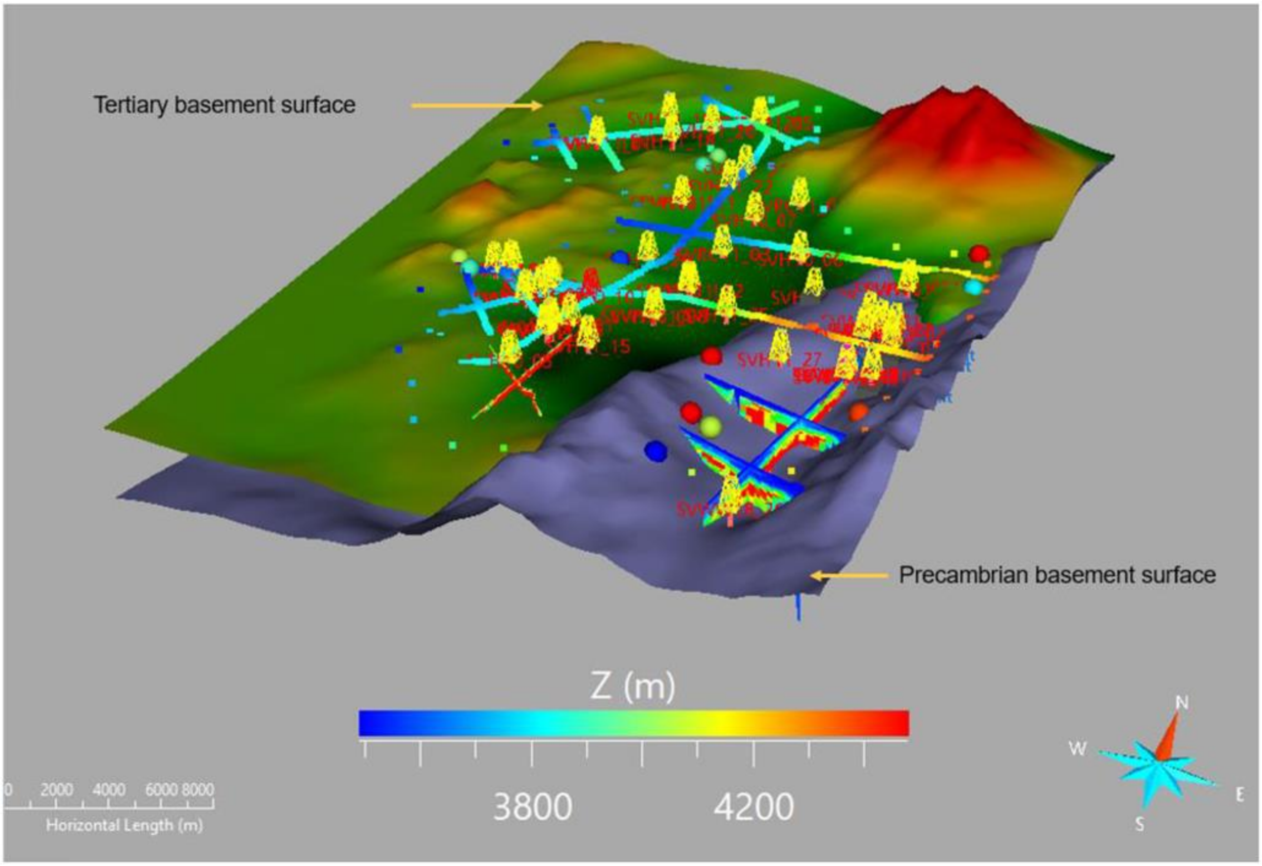
- Topographic data;
- Geological maps showing basement outcrops;
- Interpreted cross-sections;
- Drill data, including petrophysical data on drillhole samples (density and porosity);
- Surface sample petrophysical data (Sharpe, 2010);
- Geophysical data from TEM, VES, and Gravity surveys.

Figure 9-4: 2D Planview of Sal de Vida Basement Map



Note: Tertiary Basement is indicated in green and in the Precambrian Basement is indicated in brownish yellow.
Figure prepared by Allkem, 2021.

Figure 9-5: 3D Model Update Outcropping Cerro Ratones Northeast Edge



Note: Tertiary Basement is indicated in green and the Precambrian Basement in gray with a 1:3 vertical exaggeration. Figure courtesy of Galaxy, 2021; based on Mira Geoscience Project #5020 December 2021 report.

9.3 Pits and Trenches

Pits and trenches were used to establish the presence of lithium-bearing brines in the Project area, and the information collected is superseded by drill data.

The first campaign was completed by Lithium One in 2009 to verify if there were brines within the concessions. Mapping and observation of the exploration pits indicated the presence of a free-flowing aquifer transmitted through at least one poorly-sorted sand and silt horizon.

A second, more detailed set of 42 trenches were excavated by Lithium One within an area of approximately 75 km^2, providing an average density of one sample per 1.5 km^2. Not all of these trenches are within the current Project area. The chemistry of the fluids sampled in the trenches confirmed that there was only one brine type within the salar, originating from the evaporation of influent waters.

The final pit phase was conducted in 2009-2010 by Lithium One, with 21 near-surface samples collected from excavated pits. The samples were used to obtain information on the basic physical parameters of each brine sample (e.g., pH, density, electrical conductivity, TDS, temperature, Eh).

9.4 Stream Gauging

Stream gauging was conducted to quantify baseflow conditions, and to develop baseline measurements. Flows were measured in the Río de los Patos, and at the much smaller La Redonda stream on the northeast part of the main salar.

Measurements were conducted during relatively dry times of the year, using a Pygmy flowmeter and Aquacalc recording system, and it is considered to be reliable. Water flow readings taken in May 2011 and May 2012 indicate that there can be quite a large variation in flow rates on an annual basis. The majority of surface water inflow is believed to occur during flood events on the Río Los Patos; flow rates associated with such events have not been gauged.

9.5 Comments on Exploration

Exploration to date has identified the Sal de Vida brines, and has used exploration methodology conventional to brine exploration, such as geophysics and surface sampling, in addition to the drilling programs outlined in Section 10.

10 DRILLING

10.1 Introduction

Drilling was conducted in several phases. These were broken out into Phase 1 to 6, with Phase 1 commencing in 2009, and Phase 6 in late 2020 as part of the East Wellfield development. The drill programs are summarized in Table 10-1, and drill collar locations are provided in Figure 10-1. Drilling Phases 1, 2, and 3 were conducted by Lithium One; Phases 4, 5, and 6 were conducted by Galaxy Lithium.

10.2 Drill Methods

10.2.1 Phase 1

The drilling contractor for the core program was Energold Drilling Inc., (Energold) headquartered in Vancouver, Canada and based out of Mendoza, Argentina. The drill rig used for wells SVH10_05 – SVH11_15 was a DDH Energold Series 3 type. Core holes commenced using HQ core sizes (63.5 mm core diameter), and, if needed to suit drilling conditions, were reduced to NQ (47.6 mm). HWT (71 mm) casing was installed in the drill holes.

Brine wells SVH09_01 and SVH09_02 were drilled by Hidroplus S.R.L. (Hidroplus) using conventional air circulation. These wells could not be cased and were abandoned. Wells SVH10_03A through SVH10_04B were drilled by Ernesto Valle, S.R.L., a firm based in the city of Salta, using conventional circulation mud-rotary drilling methods, and were cased with 4.5-inch PVC screened casing and gravel pack filter.

10.2.2 Phase 2

The core drilling contractor was Energold. Core holes commenced using HQ core sizes (63.5 mm core diameter), and, if needed to suit drilling conditions, were reduced to NQ (47.6 mm). All core holes were cased with 2-inch (50.8 mm) PVC casing for use as monitor wells. The measured depth to water below the land surface was 3 m for all wells.

Drilling contractors for the brine and RC wells were Compañía Argentina de Perforaciones S.A. (CAPSA), from Mendoza, Argentina and Andina Perforaciones S.A. (Andina), based in the city of Salta, Argentina. All brine exploration wells were cased with 8-inch (203 mm) PVC casing, except well SVWW11_07, which was cased with 6-inch (152 mm) PVC casing.

10.2.3 Phase 3

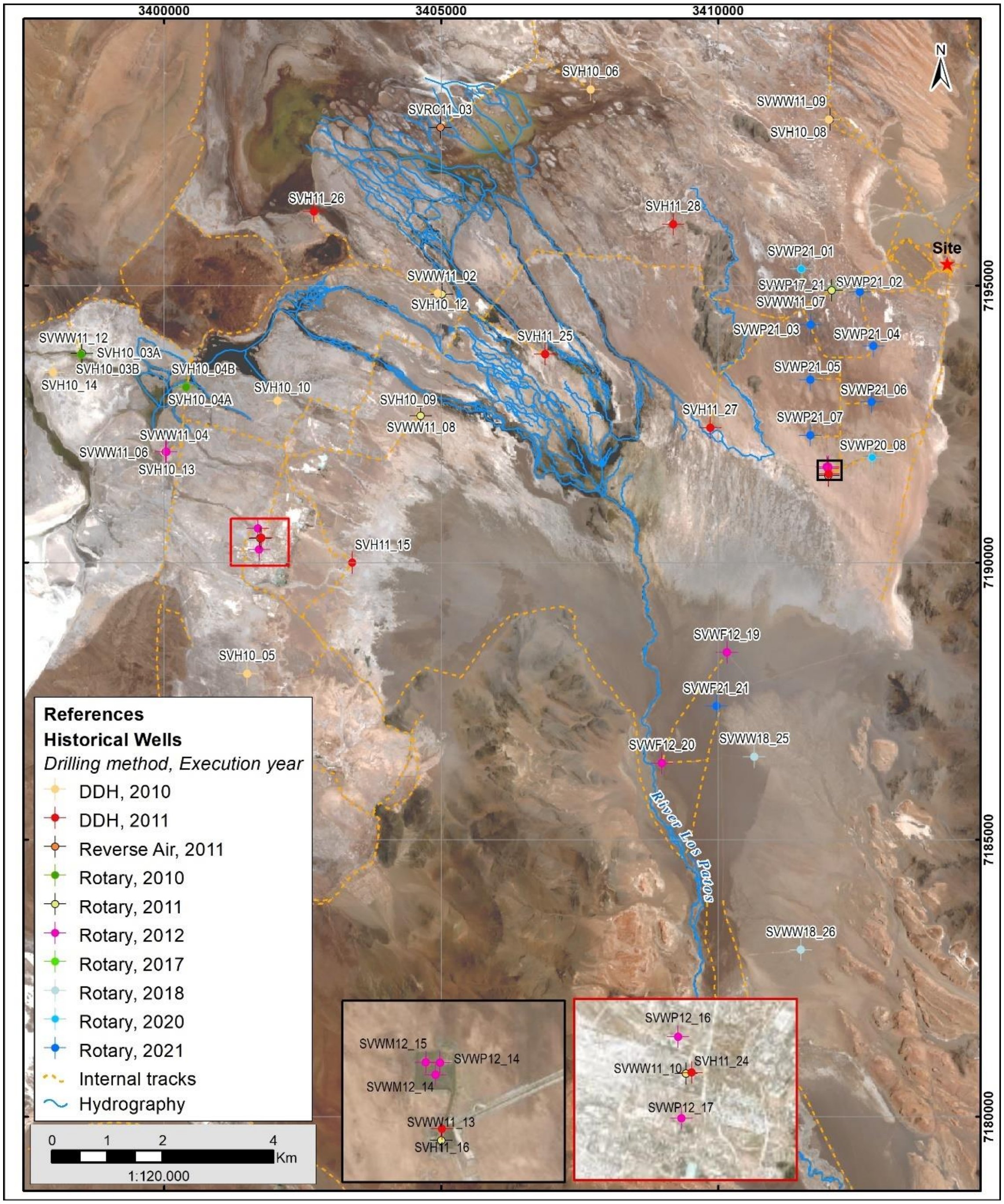
The drilling contractor was Andina. Some wells were designed to be pumping wells and some were designed to be observation wells for long-term tests. All wells were drilled by conventional mud rotary circulation. Drilled borehole diameters were 17.5 inches (444.5 mm), 12.25 inches (311.2 mm) and 8 inches (203.2 mm). Once drilling was completed, 8-inch (203.2 mm) and 2-inch (50.8 mm) blank PVC casing, and slotted PVC well screens were installed (slot size 1 mm) for monitoring wells. The pilot production wells were cased with 10-inch (254 mm) blank PVC casing and a PVC well screen (slot size 1 mm). Gravel pack (1 – 2 mm and 1 – 3 mm diameters) was installed in the annular space surrounding the well screen. A bentonite seal was installed above the gravel pack, and fill material was placed up to the level of the land surface.

Table 10-1: Drill Summary Table

Drilling Phase	Duration	Note	Number of Holes	Metres (m)	Max Depth (m)	Comments
Phase 1	2009 to early 2011	Core holes	9	271	SVH11_15 149.0 m	Nine conventional core holes. Core was logged, recovery recorded, and the holes were analysed for drainable porosity and brine chemistry. Results from Phase 1 indicated that basin-fill deposits in Salar del Hombre Muerto could be divided into hydrogeological units dominated by five lithologies, all of which had been sampled and analysed for drainable porosity.
		Brine exploration wells	6	1,070.20	SVH10_04B 63.0 m	Six small diameter shallow wells were completed and one well (SVH10_04B) was used for pilot plant brine supply. Work included geological control with cutting sampling and lithological description and physical-chemical analysis of brine samples.
Phase 2	2011	Core holes	6	894.3	SVH11_24 195.54 m	Six core holes. The measured depth to water below the land surface was 3 m for all wells. Analytical results for drainable porosity and brine chemistry are available for all core holes. For each core hole, electrical conductivity and temperature were measured at 2–5 m intervals using an Aquatroll 200 downhole electrical conductivity probe. Using the results from the downhole electrical conductivity profiles, it was possible to identify raw-water influences in the upper part of four core holes.
		Brine exploration wells	9	1,440	SVWW11_13 165.0 m	Nine brine exploration wells and one reverse circulation (RC) well. Short-term pumping tests were completed on brine exploration wells SVWW11_02 and SVWW11_04 to SVWW11_13.
Phase 3	2012	Brine exploration wells	5	651	SVWW12_16 175.70 m	Five wells. Short-term (24-hour) pumping tests were conducted at each well. The pumping rate was measured using a Krohne magnetic flowmeter. Water-level measurements were taken using both electric water level sounders, and non-vented in-situ LevelTroll pressure transducers/dataloggers. Water level recovery after pumping was measured for all wells for a period of time at least equal to the pumping period. Distance from pumped wells to observation well ranged from 25–130 m. Drawdown data were analysed for aquifer transmissivity. The results confirmed potential for production in the western and eastern areas. A recommendation was made to perform 30-day pumping tests in both areas and confirm the viability for long-term production.

Drilling Phase	Duration	Note	Number of Holes	Metres (m)	Max Depth (m)	Comments
Phase 4	2017	Brine exploration wells	1	158.49	SVWP17_21 158.49 m	One well completed. Activities included geological wireline logging with spontaneous-potential, long and short induction, sample splitting, lithological descriptions, and downhole brine sampling. Results from this well confirmed that the tested zone had production potential and a recommendation was made to perform a 30-day pumping test in this area and confirm the viability for long-term production.
Phase 5	September 2018 to March 2019	Brine exploration wells	2	535	SVWP18_25 303.0 m	Two wells completed. Short-term pumping tests conducted. Brine samples were obtained at regular intervals from the discharge pipeline. Drawdown and recovery data were analysed. The laboratory results support the interpretation that the wells may have been perforated in both the upper freshwater aquifer and the lower brine aquifer. This program provided geological and brine chemistry data that were used to characterise the southeastern area.
Phase 6	Commenced in Q4 2020. Finalized in Q4 2021	Production wells	8	2,021.70	SVWP21_02 307.0 m	Eight wells completed. Activities included geological wireline logging with spontaneous-potential, long and short induction, borehole magnetic resonance, spectral gamma ray and lithological descriptions. Short-term (36-72hour) pumping tests were conducted at each well. The pumping rate was measured using a Rosemount magnetic flowmeter and a v-notch tank. Water-level measurements were taken using both electric water level sounders, and non-vented Solinst® Levelogger pressure transducers/dataloggers. Water level recovery after pumping was measured for all wells for a period of time at least equal to the pumping period. Distance from pumped wells to observation well ranged from 6.74–2,438 m. Drawdown data were analyzed for aquifer transmissivity. This program was planned to develop the first production wellfield to provide brine to the evaporation ponds as part of the process to concentrate and obtain lithium from the brine.
	Commenced in Q4 2021. Finalized in Q1 2022	Fresh water well	1	42.00	SVFW21_21 42.0 m	One fresh water well completed, located in the southeast area of the properties. Activities included geological wireline logging with long and short resistivities, conductivity, gamma ray, temperature. Data from pumping test are still pending.

Figure 10-1: Drill Collar Location Map



10.2.4 Phase 4

The exploration well was drilled by Andina using a rotary drill rig and completed with 10-inch PVC casing and gravel pack filter.

10.2.5 Phase 5

The exploration wells were completed by Andina (SVWW18_25) and Hidroper S.R.L (SVWW18_26) using a rotary drill rig and completed with 8-inch PVC casing and gravel pack filter.

10.2.6 Phase 6

The drilling contractor was Cono Sur Drilling, a division of Energold Drilling. The operation occurred from December 2020 to November 2021. All wells were designed to be part of the first production wellfield to provide brine to the evaporation ponds as part of the process to concentrate the lithium in the brine. The wells were drilled by conventional mud rotary circulation. Drilled borehole diameters were 24 inches (609.6 mm), 16 inches (406.4 mm) and 8.75 inches (222.25 mm). Once drilling was completed, production wells were cased with 10-inch (254 mm) blank PVC casing and a PVC well screen (slot size 0.75 mm). Gravel pack (1 – 2 mm and 1 – 3 mm diameters sand) was installed in the annular space surrounding the well screen. A bentonite seal was installed above the gravel pack, then cement and fill material were placed to the level of the land surface.

A freshwater well was constructed by Cono Sur Drilling Co. during Phase 6. This well was labeled as SVFW21_21 and the drilled borehole diameters were 16 inches (406.4 mm) and 8.75 inches (222.25 mm). Once drilling was completed, the production water well was cased with a 10-inch (254 mm) blank PVC casing and a PVC well screen (slot size 0.75 mm). Gravel pack (1–2 mm) was installed in the annular space surrounding the well screen. The upper part of the well was sealed with cement.

Location coordinates and construction information for the production wells and freshwater well are given in Table 10-2.

Table 10-2: Summary of Well Construction Information for Production Wells and Fresh Water Well

Borehole ID	Well Coordinates[a]		Altitude (masl)[b]	Borehole		Production Casing		
	North	East		Dia. (in)	Depth Drilled (m bls)[c]	Dia. (in)	Depth (m, bls)	Screened Intervals (m bls)
SVWP21_01	7,195,299	3,411,502	3,972.4	24	0 – 102	10	0 – 230	117.9 – 223.9
				17	0 – 102			
				16	102 – 233			
				8 ¾	0 – 240			
SVWP21_02	7,194,884	3,412,559	3,972.7	24	0 – 91	10	0 – 299.9	123.1 – 170.2 176.9 – 293.78
				16	0 – 303			
				8 ¾	0 –307			
SVWP21_03	7,194,301	3,411,664	3,973.7	24	0 – 65	10	0 – 177	88.5 – 135.6 141.5 – 171
				16	0 – 182			
				8 ¾	0 – 202			
SVWP21_04	7,193,909	3,412,798	3,973.8	24	0 – 84	10	0 – 223.7	87.8 – 129.1 135 – 217.5
				16	0 – 226.7			
				8 ¾	0 – 236			
SVWP21_05	7,193,289	3,411,643	3,973.1	24	0 – 87.5	10	0 – 202.2	90.4 – 137.4 143.2 – 190.2
				16	0 – 208.3			
				8 ¾	0 – 212			
SVWP21_06	7,192,906	3,412,771	3,973.8	24	0 – 86	10	0 – 252.8	87.5 – 140.6 148.4 – 248.4
				16	0 – 264			
				8 ¾	0 – 267.7			
SVWP21_07	7,192,294	3,411,658	3,973.6	24	---	10	0 – 235.1	87.4 – 140.7 146.3 – 229
				16	0 – 12			

Borehole ID	Well Coordinates[a]		Altitude (masl)[b]	Borehole		Production Casing		
	North	East		Dia. (in)	Depth Drilled (m bls)[c]	Dia. (in)	Depth (m, bls)	Screened Intervals (m bls)
				8 ¾	0 – 58			
SVWP20_08	7191901	3412781	3975.6	24	0 – 92	10	0 – 270.4	111.9 – 159 170.8 – 264.3
				18	92 – 98			
				16	0 – 280			
				8 ¾	0– 307			
SVWF21_21	7187411	3409970	3980	24	---	10	0 – 33.7	4.0 – 27.5
				16	0 – 42			
				8 ¾	0 – 36			

Notes: a = Coordinates on UTM system (Universal Transverse Mercator), Datum GAUSS KRÛGGER-POSGAR 07.
b = metres, amsl = above mean sea level
c = metres, bls = below land surface
d = Replacement well

10.3 Logging and Recovery

Unwashed and washed drill cuttings from the exploration and RC wells were described and stored in labelled plastic cutting boxes. Core was described at 1-m intervals. Downhole geophysical logging was completed for the Phase 2 to Phase 5 programs, and consisted of gamma ray, resistivity, spontaneous-potential surveys, and borehole magnetic resonance and spectral gamma ray which was conducted in wells SVWP21_01, SVWP21_06, and SVWP21-07 during Phase 6 of drilling program.

Recovery percentages of drill core were recorded for each core hole; percent recovery was excellent for the majority of the samples obtained, except for weakly cemented, friable clastic sediments. General summary of downhole geophysical survey conducted during initial phases of drilling program is shown in Table 10-3, more detail downhole geophysical survey including BMR survey conducted in Phase 6 of this last drilling campaign is shown in Table 10-4.

Table 10-3: Summary of General Geophysical Survey Conducted on Phases 2, 3, 4, 5, and 6 of Drilling Program

	Wells	GR	SP	RS	RL	BMR	DPOR	TPOR	CAL	U/K/Th	EC	T°	Acoustic Imaging
Wells from Phase 2, 3, 4, and 5	SVWW11-04	X	X	G	X								
	SVWW11-06	X	X	X	X								
	SVWW11-08	X	X	X	X								
	SVWW11-10	X	X	X	X								
	SVWW11-12	X	X	X	X								
	SVWW11-13	X	X	X	X								
	SVWM12-14		X	X	X								
	SVWP17_21		X	X	X								
	SVWW18_25		X	X	X								
	SVWW18_26		X	X	X								
	SVWF12-19		X	X	X								
	SVWF12-20			X	X								
Wells from Phase 6	SVWP21_01	X		X	X	X	X	X	X		X	X	X
	SVWP21_02	X	X	X	X				X				
	SVWP21_03	X		X	X				X	X			X
	SVWP21_04	X	X	X	X				X		X	X	
	SVWP21_05	X		X	X				X	X			
	SVWP21_06	X		X	X	X	X	X	X	X	X	X	
	SVWP21_07	X		X	X	X	X	X	X	X	X	X	X
	SVWP21_08	X	X	X	X						X	X	
	SVWF21-21	X		X	X						X	X	

Note: GR = Gamma Ray; SP = Spontaneous Potential; RS = Short Normal Resistivity; RL = Long Normal Resistivity; BMR = Borehole Magnetic Resonance
DPOR = Drainable Porosity; TPOR = Total Porosity; CAL = Caliper; U/K/Th = Uranium, Potassium, Thorium; CE – Electrical Conductivity; T = Temperature

Table 10-4: Summary of Geophysical Surveys Conducted During Phase 6 of the Drilling Program

Borehole ID	Borehole		Geophysical Survey	Geophysical Logs					
	Dia. (in.)	Drilled Depth (m bls)[a]	Date	Caliper Depth (m btoc)[b]	Normal Resistivity Depth (m btoc)[b]	Spontaneous-Potential Depth (m btoc)[b]	Specific Yield/ Specific Retention Depth (m btoc)[b]	Gamma Rays Depth (m btoc)[b]	Electric Conductivity Temp. Depth (m btoc)[b]
SVWP21_01	24	0 – 102	17-03-2021	0 – 235	3 – 237	---	3 – 227	8 – 238	8 – 235
	17	0 – 102							
	16	102 – 233							
	8 ¾	233 – 240							
SVWP21_02	24	0 – 91	18-04-2021	140 – 301.3	90 – 301.6	90 – 301.6	---	90 – 302.4	90 – 301.6
	16	91 – 140	19-04-2021						
	8 ¾	140 – 307							
SVWP21_03	17	0 – 68	06-10-2021	12.5 – 197	12.5 – 199	---	not surveyed	0 – 197	not surveyed
	8 ¾	0 – 202							
SVWP21_04	17	0 – 80	10-02-2021	8 – 211	3 – 227	3 – 227	---	8 – 212	8 – 212
	8 ¾	0 – 236	12-02-2021						
SVWP21_05	18	0 – 12	06-07-2021	12 – 192	12 – 196	---	not surveyed	0 – 192	not surveyed
	8 ¾	12 – 196							
SVWP21_06	24	0 – 85	27-09-2021 28-09-2021	11 – 260	0 – 264	---	not surveyed	0 – 260	0 – 263
	16	0 – 256							
	8 ¾	0 – 267.5							
SVWP21_07	24	0 – 76	01-09-2021	76 – 237	76 – 238	---	82.5 – 236	0 – 235	0 – 238
	8 ¾	0 – 250							

Borehole ID	Borehole		Geophysical Survey	Geophysical Logs					
	Dia. (in.)	Drilled Depth (m bls)[a]	Date	Caliper Depth (m btoc)[b]	Normal Resistivity Depth (m btoc)[b]	Spontaneous-Potential Depth (m btoc)[b]	Specific Yield/ Specific Retention Depth (m btoc)[b]	Gramma Rays Depth (m btoc)[b]	Electric Conductivity Temp. Depth (m btoc)[b]
	8 ¾	0 – 250							
SVWP20_08 Run 1	17½	0 – 17	28-12-2020	0 – 124	0 – 124	0 – 124	---	0 – 124	0 – 70
	8 ¾	17 – 129.5							
SVWP20_08 Run 2	18	0 – 98	13-01-2021	0 – 255	---	---	---	0 – 305	---
	8 ¾	98 – 307							
SVWF21_21	16	0 – 42	19-10-2021	1.7 – 36	5.3 – 31.0	---	---	6.9 – 32.3	0 – 33.3
	8 ¾	0 – 36							

Notes: [a] = Coordinates on UTM system (Universal Transverse Mercator), Datum GAUSS KRÛGGER-POSGAR 07.
[b] = metres, amsl = above mean sea level
[c] = m bls = meters below land surface
[d] = m btoc = meters below top of casing

10.4 Collar Surveys by Lithium One

A professional collar survey was conducted in 2011 of core holes SVH10_05 through SVH11_28, exploration wells SVWW11_01 through SVWW11_08, and RC drill hole SVRC11_02 was conducted using a Trimble differential global positioning system (GPS) instrument. The remaining exploration wells (SVWW11_09 through SVWW11_13) and RC drill hole SVRC11_03 were surveyed using hand-held portable GPS equipment.

10.5 Collar and Downhole Surveys by Galaxy Lithium

Collars since 2011 have been surveyed by Galaxy personnel using a differential GNSS instrument. Over the years 2020/2021, core holes SVH10_05 through SVH11_28, exploration wells SVWW11_01 through SVWW11_08, RC drill hole SVRC11_0240, SVWW11_09 through SVWW11_13, and RC drill hole SVRC11_03 were measured obtaining high precision position corrections, including production wells SVWP21_01 through SVWP21_08. The North and East coordinates, elevation above ground level, elevation at the wellhead and stick-up elevation were provided, through the RTK method, linked to the official reference system and reference frame.

WGS 84, POSGAR 2007, FAJA 3.Downhole Survey during the exploration program, downhole electrical conductivity surveys were conducted at many of the wells after completion and boreholes to identify fresh water and brine-bearing parts of the aquifer. Following installation of 2-inch PVC in the exploration core holes, and after waiting several weeks for the brine inside the casing to equilibrate to the surrounding aquifer, a downhole electrical conductivity profile was conducted at the core holes and selected wells. Electrical conductivity is a measure of the water's ability to conduct electricity and is an indirect measure of the water's ionic activity and dissolved solids content. Electrical conductivity is positively correlated with brine concentration. The purpose of the profiles was to:

- Determine the electrical conductivity profile and identify potential freshwater influence and low density;
- Provide additional verification for the chemistry profiles generated from depth-specific samples.

For each core hole, electrical conductivity and temperature were measured at 2- to 5-metre intervals using an in-situ brand Aquatroll 100 downhole electrical conductivity probe. The probe was calibrated with a standard solution before each survey. Three 1-minute measurements were obtained at each depth station; the average of the three measurements was used to generate the profile. Measurements were taken only while lowering the probe through the column of brine.

During later phases of drilling other wells were also surveyed for temperature and electrical conductivity using same calibrated probe of Aquatroll and with same purposes explained above. Downhole temperature and electrical conductivity surveys were completed on core holes SVH11_16 and SVH11_24 to SVH11_28. For each core hole, electrical conductivity and temperature were measured at 2–5 m intervals using an Aquatroll 200 downhole electrical conductivity probe. Three measurements were obtained for one minute each at each depth station; the average of the three measurements was used to generate the profile. Measurements were taken only while lowering, not raising, the probe through the column of brine, to minimise disturbance of the fluid column during measurements.

10.6 Short-Term Pumping Tests

10.6.1 Phase 2

Short-term pumping tests were completed on brine exploration wells SVWW11_02 and SVWW11_04 to SVWW11_13. All brine exploration wells were equipped with temporary submersible electric pumps, and short-term

(24-hours or less) pumping tests were conducted at each well to measure aquifer transmissivity, obtain a representative brine sample, and provide design data for future, higher-capacity, production wells.

Installation depths for the submersible pumps at each tested brine exploration well ranged from 32 – 91.5 m. A short step-rate pre-test was conducted at most wells to determine the pumping rate for the constant rate tests. Typically, a Krohne magnetic flowmeter was used for pumping rate measurements. Water-level measurements were taken using electric water-level sounders and non-vented LevelTroll pressure transducer/dataloggers. Pressure transducers were adjusted to compute the water-level drawdown using a brine specific gravity of 1.2 g/cm^3.

The pumping period duration was 24 hours for all constant rate tests, except the test for brine exploration well SVWW11_07, which was tested for 12.25 hours due to generator failure. Core drill holes, cased with 2-inch (50.8 mm) PVC, served as observation wells during pumping tests. The distance from pumped wells to observation well core holes ranges from 14.1 – 70.4 m. Brine exploration well SVWW11_07 was in an area where there was no adjacent core hole.

Raw-water influences were noted in the upper part of core holes SVH10_08, SVH11_15, SVH11_16 and SVH11_27. For these wells, laboratory-specific conductivity values were found to be similar to the results measured by the downhole probe. Core holes SVH10_08, SVH11_16 and SVH11_27 were located on the eastern side of the basin where mountain-front recharge of raw water, and surface water inflows, were believed to enter the groundwater system. Core holes SVH11_15 and SVH10_09 were located near the edge of a large alluvial fan in the southern part of the basin and showed profiles that suggested raw-water influence in the upper part of the well. This could be due to raw-water infiltration from the Río de los Patos into coarser fan sediments, or due to precipitation recharge from the south.

10.6.2 Phase 3

Most wells were equipped with temporary submersible electric pumps, and short-term (24-hour) pumping tests were conducted at each well. During testing, the pumping rate was measured using a Krohne magnetic flowmeter. Water-level measurements were taken using both electric water level sounders, and non-vented in-situ LevelTroll pressure transducers/dataloggers. Water level recovery after pumping was measured for all wells for a period of time at least equal to the pumping period. Distance from pumped wells to observation well ranged from 25 – 130 m.

Results confirmed potential for production in the western and eastern areas. A recommendation was made to perform 30-day pumping tests in both areas and confirm the viability for long-term production.

10.6.3 Phase 4

Exploration well SVPW17_21, was equipped with a temporary submersible electric pump, and a short-term, 48-hour pumping test was completed. SVWW11_07 served as an observation well with a distance from the pumped well of 6.13 m. The installation depth for the submersible pump was 90 m. A short step-rate pre-test was conducted to determine the pumping rate for the constant-rate tests. Pumping rates were measured with a graduated bucket and a stopwatch. Water-level measurements were taken using both electric water-level sounders, and non-vented LevelTroll pressure transducers/dataloggers. The water-level recovery after pumping was measured for a period of 38 hours.

Results from this well supported that the tested zone had production potential and a recommendation was made to perform a 30-day pumping test in this area and check long-term production viability.

10.6.4 Phase 5

Exploration wells SVWW18_25 and SVWW18_26 were equipped with temporary submersible electric pumps, and short-term pumping tests (48 hours for exploration well SVWW18_25 and 24 hours for exploration well SVWW18_26) were conducted at each well. Installation depths for the submersible pumps at each tested exploration well ranged from 85.5 – 89.0 m. A short step-rate pre-test was conducted at each well to determine pumping rate for the constant-rate. Pumping rates were measured with a graduated tank and a stopwatch. Water level measurements were taken using both electric water level sounders, and non-vented LevelTroll pressure transducers/dataloggers.

The water level recovery after pumping was measured for both wells for same number of minutes of pumping (2,880 and 1,440 minutes after the pump was stopped). As there were no nearby wells, no measurement of water levels at observation wells could be taken.

During the tests at exploration wells SVWW18_25 and SVWW18_26, brine samples were obtained at regular intervals from the discharge pipeline.

The laboratory results support the interpretation that exploration wells SVWW18_25 and SVWW18_26 may have been perforated in both the upper freshwater aquifer and the lower brine aquifer. This program provided geological and brine chemistry data that were used to characterise the southeastern area.

10.6.5 Phase 6

All production wells were equipped with temporary submersible electric pumps, and short-term pumping tests were conducted at each well. Installation depths for the submersible pumps at each tested production well ranged from 103.5 – 132.5 m. A short step-rate was conducted at each well to determine pumping rate for the constant-rate. Pumping rates were measured with a graduated tank and magnetic flowmeter. Duration of constant-rate pumping test was 36 hours for well SVWP21_02; 48 hours for wells SVWP21_01, SVWP21_05, SVWP21_06 and SVWP20_08; 52.5 hours for well SVWP21_03; and 72 hours for wells SVWP21_04 and SVWP21_07. Water level measurements were taken using both electric water level sounders, and non-vented Levelogger pressure transducers/dataloggers.

The water level recovery after pumping was measured for the same number of minutes of pumping at wells SVWP21_01, SVWP21_04, SVWP21_05, SVWP21_06 and SVWP21_07 (2,880 and 4,360 minutes after the pump was stopped). For wells SVWP21_02, SVWP21_03 and SVWP20_08 time for water level recovery measurement exceeded the time of pumping ranging from 2,580 to 6,060 minutes. During testing water level was measured at observation wells in the nearby wells at each location; however, observed water level drawdowns were too small to be used to compute hydraulic parameters because the wells were too far from the pumped well.

During the tests at the production wells, brine samples were obtained at regular intervals from the discharge pipeline. A summary of pumping tests conducted at production wells is given in Table 10-5.

Table 10-5: Summary of Pumping Tests at Production Well

Well ID	Pumping Start Date	Pumping Duration (hours)	Pre-pumping Water Level (m bls)[1]	Average Pumping Rate (L/s)[2]	Drawdown at End of Pumping (m)	Specific Capacity (L/s/m)[3]
SVWP21_01	08-09-2021	48	8.93	27.54	74.55	0.37
SVWP21_02	19-06-2021	36	10.18	26.1	67.12	0.39
SVWP21_03	22-08-2021	52.5	9.59	35.04	55.42	0.63
SVWP21_04	08-04-2021	72	10.81	17.8	87.55	0.20
SVWP21_05	31-10-2021	48	10.77	30.04	88.79	0.34
SVWP21_06	02-12-2021	48	11.43	33.34	42.98	0.77
SVWP21_07	15-11-2021	72	11.27	33.04	4.72	7.00
SVWP20_08	14-03-2021	48	12.25	26.10	52.6	0.50
SVWF21_21	---	---	---	---	---	---

Note: [1] metres below land surface
[2] L/s = litres per second flowrate
[3] L/s/m = litres per second per meter

10.7 Long-term Pumping Tests

Two long-term pumping test campaigns were undertaken to simulate wellfield production:

- Long-term pumping test, 2012: two 30-day tests in the western and eastern sub-basins (SVWW11_10 and SVWW11_13);
- Long-term pumping test, 2020: one 28-day test north of the eastern sub-basin (SVWP17_21).

10.7.1 2012 Tests

Additional investigations were conducted during 2012 in two areas of the basin where aquifer conditions appeared most favourable for long-term brine production. Factors used to select these potential wellfield areas included favourable brine quality, comparatively large aquifer transmissivities and yield from existing wells in these areas, and the presumed continuity and large extent of the favourable aquifer units. To better understand the potential of these two areas, a pilot production wellfield program was designed and included new wells and 30-day aquifer tests. Long-term testing was conducted at exploration well SVWW11_13 in a simulated eastern wellfield and at well SVWW11_10 in a simulated southwestern wellfield:

- Exploration well SVWW11_13 was pumped at a constant rate of 15.2 L/s during the period August 27 to September 26, 2012. During testing, four observation wells, SVH11_16, SVWM12_14, SVWP12_14, and SVWM12_15, were monitored for water-level changes;
- Exploration well SVWW11_10 was pumped at a constant rate of 9.8 L/s during the period October 19 to November 18, 2012. During testing, three observation wells, SVH11_24, SVWP12_16, and SVWP12_17, were monitored for water-level changes.

Based on the results of the 30-day tests, the simulated wellfield locations are suitable for brine production at a rate of about 350 L/s. Because of the larger transmissivity, the efficiency of a wellfield in the eastern sub-basin may be larger and therefore result in less pumping lift; however, brine grades were more favourable, and brackish water influence was less in the western sub-basin.

Operational pumping rates were maintained throughout the pumping periods without significant encounters of subsurface hydraulic boundaries (i.e., positive or negative boundaries caused by faulting or aquifer heterogeneities that could affect pumping water level trends). Transmissivity values were consistent with previous shorter-term testing results, being 400 m^2/day for exploration well SVWW11_13 and 110 m^2/day for exploration well SVWW11_10.

In the simulated eastern wellfield area, storativity values on the order of 10-4 to 10-3, derived from observation wells during pumping at exploration well SVWW11_10, were indicative of confined to semi-confined, leaky aquifer conditions.

In the western wellfield area, due to anomalous water-level trends at observation wells during testing at exploration well SVWW11_13, storativity values were uncertain. After long-term pumping in the production wellfields, when unconfined aquifer conditions are established, the specific yield was anticipated to be on the order of 10-1.

The available data suggest that the horizontal conductivity (Kr) is one to two orders of magnitude greater than vertical conductivity (Kz), indicating that the aquifer is horizontally stratified.

Analysis of brine samples collected daily during the 30-day pumping periods indicates averages as follows:

- Lithium concentration of 776 mg/L at exploration well SVWW11_13 and 840 mg/L at exploration well SVWW11_10; the standard deviation was 11 and 23 mg/L, respectively;
- Potassium concentration averaged 8,590 mg/L at exploration well SVWW11_13 and 8,351 mg/L at exploration well SVWW11_10; the standard deviation was 103 and 105 mg/L, respectively;
- The magnesium to lithium ratio was 2.8 at exploration well SVWW11_13 and 1.84 at exploration well SVWW11_10.

Although hydraulic parameters indicated vertical stratification of the aquifer, the variance in critical brine chemistry parameters during the 30-day production tests was small. Similarly, no dilution of produced brine was evident during the pumping periods.

Several downhole temperature and electrical conductivity profiles were collected at pumping and observation wells, before, during, and after the 30-day long-term pumping tests in each wellfield. In general, although some variation between pre- and post-testing measurements were observable, the overall vertical electrical conductivity profiles were mostly similar or the same for all the wells. Variations in scale may be due to the accuracy of the instrument. Overall, results did not suggest that significant or demonstrable increases or decreases were observed as a result of pumping for 30 days.

For the 30-day pumping test at well SVWW11_13 in the southwestern wellfield, observation wells SVWP12_14 and SVH11_16 were measured for electrical conductivity and temperature profiles during and after testing. For each observation well, the during- and post-pumping vertical profiles for both temperature and electrical conductivity show the same shapes and shifts, particularly at observation well SVH11_16 where a dramatic shift is observed at a depth of about 57 m. However, similarly to the observation wells in the southwestern wellfield, the absolute electrical conductivity values were slightly different during and post-pumping profiles. For observation well SVH11_16, the post-pumping profile indicates a larger electrical conductivity, but for observation well SVWP12_14, the profile indicates smaller electrical conductivity values. Although it is possible that a true change in chemistry occurred, because the differences are relatively small and the profiles were measured only 24 hours apart, it is not believed that this would be sufficient time for inflow of denser or less dense water to the well that would result in these changes. Therefore, the variation may be a function of instrument calibration or accuracy.

For the 30-day pumping test at well SVWW11_10 in the southwestern wellfield, the pumped well SVWW11_10 and observation wells SVH11_24, SVWP12_16 and SVWP12_17 were measured for electrical conductivity and temperature profiles before and after testing. For pumping well SVWW11_10 and observation well SVH11_24, the pre- and post-pumping vertical profiles for both temperature and electrical conductivity are essentially the same. However, for observation wells SVWP12_16 and SVWP12_17, the post-pumping electrical conductivity profile is slightly shifted toward lower electrical conductivity values. Although it is possible that a true change in chemistry occurred, because the differences are relatively small (<10% variation), the observed change may be a function of instrument calibration or accuracy.

Based on 30 days of pumping at each wellfield, the results do not show any significant or obvious change in the aquifer water chemistry entering the wellfields during the pumping period. Minor variations may be related to instrument sensitivity and/or water mixing within the borehole.

10.7.2 2020 Tests

Following the results from the 2012 long-term pumping tests, a long-term test was conducted at well SVWP17_21 in the northern end of the east wellfield, which was undertaken during the period May–June 2020. The constant-rate test was planned as part of pond filling to take advantage of the opportunity to obtain long-term pumping data in the northern part of the wellfield. The testwork results were used to assist with numerical groundwater flow model calibration. This basin sector is dominated by clastic sediments, with clay and sand in the upper part of the system and underlying coarse sediments (mostly gravel and sand) in the lower part where pumping occurs.

Pumping was monitored for a total of 28.8 days. Mechanical problems with the generator interrupted pumping at that time and the test was terminated. The 28.8-day duration was considered adequate for reliable evaluation of the test results. During the test, water-level drawdown was measured at the pumped well and at three observation wells, SVWP11_07, SVH11_27 and SVWP12_14, located at distances ranging from 6 – 3,300 m from the pumped well.

The flow rate was measured using a Rosemount mechanical flowmeter. The average flow rate measured during the test was 61.6 m^3/hr, or about 17.1 L/s. During the 28.8-day pumping period, short-term shutdowns of the pump occurred either due to generator malfunction or maintenance. These brief shutdowns are not considered to affect the test results.

Water levels were measured using a pressure transducer and a sounder for the pumped well and observation wells. Field parameters (temperature, pH, and electrical conductivity) were measured using a calibrated multiparameter instrument. Brine density was measured using a hydrometer. Barometric pressure was also measured to correct water-level data for barometric changes. Pumped water was conveyed 1,250 m from pumped well SVWP17_21 to minimize potential interference with testing and for filling existing evaporation ponds. During pond filling, Galaxy personnel moved the discharge to different locations inside the ponds; this is not considered to have had an effect on testing.

During the test, 39 brine samples were collected. One early-time, and one late-time sample were sent to Alex Stewart Laboratories in Mendoza, Argentina (Alex Stewart) for chemical analyses. Results of the laboratory results for these two samples indicate that the chemical composition of the brine did not change during the pumping period; therefore, analysis of the remaining samples was not considered necessary.

At the pumped well, transmissivity was calculated to be 260 m^2/d using the drawdown measurements based on the Cooper and Jacob (1946) method. Recovery data are considered more reliable in general because minor changes in water level due to pumping variations were not observed. Recovery measurements at the pumped well were analysed using the Theis (1935) recovery method; transmissivity was calculated to be 250 m^2/d and is consistent with the transmissivity value calculated using drawdown data.

The distant observation wells showed little to no drawdown. About 0.4 m of drawdown was observed during pumping at observation well SVWP12_14, and about 7.7 m of drawdown was observed at observation well SVWW11_07. Similar to the pumping well, drawdown measurements at observation well SVWW11_07 show evidence of flow rate changes and generator failures at the pumped well. A transmissivity value of 320 m^2/d was calculated for observation well SVWW11_07 using the Theis (1935) method). The operative transmissivity for the aquifer was calculated to be 250 m^2/d.

10.7.3 2021 Tests

After production wells were completed in Phase 6, they were pump tested with temporary submersible electric pumps. Water level measurements were taken manually with sounders, and Levelogger pressure transducers.

Constant discharge pumping tests were conducted at all 8 production wells; water level drawdown and recovery water levels were measured with same instruments. Transmissivities and specific capacities were calculated for each production well. During testing, observation wells were used to measure water levels; drawdown was too small to compute hydraulic parameters.

Wells SVPW21_06 and SVWP21_07 have the highest specific capacities of 0.77 and 7.0 liters per second per meter of water level drawdown (L/s/m) respectively (Table 10-5).

Wells SVWP21_03 and SVWP21_07 have the highest transmissivity values of 220 and 600 m^2/d respectively (Table 10-6).

Table 10-6: Summary of Flowrates and Transmissivities from 2021

Pump Well ID	Average Pumping Rate (L/s)[1]	Cooper-Jacob Drawdown Method (1946) Transmissivity (m^2/d)[2]	Theis Recovery Method (1935) Transmissivity (m^2/d)[2]
SVWP21_01	27.5	55	100
SVWP21_02	26.1	75	90
SVWP21_03	35.0	220	270
SVWP21_04	17.8	100	100
SVWP21_05	30.0	120	100
SVWP21_06	33.3	130	110
SVWP21_07	33.0	600	690
SVWP20_08	26.1	150	100

Note: [1] (L/s) = litres per second, flowrate
[2] (m^2/d) = square meter per day, transmissivity

10.8 Raw Water Wells

Two wells were completed in 2012 to identify and provide a source of raw water for mineral processing, and the camp. The wells were designed to be 8-inch diameter fresh water production wells and could also serve as observation wells during long-term testing. The drilling contractor was Andina.

Wells SVWF12_19 and SVWF12_20 were drilled in the southern section near the Río de los Patos. Each well was pumped at rates of over 20 L/s with very little drawdown, suggesting a favourably large transmissivity. The estimated raw-water requirement for use in future brine processing is 20–40 L/s. For raw water supply wells, SVWF12_19 and SVWF12_20, downhole temperature and electrical conductivity profiles were completed, with the purpose of identifying potential brine influence in raw water. The electrical conductivity profile for the raw-water wells show values of about 3,000 microSeimens (µS)/centimetre (cm) above 36 m for well SVWF12_19 and above 33 m for well SVWF12_20. Large electrical conductivity readings of about 30,000 µs/cm that were returned near the bottom of each well suggest a brine influence, but this could also be due to suspended solids in the lower portions of the wells.

Pumping resulted in groundwater that had an average specific electrical conductivity of 2,550 µs and a TDS content of 1,500 mg/L. Although this TDS value is typically higher than accepted for drinking water purposes, these wells, or additional shallow wells in the area, are considered adequate to supply water for treatment and ultimately processing at the design rates.

Each well was pumped at rates of over 20 L/s with very little drawdown, suggesting a favourably large transmissivity. The estimated raw-water requirement for use in future brine processing is 20 – 40 L/s. The recommendation was to designate well SVWF12_19 for production and SVWF12_20 for monitoring, given the proximity to the Río de los Patos.

During Phase 6 of drilling program, a new raw water well SVFW21_21 was constructed during the period of October of 2021. Total depth was 42 met. The initial bore hole was 8 ¾ inches in diameter and it reached 36 m of depth. Downhole geophysical survey was conducted immediately after finishing exploration drilling and the borehole was reamed 16 inches down to a depth of 42 m. Well screen was installed 33.7 m deep with slotted PVC casing between 4 m of depth to 27.5 m. Gravel pack of 1-3 mm diameter was installed and the well was developed. During the development, water sampling and physico-chemical measurements on this well indicated that pH ranges from 8.9 to 9.4 values.

In February 2022 a short-term pumping test was performed to infer well productivity. The water table was 3.21 m. The maximum tested pumping rate during the step-rate test was 50 L/s with a drawdown of 4.5 m. After step-rate test a 36-hour production drawdown test followed by same time build-up was performed to estimate aquifer properties. Interpretation by Theiss and Jacobs methods gave a transmissivity value of 1,574 m^2/d and a storativity of 0.027, typical of unconsolidated unconfined aquifer systems.

The recommendation is to designate well SVWF12_21 for production of raw water, to be used in the process plant and for camp consumption.

10.9 Comments on Drilling

In the QP’s opinion, drill data are acceptable to support Brine Resource and Brine Reserve estimations.

11 SAMPLE PREPARATION, ANALYSES, AND SECURITY

11.1 Sampling Methods

11.1.1 Drainable Porosity Sampling Methodology

Porosity samples were collected during 2010, 2011, and 2012 from intact HQ and NQ-core. Full diameter core with no visible fractures was selected and submitted for laboratory analyses. The selected sleeved core samples were capped with plastic caps, sealed with tape, weighed, and stored for shipment. The typical sample length was 15 – 40 cm. Porosity samples were shipped to Core Laboratories Petroleum Services Division, Houston, Texas (Core Laboratories) for analysis.

11.1.2 Brine Sampling Methodology

In addition to the depth-specific brine samples obtained by drive-points during coring, brine samples used to support the reliability of the depth-specific samples included analyses of the following:

- Brine centrifuged from core samples;
- Brine obtained from low flow sampling of the exploration core holes;
- Brine samples obtained near the end of the pumping tests in the exploration and production wells.

11.1.2.1 Brine Sampling by Drive-Point Samplers

Brine samples were collected during 2010–2011 from the same core holes that provided porosity samples. Brine samples were collecting by removing the core barrel and installing a drive-point onto BT size (55 mm) drill rods. The drive-point was driven to a depth below the drill bit using a drop hammer on the drill rig. An impermeable diaphragm located just above the drive-point prevented the BT drill rods from being filled during driving. After driving the drive-point to the desired depth, an electric water-level sounder was lowered into the BT drill rods to ensure that the rod interiors were dry. The sounder was removed, and the diaphragm was perforated using a weighted pin lowered with the wireline. This piercing allowed brine to flow into the drive-point and begin filling the BT rods. After bailing and discarding the first fluid, the brine sample was bailed from the drill rods.

11.1.2.2 Brine Sampling by Centrifuge Phase 2

For core hole SVH11_15, a second set of centrifuge pucks was cut in 2011 from core samples at Core Laboratories, centrifuged for an extended period, and brine removed was collected and submitted to Alex Stewart for analysis. Brine was collected from a total of 15 core pucks. The volume of brine obtained by centrifuge ranged from 10–36 mL. Selected samples were split and duplicate analyses were obtained. The results of the brine centrifuge sampling and analysis validated and confirmed the drive-point sample collection methodology.

11.1.2.3 Brine Sampling by Low-Flow Pumping Phase 2

Brine samples were collected in 2010 and 2011 by pumping selected 2-inch (50.4 mm) PVC wells to acquire composite brine samples from core holes and confirm the brine chemistry derived from other sampling methods. The average pumping rate ranged from about 1 – 4 L/min. Wells were pumped for sufficient time to remove three borehole volumes, and samples were collected for analysis. Brine samples from the low-flow sampling program, together with duplicate and standard samples were sent to Alex Stewart Assayers of Mendoza, Argentina (Alex Stewart).

For most core holes, results indicated that lithium and potassium values for low-flow pumped samples were similar to the results derived from drive-point samples.

11.1.2.4 Brine Sampling During Pumping Tests and Drilling

Brine samples were collected directly from the discharge line for analysis near the end of each pumping test. Physical-chemical parameters including temperature, electrical conductivity, pH, and brine density were monitored during pumping. Brine samples from the pumping test program together with duplicate and standard reference material (standard) samples were sent to Alex Stewart.

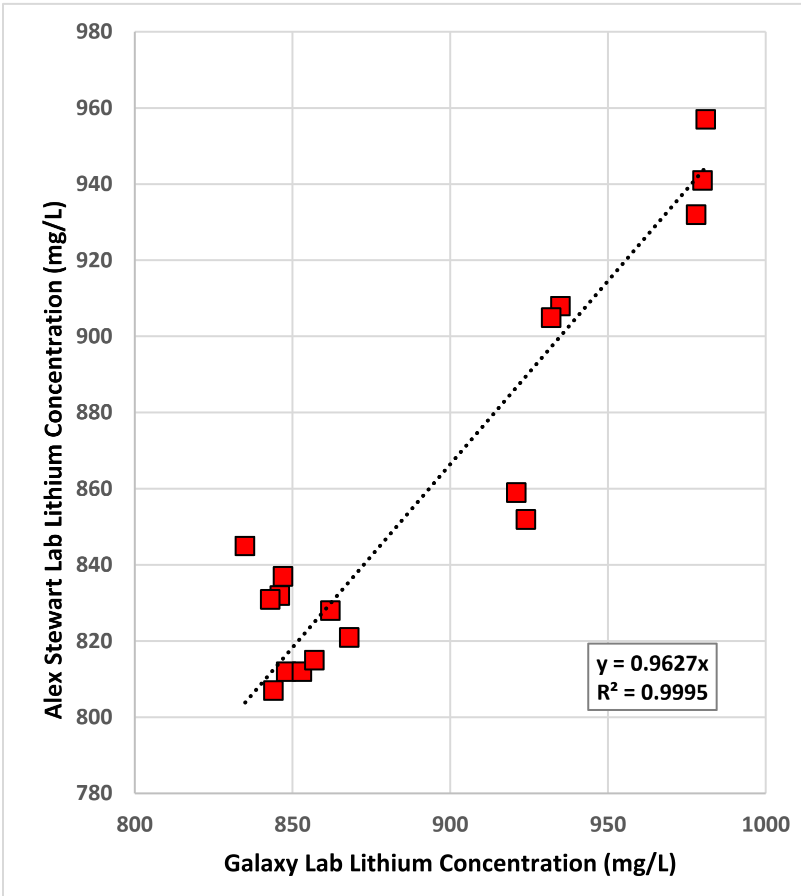
For brine samples collected from pumping test at the proposed East Wellfield, lithium results obtained by Galaxy Laboratories and from Alex Stewart Laboratories were compared. A summary of results is shown for each pumping well at Table 11-1.

Table 11-1: Lithium Concentration Results from Galaxy and Alex Stewart Labs

Well	Sample ID	Lithium Concentration (mg/L)	
		Galaxy Lab	Alex Stewart Lab
SVWP21-01	SV-08141	921	859
	SV-08142	924	852
SVWP21-02	SV_08119	844	807
	SV_08120	848	812
	SV_08121	853	812
	SV_08123	857	815
SVWP21-03	SV_08132	935	908
	SV_08133	932	905
SVWP21-04	SV-08146	981	957
	SV-08147	980	941
	SV-08148	978	932
SVWP21-05	SV-08155	847	837
	SV-08159	835	845
SVWP21-06	SV-08174	868	821
	SV-08175	862	828
SVWP21-07	SV-08165	846	832
	SV-08166	843	831

A graphical comparison between the results is shown in Figure 11-1. A good fit is observed between both data sets although the results from Alex Stewart lab are generally slightly lower than those of Galaxy lab. Because the data used for the Brine Resource estimation corresponds to the Alex Stewart lab, the estimated Brine Resource may be slightly conservative.

Figure 11-1: Galaxy Lab Lithium Data vs. Alex Stewart Lab Lithium Data



Note: Figure prepared by Montgomery & Associates, 2013.

Brine samples were also collected during drilling of drill hole SVRC11_03. These samples were collected by airlift pumping from the opened borehole at 6-m intervals as the hole was drilled. These samples represent a composite sample of the drill hole at different depths. For each sample, airlift pumping rate, brine temperature, pH, electrical conductivity, and density were measured and recorded.

Brine samples from short-term pumping tests provide the best available analyses for the brine chemistry that would be produced during production pumping. Results indicate only small variations in the lithium (standard deviation <11 mg/L) and potassium (standard deviation <139 mg/L) content for all time-series samples.

11.2 Analytical and Test Laboratories

Porosity analyses were conducted by Core Laboratories. Core Laboratories is ISO 9000:2008 accredited. The laboratory is independent of Galaxy.

Brine chemistry samples from Sal de Vida were analysed by Alex Stewart, a laboratory that has extensive experience in analysing lithium-bearing brines. Alex Stewart is ISO 9001 accredited and operates according to Alex Stewart Group standards which are consistent with ISO 17025 methods at other laboratories. The laboratory is independent of Galaxy.

Selected duplicate samples were sent to the University of Antofagasta, Chile, as part of the quality assurance and quality control (QA/QC) procedure. The University of Antofagasta laboratory is not ISO certified, but has extensive experience in the analysis of brines samples submitted from all over South America. The laboratory is independent of Galaxy.

The ACME Santiago laboratory (ACME) was also used for check analysis. The laboratory is ISO 9001 certified and independent of Galaxy.

Duplicate samples were also sent to ALS Chemex in Mendoza for check analyses. The ALS Chemex laboratory is ISO 17025 and ISO 9001:2000 accredited. These samples were transferred from the ALS Chemex preparation facility in Mendoza to the laboratory facility in Santiago for analysis. The laboratory is independent of Galaxy.

11.3 Sample Preparation

Neither porosity (core) nor chemistry (brine) samples were subjected to any further preparation prior to shipment to participating laboratories. After the samples were sealed on site, they were stored in a cool location, and then shipped in sealed containers to the laboratories for analysis.

11.4 Analytical Methods

11.4.1 Drainable Porosity

The laboratory analytical procedure for drainable porosity by centrifuge as described by Core Laboratories consisted of:

- Cut 38 mm (1.5 inch) diameter cylindrical plug from sample material (plunge cut or drill); typical length was about 45 mm (1.75 inch);
- Freeze sample material with dry ice if needed to maintain integrity;
- Calliper the bulk volume of the cylindrical plug and weigh sample;
- Encapsulate plug (as needed) in Teflon and nickel foil, with nickel screen on ends of plugs, and weigh encapsulated sample;
- Calculate bulk density as: (mass of plug before encapsulation)/(calliper bulk volume);
- Place plug in brine and saturate under vacuum to ensure full saturation. Core Laboratories uses a standard sodium chloride brine containing 244,000 ppm NaCl. The standard brine has a density of 1.184 g/cm^3, which approximates the density of brine samples collected from core holes (field measurement of 119 brine samples collected from bore holes during core drilling have a mean specific gravity of 1.18; median specific gravity for these samples is 1.19);
- Record weight of saturated core;

- Desaturate samples in high-speed centrifuge for 4 hours. Spin rates were calculated to give drainage pressure of 1 psi for poorly-cemented or loose sands; and 5 psi for clay and halite. Pressure was calculated at the centre of the plug placed in the centrifuge;
- Collect any drainage and record volume; discard drained fluid. (Fluid collected from these cores is not representative of in situ brines, due to re-saturation with NaCl);
- Remove plug from centrifuge and record weight;
- Drained fluid volume is calculated as: (saturated plug weight – drained plug weight)/1.184;
- Drainable porosity is calculated as: (drained fluid volume)/(calliper bulk volume).

Screened and wrapped "pucks" of the sampled sediment were returned to Montgomery and Associates in Tucson.

Drainable porosity estimates are given as a fraction of the total rock volume and are unitless. For example, if a rock has a volume of 100 mL, and 10 mL of fluid can drain from the rock, the drainable porosity is 10/100, or 0.10. Although determined by laboratory methods, the drainable porosity is essentially the same as specific yield as defined in classical aquifer mechanics.

For boreholes SVH11_15, SVH11_22 and SVH11_25, 15 core samples were sub-sampled twice, with a centrifuge puck removed from each end of the core. The core samples were selected to be visually uniform. Results demonstrate the high variability of drainable porosity measurements but are consistent within expected porosity ranges associated with a given lithology. Analyses for drainable porosity are difficult to duplicate for the following reasons:

- The measurement method is destructive of the samples;
- Duplicate samples are impossible to obtain due to natural variation of properties;
- Inter-laboratory standard comparisons are difficult, due to the above cited reasons.

11.4.2 Total Porosity

After drainable porosity measurements were completed, the plug samples from the centrifuge were analysed for total porosity. Total porosity, like drainable porosity, is given as a fraction of the total rock volume and has no units. The determinations included the following steps:

- Oven dry sample for 5 days at 115.6º C;
- Weigh oven-dried sample;
- Assume that all weight loss is pure water lost from pore space: Therefore, volume of water lost due to oven-drying is calculated as: ((drained plug weight) - (oven-dried plug weight))/(water density of 1 g/cm3);
- Total porosity is calculated as: ((drained fluid volume) + (oven drying fluid loss))/(calliper bulk volume).

11.4.3 Brine Chemistry

Table 11-2 lists the analytical methods used by the laboratories. These are based upon American Public Health Association (APHA), Standard Methods for Examination of Water and Wastewater, Environmental Protection Agency (EPA), and American Society for Testing Materials (ASTM) protocols.

Physical parameters, such as pH, conductivity, density, and TDS are directly determined from the brine samples. Analysis of lithium, potassium, calcium, sodium and magnesium is achieved by fixed dilution of filtered samples and direct aspiration into atomic absorption (AA) or inductively coupled plasma (ICP) instruments.

Table 11-2: Basic Analytical Suite

Analysis Type	Alex Stewart	University of Antofagasta	ACME	ALS Chemex	Method Description
Physical Parameters					
Total dissolved solids	SM 2540-C	APHA 2540-C	2B05-B	APHA 2540-C	Total dissolved solids dried at 180°C
pH	SM 4500-H+-B	APHA 4500-H+-B	2B02	APHA 4500-H+-B	Electrometric method
Conductivity	SM 2510-B	APHA 2510-B	2B03	APHA 2510-B	Meter
Density	IMA-28	Pycnometer	2B14	Gravimetric method, pycnometer	Pycnometer
Alkalinity	SM 2320-B	APHA 2320-B	2B06	APHA 2320-B	Titration method
Alkalinity (carbonates)	SM 2320-B	APHA 2320-B	2B13-B	APHA 2320-B	Titration method
Alkalinity (bicarbonates)	SM 2320-B	APHA 2320-B	2B13-B	APHA 2320-B	Titration method
Inorganic Parameters					
Boron (B)	IMA-23-Version 1	APHA 4500-B-C	2C	APHA 4500-B-C	Carmine method
Chloride (Cl)	SM 4500-Cl-B	APHA 4500-Cl-B 2B12	Argentometric Method	APHA 4500-Cl-B	
Sulphates (SO_4)	SM 4500-SO_4-C	APHA 4500-SO_4-C	SO_4	APHA 4500-SO4-C	Gravimetric method with ignition of residue
Dissolved metals					
Lithium (Li)	ICP-13 APHA	3500-Li-B	2C	APHA 3500-Li-B	Direct aspiration - ICP or AA finish
Potassium (K)	LACM16	APHA 3500-K-B	2C	APHA 3500-K-B	Direct aspiration - ICP or AA finish
Sodium (Na)	LACM16	APHA 3500-Na-B5	2C	APHA 3500-Na-B5	Direct aspiration – ICP or AA finish
Calcium (Ca)	LACM16	APHA 3111-B-D	2C	APHA 3111-B-D	Direct aspiration – ICP or AA finish
Magnesium (Mg)	ICP-13	APHA 3111-B-D	2C	APHA 3111-B-D	Direct aspiration - ICP or AA finish

Note: AA = atomic absorption, ICP = inductively-coupled plasma.

11.5 Quality Assurance and Quality Control

11.5.1 Quality Assurance and Quality Control Program

Analytical quality was monitored through the use of randomly inserted quality control samples, including standard reference materials (SRMs), blanks and duplicates, as well as check assays at independent laboratories. Each batch of samples submitted to the laboratory contained at least one blank, one low-grade SRM, one high-grade SRM and two sample duplicates. Approximately 38% of the samples submitted for analysis were quality control samples.

11.5.1.1 Standard Reference Materials

Three SRMs were used in the 2010–2011 sampling program. These reference materials were collected from selected brine sources of known lithium concentration, Wells SVWW11_09 and SVWW11_10. The brines were collected as bulk samples, homogenized, filtered and bottled prior to shipment for analysis. Sets of randomized replicates were sent in a laboratory round robin analysis program to five laboratories to determine the certified values used in assessing the quality of analyses.

SRM analyses at Alex Stewart indicate acceptable accuracy generally well within the mean ±2 standard deviations for all of the standards analyses. Where failures were observed, the values lie just outside of the mean ±2 standard deviation error limits. None of the failures exceeded the mean ±3 standard deviation error limits. Relative standard deviations are a measure of the reproducibility of measurements or precision of the standard. A value below 10 indicates acceptable reproducibility for a standard. The lower the value, the more precise the measurement. The relative standard deviation values for the Alex Stewart analyses ranged from 3.7 to 7.5, indicating good overall analytical reproducibility for the standard analyses conducted.

11.5.1.2 Blanks

Blank samples consisting of distilled water have been included for laboratory analysis as part of the QA/QC program. Requested analytes for the blank samples have been the same as for the other brine samples from the wells and boreholes sent to the laboratory. Laboratory results for the blank samples have consistently reported values consistent with distilled water, with lithium being reported below detection limits.

The relative standard deviation values for the Alex Stewart analyses range from 3.0 to 7.4, indicating good overall analytical reproducibility for standard analyses conducted at Alex Stewart.

11.5.1.3 Duplicates

Sample duplicates were obtained during sample collection. Sample duplicate analyses at Alex Stewart indicated acceptable precision within 2% or less for lithium, potassium, and magnesium. All of the lithium, potassium, and magnesium laboratory duplicates were within 10% of one another and all of the samples were within the ± 10% limits. The observed bias between duplicates was within 1% and the correlation was high ($r2 > 0.99$). All of the duplicate lithium, potassium, and magnesium analyses were within 10% and all of the samples were within the ± 10% limits.

Sample and laboratory duplicate analyses indicated acceptable precision for lithium, potassium, and magnesium analyses conducted at Alex Stewart.

11.5.1.4 Check Analyses

The round robin analytical program conducted by Lithium One at the beginning of the 2010 – 2011 drill program indicated comparable accuracy and precision to that achieved by Alex Stewart. For this reason, the University of Antofagasta was chosen as the check analysis laboratory for the 2010 drill program. Due to turnaround time delays using the University of Antofagasta, ACME was used as the check analysis laboratory for the 2011 drill program.

Fifteen percent of the original samples were sent for check analysis. In addition, blanks, low-grade and high-grade lithium SRMs were included to monitor accuracy and potential laboratory bias. The SRMs included with these samples indicated acceptable accuracy and precision for lithium and potassium. No significant bias was observed in these analyses.

11.5.1.4.1 University of Antofagasta

Precision ranges from 5.7% for lithium to 8.4% for magnesium. Bias is acceptable and ranges from -1.7% for lithium to 7.2% for potassium. Correlation is high (r2 = 0.97 to 0.99).

Precision of these duplicate analyses is acceptable for lithium and potassium. Seventy-eight percent of the lithium analyses are within ± 10% of one another. One hundred percent of the lithium analyses are within 20% of one another. Seventy-two percent of the potassium analyses are within ± 10% of one another. One hundred percent of the potassium analyses are within 20% of one another. Only 50% of the magnesium analyses are within 10% of one another, but this percentage improves, and all of the magnesium analyses are within 20% of one another.

The magnesium analyses at the University of Antofagasta show lower precision than corresponding analyses at Alex Stewart. The reason for this greater imprecision is related to the analytical finish used by each of the laboratories. Alex Stewart uses an ICP finish while University of Antofagasta uses an AA finish. The greater imprecision at the University of Antofagasta is introduced by the incomplete digestion of microcrystals of magnesium hydroxide (suspended in the brine) by lower plasma temperatures used during AA analyses.

11.5.1.4.2 ACME

Precision ranges from 7.4% for potassium to 9.1% for lithium. Bias is acceptable and ranges from -1% for magnesium to 5.3% for potassium. Correlation is high (r2 = 0.90 to 0.96).

Sixty-eight percent of the lithium analyses are within ± 10% of one another. Ninety-four percent of the lithium analyses are within 20% of one another. Fifty percent of the potassium analyses are within ± 10% of one another. Ninety-seven percent of the potassium analyses are within 20% of one another. Sixty-eight percent of the magnesium analyses are within 10% of one another, but this percentage improves and 91% of the magnesium analyses are within 20% of one another.

The ACME results display slightly poorer reproducibility for lithium and potassium than the University of Antofagasta check analyses. This lower precision is also reflected within the set of laboratory duplicates analysed by ACME within the check analyses program. This suggests that the imprecision observed between the original ASA analyses and the ACME check analyses is not only a function of the sample difference, but incorporates the imprecision contributed by ACME's inability to reproducible analyses to the same precision level as Alex Stewart or University of Antofagasta. Regardless of the precision comparison, the population standard deviations and means between the sets of data for Alex Stewart and ACME are not statistically significantly different.

11.5.1.4.3 ALS Chemex

Three non-certified SRMs were used. Brine fluids were collected from selected surface brine pools of known concentration which have undergone significant mixing and homogenization and were included as control samples with the check samples. Three ALS analyses exceeded the +10% accuracy limits, appear to be analytical outliers, and could be classified as analytical failures.

ALS Chemex laboratory lithium analyses for Standard 1 were generally half of the value of the Alex Stewart analyses. As the concentration of lithium increased to above 300 mg/L for Standards 2 and 3, (excluding an obvious analytical outlier of 952 mg/L for Standard 2), the mean difference between lithium analyses by each laboratory decreases from over 50% for Standard 1 to within 6% for Standards 2 and 3.

Although there is a significant bias at low concentrations, analyses of lithium at higher grades are within 6% of one another and are considered to be within acceptable limits of analytical reproducibility.

Standard analyses at ALS Chemex are more variable than those at Alex Stewart, but still generally within +10% of the mean and +2 standard deviations.

Duplicate analyses at ALS Chemex show more variable results than those performed at Alex Stewart, but still indicate acceptable precision of less than + 10% for the sample duplicates, with only one sample exceeding a precision of + 10%.

Check analyses were conducted at ALS Chemex using duplicate samples. The correlation between Alex Stewart and ALS Chemex analyses ranges from 0.94 for magnesium to 0.98 for lithium and potassium. Precision of these duplicate analyses is acceptable, but there is an analytical bias between the laboratories. ALS Chemex analyses are biased 4.9% for potassium, which is within analytical acceptability, to 21.1% for magnesium, which is significantly lower than corresponding Alex Stewart analyses. ALS Chemex lithium analyses are biased 11.5% lower than corresponding Alex Stewart analyses. This bias is observed throughout the range of grades analysed, and most likely reflects instrumental calibration bias between the laboratories.

Check analysis statistics for pH, density, and conductivity between Alex Stewart and ALS Chemex were evaluated. The parameters are measured with different instrumental methods than lithium, potassium, and magnesium. Correlation of check analyses between the laboratories ranges from 0.73 for pH to 0.99 for conductivity. Accuracy and precision are within acceptable limits (<10%) and there is no significant bias between physical measurements conducted at either laboratory.

11.5.2 Anion–Cation Balance

Another measure of accuracy of water analyses involves determining the anion-cation balance of the samples. The accuracy of water analyses may be readily checked because the solution must be electrically neutral. Thus, the sum of cations in meq/L should equal the sum of anions in meq/L.

The term meq/L is defined as: Meq/L = mg/L * valency / formula weight.

The charge balance is usually expressed a percentage, where:

$$\text{Balance} = ((\sum C - \sum A)/(\sum C + \sum A)*100$$

where $\sum C$ is the sum of cations and $\sum A$ is the sum of anions.

If the balance calculated by this formula is <5%, the analysis is assumed to be acceptable. The anion-cation balances for all of the samples analysed at Alex Stewart have a balance within a value of 5.0. Overall, the Alex Stewart analyses show acceptable accuracy and precision, and anion-cation balance such that the data can be used in Brine Resource estimation.

11.6 Databases

All data were transferred into a central data repository managed by Galaxy personnel. The database was originally located in Denver, Colorado and later synchronised with a data repository in the Galaxy offices in Argentina, and a separate data repository at Montgomery and Associates' offices in Tucson, Arizona.

Raw data from the Project were transferred into a customised Access database and used to generate reports as needed.

Field data were transferred by field personnel into customised data entry templates. Field data were verified before being uploaded into the Access database using the methodology of crosschecking data between field data sheets and Excel tables loaded in the server. Data contained in the templates were loaded using an import tool, which eliminated data reformatting. Data were reviewed after database entry.

Laboratory assay certificates were directly loaded into the Access database, using an import tool. Quality control reports were automatically generated for every imported assay certificate and reviewed by to ensure compliance with acceptable quality control standards. Failures were reported to the laboratory for correction.

The drainable porosity and chemistry data to support the Brine Resource estimates were verified. These verifications confirmed that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for Brine Resource estimation purposes.

11.7 Sample Security

All samples from the Lithium One and Galaxy Lithium programs were labelled with permanent marker, sealed with tape and stored at a secure site until transported to the laboratory for analysis. Labels were hand-written in accordance with the chain-of-custody field data sheets. Samples were packed into secured boxes with chain-of-custody forms and shipped to the relevant laboratory.

11.8 Sample Storage

All core and drill cuttings are stored at site.

11.9 Comments on Sample Preparation, Analysis, and Security

Sample collection, preparation, analysis, and security for the drill programs are in line with industry-standard methods for brine deposits.

The Alex Stewart analyses show acceptable accuracy and precision with an acceptable anion–cation balance. Check analyses at University of Antofagasta and ACME validate lithium and potassium analyses conducted at Alex Stewart. The lower bias observed in the ALS Chemex data for lithium, potassium and magnesium is most likely due to calibration differences between the ICP and AA instruments used to analyse the samples.

Drill programs included QA/QC measures. QA/QC program results do not indicate any problems with the analytical programs.

The QP is of the opinion that the quality of the sample preparation, security, and analytical procedures are in accordance with industry standards, and are sufficiently reliable to support Brine Resource and Brine Reserve estimation.

The conceptual understanding of the hydrogeological system of Salar del Hombre Muerto is good, and the observed drilling and testing results are consistent with anticipated stratigraphic and hydrogeological conditions associated with mature, closed-basin, high altitude salar systems. One of the most important features of this hydrogeological system is the general consistency of the lithium and potassium grades measured throughout the entire salar. The majority of the salar contains high-density brine with an average lithium grade over 700 mg/L. The identified aquifer units in the basin are shown to be aerially extensive with a demonstrated ability to pump brine.

12 DATA VERIFICATION

12.1 2010 Technical Report

The following is a summary of the data verification performed in support of the 2010 Technical Report.

Lithium One carried out an internal validation of the available assay data for the 51 sample sites. Data verification was completed on the entire set of samples for each sample collected in the second sampling campaign. This included Alex Stewart and ALS Chemex values for pH, density, conductivity, TDS, sulphate, Cl, alkalinity, B, Ca, K, Li, Mg, and Na. No data errors were found.

Verification of the location of trenches and samples collected by use of differential GPS was also conducted.

The QPs concluded that the information was acceptable to support Brine Resource estimation.

12.2 2011 and 2012 Technical Reports

The following is a summary of the data verification performed in support of the 2011 and 2012 Technical Reports.

Lithium One implemented a series of industry-standard routine verifications to ensure the collection of reliable exploration data.

Documented exploration procedures existed to guide most exploration tasks to ensure the consistency and reliability of exploration data.

The QPs for the reports conducted site visits and inspected Project core stored on site.

Montgomery and Associates, and Lithium One personnel inspected laboratory facilities at Core Laboratories, and reviewed laboratory procedures with Core Laboratories personnel. Geochemical Applications International has conducted laboratory audits of Alex Stewart.

The QPs for those reports considered that these verifications confirmed that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for the purpose of Brine Resource estimation.

12.3 2018 Feasibility Study

Lithium One and Galaxy retained Montgomery and Associates to undertake Brine Resource and Brine Reserve estimations. These estimates formed the basis of the 2018 Feasibility Study.

Montgomery and Associates personnel verified the drainable porosity and chemistry data used for the Brine Resource estimates. These verifications support that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for the Brine Resource and Brine Reserve estimations outlined in this Report.

12.4 2021 Feasibility Study

Galaxy retained Montgomery and Associates to undertake Brine Resource and Brine Reserve estimations. These estimates formed the basis of the 2021 Feasibility Study.

Montgomery and Associates personnel verified the drainable porosity and chemistry data used for the Brine Resource estimates. These verifications support that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for the Brine Resource and Brine Reserve estimations outlined in this Report.

12.5 Verification by the Qualified Person

Verification by the QP, Michael Rosko of Montgomery & Associates, covered field exploration and drilling and testing activities, including descriptions of drill core and cuttings; laboratory results for drainable porosity and chemical analyses, including quality control results; and review of surface and borehole geophysical surveys.

12.6 Comments on Data Verification

The QP is of the opinion that the analytical results delivered by the participating laboratories and the digital exploration data are sufficiently reliable for the purpose of the Brine Resource and Brine Reserve estimates.

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Testwork

13.1.1 History

Galaxy conducted a series of internal and external testwork programs to determine the feasibility of producing battery-grade (BG) lithium carbonate from the Sal de Vida Project. A conventional brine flowsheet was initially investigated that used common unit operations for lithium brine processing. The initial design also included a potash plant for production of saleable potassium chloride, processed from the salts precipitated in the muriate solar ponds. The initial flowsheet and unit operations are summarised in Table 13-1.

Table 13-1: Testwork

Operation	Element Targeted	Description
Solar evaporation	Na, K, water	Evaporation of brine in ponds to remove water. Precipitation of sodium and potassium as halite and sylvite salts in halite and muriate ponds respectively
Liming	Mg, B, SO_4	Reaction of brine with calcium hydroxide ($Ca(OH)_2$) to remove magnesium, sulphate and some boron as magnesium hydroxide, calcium sulphate and borate solids
Solvent extraction (SX)	B	Removal of boron by pH adjustment and contact with an organic extractant
Ion exchange (IX)	B, Ca, Mg	Eluting of brine through a column with a resin with a high affinity for calcium, magnesium and/or boron
Softening	Mg, Ca	Reaction of brine with sodium carbonate (Na_2CO_3) and/or caustic soda (NaOH) to precipitate calcium and magnesium as calcium carbonate and magnesium hydroxide solids
Crystallisation	Li	Precipitation of lithium carbonate (Li_2CO_3) crystals by reaction with sodium carbonate at elevated temperatures
Bicarbonation	Li	Purification of lithium carbonate by reacting with carbon dioxide to produce soluble lithium bicarbonate ($LiHCO_3$), filtration to remove solid impurities and recrystallisation of refined lithium carbonate by heating to >75 °C and expulsion of CO_2

13.1.2 Evaporation Rate Dynamics

A standard Class A pan test was performed on site between 2011 – 2013 to understand the evaporation rate dynamics on the salar. This involved taking daily readings of the pan and replenishing the amount of water that had been evaporated during the previous day. A 16 wt% NaCl solution was used. The gross evaporation (inclusive of rainfall) for each month was recorded. The relation between the NaCl solution activity and density was used to estimate the equivalent evaporation rate of pure water. The study outcomes and established correlations were used to estimate a preliminary evaporation rate for modelling purposes.

13.1.3 Liming and Concentration Pathway Testwork

Testwork was performed on site in 2012 to generate concentration path data from limed brine. Raw brine was limed batchwise, then evaporated to different final concentrations in six 3-m and 6-m test ponds, with daily sampling and ion analysis. The results were used to plot sodium and potassium concentrations as a function of lithium concentration. Results indicated that raw brine could be evaporated to 2.2 wt% Li without lithium precipitation.

13.1.4 Galaxy-Jiangsu Lithium Carbonate Plant

Galaxy commissioned its Jiangsu lithium carbonate plant in China to investigate the applications of solvent extraction (SX), ion exchange (IX), softening, and crystallisation.

Jiangsu was requested to perform boron SX testwork to provide a greater understanding of the applicability of a boron SX circuit in the process. Jiangsu conducted several softening optimisation testwork to determine its effects on the circuit's performance, conducted optimisation testwork for Ca/Mg IX and boron IX, and optimisation testwork for the crystallisation circuit. This option was not pursued further.

13.1.5 Hazen Research Inc.

Hazen Research Inc. of Golden, Colorado (Hazen), completed bench-scale testwork and larger batch tests using a supplied 50 kg evaporated brine (2.2 wt% Li) produced on site. Hazen first performed a process review and testwork program to determine the most appropriate extractant for boron removal, which was found to be 2,2,4-trimethyl-1, 3-pentanediol in iso-octanol (Exxal 8). Bench-scale testwork for calcium and magnesium removal with sodium carbonate (Na_2CO_3) were also performed prior to the larger-scale runs.

The Hazen testwork demonstrated that a primary-grade (PG) lithium carbonate could be produced from a 2.2 wt% Li brine, at a larger scale than bench work. The testwork also provided some insight into optimal conditions and the flowsheet arrangement; for example, including caustic addition to target pH 10.4 prior to softening via sodium carbonate addition reduced the quantity of reagents required.

13.1.6 Galaxy Testwork

In 2018, Galaxy conducted IX scoping tests using two types of chelating resins; LSC 750 and LSC 780, with a high selectivity to divalent cations (magnesium and calcium) and boron respectively. Results indicated that IX, with an appropriate resin, could reduce the impurities in concentrated 2.2 wt% Li brine by 88% for calcium, 97.5% for magnesium and 99% for boron.

13.1.7 ANSTO

13.1.7.1 Laboratory Testwork – Stage 1

The Australian Nuclear Science and Technology Organisation (now ANSTO Minerals; ANSTO) was contracted to provide ongoing validation testwork. Site brine samples were produced on site for ANSTO testwork by evaporating wellfield brine in 6-m pans. This testwork was performed using 2.2 wt% Li evaporated brine samples. The investigations performed included:

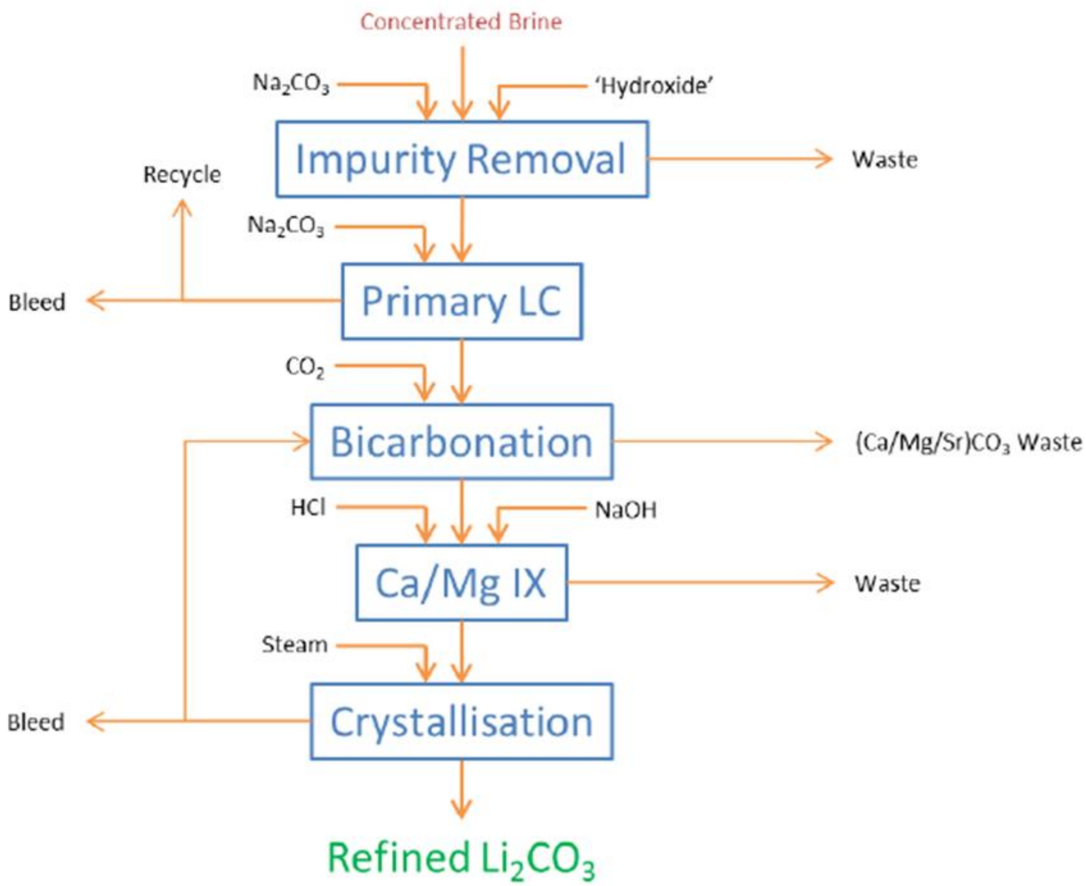
- SX and IX testwork for boron, calcium, and magnesium removal;
- Softening investigating Na_2CO_3 and NaOH addition testwork for removal of calcium and magnesium and pH adjustment;
- Crystallisation of primary Li_2CO_3;
- Lithium carbonate purification by bicarbonation, IX, and re-crystallisation.

The key findings were:

- SX and IX for boron removal are not required as almost all boron is rejected during the crystallisation of primary lithium carbonate as well as recrystallisation of refined Li_2CO_3;
- Recycling of mother liquor from crystallisation can be achieved without the inclusion of a specific boron-targeted removal step;
- The divalent cations, calcium and magnesium, can be mostly removed by addition of NaOH, Na_2CO_3 and/or a combination of the two. A combination of the two can easily reject all divalents, but presents risks of lithium losses;
- IX treatment to removal calcium and magnesium is not required prior to precipitation of primary Li_2CO_3;
- Bicarbonation, followed by clarification, results in rejection of the majority of divalent carbonates as these carbonates are largely insoluble, while lithium bicarbonate is highly soluble;
- Some sodium and potassium are rejected during bicarbonation/clarification;
- Control of the crystallisation of Li_2CO_3 is vitally important to minimising sodium and potassium contamination in the final product;
- With the baseline flowsheet, IX for divalent cation removal after bicarbonation would always be required to produce BG product.

The primary recommendation was to investigate the effect of liming as an impurity removal step, and to adopt the simplified process flowsheet set out in Figure 13-1.

Figure 13-1: Simplified Block Flow Diagram



Note: Figure prepared by ANSTO, 2020. Note: LC = lithium carbonate; IX = ion exchange.

13.1.7.1.1 Small-Scale Evaporation

Evaporation testwork was performed on site with site produced brine, evaporated under ambient conditions in ~50 cm plastic trays. Through routine sampling to track ion concentrations, modelling of the brine concentration pathway and density changes during evaporation was updated. The data can be found in Table 13-2. This work was validated by similar evaporation testwork performed in Perth, under heat lamps (Bureau Veritas (BV) and Nagrom).

Table 13-2: Small-Scale Evaporation Results

Sample	Li (mg/L)	Ca (mg/L)	Mg (mg/L)	K (mg/L)	B (mg/L)	SO_4 (mg/L)	Na (mg/L)	Cl (mg/L)	Density (g/mL)
SV-07704	832	1050	2450	9380	578	6627	112000	191416	1.21
SV-07705	1890	645	5750	19800	1250	11039	106000	204738	1.22
SV-07701	2480	501	8270	28100	1840	13990	93700	210754	1.23
SV-07703	5740	143	19200	41900	4270	25914	66300	215265	1.24
SV-07699	6990	150	21200	43500	3660	25787	57200	218057	1.24
SV-07700	8450	95.7	25100	45700	4400	29573	58300	226864	1.24
SV-07707	9290	124	27800	36100	3370	35389	49300	214031	1.24
SV-07708	11700	86.6	34700	32000	4290	40366	36200	215516	1.24
SV-07702	12000	74	36900	29500	3600	40818	32600	226470	1.24
SV-07709	13500	54.6	40000	31200	4190	40378	28100	223678	1.24
SV-07706	14000	63.1	41100	27700	3570	39826	26600	226116	1.24
SV-07710	14800	55	45900	30800	4320	40296	22400	233890	1.24
SV-07711	15100	66.7	43900	29800	3810	40538	19500	245461	1.24

The major outcomes included:

- Raw data were obtained to further validate concentration pathway correlations;
- The work performed in Perth revealed that some lithium would precipitate as potassium lithium sulphate ($KLiSO_4$) beyond a concentration of 1.2 wt.% Li in the brine. As a result, it was decided that brine would only be evaporated to 1.2 wt% Li instead of 2.2 wt%, to avoid precipitative lithium losses.

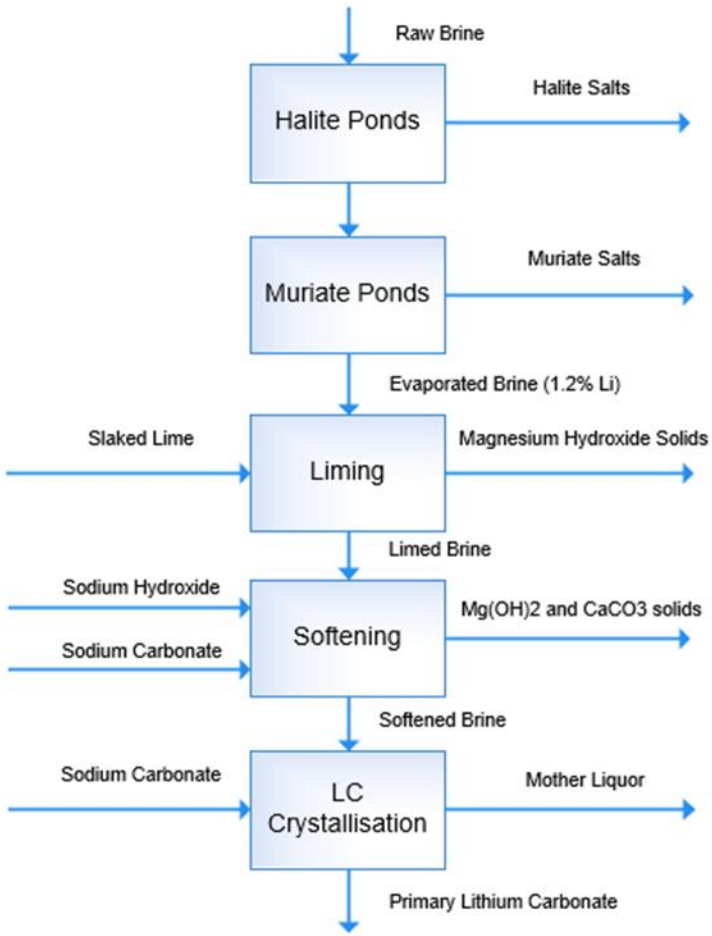
13.1.7.1.2 Single Go Forward Option

A single go forward option was determined, based on the following considerations:

- Liming will be performed after evaporation of the raw brine rather than upfront. This will reduce the throughput volume of the liming plant and hence the capital cost. There is also potential for the cost to be deferred until later in the Project timeline;
- The Sal de Vida plant will produce a primary grade Li_2CO_3 that can then be shipped elsewhere for purification or sold to customers. This will be more economically favourable as it allows for a simplified flowsheet to be used on-site, while purification can be performed offsite, without the constraints of isolation and altitude.

The flowsheet selected for the proposed on-site process plant and subsequent process development is provided in Figure 13-2.

Figure 13-2: Recommended Flowsheet



Note: Figure prepared by Galaxy, 2020. LC = lithium carbonate.

13.1.7.2 Laboratory Testwork – Stage 2

The ANSTO Stage 2 testwork was performed on a combination of synthetic and site-produced evaporated brines, targeting a range of lithium concentrations. Two programs were completed.

13.1.7.2.1 Program 1

Work performed included:

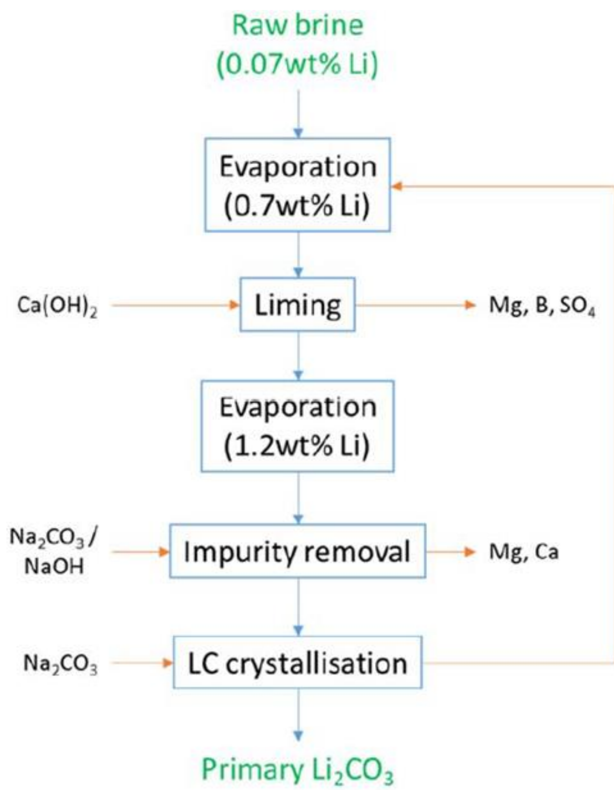
- Evaporation profiles to investigate the impact of sulphate concentration;
- Characterisation of the effect of liming on calcium, magnesium, and SO_4 concentrations at 0.7 wt% Li;
- Multi-step validation to help determine the best sequence of liming, evaporation and softening for optimum impurity removal and lithium recovery.

Findings included:

- Lithium precipitates as $KLiSO_4$ at an earlier concentration than previous testwork had indicated — after 0.7 wt.% Li rather than 1.2 wt.% Li;
- Lime is more effective in less concentrated brines;
- Magnesium that is not removed in liming can be removed in the softening circuit;
- Softening performance is not affected by reaction temperatures between 20–40°C;
- Li_2CO_3 can be produced at a purity above 99% using the recommended flowsheet. The dominant impurities are sodium, potassium and chlorine.

The flowsheet was modified (Figure 13-3) to place liming between the two stages of evaporation ponds, rather than before or after. The halite ponds evaporate the brine to 0.7 wt% Li, after which the brine is limed to remove magnesium, then evaporated again in muriate ponds to a target of 1.2 wt% Li. The intermediate liming stage affects the chemistry of the brines such that lithium no longer precipitates after 0.7 wt% Li.

Figure 13-3: Flowsheet Modified Based on ANSTO Testwork



Note: Figure prepared by ANSTO, 2020. LC = lithium carbonate

13.1.7.2.2 Program 2

Work completed included flowsheet validation testwork, 'locked-cycle' testwork (replicating the inclusion of anticipated recycle streams) with site reagents, investigation into liming temperature, and solid–liquid separation assessment for liming, softening and crystallisation.

Findings included:

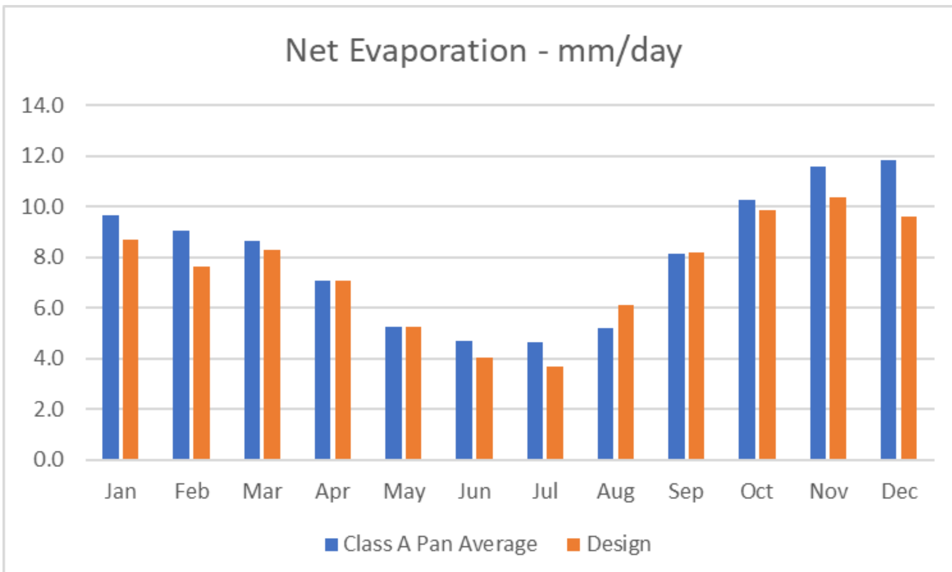
- High purity Li_2CO_3 (99.5%) can be reproducibly prepared using site reagents and site brine. High-purity Li_2CO_3 (99.5%) can be reproducibly prepared using site reagents and locked-cycle brine;
- Liming slurries demonstrated fast filtration rates of 400–800 kg/m²/hr, resulting in a cake moisture of 66 – 70%;
- Softening slurries demonstrated slow filtration rates ranging from 100 kg/m²/hr to 10 kg/m²/hr. Perlite filter aid did not improve the performance. However, repulping softening slurry with liming thickener underflow increased the filtration rate by two to three times;
- Li_2CO_3 can be readily filtered at a fast rate based on the Li_2CO_3 filtration tests.

13.1.8 Class A Pan Evaporation Rate Measurement

Additional Class A pan tests using 16 wt% NaCl solution commenced in March 2020 to monitor site evaporation and collect modelling data. Daily density and water level decrease measurements were recorded, with the water level maintained through the addition of purified water. This testwork program was in progress at the Report effective date, with the collected data to be used for validation of the 2011 – 2013 Class A pan data.

As of February 2022, the Class A pan tests have collected almost 2 years' worth of evaporation data in the vicinity of the camp and pilot ponds, which have compared favourably with the values used in evaporation pond design (which were based on the 2011 – 2013 Class A pan measurements and larger datasets from nearby operations). Figure 13-4 shows the average daily evaporation broken down by month, comparing it to the design evaporation rates.

Figure 13-4: Daily Net Evaporation Measured by Class A Pan Test



Note: Figure prepared by Allkem, 2022.

An additional Class A pan operation was set up in November 2021 in Area 4, where the commercial evaporation ponds are being constructed. Preliminary results indicate that the monthly evaporation rates in this area are higher than the design rates, meaning that the evaporation pond design is conservative.

Additional Class A pan tests are underway using site brine, limed and unlimed, at concentrations representative of the conditions in the evaporation ponds. These tests will be used to validate the effect of brine composition on evaporation rates.

13.1.9 Pilot Ponds

The pilot ponds consist of 31 ponds of various sizes arranged in 5 strings (Figure 13-5). The ponds are numbered according to string and pond number, e.g., H51 is the first pond in String 5. Each string can be used for a different activity or purpose.

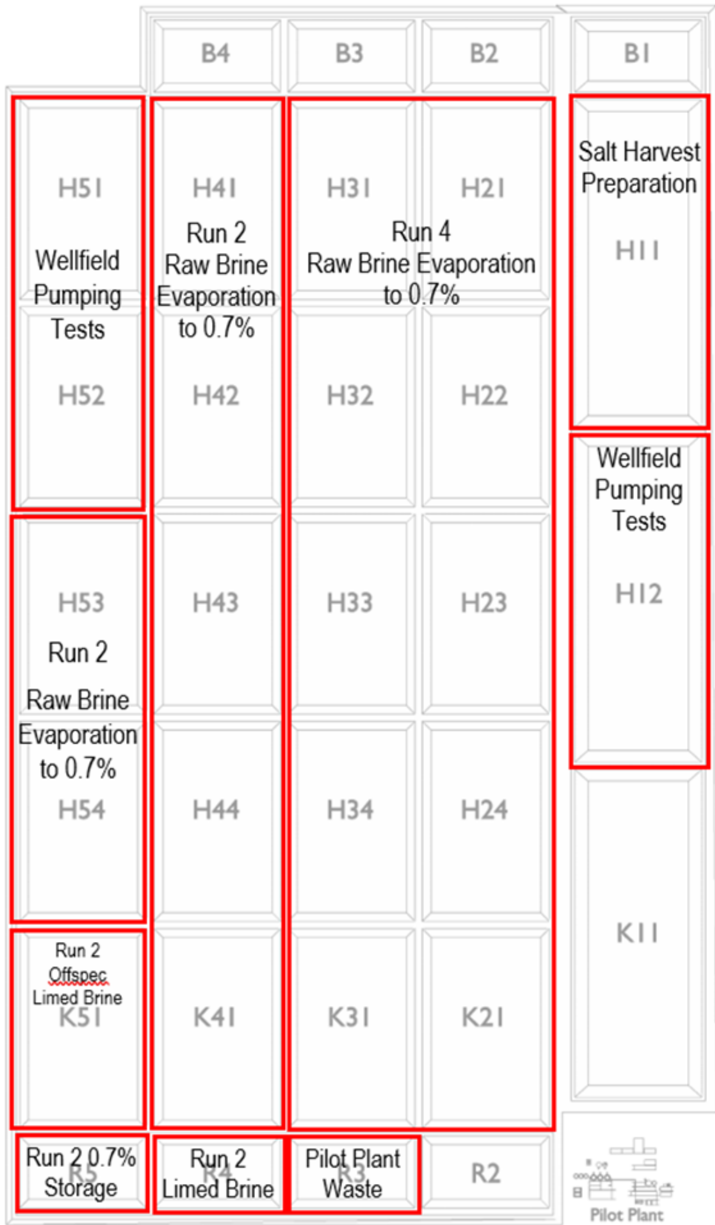
The pilot ponds are subject to routine surveys in which the levels of the brine and salt beds are measured. In late 2020, the temperature profile across the time of day was recorded once or twice per month to understand how the pond temperature responds to changes in the ambient temperature. Pond samples from the ponds are laboratory analysed for ion concentrations when needed to track the concentration path.

13.1.9.1 April 2020 – February 2021 - Batch Evaporation

The brine for Run 2 in the pilot plant (see Section 13.1.3) was evaporated batchwise in the String 4 H and K ponds along with H53 and H54, which were consolidated as needed to adjust the surface area (and hence the evaporation rate) such that the brine would reach the correct lithium concentration in the brine (0.7%) when the team was ready to begin the liming operation. When the brine concentration of lithium reached 0.7%, it was transferred to R5 to minimise evaporation as it was processed through the liming plant. Following liming, the brine was pumped to R4 for continued evaporation to a 1.2% lithium concentration, before being transferred to storage tanks to feed the softening circuit.

H11 was slated for salt harvesting testwork, so in late 2020 it was filled with raw brine with the intention of building up a salt layer thick enough for harvesting in 2022. Other ponds were used for disposal of various waste brines, including raw brine from well pump tests (H51, H52, H12) and pilot plant waste (R3).

Figure 13-5: Pilot Pond Operations Apr 2020 – Feb 2021



Note: Figure prepared by Galaxy, 2022.

13.1.9.2 February 2021 – February 2022 – Continuous Pond System and Salt Harvesting

At the end of February 2021, a continuous pond system was implemented in String 5, wherein brine was continually pumped from the holding pond B4 into H51, and flowed through the weirs into K51. The operation was later expanded into String 4 by pumping the brine across to K41, allowing it to flow through the weirs to H41 where it was pumped to storage pond B3. This exercise allowed the site team and technical support to develop experience with operating and controlling a continuous system throughout changing evaporation rates and weather conditions, including snow and rain. B2 was used as additional storage when B3 became full.

The brine from Strings 2 and 3 was consolidated into H24 as it approached 0.7% Li. This pond was used to feed the liming plant during the 2021 liming exercise for pilot plant Run 4. The limed brine from this exercise was stored in R4 for further evaporation to 1.7%, at which point it was transferred to the plant storage tanks to be used for softening operations. Regular sampling of the limed brine during evaporation allowed the concentration path to be defined for limed brine from the liming plant output concentration (0.6%) to the softening feed concentration (1.7%), with the results used for pond modelling. R3 continued to be used for pilot plant waste disposal.

In February 2022, H11 was drained and harvested. Earthmoving equipment constructed ramps for ingress and egress, and a layer of approximately 30 cm was removed according to a procedure developed by the site team, leaving a sacrificial salt layer of approximately 20 cm. The exercise allowed the team to gain experience in salt harvesting and will be used to update the harvesting procedure for operational readiness for the commercial ponds. In addition, a report will be issued detailing the amount and composition of the entrained brine recovered and the properties of the harvested salt.

Figure 13-6: Pilot Pond Operations Feb 2021 – Feb 2022

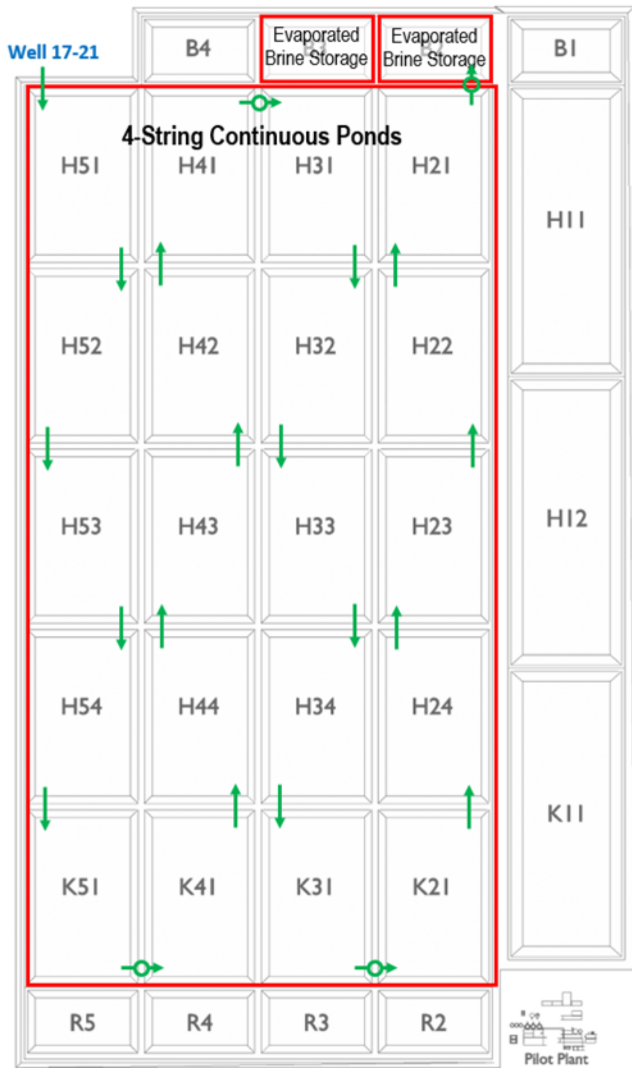
Note: Figure prepared by Galaxy, 2022.

13.1.9.3 February 2022 Onward – Continuous Production

Beginning in February 2022, the continuous pond system was expanded across Strings 3 and 2, with the evaporated brine being stored in B2 (with B3 being used to store the existing evaporated brine from the operation thus far). The mode of operation was also changed to a production focus, with the goal of producing ~20 m³ of evaporated brine at 1.0% Li per day once at steady state and maintaining this concentration in the storage pond.

This operation will continue throughout 2022 and will allow the site team and technical support to gain experience in operating the continuous ponds in the same manner that will be employed in the commercial process.

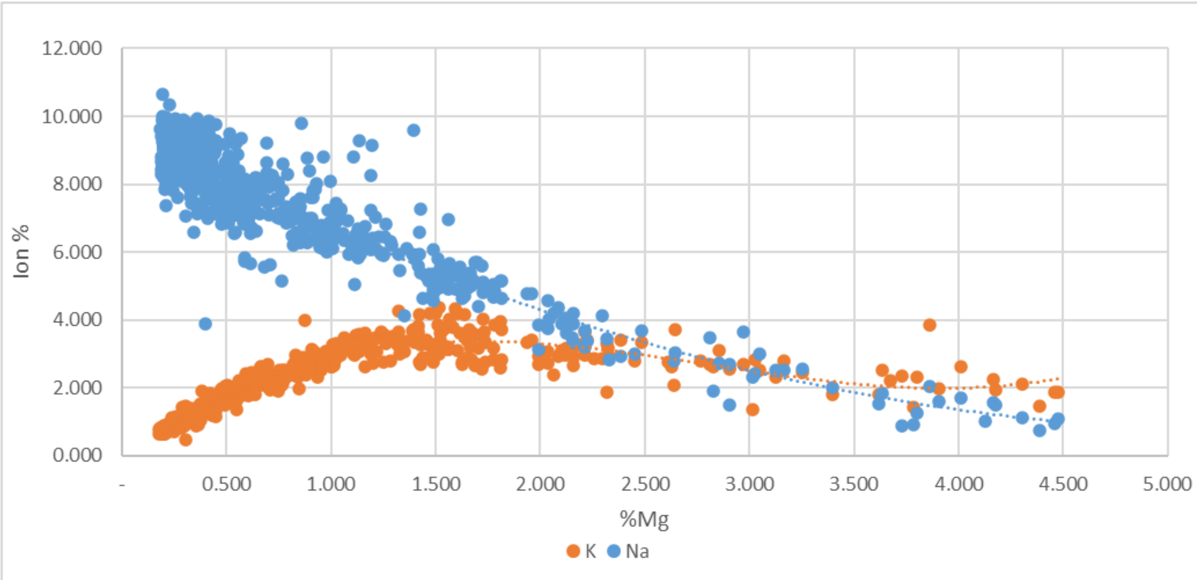
Figure 13-7: Pilot Pond Operations Feb 2022 Onward



Note: Figure prepared by Galaxy, 2022.

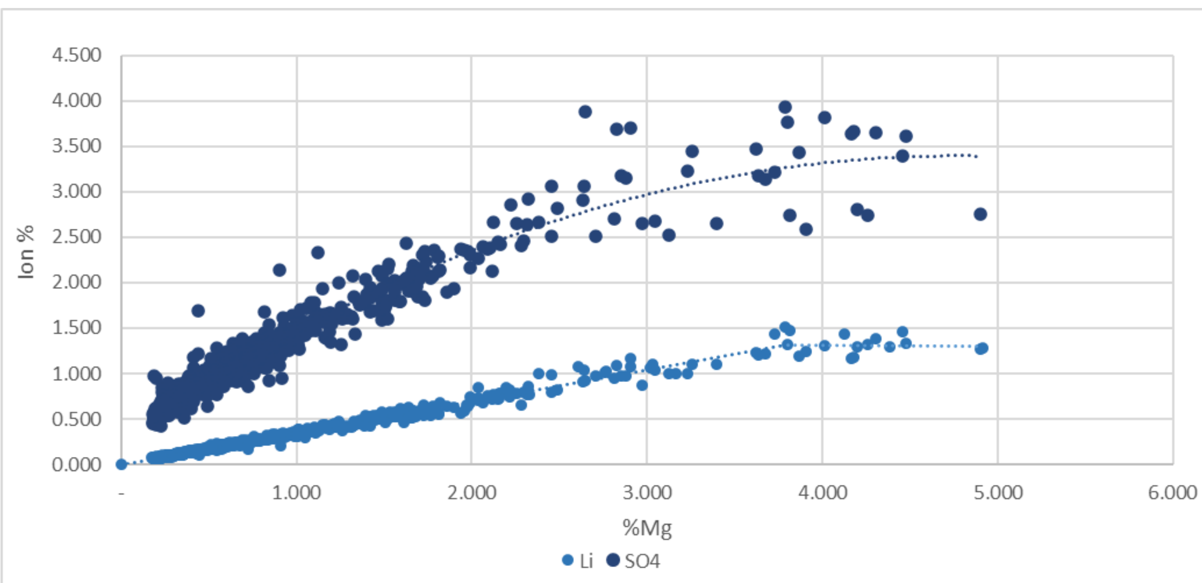
The pilot pond data was used to validate the concentration paths used for the evaporation pond model. This data can be seen in Figure 13-8 and Figure 13-9.

Figure 13-8: Sodium and Potassium Concentration Paths from Pilot Ponds (Raw Brine)



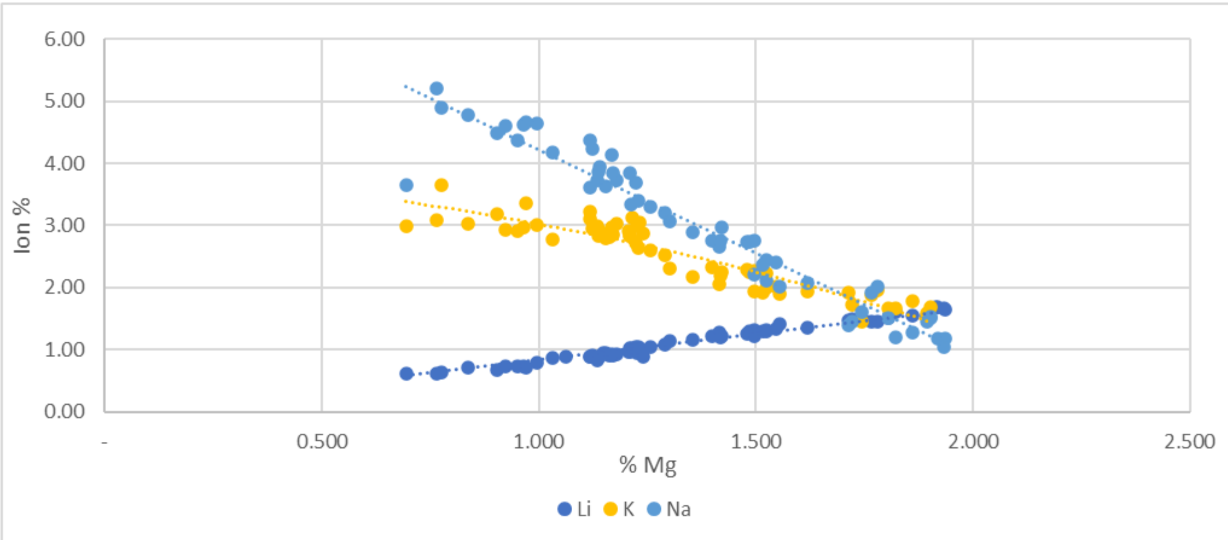
Note: Figure prepared by Allkem, 2022.

Figure 13-9: Lithium and Sulfate Concentrations Paths from Pilot Ponds (Raw Brine)



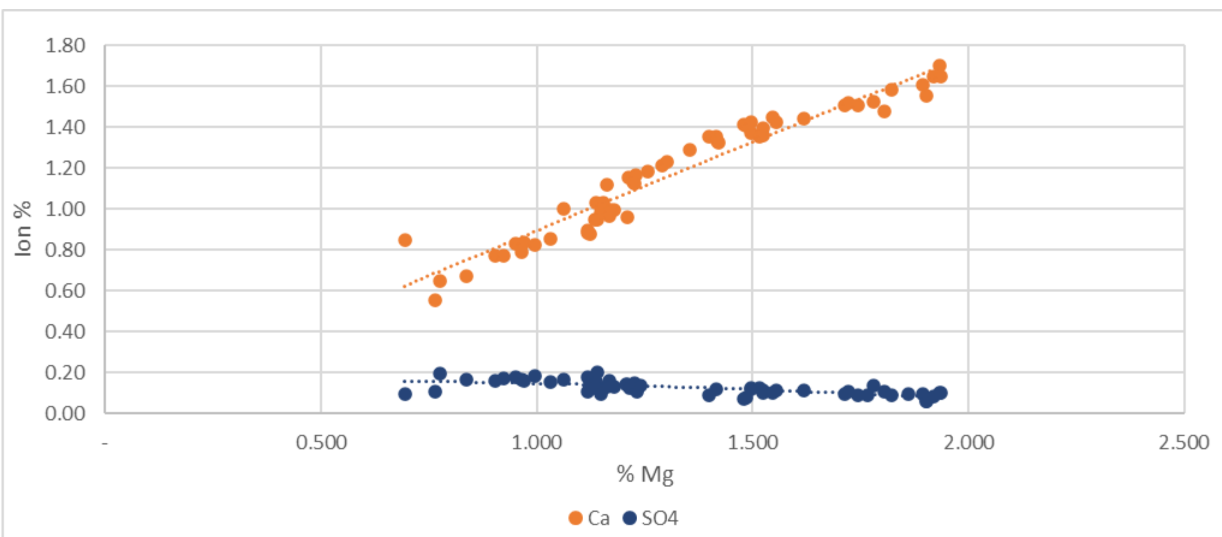
Note: Figure prepared by Allkem, 2022.

Figure 13-10: Lithium, Sodium, and Potassium Concentration Paths from Pilot Ponds (Limed Brine)



Note: Figure prepared by Allkem, 2022.

Figure 13-11: Calcium and Sulfate Concentration Paths from Pilot Ponds (Limed Brine)



Note: Figure prepared by Allkem, 2022.

13.1.10 Pilot Plant

A pilot-scale plant was constructed close to the pilot evaporation ponds, to validate laboratory testwork and explore operational considerations. Run 1 used synthetic brine for commissioning of the pilot plant with Run 2 and 3 using "real" site brine evaporated from the pilot ponds (Table 13-3).

Table 13-3: Pilot Plant Runs

Run Number	Description	Activities	Date
1	Liming plant commissioning with synthetic brine.	Commissioning	July 2020
2	Pilot trials using raw brine from wellfields. Process validation and first pilot-scale lithium carbonate product.	Evaporation to 0.7%	Mar– Aug 2020
		Liming	Aug 2020
		Evaporation to 1.2%	Aug – Sep 2020
		Softening	Oct 2020
		Crystallisation	Oct – Nov 2020
3	Production run using 1.2% brine from Run 2 to produce lithium carbonate product for customers.	Softening	Nov 2020
		Crystallisation	Dec 2020
4	Concentration and liming of raw brine to prepare feed stock for subsequent piloting. Objectives: process optimisation focusing on Li recovery and demonstration of high-grade Li_2CO_3 production. Softening and crystallisation cancelled due to COVID-19, with objectives met in Runs 5 and 6 instead.	Evaporation to 0.7%	Sep 2020 – Mar 2021
		Liming	Mar – Apr 2021
		Evaporation to 1.7%	Apr – May 2021
		Softening	Cancelled
		Crystallisation	Cancelled
5	Investigation of Ca/Mg ion exchange (IX) and alternative filtration technologies in softening, as well as reagent addition strategies, residence time and heating profiles in crystallisation; in order to meet BG specifications.	Softening + IX	Jul 2021
		Crystallisation	Jul 2021
6	Integration of IX and candle filtration into Softening circuit operation and optimisation of Li recoveries in Softening. Further investigate recycle needs within Crystallisation. Instrumentation review within pilot trials of pH, density, turbidity and pressure monitoring devices.	Softening + IX	Aug – Sep 2021
		Crystallisation	Sep 2021
7	Crystallisation heating review – trialing 'scraper heat exchanger'. Assessment of particle size control in relation to product purity, with 'proof of concept' application of product screening. Continuation of Run 6 instrumentation review with in-pilot trials. Integration of all unit operations from softening through to crystallisation in continuous operation.	Softening + IX + Crystallisation	Nov – Dec 2021

13.1.10.1 Liming 2020 (Run 2)

Liming was performed in Run 2 in August 2020, with 360 m^3 of brine processed over 21 days. The process included lime slaking, the liming reaction and solid–liquid separation to remove the solids produced. Operational observations and outcomes included:

- Only on-specification limed brine was produced, validating the laboratory testwork;
- Filter press cycle time of 40 min was achieved;
- Operational targets were adjusted to account for the differences in process conditions compared with laboratory testwork;
- The impact of commercial lime quality on slaking temperature and magnesium removal was examined, highlighting the impact of poor-quality lime on process control;
- Thickener data were obtained, validating the settling properties of the liming solids.

13.1.10.2 Softening 2020 (Run 2 – 3)

The softening circuit was run during October 2020 for Run 2, processing 37 m^3 of evaporated limed brine at 1.2% Li and producing approximately 27 m^3 of on-spec softened brine over seven days. The circuit was run again for Run 3 in November, processing a further 40 m^3 of 1.2% limed brine and producing 32 m^3 of on-spec softened brine over seven days. Caustic addition was followed by sodium carbonate addition in a series of cascading tanks, and the resulting slurry was filtered to remove the solids. Key findings were:

- Validation of laboratory testwork, with calcium and magnesium reduction exceeding expectations;
- Excellent filtration performance, with cake moisture levels around 50% versus the expected 70%;
- Some of the solids exist as fine particulates which can pass through the filter press cloths. If not immediately filtered with a cartridge filter or similar, these solids can re-dissolve and re-introduce calcium and magnesium to the liquor. This highlights the importance of effective removal of fines immediately following press filtration and informed the large-scale plant design;
- If necessary, off-specification softened brine can be re-treated to bring the brine back on-specification;
- Variation in temperature above 20°C has no effect on softening performance — therefore, 20°C was selected as the desired operating temperature;
- Circuit stability is important to softening performance.

13.1.10.3 Lithium Carbonate Crystallisation 2020 (Run 2 – 3)

The crystallisation circuit was operated in late October 2020 as part of Run 2. Brine from Run 2 softening was heated to 70°C and sodium carbonate was added to precipitate lithium as lithium carbonate, which was recovered by filtration and subject to a repulp wash followed by secondary filtration with a displacement wash of 1 kg water per kg cake. Over 300 kg of washed lithium carbonate cake was produced at approximately 30% moisture, after processing 17 m^3 of softened brine. The circuit was operated again in December 2020 as part of Run 3, processing a 25 m^3 of brine from Run 3 softening to produce 600 kg of washed lithium carbonate cake. Unlike in Run 2, the cake was recovered by centrifugation and washed within the centrifuge with a displacement wash of 6 kg water per kg cake. The following were noted:

- Due to the high temperature and low atmospheric pressure, evaporation of brine resulting in saturation of sodium was a potential issue. To combat this, the sodium carbonate solution was diluted to 20% and additional dilution water was added to the brine heating tank;
- Short circuiting presented a risk due to upcomers in mixing tanks becoming blocked. Regular cleaning will be required;
- Product quality depends strongly on having a stable process. Short circuiting, blockages and stopping/starting can cause major process upsets and reduce product quality;
- Lithium dissolution loss during repulp washing presented a serious issue, especially at lower temperatures. This highlights the importance of temperature control and suggests that use of a saturated lithium solution may be beneficial for washing;
- Repulp washing, followed by a secondary filtration with a displacement wash, was required to achieve TG specifications when using vacuum filtration to recover the product (Run 2). When recovering product with centrifugation (Run 3), only a displacement wash was required. This confirmed centrifugation as the preferred solids recovery method from both a purity and recovery perspective;
- Validation of and improvement over laboratory testwork, with TG (99.5% lithium carbonate) achieved whenever the process was stable, and BG specifications achievable for all elements except Ca and Mg.

13.1.10.4 Vendor Testwork

The pilot plant produced a variety of samples suitable for additional testwork. This testwork was conducted at external vendors' facilities and the results informed the design of the plant for optimum operational efficiency.

13.1.10.4.1 GBL Thickening and Pressure Filtration

GBL were supplied representative samples of the liming, softening and crystallisation slurries produced on site, to conduct thickening and pressure filtration test work. The test work was performed to:

- Calculate TDS for each process liquor – liming, softening, crystallisation;
- Define thickening properties – liming, softening, crystallisation;
- Test the suitability and performance of the DrM Fundabac pressure filter (proprietary candle filtration unit) – softening;
- Test the suitability and performance of plate and frame pressure filtration – softening, tailings;
- Determine the sizing parameters for each duty.

The primary findings were:

1. Liming slurry

- % solids measured at ~4.5 wt.% (excluding TDS);
- The diluted liming slurry settled well without the use of flocculant;
- Feed dilution was optimal at ~1 wt.% solids;
- Solids flux rates ranged from 0.005 – 0.02 t/m^2/h with associated rise rates of 0.36 – 1.46 m/h;

- The highest underflow solids concentration achieved was 31 wt.%;
- The TDS was measured at 68 % water content and 32 % salt.

2. Softening slurry

- % solids measured at ~6.7 wt. % (excluding TDS);
- The sample did not settle well with or without the use of flocculant;
- Pressure filtration (Nutsche and TSD [replicating candle filtration]) was fairly slow, with flux of 20 to 50 t/m2/h with reasonable cake thickness and specific solid throughput of 4 to 18 kg/m2/h – depending on conditions and use of filter aid;
- 55 wt.% and 23 wt.% moisture for the Nutsche and candle filter respectively;
- Specific solids throughput for tests without filter aid ranged between 3-12 kg/m2/h, with specific solids throughput ranging between 38-40 kg/m2/h where filter aid was body-fed;
- The TDS was measured at 72 % water content and 28 % salt.

3. Crystallisation slurry

- % solids measured at ~6.4 wt.% (excluding TDS);
- The undiluted Crystallisation slurry settled well without the use of flocculant;
- Feed dilution was optimal at ~2.5 – 6.4 wt.% solids;
- Solids flux rates ranged from 0.025 – 0.05 t/m2/h with associated rise rates of 0.84 – 1.7 m/h;
- The highest underflow solids concentration achieved was 27.3 wt.% at a flux rate of 0.025 t/m2/h;
- The TDS was measured at 76 % water content and 24 % salt.

4. Tailings slurry

- A mixing ratio of 5.8:1 (wt.% DS / wt.% DS) for liming versus softening solids was applied when mixing liming underflow with softening wet cake to create a tailings sample;
- The water content of the filtered cake measured 50.6 wt. %;
- Specific solid throughput was 7 $kg/m^2/h$.

Andritz were supplied representative samples of the crystallisation slurry and Li_2CO_3 cake produced on site, to investigate the application of a centrifuge for dewatering and displacement washing of the Li_2CO_3 final product. Andritz were also engaged to provide feedback on the extent of dewatering achievable and the positioning and sizing of a centrifuge within the circuit. The primary findings were:

- Trials with pilot plant samples were in good alignment to Andritz's previous experience with lithium carbonate;
- Feeding the centrifuge directly from the reactor is possible however, a feed solid content of ~20 w/w% is recommended;

- Feeding the centrifuge at lower solids content results in a prolonged filling phase hence cycle time and reduced throughput of the machine. A cyclone to pre-thicken the feed to 20 w/w% may be more viable than a larger centrifuge size;
- The lowest residual moisture achieved with repulp washing of the lithium carbonate from site was 10 w/w%;
- The bench-scale drying test was successful. No encrustation or lump formation during drying was observed. A residual moisture of 0.1 w/w% was achieved.

13.1.10.5 Battery-Grade Development Program

Toward the end of pilot Run 3 in 2020, several hypotheses were tested to understand their impact on the product quality. Results obtained during these tests indicated an improvement in product quality. High-grade product from Run 3 achieved BG specification in all elements except for calcium and magnesium (Table 13-4).

Table 13-4: Battery-Grade Targets

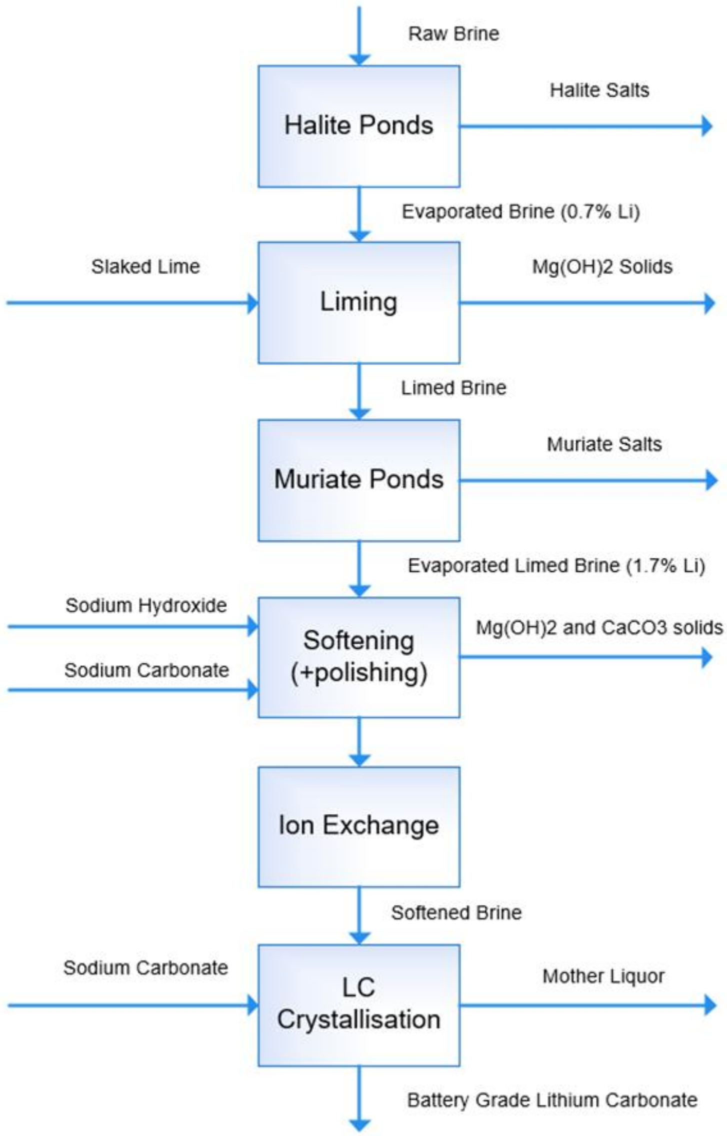
Element (ppm)	Run 3 High-Grade Product	Battery-Grade Target
Mg	165	<50
Ca	125	<50
Na	103	<180
K	26	<30
B	36	<50
SO_4	135	<375
Cl	33	<50
Li_2CO_3 (%)	>99.83	>99.65

The process modifications proposed to achieve BG specification were as follows:

- Increased lithium tenor in softening feed from 1.2% Li to 1.7% Li;
- Additional polishing filtration steps in softening, including candle filtration, to remove fine particles of calcium and magnesium solids;
- Ion exchange columns between softening and crystallisation, to remove any remaining Ca and Mg;
- Particle size control in crystallisation by management of recycle stream and implementation of a wet screen.

The implementation and testing of the circuit modifications necessary to achieve BG specification in the pilot plant was tested in 2021 in pilot plant Runs 5 – 7. The modified process flowsheet is shown in Figure 13-12.

Figure 13-12: Flowsheet Modified for Battery-Grade



13.1.10.6 Liming 2021 (Run 4)

Liming was performed in Run 4 in March and April of 2021, with 665 m³ of limed brine produced over 33 days. After thickening was shown to be inefficient for liming solids in Run 2 and the GBL testwork, no thickening was performed in Run 4 liming and only filtration was used for solid-liquid separation. Liming was shown to be effective across a broad range of feed concentrations, from 0.4% to 0.8% Li, demonstrating that the process is operationally robust. The limed brine produced by Run 4 liming was returned to the evaporation ponds for evaporation to 1.7% Li.

13.1.10.7 Softening 2021 (Run 5 – 7)

Three different softening runs were performed in 2021, all utilising the 1.7% limed brine from Run 4. The major process changes from 2020 were the implementation of a candle filtration step after the plate-and-frame filter to remove very fine solids and ion exchange columns post-filtration to remove and residual dissolved Ca and Mg. In addition, dilution and reagent addition strategies were investigated to optimise performance and lithium recovery. The findings were:

- Softening successfully demonstrated using a 1.7 wt.% Li brine feed, while removing Ca and Mg to levels of ~10 mg/L in filtrate.
- Dilution of the 1.7 wt.% Li brine to ~1.4 wt.% Li provided significant benefits to circuit operation. The circuit could tolerate operation at a higher pH, with improved robustness of operation (e.g., in the event of Na2CO3 over addition), while maintaining Li recoveries of >97% to liquor.
- Addition strategy of reagents is crucial to meet performance specifications:
  - 2-stage addition of NaOH; first reactor of the circuit and then immediately prior to filtration (filter feed tank or final reactor). The second addition was in the order of 1% stoichiometric addition, applied on an 'as needed' to maintain the pH, optimising Mg removal without significant Li loss.
  - Negligible effect on Ca rejection when using 2-stage addition of Na_2CO_3, versus 1-stage addition. 2-stage addition did provide greater control of dosing during piloting, although this is not expected to be as sensitive at larger scale.
  - Addition of Na_2CO_3 must be controlled against the Ca content after Mg removal (NaOH addition), instead of the feed brine. This philosophy reduces the risk of overdosing and therefore limiting Li losses to precipitation.
  - Typical NaOH dosages were between 100–110% (stoichiometric vs. Mg) and Na_2CO_3 was 104 – 110% (stoichiometric vs. Ca, post NaOH addition). Additions are in line with design expectations.
- Run 5 demonstrated effective polishing of softened brine, utilising 1 µm and 0.2 µm filters connected in series. Cartridge filters were capable of maintaining performance during short periods of high solids content in the feed liquor (filter press filtrate). Results informed the use of ~1 µm and ~0.2 µm industrial cartridge filters in series and duty/standby configuration to manage offline time for cartridge replacement in the industrial plant.
- Candle filter (DrM Fundabac) performance was comparable to cartridge filtration, with respect to removal of fines. The findings supported the application of candle filtration at full-scale, while retaining cartridge filtration in a 'guard' capacity. The increased capacity of the candle filter also allows for it to better tolerate upset conditions, where increased solids report to the filter press filtrate.
- Pre-coating (filter aid) of candle filter cloths for each cycle was not required. Good performance was observed with an initial precoat applied to 'fresh' filter cloths. Multiple cycles were performed in the pilot without the need to refresh the filter aid application. Improvements may be observed with cloth selection, further minimising the use of filter aid.
- IX demonstrated in a lead-lag configuration; two columns online in series, one offline for regeneration. Resin used was Lewatit MDS TP 208.
- IX columns were operated continuously, removing Ca and Mg from the softened brine (~10 mg/L) to concentrations of <1 mg/L in IX barrens (crystallisation feed). Robust operation observed with brine concentrations between 10 – 30 mg/L Ca and Mg, still reduced to <1 mg/L following IX.
- The main operational challenge experienced in IX was the passing of fine solids (Ca and Mg containing) through the resin bed after 3 to 4 days of operation. Anticipated breakthrough of soluble Ca/Mg was

~5 days, based on testwork. The solids collected within the IX column were able to be redissolved and Ca/Mg removed from the system through routine regeneration cycles.

- Run 7 demonstrated that the softening circuit could be run in tandem with crystallisation.

13.1.10.8 Crystallisation 2021 (Run 5 – 7)

Three different crystallisation runs were conducted in 2021, utilising the softened brine from each respective softening run. The softened brine was first diluted to ~0.95 wt% Li to match 2020 operations. The diluted softened brine was heated, and sodium carbonate was added to precipitate lithium carbonate, which was recovered by centrifugation with a displacement wash with hot reverse osmosis (RO) water (similar to Run 3). In Run 7, a screen was implemented in the recycle stream for particle size control, and the suitability of a scraped heat exchanger was assessed for maintaining circuit temperate by recirculation of the reactor contents.

The following findings were made regarding the crystallisation circuit:

- Feed to crystallisation was diluted to ~0.95 wt.% Li (~10.5 g/L, matching 2020 operations), following testwork recommendations. The dilution is necessary to minimise K and Na reporting to Li_2CO_3, due to elevated concentrations in the 1.4/1.7 wt.% Li-softened brines.
- A 'flat' temperature profile was implemented, with the circuit operating at a range 80-86°C, compared to previous targets of 70-86°C. High quality Li2CO3 production in the pilot was consistent with similar conditions in lab testwork.
- Circuit residence times of ~4.5 h and ~6 h demonstrated with no change in Li2CO3 quality.
- Investigation of 2-stage addition (Tank 1 and 2) vs. 3-stage addition (Tanks 1 – 3) of Na2CO3 resulted in no discernible difference in Li_2CO_3 product quality. 2-stage addition is to be retained, in line with findings following 2020 piloting (Run 3).
- Investigation of recycle ratio to manage crystal size. This informed the industrial plant design to recycle between 20 – 50% solids, to allow for optimisation.
- Importance of particle size was highlighted in Run 5 and Run 6:
    - The formation and settling of Li_2CO_3 agglomerates within reactors were identified. The settled product (lower tank discharge) was found to be of a poorer quality, with elevated Ca, K and Na – attributed to entrainment of mother liquor.
    - The application of internal tank recycles, using both opened and closed impeller centrifugal pumps, ensured the tank contents were homogeneous and minimised agglomeration. With prolonged use, the Li_2CO_3 reporting to the centrifuge became finer and in turn, difficult to wash on the centrifuge.
    - Control of particle size distribution is recommended through techniques such as cut size of cyclones, internal tank recycles, attritioning tanks and screening of slurry. Careful monitoring of particle size is required to balance between the formation of agglomerates (occlusion of mother liquor) and a particle size which is too fine (detrimental to washability).
- Upgrade from technical to BG Li_2CO_3 in 2021 piloting activities. Greater than 77% and 85% of product in Run 5 and 6 respectively, met or exceeded BG targets with respect to elemental impurities. In Run 7, 95% of the product achieved BG. The remaining product was predominately technical grade, with the decrease in quality largely attributed to poor washing characteristics on the centrifuge.

Table 13-5: 2021 Crystallisation Product Summary

Sal de Vida Site Analysis	Dist. %	Li_2CO_3 %	Ca	Mg	K	B	SO_4	Na	Fe
			ppm (ICP, AA for K and Na)						
Battery-grade (target)	80	>99.75	<25	<15	<30	<50	<400	<181	<15
Technical grade (target)	10	>99.65	250	205	80	75	375	305	35
Run 5									
Battery-grade	78	99.94	15	<10	16	<25	59	126	NR
Technical grade	22	99.85	17	<10	70	26	67	442	NR
Run 6									
Battery-grade	85	99.95	<10	<10	12	<25	<30	72	<10
Technical grade	15	99.88	12	<10	47	<25	<30	371	11
Run 7									
Battery-grade	95	99.95	33	11	12	<25	41	81	<20
Technical grade	5	99.82	29	11	28	<25	46	301	<21

Further observations were made in Run 7 regarding the new additions of a screen and scraped heat exchanger:

- Use of screen technology successfully produced a Li_2CO_3 slurry of a target particle size.
- At 100 µm, ~1% of Li2CO3 solids reported to oversize. At 63 µm the use of 'repulp' stages was identified as critical to manage rate of dewatering, with between 3 – 4% Li_2CO_3 solids reporting to oversize (unoptimized). Without the use of these features the oversize fraction increased to 10 – 20%.
- Screening at 100 µm, critical impurities (i.e., Ca and Mg) were rejected via the oversize stream, confirmed via solids analysis (see Table 13-6 below). This trend was not evident when screening at 63 µm, indicating high impurity agglomerates were primarily >100 µm in size.
- Scraped heat exchanger was suitable for both crystallisation brine pre-heating and circuit heating duties, with effective scale management. Consideration is needed for materials of selection to avoid product contamination. Steam is the preferred heating media, compared to hot RO water. Existing steam capacity to be reviewed and considered in supply package.

13.2 Recovery Estimates

Recoveries for Sal de Vida have been based on test work results and validated by independent third-party experts. A breakdown of the recoveries for the process is shown in Table 13-6.

Table 13-6: Breakdown of Recoveries

Location	Type	Recovery Loss	Comments
Pond	Entrainment	13%	Equivalent to 0.14t $_{brine}$/t $_{salt}$ and 0.11t $_{brine}$/t $_{salt}$ in the halite and muriate ponds respectively. This is based on test work conducted on site.
	Leakage	3%	Equivalent to 0.04mm/d and 0.02mm/d of brine in the halite and muriate ponds respectively. This has been validated and have been considered conservative by pond experts.
	Total (recovery)	83.8%	
Plant	Total (recovery)	83.9%	Based on vendor test work and modelled in MetSim software.
Total		**70%**	

13.3 Metallurgical Variability

A wide range of lithium concentrations from 6,400 mg/L to 8,200 mg/L Li was tested during the liming pilot run in 2020. This run utilised brine evaporated on site from Well SVWP17_21. Results from the pilot run did not indicate any performance issues relating to operating the liming plant within this range of lithium feed concentrations.

Results from recently drilled production wells show higher lithium head grade and with generally lower impurity levels than basis of design composition. Production well samples are similar in composition to Well 17_21, which was used for piloting and laboratory testwork since 2019.

Table 13-7: Sample Brine Composition Comparison

Element	Unit	Basis of Design		Well 17_21		Production Well 20_08		Production Well 21_04	
		Conc.	Ion/Li Ratio	Conc.	Ion/Li Ratio	Conc.	Ion/Li Ratio	Conc.	Ion/Li Ratio
Li	mg/L	802	1.0	806	1.0	954	1.0	911	1.0
Na	mg/L	110,939	138.3	103,386	128.1	104,993	125.8	114,575	110.1
K	mg/L	9,107	11.4	8,750	10.8	10,494	10.4	9,474	11.0
Mg	mg/L	2,233	2.8	2,327	2.9	2,858	3.0	2,753	3.0
Ca	mg/L	969	1.2	901	1.12	792	0.8	760	0.83
SO_4	mg/L	7,790	9.7	5,963	7.4	7,276	8.4	7,668	7.63
B	mg/L	543	0.7	566	0.7	544	0.63	577	0.57
SG	g/mL	1.194		1.200		1.21		1.21	

13.4 Deleterious Elements

There are two major sources of deleterious elements that may be introduced into the process; impurities from reagents and metallic iron from plant equipment.

Although all three main reagents pose a threat in introducing deleterious elements into the process plant, both caustic and slaked lime ultimately report to the waste.

Sodium carbonate is of particular concern as insoluble deleterious elements will report to the product; impacting its quality. In order to mitigate this risk, a series of steps have been taken to ensure that the sodium carbonate being utilised in the crystallisation circuit is free from these impurities. Two manual cartridge filters in a duty/standby configuration are used to ensure that insoluble particles are captured and removed from the process before being fed into the crystallisation circuit. An IX circuit will also be used to remove any trace divalent ions that may be present in the sodium carbonate solution.

Another source of deleterious elements introduced into the system is iron from plant equipment such as pumps or agitators. Strategically placed magnets within the process are used to capture and remove these impurities.

14 MINERAL RESOURCE ESTIMATES

14.1 Introduction

The deposit type is a brine aquifer within a salar basin. Brine deposits differ from solid phase industrial mineral deposits by virtue of their fluid (dynamic) nature. Because of the mobility the brines, the flow regimes and other factors such as the hydraulic properties of the aquifer material are just as important as the chemical constituents of the brine in establishing a Brine Resource estimate.

14.2 Definition of Hydrogeologic Units

Results of diamond drilling indicate that basin-fill deposits in Salar del Hombre Muerto can be divided into hydrogeologic units that are dominated by five lithologies, all of which have been sampled and analyzed for drainable porosity. Predominant lithology, number of analyses and statistical parameters for drainable porosity of these units are given in Table 14-1.

Table 14-1: Summary of Drainable Porosity Values

Predominant Lithology of Conceptual Hydrogeologic Unit	Number of Analyses	Mean Drainable Porosity	Median Drainable Porosity	Standard Deviation
Unit 1: Clay	9	0.034	0.026	0.024
Unit 2: Halite, gypsum or other evaporates	75	0.041	0.030	0.042
Unit 3: Silt and sandy silt	11	0.049	0.048	0.016
Unit 4: Sand and silty sand	25	0.131	0.146	0.086
Unit 5: Travertine, tuff and dacitic gravel	1	0.042	0.042	---

Source: Montgomery & GAI (2012)

Each borehole was divided into hydrogeologic units using the five predominant lithologies given above. Drainable porosity values for each hydrogeologic unit within a single polygon were computed by averaging the available drainable porosity data from within the hydrogeologic unit at the polygon borehole. For a few hydrogeologic units, within some polygon blocks, no porosity data were available. For these units, drainable porosity was estimated and assigned from laboratory analyses of similar lithologies in other Hombre Muerto boreholes, or conservative drainable porosity values were estimated from published values (Johnson, 1967), and assigned based on lithology, as follows in Table 14-2.

Table 14-2: Assigned Drainable Porosity Values

Predominant Lithology of Hydrogeologic Unit	Assigned Drainable Porosity
Clay	0.02
Halite, gypsum, or other evaporites	0.04
Silt and sandy or clayey silt, and siltstone	0.05
Sand, silty sand, and sandstone (>50% sand)	0.10
Travertine, tuff, and dacitic gravel	0.15

Source: Montgomery & GAI, 2012.

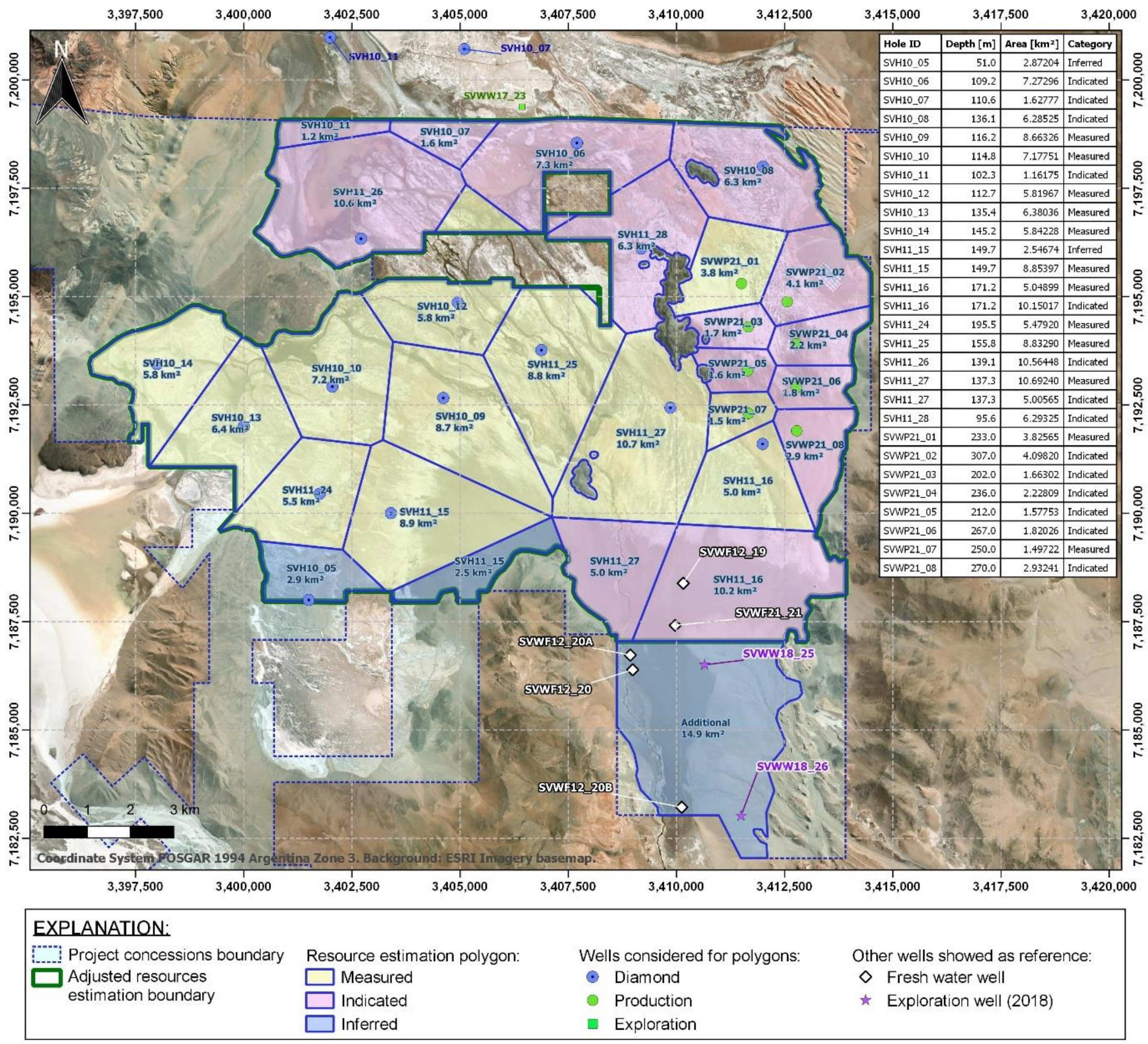
For those hydrogeologic units within an individual borehole where no chemistry data are available, the analyses from the nearest samples both above and below the unit are averaged and the average value was applied to the entire unit.

14.3 Brine Resource Methodology

The following is an abbreviated summary of the methodology and resource calculations that were previously documented and updated for this current report. To estimate total amount of lithium in the brine, the basin was first sectioned into polygons based on location of exploration drilling. Each polygon block contained one diamond drill exploration hole or exploration well. Boundaries between polygon blocks are generally equidistant from diamond drill holes. For most polygon blocks, outer boundaries are the same as basin boundaries, as discussed above.

Figure 14-1 is a location map for Sal de Vida Project showing Measured, Indicated, and Inferred lithium resource polygons. The total area of polygon blocks used for resource calculations is about 146 km^2, not including the new additional Inferred Resource in the southeast part of the concession area, which is about 14.9 km^2.

Figure 14-1: Location Map Showing Measured, Indicated, and Inferred Lithium Resources



Hole ID	Depth [m]	Area [km²]	Category
SVH10_05	51.0	2.87204	Inferred
SVH10_06	109.2	7.27296	Indicated
SVH10_07	110.6	1.62777	Indicated
SVH10_08	136.1	6.28525	Indicated
SVH10_09	116.2	8.66326	Measured
SVH10_10	114.8	7.17751	Measured
SVH10_11	102.3	1.16175	Indicated
SVH10_12	112.7	5.81967	Measured
SVH10_13	135.4	6.38036	Measured
SVH10_14	145.2	5.84228	Measured
SVH11_15	149.7	2.54674	Inferred
SVH11_15	149.7	8.85397	Measured
SVH11_16	171.2	5.04899	Measured
SVH11_16	171.2	10.15017	Indicated
SVH11_24	195.5	5.47920	Measured
SVH11_25	155.8	8.83290	Measured
SVH11_26	139.1	10.56448	Indicated
SVH11_27	137.3	10.69240	Measured
SVH11_27	137.3	5.00565	Indicated
SVH11_28	95.6	6.29325	Indicated
SVWP21_01	233.0	3.82565	Measured
SVWP21_02	307.0	4.09820	Indicated
SVWP21_03	202.0	1.66302	Indicated
SVWP21_04	236.0	2.22809	Indicated
SVWP21_05	212.0	1.57753	Indicated
SVWP21_06	267.0	1.82026	Indicated
SVWP21_07	250.0	1.49722	Measured
SVWP21_08	270.0	2.93241	Indicated

Source: Figure prepared by M&A, 2022.

Areas are designated as Indicated where confidence is high in the interpolation of units between wells. Although there are several areas where reasonable stratigraphic interpolation can be made between boreholes, the level of confidence drops extrapolating outward from the well where there are either: 1) no other nearby wells, or 2) where the geologic and hydrogeologic nature of basin boundaries is less uncertain. Because some of the extractable brine fluid resource will move between units to production pumping centers, a more exact interpretation of the lithologic units at this stage of the estimation process was not believed to be required and the level of accuracy at the scale of data on record is believed acceptable for the Indicated areas.

Areas are designated as Measured where additional information exists on the physical brine aquifer parameters that were derived from pumping tests (e.g., transmissivity, aquifer thickness, hydraulic conductivity, and storativity), or where the stratigraphic conditions allow more confident understanding of the units (e.g., bedding, induration, lateral continuity). In the Measured status area, several aquifer tests have been conducted in the basin and support an increased understanding of the hydrogeologic conditions and support the idea that the brine can be pumped from production wells at sufficiently large rates to support long-term economic production of brine rich in lithium. Based on reasonable agreement with aquifer test results and our conceptual model of these areas, there is sufficient understanding of the areas with respect to both stratigraphy and aquifer properties to be able to characterize these as Measured.

The areas that were categorized as Inferred include areas where no drilling or testing was conducted, but are believed to have resource in them based on results for nearby areas. For this report, although relatively common in the industry, no Inferred Resource was estimated for areas below depths drilled, even when geophysical results suggest that aquifer occurs beneath the well.

The lithium Brine Resources were estimated as follows. Within each polygon shown on the surface, the subsurface lithological column was separated into hydrogeologic units. Each unit was assigned a specific thickness and was given a value for drainable porosity and average lithium content based on laboratory analyses of samples collected during exploration drilling.

A cut-off grade of 500 mg/L of lithium was used. The value of 500 mg/L is larger than the current economic cut-off grade of about 200 mg/L. The 500 mg/L value was an early, conservatively large estimate that was selected prior to determining the current economic cut-off grade of 200 mg/L. Because very little of the brine in the basin has lithium grades less than 500 mg/L, lowering the cut-off grade to 200 mg/L to increase the estimated Resource was considered unnecessary.

Lithium metal is converted to lithium carbonate using the corresponding molecular multiplication factor of 5.323.

14.4 Brine Resource Statement

Brine Resources are reported inclusive of those Brine Resources converted to Brine Reserves. Brine Resources that are not Brine Reserves do not have demonstrated economic viability. The current Brine Resource estimate for the Sal de Vida Project is summarised in Table 14-3. At present, the QP does not know of any environmental, legal, titla, taxation, socio-economic, marketing, political, or other factors that would materially affect the current Resource estimate. The estimate has an effective date of 28 February 2022. The Qualified Person for the estimate is Mr. Michael Rosko, P.Geo., an employee of Montgomery and Associates.

To change the Inferred Resource into Measured or Indicated status, the following factors were considered:

- Level of understanding and reliability of the basin stratigraphy;
- Level of understanding of the local hydrogeologic characteristics of the aquifer system;
- Density of drilling and testing in the salar and general uniformity of results within an area.

The new information used to increase the Resource estimate for this report came mostly from the results of drilling and testing of the eight new production wells.

Table 14-3: Summary of Measured, Indicated, and Inferred Brine Resources

Category	Million Tonnes Lithium	Million Tonnes Equivalent Li_2CO_3	Average Li (mg/l)
Measured	0.47	2.487	757
Indicated	0.70	3.743	793
Total Measured and Indicated	**1.17**	**6.230**	**775**
Inferred	0.12	0.621	563

Note: Table prepared by Montgomery and Associates, 28 February 2022. Cut-off grade: 500 mg/L lithium. Qualified Person Michael Rosko, P.G., General Manager, Montgomery and Associates, 2022. The estimate is reported inclusive of those Brine Resources converted to Brine Reserves. Brine Resources that are not Brine Reserves do not have demonstrated economic viability. Lithium metal was converted to lithium carbonate using a multiplication factor of 5.323.

14.5 Factors That May Affect the Estimate

Factors that may affect the Brine Resource estimate include:

- Locations of aquifer boundaries, and or shallower than anticipated bedrock near hard rock area;
- Lateral continuity of key aquifer zones;
- Presence of fresh and brackish water that have the potential to dilute the brine in the wellfield area;
- The assumed uniformity of average aquifer parameters within specific aquifer units.

14.6 Comment on Brine Resource Estimates

For preliminary planning purposes, a more realistic assumption is that potentially 30% of this amount should be considered as a reasonable estimate of long-term, total recoverable brine based on the existing information. Achieving a larger total recovery is possible but would demand additional wells pumping at lower production rates; recovering more than 50% of the brine in storage may not be feasible. The 30% number is a rough estimate based on experience with groundwater and brine extraction from clastic and salar basins but is not a bankable estimate. However, to completely drain the basin would require increasingly large numbers of production wells and would increase the amount of fresh water moving into the brine aquifer. Therefore, 100% drainage is not technically or economically feasible for a project such as Sal de Vida. That said, the QP believes that there is substantial upside potential for increasing both the Resource categories (i.e., changing Inferred to Indicated or Measured, and/or changing Indicated to Measured), and also by increasing the total volume of the Resource by drilling in unexplored areas, and also by drilling deeper. It has been demonstrated in several parts of the basin that the lithium brine aquifer extends to depths greater than currently used to estimate the Resource.

To the extent known to the QP, there are no known environmental, permitting, legal, title, taxation, socioeconomic, marketing, political or other relevant factors that could affect the Brine Resource estimate that are not discussed in this Report.

15 MINERAL RESERVE ESTIMATES

15.1 Introduction

The methodology used to develop the estimated Resources is different to the methodology used to estimate the Reserves, but consistent with the informal guidelines for lithium brines developed by Houston et al., 2012. Because the economic reserve is estimated based on physical pumping of the brine that flows during wellfield pumping, a calibrated groundwater flow model is the best tool to estimate the brine reserve over time. The static block model used to estimate the resource cannot estimate the brine reserve.

15.2 Numerical Modelling

15.2.1 Numerical Model Design

The 3D numerical model was constructed using the Groundwater Vistas interface Version 7 (Environmental Simulations Incorporated, ESI) software and was simulated using the control volume finite difference code Modflow USG-Transport (Panday, 2019). Modflow-USG was selected because of its advanced capabilities that include its local grid refinement option, its numerical robustness using the Newton Raphson formulation (Hunt and Feinstein, 2005) and upstream weighting, as well as its ability to simulate variable density flow and transport.

The active model domain encompasses the clastic sediments and evaporite deposits that comprise the Salar del Hombre Muerto as well as the upgradient alluvial deposits and the Río de los Patos sub-basin. The extent of the active model domain, which covers an area of about 383 km^2, is shown in Figure 15-1.

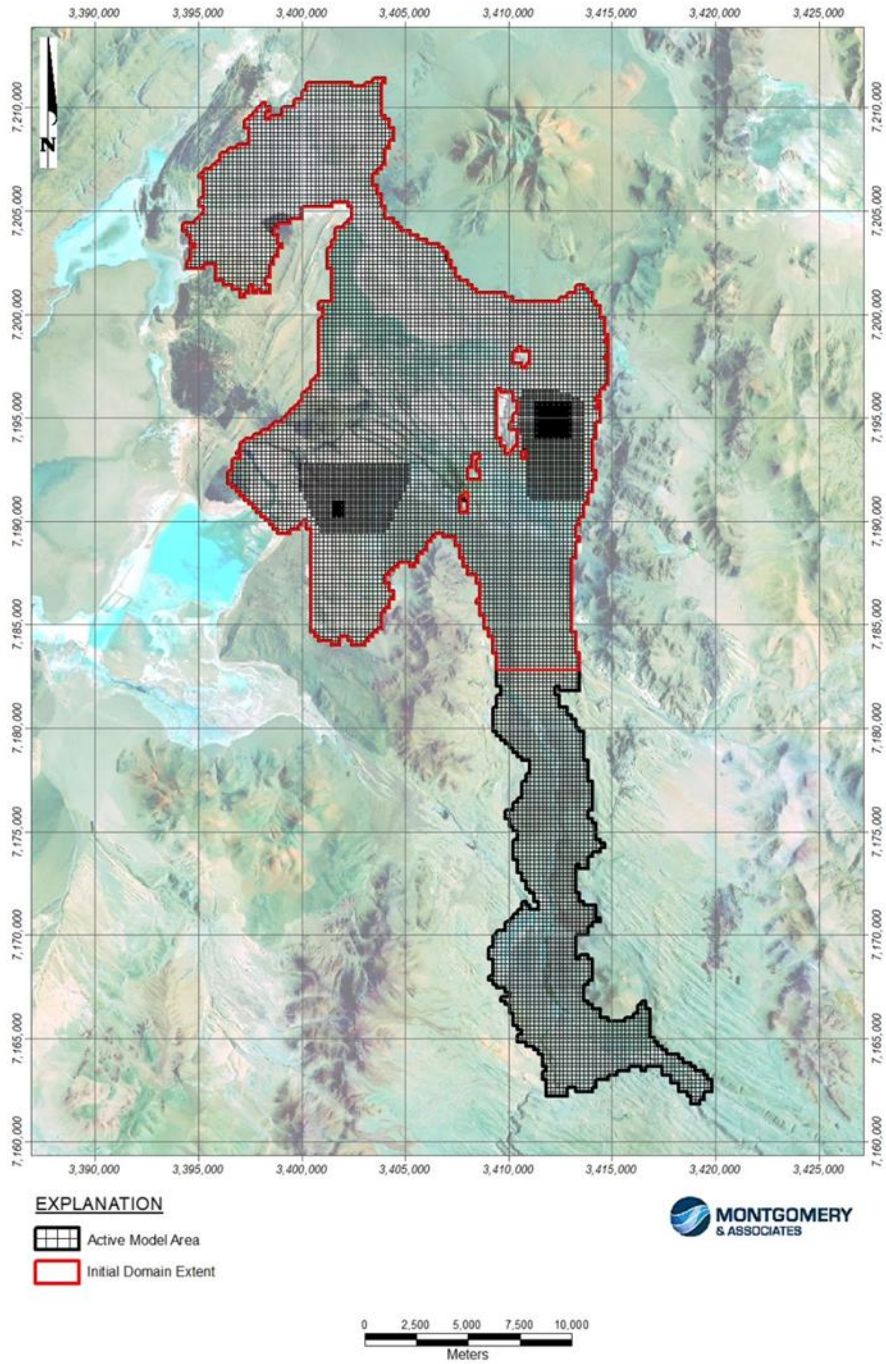
The active model domain includes the salar and outlying areas of the basin; the domain was designed to be extensive enough to adequately incorporate zones of recharge associated with the Río de los Patos and minimize the influence of applied boundary conditions on the production well simulation. The base of the active model domain was set based on current interpretation of depth to basement (Section 9), considering the location of the Tertiary basement in the western part of the model and the Precambrian basement in the eastern part of the model.

Local layers of clays based in stratigraphy information from drilled wells in the east zone of the basin (projected East Wellfield) was also incorporated in the model.

15.2.2 Grid Specifics

The 3D model domain was divided into a grid of node-centred, rectangular prisms commonly referred to as cells. Using the quadtree feature of Modflow-USG, cells with small lateral dimensions (maximum refinement of 3.125 m) were assigned in areas of interest such as pumping well locations, while larger elements (200 m) were assigned in areas with little available information or in zones farthest from the areas of interest. Vertically, the domain was divided into 12 model layers, each of which consists of a variable number of cells depending on the presence of low permeability bedrock or lack of exploration data at depth. Model layer thicknesses ranged from 10 – 60 m, and each layer, other than the basal layer, was of a constant thickness. The lower layer was set to be thicker because there is less information in the deeper portions.

Figure 15-1: Numerical Model Domain



Note: Figure prepared by Montgomery and Associates, 2020.

15.2.3 Density Driven Flow and Transport

The density-driven flow (DDF) package, coupled with block-centred transport (BCT), simulated variable-density flow and transport (advection and dispersivity mechanisms). The modelled area included zones of mixing where incoming recharge of lower density water enters the salar but discharges to the surface due to differences with the density of the brine in the aquifer. Thus, the numerical model was designed to simulate changes in solute concentration during pumping that are likely to occur due to influx of fresh water to the future production wells.

TDS in the brine and freshwater were defined as the only solute component in the numerical model to represent the concentration–water density relationship and freshwater–brine interface. The DDF package assumed a linear relationship between TDS concentrations and water density. The following linear relation was used to model variable density flow and transport:

- A freshwater density of 1,000 kg/m^3 for a TDS concentration of 0 kg/m^3;
- A water density of 1,210 kg/m^3 for a TDS concentration of 329 kg/m^3.

Initial concentrations were defined based on laboratory measured values from samples collected during exploration drilling and were then interpolated to create an initial distribution for the model. During the steady-state (long-term transient) calibration, the hydraulic head solution was cycled until an approximate equilibrium was achieved with the simulated concentrations (which are based on the initial concentrations from measured samples). The concentration solution of the steady-state model was subsequently used as initial conditions for the transient calibration and simulation.

The linear relationships with TDS were used to estimate concentrations in pumped brine from the wellfield simulation. The evapotranspiration (ET) concentration factor was set to 0, signifying that TDS mass did not leave the system due to evapotranspiration.

15.2.4 Numerical Model Boundary Conditions

Groundwater outflow from the basin occurs via evaporation from dry and moist salar surfaces in addition to evapotranspiration from vegetation and from open water evaporation surface water bodies (Laguna Verde). Groundwater movement is generally from the margins of the salar, where mountain front recharge enters the model domain as groundwater underflow, toward the centre of the salar. Direct precipitation recharge was applied over all areas of the active model domain.

The numerical model boundary conditions were designed to be consistent with the conceptual baseline water balance (Montgomery and Associates, 2020), assuming average natural long-term hydrologic conditions, where inflows (recharge from precipitation and snowmelt) are approximately equivalent to outflows (evaporative discharge) and no production pumping occurs in the salar. The conceptual water balance was implemented by following the equation:

$$Precipitation\ Recharge + Snowmelt\ Recharge = Evaporation\ Discharge$$

Recharge to basins similar to the Salar de Hombre Muerto is typically 5 – 20% of its volumetric precipitation (Hogan et al., 2004). The intersection of these bounds with the evaporative discharge estimate provides an approximate range for the studied sub-basin recharge.

Liquid and solid (snowmelt) precipitation in the Salar de Hombre Muerto basin is estimated to be about 106 mm/a, or as a volumetric rate, 11,050 L/s. Using 5 – 20% of the annual volumetric precipitation, an estimated range of precipitation recharge is likely between 550 – 2,210 L/s.

Long-term evaporation rate estimates of 850 L/s, 1,500 L/s and 2,300 L/s for low, medium and high evaporation rate scenarios, respectively, were obtained, using remote sensing combined with an evaporation rate characterization based on local meteorological data. The higher evaporation estimate is slightly too large compared to the upper bound of the precipitation recharge estimate (2,210 L/s). In addition, the lower bound of the precipitation recharge estimate (550 L/s) is too low compared to the lower evaporation estimate (~850 L/s) and is not believed to be realistic.

The recharge estimate for the east sub-basin of the Salar del Hombre Muerto is believed to range from 850 – 2,210 L/s based on the results of intersecting the evaporation and precipitation recharge ranges. Within this range, the current best estimate for a recharge to the salar is 1,500 L/s based on the calculated medium evaporation discharge, which approximately corresponds to 13.1% of total volumetric precipitation (including snowmelt) estimated for the basin.

The current best estimate is considered to be that obtained from the evaporation estimate, which is specifically the medium evaporation rate scenario at 1,500 L/s. The numerical model assumed a dissolved TDS concentration of 1.5 kg/m^3 for inflow at the recharge cells.

The Río de los Patos was simulated using a river (RIV) package, which simulates the interaction between groundwater and surface water. For the purposes of the Brine Reserve estimate, the river behaviour in the far upper region of the Río de los Patos sub-basin is not considered a key factor because it ultimately translates to a net amount of water moving toward the salar. Similar to the simulated recharge, modelled TDS concentrations in the river water were set to 1.5 kg/m^3.

The general head boundary (GHB) condition represents the connection between groundwater in the active model domain and the immediate area of Laguna Catal, a natural zone of discharge. The GHB stage was set to equal the average elevation of the surface water in Laguna Catal (3,965 m), and the conductance was specified based on the distance between Laguna Catal and the southwest limit of the active domain as well as the hydraulic conductivity and saturated cell volume. TDS concentrations of potential inflow to the domain from those cells were conservatively set to 0 mg/L to assume maximum potential dilution in the future. The specified flux (WEL) cells were assigned in the northwest portion of the salar to represent a small outflow of 10 m^3/d (Montgomery and Associates, 2018).

The evapotranspiration (EVT) package was used in cells of the salar to simulate evaporation from three distinct zones including soil, vegetation, and open water. The zone representing open water evaporation was specifically applied in the Laguna Verde area. The EVT package simulated a linear change in evaporation from the specified extinction depth to land surface. The extinction depth is defined as the depth below which groundwater does not evaporate. The evaporation rates varied according to the zone, and extinction depths were set based on the type of soil and measured water density trends.

15.2.5 Numerical Model Hydraulic Properties

Hydraulic properties of the numerical model include hydraulic conductivity in the three cardinal directions (Kx, Ky, and Kz), specific storage (Ss), and specific yield (Sy). These parameters were assigned based on the hydrogeological unit and were adjusted throughout the calibration in specific zones according to the conceptual range. The range of assigned hydraulic properties is generally consistent with expected values in this environment of deposition as well as the calculated values and trends observed from on-site aquifer tests (Montgomery and Associates, 2013; 2018).

Also, results from hydraulic test in recently drilled production wells were used as a reference por calibration in the east zone of the model. Specific hydraulics values were also assigned to local clay layers in this zone of the model, based in stratigraphy information from drilled wells.

Without evidence of horizontal anisotropy from testing results, Kx is considered equal to Ky, and the horizontal hydraulic conductivity is termed radial hydraulic conductivity (Kr). Vertical anisotropy (Kz/Kr) was applied in certain zones throughout the calibration in accordance with the geological unit and form of deposition. Where anisotropy was incorporated for calibration purposes, the ratios of Kz/Kr also consider estimates from literature values for similar regimes (e.g., Freeze and Cherry, 1979 and Mason and Kipp, 1998).

The range of specific storage assigned in the model is based on the type of lithology and estimates from literature (Batu, 1998). The lower end of the range is near the compressibility of water, which indicates a rigid, low porosity material with small compressibility of the rock mass, and the upper end is indicative of a higher porosity and larger compressibility of the rock mass. Assigned values of specific yield considered laboratory testing results (Montgomery and Associates, 2018) and used values in comparable geological units of similar salars.

Effective porosity is generally assumed to be equivalent to specific yield and varies spatially depending on the lithology. For simulating the transport of dissolved TDS, assigned values of dispersivity correspond to 20 m for longitudinal dispersivity, 2 m for transverse dispersivity, and 0.2 m for vertical dispersivity. These values and ratios are generally consistent with those determined from controlled field experiments (Hess et al., 2002). Molecular diffusion was not included in the numerical model because it is considered to be negligible in large-scale regional models.

15.2.6 Numerical Model Calibration

Prior to the simulation of future brine production, the numerical model was calibrated to verify assigned model parameters such as hydraulic conductivity and storage. International modelling guides were used to evaluate the quality of the calibration (Reilly and Harbaugh, 2004; Anderson et al., 2015).

The numerical groundwater model was initially calibrated to average, steady-state conditions using the available average on-site field measurements of water levels in observation wells. The numerical model simulates variable-density flow and transport, therefore a “long-term transient” model, with constant stresses (used interchangeably here with ¨steady-state model¨), was simulated over a sufficiently long time period to approach equilibrium steady-state conditions. The hydraulic head and concentration solutions were then cycled until the change in storage was sufficiently low (approximately 0.1% of the average total inflow and outflow). Although the spatial variations in hydraulic head indicate that groundwater flow occurs predominantly from the south to the north, the change in head over time at the end of the long-term transient simulation is negligible. The calibrated solution in steady state is considered acceptable with all hydraulic head residuals (observed value minus simulated value) within approximately 5 m, and a mean residual of -0.4460 m.

A transient model calibration was conducted to better represent the aquifer’s response to pumping. The head and concentration results from the steady-state model were used as initial conditions for two separate transient calibrations using water level drawdown data from long-term pumping tests conducted at SVWW11-10 and SVWP17-21. Although these two transient calibrations were local, the modelled aquifer parameter zones extend beyond the immediate pumping areas (e.g., the volcaniclastic hydrogeological unit), so a larger area of the numerical model was also improved as a result of the transient calibration:

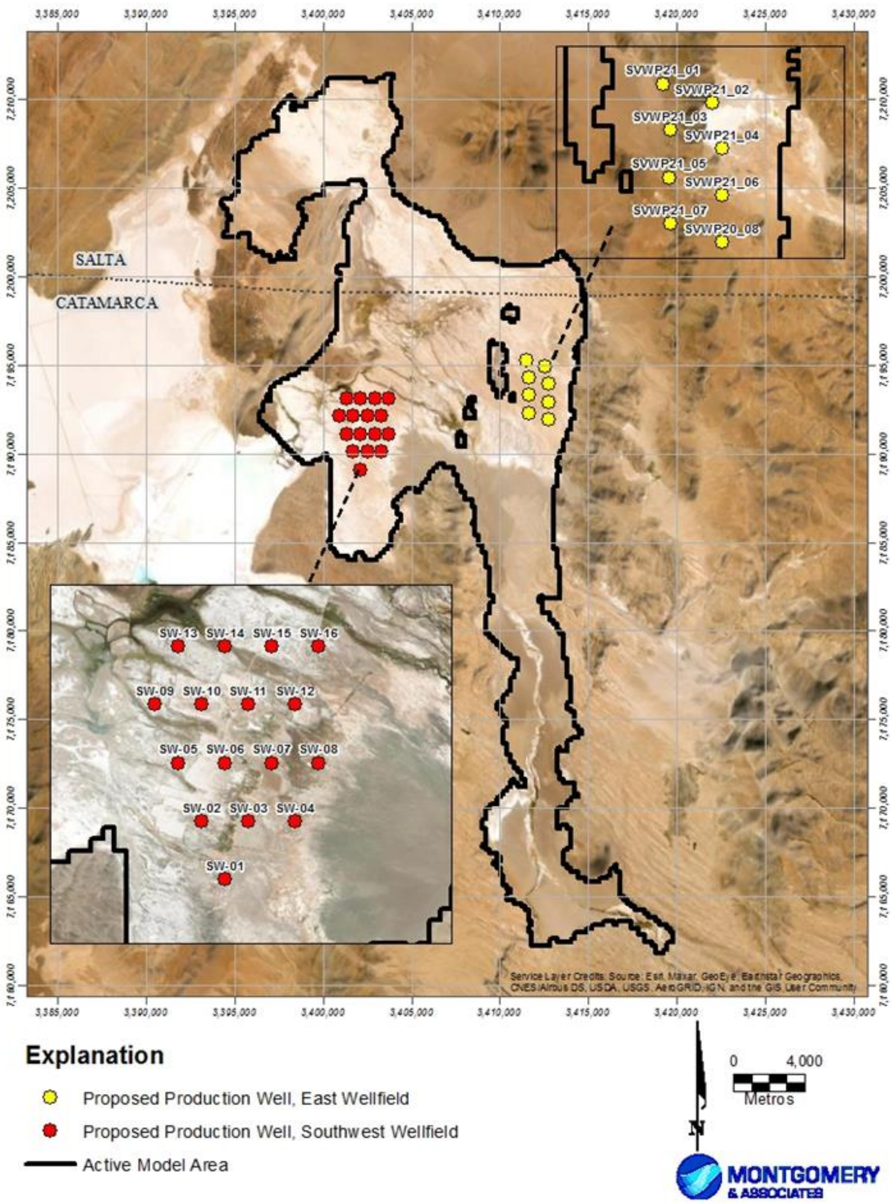
- Observed and simulated hydrographs of observation wells during the SVWW11-10 test in the proposed Southwest wellfield closely agree and show that the model adequately represents the aquifer’s response to pumping (i.e., drawdown) at the distinct observation wells. Other calibration parameters include a scaled RMS of 6.1% and absolute residual mean of 0.11 m, which is considered acceptable.

- Observed and simulated hydrographs of observation wells during the SVWP17-21 test in the proposed East Wellfield are closely matched and show that the model is appropriately representing the aquifer response to pumping at the distinct observation wells. Other calibration parameters include a low scaled RMS of 2.9% and absolute residual mean of 0.16 m, which is considered acceptable.

15.2.7 Numerical Model Simulation

Following the steady-state and transient calibrations, the numerical groundwater model was used to simulate future brine extraction from the East and Southwest wellfields. The two wellfields and simulated production wells are shown on Figure 15-2.

Figure 15-2: Simulated Production Well Locations



Note: Figure prepared by Montgomery and Associates, 2020.

The Stage 1 pumping from the East Wellfield is expected to produce about 15,000 t of lithium carbonate equivalent (LCE) per year while Stage 2 will generate an additional 45,000 t of LCE per year with active pumping from both wellfields. Due to seasonal changes in pond evaporation and maintaining the lithium carbonate target for each stage, the modelled production pumping rates are time-variable on both a monthly and annual timeframe (Table 15-1).

Table 15-1: Simulated Stage 1 and 2 Pumping Rates

Month	Stage 1 Total Pumping (L/s)	Stage 2 Total Pumping (L/s)	Stage 1 and Stage 2 East Wellfield Pumping per Well (L/s)	Stage 2 Southwest Wellfield Pumping per Well (L/s)
January	91.1	278.9	12.1	11.5
February	97.3	297.9	12.9	12.3
March	189.2	579.2	25.0	24.0
April	173.9	532.5	23.0	22.0
May	123.3	377.5	16.3	15.6
June	96.8	296.3	12.8	12.3
July	79.9	244.6	10.6	10.1
August	153.7	470.7	20.4	19.5
September	201.6	617.1	26.7	25.6
October	256.0	783.8	33.9	32.5
November	268.8	822.9	35.6	34.1
December	197.4	604.3	26.1	25.0
Average	**161**	**492**	**21**	**20**

The process efficiency is assumed to be 70% and the expected life of mine (LOM) is 40 years. Pumping is anticipated to proceed as follows:

- Stage 1 (8 wells in the East Wellfield) is assumed to start pumping at day 1 and continues for 2 years;
- Stage 2 (15 wells in the Southwest wellfield and 8 wells in the East Wellfield) is assumed to begin pumping at the start of Year 3 and continues pumping for 38 years.

Initial conditions for flow and transport were defined from the steady-state model solution and in the case of the Southwest Wellfield, each production well was screened from Model Layer 7 (140 m bls) to Model Layer 11 (250 m bls). In the case of the East Wellfield, each well was screened based on it´s own construction and well schematics, with screens between 90 m (Layer 5) and 300 m (Layer 12).

Results of the 40-year pumping simulation were analysed to estimate:

- The extracted lithium grade as a function of time;
- The estimated lithium reserve;
- The simulated water table drawdown after 40 years of pumping.

Although pumping from the Southwest Wellfield starts after 2 years of production and the East Wellfield pumping begins immediately, dilution is more prominent in the East Wellfield due to its close proximity to zones of freshwater recharge (e.g., to the Río de los Patos sub-basin). Dilution is not as significant in the Southwest Wellfield and the extracted grade exceeds the East Wellfield during almost the entire simulation.

The predicted cumulative mass of lithium produced was estimated using the 40-year simulation results. The results were then multiplied by a conversion factor of 5.322785 (based on molecular weight)to compute LCE. To account for processing losses, the net amount of LCE produced was computed by multiplying the LCE extracted from the wellfield by an assumed process efficiency of 70%. The resulting values from each production well were then summed for each production year to determine the predicted annual LCE production.

15.2.8 Deleterious Elements

Together with lithium, the pumped brine is projected to contain significant quantities of potassium, magnesium, calcium, sulphate, and to a lesser degree, boron. These constituents must be removed from the brine to enable effective retrieval of the lithium. The specific design and operation of the industrial processes for the removal of magnesium, calcium, sulphate and boron are detailed in Section 13 of this Report.

The numerical groundwater flow model simulates concentrations for these deleterious elements based on linear relationships between their measured values and measured values of TDS. These relationships were developed for each wellfield by establishing a correlation between these components using data from samples collected during pumping tests and from depth-specific core hole samples in the wellfield areas.

The following linear equations (valid for TDS>50 kg/m^3) are used to convert projected TDS (kg/m^3) content for the Southwest Wellfield to concentrations of magnesium, sulphate, and boron:

$$Mg\ (mg/L) = 5.9347893 * TDS - 98.70213, R2 = 0.37, p < 0.0001 \quad (1)$$

$$Sulphate\ (mg/L) = 19.368905 * TDS + 2183.2078, R2 = 0.43, p < 0.0001 \quad (2)$$

$$B\ (mg/L) = 1.3765573 * TDS + 133.34104, R2 = 0.54, p < 0.0001 \quad (3)$$

$$Ca\ (mg/L) = 0.3626721 * TDS + 808.72624, R2 = 0.007, p < 0.4134 \quad (4)$$

Because calcium shows no clear correlation to TDS, there is a low level of confidence using the best fit equation to predict calcium concentrations based on TDS content projected by the numerical model.

The linear equations used to convert projected TDS (kg/m^3) content for the East Wellfield to concentrations of magnesium, sulphate, and boron (valid for TDS>50 kg/m^3) are as follows:

$$Mg\ (mg/L) = 7.3030067 * TDS - 78.49239, R2 = 0.94, p < 0.0001 \quad (1)$$

$$Sulphate\ (mg/L) = 17.779001 * TDS + 2160.0505, R2 = 0.64, p < 0.0001 \quad (2)$$

$$B\ (mg/L) = 1.2432718 * TDS - 150.73217, R2 = 0.84, p < 0.0001 \quad (3)$$

$$Ca\ (mg/L) = 0.3983328 * TDS + 924.55047, R2 = 0.015, p < 0.3880 \quad (4)$$

Because calcium shows no clear correlation to TDS, there is a low-level confidence using the best-fit equation to predict calcium concentrations based on TDS content projected by the numerical model.

Results show that each wellfield starts at a different TDS concentration. For each wellfield, the dilution effects of downward and lateral migration of fresh/brackish water results in decreased TDS concentration during sustained pumping.

Projected TDS concentrations were converted to estimated magnesium, sulphate, and boron concentrations using the empirically developed equations listed above.

15.3 Estimation Methodology

15.3.1 Conversion of Simulated Concentrations of Total Dissolved Solids to Lithium

The numerical groundwater flow model simulates lithium concentrations based on linear relationships developed from measured values of lithium and TDS. Additionally, the groundwater model simulates density-dependent flow based on measured relationships between fluid density and TDS. These relationships were developed for each wellfield by establishing a correlation between these components using the results of the chemical analyses for samples collected during the pumping tests and for the depth-specific samples collected from the core holes in the wellfield areas.

The following linear equation (valid for TDS>20 kg/m^3) was used for converting model results of simulated TDS (kg/m^3) content for the Southwest wellfield to concentrations of lithium:

$$Li\ (mg/L) \ = \ 2.4937346 * TDS \ + \ 17.304226$$

The linear equation used to convert model results of simulated TDS content for the East Wellfield to concentrations of lithium is as follows:

$$Li\ (mg/L) \ = \ 2.5241894 * TDS \ + \ 3.1884033$$

15.3.2 Conversion from Brine Resources to Brine Reserves

The Brine Resource was estimated using a polygonal method, using hydrogeological aquifer units, bounded by concession boundaries and depth-drilled and sampled, and key input parameters of drainable porosity and lithium grade. Because a lithium brine is a fluid resource and moves within the aquifer, traditional mining methods of estimating a Brine Reserve from a more detailed subset of the same method are not feasible because of the aquifer mechanics associated with production wellfield pumping. Additional aquifer hydraulic properties are required to estimate the Brine Reserve.

The industry-accepted method for simulating removal of aquifer fluid (fresh water or brine) is to use a numerical groundwater flow model to simulate wellfield pumping. The model can be used to estimate water level drawdown associated pumping (local and regional) and also to determine maximum pumping rates, sustainability of wellfield pumping, and in the case of modelling lithium brines, the average lithium grade of the brine over time. Polygonal estimates or 3D block models do not have the capability of doing this type of simulation.

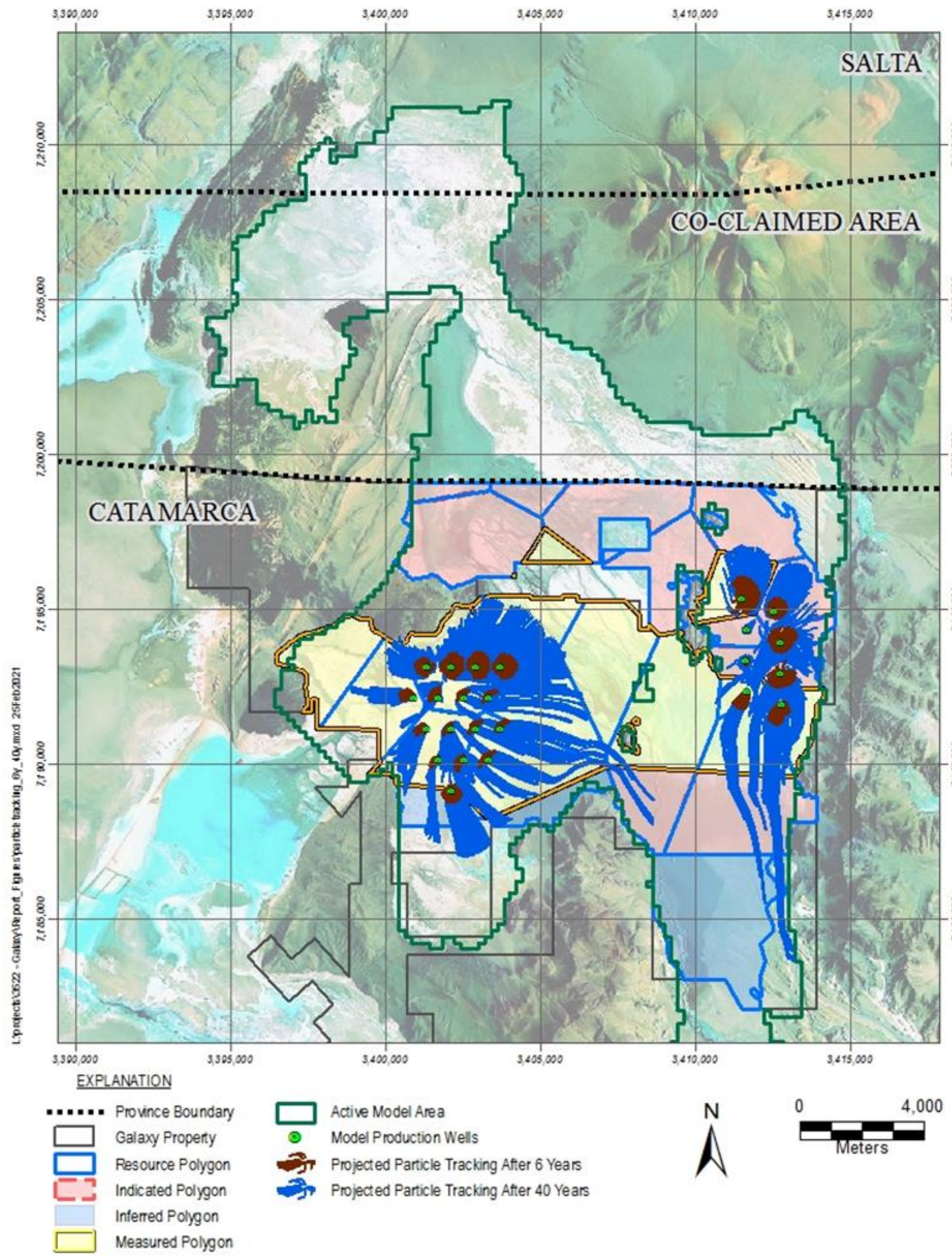
Although the numerical model used to estimate the Brine Reserve for this Project is not a direct subset of the polygon method, the conceptual hydrogeological model (hydrogeologic units, parameters, and chemistry) determined during the Brine Resource estimation, was used to construct the framework of the numerical groundwater flow model. In addition to these initial parameters, aquifer boundary conditions, basin recharge and discharge, estimates, hydraulic conductivity and storativity obtained from aquifer testing, and other parameters were included in construction of the numerical model. Finally, the model was calibrated against data obtained in the field to improve reliability of the simulations. Although the numerical model is not a direct subset of the Resource model, it is an enhanced and more robust tool for the Brine Reserve estimation.

To demonstrate the interconnection between the two models, Figure 15-3 show the particle tracks for pumped brine after 6 years (Proven Reserve) and after 40 years (Probable Reserve).

After 6 years of pumping, the simulation shows that pumped brine comes exclusively from the Measured and currently Indicated polygons areas. After the end of production well construction and testing, the resource in the south zone of the East Wellfield was upgraded to Measured reflecting an increased confidence for the designation of the Proven Reserve. After 40 years pumping, Figure 15-3 shows that pumped brine comes from a farther distance, but in general is still from within the Measured and Indicated Resource polygons. It is worth mention that particle tracking algorithms in the simulation model can be less accurate for very long time periods. Also observe from Figure 15-3 that after 40 years of pumping, there will still be some areas not being drained by the proposed wellfields. This suggests the possibility of upside projects.

The groundwater model simulates concentrations of TDS, which are used to derive concentrations of lithium by linear relationships developed for each wellfield. It is assumed that the relationship between TDS and lithium content is constant during 40-year period of brine production from the East and Southwest Wellfields. In this manner, the concentrations of lithium on model projections of TDS in the brine produced from pumping wells in each production wellfield are estimated.

Figure 15-3: Particle Tracks for Brine Pumped from the Proposed Wellfields (6 and 40 years)



Note: Figure prepared by Montgomery and Associates, 2022.

Using the numerical groundwater flow model projections, total lithium to be extracted from the proposed Southwest and East Wellfield was calculated for a total period of 40 years, considering the two stages of the Project and taking into account that East Wellfield will be pumping for 40 years, and the Southwest wellfield will be pumping for 38 years with a gap of 2 years between both wellfields. The model projections used to determine the Brine Reserve that assumed increasing pumping from both wellfields, indicate that the proposed wellfields should be able to produce a reliable quantity of brine at an average annual rate of approximately 14,750 m^3/d (about 171 L/s) in the case of the East Wellfield and about 26,400 m^3/d in the case of Southwest Wellfield (about 306 L/s). The average grade at start-up calculated from the initial model simulations used to estimate the Brine Reserve is expected to be about 805 mg/L of lithium in the East Wellfield) and 815 mg/L in the Southwest Wellfield; average final grade after 40 years of pumping is projected to be 778 mg/L of lithium (considering both wellfields). Depending on how the wellfields are ultimately operated, these rates and grades may be different.

Using the groundwater model, the average TDS content of brine was estimated for each pumping cycle for each wellfield. After estimating the total lithium content for each time step and summing the amounts of lithium projected to be pumped during those time steps, a total mass of unprocessed lithium to be pumped from the wellfields was estimated. The results are summarised in Table 15-2.

Total mass values in 1,000-kilogram units (tonnes) of lithium were then converted to LCE units. Therefore, the amount of lithium in the brine supplied to the ponds in 40 years of pumping are estimated to be about 2.49 Mt LCE, assuming no losses during processing. Modelling results indicate that during the 40-year pumping period, brine will be diluted by fresh and brackish water, so the pumping rates increase slightly with time to meet the anticipated LCE tonnes per year for each wellfield.

15.4 Brine Reserve Statement

During the evaporation and concentration process of the brine, there will be anticipated losses of lithium. Therefore, because the total amounts provided in Table 15-2 do not include anticipated loss of lithium due to process losses and leakages, those values cannot be used for determination of the economic Brine Reserve. The amount of recoverable lithium in the brine feed is calculated to be about 70% of the total brine supplied to the ponds. Table 15-3 gives results of the Proven and Probable Brine Reserves from the initial two wellfields when these percent estimated processing losses are factored. Table 15-4 gives results of the Proven and Probable Brine Reserves from the two wellfields in terms of total brine pumped and average grade. All three tables are referencing the same estimate reserve, with Table 15-2 reflecting the total lithium extracted, and Table 15-3 being the estimate Lithium Brine Reserves being reported.

15.5 Factors that May Affect the Brine Reserves

The Brine Reserve estimate may be affected by the following factors:

- Changes in recoverable lithium estimates based on chosen processing method;
- Assumptions regarding aquifer parameters used in the groundwater flow model for areas where empirical data do not exist;
- Estimated vertical hydraulic conductivity values which partially control the amount of anticipated future dilution in areas where fresh water overlies brine.

Table 15-2: Total Projected Lithium and Lithium Carbonate Pumped (Not factoring in process losses)

Time Period	Years	Active Wellfield	Lithium Total Mass (Tonnes)	Li_2CO_3 Equivalent (Tonnes)
1	1-2	East	8,052	42,857
2	3-40	East + Southwest	458,975	2,443,027
Total			**467,027**	**2,485,884**

Table 15-3: Summary of Estimated Probable and Proven Brine Reserves (31 March 2022)

Reserve Category	Wellfield	Time Period (Years)	Average Lithium grade (mg/L)	Lithium Total Mass (Tonnes)	Li_2CO_3 Equivalent (Tonnes)
Proven	East	1-6	786	16,908	90,000
Proven	Southwest	3-8	814	33,817	180,000
Total Proven		**1-8**	**805**	**50,725**	**270,000**
Probable	East	7-40	743	95,828	510,074
Probable	Southwest	9-40	790	180,365	960,045
Total Probable		**7-40**	**773**	**276,193**	**1,470,118**
Total Proven and Probable		**40**	**778**	**326,919**	**1,740,119**

Note: Table prepared by Montgomery and Associates, 2022. Assumes 500 mg/L Li cut-off, 70% Li process recovery. Qualified Person Michael Rosko, P.G., General Manager, Montgomery and Associates, 31 March 2022. Multiplication conversion from lithium to lithium carbonate is 5.323.

Table 15-4: Projected Pumped Brine and Grade of Brine Reserves

Reserve Category	Wellfield	Time Period (Years)	Projected Total Brine Pumped (m^3)	Projected Average Grade Li (mg/L)
Proven	East	1 – 6	30,735,453	786
Proven	Southwest	3 – 8	59,325,003	814
Total Proven		**1 – 8**	**90,060,456**	**805**
Probable	East	7 – 40	184,440,674	743
Probable	Southwest	9– 40	326,624,728	790
Total Probable		**7 – 40**	**511,065,402**	**773**
Total Proven and Probable		**40**	**601,125858**	**778**

Note: Table prepared by Montgomery and Associates, 2022. (*) Average grade Li for the 40 years. Qualified Person Mike Rosko, P.G., General Manager, Montgomery and Associates, 2022.

15.6 Comments on Brine Reserve Estimates

Based on the modelled hydrogeological system and results of the numerical modelling, it is appropriate to categorise the Proven Brine Reserve as what is feasible to be pumped to the ponds and recovered at the end of the process during the first 8 years for each wellfield. The model projects that the wellfields will sustain operable pumping for 40 years; thus, the following 34 years of pumping as a Probable Brine Reserve have been categorised. These values represent about 28% of the total Brine Resource estimate. The effective date for the Reserve estimate is 31 March 2022.

The current numerical model projections suggest that additional brine could be pumped from the basin from the proposed wellfields past a period of 40 years. However, recalibration of the model would be required after start-up pumping of each wellfield to refine the model and support this projection.

In addition, exploration should be conducted to better identify and potentially demonstrate additional extractable brine in other parts of the basin. Favourable exploration results represent Project upside potential.

The relative accuracy and confidence in the Brine Reserve estimation is dominantly a function of the accuracy and confidence demonstrated in sampling and analytical methods, development and understanding of the conceptual hydrogeologic system, and construction and calibration of the numerical groundwater flow model. The input data and analytical results were validated via sample duplication, use of multiple methods to determine brine grades throughout the basin, and with pumping tests. Using these data developed using standard methods, a conceptual geological and hydrogeological model was created consistent with the geological, hydrogeological, and chemical data obtained during the exploration phases.

In the opinion of the QP, each phase of the Project was conducted in a logical manner, and results were supportable using standard analytical methodologies. In addition, the calibration of the numerical model, against long-term pumping tests provide solid support for the conceptual hydrogeologic model developed for the Project. Thus, there is a reasonably high-level confidence in the ability of the aquifer system to yield the quantities and grade of brine estimated as Proven and Probable Brine Reserves.

There are no other environmental, permitting, legal, title, taxation, socioeconomic, marketing, political, or other relevant factors known to the QP that may affect the Brine Reserve estimate that have not been discussed in this Report.

16 MINING METHODS

16.1 Introduction

Brine operations are not conventional mining operations; the resource is extracted by pumping from wells rather than excavation from solid rocks or minerals. This section describes the wellfields used for brine extraction and the mobile equipment used to support site operations. The numerical modelling used to support process designs is discussed in Section 15. Section 17 outlines the process operations including the booster ponds, evaporation ponds and the process plant. Production rates and projected mine life are discussed in Section 22.

16.2 Wells and Wellfields

There are two wellfields being considered for production: one in the East and one in the Southwest. For Stage 1, only wells from the East Wellfield will be used, while Stage 2 will utilise the Southwest Wellfield. All production wells will be connected through pipelines to centrally positioned booster ponds. Stage 1 will utilise nine wells, eight of which will be operational during peak brine pumping season, with one on standby.

The production well locations were selected to reduce long-term freshwater level drawdown and maintain as high a brine grade as possible, given each well location and the potential for brine dilution. During wellfield construction, each production well will be tested and analysed immediately after construction.

Well depths, well filters, and well casing blind intervals sealed from pumping were designed based on the following factors:

- Location of lithium-bearing brine zones;
- Location of aquifer zones with comparatively large hydraulic conductivity;
- Location of existing fresh or brackish water zones, and/or future potential for brackish water to enter the wellfield.

The average production well depth in the proposed wellfields is approximately 280 m, and the screened interval of the well where brine can enter the well ranges from 100 – 300 m below surface. However, because substantial areas of the wellfields require additional infill characterization, actual depths and completion zones will be determined in the field based on observation of geotechnical conditions at each proposed well location. Therefore, modifications to individual well construction plans will be undertaken as necessary during construction drilling, based on the actual conditions observed.

Fresh and brackish water zones occur in both proposed wellfield areas. In addition to the upper zones being brackish water in the eastern part of the basin, there are nearby wells to the east of the proposed southwest wellfield where brackish water was also observed in the upper aquifer zones. Therefore, in both wellfields, production wells are designed to seal off the upper part of the aquifer system and in effect, reduce the downward movement of fresh and brackish water into the production zones of wells. Although some subsurface variations exist between the two wellfields, the general design is to seal off approximately the upper 60 m of aquifer at each production well in the Southwest wellfields and approximately the upper 100 m of aquifer in the East wellfield.

The East Wellfield (Stage 1) is designed with 8 operating wells plus one on standby (at peak flowrate seasons). These wells will be equipped with pumps and manifolds to the distribution pipeline. Wells will be cycled on and off as needed to reduce the potential for over-pumping at any given well that could result in excessive drawdown, increased pumping lift, and extra energy costs. Wells on standby will be ready to be turned on when well maintenance or pump repair/replacement is required at other wells.

The materials considered for the brine well area pipelines are HDPE and cross-linked polyethylene (PEX). The maximum capacity of the brine well pumps for this area will be 115 m^3/hr each. Each wellfield pump will have a wireless data link to the process plant data acquisition system (SCADA) with remote start/stop capability. Each pump will also have its own dedicated diesel generator and diesel storage tank with three days storage capacity.

16.3 Well Pads and Infrastructure

Infrastructure in the wellfield will include well pads, access roads and power generation. Each brine well will have its own generator and diesel storage tank, and each tank will have a residence time of 72 hr. A diesel truck will feed the diesel tanks to keep the diesel generators running. All wells will be connected by road to the booster station. Drilling pads will be elevated to as much as 1.5 m above the salar surface to mitigate flooding risks. Drill pad dimensions will have a platform area sufficient to house the required diesel generators and control instrumentation.

16.4 Equipment

Mobile equipment will be required for plant operations (Table 16-1). Some transport services will be contracted out to local companies; however, in most cases the equipment will be owned and operated by Galaxy. Galaxy will provide fuel and servicing for all vehicles, except for reagent and product logistics.

Table 16-1: Plant Mobile Equipment List

Vehicle	Quantity Stage 1	Quantity Stage 2
Grader	2	3
Front end loader	2	4
Excavator	2	3
Roller	2	4
30 t truck	3	6
Transport bus	4	6
Mobile crane	1	2
Manitou telehandler	1	1
Diesel truck	1	1
Water cart	1	1
Utility vehicles	10	15
Forklift	5	10

All ponds will be harvested using specialized, Galaxy-owned machinery, such as:

- Excavator CAT 330 or equivalent: perimeter trenches and cut trenches;
- Front loader CAT 980 or CAT 990 or equivalent: stacking and loading;
- Trucks CAT 730 or Mercedes Benz Actros 4144 or 3336 or equivalent: 3 – 4 per front loader, depending on the stockpile distance;
- Motor grader CAT 140H or equivalent: brine management control, finishing;
- Roller CAT CS-431 or equivalent: finishing.

The lithium carbonate product will be packed into 1-m^3 big bags and loaded onto semi-trailers with side lifters. Trucks will transport the lithium carbonate to the port of Antofagasta in Chile. Lithium carbonate and reagent transport logistics will be outsourced to a local company.

During the first 2 years of operation, Galaxy-owned trucks with a 30-t load capacity, designed for loose bulk wet solids, will be used to transport the magnesium hydroxide and calcium sulphate that will be precipitated as discards from different areas of the lithium carbonate plant. This material will be transported to the co-disposal area. To move the total amount of solids, several bins will be used to alternate bin loading. Trucks for discard transport will be necessary from Year 2 onward.

Thirty-tonne trucks will be used for maintenance and general freight movement around the site. Mobile cranes with 20-t load capacity will be retained at the site for general maintenance. Forklift trucks will be used at the plant for loading lithium carbonate, handling reagents, maintenance workshop and for the general store. Front-end loaders with backhoe will be required for general site maintenance, such as clearing drains. Water trucks (for dust suppression), graders and rollers will be required for road maintenance on the site and for roads leading into the site.

17 RECOVERY METHODS

The process design is based on the testwork discussed in Section 13, and the numerical modelling in Section 15. The selected process for Sal de Vida is shown in Figure 17-1. The process plant will operate year-round, with a planned plant availability of 8,000 hours per year. The surge capacity of the buffer ponds will allow the plant throughput to remain constant, while the evaporation rate and pond throughput will vary seasonally.

17.1 Process Design

The process will commence with brine extracted from wells extending to a depth of up to 300 m into the salar. Brine will be pumped to a series of evaporation ponds at a seasonal rate ranging from 53 L/s in winter to 154 L/s in summer, where it will be evaporated to increase the salt concentration beyond the NaCl saturation point. NaCl will precipitate as halite solids that will collect at the bottom of the ponds.

The evaporated brine will be fed into the process plant liming circuit, where it will be combined with a slaked lime ($Ca(OH)_2$) slurry. The lime will react with magnesium and boron ions in the brine, removing these impurities as solid magnesium hydroxide ($Mg(OH)_2$) and borate salts. The solids will be separated from the brine and report to a discard facility.

The limed brine will be fed to another series of evaporation ponds and will be further concentrated, exceeding the saturation point of KCl and causing it to precipitate together with the NaCl as a mixture of halite and sylvite salts (muriate). A small amount of gypsum ($CaSO_4 \bullet 2H_2O$) will also be precipitated.

The concentrated brine will be sent back to the process plant, where it will be softened to remove the remaining magnesium ions as well as the calcium. The softening circuit will use a combination of both caustic soda (NaOH) and sodium carbonate (Na_2CO_3) for pH management and divalent ion removal. The solids will once again be separated and discarded.

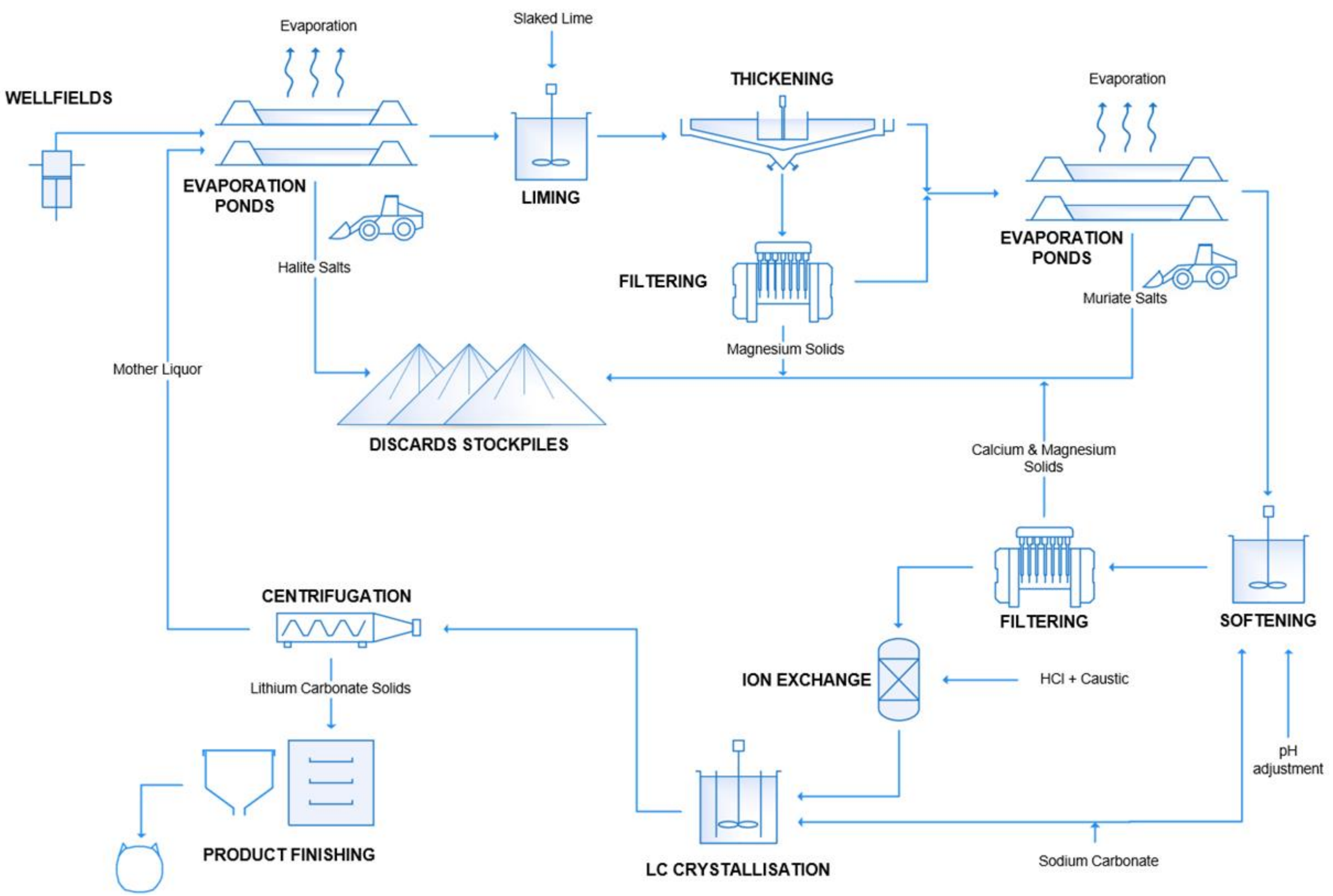
The clear softened brine will be pumped through a conventional Ca/Mg IX circuit in a lead–lag–regeneration configuration to ensure that trace magnesium and calcium ions still present in the brine are removed. HCl and NaOH or water will be used for stripping and regeneration of the IX resin respectively.

The softened brine will be sent to the lithium carbonate crystallisation circuit to crystallise lithium by combining the brine with sodium carbonate at elevated temperatures to produce lithium carbonate. The lithium carbonate solids will be recovered while the liquor will be recycled back into the process.

Finally, the lithium carbonate solids will be processed through a product finishing circuit for drying, cooling, micronizing and bagging.

The process was simulated using an internally-developed evaporation pond model, together with a METSIM simulation of the process plant.

Figure 17-1: Sal de Vida Simplified Process Flow Diagram



Note: Figure prepared by Galaxy, 2022. LC = lithium carbonate.

17.1.1 Halite Evaporation Ponds

The objective of the halite evaporation ponds is to evaporate the brine to reduce the volume that must be processed through the liming plant, while also increasing the lithium concentration. In the process, sodium and chloride impurities will reach saturation and will be precipitated as halite salts. The brine will be evaporated until the lithium concentration reaches 0.7% by weight.

The key parameters used in the pond model are the concentration of magnesium at the inlet and outlet of each pond, and the outlet brine required. For the first pond in the sequence, the inlet concentration was known from analysis of the raw brine from the wellfields. For the final pond in the sequence, the required magnesium concentration is the value in the concentration path data corresponding to a concentration of 0.7% Li. For all other ponds, the inlet and outlet magnesium concentrations were determined iteratively, such that sequential ponds would decrease in area as their average brine concentration increased. This approach was taken to minimise the impact of leakage on lithium recovery (leakage is proportional to area, so it was preferred to minimise the area of ponds with a higher lithium concentration).

The ions included in the pond brines will be Mg^{2+}, Ca^{2+}, Na^{+}, K^{+}, Li^{+}, Cl-, SO_4^{2-} and B (present as a variety of borates). In the halite ponds the sodium saturation value is based on the concentration path correlations (see Section 13.1.9).

17.1.2 Liming

The objective of liming is to remove magnesium from the brine. Brine will be treated with milk-of-lime, a hydrated (slaked) lime slurry as $Ca(OH)_2$, to precipitate magnesium as $Mg(OH)_2$. Other solids produced will include borate solids and gypsum ($CaSO_4 \bullet 2H_2O$). The slurry of limed brine and precipitated impurities will be sent to a thickener for solid–liquid separation. The underflow will be combined with the solids from the softening circuit and filtered in the primary liming filter. The filtrate will be recombined with the thickener overflow—this clear liquor will be the limed brine that is pumped to the muriate ponds for further evaporation.

17.1.3 Muriate Evaporation Ponds

After liming, the clarified limed brine will be pumped to the muriate ponds for further evaporation, to bring the lithium concentration up to 1.7% by weight. The principles behind the muriate ponds are very similar to those of the halite ponds, and they were modelled with the same evaporation pond model. The key difference with the muriate ponds is that the brine will be evaporated beyond the saturation point of KCl, such that significant amount of sylvite salts will be precipitated along with the halite. Some calcium will also be precipitated as gypsum. A set of evaporation curves were developed by evaporating limed brine from the pilot plant on site (Section 13.1.9).

17.1.4 Softening

Once the target lithium concentration of 1.7% is achieved, the brine must be softened to remove calcium and magnesium impurities. . The brine will be heated using a two-step process at mild temperatures (~20°C) and sent to a series of six softening and mixing tanks to allow the brine to react with all reagents. The addition of 25% soda ash (sodium carbonate) solution in the softening circuit will enable the precipitation of magnesium hydroxide and calcium carbonate, as solids within the brine and pH adjustment.

Filtration will be used to remove the calcium and magnesium precipitates from the brine. This will be achieved by using a plate and frame filter to remove the bulk of the solids. It will be followed by a secondary filtration stage for final polishing. The result will be a clarified softened brine with near-negligible calcium and magnesium concentration. The clarified softened brine will be conditioned before it is fed into a Ca/Mg IX circuit. The Ca/Mg IX circuit will be a standard circuit, consisting of three columns, in a lead–lag–regeneration, merry-go-round configuration. Small amounts of HCl and NaOH or RO water will be used for stripping and resin regeneration. The treated softened brine will then be stored in two softening filtrate tanks to be used as feedstock for crystallisation.

The filter cake will be pumped to the liming circuit where it will be combined with the liming thickener underflow prior to filtration. The combined reject filter cake reports to the discard facility.Lithium Carbonate Crystallisation

Lithium carbonate will be recovered from the purified brine by a crystallisation reaction with sodium carbonate at elevated temperatures of about 84°C:

$$2\mathrm{LiCl}_{(\mathrm{aq})} + \mathrm{Na_2CO_3}_{(\mathrm{s})} \rightarrow \mathrm{Li_2CO_3}_{(\mathrm{s})} + 2\mathrm{NaCl}_{(\mathrm{aq})}$$

Sodium carbonate will be added as a solution at a concentration of 25%. The reaction will be performed in a series of heated mixing tanks (crystallisers) operated at 84°C. Higher temperatures increase the crystallisation efficiency because lithium carbonate solubility decreases with increasing temperature. The temperature will be limited by the low air pressure, given the altitude at Sal de Vida, which will reduce the solution boiling point. Ideally, the circuit will be run at just below the boiling point. A seed recycle stream of lithium carbonate crystals will be implemented to improve crystal growth by providing the precipitating lithium carbonate with a surface on which to grow.

After crystallisation, the lithium carbonate solids will be recovered from the mother liquor by a hydrocyclone and a centrifuge. The solid cake will be subjected to a displacement wash on the centrifuge, before being conveyed to product finishing for drying and micronizing.

17.1.5 Product Finishing

The purpose of the product finishing circuit is to perform the final physical operations required to make the lithium carbonate suitable for transport to customers.

First, the lithium carbonate solids will be dried to <1% moisture, before being filtered and cooled. The solids will be micronized and iron contaminants will be removed magnetically. The micronized product will then be bagged for transport.

17.2 Process Facilities

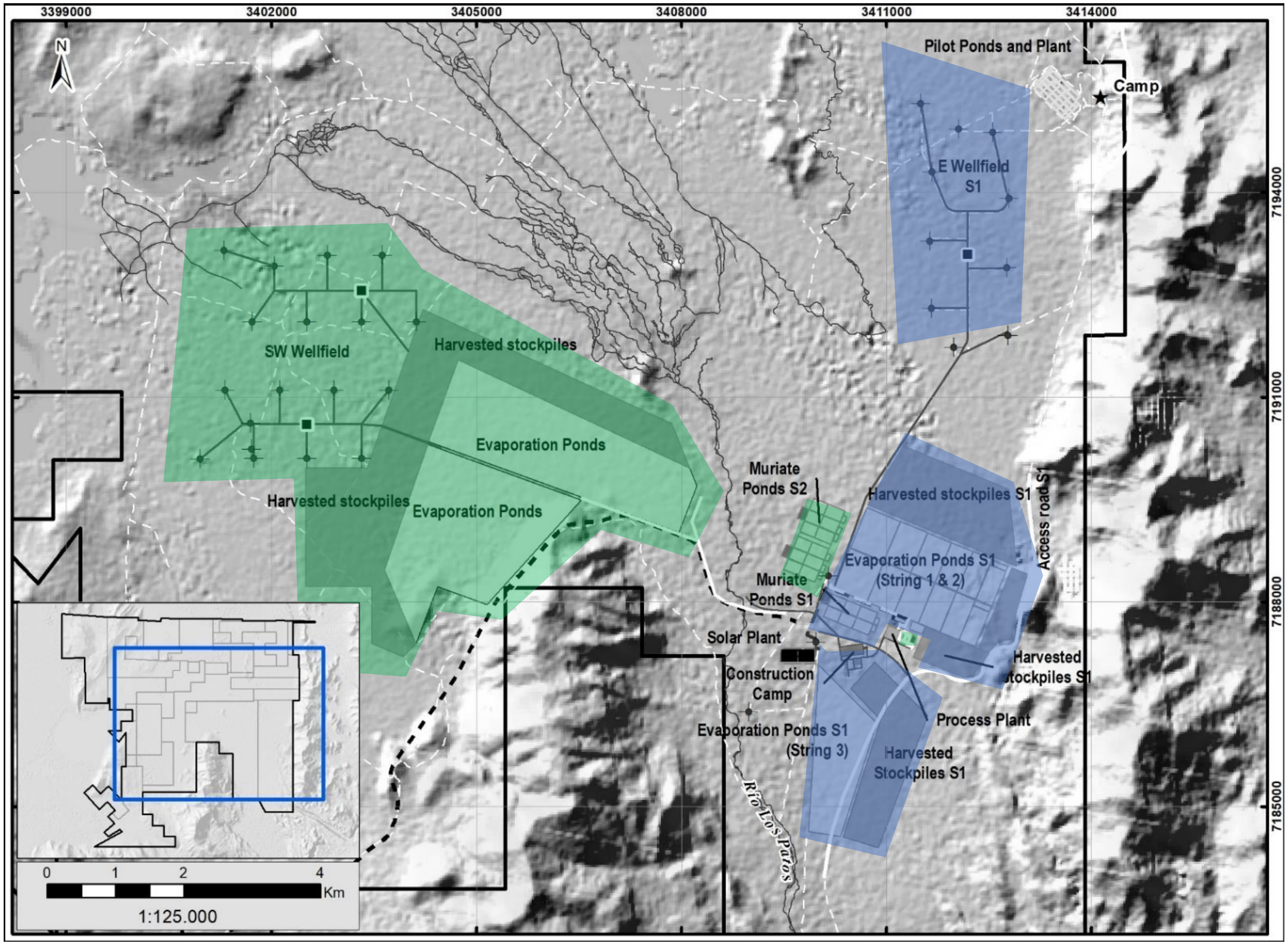
The process facilities have been divided in the following main areas:

- Wellfield and brine distribution;
- Solar evaporation ponds;
- Production plant (liming and lithium carbonate plant);
- Waste disposal.

As seen in Figure 17-2, the East Wellfield for Stage 1 will be located directly above the east sub-basin of the Salar del Hombre Muerto over the salt pan. Stage 1´s ponds will be located in two areas directly south and Stage 2´s ponds will be located southeast of the Southwest Wellfield. The brine distribution system will traverse the salar toward where the evaporation ponds will be located. The location of the ponds has been determined based on a number of a factors including optimal constructability properties and minimising earthworks, environmental impact and risk of flooding.

The processing plant for all stages will be sited in the centre of to Stage 1's evaporation ponds. A road system, including ramps and causeways, will connect the processing facilities and provide access to all working areas. The waste disposal areas will surround the evaporation ponds to the north, east and southeast. Figure 17-2

Figure 17-2: Sal de Vida Layout Plan



Note: Figure provided by Allkem, 2022. Blue areas represent Stage 1, green areas Stage 2 facilities.

17.2.1 Wellfield and Brine Distribution

17.2.1.1 Wells

The first step in the lithium recovery process is the extraction of brine from the hydrogeological reserve via well pumps. The wellfields and associated infrastructure are described in Section 16.

17.2.1.2 Booster Station

A booster station will mix brine from the different wells, both acting as a buffer for the seasonal flow changes and as a brine pumping station to reach the halite ponds. The station will consist of two booster station ponds, which will operate in parallel based on volume requirements. During summer, both ponds will operate; during winter, only one pond would be used. These ponds will be regularly cleaned; the cleaning frequency will depend on the amount of salt that may precipitate out on the pond bottom.

Five transfer pumps will be located at the pond outlets, operating with four pumps on duty and one on standby. Pumps will have a wireless data link to the process plant SCADA system with remote start/stop capability.

Stage 1 design includes one booster station in the East Wellfields. Stage 2 will require two booster stations in the Southwest Wellfield.

17.2.1.3 Brine Distribution

The brine distribution system will connect all wells with the booster station. From there, brine will be pumped to the evaporation ponds. The piping system requires separate lines from each pump station to the booster ponds. From the booster ponds three booster pumps will feed a single pipeline, which will deliver brine to the evaporation ponds. The design includes trenches for laying pipelines and suitable ground-anchoring systems. Pipeline design includes section divisions at 100-m spacing for pipeline flushing/cleaning. The pipeline materials for this area will consist of HDPE and PEX. Instrumentation will be implemented accordingly for these areas.

Brine well instrumentation will include instrumentation for the operational safety of the pumps (pressure and temperature) as well as instrumentation to monitor process variables (e.g., liquid level in each well and brine flow from each pump). In the booster station area, instrumentation will be required for the booster station ponds and the outlet pumps. The booster station ponds will monitor the brine levels, through the use of radar sensors, and sending the data collected to the control system. The booster station pumps will have instrumentation for pump operational safety (e.g., measuring pressure and temperature) as well as instruments that will measure process variables (e.g., total brine flow to the pumps).

17.2.1.4 Operations

The average flow from the brine wells to the first evaporation ponds will be approximately 159 L/s for Stage 1 and 316 L/s for Stage 2. This figure is supported by the process mass balance and brine well capacities. Maximum flow is expected each November, of 255 L/s (summer) and minimum flow is projected for each July, of 80 L/s (winter), for Stage 1. Maximum and minimum flows for Stage 2 will be 510 L/s and 160 L/s respectively. The brine well pumps are designed for maximum flow during summer, but during average and wintertime flows, the rate would be regulated through the use of a variable speed drive (VSD) for each pump. Each Stage 1 well is projected to pump at a rate of 115 m^3/hr during the summer period, and an average of 72 m^3/h throughout the year.

17.2.2 Solar Evaporation Ponds

The solar evaporation pond system will consist of a series of halite and muriate evaporation ponds, which will concentrate brine suitable for feeding a lithium carbonate plant. The evaporation ponds for Stage 1 will be located in two areas on the northeastern corner and southeastern edge of the Río de los Patos alluvial fan, over a large gravel field directly south of the East Wellfield and above the salar, covering a total area of approximately 450 ha. The halite evaporation ponds for Stage 2 will be located on the northwestern corner of the Río de los Patos alluvial fan, over a large gravel field directly southeast of the Southwest wellfield covering an area of approximately 850 ha. The muriate evaporation ponds for Stage 2 will be located next to the Stage 1 halite ponds and will cover approximately 50 ha.

17.2.2.1 Halite Ponds

Halite ponds for Stage 1 will be arranged in three strings which will operate in parallel. Strings 1 and 2 will be located immediately north of the process plant in the northeastern corner of the alluvial fan and String 3 will be located about 1.5 km southeast of the process plant. Each string will contain six cells plus a buffer pond with the flow from one pond to the next in series. The halite system will have a total surface area of approximately 400 ha, divided evenly among the three strings. The key assumptions that were used in the halite pond design were:

- Average evaporation rate of 2,700 mm/a;
- Evaporation derating factor of 0.7 for pond size;
- Evaporation derating for brine activity based on empirical correlations with Mg and Li;
- Availability derating based on estimated harvesting times (approximately 91% on average);
- Average leakage rate of 0.03 mm/d;
- Lined ponds;
- Depth of 1.2 m including 0.3 m freeboard.

A 0.3 m permanent salt bed layer will be maintained on the pond base to protect the liner during harvesting. That layer would not be harvested. A maximum 0.3 m high harvesting layer will be formed on top of the salt bed layer and the liquid pond depth will be controlled to stay around 0.3 m above the harvest salt layer.

Pond construction will consist primarily of cut-and-fill earthworks and, if required, local quarry material would be introduced. The ponds will be lined with a geomembrane that would consist of a HDPE layer installed above the soil to waterproof the ponds.

17.2.2.2 Muriate Ponds

The muriate ponds will be located south of the Stage 1 halite ponds strings 1 and 2, adjacent to the process plant. The muriate pond system will consist of a muriate buffer pond, two strings of muriate ponds operating in parallel with three cells each, and two concentrated brine storage ponds. Brine will flow from one pond to the next in series. The system will also include a mother liquor buffer pond located between the process plant and Strings 1 and 2 of the halite ponds. The muriate system will have a surface area of approximately 26 ha for Stage 1 and 52 ha for Stage 2.

The key assumptions used in the muriate pond design include:

- Average evaporation rate of 2,700 mm/a;
- Evaporation derating factor of 0.7 for pond size;
- Evaporation derating for brine activity based on empirical correlations with Mg and Li;
- Availability derating based on estimated harvesting times (approximately 91% on average);
- Average leakage rate of 0.02 mm/d;
- Lined ponds;
- Depth of 1.2 m including 0.3 m freeboard.

A 0.3 m permanent salt bed layer will be maintained on the pond base to protect the liner during harvesting. That layer would not be harvested. A maximum 0.3 m high harvesting layer will be formed on top of the salt bed layer and the liquid pond depth would be controlled to stay around 0.3 m above the harvest salt layer.

Pond construction will consist primarily of cut-and-fill earthworks and, if required, local quarry material would be introduced. The ponds will be lined with a geomembrane that would consist of a HDPE layer installed above the soil to waterproof the ponds.

17.2.2.3 Pond Infrastructure

Weirs will be used to transfer brine between the same pond types. Weirs will have a width of 5 m to allow for the correct flow between the ponds. The connection between ponds through weirs will allow for a constant natural flow from one pond to the next and will keep the same brine level in all ponds, reducing pump usage. Since the brine transferred between ponds is saturated, the weirs will have to be periodically cleaned to reduce salt accumulation. For brine transfers over longer distances (i.e., between halite and muriate ponds) pumping will be required. The pump type and size will depend on application. The expected maximum flow is 450 m^3/hr. All pumps and pipelines will have a connection point to periodically flush any salt scaling build-up. The washing frequency will be determined during operations.

The road system will connect all of the processing facilities and provide access to the working areas. Roads, ramps, and causeways will be designed based on the vehicle types that will be used. In the evaporation ponds area, roads will be designed to externally circumnavigate the berms. These roads will be designed with a width that is sufficient to allow the transit of harvest trucks, which will be operating during salt harvest from each pond. A ramp will be constructed during pond harvest using harvested salts from previously harvested ponds to allow the truck access into each pond. Internal roads for light vehicles, buses, and heavy vehicles supplying reagent or diesel, will be constructed for production plant support.

17.2.2.4 Operations

The first process step will consist of pumping brine into the halite ponds to initiate lithium concentration through evaporation. Evaporation will result from the combination mostly of solar radiation, wind, temperature and relative humidity. The evaporation area required was calculated based on the expected evaporation rates and the well flow rates.

Halite salts (primarily sodium chloride) will precipitate and deposit in the pond bottom. To avoid increasing the bottom salt level inside each pond above an optimal operational level, these salts will be periodically harvested, and stockpiled in accordance with environmental requirements.

The muriate ponds will be physically located adjacent to the halite ponds and will consist of two strings. Brine will be transferred from the muriate buffer pond to each muriate pond string. The muriate ponds have the same design basis as the halite ponds (depth, liner, layer depth) and will also be harvestable. When the brine reaches a concentration of ~21 g/L, it will be stored in a set of concentrated brine storage ponds, from where the brine would be fed to the lithium carbonate plant.

The concentrated brine storage ponds will act as buffer ponds to accommodate seasonal flow variations.

All evaporation ponds will be harvestable, with a harvesting frequency of approximately once a year. The estimated annual total of salt harvest from the halite ponds is 1.4 million tonnes per annum (tpa), and from the muriate ponds is 79,000 tpa for Stage 1 of the Project. For Stage 2, the annual salt harvest will be 2.8 million tpa, and 158,000 tpa for halite and muriate ponds respectively.

The total brine level in each pond, the total salt level in each pond and the chemical composition will require control. The total brine level of the ponds and the salt level will be measured manually or through topography. The chemical composition will be measured through laboratory analysis of a manually taken brine sample. The inlet flow will be measured in four places:

- At the inlet to the first halite pond of each string;
- At the inlet to the first muriate pond of each muriate string.

Flow rates will be monitored using flowmeters and tracked in the control room via a control system. Flow rates will depend on seasonal fluctuations.

17.2.3 Process Plant

The process facilities will consist of a lithium carbonate plant, with a liming plant and associated plant infrastructure, such as the power station, fuelling and workshops. The process facilities will be located in an area adjacent to the muriate ponds south of the Stage 1 halite ponds.

17.2.3.1 Liming Plant

The liming plant will have a total of the following equipment:

- Liming mixing tanks;
- Heat exchangers;
- Storage tanks;
- Hoppers;
- Press filters;
- Thickeners;
- Pumps;
- Sump pumps.

The pump types to be used will depend on the specific application, and pump sizes would vary between 20 – 100 m^3/hr. Pipeline material will also depend on the specific application.

17.2.3.2 Softening Stage

The softening stage will include the following equipment:

- Softening mixing tanks;
- Heat exchangers;
- Storage tanks;
- Storage hoppers;
- Press filter;
- Polishing filters;
- Ion exchange columns;
- Pumps;
- Sump pumps.

The pump type to be used will depend on the specific application in this area, and pump size will vary from 4 – 67 m^3/hr. Pipeline material will also depend on the specific application.

17.2.3.3 Crystallisation Stage

The crystallisation stage will consist of the following:

- Crystallisation mixing tanks;
- Heat exchangers;
- Storage tanks;
- Storage hoppers;
- Cyclones;
- Centrifuges;
- Cartridge filters;
- Pumps;
- Sump pumps.

The pump type will depend on the specific application in this area, and pump sizes will vary from 7 – 69 m^3/hr. Pipeline material will also depend on the specific application.

17.2.3.4 Product Finishing

The main equipment requirements in the product finishing plant include:

- Belt conveyors;
- Hoppers;
- Screw feeders;
- Drying system (includes air heater, dust collector and air heat exchanger);
- Transport filter;
- Chiller hopper;
- Magnets;
- Vibrating screen;
- Bagging system (includes storage hopper, samplers, vibrator and conveyor for final product big bags);
- Product storage shed.

17.2.3.5 Reagents Area

Each reagent will have its own preparation area, with equipment consisting of feed hoppers, mixing tanks and storage tanks. Reagents will be transported to the plant site in a solid state and be prepared based on the process requirements.

17.2.3.6 Operations

When the brine reaches a suitable lithium concentration in the halite ponds (8.9 g/L, 0.7 wt%), it will be stored in three liming plant buffer ponds, designed to store brine and handle all seasonal variations in the brine flow. From these buffer ponds, brine will be fed to the liming stage, which is the first purification process that requires the addition of reagents. A solution of milk-of-lime ($Ca(OH)_2$) will be added to the brine inside agitated mixing tanks that will operate in series, increasing pH and precipitating magnesium as magnesium hydroxide, as well as removing other unwanted elements from the brine, such as boron and sulphates. The limed brine will be pumped to solid – liquid separation equipment (thickeners and press filters), to separate the precipitated solids from the lithium-concentrated brine. The solids will be sent to a final disposal area. The lithium-concentrated brine will be pumped to a muriate buffer pond and distributed to the muriate ponds. It will be evaporated to ~21 g/L Li and will be stored in the concentrated brine storage ponds, which will handle all seasonal variations in the brine flow similarly to the liming buffer ponds.

The lithium carbonate plant was designed to produce 15,000 tpa of lithium carbonate in Stage 1, with Stage 2 enabling the production of an additional 30,000 tpa. This design was based on average brine supplies of 26 m^3/hr and 52 m^3/hr for Stage 1 and 2 respectively, and an average lithium concentration of 21 g/L in the softening feed. The plant will operate continuously with a design availability of 91%.

Brine coming from the concentrated brine storage ponds will enter a softening stage, where magnesium and calcium will be removed from the brine. The brine will enter the plant at a temperature of around 0°C and will be stored in an evaporated brine storage tank where it will be diluted slightly with RO water. It will be heated to 20°C by a spiral heat exchanger and a plate heat exchanged in series, which will use recirculation of process streams and hot water respectively as heating agents. The heated brine will enter a group of six softening mixing tanks, which will operate in series, to allow the correct residence time for the brine to react with all reagents. Caustic soda will be added in the first mixing tank, and pH will be controlled in the third tank. The brine will be mixed with a sodium carbonate solution in the fourth softening mixing tans. Both reagents will react with the divalent ions left in the brine and precipitate magnesium hydroxide and calcium carbonate ($CaCO_3$), as solids within the brine. The brine and precipitated solids will be subject to a solid–liquid separation stage, to remove all solid contaminants, using press filters and polish filters. The lithium-concentrated brine will be sent to storage tanks to feed the ion exchange columns. Solid contaminants will be sent to a filter cake tank to be re-pulped with the liming area waste/discards and then sent to the discard facility.

The softened brine will be passed through ion exchange columns to remove any residual calcium and magnesium in solution. It will then be stored in two softening filtrate tanks to be used as feedstock for crystallisation.

Lithium-concentrated brine from the softening stage will feed the crystallization stage at a rate of 28 m^3/h for Stage 1 and 56 m^3/h for Stage 2 and will have a lithium concentration of around 14 g/L and will be contaminant-free. The first crystallisation step will consist of feeding the brine through a spiral heat exchanger and a plate heat exchanger operating in series, increasing the temperature of the brine from 21°C to 85°C. Hot mother liquor recycle will be used as a heating agent in the first heat exchanger. Saturated steam will be used in the second heat exchanger and will be obtained from a boiler. The heated brine will feed a group of five crystallisation mixing tanks that will operate in series. Sodium carbonate, with a concentration of 25% w/w, will be fed to the first and second crystallisation mixing tanks, where the reagent will react with the dissolved lithium contained in the brine and precipitate lithium carbonate as a solid inside the tanks. To separate the precipitated lithium carbonate with the brine solution, the crystallisation mixing tank outlets will feed a crystallisation cyclone cluster for dewatering. 50% of the cyclone cluster underflow, which is the precipitated lithium carbonate, will be returned to the crystallisation mixing tanks as a seed recycle. The other 50% cyclone cluster underflow will be sent to the centrifuge stage for lithium carbonate recovery and washing. The centrifuge stage will consist of three centrifuges operating in duty/duty/standby configuration. The centrifuge stage process will operate in batch mode. Each centrifuge will have specific loading, centrifuging, washing and unloading stages. The final washed, low-moisture content product will be fed to the product finishing stage. All equipment in the crystallisation stage will be thermally insulated.

17.2.3.7 Product Finishing

Following dewatering and washing in the centrifuge the wet lithium carbonate solids will be transported via a belt conveyor to a surge hopper and then via a steep incline belt conveyor to the dryer to reduce the moisture content to less than 1 wt%. The dryer is fed via a surge hopper to allow continuous operation, because the centrifuges discharge wet product for 5.5 minutes in a 22-minute cycle. A diverter gate before the surge hopper enables the bagging of wet product. Filtered ambient air will be preheated to 101 °C by the 149 °C exhaust air from the dryer and to 400 °C by an electric air heater before entering the dryer to remove moisture from the product solids. The solids entrained by the dryer exhaust air will be removed by the dust collector upstream of the air preheater. The cleaned air will be discharged to atmosphere, while the hot lithium carbonate solids at 149 °C will be discharged from the bottom of the dryer and dust collector via rotary valves and pneumatically transported to the bulk solids heat exchanger cooler to cool to 50 °C prior to transferring by pneumatic conveyance to the lithium carbonate hopper. The cooler will use RO water, which will then be directed to the hot RO water tank.

Product from the hopper will be fed via a rotary valve to the microniser through a grate magnet to remove ferrous (magnetic) contaminants. A portion of the filtered ambient air drawn from the downstream fan will entrain via a feed chute the product solids fed by a rotary valve to the air classifier mill. The remaining filtered ambient air will be combined with the solids transport air in the air classifier mill. The solids size will be reduced from 100% < 4 mm with a d50 of 55 – 57 µm to 100% < 40 µm with a d50 of 5 – 6 µm. The milled product solids will be collected by the air classifier mill bag filter and the clean air will be discharged to atmosphere via the mill fan. Lithium carbonate product in the lithium carbonate hopper, which will not be micronised will be pneumatically transported via a rotary valve to contaminants removal.

The product solids will be removed from the bottom of the air classifier mill bag filter by a screw feeder and then fed by a rotary valve to a circular vibrating screen to remove non-magnetic contaminants before conveyed to the downstream equipment. The removal of ferrous (magnetic) contaminants to a specification of <400 ppb is achieved, first by the RO water cooled dry vibrating magnetic filter and then by a grate magnet. Similarly, non-ferrous and ferrous contaminants in the non-micronised lithium carbonate product will be removed by a dedicated circular vibrating screen, dry vibrating magnetic filter and grate magnet.

The micronised BG lithium carbonate product will then be pneumatically transported to the product storage bin and then via a rotary valve packed into 1 ton (2-m^3) bulk bags and stored for export. The non-micronised lithium carbonate product will similarly be pneumatically transported to the non-micronised product storage bin and via a rotary valve packed into 1 ton (2-m^3) bulk bags and stored for export.

The bagging system will fill labelled maxi bags (or big bags) with solid lithium carbonate. Automatic sampling will be carried out in the storage bin inlet of the and manual sampling will be conducted on each filled maxi bag. All samples will be sent for laboratory analysis. The filled and sampled maxi bags will be stored in a product storage shed, prior to despatch. The storage shed will have a one-month storage capacity.

17.2.3.8 Waste/Discard Disposal

This facility will consist of halite, muriate, and co-disposal stockpiles surrounding the halite ponds and will cover a total area of approximately 300 ha for Stage 1 and 600 ha for Stage 2. All waste/discards from the process will be appropriately treated, stockpiled and stored to comply with corporate and environmental requirements.

The main process waste/discards will include:

- Solid discards from the evaporation ponds: these would consist of harvested salts from the halite and muriate ponds. These salts would be generated from around year two of production, since the salt layer and harvestable layer must be in place at the base of each pond before the first harvest can be undertaken. The estimated annual total of salt harvested and stockpile from the halite ponds is 1.4 million t/a, and from the muriate ponds is 79,000 tpa for Stage 1 of the Project. For Stage 2, the annual salt harvest will be 2.8 million tpa and 158,000 tpa for halite and muriate ponds respectively.;
- Solid-liquid waste/discards from the process plant:
    - Liming solid discards: primarily precipitated magnesium hydroxide, borate salts and gypsum. Around 80,000 dry tpa are estimated to be produced in Stage 1 and 160,000 in Stage 2;
    - Softening solid discards: primarily precipitated calcium carbonate and magnesium carbonate. Around 12,800 and 25,300 dry tpa are assumed to be produced in Stage 1 and 2 respectively, which are combined with the liming solids and transported by truck to co-disposal stockpiles;
    - Mother liquor that is not used in the process: a portion of the mother liquor generated from the lithium carbonate plant will be discarded as entrained moisture in the liming filter cake;
    - RO plant retentate;
    - Steam boiler retentate;
- Any sump pump solutions that cannot be recycled within the process.

The co-disposal area, approximately 300 ha in area for Stage 1 and 600 ha for Stage 2, will be used for the storage of both discards/waste from the process plant as well as harvested halite salts. Since the generation of solid-liquid discards from the process plant begin before the harvest of any salts from the pond, these discards will be treated differently during the first two years. During this period, all liquid discards generated from the process plant would be sent to an event pond, which will be located near the plant. After year two of production, the event pond will only be used for unprogrammed events such as flooding or plant spills. All process plant solid discards from that point onward will be sent to the co-disposal area for stockpiling.

From year two of production onward, the solid salts harvested from the halite evaporation ponds will be sent to the same co-disposal area and will be deposited around the initial two years of solid stockpile that will have built, generating a containment dam. From year two of production onward, both liquid and solid wastes from the process plant will be mixed in a tank located near the production plant and will be sent as a pulp (or slurry stream) to the co-disposal area, to be co-disposed in the containment dam within the halite salts. This setup will operate for the remainder of the Project life.

Not all harvested halite salts will be sent to the co-disposal area. Some halite salts will be stockpiled separately to be used as construction material for future evaporation ponds. These salts will be sent by truck directly to the halite stockpile area. The total area required for the halite stockpile is 93 ha.

All muriate salts that are harvested will be separately stockpiled. These salts will be sent by truck directly to the muriate stockpile area, after being harvested. The total area required for the muriate stockpile is 10.7 ha for Stage 1 and a further 21 ha for Stage 2.

The infrastructure in the stockpile and co-disposal areas will consist of:

- Access roads to each stockpile and co-disposal area, accessible by trucks and light vehicles;
- Containment system such as low-height berms, for any liquids that may permeate from the salt stockpiles.

No other major infrastructure is required for this area.

17.3 Process Control Strategy

Process control will be achieved using the supervisory control and data acquisition (SCADA) system, which will consist of computers, networked data communications, and a graphical user interface for process supervisory management at a high level. The SCADA system will interact with PLCs to continuously monitor the input values from sensors and the output values for actuator operations. Operators will interface with the SCADA system using a PC-based operator interface terminal (OIT) from the process plant control room.

17.4 Consumables and Reagents

17.4.1 Water

Raw water will be pumped from Well SVWF 12_19 to the raw water storage tanks. From these tanks, the raw water is distributed around the plant including lime slaking, product cooling and RO water production. RO water will be produced from raw water by an onsite RO plant and will be used for sodium carbonate and caustic preparation, as hot water for process heating and as feed for the demineralisation plant. The demineralisation water will be used as boiler feed water. Other than the raw water stream, the only water input to the process will be the raw brine. Water will exit the process through pond evaporation, entrainment in harvested salt deposits, pond leakage, process discard streams (which include RO and demineralisation retentate as well as filter cake discards), general water losses from evaporation throughout the process plant, and as entrained moisture in the lithium carbonate product.

17.4.2 Steam

Steam will be used for sodium carbonate storage and crystallisation heating, mixing and thickening. Steam will also be used to heat RO water. The steam boiler will be housed in a dedicated building with fire-resistant walls. The boiler for Stage 1 will produce 6.6 t/hr of saturated steam ~5 bar g.

A diesel bulk tank and the deaerator tank will be located outside the building.

17.4.3 Compressed Air

The process plant will require compressed air for the main equipment and instrumentation. For all users the quality will be 1-2-1, based on ISO 85731 specifications. The supply will include dry air vessel, three screw compressors, filters and an adsorption dryer unit.

17.4.4 Reagents

Lime will be delivered as quicklime in solid granule form and will be slaked with raw water to produce hydrated lime slurry for the liming circuit.

Sodium carbonate (soda ash) will be delivered in solid powder form and dissolved in RO water to produce sodium carbonate solution for the softening and lithium carbonate crystallisation circuits.

Caustic soda will be delivered as a solid and dissolved in RO water to produce a 50% caustic soda solution.

17.4.5 Power

Power requirements for the process operations are provided in Section 18.

18 PROJECT INFRASTRUCTURE

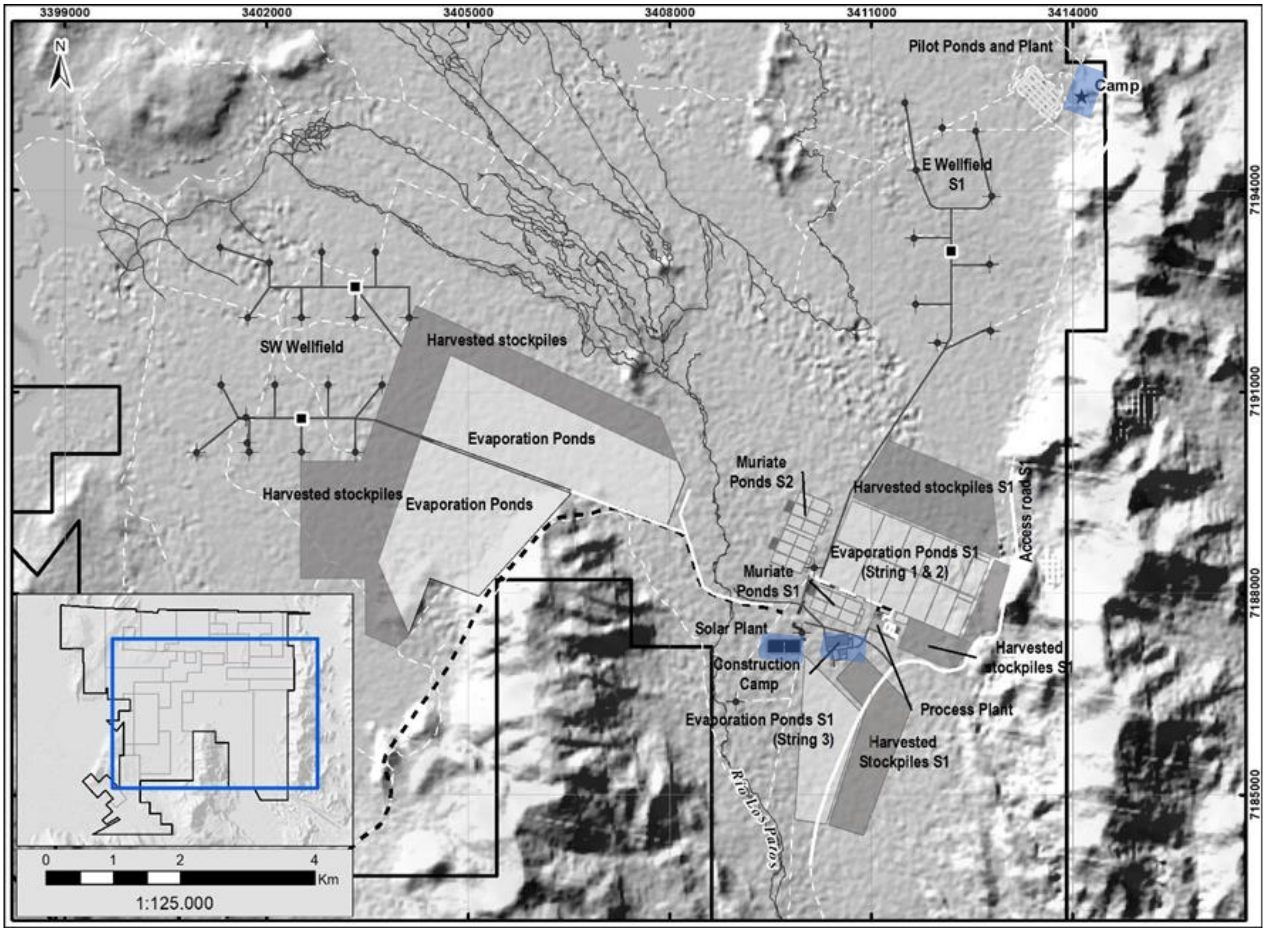
18.1 Introduction

Infrastructure required to support the 2021 Feasibility Study is divided into process infrastructure (see Section 17), and non-process infrastructure. The non-process infrastructure includes:

- Raw water and RO water;
- Demin water;
- Power generation and distribution;
- Fuel storage and dispensing;
- Construction camp to accommodate up to 600 people;
- Sewage treatment plant;
- Fire protection system;
- Buildings;
    - Process plant buildings;
    - Reagent storage and preparation building;
    - Product storage building;
    - Maintenance workshop;
    - Equipment storage;
    - Vehicle workshop;
    - Boiler building;
    - Site access security control;
    - Administration offices;
    - Canteen;
    - First aid building;
    - Electrical and control rooms;
    - Other buildings;
- Site roads, causeways and river crossings;
- Communications and control system;
- Steam generation and water heating;
- Compressed air system;
- Drainage system.

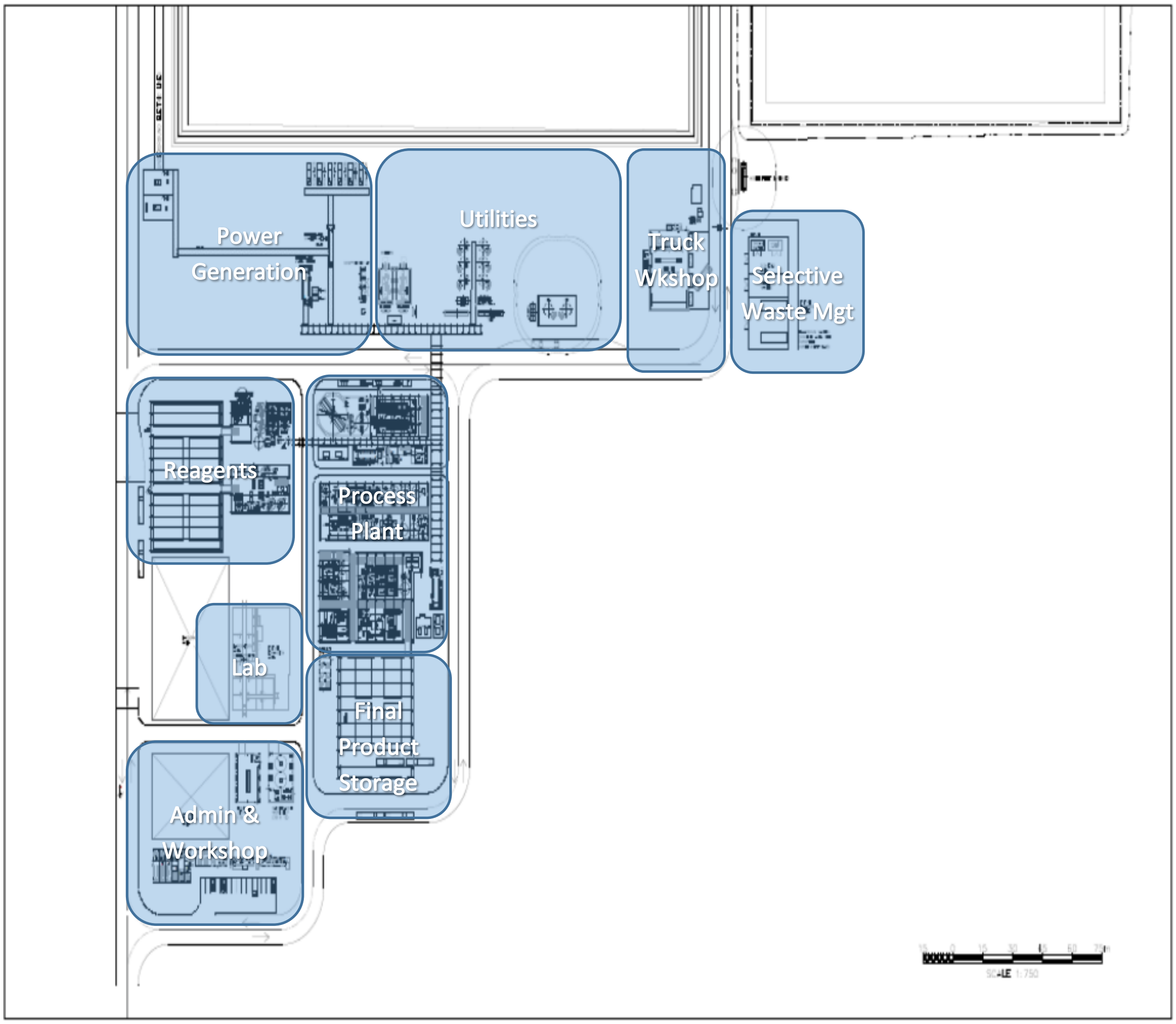
A location plan showing the major non-process infrastructure is included as Figure 18-1 and Figure 18-2.

Figure 18-1: Non-Process Infrastructure Layout Plan



Note: Figure provided by Allkem, 2022. Main non-process infrastructure.

Figure 18-2: Process Area Infrastructure



Note: Figure provided by Allkem, 2022.

18.2 Roads and Logistics

Site roads will range from 6 – 11 m wide depending on the traffic requirements. The road elevation will be sufficient to maintain the roads as operable throughout normal weather conditions. The road surface will be treated with local material from borrow pits. Maintenance will be performed periodically, and salt will be used, once available, to strengthen and provide longevity to the roads.

Since the salar is prone to flooding during the rainy season, suitable road embankments will be constructed to allow permanent access. Causeways connecting the East wellfield will consist of 3.6 m wide single lane roads with stopping bays constructed at an elevation 0.5 m. During operations, salt harvesting material will be used to further elevate the causeways up to 1.5 m above the surface of the salar and allow sufficient height for insertion of drainage pipes where required.

The main access road connecting site with the national road network traverses the Río de los Patos and the Río Aguas Calientes. Two river crossings are required to enable inbound/outbound logistics. The design will consist of a culvert constructed with 1 m galvanised corrugated steel pipes packed with medium/large gravel material. A geomembrane will separate the culvert from the traversing road to stop the vertical movement of fine material.

18.3 Built Infrastructure

The infrastructure will contain two types of buildings: site erected steel buildings and modular steel buildings/rooms:

Erected Buildings:

- Maintenance Workshop – Area 600;
- Equipment Storage – Area 600;
- Vehicle Workshop – Area 600;
- Reagent Storage – Area 3500;
- Reagent and Consumable Preparation Building – Area 3500;
- Quick Lime Plant Building – Area 3500;
- Liming Plant Building – Area 3100;
- Softening Plant Building – Area 3200;
- Crystallization Plant / Product Finishing Building – Area 3300/3600;
- Product Storage – Area 3600.

Modular Buildings/Rooms:

- Boiler Building – Area 500;
- Vehicle support module;
- Administrative Building;
- General restrooms;
- Lunchroom;
- Changing room;
- First aid;
- Access control;
- Truckers room;
- Control Room;
- MV Electric room;
- LV Electric room.

There will be four separate process buildings. The Reagent Preparation building will have three storage areas, one each for quicklime, caustic, and sodium carbonate. The Product Storage building will have a storage capacity of 1,438 t of product and will be connected to the bagging area by a covered, closed corridor.

The Liming building will have multiple areas for circuits required to remove magnesium from brine. The Softening building will have a dedicated room containing all necessary circuits including mixing tanks, filters, treatment tanks and ion exchangers, to precipitate and extract any remaining magnesium and calcium, prior to the Crystallisation stage. The Crystallisation and Product Finishing stages will be placed in one single building to optimise the operation and the footprint. The centrifuge area will be located in the same building. The Product Storage building will contain the final lithium carbonate product bagged in 2-m^3 bulk bags. The filled bags will be sealed and stored, ready for transportation in flatbed trucks. Each bag will have a unique bar code attached to it so that it can be traced.

The maintenance workshop will consist of a general open area with two column-mounted jib cranes, workbenches, and different dedicated areas for mechanical repairs, electrical repairs, painting, and welding. It will also include a break room space, an office, and an electrical storage room. The vehicle workshop will be fully dedicated to the maintenance of the truck fleet that will mostly be used for salt harvesting. It will include four bays for truck maintenance, a store area, administrative offices, and restroom facilities.

The site access and security control facilities will include a gatehouse with access control, communications, ablutions, parking, and area lighting. A weighbridge provision will be made for security cameras and display screens in key areas where security or safety risks are considered high. The first aid building will consist of four fully-equipped emergency rooms to attend to patients and treat emergencies. This facility will have an emergency phone line to communicate with medical support services.

Administration offices will be sized for 18 people and will consist of offices, conference facilities, restrooms and a break room.

18.4 Camp Facilities

Tango 01 is the name given to the Sal de Vida accommodations camp. Tango 01 can host up to 330 people and is currently used by Galaxy´s staff and contractors principally for exploration work, pilot operations and early works. The Tango 01 camp was originally designed for modular expansion.

A construction camp with capacity to accommodate up to 600 people will be established early in the construction phases of the Project. The number of beds may vary in the early construction stages. The construction camp will be located next to the process plant area. Buildings will be pre-manufactured by the supplier.

18.5 Raw Water and RO Water

All raw water will be sourced from well SVWF12_19 and pumped to the process plant and distributed to the various applications requiring fresh water. A supplementary well will be drilled in the vicinity as a back up.

Raw water for camp will be trucked in 30 m^3 trucks from the process plant and stored in three 300 m^3 tanks (one existing and two future tanks) located on the hill immediately west of camp. The RO plant will be located adjacent to the raw water tanks, and each will treat 3 m^3/hr of water. Treated RO water will be stored in two tanks, each of 48 m^3 capacity, which will connect into the water network. Two additional RO plants and four storage tanks are considered for future expansions.

Significant salt build-up is expected in the pumps and pipe network during wellfield operation. Regular maintenance will be required. Lines will be flushed with raw water to dissolve the encrusted salts. Major maintenance activities will be performed during winter, when several wellfield pumps are expected to be offline. Tees and valves will be considered in the pipeline for the injection of flushing water. Raw water will be trucked to the individual injection points and line sections will be flushed to remove salt build-ups.

Raw water from well SVWF 12_19 will be connected and pumped to water tanks in the process area. The raw water system will consist of centrifugal water pumps (duty and standby) and a pipe distribution network to reticulate water to all process areas as required. Raw water requirements in the process plant facilities will be equivalent to the 42 m^3/hr for each stage. Raw water will be used in the demineralized water plant, lime slaking, fire systems amongst other plant uses.

The demineralisation (demin) circuit will be a turnkey vendor-supplied package. It will receive raw water and produce demineralized water to supply the boiler for steam production.

18.6 Power Generation and Distribution

Power generation will consist of off grid power generation centres to power the geographically isolated facilities. The configuration will consist of the following:

- Camp: A diesel central serving camp facilities. Later, the Camp will be powered by a power line with renewable energy and an automatic transfer to the diesel central generation will be designed in case the power line is out of service;
- Wellfield: Individual generators with their dedicated fuel tank powering each well during pre-production (approx. 1 year). Once the Power Generation commissioned, the booster stations will be powered by a power line;
- Booster station: Individual generators with their dedicated fuel tank powering the booster stations during pre-production (approx. 1 year). Once the Power Generation commissioned, the booster stations will be powered by a power line;
- A Power Distribution Line will be designed to power the pumps stations, Pilot Plant and the Camp;
- Main Diesel Generation Plant: Central 6 MW powerhouse and electric distribution system to supply power to the ponds, processing plant, civil infrastructure (buildings), the Power Distribution Line, and the raw water well;
- A Photovoltaic utility scale to feed the Project demand with renewable energy. The Solar Central will be operating in a hybrid mode with the Main Diesel Generation Plant.

The Tango 01 camp powerhouse will consist of a series of 380 V, diesel generators that will be located to the southeast of the sleeping modules and offices. The future Power Line’s substation will be located next to the Genset.

All wells will have the similar configurations that will consist of 380 V diesel generators per pump, depending on the specific requirements, with an external fuel tank (with autonomy of three days) and an electric panel with the well pump starter and a variable frequency drive (VFD). The future Power Line’s substation will be located next to the VFD’s board.

The booster station will have a similar configuration that consist of 380 V diesel generators and electric panels with VFD per pump. The generators will share an external fuel tank and a fuel distribution (with autonomy for three days at full operation). The future Power Line’s substation will be located next to the VFD’s board.

The Diesel Generation Centre will be located at the process plant substation and the power configuration will consist of approximately 6 MVA powerhouse and an electrical distribution system serving the plant, Camp, Pilot Plant, ponds and raw water well areas. The powerhouse will consist of a series of generators of approximately 1,400 kVA of installed power or equivalent derated by the site conditions, which will be housed in weather-proof enclosures. The expected operating mode is 75% running and 25% on standby. The electrical distribution system will consist of a medium-voltage network (13,200 V) connecting the powerhouse with three electrical rooms. The electrical rooms will house the switchgears, the motor control centre (MCC) and boards, which will feed the different electrical equipment with the respective transformers. A redundant substation of 13,200/380 V will be located next to each electrical room.

The Diesel Generation Centre will have a heat exchanger system to cogenerate thermal energy in order to heat water for process resulting in efficiency gains.

The electrical distribution system in the process plant will consist of three electrical rooms deployed in different strategic areas to reduce electrical losses. For reliability reasons, the distribution will be redundant and transmitted in medium voltage, hence each electrical room will have a substation comprised by two transformers. In addition, a UPS and battery systems will be installed in each electrical room to power all the critical loads in case of contingencies.

Despite the adoption of diesel power generation in this study, Allkem is targeting 30% of power generation for Stage 1 production to be sourced from photovoltaic energy generated by a site-based solar farm. The Company is currently in a tender process to install this hybrid solution for Day 1 of Stage 1 production and this will be defined further in H2 CY22. This is not factored into any of the operating costs or economics outlined in this report.

18.7 Fuel Storage and Dispensing

Fuel will be trucked to site by the vendor and stored in two principal locations, one at camp in two 40 m^3 capacity dispenser units, and one at the process plant, in the 240 m^3 capacity tank farm plus one 40 m^3 capacity dispenser unit.

18.8 Reagents

Reagents will be delivered in 1-t bulk bags on 28-t flatbed trucks. The operator will unload bulk bags from the trucks with a forklift and store the bags in covered sheds. There will be a total of four forklifts in the process plant: one for the warehouse, one for product bagging and two for reagent operations.

18.9 Communications and Control System

The communication system will consist of:

- Site Data Network (WWAN wireless);
- Telephony Services;
- Video Surveillance (CCTV);
- Access Control Systems;
- Intruder Detection System;
- Mobile Radio Communication;

- Measuring and control instruments;
- Process Control System (PCS);
- Fire Detection System;
- Radio communication service;
- Satellite phone service.

The main control system room, which will be located inside the process plant building, will house necessary PC based OIT. OITs will act as the control system SCADA servers as well as configuration and operator stations. The control room is intended to provide a central area from where the plant and well stations is operated and monitored and from which the regulatory control loops can be monitored and adjusted. All key process and maintenance parameters will be available for trending and alarming on the process control system. Centralization of the complete plant will be at the operation control room and the command of operations will be made remotely from the control system workstations.

18.10 Sewerage Treatment Plant

Sal de Vida will have three sewerage treatment plants, one located at the Tango 01 camp, one at the Construction camp and one at the process plant location. The effluent quality will comply with Catamarca Province regulations (Resolution 65/05).

18.11 Fire Protection System

Fire Protection systems to be provided at the process plant in order to:

- Assist in the protection of life and plant assets through the control and prevention of escalation of a fire event;
- Limit the radiation effects of a fire to allow safe emergency escape, evacuation and rescue activities;
- Assist in maintaining the structural integrity of buildings and steel structures by cooling them;
- Provide the capability to extinguish fires were considered safe to do so.

Fire Protection systems will be divided into two main categories:

- Firewater based FP systems that are connected to a fixed firewater distribution system, including the following elements:
    - Firewater supply (storage system and pumps).
    - Firewater distribution (firewater ring-main and feeder lines to firewater users).
    - Delivery systems (e.g., hydrants, hose reels, monitors).
- Other fire protection systems, such as self-contained foam skids and portable/mobile extinguishing systems that are not connected to the firewater distribution systems.

18.12 Drainage System

The process plant will consist of multiple sump pumps in operational areas to collect any spills that may occur.

- Reagent preparation sumps will discharge to the event pond.
- Liming circuit sumps will discharge to event pond to prevent dilution, and if appropriate to the first liming mixing tank.
- Softening mixing tank area sump will discharge to event pond to prevent dilution, and if this is not possible to the first softening mixing tank.
- Softening filter area sump will discharge to the softening filter cake tank.
- Crystallisation area sump will discharge to the liquid discards tank.

18.13 Steam System and Water Heating

The boiler system will consist of two boilers each capable of supplying 50% of the total heating requirements of the plant, which includes the heating provided by the hot RO water and mother liquor. Each boiler will be an OEM supplied package which will include a de-aerator, burner, boiler, flu gas stack and steam distribution system. Inlet streams include water from the demin circuit and condensate return. Diesel is pumped from the diesel storage tanks into the boilers.

Outlet streams from the boilers include steam to the crystallisation circuit, and steam to sodium carbonate mixing. Steam will heat cold RO water to produce hot RO water when not possible to recover heat from the diesel generators. Steam requirements in the process plant facilities will be equivalent to the 13 t/hr.

18.14 Compressed Air System

Compressed air services for the process plant will be a vendor supplied package. Two plant air compressors, with a third on standby, will distribute compressed air through a filter following by two air dryers in parallel and another filter to a receiver. From there the air will be distributed to service instrument and plant air. Instrument air will be dry and clean air and will be used for pneumatic instrumentation. In addition, another air compressor and drying/filtration system will provide air to the vehicle workshop.

19 MARKET STUDIES AND CONTRACTS

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 – 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 [$Na_{0.3}(Mg,Li)_3Si_4O_{10}(OH)_2$]. 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. Other lithium bearing members of the smectite group are salitolite [$(Li,Na)Al_3(AlSi_3O_{10})(OH_5)$] and swinefordite [$Li(Al,Li,Mg)_4((Si,Al)_4O_{10})_2(OH,F)_4nH_2O$].

19.1.1.3 Lithium brines

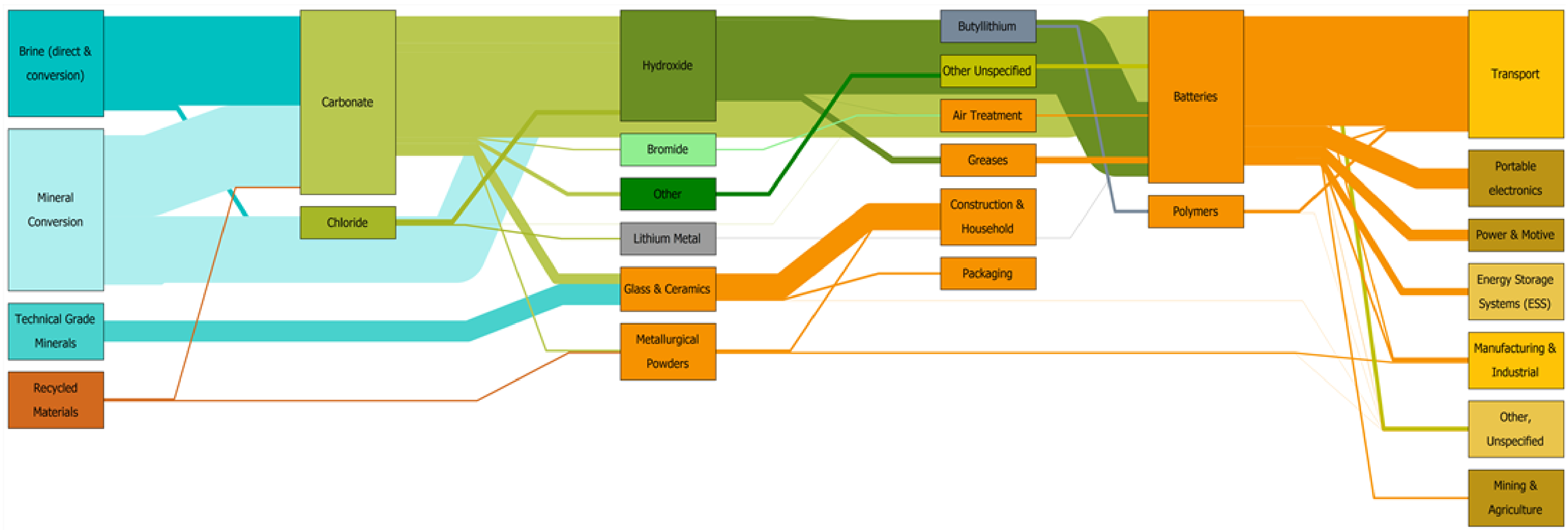
Lithium-enriched brines occur in three main environments: evaporative saline lakes and salars, geothermal brines and oilfield brines. Evaporative saline lakes and salars are formed as lithium-bearing lithologies which are weathered by meteoric waters forming a dilute lithium solution. Dilute lithium 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 Salar de Atacama in Chile and Salar de Hombre Muerto 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 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 are shown in orange with the relevant end-use sectors shown in yellow.

Figure 19-1: Lithium Industry Flowchart, 2021



Note: Figure prepared by Wood Mackenzie, 2021.

19.2 Global Demand for Lithium

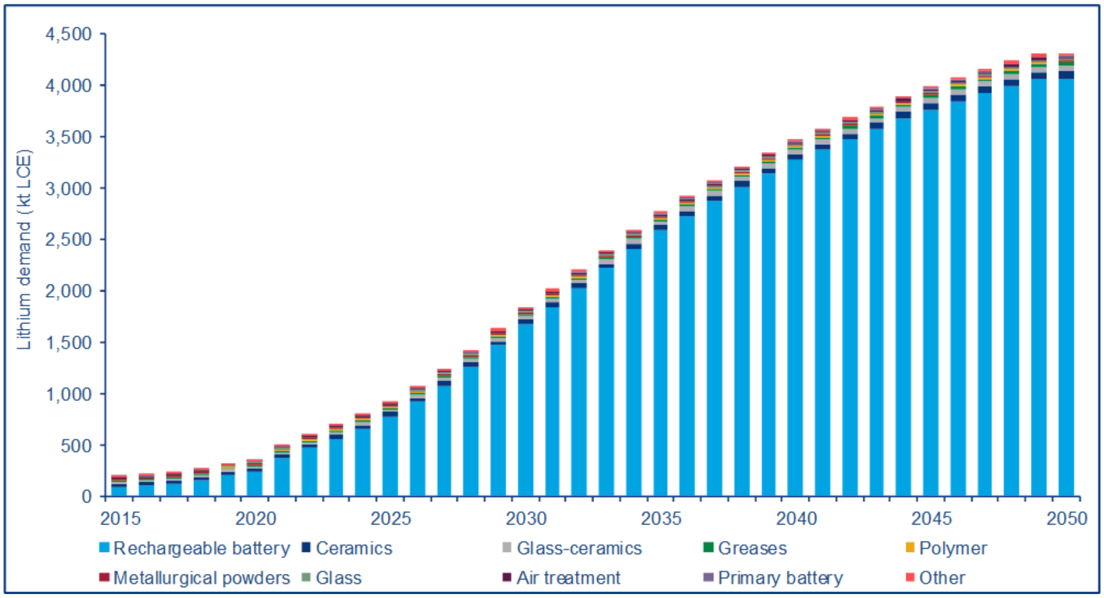
Lithium demand has historically been driven by macro-economic growth, but the increasing use of rechargeable batteries in electrified vehicles over the last several years has been the key driver of global demand. Global demand between 2015 and 2021 has more than doubled, reaching 498.2kt LCE with a CAGR 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.

19.2.1 Lithium Demand by End Use

In recent years lithium-ion batteries have become the battery technology of choice for electric vehicles (EV), from hybrid vehicles to full electric vehicles. The lithium-ion battery industry, particularly in its use in automotive applications will be the largest driver of lithium demand for the foreseeable future. Roskill's analysis shows that total vehicle sales continued to increase up until 2017, before the market saw marginal declines in 2018 and 2019. Sales in 2020 saw a sharp decline as the global COVID-19 pandemic set in and restricted movement and production. Demand growth for lithium in rechargeable batteries grew at 26.0% CAGR between 2015 and 2021, forming over 50% of lithium demand since 2017. Unlike most other major end-use applications, demand from rechargeable batteries continued to increase in 2020, despite disruption caused by the COVID-19 pandemic and related lockdowns, with this trend continuing into 2021 with demand reaching 362.0 kt LCE.

All other end-uses for lithium have also experienced growth since 2015, albeit at lower rates than the rechargeable battery sector. Non-battery uses of lithium include ceramic glazes and porcelain enamels, glass-ceramics for use in high-temperature applications, lubricating greases and as a catalyst for polymer production. Between 2015 and 2019 growth in demand from ceramics, glass-ceramics, greases, and polymers increased on average by between 1.6% pa and 4.4% CAGR, though demand volumes fell notably in 2020 as a result of COVID-19 related lockdowns and reduced industrial output. In 2021, the recovery in industrial production supported a growth in demand once again, with non-battery demand exceeding 2019 levels. In 2022 this growth is expected to continue across all categories.

Figure 19-2: Global Demand for Lithium by End Use, 2015 – 2050 (kt LCE)



Note: Figure prepared by Wood Mackenzie, 2021.

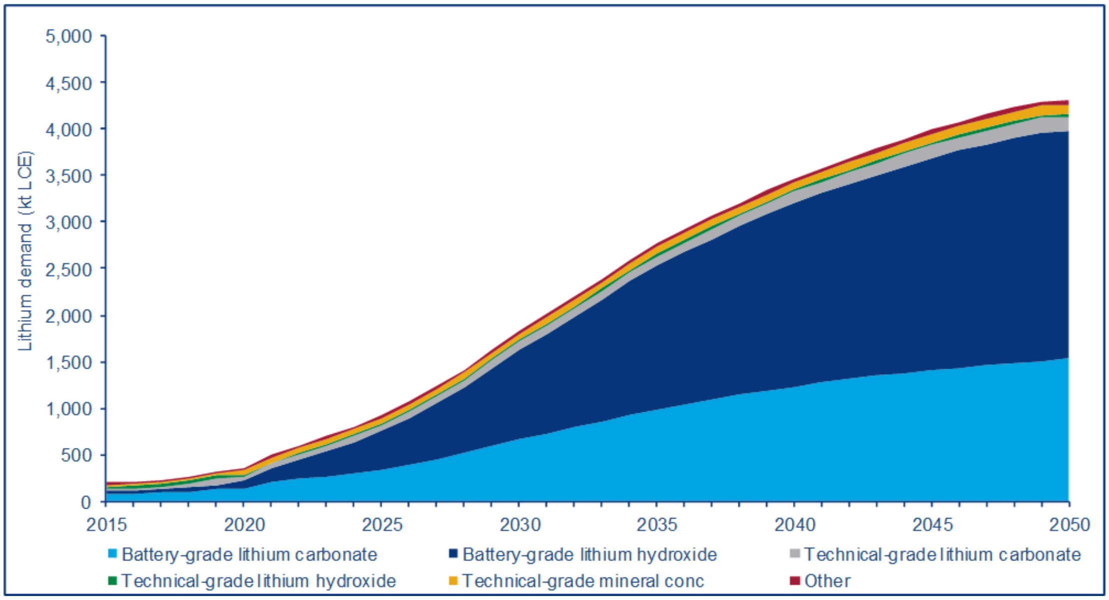
Lithium demand is forecast to increase by 13.8% CAGR in the period from 2022 to 2032, reaching a total of 2,199 kt LCE in 2032. Lithium demand is predominantly derived from the expected build-out of battery production, with 3,370-GWh capacity required across all end-use applications by 2032. This is primarily driven by growing demand for EV, government policies facilitating a lower emission future, as well as greater choice for consumers as EV manufacturers bring more models online. The rechargeable battery segment will see a growth of 28% from 2021 to 2022. The largest driver within the rechargeable battery segment is from automotive where growth between 2021 and 2031 is forecast at 19.0% CAGR. Stationary energy storage (ESS) will grow at 18.7% CAGR in the same period. Wood Mackenzie forecast that total lithium demand in rechargeable batteries in 2031 will reach 1,834 kt LCE, up from 362 kt LCE in 2021.

Growth is forecast to slow down in the following two decades as the market matures. From 2030 to 2040, total demand growth of 6.9% CAGR is forecast, followed by 2.2% CAGR from 2040 to 2050. Total demand is forecast to reach 3,262 kt LCE in 2040 and 4,061 kt LCE in 2050.

19.2.1.1 Lithium demand by product

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.

Figure 19-3: Global Demand for Lithium by Product, 2020 – 2050 (kt LCE)



Note: Figure prepared by Wood Mackenzie, 2021.

Lithium in the form of lithium hydroxide and lithium carbonate collectively accounted for 95% of production in 2021 and will continue to be the most important lithium products for the foreseeable future. Lithium hydroxide and lithium carbonate products are classified as 'battery-grade' for use in rechargeable battery applications and 'technical-grade' which is primarily used in industrial applications. Technical grade lithium carbonate can also be processed and upgraded to higher purity carbonate or hydroxide products.

Lithium carbonate is the most widely consumed product, finding application in rechargeable batteries, ceramics, glass-ceramics, glass, metallurgical powders, aluminum, and other uses. Demand for battery-grade (BG) and technical-grade (TG) lithium carbonate was 263.0 kt LCE in 2021, with BG now accounting for 42.3% of total refined lithium compound demand and TG 10.5% (Figure 19-3).

Battery grade carbonate demand increased by 38.6% CAGR between 2015 and 2021 and has remained the most widely consumed lithium compound. Technical grade mineral concentrates accounted for a further 9.6% of consumption in 2021 and are used in similar ceramic, glass-ceramic, glass, and metallurgical applications to lithium carbonate. Consumption of mineral concentrates has increased particularly in periods of higher lithium carbonate pricing, as some consumers may switch between the two products in their production process.

TG and BG lithium hydroxide together represented 31.8% of total consumption in 2021, with BG showing the highest growth rate of all lithium products since 2015 at 25.3% CAGR. The use of lithium hydroxide in high-Ni cathode materials for Li-ion batteries is the main factor attributing to the rapid increase in BG lithium hydroxide demand.

BG carbonate and hydroxide together accounted for 70.5% of total demand in 2021 reflecting the share of the rechargeable battery market in the overall lithium market. A small amount of battery-grade metal is used in rechargeable batteries, but its main use is in primary batteries, with all battery uses for lithium at 73.6% of total product consumption. TG hydroxide is mainly used in greases, butyllithium in polymers and bromide in air treatment.

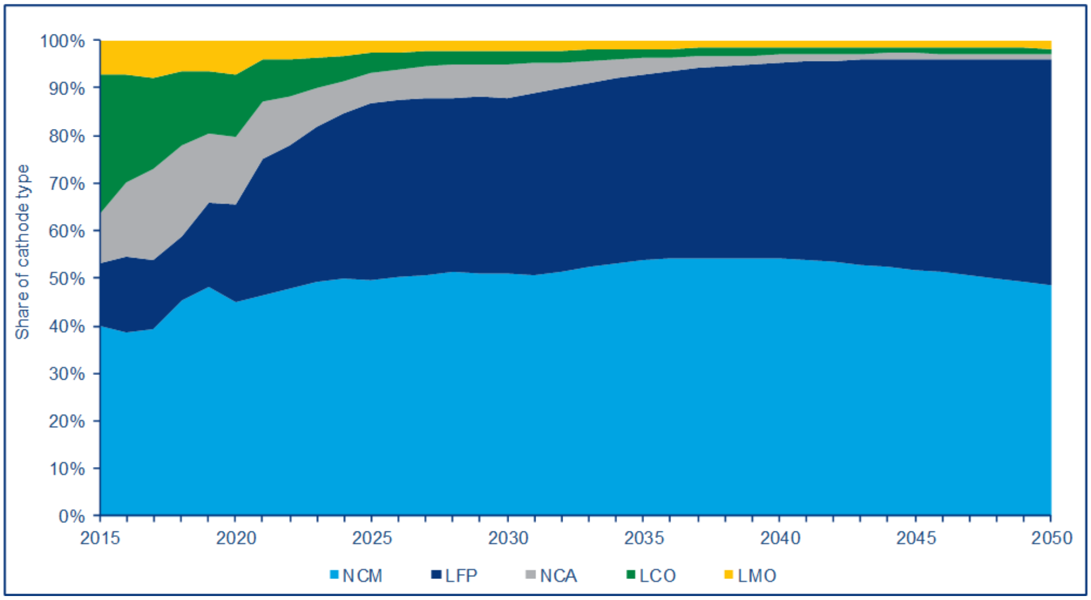
As a result of the strong growth in demand from rechargeable battery applications, demand growth for BG products is forecast to accelerate towards the end of the forecast period. In this context, lithium hydroxide is expected to experience exponential growth due to the introduction of high-nickel Li-ion batteries by the early part of the decade. This type of high-performing batteries was present in the technology roadmaps of most global automakers in 2020 as they could be the key enablers of long-distance driving EV ranges. In the outlook period, however, competition from LFP (Lithium-iron-phosphate) batteries using lithium carbonate, is to be expected in passenger EVs in developing countries and even in the urban vehicles of western auto markets. This will be result of the better economics and the longer cycle life of this battery type, whose cost does not depend on the cobalt and the nickel markets.

In addition to electric vehicle applications, rechargeable batteries will also play an important role in the energy transition. As the world shifts away from fossil-fuel based energy generation to renewable energy sources, growth in energy storage systems used to complement wind and solar generation will contribute to global growth in lithium consumption.

Lithium hydroxide is expected to experience exponential growth due to the introduction of high-nickel Li-ion batteries by the early part of the decade. These include NCM811 precursor material and NCMA and LNMO cathodes. By 2028, BG hydroxide is forecast to account to over 50% of chemical demand. Demand for BG lithium hydroxide is expected to grow at 19.4% CAGR 2022-2032 to reach 1,182.7kt LCE in 2032, up from 140.7 kt LCE in 2021. By 2025 demand for BG lithium hydroxide will exceed total demand for all lithium products in 2020. Growth for BG lithium hydroxide will be lower from 2030, with growth of 7.4% CAGR 2030-2040 and 2.1% CAGR 2040-2050, reaching 2,437 kt LCE in 2050.

The rapidly growing use of LFP chemistries for cathode will result in strong growth for BG lithium carbonate. LFP cathodes are expected to be fastest growing cathode chemistry, increasing its share of the from 30% to 47% by 2050, as the Chinese market continues to expand and LFP cathode increasingly become the material of choice for a large number of EV-makers. This will correlate to a growth in lithium carbonate demand of 10.9% CAGR between 2022 and 2032. Over the forecast period, demand for lithium carbonate is expected to grow at 6.2% CAGR, from 255.2 kt LCE in 2022 to 1,381 kt LCE by 2050.

Figure 19-4: Summary Cathode Chemistry, 2015 – 2031



Note: Figure prepared by Wood Mackenzie, 2021.

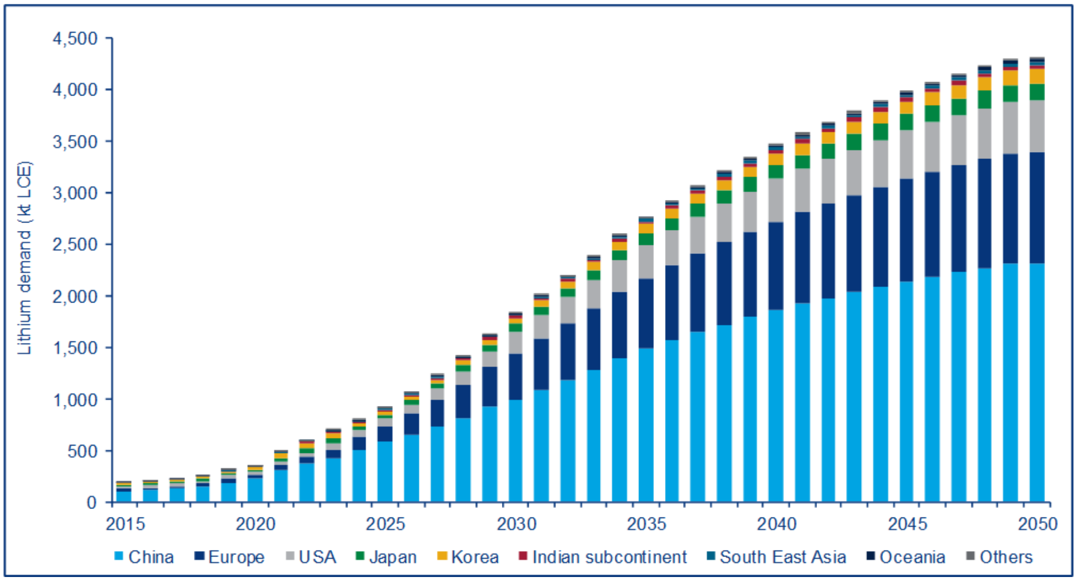
19.2.1.2 Lithium demand by country

In 2021, China was the largest consumer of lithium, accounting for 62.7% of total demand or 324.3 kt LCE. Chinese demand has increased by 21.4% CAGR since 2015, largely through rapid expansion of the domestic Li-ion battery sector with supplementary growth in industrial end-use markets. The construction of significant Li-ion battery production capacity since 2018 has seen an acceleration of China's demand for lithium products. The relocation of some production capacity from South Korea and Japan into China has caused further increases in market share. Despite some production capacity being relocated, there has been a rapid build-out of battery production capacity in Japan and South Korea overall during the early to mid-2020s. Japan and South Korea accounted for 8.6% and 8.1% of global lithium demand respectively in 2021, compared with 8.0% and 3.8% in 2015.

European demand has risen significantly in the period since 2015, with the majority of demand growth occurring in the period since 2018 with greater Li-ion battery manufacturing taking place in the region. US demand has displayed growth of 21.4% CAGR from 2015, again driven by greater battery manufacturing capabilities in the region. Both Europe and North America are mature markets for lithium, and while some end-uses for lithium have grown, such as construction, others, like ceramics, glass, and aluminum, have fallen, with growth remaining flat since the 2010s. The construction of new battery production hubs in Europe and North America by major battery manufacturers is expected to see these regions increase their overall market share over the coming decade.

India and Southeast Asia remain relatively small markets, together representing 2.1% of total demand in 2021. The Indian market has increased by 46.7% CAGR since 2015, though from a small base and was only around 7.4 kt LCE in 2021, mainly for grease, polymer, and ceramic tiles, though with a growing demand from rechargeable batteries. Other countries have also displayed strong growth, especially Southeast Asia where ceramic and primary battery production is growing (e.g., in Indonesia, Thailand and Malaysia) as well as rechargeable battery raw material production (e.g., Taiwan).

Figure 19-5: Global Demand for Lithium by Country/Region, 2015 – 2050 (kt LCE)



Note: Figure prepared by Wood Mackenzie

19.2.1.3 China

Chinese demand has increased by 21.4% CAGR between 2015 and 2021, largely through rapid expansion of the domestic Li-ion battery sector with supplementary growth in industrial end-use markets. The construction of significant Li-ion battery production capacity since 2018 has seen an acceleration of China's demand for lithium products. The relocation of some production capacity from South Korea and Japan into China has caused further increases in market share.

The Chinese lithium market is heavily dependent upon imports of lithium mineral concentrates and lithium compounds produced in the rest of the world. Imports of mineral concentrates from Australia and lithium compounds from South America provide key raw material sources to supplement domestic production and meet demand. Chinese imports of lithium carbonate increased sharply from 29.4 kt in 2019 to 81 kt in 2021, with imports from Chile (64 kt) and Argentina (16 kt) forming the majority of imported material.

19.2.1.4 Japan

Japan has no domestic production of lithium raw materials and is wholly reliant on imports of lithium products to satisfy demand. The Japanese lithium-ion battery industry is a major consumer of BG lithium carbonate and lithium hydroxide.

Chile (both SQM and Albemarle) is the main source of lithium carbonate, accounting for 75 – 85% of imports in any one year, with most of the balance coming from Argentina and China.

Lithium hydroxide is imported and used as a raw material for production of NCA cathode materials, such as at Panasonic's facilities in Japan, and high nickel content NCM cathode materials at a number of manufacturers such as Tanaka Chemical, SANYO, Hitachi Maxwell and GS Yuasa. Imports from Livent in the USA have fallen sharply in recent years and China is now the main source of supply to the Japanese market.

19.2.1.5 South Korea

South Korea has no domestic supply of mined lithium materials, though lithium compounds are produced in-country from reprocessing lithium compounds and recycling of lithium-ion batteries sourced domestically and from imports. Strong demand for lithium compounds from the lithium-ion battery and lithium grease industries in South Korea led to imports rising steadily in the 2010s, with the increase in imports accelerating after 2017.

South Korea is the largest market, after China, for lithium carbonate exported from Chile and is by far the biggest market for that country's exports of lithium hydroxide. It is also the principal destination for China's exports of lithium carbonate and lithium hydroxide. The increase in Chinese imports of lithium carbonate in recent years represent growing trade between Ganfeng Lithium and LG Chem.

The increase in imports of lithium hydroxide from about 2019 came as battery cathode manufacturers based in South Korea ramped up production of higher nickel NMC and NCA type cathode materials which require lithium hydroxide as opposed to lithium carbonate. Major global cathode and battery manufactures operate facilities in South Korea, include LG Chemical, Samsung SDI and L&F Corp.

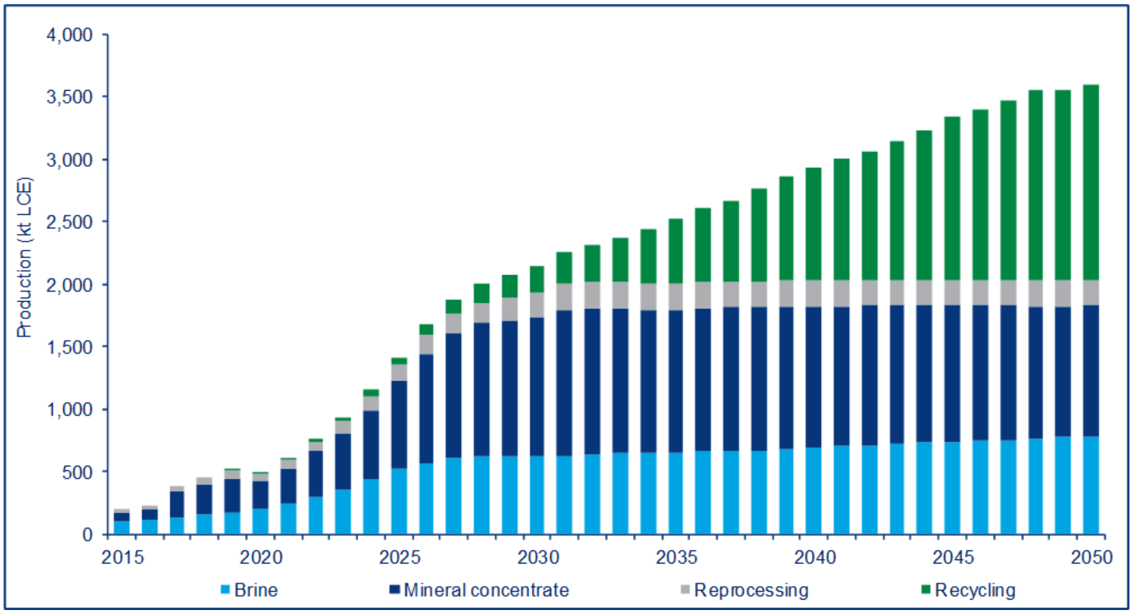
19.3 Global Supply of Lithium

19.3.1 Refined Supply by Source

The world's lithium is supplied by primary production from hard rock mineral mines (spodumene, lepidolite, petalite), continental lithium brines, and reprocessing (upgrading) of lithium carbonates. Lithium recycling currently contributes to a very small proportion of global supply (<1%) but as the industry matures and recycling technology develops, supply from recycling will play an ever-increasing role in global supply.

Mineral concentrates are the world's largest source of lithium, and is forecast to continue growing to 1,163 kt LCE by 2032 up from an estimated 359 kt LCE in 2022. Growth in mineral concentrate supply is forecast to slow down slightly and result in total output of 1,131 kt LCE by 2040, decreasing to 1,047 kt LCE by 2050. Australia will continue to be the largest supply of mineral concentrate with spodumene ore being the primary source of its lithium.

Figure 19-6: Refined Lithium Production by Source, 2015 – 2031 (kt LCE)



Note: Figure prepared by Wood Mackenzie, 2021.

Supply from mineral concentrate will be supplemented by increasing production from brine resources where expansions and new projects in South America will add significant supply to the market. Wood Mackenzie forecast an annual growth rate of supply from brine of 12.5% CAGR 2020-2030 reaching 626 kt LCE by 2030. Growth is forecast to slow down to an annual growth rate of 1.0% CAGR 2030-2040 to reach 693 kt LCE by 2040 and 781 kt LCE by 2050 at 1.2% CAGR 2040-2050.

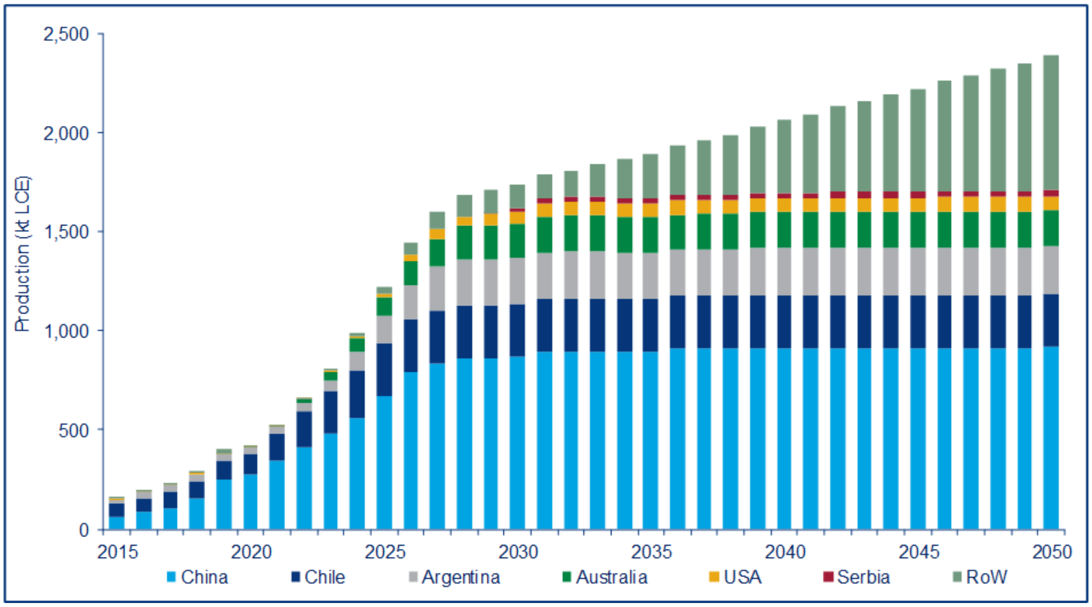
Over the next decade, total supply of refined lithium is forecast to increase 17.2% CAGR in the 2022 to 2032 period to reach 2,309 kt LCE by 2032. Global refined lithium supply is forecast for steady growth and will reach 2,927 kt LCE in 2040 and 3,599 kt LCE in 2050.

Wood Mackenzie estimates that BG lithium carbonate accounted for approximately 32% of global lithium supply in 2021, the largest of the lithium chemical products. However, by 2023, BG lithium hydroxide is expected to be the largest product in terms of volume supplied to the market. Supply of BG lithium hydroxide, as the final product, will show the strongest growth at 17% over the next decade to reach levels of 920 kt LCE per year by 2032.

19.3.2 Refined Supply by Country

China has the world's largest lithium refining capacity and is forecast to remain the main supplier of lithium chemicals to the global market. In 2022, around two-thirds of lithium chemicals are expected to be produced in China from domestic sources as well as imported mineral concentrates and lithium compounds (carbonates and chlorides). Chile and Argentina's large brine operations are also significant contributors to global refined lithium, forecast to produce 34% of global supply in 2022. Developing projects in Chile and Argentina are expected to more than double production output over the decade, increasing from 224 kt LCE in 2022 to 506 kt LCE in 2032.

Figure 19-7: Refined Lithium Production by Country, 2015 – 2050 (kt LCE)



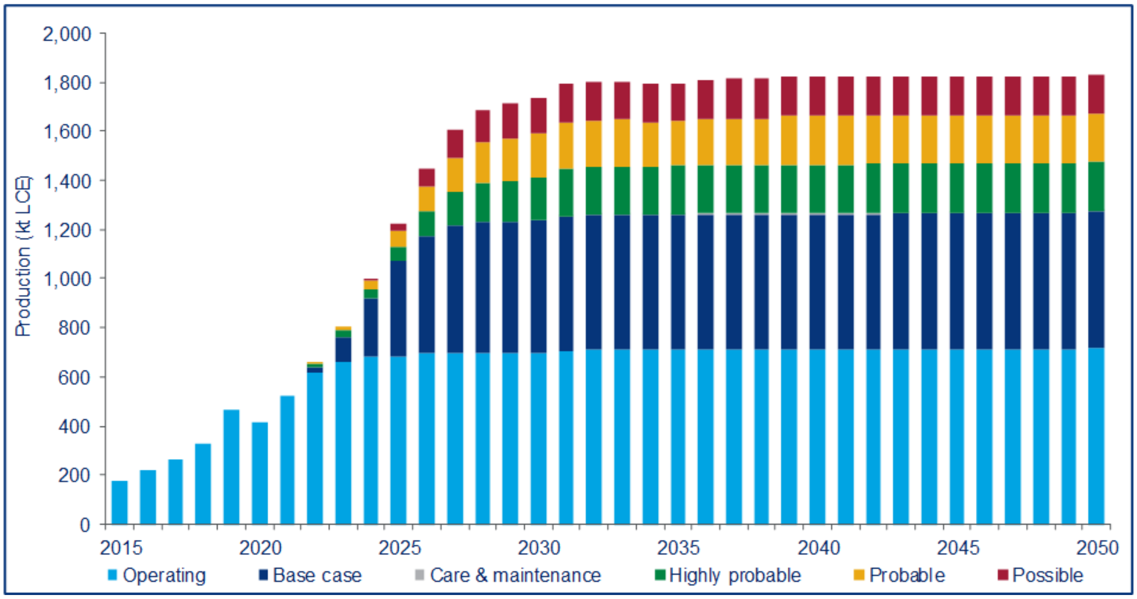
Note: Figure prepared by Wood Mackenzie

19.3.3 Refined Supply by Status

Global production of refined lithium, declined to 418 kt LCE in 2020, down from 462 kt LCE in 2019, primarily driven by supply disruptions in the mineral (hard rock) supply. In 2021, as production began ramping up, global lithium production increased by 25% reaching 521 kt LCE.

Following strong growth in the short term, lithium supply from operating assets alone is forecast to plateau at around 700 ktpa LCE from 2032 onward and future supply is expected to come from existing capacity at mines under care and maintenance and new projects.

Figure 19-8: Lithium Production Outlook by Status, 2021 – 2050 (kt LCE)



Note: Data is net of reprocessing. Figure prepared by Wood Mackenzie, 2021.

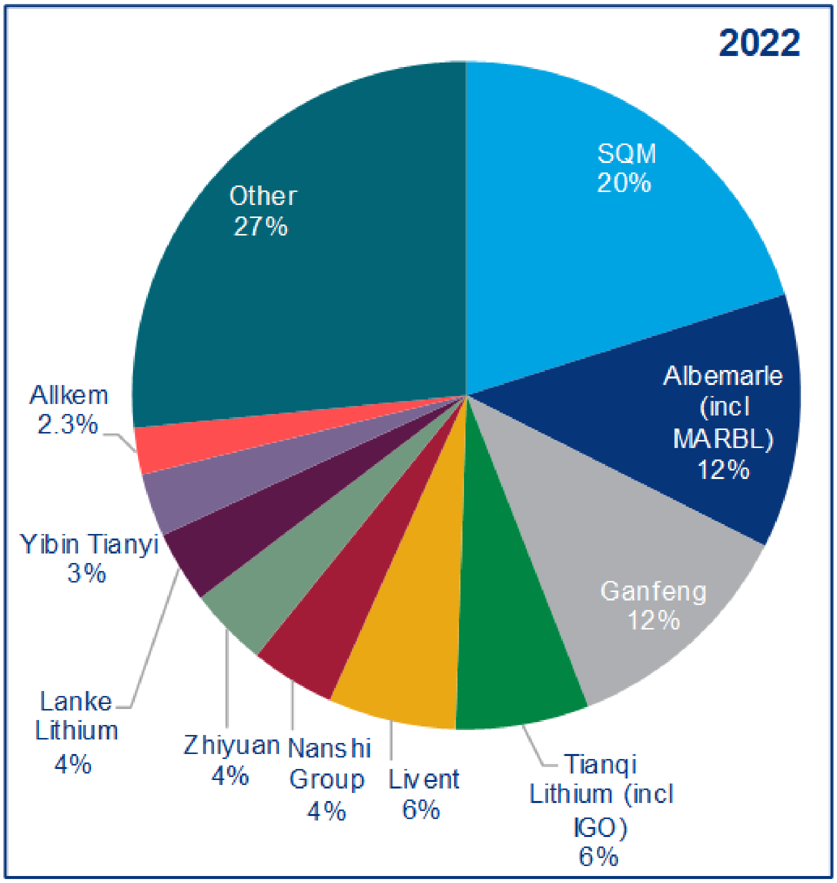
Including projects classified as base case and assuming operations under care and maintenance will restart production, global supply of lithium is expected to exceed 1 million tonnes (LCE) per year by 2025. With the inclusion of mineral and brine projects rated Highly Probably, Probable, and Possible, global supply has the potential to exceed 1.7 Mt per year by the end of the decade.

19.3.4 Refined Supply by Company

The industry will remain led by a few giant producers with new entrants being added to the list every year. In 2021 there were 46 producing companies of lithium chemicals with the largest five producers accounting for 52% of total output. In 2030 Wood Mackenzie forecast there to be 70 active producers of lithium chemicals with the five largest accounting for 43% of the total output.

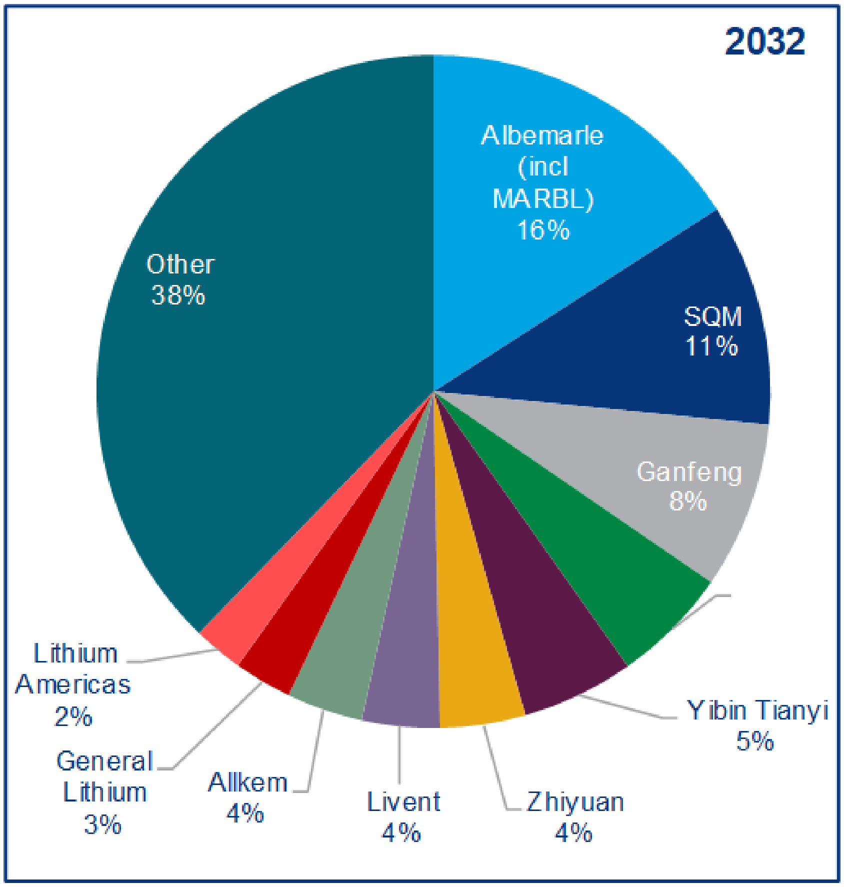
Refined lithium production is dominated by integrated producers, with integrated production totaling 386.0 kt LCE in 2020 representing 80% of total refined production. Mineral conversion companies have increasingly sought to integrate upstream, in efforts to remove supply-chain risk and additional margin between the mineral concentrate and mineral conversion stages. Despite this, the development of new production capacity reliant upon the free-market or off-take agreements with mineral concentrate producers has outpaced integrated in terms of year-on-year (YOY) growth between 2014 – 2021.

Figure 19-9: Global Lithium Production by Company, 2022 (%)



Note: Figure prepared by Wood Mackenzie

Figure 19-10: Global Lithium Production by Company, 2032 (%)



Note: Figure prepared by Wood Mackenzie, 2021.

The top five operators in 2022 are forecast to account for 57% of the total refined lithium output. Over the next decade, the share of the top five producers is forecast to decrease to 46% as a new entrants enter the market. The top five producers will continue to hold an important position in the market as they possess the know-how to produce high-quality products. The large-scale production of these companies will remain attractive to buyers.

In 2022, SQM will claim the crown as the largest lithium producer globally with a forecast output of 147.3 kt or approximately 20% of global output. Wood Mackenzie have assumed that their license to operate at Salar de Atacama will be renewed beyond 2030 and that expansion will continue to some degree. SQM will have an output of 215 kt LCE by 2030 and will be the world's second largest producer.

Albemarle is the second largest producer in 2022 with a 90 kt LCE output and will overtake SQM as the largest producer in 2025. Through continued investment in conversion capacity the company is forecast to grow output to over 318 kt LCE by 2030. Production will include output from its brine productions in Chile and USA, and spodumene production from Greenbushes and Wodgina in Western Australia. The spodumene concentrate will feed conversion facilities at Kemerton, Sichuan, Guangxi, Jiangxi, and Jiangsu.

Ganfeng's growth in the lithium industry has been remarkable. In 2020 it had an output of 40.4 kt LCE, which will more than double by 2023 and is forecast to reach 160 kt LCE by 2030. Their expansions have been through investment in several resource projects around the world and conversion capacity simultaneously. Ganfeng has also actively secured offtake agreements for spodumene concentrate used as raw material in the continued expansion of their conversion assets.

Tianqi Lithium will also remain a top-five producer through the forecast period. Existing assets at Shehong, Zhangjiagang and Tongliang will be supplemented by the production of lithium hydroxide in Kwinana in partnership with IGO. Later the company will add additional lithium carbonate capacity with a new plant at Anju. All facilities will have spodumene sourced from Talison's Greenbushes mine and concentrator.

19.4 Lithium Carbonate Trade

Lithium carbonate is the most commonly traded lithium compound on the international market. The vast majority of this trade is material flow from Chile and Argentina and there is also a substantial volume of re-export trade.

In 2020, approximately 154 kt (gross weight) of lithium carbonate were exported, of which about 132 kt were exports from the producing countries. Total exports were 5.3% higher than in 2019 (6.0% in the case of the producing countries). Although this growth was lower than had been seen in the two previous years, the fact that there was any increase at all during the worst of the COVID-19 pandemic highlights the rising demand for lithium. Over the period of 2014 – 2020 total exports of lithium carbonate grew by a CAGR of 9.6%, or 10.8% for the producing countries.

Chile is the largest source of exports, accounting for 73.8% of exports from the producing countries in 2020. Its share of the market since 2014 has varied between 63% and 76.4%. At 97.7 kt, exports from Chile in 2020 were almost double the level of 2014.

Argentina is the second largest exporter of lithium carbonate and accounted for just under 20% of the total from producing countries in 2020. The majority of exports from Argentina are to China and the USA, representing trade ultimately destined for the Asian market or internal trade to USA.

China's exports of lithium carbonate are made largely to the regional market, notably South Korea and Japan. Large volumes of lithium carbonate produced in South America are exported to Belgium and the Netherlands for distribution throughout the European market.

After surging in 2015 – 2016, the unit value of lithium carbonate exports from China fell back in 2017 and continued to slide through 2020. Overcapacity and oversupply of lithium carbonate within the Chinese market were the main causes for the price decline, which in turn has led many lithium refineries to suspend production temporarily or permanently. The downward trend in lithium carbonate prices continued for all major producing countries in 2019 and 2020, though companies undertaking largely internal trade between the USA and Europe have displayed better price support.

Global imports of lithium carbonate in 2020 were just under 145 kt. This figure is higher than for exports from the producing countries as it includes re-export trade, particularly via Belgium and the Netherlands. Despite the COVID-19 pandemic, world imports of lithium carbonate increased by 2.5% in 2020 and remained healthy in 2021, with Q1 imports up 23.6% YOY.

China is by far the largest importer and accounted for about 35% of total imports in 2020. Combined, China, South Korea and Japan made up nearly 68% of world imports in 2020. South Korea was the largest single importer in both 2028 and 2019. The prominent position held by these three countries is the result of their being the largest producers of lithium batteries (although US production is similar to that in Japan and South Korea).

The USA, Russia, and Germany are the only other major importers. The majority of US imports are for use as feedstock in the production of other lithium compounds. European imports mainly involve redistribution of imports to regional customers. Imports into Russia are understood to represent toll processing of lithium carbonate to lithium hydroxide at Russian facilities for the European market. Imports from China into Russia are believed to also be for conversion to lithium hydroxide for the European market.

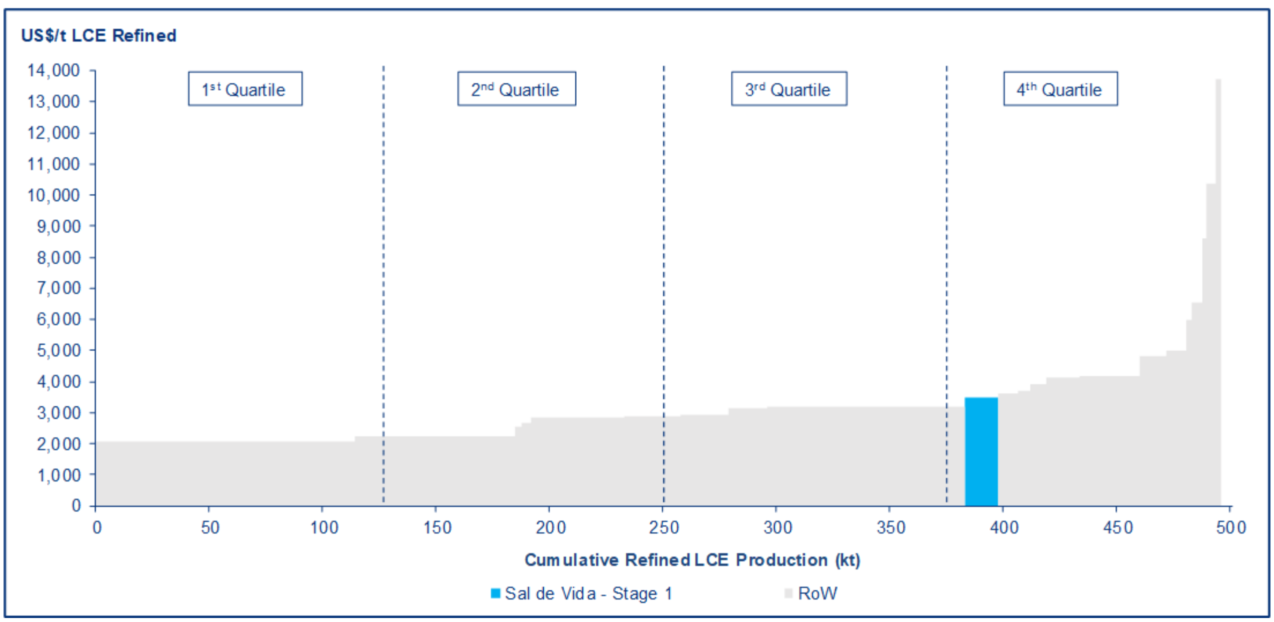
19.5 Cost of Supply

Figure 19-11 shows the site operating cost curve for lithium brine operations in 2025, it includes currently operating assets, brownfield expansions and several greenfield projects. SQM's and Albemarle's Chilean operations with extraction sites and pond complexes in the Salar de Atacama have the lowest site operating cost of any assets globally, owing to the high-grade brine and favourable dry climatic conditions in the Atacama.

Elsewhere, lower portions of the cost curve tend to be dominated by established operations. In contrast, the upper quartile of the cost curve is populated by a swathe of projects that have the potential to enter production by the midpoint of the decade. Due to the multi-year ramp-up period commonly associated with brine projects, the operating cost of these assets appears artificially high during their early years of production due to the higher proportion of fixed costs, which are spread across a lower volume of production during the ramp-up phase.

In 2025, Sal de Vida is expected to have a site operating cost of US$3,477/t, placing the operation in the 4th quartile of the cost curve for brine projects. A lithium carbonate price forecast in 2025 ranging between US$15,000 and 17,000 per tonne for TG and BG leaves substantial headroom for margin for the majority of lithium producers.

Figure 19-11: Global Brine Cost Curve, 2025



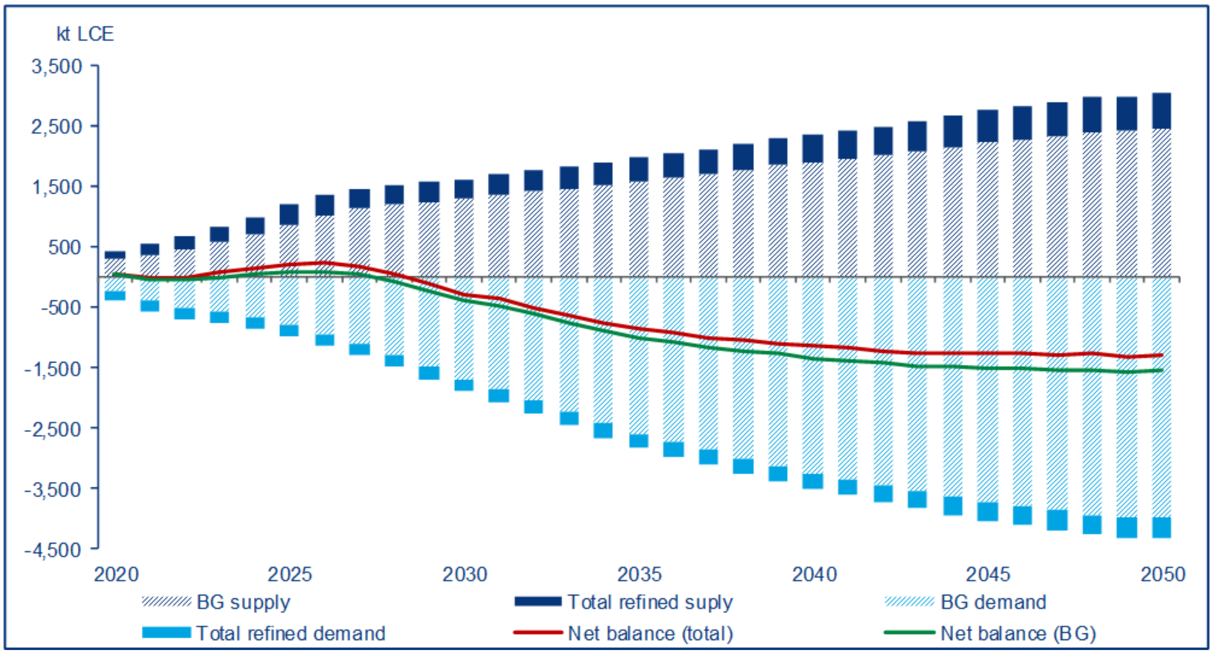
Note: Figure prepared by Wood Mackenzie, Allkem, 2021.

19.6 Market Balance

The lithium market is forecast to have a supply shortfall in the long term. Supply from current operations and upcoming projects is insufficient to meet the increasing demand. The global interest in the transition towards lower-emission transportation has facilitated many new projects to supply lithium chemicals both from mineral concentrate and brine.

Wood Mackenzie's base case view show that the overall lithium chemical market registered a minor supply deficit in 2021, despite increasing production of lithium chemicals from both brine and minerals. Following a smaller deficit expected in 2022, growing supply is expected to shift the market into surplus from 2023 onward which will continue to grow to a peak of 230.9 kt LCE in 2026. As growth in demand outpaces new supply in the late 2020s, a supply deficit will emerge from 2029. The forecast supply deficit will continue to grow and reach a peak in 2049 at 1,321.0 kt LCE.

Figure 19-12: Refined Lithium Market Balance



Note: Figure prepared by Wood Mackenzie

The market balance for BG lithium chemicals in the base case shows a supply deficit in 2022 and a relatively balanced market in 2023. From 2024 to 2027 we forecast a supply surplus across the BG lithium chemical market with a peak in 2026 of 79.8 kt LCE or 8% of demand, shifting to a deficit from 2028 onward. The deficit will reach 1,573 kt LCE by 2049 as demand for electric vehicles continues to grow despite existing suppliers' expansions, which are mainly targeting the production of BG lithium chemicals. In the late 2040s supply from the recycling of EV batteries will start to have a material impact on the market balance and we expect the deficit to ease. The deficit in our base case is forecast to reach 1,533.9 kt LCE by 2050.

Table 19-1: Outlook for Refined Lithium Supply and Demand, 2021 – 2050 (LCE kt)

	2020	2021	2022	2023	2024	2025	2030	2035	2040	2045	2050
Total refined supply	428	539	678	821	1,001	1,193	1,620	1,971	2,361	2,767	3,038
BG supply	295	367	467	589	717	872	1,295	1,589	1,902	2,227	2,445
Total refined demand	381	566	688	749	852	978	1,897	2,822	3,509	4,027	4,321
BG demand	236	401	516	586	680	803	1,691	2,586	3,242	3,721	3,979
Net balance (total)	47	-27.2	-10.6	72	150	216	-277	-851	-1,148	-1,260	-1,283
Net balance (BG)	59	-34	-49	3	37	68	-396	-997	-1,340	-1,494	-1,534

Source: Wood Mackenzie

19.7 Lithium Prices

Lithium prices continue to outperform expectation in 2022. In 2021, spot prices for lithium carbonate and lithium hydroxide almost quadrupled to reach prices around US$30,000/t, and in the first quarter of 2022; spot prices have breached the US$50,000/t mark for both BG lithium carbonate and BG hydroxide.

While supply has been growing, it has been struggling to keep up with strong demand from the EV sector. In 2021, we saw incentives implemented across Europe that boosted EV sales and spurred stronger lithium demand. At the same time, we saw EV sales in China return to record levels that further boosted demand, especially for BG lithium carbonate used in LFP cathodes.

Despite the short-term imbalance in the market, it is difficult to find justification in the market fundamentals for the price increases we have seen in the spot market. Part of the additional demand is likely created by every link in the supply chain boosting inventories slightly to create a buffer against supply chain delays. The aggregated additional demand for lithium will therefore be substantial and could have contributed to the market sentiment.

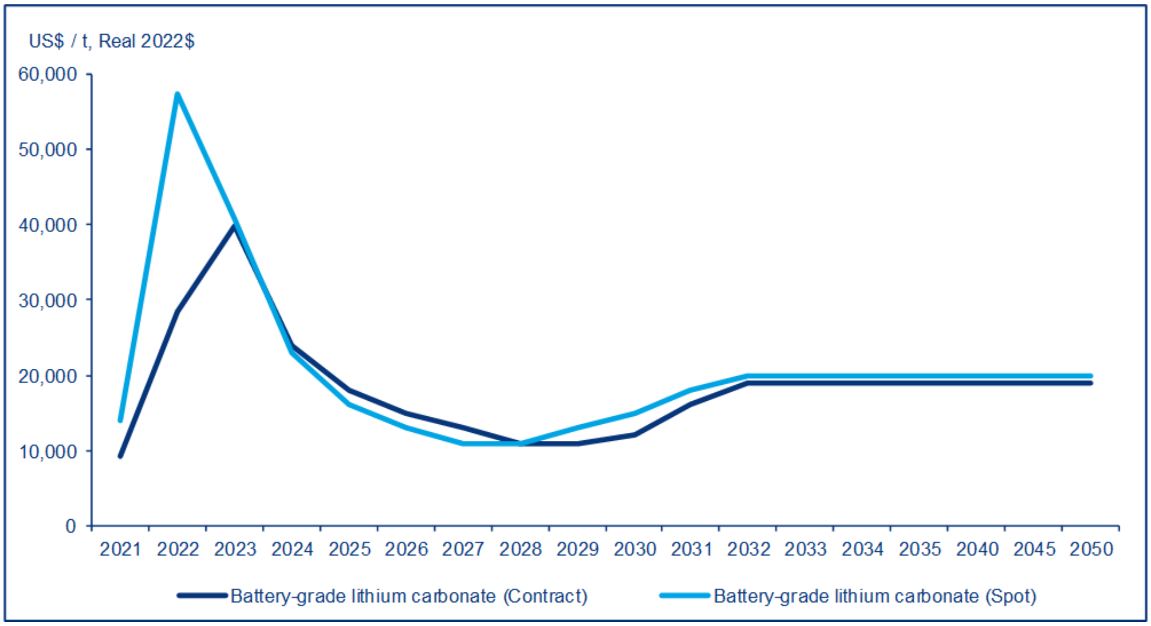
Wood Mackenzie believes the elevated lithium spot prices in Q1 2022 are not sustainable in the long term and prices will decrease in the short to medium term to reflect market fundamentals. Spot prices are expected to decline in the second half of 2022. The declining trend is expected to continue as supply catches up with demand and the market moves into surplus in the mid-2020s. Contract prices are expected to follow a similar trend with a delay due to the lag built into price mechanisms in long-term contracts. Prices are expected to trend towards the long-term incentive prices by the end of the decade.

19.7.1 Battery-grade Lithium Carbonate

Demand for BG lithium carbonate is set to exhibit strong growth due to the increasing use of LFP cathode chemistries in LiB batteries. This demand is likely to be met primarily with supply from brine projects. As there are a large number of brine projects entering production in the coming years the longer-term outlook for BG lithium carbonate is more subdued but remains very positive.

During 2022 we forecast a continued increase in contract pricing, but as new supply enters the market, we forecast a stabilisation of prices followed by declining prices throughout the middle of this decade. By the mid-2020s prices are expected to gradually decline to around US$15,000/t. As demand continues to grow, a larger deficit will emerge toward the end of the decade and contract prices will trend towards a long-term contract price of US$19,000/t.

Figure 19-13: Battery-grade Lithium Carbonate Price Outlook



Note: Figure prepared by Wood Mackenzie, 2021.

Table 19-2: Battery-grade Lithium Carbonate Price Outlook, 2021 – 2031

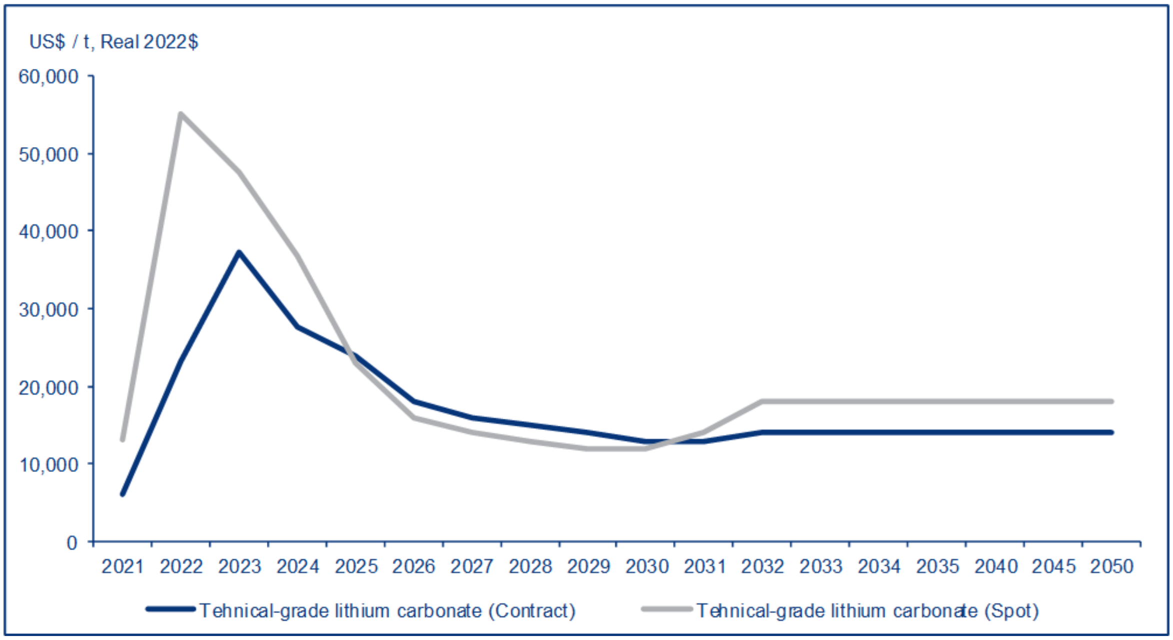
CIF Asia (US$/t Real 2022$)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Contract	9,108	28,336	39,874	23,911	18,000	15,000	13,000	11,000	11,000	12,000
Spot	13,921	57,375	40,800	22,880	16,000	13,000	11,000	11,000	13,000	15,000

Note: Table prepared by Wood Mackenzie

19.7.2 Technical-grade Lithium Carbonate

Demand for TG carbonate from industrial sectors is forecast to grow in line with economic growth. TG lithium carbonate, however, lends itself very well to be reprocessed into BG lithium chemicals. This is an established process occurring in Chile, US, China, and soon in Japan. The ability to re-process the product into BG lithium chemicals will ensure that prices will increase in line with prices of BG lithium chemicals.

Figure 19-14: Technical-grade Lithium Carbonate Price Outlook



Note: Figure prepared by Wood Mackenzie

Table 19-3: Technical-grade Lithium Carbonate Price Outlook, 2021 – 2031

CIF Asia (US$/t Real 2022$)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Contract	6,092	23,246	37,195	27,732	24,000	18,000	16,000	15,000	14,000	13,000	13,000
Spot	13,119	55,136	47,685	36,920	23,000	16,000	14,000	13,000	12,000	12,000	14,000

Note: Table prepared by Wood Mackenzie

19.8 Conclusions

Growth in rechargeable batteries will lead to the growth in lithium demand with 21.9% CAGR between 2020 and 2030, and 6.9% a year in the following decade before slowing down to 2.2% a year between 2040 and 2050 as markets become increasingly saturated. Demand in the Chinese market, and to some extent overseas markets, will drive growth for BG lithium carbonate through increasing demand for LFP cathode chemistry. Demand for BG lithium carbonate is forecast to increase 16.9% CAGR between 2020 and 2030, 6.3% a year from 2030 to 2040 followed by 2.3% a year in the following decade.

Increasing prices are yet again incentivizing investment in supply capacity in brine, mineral concentrate, conversion and in new sources such as clay. Refined lithium production capacity is forecast to grow by 10.8% CAGR in this decade, slowing to 4% between 2030 and 2040 and 2.9% in the following decade.

19.9 Contracts

At time of writing, Galaxy has no existing commercial agreements in place for the sale of lithium carbonate, from the Sal de Vida Project. Galaxy is having discussions with potential customers for Sal de Vida. In line with the Project execution schedule, these discussions are expected to advance to negotiations throughout the course of the Project.

20 ENVIRONMENTAL STUDIES, PERMITTING, AND SOCIAL OR COMMUNITY IMPACT

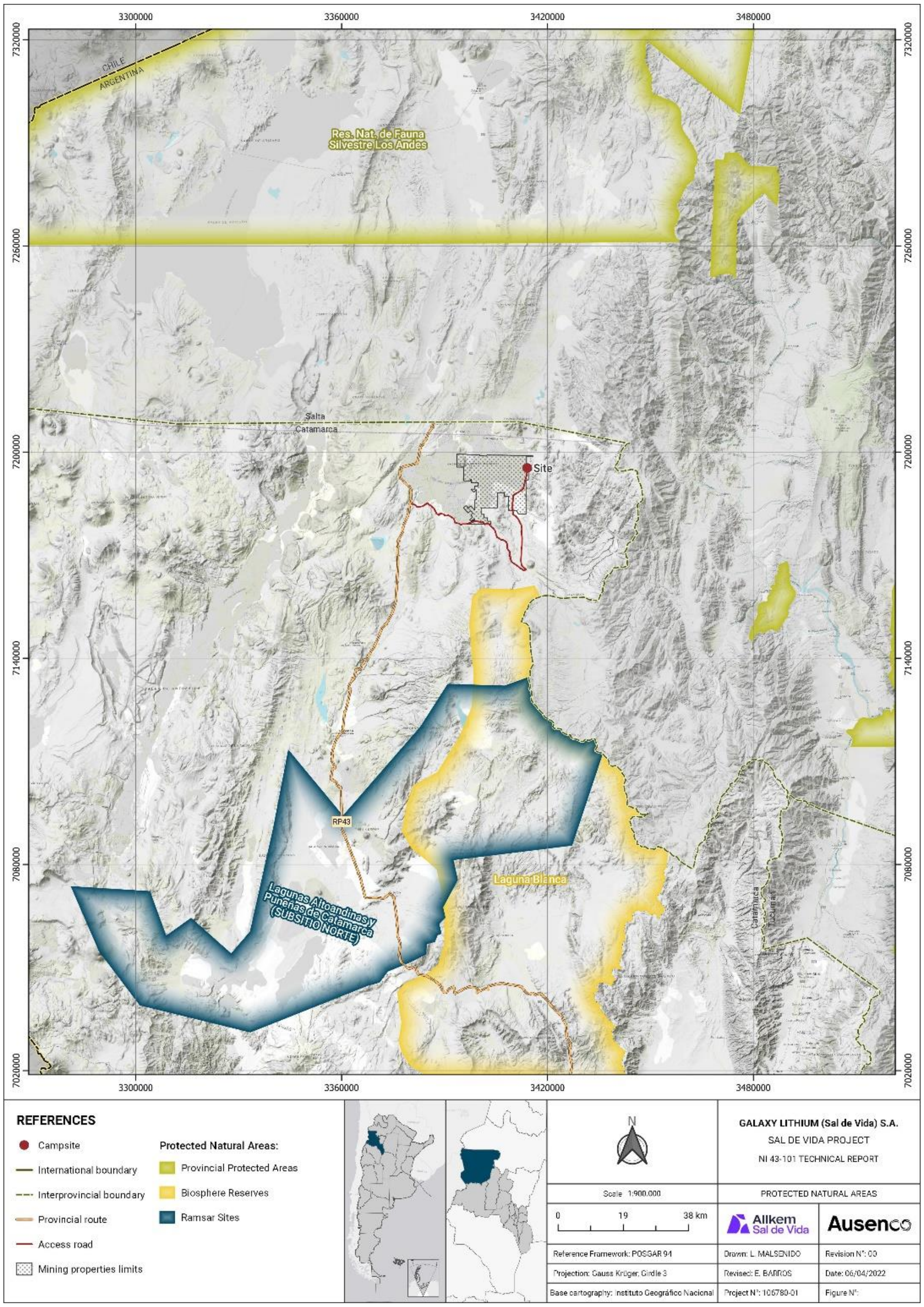
This chapter describes the environmental, social, and permitting contexts of the Sal de Vida Project. The physical and biological baseline data for the Project have been collected over the wider area of the Salar de Hombre Muerto since 2011 (ERM, 2011), with more recent baseline field programs focusing on Stage 1 (see Table 20-1). Specific baseline field campaigns and impact studies will need to be performed as part of the environmental permitting for Stage 2 of the Project.

Other reference documents include the Social and Environmental Impact Report (EIR) prepared by Ausenco for Galaxy in 2021 and Galaxy's corporate policies.

This chapter is structured as follows:

- Protected areas: areas protected by law (Figure 20-1);
- Environmental baseline studies carried out in the Project area and its area of indirect influence, namely the Salar de Hombre Muerto;
- Environmental risks and opportunities that have been identified;
- Mine closure considerations: Project and facility closure, consisting of concurrent and final closure;
- Permitting: identification of permits obtained, those that are in process, and those still required for the Project.

Figure 20-1: Protected Natural Areas Closest to the Sal de Vida Project



Note: Figure prepared by Galaxy Lithium, 2022.

20.1 Corporate Sustainability Principles

Allkem is committed to the transition to net zero emissions by 2035 and is progressively implementing actions across the group to achieve this target. Each project within the group will contribute to this target in a different, but site appropriate manner. Allkem will seek to further decarbonise the project by maximising this renewable energy source through its life. A standalone study for Stage 2 will also be undertaken with the intention of replacing all remaining site-based diesel generated power with natural gas. The design basis and infrastructure allows the project to move to a 100% photovoltaic energy solution when battery storage technology is certified to work at altitude.

Galaxy has developed, and is in the process of implementing, a sustainability framework based on recognised Good International Industry Practice (GIIP).

The corporate approach to sustainability is based on Galaxy's corporate values and is supported by five sustainability pillars:

- Health and safety;
- A people focus;
- Social responsibility;
- Economic responsibility and governance;
- Environmental responsibility.

Galaxy implements a corporate approach to sustainability through a Health, Safety and Environmental Management System (HSECMS). The HSECMS is the framework within which Galaxy and its subsidiary companies, manages its operations in order to meet their legal obligations and is designed in accordance with international frameworks for management systems including ASNZS 4801 Occupational Health and Safety Management Systems. The system consists of policies which set the overall intent of the company and standards which set the minimum mandatory requirements across specific topics.

Galaxy Policies relevant to environmental and social management include:

- Health and Safety Policy;
- Environmental Policy;
- Equal Employment Opportunity and Harassment Policy;
- Human Rights Policy.

Galaxy Standards relevant to environmental and social management are based on recognised GIIP and include:

- Environmental and social impact assessment;
- Biodiversity, flora and fauna management;
- Landform, soil management and bioremediation;
- Water;

- Tailings;
- Waste (non-process);
- Environmental noise management;
- Air quality management;
- Heritage management;
- Environmental monitoring;
- Rehabilitation and closure;
- Social investment;
- Stakeholder engagement;
- Complaints and grievance mechanism;
- Energy and carbon.

These standards were developed in 2020 and will be implemented across the business in 2022. A gap analysis will be conducted on the Sal de Vida Project to ensure that the environmental and social studies, impact assessment, and their proposed management meet the corporate requirements.

Galaxy produces a Sustainability Report, which is a voluntary disclosure of the company's endeavours to strengthen the sustainability performance and increase transparency, in accordance with the core option of the Global Reporting Initiative (GRI) Standards and that cover the Sal de Vida Project.

20.2 Environmental Baseline Studies

Environmental baseline studies were carried out in the Sal de Vida Project area over a number of field seasons starting in 1997. The baseline study area has changed over time as the Project footprint has changed. As a result of environmental baseline, no components have been found to be incompatible with the Project execution. Environmental elements included in the baseline studies, with their salient features, were the following:

- Hydrology: The total water catchment area for Salar del Hombre Muerto is approximately 3,929 km^2. The main perennial streams entering the Hombre Muerto basin are the Rio Trapiche and the Rio de los Patos, both of which enter from the south. Estimated total surface water flow to the salt pan is 147 x 106 m^3/year. However, during wet years, the total surface water flow to the salt pan may greatly exceed this.
- Surface and near-surface water recharge: Liquid and solid (snowmelt) precipitation in the basin is estimated at 129 mm/a, or as a volumetric rate, at 39,780 m^3/hr. Using 5 – 20% of the annual volumetric precipitation, an estimated range of precipitation recharge is likely between 1,980 – 7,920 m^3/hr. The last water balance estimation was carried out by Montgomery and Associates in 2021.
- The current best estimate for groundwater recharge in this area is considered to be 5,400 m^3/hr; however, whenever the recharge estimate is used, it is recommended that a sensitivity analysis be run for recharge rates as low as 1,980 m^3/hr, or as high as 7,920 m^3/hr. If these sensitivity analyses identify a risk, then a more focused investigation could be required to assess the chance of having a recharge below or above a specific value (Montgomery and Associates, 2020).
- Water quality:

- Surface water quality: Surface water sampling campaigns commenced with the 2011 environmental baseline studies at five locations which included one site in the Río de los Patos and one site in each of the Laguna Verde, Vega de Hombre Muerto, Vega de las Ignimbritas, and at the mouth of the Laguna Catal. In 2011, samples were taken from areas with no evidence of any type of disturbance and were considered to be representative of the baseline in the study area. Results indicated that the water samples had high levels of sulphates, chlorides, boron. Quarterly water campaigns were carried out in 2019, 2020, and 2021; high arsenic[4] is considered typical of the Puna area. An elevated reading in the Laguna Verde is probably due to the lake having no discharge point, with evaporation concentrating arsenic. High concentrations (naturally occurring), do not represent an additional environmental risk. Due to its chemical characteristics, surface water it is not considered for consumption. Also, there is no use of surface water in the process.
- Groundwater quality (fresh water wells): Groundwater quality was first sampled in 2012 during the water well drilling program and has been continuously monitored until now. This water is used as raw water for the operations. However, it is not potable and is treated via a RO plant that produces potable water.
- The water samples were classified as sodium chloride. The predominant anions were chlorides, and the main cations were Na+ and K+. TDS values were lower in groundwater than the ones in surface water.
- Groundwater quality (brine-deep aquifer): This water quality is discussed in Sections 7 and 15 as it is related to the resource/reserve for the Project.

- Air quality: The parameters evaluated were found in low concentrations in accordance with favourable atmospheric dispersion conditions and limited anthropic activity in the study area.
- The last air quality and environmental noise monitoring, which was conducted in November 2021, showed results below the limits established by Law 24.585 for mining activities, for all five sites sampled.
- Soils: Soils are generally alkaline in character, especially in the salt pan. Interpreted as being due to the higher concentration of ionic elements supplied by the phreatic water in the salt pan. There is a low level of organic matter in the samples. Where high nitrogen content is found, this corresponds to the organic composition of black, fetid clay. There is a strong concentration of calcium and sodium in the superficial horizon located on the margins next to the salt pan, decreasing in the deeper horizons of the soil profile. No hydrocarbons were detected in any of the samples taken during the 2011 baseline studies. The absence of heavy metals anomalies in the waters implies their absence as well as in the soils affected by them.
- Flora: Predominant vegetation consists of a high-altitude xerophytic type, dominated by low-height woody herbs from 0.40 – 1.5 m, grasses, and cushion plants. The nucleus of the salt pan is devoid of vegetation due to the high surface salinity.
- Fauna on its biology and ecology should be performed in view of the likely increase in anthropogenic pressure in the upper reaches of mountain streams. In the supplementary biodiversity baseline studies performed in the area of influence of the Sal de Vida Project in March 2021 by Knight Piésold Consulting, only the presence of rainbow trout specimen could be identified, not recording other species of fish.

[4] The arsenic and other heavy metal concentrations are related to the geological outcrop.

- Limnology: The March 2020 baseline study highlighted the ecological value of the macroinvertebrates that inhabit aquatic lotic ecosystems such as the Río de los Patos, since they process organic matter and serve as food for other organisms such as fish or amphibians. Supplementary studies of the Limnological Baseline for the area of influence of the Sal de Vida Project performed by Knight Piésold in March 2021, made it possible to characterize the taxonomic assemblages of phytobenthos, zooplankton, phytoplankton and aquatic macroinvertebrates in wetland bodies. Shallow and hypersaline water bodies condition the limnological composition to less richness and abundance of organisms, where species of the Bacillariophytes and Cyanobacteria taxa predominate. In the water bodies with better chemical quality or less saline concentration, macroinvertebrates predominate, and zooplankton is much more abundant.
- Ecosystem characterization: The area of the Sal de Vida Project covers two Phytogeographic Provinces of the Andean Domain: Puna and Altos Andes (Cabrera, 1976). The climate is cold and dry, with very strong winds and precipitation in the form of snow or hail in any season of the year. In general, the higher peaks have permanent snow coverage. The average annual temperature is 3.1°C and the mean monthly temperatures tend to be below freezing for more than half the year; the solar radiation is high and the thermal amplitude is very large. During 2021, two wetland monitoring campaigns were carried out in the Salar basin in order to define the main characteristics of the most fragile ecosystems called vegas, some of which provide ecosystem services to the local community of Ciénaga La Redonda (see Table 20-1).
- Landscape: The dominant landscape is extensive alluvial and salt flats. The main landscape modelling agents are river run-off and wind action, generating both erosion and accumulation geo-forms. The salar has superficial salt crusts and shallow superficial lagoons. The visual quality is favored by the scenic background, especially in those units of landscape in which steep mountain ranges stand out in different perspectives, with unique elements such as high-altitude hills like the Ratones volcano and the Ciénaga mountain range. There are natural landmarks that increase the visual quality of the landscape, such as the Los Patos River and its delta, meadows, streams, as well as positive cultural landmarks like the Ciénaga Redonda hamlet.
- Protected Areas: There are no protected area or natural reserves in the Sal de Vida Project area. The nearest protected areas are two reserves: Los Andes Reserve in the Province of Salta and Laguna Blanca Biosphere Reserve in the Province of Catamarca (Figure 20-1). The area pertaining to Sal de Vida Project is 75 km south of the Los Andes Reserve and 35 km north of the Laguna Blanca protected area.
- Socioeconomic Setting: The department of Antofagasta de la Sierra is located to the west of the province, 580 km from the capital city of San Fernando del Valle de Catamarca, while the distance between the provincial capital and the head of the department is 608 km. The department consists of the localities of Villa de Antofagasta, El Peñón, Los Nacimientos, el Salar del Hombre Muerto, Antofalla, Las Quinuas, Ciénaga La Redonda, Paraje La Banda, Vega de la Laguna and Río la Punilla. According to the Municipal Census (2018) it has 1,684 inhabitants, with a density of 0.6 inhabitants/km^2. The type of population is rural grouped: 72.7%,rural dispersed: 27.3%.
- Archaeology: The 2011 baseline studies provided an archaeological profile of the study area and a reference framework at a regional level, upon which it would be possible to compare and integrate results of future surveys carried out for infrastructure works programmed in the framework of ongoing projects. The Stage 1 area was covered by the 2020 – 2021 archaeological baseline studies (see Table 20-1) and the Stage 2 Project area will be specifically studied in the 2022. However, it was possible to define archaeologically sensitive areas within the study area, these being:

  - The occurrence of archaeological findings in 122 registered sites (with different categories of importance), considering a buffer area of 20 m in diameter (taking the site in question as the centre); and
  - Areas near existing or extinct water bodies, such as the edges of plains and salt flats, high parts of hills, riverbeds and paleo-corridors, and foothills, not surveyed in the framework of the study but finding potential.
  - The study noted that these zones should be considered when diagramming all activity within the area, in order to prevent any alteration of the cultural assets and their contexts.
- Geology and geomorphology: Covered in Section 7.

The field campaigns conducted to date are summarized in Table 20-1.

Table 20-1: Environmental Baseline Field Campaigns

Month/Year	Environmental Elements	Season	General Comments	Technical Comments
February 1992	Water quality data of Salar del Hombre Muerto Fenix Project	Summer	Published in DIA 1997 Fenix Project	Rio de Los Patos (upstream), Los Patos delta, Laguna Catal and Laguna Verde sites.
July 1993	Water quality data of Salar del Hombre Muerto Fenix Project	Winter	Published in DIA 1997 Fenix Project	Rio de Los Patos (upstream), Los Patos delta, Laguna Catal and Laguna Verde
29 January 1998	Surface water quality	Summer	Sampling done by the Secretary of Water Resources of the Province of Salta, within the framework of the Provincial Sampling Plan	Peak water flow
21 July 1998	Surface water/ quality	Winter	Sampling done by Secretary of Water Resources of the Province of Salta, within the framework of the Provincial Sampling Plan	Low water flow
25 April – 06 May 2011 (ERM, 2011)	Flora, fauna; archaeology; air quality, soils, geology, geomorphology, hydrogeology, hydrology and surface water quality; socioeconomic.	Autumn	Study area consists of much larger area that the Stage 1 Project	Comprehensive baseline study
July 2009	Geochemistry evaluation of Salar del Hombre Muerto	Winter	Undertaken by Conhidro for Lithium One	
April 2012	Hydrological Study of Los Patos river basin	Autumn	Carried out by Conhidro for Lithium One	Rio Aguas Calientes, Rio de Los Patos, upstream, confluence, and downstream
February 2018	Water baseline sampling	Summer	Sampling by Secretary of Mining of Catamarca	Five sampling sites along Rio de Los Patos basin (three surface and two groundwater samples)
June 2018	Water baseline sampling	Summer	Sampling by Secretary of Mining of Catamarca	Five sampling sites along Rio de Los Patos basin (three surface and two groundwater samples)
July 2019	Water quality and air quality	Winter	Monitoring sampling by Inducer Laboratory for Galaxy	Five sampling sites along Rio de Los Patos basin (three surface and two groundwater samples)
November 2019	Water	Spring	Sampling by GXY and chemical analysis by Inducer Laboratory for Galaxy	Five sampling sites along Río de los Patos basin (three surface and two groundwater samples)
December 2019	Air quality and noise	Summer	Monitoring and analysis by Inducer Laboratory for Galaxy	Five sampling sites in Salar del Hombre Muerto

Month/Year	Environmental Elements	Season	General Comments	Technical Comments
February 2020	Water	Summer	Sampling by Galaxy and chemical analysis by EnviroSG lab.	Five sampling sites along Río de los Patos basin (three surface and two groundwater samples)
March 2020	Biodiversity (flora and vegetation, terrestrial and aquatic vertebrates)	Summer	Monitoring campaign carried out by SEIMCAT for Galaxy	Carried out in the area of Project direct and indirect influence.
March 2020	Archaeology	Summer	Carried out by external archaeologist for Galaxy	Survey of proposed main access road site and control of archaeological sites detected in previous campaigns.
May-2020	Water baseline	Autumn	Monitoring sampling by Galaxy	Five sampling sites along Río de los Patos basin (three surface and two groundwater samples)
June 2020	Air quality and noise	Spring	Monitoring sampling by Inducer Laboratory for Galaxy	Five sampling sites in Salar del Hombre Muerto
September 2020	Water baseline	Spring	Monitoring sampling by Galaxy	Five sampling sites along Río de los Patos (three surface and two groundwater samples)
November 2020	Air quality and noise	Spring	Sampling and chemical assays by Inducer Laboratory for Galaxy	Five sampling sites in Salar del Hombre Muerto
December 2020	Water baseline	Summer	Sampling by Galaxy and chemical assays by ALS Lab.	Sampling along Rio de Los Patos basin (five surface and two groundwater sampling points)
March 2021	Water quality	Summer	Monitoring sampling by INDUSER Laboratory for Galaxy	Seven sampling points along the Los Patos River watershed (five surface water and two groundwater samples).
March 2021	Biodiversity Monitoring	Summer	Field campaign and report by Knight Piésold Consultants	Including Wetlands monitoring (fauna, flora, limnology and vicugna and avifauna censuses).
April 2021	Water quality	Autumn	Monitoring sampling by INDUSER Laboratory for Galaxy	Three sampling points along the de Los Patos River watershed (one surface water and two groundwater samples).
May 2021	Archaeology	Autumn	Archaeological survey and monitoring performed by external archaeologist for Galaxy	Survey of the future bypass route and control of archaeological sites detected in previous campaigns.
July 2021	Water quality	Winter	Monitoring sampling by Alex Stewart Laboratory for Galaxy	Monitoring sampling by Alex Stewart Lab for Galaxy. Seven sampling points along the de Los Patos River watershed (five surface water and two groundwater samples).
September 2021	Water quality	Spring	Monitoring sampling by Alex Stewart Laboratory for Galaxy	Monitoring sampling by Alex Stewart Lab for Galaxy. Seven sampling points along the de Los Patos River watershed (five surface water and two groundwater samples).

Month/Year	Environmental Elements	Season	General Comments	Technical Comments
November 2021	Air quality and Environmental Noise	Spring	Monitoring sampling by ENVIRO SG Laboratory for Galaxy	Five sampling sites in Salar del Hombre Muerto
November 2021	Biodiversity Monitoring	Spring	Field campaign and report by Knight Piésold Consultants.	Including Wetlands monitoring (fauna, flora, limnology and vicugna and avifauna censuses).

20.2.1.1 Aquifer Management

Although the Sal de Vida Project will not use surface water for either its operations or camp, neighbouring projects that are forecast to come online will affect the surface water levels both upstream and downstream of Galaxy's operation. Regular water flow measurements and laboratory chemical analyses of surface water in the Río de los Patos, and from nearby wells will be used to generate a baseline. This baseline will be used to identify changes in flow/chemistry. Data will also be used to refine future model simulations.

The SVWF12_20 monitoring well provides information on seasonal variations in the water level and sensors were installed inside it for continuous recording of pH, electrical conductivity and temperature with real-time data transmission.

The ongoing management of, and a continuous hydrogeological oversight of, brine extraction from the aquifer is considered to be critical in understanding its possible long-term effects on the surficial and near-surface water system, and consequently the ecosystem that is dependent on this water supply.

Water for industrial use comes from the fresh water well (SVWF12_19), which requires ultrafiltration and RO treatment. The first step in the provision of fresh water from well SVWF12_19 to the camp, is the installation of two storage tanks and a modular RO plant. In the operation stage, the supply of water from well SVWF12_19 to the modular RO plant by means of an aqueduct is also considered.

In October 2021, a new freshwater well was drilled to use as a reserve or backup in case that well SVWF12_19 is in maintenance.

20.2.1.2 Mining Waste

The Project will generate discarded salts and liquid waste during the process, mainly brines, which do not represent a contamination risk. This liquid waste will be sent to the waste/discard disposal facilities. The Project does not require a tailings storage facility.

This waste/discard disposal facility will consist of halite stockpiles, muriate stockpiles and co-disposal stockpiles surrounding the halite ponds. The facility will cover a total area of approximately 300 ha for Stages 1 and 2 of the Project. The salt piles will average 30 m in height and will be built principally on the salt pan surface. Further details on waste/discard disposal can be found in Section 17.2.3.8.

The salts are generated from brines already present in the salt flat and do not introduce foreign compounds to it. Basically, they are composed of sodium chloride (common salt), potassium chloride, sodium and calcium sulphates, magnesium hydroxide and boron. It is estimated that sodium chloride and sulphate make up over 94% of this waste.

The main process waste/discards will include:

- Solid discards from the evaporation ponds: these will comprise harvested salts from the halite and muriate ponds. These salts will be generated from around Year 2 of production, since the salt layer and harvestable layer must be in place at the base of each pond before the first harvest can be undertaken.
- Solid-liquid waste/discards from the process plant:
    - Liming solid discards: primarily precipitated magnesium hydroxide, borate salts and gypsum.
    - Softening solid discards: primarily precipitated calcium carbonate and magnesium carbonate.

- Mother liquor that is not used in the process: a portion of the mother liquor generated from the primary lithium carbonate plant will be discarded since it is not required in the process.
- RO plant retentate (reject).
- Steam boiler retentate.
- Any sump pump solutions that cannot be recycled within the process.

All waste/discards will be disposed as follows:

- Co-storage of solids and liquids: the co-storage area will be around the halite ponds for both process plant discards/wastes and harvested halite salts. It will consist of an area of approximately 300 ha.
- Since the generation of solid-liquid discards from the process plant begin before the harvesting of any salts from the pond, these discards will be treated differently during the first two years. During the first two years all liquid discards generated from the process will be sent to an event pond, which will be located near the process plant. After Year 2 of production, the event pond will only be used for unprogrammed events. All solid discards will be sent to de co-disposal area, to be stockpiled in the harvested salts storage area. From Year 2 of production onward, the solid salts harvested from the halite evaporation ponds will be sent to the same co-disposal area and will be deposited around the initial 2 years of solid stockpile built up to that date, generating a containment dam. From Year 2 of production onward, both liquid and solid waste from the process plant will be mixed in a tank located near the process plant and sent as a pulp (or slurry stream) to the co-disposal area, to be co-disposed in the containment dam within the halite salts. This will operate for the remainder of the Project life.
- Halite stockpile: not all harvested halite salts will be sent to the co-disposal area. Some halite salts will be stockpiled separately to be used as construction material for future evaporation ponds. These salts will be sent directly to the halite stockpile area by truck after being harvested, to be stockpiled accordingly. The total area available for the halite stockpile will be 20.8 ha.
- Muriate stockpile: all muriate salts that are harvested will be stockpiled separately. These salts will be sent directly to the muriate stockpile area by truck after being harvested, to be stockpiled accordingly. The total area available for the muriate stockpile will be 46.3 ha .

20.3 Permitting

20.3.1 Environmental Impact Assessment Permit

The Environmental Impact Assessment (DIA) permit is the instrument that governs all of a Project's exploration, construction and exploitation activities and must be updated every 2 years (Article 11 of Federal Law No. 24.585). The Sal de Vida Project has an approved DIA, Resolution 2021-781-E-CAT-MM, which enables Galaxy to construct and operate the Sal de Vida Project within the constraints of the issued permit. This approval is included in Galaxy's DIPGAM file E4220/2013 (Galaxy's file with the Secretary of Mining of the Province of Catamarca) for the proposed Sal de Vida operations.

The DIA approvals for the Project are shown in Table 20-2. The DIA submission includes, and its approval generates, a series of commitments and obligations. Obligations and commitments include, but are not limited to: schedules, investment commitments, social obligations, environmental monitoring and audits, and safety conditions. Breaches of these commitments and obligations may result in sanctions, fines, project suspensions and, after an administrative procedure, in the cancellation of the environmental permit.

Table 20-2: Exploitation Permits for Sal de Vida Project

Permit Name	Date Filed	Approval Resolution	Approval Date	Expiration Date	Observations
DIA for Exploitation	—	Resolution SEM 256/2014	20 March 2014	(Updated)	Production of 25,000 tpa of lithium carbonate (Li_2CO_3) and 107,000 tpa of potassium chloride (KCl). A description of the Project's flowsheet, infrastructure, layouts, studies and environmental impacts were included in the submission.
DIA, Extension Request (1 year)	April 2016	-	-	(Updated)	Request filed with DIPGAM for 1-year extension to biannual update requirement for DIA. Request based on statement that none of the activities approved in Resolution SEM 256/2014 have been carried out.
DIA, Second Extension Request (6 months)	April 2017	Resolution SEM 147/2017	03 March 2017	(Updated)	A 6-month extension of the deadline to present the DIA update was granted.
Biannual Update, Environmental Impact Declaration DIA for Exploitation	3 June 2018	Resolution SEM 639/2018	24 August 2018	(Updated)	Approval of the update of the general DIA and construction of a pilot plant; drilling of seven wells to 150 m; two wells to 400 m; and four wells to 260 m; Relocation of the Ratones camp. Approved for 6 months.
Biannual Update, Environmental Impact Declaration DIA for Exploitation	22 February 2019	Resolution SEM 676/2019	31 July 2019	30 July 2021 (update submitted for approval)	Approval of the update of the general DIA and approval to drill eight production wells in the East Wellfield
Biannual Update, Environmental Impact Declaration DIA for Exploitation	1 March 2021	Resolution 2021-781-E-CAT-MM	21 December 2021	21 December 2023	Update of the general DIA Resolution SEM 676/2019 and requesting approval to build ponds and plant of lithium carbonate (Li_2CO_3) for Stage 1. A description of the Project's flowsheet, infrastructure, layouts, studies, and environmental impacts and mitigation plans were included in the submission.

The DIA update submitted on 01 March 2021, includes the brine distribution system, 320 ha of evaporation ponds, the latest flowsheet and lithium carbonate plant, and onsite infrastructure for Stage 1 of the Project. The early works including the East wellfield were previously approved in the application filed on 22 February 2019.

The environmental permitting of Stage 2 of the Project will occur as an update to the DIA for Exploitation.

20.3.2 Permits Required for Construction and Operation

Table 20-3 summarizes the permit applications to support construction and operations for the Stage 1 Project that have been approved or are pending approval. Table 20-5 identifies the major construction and operations phase permits that are still required to be submitted and approved before the Project can commence operations.

20.3.3 Water Permits

A limited-term groundwater permit was received on 15 May 2020, by Provincial Decree 770/20, for Well SVWF12_19 with a flow of 130 m^3/hr and well SVFW12_20 for monitoring and control, for a term of 2 years, as stipulated in Article 7° of the Water Law of the Province of Catamarca, N° 2577/73. The Sal de Vida Project will require 40 m^3/hr of raw water for the operation of Stage 1.

Catamarca's Provincial Law N° 2577 (Section 5, Article 86), establishes that for industrial use, which includes mining, water concessions are granted for the LOM. However, if the authority considers that there is not enough knowledge of the basin, authorisations may be granted through permits for a shorter period.

Since there is limited data available for the Río de Los Patos basin, the Water Authority, under law N° 2577 Article 7, advised the executive power to grant a limited term permit for the use of groundwater, subject to the condition that the wells are monitored, and the information provided to the Water Authority. The maximum validity of a limited-term permit is 2 years. The permit can be renewed every 2 years.

The water usage monitoring between companies, the authorities and community will allow the Water Authority to understand the maximum capacity of the Río de los Patos basin and then, once the information is completed, the Water Authority will advise the executive power as to whether to grant a water concession (Art 5). In addition, the provincial government is undertaking an independent hydrological study to model the water resources with the objective of administering the extraction of water from the Río de los Patos basin.

The limited-term permit can be revoked at any time without indemnification for the company (Art. 7 Law N°2577).

According to the Royalty Agreement (see section 4.9), the Government of Catamarca have agreed to grant a water concession which shall replace the current groundwater permits for the Project

Regarding the use of surface water, the Direction of Hydrology and Evaluation of Hydric Resources granted the Renewal of the Precarious Permit for the Use of Surface Public Water for a volume of 40 m^3/day, for a term of 12 months to be extracted from the Río de los Patos, by means of Disposition DH[5]. and ERH[6]. No. 009/21.

The water permits that will be required to take account of the increased water demand to construct and operate Stage 2 of the Project have not yet been applied for.

The water permit approvals and applications for the Project are shown in Table 20-3.

[5] DH for its acronym in Spanish, Direction of Hydrology.
[6] ERH for its acronym in Spanish, Evaluation of Hydric Resources.

Table 20-3: Construction and Operations Permits Approved and Pending Approval

Permit Name	Date Filed	Approval Resolution	Approval Date	Expiration Date	Observations
Reagents	February 2019	RENPRE (Federal)	May 2020	May 2021	1-year validity. Mandatory quarterly reports on usage and traceability of reagents to be submitted to regulators to maintain good standing for future renewals.
Water easement	July 2016	Mining Court/Water Authority (Provincial)	December 2020	LOM	Granted
Infrastructure and services easement	September 2019	Mining Court (Provincial)	December 2020	LOM	Granted.
Reverse osmosis plant	October 2019	DIPGAM (Provincial)	December 2021	LOM	Plant installed and informed to DIPGAM on November 20, 2019
Discharge of effluents	February 2022	DIPGAM (Provincial)	February 2022	LOM	Submitted to Environment Province Secretariat. 120 days validity
Quarries	*	DIPGAM (Provincial)	Granted	LOM	Quarry M, D, K, E, B G, L, J, N – granted. New filings are required if additional quarries are needed.
Road bypass	October 2019	DIPGAM (Provincial)	Sept 2020	LOM	Permit approved.
Fuel tank	February 2021	SEN (National Energy Secretariat) (Federal)	Granted	February 2022	Facility approved by external auditor for use. Renewable annually
Liquid gas	—	YPF (service provider)	Granted	—	Approval delivered by YPF with services contract and licences. To be reviewed and updated for construction and operation needs
Hazardous waste (hydrocarbons)	December 2020	Environmental Authority (Provincial)	February 2021	February 2022	1-year validity.
Hazardous waste (pathogenic)	November 2021	Environmental Authority No. 800 (Provincial)	November 2022	November 2023	1-year validity.
Hazardous waste (chemicals)	December 2020	Environmental Authority (Provincial)	Environmental Authority (Provincial)	February 2023	1-year validity.
Trucks	January 2021	RUTA (Federal)	March 2022	March 2023	1-year validity.
Radio communication	March 2020	ENACOM (Federal)	Pending	—	1-year validity.
Register of mining producers		Provincial Mining Ministry (Provincial)	March 2022	September 2022	6-month validity

Permit Name	Date Filed	Approval Resolution	Approval Date	Expiration Date	Observations
Mandatory environmental insurance (SAO)	September 2020	Environment Secretariat	October 2021	October 2022	1-year validity.
Well Water Permit back up 21_21	-	Directorate of Hydrology and Evaluation of Water Resources (Disposal 0013)	October 2021	-	Only drilling permit.
Sewer system at the de Los Patos and Aguas Calientes river crossings. Antofagasta de la Sierra, Catamarca	July 2021	Environmental Secretariat. Provincial Directorate of Environmental Management (Disposal 065).	July 2021	-	Report the survey of selected environmental indicators semi-annually.

Table 20-4: Outstanding Construction and Operations Permits for Sal de Vida Project

Permit Name	Expected Submission Date	Expected Approval Date	Regulator	Observations
Construction camp	March 2021	Aug 2021	Environmental Authority (Provincial)	A new temporary camp for construction stage will require permit approval from DIPGAM.
Diesel tanks	2022	2022	Environmental Authority (Provincial) and National Secretariat of Energy	Dependent on final energy strategy
Hazardous waste	2022 (already filed 08 Feb 2022)	2022	Environmental Authority (Provincial)	The new activities involved during construction and first years of production (calibration/stabilization stages) could incorporate new materials and reagents which could generate new categories of hazardous waste
Bromatology (for dining room, coolers and kitchen)	—	—	Health Authority (Provincial)	To be requested by service provider. One-year validity.
Medical service (radioactive source RX)	—	—	Health Authority (National & Provincial)	To be requested by the service provider.
Solar Photovoltaic System	*	*	DIPGAM Environmental Authority (Provincial),	DIA to be submitted
Airstrip construction and operation	2023	2023	DIPGAM, ANAC and National Air Authority	ANAC: National Administration for Civil Argentine Aviation
DIA for Stage 2	2023		Catamarca Secretary of Mines	
DIA for Stage 3	2025		Catamarca Secretary of Mines	

Note: * = Approval pending. Dependent on final energy strategy.

Table 20-5: Water Permits for Sal de Vida Project

Permit Name	Date Filed	Approval Resolution	Approval Date	Expiration Date	Observations
Raw-water Permit (Raw Water)	July 2020	Directorate of Hydrology and Evaluation of Water Resources (Disposal 009/21)	July 2021	July 2022	1-year validity. Raw-water permit to take water from the Ciénaga Redonda and the Río de los Patos up to 20 m³ per day each site (40 m³/d). Permit covers camp (116 beds) and pilot plant needs. Galaxy can only use water from the Río de los Patos.
Groundwater Permit	August 2019	Provincial Decree 770/20	May 2020	May 2022	2-year validity. A limited-term groundwater permit was received on 15 May 2020, by Provincial Decree 770/20, for well SVW12_19 with a flow of 130 m³/hr (1.14 GL/a) and well SVW12_20 for piezometric control. Permit has a term of two years, as stipulated in Article 7° of the Water Law of the Province of Catamarca, N° 2577/73. Approval pending.
Well Water Permit back up 21_21	December 2020	Directorate of Hydrology and Evaluation of Water Resources (Disposal 0013/21)	October 2021	*	Backup well of SVW12-19, SVWF_21_21, requested to the water authority. Granted.

Note: * = Approval pending See Section 4.2.

20.4 Closure and Reclamation

Closure considerations cover the different Project phases, from exploration, to construction and operations.

20.4.1 Construction and Operations Phase Closure Plan

A detailed closure and post-closure monitoring plan will be prepared for the Sal de Vida Project incorporating Galaxy's requirements. The closure and post-closure monitoring plan will also comply with applicable legal closure and post-closure requirements. Objectives will focus on physical and chemical stability, safety, environmental restoration, and legal compliance with applicable regulatory requirements. The closure plan scope will include Sal de Vida facilities at the mine site as well as all associated offsite infrastructure.

The Project has an estimated life of mine (LOM) of 40 years. It is expected that closure and post-closure monitoring activities will continue for a minimum of five years from the end of the operation phase. Most of the closure activities will be carried out at the end of the mine operation phase; however, it is possible that some activities will be carried out in parallel with the operation stage as concurrent closure. Once the closure activities have been executed, a minimum period of seven years of post-closure environmental monitoring will continue, before definitive closure is achieved. The removal of access roads to the pond and waste pile areas will occur at the end of the monitoring period.

20.4.2 Environmental Insurance

Environmental insurance requirements are prescribed by National Law No. 25.675 and by Resolution No. 19/12 by the Secretariat for the Environment and Sustainable Development of Catamarca. This resolution requires mandatory insurance coverage, sufficient to guarantee the financing of any environmental remediation. The insurance must be in place to obtain any related permits, authorizations, registrations and Environmental Impact Statements. It is an essential requirement for the issuance of certain permits, such as the National Hazardous Wastes registration (Blue Pampa, 2019). Galaxy has insurance for all early work activities and will extended its coverage along with the upcoming construction activities as required.

A total of US$30 M is budgeted for remediation and reclamation activities at the end of mine life.

20.4.3 Environmental Liabilities

The Project is not subject to any known environmental liabilities. There has been active ulexite mining within the boundaries of the existing land agreement, but the operations are limited to within 5 m of the surface and will naturally be reclaimed fairly quickly once mining has halted (Houston and Jaacks, 2010).

20.5 Social Considerations

20.5.1 Project Setting and Social Baseline Studies

The original sociocultural baseline was carried out in 2011 (ERM, 2011). In 2018, the National Scientific and Technical Research Council (CONICET), together with the Salta University, undertook a social survey in the Cienaga La Redonda community immediately to the east of the Project area.

Galaxy's tenements are located 100% in the Province of Catamarca in the northern department of Antofagasta de la Sierra and immediately south of the department of Los Andes in the Province of Salta.

There are five population centres in the area of the Salar de Hombre Muerto: Antofagasta de la Sierra and Ciénaga La Redonda in the Province of Catamarca, and Pocitos, San Antonio de los Cobres, and Santa Rosa de los Pastos Grandes in the Province of Salta (ERM, 2011). The closest settlement to the Project is Ciénaga La Redonda, which is located approximately 5 km by road from Galaxy's Tango 01 camp.

Galaxy updated the social baseline report in 2020 undertaking the following studies:

- A social perception survey with local communities;
- A new socioeconomic baseline based on the ERM 2011 report;
- A local supplier survey, particularly in the Province of Catamarca; and
- A local skills study in the area of direct influence and the Province of Catamarca.

20.6 Socioeconomic Aspects

20.6.1 Socio-economic environment of Sal de Vida Project

Antofagasta de la Sierra department is made up of the towns El Peñón, Antofalla, Los Nacimientos, Ciénaga Redonda and Antofagasta Village, which are scattered rural towns. There are currently 1,684 inhabitants in the whole department (Municipal Census 2018). Antofagasta Village is the departmental capital, being a unique third category municipality. The Municipality does not have a Deliberative Council or a Municipal Charter.

The population is rural. 60.1% reside in Antofagasta Village, the rest is distributed in the localities mentioned above.

The age structure of the population shows a particular concentration of inhabitants in the central active ages, namely 25 – 29 and 30 – 34 years; this concentration is more accentuated in the male population than in the female one, which is attributed to a phenomenon of population attraction associated with the development of mining activity in recent years.

We can recognise two processes of emigration in the department, both on a small scale. On the one hand, there is seasonal family migration between the months of June and August associated with climatic reasons to Belén and the provincial capital. On the other hand, there is migration of young people to the provincial capital, Belén or Salta for study purposes. However, few families can sustain the economic costs of having one of their members in another jurisdiction.

According to the 2010 Census, the percentage of households with Unsatisfied Basic Needs (UBN) in the department is 17.5%, compared to 11.4% at the provincial level and 9.2% at the national level. As for the quality of housing, almost all of them (97.8%) have an insufficient quality and only 2.2% have a satisfactory quality. In general, connections to basic services are insufficient. According to the 2010 Census, only 30.3% of the households in the department are connected to the sewage system. The rest of the inhabitants have septic tanks and cesspits.

The school term in the department starts on 20 August and lasts until mid-June, with a school break at the end of the year. In total, the department has 3 pre-schools, 5 primary schools and 3 secondary schools. In 2021 Galaxy Sal de Vida contributed to the communities of Antofagasta de la Sierra with the construction of two schools: Secondary School N° 27 in El Peñón and the extension of Primary School N° 494 in Antofagasta Village.

Antofagasta de la Sierra has a hospital for low-risk care with single hospitalisation. In the districts there are health posts run by a nurses or health workers.

Outside the mining sector, opportunities for qualified formal employment with salaries above the minimum wage are scarce. Thus, the development of self-employment activities or family enterprises in services and commerce is limited by the restricted purchasing power of a large part of the population's families, as well as by the absence of credit options adapted to the local reality.

In the last three years, there has been a boost in local development initiatives and expectations of improved quality of life, attributed to the development of mining activity and the associated royalty system. Improvements can be seen mainly in the area of public works and access to basic services.

Municipal employment absorbs about 70% of the municipal budget. If this figure is considered in percentage terms, it is possible to estimate that about 47% of the economically active population works as municipal employees.

Since 1990, mining has begun to gain momentum in the department, becoming the main economic activity in the private sector.

Tourism is the second most important economic activity in the private sector. Its development is based on the initiatives of extra-local tourist guides and the private enterprises of local families who have created accommodation, restaurants, canteens and handicraft shops.

Livestock farming is a significant source of family sustenance for households in the department. Sheep and camelid production is the most important and, secondly, goat farming.

20.6.1.1 Indigenous Communities (*Población Originaria*)

In Antofagasta de La Sierra, there are two native communities:

Kolla-Atacameña Community of Antofalla: it is the only native community officially recognised within the department of Antofagasta de la Sierra by Resolution N° 158 of the National Institute of Indigenous Affairs (INAI), issued on 4 May 2007. It is made up of 60 people. According to the information provided by the Cacique of the Community, 45 of them reside in Antofalla, while another 15 members are dispersed in the vicinity of the territory, in houses called "stone shacks".

The internal organisational system of the Kolla-Atacameña community of Antofalla consists of a Cacique, the Council of Elders (made up of a total of 18 people, including men and women), a manager, a treasurer, a delegate from the North and a delegate from the South. All these authorities are elected in an open assembly every two years. At the time of the survey and given the health emergency decreed at the national level as a result of COVID 19, the assembly to elect the new cacique had not yet taken place in Antofalla. The term of office is two years.

The members of the community do not have individual title to the land. The land is managed by the community and has been endorsed by national regulations (INAI). It is precisely on this premise that the community consultation processes are based, which are carried out prior to the implementation of any mining project. Although each family or individual owns their own land, it is not formally demarcated.

Mining activity is strongly established in the community of Antofalla and constitutes together with tourism, the main source of employment for the population. Even before the arrival of mining companies, there was a strong "mining culture" due to the artisanal development of this activity (mainly gold and silver mining).

According to the information provided by the Cacique, until recently the active population worked in the mining sector, either as employees of the company running the project or as service providers (canteen, laundry or tire shops). Some of the companies that have carried out exploration work in the area are Barrick, Albemarle, Advantage

Lithium, Lea, Buena Vista Gold and Rio Tinto. All projects within the community's territory are currently inactive due to lack of investors.

Atacameños del Altiplano Community: In the Salar del Hombre Muerto there is a process of identity emergence which corresponds to the creation of an indigenous community called "Atacameños del Altiplano". This native community does not yet have legal status or technical or legal cadastral studies, its conformation is in process, the community has submitted documentation to the INAI during 2020 and is awaiting the resolution. The community is made up of a small number of people, some from Ciénaga Redonda and families from places in the Salar del Hombre Muerto.

20.6.2 Identification of Risks and Opportunities

There are expected to be both positive and negative social impacts from the Sal de Vida Project on the surrounding communities. A potential negative impact could be the influx of people new to the area and their effect on public infrastructure and resources, such as housing, clinics, schools, municipal services, and the potential to affect local cultural values. The increasing activity derived from Project construction and operation will have a positive impact on revitalizing the local and regional economy. Local communities in the area of influence will be able to access jobs with social benefits, medical services, retirement benefit contributions and good hiring conditions.

As part of the social commitments and compliance with the requirements established by Catamarca Mining Authority, Galaxy has been working with the government in community engagement programmes tailored to:

- Train and upskill people from the local communities;
- Prioritise recruitment of local operators and technicians from the area of influence;
- Work with Catamarca University and technical schools to develop professionals for future positions.

20.6.3 Community Relations

The Sal de Vida Project has a Community Relations Plan (CRP) in place, the objectives of which are to:

- Implement and develop CRP programs to maximize the positive effects of the Project and optimize the relationship between Galaxy, and communities, and institutions in Antofagasta de la Sierra;
- Minimize the risks of misunderstandings that could arise between Galaxy and the local communities by having conflict resolution strategies in place;
- Encourage families, residents, and institutions to take advantage of sustainable development opportunities, based on joint work with the local communities to identify such opportunities;
- Establish an information and consultation system open to the community regarding the activities carried out by Galaxy in its Project areas and activities in the areas of influence.

The programs that are established in the CRP are:

- Communication and Commitment to the Population Program;
- Training and Local Employment Program;
- Procurement and Purchase Program for Local Goods and Services;
- Infrastructure Development Program and Productive Projects;

- Support Program for Sports, Cultural and Educational Initiatives;
- Community Health and Well-Being Program.

The programs set forth commitments that include timeframes and schedules as appropriate and that are aligned with Galaxy's four-pillar focus for social initiatives and projects within its sustainability framework, namely education and employment, sustainable development and culture, health and well-being, and infrastructure (Galaxy, 2020a).

The Sal de Vida Project has also defined a territory-based community management approach. This approach specifies the following points:

- Open-door communication policy with the community;
- Early and constant contact and relationships with institutions, organizations and the community in general;
- Identification and characterization of communities, idiosyncrasies, mapping of social actors, survey of common social problems;
- Early response to queries and claims;
- During 2021 Galaxy completed important works in Ciénaga Redonda for the benefit of its inhabitants: construction of a first aid facility, construction of a sports playground, construction and improvement of sanitary facilities, implementation of solar panels technology water heaters and has implemented a successful technical training programme which was developed in all communities in Antofagasta de la Sierra department. The training programme was designed and established so that inhabitants close to Sal de Vida can be trained in lithium industry topics and thus acquire skills that will allow them to have job opportunities within the Sal de Vida Project.

Since 2021, Sal de Vida has been developing a "Completion of education" programme that benefits employees of the project, the communities of Ciénaga Redonda and Antofalla. This programme is carried out jointly through an agreement signed with Catamarca Education Ministry. Allkem aims to support local communities by maximising health, wellbeing and the procurement of local goods and services whilst upskilling and providing future employment opportunities. During CY21 Allkem undertook a number of initiatives including:

- Industrial technical training program in Antofagasta de La Sierra, carrying out more than 43 courses attended by more than 600 people;
- The development of local suppliers in Antofagasta de La Sierra, establishing a local laundry service for Sal de Vida project;
- Implementation of Health and Wellbeing seminars in Antofagasta de la Sierra villages, which involved talks by medical professionals about the prevention and care of different conditions and pathologies in all communities.

As of 31 March 2022, over 70% of the local employees are from Catamarca and Stage 1 will create approximately 900 full-time positions in the peak of construction and 170 full time position during stable Stage 1 operations.

Further engagement with the provincial government and stakeholders, including the communities of Antofagasta de La Sierra, continue in relation to project updates.

21 CAPITAL AND OPERATING COSTS

21.1 Introduction

Capital and operating cost estimates were prepared using AACE International guidelines:

- Stage 1:
  - Wellfields, brine distribution, evaporation ponds, waste (wells and ponds): Class 2 ±10%;
  - Process Plant and Non-Process Infrastructure: Class 4 +30% / -20%.
- Stage 2:
  - Class 4 +30% / -20%.

Cost estimates are based on first quarter 2022 pricing. Sunk costs, including all costs prior to 1 January 2021, were excluded from the estimate.

21.2 Capital Cost Estimates

21.2.1 Overview

The capital cost estimate for Stage 1 of the Sal de Vida Project was prepared by Worley Chile S.A. and Worley Argentina S.A. (collectively, Worley) in collaboration with Galaxy to include capital cost estimating data developed and provided by Worley, Galaxy, and current estimates for completion for Stage 1. Stage 1 is the under-construction phase, with approximately 25% of the project budget already committed.

The capital cost estimate for Stage 2 of the Sal de Vida Project was prepared by Spark Engineering (Spark) in collaboration with Galaxy to include capital cost estimating data developed and provided by Spark, Worley, Galaxy, and other third-party contractors in accordance with individual scope allocations for the 2022 Pre-Feasibility Study for Stage 2. The Stage 2 estimate is unescalated and a factored estimate based largely on Stage 1 costs, and as such is regarded as very preliminary.

Specific cost elements for the estimate that were originally in other currencies were converted to US$.

21.2.2 Basis of Estimate

The capital cost estimate was broken into direct and indirect costs.

- Direct costs: costs that can be directly attributed to a specific direct facility, including the costs for labour, equipment, and materials. This includes items such as plant equipment, bulk materials, specialty contractor's all-in costs for labour, contractor indirect costs, construction and materials, and labour costs for facility construction or installation;
- Indirect costs: costs that support the purchase and installation of the direct costs, including temporary buildings and infrastructure, work areas, temporary roads, walkways and parking areas; temporary utilities, transportation facilities, weather protection, general purpose scaffolding, cribbing, minor temporary construction, general and final site cleanup, manual labour training and testing, security, medical, soil and other testing, survey and operation and maintenance of facilities, camp construction, operation and maintenance costs, engineering, procurement, construction and project management costs (EPCM), costs

associated with the travel, accommodation and overheads, etc., third party consultants, Owner's costs, and contingency.

Quantity development was based on a combination of detailed engineering (including material take-offs from approved-for-construction drawings, material take-offs from study specific general arrangement drawings, approved-for-construction drawings and engineering modelling that includes earthworks, structural steel and concrete), basic design (study-specific engineered conceptual designs), estimates from plot plans, general arrangements or previous experience, and order of magnitude allowances.

Estimate pricing was derived from a combination of budget pricing that included an extensive budget quotation process for general commodities and bulks, fixed quotations for major equipment, and budget quotations for all other mechanical equipment, historical pricing from similar projects, estimated or built-up rates and allowances and placed purchased orders.

The manual base of hourly labour costs was built up to include labour wages, statutory payroll additives, insurances, vacation, overtime provisions and an assumed work rotation of 14 days on and 14 days off. The estimate considers execution under an EPCM approach; thus, for all construction contractors, field distributable costs are included in their labour all-in unit costs.

The construction working hours are based on 14 consecutive days on, at 9.5 hours per day, and 14 days off. Although an agreement will need to be reached with the relevant trade unions, this roster cycle is allowed under Argentinian law and has been used for other similar projects. Labour at the wellfields, ponds, process plant, and pipelines areas will be housed in construction camps, with camp operation, maintenance, and catering included in the indirect cost estimate. A productivity factor of 1.35 was estimated, taking into account Project/site-specific conditions.

Spare parts were estimated at 5% of all mechanical, piping, electrical, and instrumentation plant materials and equipment. Sustaining capital costs were estimated as 1% of direct capital costs.

Engineering, management, and Owner's costs were developed from first principles. The estimate assumed the works will be undertaken using an EPCM delivery model. The EPCM cost estimate includes provision for home office costs and site staffing, office consumables, equipment, and associated project travel. The Owner's cost estimate includes home office costs and site staffing, engineering and other sub-consultants, office consumables, equipment, insurance, and associated project travel. The estimate for the engineering, management and Owner's costs was based on a preliminary staffing schedule for the anticipated Project deliverables and Project schedule. Contingency for Stage 1 is presently 6%, and Stage 2 contingency was calculated using a deterministic approach based on the quantity and pricing input derivation and guided by previous project experience. The overall contingency allowance is 11% of the estimated development capital cost.

Project-related costs were determined as all costs from 1 January 2021, and include the local Galaxy corporate office.

21.2.3 Capital Costs Summary

A summary of the estimated direct and indirect capital costs by area is presented in Table 21-1. The projected overall LOM capital cost estimate is US$902 M.

Table 21-1: Capital Cost by Area

	Stage 1 (US$ M)	Stage 2 (US$ M)	Total Stages 1 & 2 (US$ M)
Direct Costs	**221**	**424**	**645**
General Engineering & Studies	12	13	25
Wellfields & Brine Distribution	13	26	38
Evaporation Ponds, Waste & Tailings	62	184	246
LiCO Plant & Reagents	119	181	300
Utilities	4	7	12
Infrastructure	12	13	25
Indirect Costs	**50**	**99**	**149**
Owners Cost	17	17	33
Contingency	15	63	78
Other	17	20	37
Government, Community, Environment	1	1	2
On-site Infrastructure	5	10	15
Owners Cost	31	60	91
Grand total	**308**	**594**	**902**

21.3 Operating Cost Estimates

21.3.1 Overview

The operating cost estimate for Stage 1 of the Sal de Vida Project was prepared by Galaxy and the operating cost estimate for Stage 2 was prepared by Spark, in collaboration with Galaxy. The cost estimate excludes indirect costs such as distributed corporate head office costs for corporate management and administration, marketing and sales, exploration, project and technical developments, and other centralised corporate services.

21.3.2 Basis of Estimate

Reagent consumption rates were obtained from the plant mass balance. Prices for the main reagent supplies were obtained from budgetary quotations during Q4 2021 and were based on delivery to site.

The operations will use the following work rotation, depending on the operational area:

- 14 days on/14 days off: this work rotation would be based on fourteen days on-duty and fourteen days off-duty, with 12-hour shifts per workday, and would be applicable for staff at site;
- 5 days on/2 days off: this work rotation would be based on a Monday-to-Friday schedule, 40 hours per week, and would be applicable only to personnel at the Catamarca city office.

Galaxy developed a detailed proposed organizational chart and salary plan for the entire Project. Salaries were based on current actual costs, with a 25% uplift for market positioning and an attraction/retention factor for the number of personnel required for the first year of operations.

Electrical power will be supplied by a Power purchase agreement (PPA) with third-party contractor and distributed internally to the process areas and through an overhead power line to booster station, wells, pilot plant and camp facilities. PPA fixed prices are based on budgetary prices and benchmarking. Diesel pricing estimates are based on current actuals. The electrical load was developed by Galaxy, using typical mechanical and electrical efficiency factors for each piece of equipment.

A maintenance factor based on industry norms was applied to each area to calculate the consumables and materials costs.

Pricing for transportation and port costs were obtained from budgetary quotations and are based on 30t trucks, the maximum load allowed in Argentina. The estimate includes freight, handling, depot and customs clearance to deliver lithium carbonate FOB Angamos (Chile). The transportation approach considers a storage facility at the port to supply a buffer for shipments against disruption events such as road blocks, strikes, production, etc. Approximately 120 t of lithium carbonate will be trucked to port each day, equivalent to just over four trucks per day. During operations, transport strategy optimization opportunities in truck movement of reagents and finished product will be considered, such as backhaul opportunities.

Annual general and administrative (G&A) costs include the on-site accommodation camp, miscellaneous office costs and an allowance for a corporate social responsibility levy.

21.3.3 Operating Cost Summary

Table 21-2 provides a summary of the estimated annual cost by category for a nominal year of operation. No inflation or escalation provisions were included. Subject to the exceptions and exclusions set forth in this Report, the aggregate average annual FOB cash operating costs for the Project is estimated to be approximately US$148 M per year.

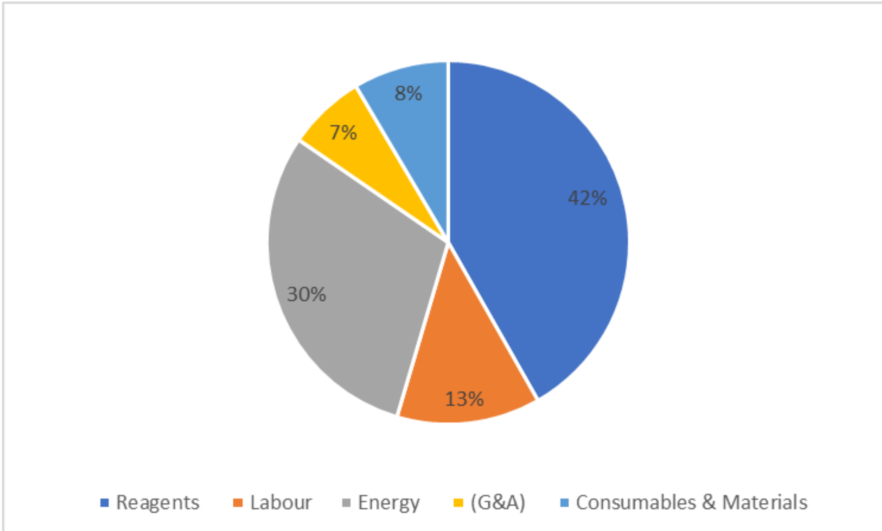
For Stages 1 and 2, reagents represent the largest operating cost category (42%) of site cash costs. Energy represents the second largest cost category (30%) followed by labour (13%). Other cost inputs such as camp services, and consumables represent a relatively small proportion of the total operating cost. A breakdown of the costs is shown in Figure 21-1.

Table 21-2: Estimated Operating Cost by Category

Description	Stage 1		Stage 2		Stages 1 & 2	
	Per Tonne (US$/t)	Annual (US$ M)	Per Tonne (US$/t)	Annual (US$ M)	Per Tonne (US$/t)	Annual (US$ M)
Reagents	1,314	20	1,314	39	1,314	59
Labour	700	11	255	8	403	18
Energy	943	14	943	28	943	42
General and Administrative (G&A)	250	4	202	6	218	10
Consumables & materials	269	4	268	8	268	12
Site cash costs	**3,477**	**52**	**2,981**	**89**	**3,146**	**142**
Transport and port	134	2	133	4	133	6
FOB cash operating costs	**3,612**	**54**	**3,113**	**93**	**3,279**	**148**

Note: Table prepared by Allkem, 2022. FOB = Free on board at port Angamos, Chile.

Figure 21-1: Operating Costs by Category



Note: Figure courtesy Allkem, 2022.

21.4 Comments on Capital and Operating Costs

The total capital cost estimate is US$794 M, consisting of US$645 M in direct capital costs and US$149 M in indirect capital costs.

Site operating cash costs are estimated at US$3,146/dry metric tonnes (dmt), free on board (FOB) cash operating costs (inclusive of transportation and port costs) of 3,280 dmt.

22 ECONOMIC ANALYSIS

22.1 Cautionary Statements

The production schedules and financial analysis annualized cash flow table are presented with conceptual years shown. Years shown in these tables are for illustrative purposes only. If additional mining, technical, and engineering studies are conducted, these may alter the Project assumptions as discussed in this Report and may result in changes to the calendar timelines presented and the information and statements contained in this Report.

No development approval has been forthcoming from the Allkem Board and statutory permits, including environmental permits, are required to be granted prior to mine commencement.

22.2 Methodology Used

The financial evaluation is based on a discounted cashflow (DCF) model. The DCF approach involves projecting yearly estimated revenues and subtracting yearly estimated cash outflows such as operating costs including production costs, G&A costs and associated maintenance costs, initial and sustaining capital costs, taxes and royalties to obtain the estimated net annual free cash flows. These net cash flows are discounted back to the valuation date using a real, after-tax discount rate of 10%, and then summed to determine the NPV at the 10% discount rate (NPV10) of the Project. The 10% discount rate reflects Allkem's estimated weighted average cost of capital. There are no additional project or country-specific risk factors, or adjustments considered. For the purposes of discounting, the model assumes that all revenues, operating and capital costs, taxes, and resulting free cash flows occur at the end of each month.

The DCF model is constructed on a constant fourth quarter 2020 US$ basis and none of the inputs or variables are escalated or inflated. For discounting purposes, January 1, 2021, is considered to be the first period (valuation date). All cash expenditures related to the project before this date have been excluded. The primary outputs of the analysis are NPV10; IRR; payback period; annual earnings before interest, taxes, depreciation and amortization (EBITDA); and annual free cash flow (FCF), all on a 100% Project basis.

22.3 Financial Model Parameters

22.3.1 Overview

- The production schedule (annual brine production, pond evaporation rates, process plant production, ramp-up schedule), plant recoveries, lithium grades, and operating, capital and closure costs;
- A 40-year operating life;
- Operating costs from wellfields, evaporation ponds, process plant, waste removal, site-wide maintenance and sustaining costs, environmental costs, onsite infrastructure and service costs and all labour costs including contractors;
- Product sales are assumed to be FOB Angamos, Chile.

22.3.2 Brine Resource, Brine Reserve

The Brine Resource discussed in Section 14 was converted to the Brine Reserve outlined in Section 15.

22.3.3 Production Rate

The production schedule by product is summarized in Table 22-1. Average annual lithium carbonate production is anticipated to be 45,000 t from an average annual wellfield head grade of 0.067% Li and average annual evaporation pond feed grade of 1.7% Li.

Table 22-1: Production Schedule

Production Li_2CO_3	Unit	2021	2022	2023	2024	2025	2026	2027	2028	Total LOM
Battery-grade	tpa	0	0	3,528	10,534	19,055	33,019	36,000	36,099	**1,428,941**
Technical-grade	tpa	0	0	882	2,633	4,764	8,255	9,000	9,025	**357,235**
Total	**tpa**	**0**	**0**	**4,410**	**13,167**	**23,819**	**41,274**	**45,000**	**45,123**	**1,786,177**

22.3.4 Process Recoveries

The basis for the process recoveries is included in Section 13, and the process design is outlined in Section 17.

22.3.5 Commodity Prices

The commodity price basis is discussed in Section 19. Base case price assumptions and exchange rate assumptions used in the economic analysis reflect Allkem's long-term evaluation assumptions and are shown in Table 22-2.

Table 22-2: Sal de Vida Lithium Product LOM Weighted Annual Price Forecast

Selling Prices Li_2CO_3	Unit	2021	2022	2023	2024	2025	2026	2027	2028	Total LOM
BG	US$/t	0	0	39,724	23,761	17,850	14,850	12,850	10,850	**18,025**
TG	US$/t	0	0	37,045	27,582	23,850	17,850	15,850	14,850	**14,260**
Total	**US$/t**	**0**	**0**	**39,188**	**24,526**	**19,050**	**15,450**	**13,450**	**11,650**	**17,272**

22.3.6 Capital and Operating Costs

The capital and operating cost estimates are detailed in Section 21.

22.3.7 Royalties and Incentives

The Project is subject to local and national royalties and duties. Argentinian mining law limited royalties to a 3% of the mine head value "Valor Boca Mina", which consist in the sales price less direct cash costs related to exploitation, excluding fixed asset depreciation (referred in Section 4.9 "Mining Royalties"). The Project is entitled to a 2% Puna Refund incentive determined by the Argentinian Mining Law to encourage mining activities in the Puna region. All exporting companies in Argentina are subject to Export Duties at a 4.5% levy on FOB exports. Net total LOM royalties and incentives are US$34 M per year in average including Provincial royalties, export duties and export incentives.

22.3.8 Taxes

The Corporate Tax Rate is set at 35%.

22.3.9 Closure Costs and Salvage Value

Sal de Vida currently assumes US$58 M closure cost for the Project and no salvage value at the end of mine life.

22.3.10 Financing

The base case economic analysis assumes 100% equity financing and is reported on a 100% project ownership basis.

22.3.11 Inflation

The base case economic analysis is expressed in real terms.

22.4 Economic Analysis

The key out comes include:

- The Project is expected to support a production rate of 44.7 ktpa of lithium carbonate for approximately 40 years, producing approximately 1,786 kdmt of saleable product;
- Saleable product is expected to be BG (80%) and TG (20%);
- Pre-tax net present value is US$3,036 M at an 10% discount rate;
- Post-tax net present value is US$1,863 M at an 10% discount rate;
- At full production rates, the Project is estimated to generate average annual revenues of US$798 M and free cash flow before interest and tax of US$557 M;
- The LOM operating cost is estimated at US$3,280/t Li_2CO_3 produced;
- Funding requirements peak at US$670 M (project and working capital).

Funding is expected to be provided through one or more of the following:

- Existing corporate cash;
- Existing or new corporate debt or project finance facilities;
- Cash flow from operations;
- Strategic offtake partner(s).

The key metrics are summarized in Table 22-3.

Table 22-3: Key Outcomes

Economics Summary	Units	Total
Production (total)	tonnes	1,786,177
Production (average)	tpa	44,654
Mine Life (from first production)	years	40
Development capital costs	US$ M	794
Pre-production capital costs	US$ M	108
Operating costs	US$/t LC	3,280
Selling price (average)	US$/t LC	17,272
Annual revenue (average)	US$ M	798
Operating cash flow (pre-interest, tax)	US$ M	557
Annual Free Cash Flow (post-tax)	US$ M	357
NPV (10% pre-tax)	US$ M	3,036
NPV (10% post tax)	US$ M	1,863
IRR (pre-tax)	%	44%
IRR (post-tax)	%	38%
Payback from first production	years	3.75

Note: LC = lithium carbonate

Table 22-4 through Table 22-6 summarise the LOM annual financial projections.

Table 22-4: LOM Annual Financial Projections (2021 – 2036)

Financial Projections	Unit	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Production	tonnes	0	0	4,410	13,167	23,819	41,274	45,000	45,123	45,000	45,000	45,000	45,123	45,000	45,000	45,000	45,123
Operating Revenue	US$ M	0.0	0.0	172.8	322.9	453.8	637.7	605.3	525.7	515.3	542.3	686.3	805.5	803.3	803.3	803.3	805.5
Operating Costs	US$ M	0.0	0.0	-22.4	-51.2	-85.8	-138.3	-147.2	-147.5	-147.2	-147.2	-147.2	-147.5	-147.2	-147.2	-147.2	-147.5
Royalties & incentives	US$ M	0.0	0.0	-8.2	-16.3	-22.5	-29.4	-27.9	-24.4	-23.9	-25.1	-31.6	-36.9	-36.8	-36.8	-36.8	-36.9
EBITDA	US$ M	0.0	0.0	142.1	255.4	345.5	470.0	430.1	353.8	344.1	369.9	507.5	621.1	619.3	619.3	619.3	621.1
EBT	US$ M	-0.3	-2.2	135.1	243.7	325.8	448.2	408.7	332.7	323.4	349.6	487.5	601.4	599.9	600.3	600.6	602.7
Tax	US$ M	0.1	0.8	-47.3	-85.3	-114.0	-156.9	-143.0	-116.5	-113.2	-122.4	-170.6	-210.5	-210.0	-210.1	-210.2	-211.0
Net profit (post-tax)	US$ M	-0.2	-1.4	87.8	158.4	211.8	291.3	265.6	216.3	210.2	227.2	316.9	390.9	390.0	390.2	390.4	391.8

Table 22-5: LOM Annual Financial Projections (2052 – 2066)

Financial Projections	Unit	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Production	tonnes	45,000	45,000	45,000	45,123	45,000	45,000	45,000	45,123	45,000	45,000	45,000	45,123	45,000	45,000	45,000
Operating Revenue	US$ M	803.3	803.3	803.3	805.5	803.3	803.3	803.3	805.5	803.3	803.3	803.3	805.5	803.3	803.3	803.3
Operating Costs	US$ M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Royalties & incentives	US$ M	-36.8	-36.8	-36.8	-36.9	-36.8	-36.8	-36.8	-36.9	-36.8	-36.8	-36.8	-36.9	-36.8	-36.8	-36.8
EBITDA	US$ M	619.3	619.3	619.3	621.1	619.3	619.3	619.3	621.1	619.3	619.3	619.3	621.1	619.3	619.3	619.3
EBT	US$ M	601.2	601.5	601.8	603.9	602.3	602.6	602.8	604.9	603.3	603.6	603.8	605.9	604.3	604.5	604.7
Tax	US$ M	-210.4	-210.5	-210.6	-211.4	-210.8	-210.9	-211.0	-211.7	-211.2	-211.3	-211.3	-212.1	-211.5	-211.6	-211.6
Net profit (post-tax)	US$ M	390.8	391.0	391.1	392.5	391.5	391.7	391.8	393.2	392.2	392.3	392.5	393.8	392.8	392.9	393.0

Table 22-6: LOM Annual Financial Projections (2052 – 2066)

Financial Projections	Unit	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066
Production	tonnes	45,123	45,000	45,000	45,000	45,123	45,000	45,000	45,000	45,123	45,000	45,000	37,438	30,082	14,877	0
Operating Revenue	US$ M	805.5	803.3	803.3	803.3	805.5	803.3	803.3	803.3	805.5	803.3	803.3	668.3	537.0	265.5	0.0
Operating Costs	US$ M	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Royalties & incentives	US$ M	-36.9	-36.8	-36.8	-36.8	-36.9	-36.8	-36.8	-36.8	-36.9	-36.8	-36.8	-30.8	-24.6	-12.5	0.0
EBITDA	US$ M	621.1	619.3	619.3	619.3	621.1	619.3	619.3	619.3	621.1	619.3	619.3	517.4	419.0	206.7	0.0
EBT	US$ M	606.7	605.1	605.3	605.5	607.5	605.9	606.0	606.2	608.2	606.5	606.7	504.6	406.0	-366.5	0.0
Tax	US$ M	-212.4	-211.8	-211.9	-211.9	-212.6	-212.0	-212.1	-212.2	-212.9	-212.3	-212.3	-176.6	-142.1	128.3	0.0
Net profit (post-tax)	US$ M	394.4	393.3	393.4	393.6	394.9	393.8	393.9	394.0	395.3	394.2	394.4	328.0	263.9	-238.3	0.0

22.5 Sensitivity Analysis

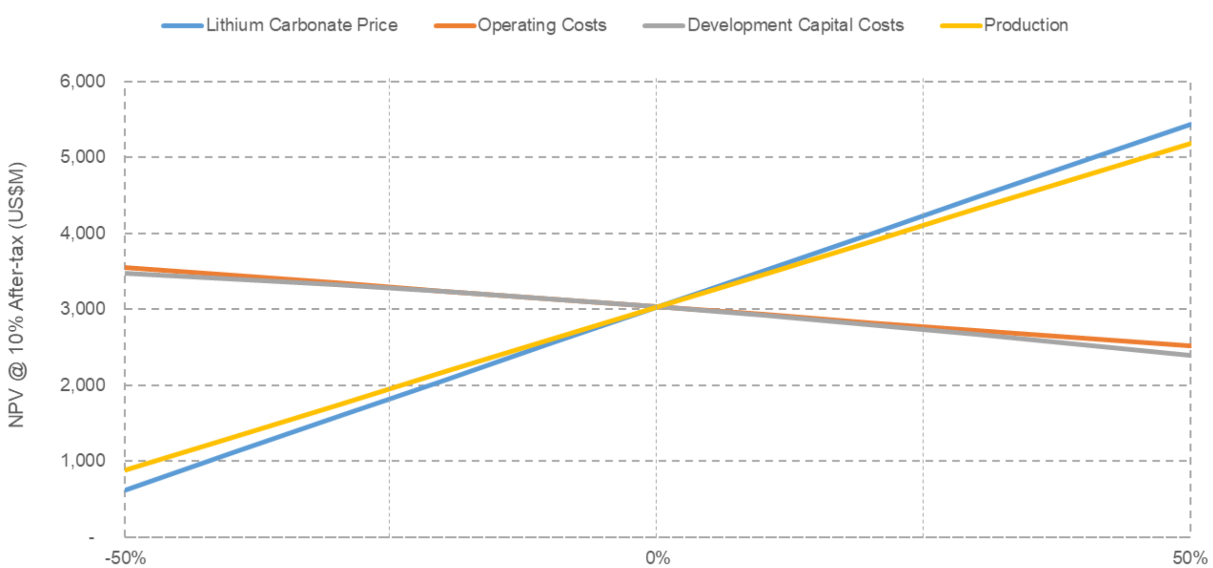
A sensitivity analysis was performed on commodity price, capital costs , operating costs and production.

Table 22-7 shows the impact of changes in key variables on the Project's pre-tax net present value. Figure 22-1 shows the sensitivity to price, operating costs, development capital costs and production with lithium carbonate price and production having the largest impact on NPV.

Table 22-7: Project Net Present Value Post-Tax Sensitivity Analysis

Driver Variable	NPV @ 10% Pre-tax (US$ M)				
	-20%	-10%	Base	10%	20%
Lithium Carbonate Price	2,074	2,555	**3,036**	3,517	3,998
Operating Costs	3,244	3,140	**3,036**	2,933	2,829
Development Capital Costs	3,237	3,141	**3,036**	2,924	2,803
Production	2,175	2,606	**3,036**	3,466	3,896

Figure 22-1: Spider Plot Net Present Value Sensitivities



Note: Figure prepared by Allkem, 2022.

22.6 Comments on Economic Analysis

Under the assumptions described in this Report, the Project shows positive economics.

23 ADJACENT PROPERTIES

This section does not pertain to this report.

24 OTHER RELEVANT DATA AND INFORMATION

This section does not pertain to this report.

25 INTERPRETATION AND CONCLUSIONS

25.1 Introduction

The QPs note the following interpretations and conclusions in their respective areas of expertise, based on the review of data available for this Report.

25.2 Mineral Tenure, Surface Rights, Water Rights, Royalties and Agreements

Legal opinion provided supports that Galaxy currently holds an indirect 100% interest in the Sal de Vida Project through its subsidiary Galaxy Lithium (Sal de Vida) S.A., a wholly owned subsidiary of Galaxy Resources Ltd., which is owned by Allkem Ltd. (Allkem).

Legal opinion provided also supports that the mineral tenures held are valid and sufficient to support declaration of Brine Resources and Brine Reserves. Galaxy currently has mineral rights over 26,253 ha at Salar del Hombre Muerto, which are held under 31 mining concessions.

The Argentine Mining Code (AMC) sets out rules under which surface rights and easements can be granted for a mining operation. The AMC provides the mining right holder with the right to exploit the mineral from the granted area.

Water use rights may be acquired by permit, by concession, and, under laws enacted in some Provinces, through authorization.

During the tenement acquisition process, in some cases, sellers retained usufruct rights and commercial rights for the development of ulexite at surface. The transfer deeds establish that the lithium property holder, Galaxy, has priority over these rights. Galaxy retained the option to buy out any of these rights if the company considers it necessary at any point in time.

The QP is not aware of any significant environmental, social or permitting issues that would prevent future exploitation of the Sal de Vida Project, other than as discussed in this Report.

25.3 Geology and Mineralization

The Sal de Vida deposit is considered to be typical of a brine system in a mature salar with an evaporite core dominated by halite. The most notable source of fresh water to Salar del Hombre Muerto is the Río de los Patos drainage that enters the basin from the southeast.

Sal de Vida's brine chemistry has a high lithium grade, low levels of magnesium, calcium and boron impurities and readily upgrades to battery grade lithium carbonate. The knowledge of the hydrogeological system is sufficient to support Brine Resource and Brine Reserve estimation.

25.4 Exploration, Drilling and Analytical Data Collection in Support of Mineral Resource Estimation

Exploration activities to date have identified the Sal de Vida brines, and has used exploration methodology conventional to brine exploration, such as geophysics and surface sampling, in addition to the drilling programs.

Drilling was conducted in several phases including small diameter shallow wells, brine exploration DDH wells, pilot brine production wells, fresh water wells, and RC drill holes. . The phases were broken out into Phase 1 to 6, with

Phase 1 commencing in 2009, and Phase 6 in 2021 as part of the East wellfield development. Drill data are acceptable to support Brine Resource and Brine Reserve estimation.

Short-term pumping tests were completed as part of all drill program phases to measure aquifer transmissivity; obtain a representative brine sample for the well; and provide design data for future higher-capacity production wells.

Analyses for porosity and brine chemistry were performed at accredited laboratories independent of Galaxy. Analytical quality was monitored through the use of randomly inserted quality control samples, including SRMs, blanks and duplicates, as well as check assays at independent laboratories. The drainable porosity and chemistry data to support the Brine Resource estimates were verified. These verifications confirmed that the analytical results delivered by the participating laboratories and the digital exploration data were sufficiently reliable for Brine Resource estimation purposes.

Sample collection, preparation, analysis, and security for the drill programs are in line with industry-standard methods for brine deposits. Drill programs included QA/QC measures. QA/QC program results do not indicate any problems with the analytical programs. The QP is of the opinion that the quality of the analytical data is sufficiently reliable to support Brine Resource and Brine Reserve estimation.

The conceptual understanding of the hydrogeological system of Salar del Hombre Muerto is good, and the observed drilling and testing results are consistent with anticipated stratigraphic and hydrogeological conditions associated with mature, closed-basin, high altitude salar systems. One of the most important features of this hydrogeological system is the general consistency of the lithium and potassium grades measured throughout the entire salar and the high value of lithium grade. The majority of the salar contains high-density brine with an average lithium grade over 700 mg/L. The identified aquifer units in the basin are shown to be aerially extensive with a demonstrated ability to pump brine.

25.5 Metallurgical Testwork

Galaxy conducted a series of internal and external testwork programs on Sal de Vida brine to determine the feasibility of producing BG lithium carbonate. This has been achieved at a high level of confidence and will be developed further.

Initial testwork included evaporation rate dynamics, liming and concentration pathway testwork, applications of SX, IX, softening, and crystallisation to the brines, process review and testwork program to determine the most appropriate extractant for boron removal, bench-scale testwork for calcium and magnesium removal with sodium carbonate (Na_2CO_3), and IX scoping tests using two types of chelating resins. Progressive enhancements were made to the Project flowsheet, in particular the arrangements of various process steps.

Testwork in support of the 2021 Feasibility Study included flowsheet validation testwork, 'locked-cycle' testwork (replicating the inclusion of anticipated recycle streams) with site reagents, investigation into liming temperature, and solid – liquid separation assessment for liming, softening and crystallisation.

Pilot ponds were constructed, and a pilot plant operated in 2020–2021, to validate laboratory testwork and explore operational considerations. The pilot plant produced a variety of samples suitable for additional testwork. This testwork is ongoing at external vendors' facilities and the results will inform the design of the plant for optimum operational efficiency.

Towards the end of Pilot Run 3 in 2020, several hypotheses were tested to understand their impact on the product quality. Results obtained during these tests indicated an improvement in product quality. This hypothesis was then confirmed in a controlled laboratory environment and showed that with minor circuit modifications, achieving a lithium carbonate product that meets industry specification for BG lithium carbonate is possible. High-grade product from Run 3 achieved BG specification in all elements except for calcium and magnesium.

The implementation and testing of the circuit modifications necessary to achieve BG specification in the pilot plant was completed in 2021. Introduction of an IX circuit and refining of reagent addition strategies allowed production of over 77% BG product in the pilot plant in Run 5. This was improved by further optimisation of process parameters to over 95% of product achieving battery grade in Run 7 at the end of 2021.

25.6 Brine Resource Estimates

The resource model includes only discrete-depth data points, such as drainable porosity determined on core and drive-point sample brine chemistry. Only depth-specific data was used (i.e., drainable porosity and drive-point sample brine chemistry from core holes).

A volumetric cut-off grade of 500 mg/L of lithium was used. Hydrogeological units within each polygon with lithium content less than cut-off grade were not included in the Brine Resource estimate.

Montgomery was engaged to estimate the lithium resources and reserves in brine for various areas within the Salar del Hombre Muerto basin in accordance with the 2012 edition of the JORC code ("JORC 2012"). Although the JORC 2012 standards do not address lithium brines specifically in the guidance documents, Montgomery followed the NI 43-101 guidelines for lithium brines set forth by the Canadian Institute of Mining, Metallurgy and Petroleum (CIM 2014) which Montgomery considers complies with the intent of the JORC 2012 guidelines with respect to providing reliable and accurate information for the lithium brine deposit in the Salar del Hombre Muerto. Brine Resources are reported inclusive of Brine Reserves. Brine Resources that have not been converted to Brine Reserves do not have demonstrated economic viability.

Factors that may affect the Brine Resource estimate include: locations of aquifer boundaries; lateral continuity of key aquifer zones; presence of fresh and brackish water which have the potential to dilute the brine in the wellfield area; the uniformity of aquifer parameters within specific aquifer units; commodity price assumptions; changes to hydrogeological, metallurgical recovery, and extraction assumptions; density assignments; input factors used to assess reasonable prospects for eventual economic extraction; and assumptions as to social, permitting and environmental conditions.

25.7 Brine Reserve Estimates

Using the numerical groundwater flow model projections, total lithium to be extracted from the proposed wellfields was calculated for a total period of 40 years, considering the two stages of the Project and taking into account that East Wellfield will be pumping for 40 years, and the Southwest Wellfield will be pumping for 38 years with a gap of 2 years between wellfields.

The amount of recoverable lithium in the brine feed is calculated to be about 70% of the total brine supplied to the ponds.

It is appropriate to classify the Proven Brine Reserve as what is feasible to be pumped to the ponds and recovered at the end of the process during the first 8 years. The following 34 years of pumping were classified as a Probable Brine Reserve. These values represent about 28% of the total Brine Resource estimate.

Brine Reserves are reported using the confidence categories set out in the 2012 JORC Code. These were reconciled to the 2014 CIM Definition Standards.

Factors that may affect the Brine Reserve estimate include:

- Changes in recoverable lithium estimates based on chosen processing method;
- Assumptions regarding aquifer parameters used in the groundwater flow model for areas where empirical data do not exist;
- Estimated vertical hydraulic conductivity values which partially control the amount of anticipated future dilution in areas where fresh water overlies brine.

25.8 Mine Plan

The East wellfield will be located directly above the east sub-basin of the Salar del Hombre Muerto, over the salt pan. The brine distribution will traverse the salar towards to where the evaporation ponds will be located. The production plant will be sited adjacent to Stage 1´s evaporation ponds that will be directly situated to the south on colluvial sediments. The waste disposal areas will surround the evaporation ponds to the north, east and southeast.

Mobile equipment will be required for plant operations.

Some transport services will be contracted out to local companies; however, in most cases the equipment will be owned and operated by Galaxy. Galaxy will provide fuel and servicing for all vehicles, with the exception of reagent and product logistics.

25.9 Recovery Plan

The recovery plan has been based on the outcomes of extensive testwork at bench and pilot plant scale. The recovery plan has tested and utilised well established technologies to optimise production quality and quantity from the specific chemistry of the Sal de Vida brine.

The process design envisages a number of stages:

- Extraction of brine from the East Wellfield using well pumps and combining in a pair of booster station ponds before pumping to the pond area;
- Evaporation in halite ponds to increase the salt concentration beyond the saturation point of sodium chloride and the lithium concentration to 0.7% by weight;
- Treatment of the concentrated brine using milk-of-lime to remove magnesium, borates and sulphate from the brine;
- Evaporation of the treated brine in muriate and concentration ponds to bring the lithium concentration up to 1.7% by weight. The brine will be evaporated beyond the saturation point of KCl, such that significant a amount of sylvite salts, together with some halite, will be precipitated;
- Brine softening to remove the remaining magnesium and calcium ions;
- Precipitation of battery grade lithium carbonate from the purified brine with addition of sodium carbonate;
- Lithium carbonate solids will be dewatered and bagged for weighing, sampling, and transport.

The Project facilities were divided in the following main areas:

- Wellfield and brine distribution on the salar;
- Solar evaporation ponds at the edge of the salar;
- Production plant (including liming, purification and lithium carbonate precipitation);
- Disposal of waste from the liming and softening stages.

25.10 Infrastructure

Infrastructure has been designed to provide adequate and necessary support to the operation, and will include the following elements:

- Reagent storage and preparation area;
- Product storage;
- The maintenance and vehicle workshops;
- Gatehouse, first aid, and administration offices;
- Power generation and distribution infrastructure;
- Raw water wells and supply infrastructure, feeding an RO plant and the raw water storage;
- Fuel storage and dispensing;
- Communications, accommodations camp and fire protection;
- Site roads, causeways and river crossings;
- Mobile equipment;
- Steam and compressed air generation facilities.

The existing 330-person capacity Tango 01 camp will serve as the operations camp for Stage 1 of the Sal de Vida Project.

Power generation will consist of centralized hybrid power generation centre and overhead power lines to power the geographically-isolated facilities. In the early stages of the project remote facilities will be powered by diesel generators.

25.11 Environmental, Permitting and Social Considerations

Environmental baseline studies were carried out in the Sal de Vida Project area during a number of field seasons starting in 1997. Allkem is committed to the responsible use of water resources and minimising environmental impacts. The internally developed process flowsheet was selected partly on the basis it consumed significantly less energy and water than other conventional technologies.

Sal de Vida Stage 1 of 10.7kpta is fully permitted after receiving approval from regulators in December 2021. This permit is being used for construction activities which commenced in January 2022 to build the first two string of ponds, the brine distribution system, additional camp capacity, process plant and non-process infrastructure.

The Stage 1 expansion to 15ktpa requires a permit for the additional, third string of evaporation ponds which covers an extra ~150ha. The revised EIA has already been submitted to regulators and is expected to be approved by August 2022. The plant requires minimum changes from the upgraded capacity and therefore consultation with regulators is straightforward.

Sal de Vida currently assumes US$58 M closure cost for the Project and no salvage value at the end of mine life. Closure costs for the Stage 2 projects, which are at the pre-feasibility level, will be further developed during the development of the feasibility studies for these stages.

It is expected that closure and post-closure monitoring activities will continue for a minimum of five years from the end of the operation phase. Most of the closure activities will be carried out at the end of the mine operation phase; however, it is possible that some activities are carried out in parallel with the operation stage as concurrent closure. Once the closure activities have been executed, a minimum period of seven years of post-closure environmental monitoring will continue, before definitive closure might be achieved.

In addition to the environmental permits, about 21 key permits will also be required for the construction and operations phases for the Stage 1 Project, covering aspects such as reagents, easements, infrastructure construction and operations, mobile equipment usage, consumables such as fuel and gas, waste disposal, effluent discharge, and communications.

Stages 2 of the Project, being at pre-feasibility level, have not yet been permitted, although environmental baseline studies extend to the areas where this infrastructure is expected to be developed. Potential gaps in the environmental baseline studies in those areas where Stage 2 infrastructure is likely to be developed should be identified in the next phase. Further work will also be required to define the potential environmental and social impacts of these stages of the Project, and their management and closure.

Geotechnical, hydrological and engineering studies of the river crossing between the Plant and the Stage 2 infrastructure should also be undertaken during the next phase.

During the next study phase, an understanding of closure considerations and include resulting environmental design criteria in feasibility-level design of infrastructure should be developed.

The Sal de Vida Project will consume minor amounts of raw water, equivalent to 1-2% of the groundwater recharge to the system. There is no expected loss of water to communities in either their groundwater or surface water usage. Water monitoring takes place at seven different control points alongside nearby rivers in addition to periodic sampling to test flow rates, chemical and physical properties. Galaxy currently holds a permit to extract raw water, a groundwater permit, and has lodged a permit application for an additional groundwater permit.

There are two population centres in the Project's area of influence: Ciénaga La Redonda and Antofagasta de la Sierra in Catamarca Province. The closest settlement to the Project is Ciénaga La Redonda, which is located approximately 5 km by road from Galaxy's Tango 01 camp.

The Kolla-Atacameña community of Antofalla, located 70 km southwest of the Project site, is the only officially-recognized native community within the department of Antofagasta de la Sierra. There are also communities that claim to be originators and/or descendants of native peoples within the Project area.

Galaxy has a Community Relations Plan (CRP) in place. The Stage 2 projects should be socialized during the feasibility phase for these stages through this mechanism.

25.12 Markets and Contracts

A review of the existing and forecast lithium supply and demand was completed by Wood Mackenzie. Forecast lithium demand growth is mostly derived from growth in rechargeable batteries used in Electric Vehicles.

Lithium demand is expected to increase by 21.9% CAGR between 2020 and 2030, and 6.9% a year in the following decade before slowing down to 2.2% a year between 2040 and 2050 as markets become increasingly saturated. Demand in the Chinese market, as well as overseas markets, will drive growth for battery-grade lithium carbonate through increasing demand for LFP cathode chemistry. Demand for battery-grade lithium carbonate is forecast to increase 16.9% CAGR between 2020 and 2030, 6.3% a year from 2030 to 2040 followed by 2.3% a year in the following decade.

Increasing prices are incentivising investment in supply capacity in brine, mineral concentrate, conversion and in new sources such as clay. Refined lithium production capacity is forecast to grow by 10.8% CAGR in the current decade, slowing to 4% between 2030 and 2040 and 2.9% in the following decade.

A marginal supply deficit is forecast to continue until 2027. The deficit will continue to grow until 2043 to reach 1,719 kt LCE despite increasing supply from existing producers. During the forecast, there will be increasing supply from recycled material which, combined with decreasing demand growth, will result in a lower supply deficit towards 2050.

Battery-grade Lithium carbonate prices are forecasted to continue increase in contracts during 2022 but as new supply enters the market prices are forecasted to stabilise followed by declining through the middle of this decade. By the late 2020s prices are expected to gradually decline to around US$11,000/t. As demand continues to grow, a larger deficit will emerge towards the end of the decade and contract prices will trend towards a long-term contract price of US$16,000/t.

Demand for technical-grade carbonate from industrial sectors is forecast to grow in line with economic growth, Technical-grade lithium carbonate, however, lends itself very well to be reprocessed into battery-grade lithium chemicals. This is an established process occurring in Chile, US, China and soon in Japan. The ability to re-process the product into battery-grade lithium chemicals will ensure that prices will increase in line with prices of battery-grade lithium chemicals.

As of the date of this Technical Report, Allkem has no existing commercial offtake agreements in place for the sale of lithium carbonate, from the Sal de Vida Project. Allkem is having discussions with potential customers and in line with the Project execution schedule, these discussions are expected to advance to negotiations throughout the course of the project.

25.13 Capital Cost Estimates

Capital and operating cost estimates were prepared using AACE International guidelines, and will be further refined through planned near term engineering optimisation work:

- Stage 1, estimated by Worley and Galaxy:
  - Wellfields, brine distribution, evaporation ponds, waste management: Class 2 ±10%;
  - Process Plant and Non-Process Infrastructure: Class 4 +30% / -20%.

- Stage 2:
  - Class 4 +30% / -20%.

These costs were scaled from the previous feasibility cost estimates, and will be re-estimated in the context of the actual performance of the Stage 1 project.

Cost estimates are based on fourth quarter 2020 pricing. Sunk costs, including all costs prior to 1 January 2021, were excluded from the estimate.

Direct capital costs for the combined Stages 1 and 2 total US$645 M and indirect costs are estimated at US$149 M, for an overall capital cost estimate for the Sal de Vida Project of US$902 M.

25.14 Operating Cost Estimates

Reagents represents the largest operating cost category (42%) over the site cash cost. Energy represents the second largest cost category (30%) followed by labour (13%). Other cost inputs such as camp services, and consumables represent a relatively small proportion of the total operating cost. The aggregate average annual FOB cash operating costs for Stage 1 of the Project is estimated to be approximately US$97147.53 M per year. Confidence in these operating costs is supported by having access to the experience gained at Olaroz with logistics and especially consumables pricing.

25.15 Economic Analysis

The financial evaluation is based on a discounted cash flow (DCF) model with an 10% discount rate. The DCF model was constructed on a constant fourth quarter 2020 US$ basis and none of the inputs or variables are escalated or inflated. For discounting purposes, January 1, 2021, is considered to be the first period (valuation date). All cash expenditures related to the Project before this date were excluded.

The financial model is based on the following key Project assumptions:

- The production schedule (annual brine production, pond evaporation rates, process plant production, ramp up schedule), plant recoveries, lithium grades, and operating, capital and closure costs;
- A 40-calendar-year operating life;
- Operating costs address the wellfields, evaporation ponds, process plant, waste removal, site-wide maintenance and sustaining costs, environmental costs, onsite infrastructure and service costs and all labour costs including contractors;
- Product sales are assumed to be FOB Angamos, Chile.

Average annual lithium carbonate production is anticipated to be 45.000 t from an average annual wellfield head grade of 0.067% Li and average annual evaporation pond feed grade of 1.7% Li. The base case economic analysis assumes 100% equity financing and is reported on a 100% project ownership basis. Base case price assumptions and exchange rate assumptions used in the economic analysis reflect Galaxy's long-term evaluation assumptions.

In the financial model, all estimated lithium carbonate prices, operating costs, capital costs, and resulting outputs are reported in US$. However, portions of the costs are assumed to be priced in local currency, the AR$. Galaxy's ultimate foreign exchange exposure will depend largely on sourcing decisions made during the construction period.

A royalty agreement with the Catamarca Provincial Government has been executed, confirming a life of project royalty rate at 3.5% of net sales revenue (revenue less taxes). This agreement also applies to the Stage 2 expansion of additional 30ktpa. The key outcomes for Stage 1 and 2 include:

- The Project is expected to support a production rate of 45 ktpa of lithium carbonate for approximately 40 years;
- Saleable product is expected to be battery-grade (80%) and technical-grade (20%);
- Pre-tax net present value is US$3,036 M at an 10% discount rate;
- Post-tax net present value is US$1,863 M at an 10% discount rate;
- At full production rates, the Project is estimated to generate average annual revenues of US$798 M and free cash flow before interest and tax of US$557 M;
- The LOM operating cost is estimated at US$3,280/t Li_2CO_3 produced;
- Funding requirements peak at US$670 M (Project and working capital);
- Internal rate of return (pre-tax) is 44%;
- Internal rate of return (post-tax) is 38%;
- (from Project commencement) is 3.75 years.

25.16 Risks and Opportunities

25.16.1 Risks

A Project risk workshop was held in February 2020 and was subsequently updated. A feasibility risk assessment process was conducted on March 21, 2021, that identified a broad spectrum of hazards which provides a reasonable representation of the current Project risk profile. The overall risk profile is currently driven by Project delivery, and financial/ operational performance issues, which is to be expected of a brine project at the feasibility stage.

This is consistent with the Project management team's expectations for a feasibility-stage study, given the industry's history with medium-sized project delivery, and the inherent uncertainty as to how a number of key risks in these areas can to be managed. The risks inherent in project delivery and costs is moderated by now having access to the experience gained by Allkem in their Olaroz Stage 2 expansion which is almost complete. Allkem also provide a solid knowledge of the Argentinean operating and regulatory environment.

This profile is anticipated to change over the Project duration, as the nature of the risk, Galaxy´s understanding of the risks and effectiveness of the control regime changes. As the Project develops through the various execution phases it is anticipated that while the overall risk profile will continue to be significant, the level of uncertainty in the risks and control regimes will reduce.

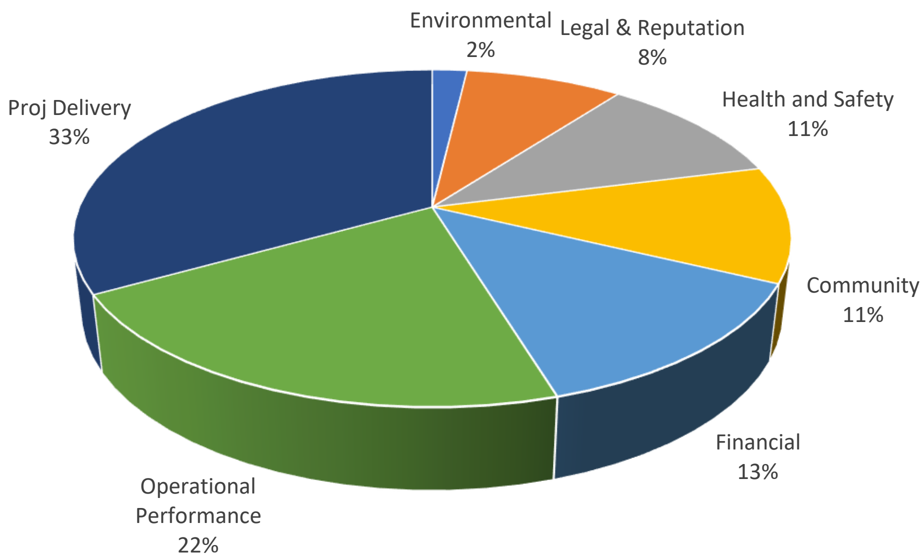
The Sal de Vida Project had 68 risks identified in the Project risk register. The key risks to Project viability are summarized in Table 25-1 and shown in Figure 25-1 by the discipline area that will be primarily affected.

Table 25-1: Material Risk Drivers

Project Viability Risk Issues	Key Drivers
Vehicle related incidents (Off-site)	This risk is mainly given due to number of kilometres that will be driven in the project, the harsh driving conditions (winter, altitude, unsealed roads), quality of roads (windy), distances, fatigue and driving skills in winding roads. Controls in place include safety awareness, roads improvement and driving procedures, road check points, among others.
Project as delivered (execution and into operations) fails to meet Galaxy's health and safety, environmental or CSR expectations	Involvement of different stakeholders in the Project and failure to communicate Galaxy´s Heath, Safety, and Environmental (HSE) policies and standards to contractors and employees. The Project HSEC will concentrate on two principal areas: • Ensuring that effective HSEC management is delivered in all facets of the Project (particularly construction) through to Project completion • Ensuring that the operation (plant and systems) as handed over from the EPCM contractor can be safely operated in line with the Galaxy HSEC expectations. Key to the delivery of these Project success factors are the establishment and resourcing of dedicated health, safety, environmental and community management systems and the establishment of a robust and structured safety-in-design process. In specific high-risk areas (e.g., vehicle related risk areas) focused principal hazard-type risk management programs will be established
Loss of community support for Project	Driven by the increasing scale and frequency of the Project interactions with the community by Galaxy and third-parties working for Galaxy (EPCM, contractors). The risk is currently well managed by an effective CSR program and community engagement, and these will be expanded upon as the Project progresses
Project capital cost blow-out (productivity, incomplete engineering, poor estimation, Project delays, poor Project controls, changing market conditions, etc.)	This risk is predominantly related to the ponds and process plant which dominate the overall capex, and has common drivers such as: • The uncertainties within the current Project definition (processing plant uncertainty); • The potential for a large range of issues to affect the capex (changes in labour costs, schedule creep, inadequate project controls, etc.); • The historical high proportion of mining projects that have exceeded budget estimates
Plant unable to achieve ramp-up to full production rates to plan	Driven by Galaxy's limited brine experience and the mining industry history of failing to achieve ramp-up targets. Specific controls that Galaxy have implemented to improve the management of this area are the use of a pilot plant to provide greater operational understanding and experience, and specific operational readiness planning components
As built, plant fails to achieve production expectation (throughput/utilization/ recovery/product quality)	The Project NPV is driven by Project costs and product sales revenue. Issues that affect the production product sales (quantity and quality) in line with the projected tonnages (such as throughput/ utilization/recovery) directly impact the NPV. Therefore, within the Project risk register each of these risks is specifically highlighted. Work programs will be established within the design and commissioning phases to manage/mitigate these risks
Changing in Argentinian financial/ regulatory framework (taxation, new legislation, import/ exports, inflation)	Driven by the possibility of changing regulatory frameworks i.e., import duties and restrictions, changes to environmental regulations, royalties and taxes, etc.

Project Viability Risk Issues	Key Drivers
Delays to achieving the planned Project schedule	Argentinian mining projects have a poor history of delivery based on schedule and/or quality, which has recently been compounded by country issues affecting Project execution (travel restrictions, importation issues, etc. The EPCM approach is new to Galaxy and potentially introduces additional uncertainties. These general Project issues are further compounded for the Sal de Vida Project by the need for the execution phase to cater for Project scope changes associated with the move to production of BG product, and increased automation.
Ability of the EPCM contractor to deliver the full spectrum of Galaxy's expectations (schedule, cost, quality, remote operations)	The novelty of the EPCM approach for Galaxy and the performance of the contractor to date have introduced a degree of uncertainty that is compounded by the increased complexity of the execution phase (associated with changes in scope, COVID travel restriction, multi-national nature of the Project structure)
COVID-19 site outbreak impacting the Project (cost, schedule).	COVID-19 has an influence on nearly every component of the Project, and while Galaxy has implemented a range of management plans and similar strategies, the inherent uncertainty and external aspects of this risk (country and regional government interventions) mean that this will continue to be a major impact on the Project.
Ability to meet all required conditions (70:30, environmental, etc.)	Key issues with this risk are the inherent local resource limitations (procurement, labour) and ability to meet regulatory and Galaxy requirements/expectations. While to date this has been able to be managed, with the expanding workforce required for the Project execution phase, continued focus will be required to ensure that the contracting and onboarding processes are appropriately implemented to meet expectations.
Increased complexity of the design (BG, automation, late changes to the design) impacting the schedule or budget	During the FEED phase, a number of material changes to the Project scope (move to BG, increased automation, etc.) were identified as being Project imperatives, because of the potential impact on the overall Project value or because they were seen as necessary controls to achieving sustainable operations. These will, however, increase the Project execution complexity, including the detailed engineering. Key Project controls are being defined (e.g., additional specialist support, deliver criteria for engineering phase, and change management process, etc.) to ensure that this increased complexity can be adequately addressed.

Figure 25-1: Risk Areas



Note: Figure provided by Risk Consult, 2021.

For all 68 identified Project execution risk issues, the existing controls and those that will be implemented during the implementation/ operations phases are broadly defined in the relevant risk register, and will be enhanced as the register is revisited throughout the Project delivery phase and into the operational phase. These controls are predicted to be appropriate for further risk reduction.

An ongoing effort will be made to ensure:

1. The delivery of all required controls to achieve acceptable risk levels within the Project;
2. That these risks are well-understood.

Given the required investment and potential returns, and when weighted against downside risks identified in the feasibility-study phase, the Sal de Vida Project progressing to the execution stage and not delivering value to shareholders can be interpreted as a Moderate risk. The exception to this interpretation is the risk of variability of lithium carbonate market conditions.

This risk/reward evaluation will need to be reviewed at each key Project stage.

25.16.2 Opportunities

The QP for the resource believes that there is substantial upside potential for increasing both the Resource categories (i.e. changing Inferred to Indicated or Measured, and/or changing Indicated to Measured), and also by increasing the total volume of the Resource by drilling in unexplored areas, and also by drilling deeper. It has been demonstrated in several parts of the basin that the lithium brine aquifer extends to depths greater than currently used to estimate the Resource. Currently, additional exploration is not planned, but during construction of the Southwest wellfield, new Resource maybe be encountered.

At this point in the Project, we do not believe that additional Reserves would be possible from the East and Southwest wellfields. After several years of production pumping, the groundwater flow model should be recalibrated and at that point, it may be possible that the aquifer would be able to allow for increased production. That said, additional Reserve could potentially come from a third wellfield, possibly located in the north central part of the Project area where a productive brine aquifer is known to exist.

Despite the adoption of diesel power generation in this Study, Allkem is targeting 30% of power generation for Stage 1 production to be sourced from photovoltaic energy generated by a site-based solar farm. The Company is currently in a tender process to install this hybrid solution for day 1 of Stage 1 production and this will be defined further in H2 CY22.

The performance parameters defined for the plant in terms of recovery are regarded as conservative, and in terms of operating costs are regarded as reasonable in the context of similar operations and the experience gained by Allkem in Argentina.

The capital costs defined for Stage 1 are regarded as conservative and reliable and are soundly derived. The capital costs for Stage 2 are preliminary and a more definitive estimate will naturally benefit from the Stage 1 experience.

25.17 Conclusions

Under the assumptions described in this Report, the Project shows positive economics.

26 RECOMMENDATIONS

26.1 Introduction

A two-phase work program is recommended. The first phase consists of additional exploration and data collection activities, water usage permitting, and environmental studies. The second work phase, which is partly dependent on the exploration and data collection activities will include revisions to the numerical flow model, additional pilot-plant testing, and engineering studies.

26.2 Recommendations Phase 1

26.2.1 Exploration

Exploration should be conducted to better identify and potentially demonstrate additional extractable brine in other parts of the basin. Favourable exploration results represent Project upside potential. Investigations shall include:

- Geophysical surveys: perform gravity and magnetic surveys over the east, south and west sub-basins to supplement the existing surveys;
- Core drilling: test the west sub-basin at a depth below 150 m to reach bed rock;
- Downhole sampling of wells 25 and 26 in the southern portion of the tenements;
- Perform additional 30-day pumping tests to identify potential for new wellfields.

This program is estimated at US$2.5 M. See details in Table 26-1.

Table 26-1: Estimated Exploration Costs

Program	Cost (US$)
Geophysics	500,000
Drilling	1,900,000
Brine Sampling	50,000
Pumping Test	50,000

26.2.2 Water Permits

Industrial water (raw water) supply is critical for the development and operation of Sal de Vida Project. The company currently has a temporary water permit that must be renewed every 2 years. A LOM water concession would be granted before the expiration of existing temporary water permits according to the Royalty Agreement. Catamarca´s Ministry of Water, Energy and Environment, as established by local regulation, will support such an application.

No budget estimate is provided as it has been assumed that the necessary monitoring and application steps will be completed by Galaxy.

26.2.3 Environmental Studies

According with the water balance report (Montgomery and Associates, 2020) liquid and solid (snowmelt) precipitation in the basin is estimated at 129 mm/a, or as a volumetric rate, at 39,780 m^3/hr. Using 5 – 20% of the annual volumetric precipitation, an estimated range of precipitation recharge is likely between 1,980 – 7,920 m^3/hr (Montgomery and Associates, 2020). The current best estimate for groundwater recharge at this area is considered to be 5,400 m^3/hr; however, whenever the recharge estimate is used, it is recommended that a sensitivity analysis for recharge rates as low as 1,980 m^3/hr, or as high as 7,920 m^3/hr also be run. If these sensitivity analyses identify a risk, then a more focused investigation may be required to assess the chance of a having a recharge below or above a specific value (Montgomery & Associates, 2020).

Collection of quarterly streamflow measurements along the Río de los Patos at multiple locations should be conducted in order to improve its representation in the numerical model and better evaluate the gaining and losing reaches of the river.

Monitoring of water levels and water chemistry data from wells and surface water should be conducted to provide additional data for numerical modelling purposes.

This program is estimated at US$ 250,000.

Biodiversity, archaeological and air quality monitoring campaigns and studies should be carried out in the western sub-basin and delta river to support the EIA of Stage 2.

26.3 Recommendations Phase 2

26.3.1 Numerical Modelling

A revision to the numerical flow model should be completed when information from the Recommendations Phase 1 work is available.

Results of the gravity and magnetic surveys should be used to reinterpret the structural model with the inclusion of all existing core holes.

A sensitivity analysis should be completed on the updated steady-state and transient calibration models as well as the predictive model based on potential changes in the anisotropy of hydraulic conductivity, and the extension of the deeper, more permeable units, along with other important model parameters such as effective porosity and dispersivity.

Modelling lithium and other elements of interest as distinct solutes in the model could be conducted, rather than relying on the best-fit linear curves with TDS. This could further improve confidence in the model predictions and will allow for the determination of extracted concentrations of other solutes that are not well correlated to TDS (e.g., magnesium and sulphate);

The deeper portions of the numerical model should be updated with improved information on the brines at depth, including the hydraulic conductivity and storage zones;

Model calibration in the Río de los Patos sub-basin should be updated, depending on the streamflow measurement data.

Recommended future work includes:

- A sensitivity analysis on the updated steady-state and transient calibration models as well as the predictive model based on potential changes in the anisotropy of hydraulic conductivity, and the extension of the deeper, more permeable units, along with other important model parameters such as effective porosity and dispersivity;
- A detail analysis of flow units and low conductivity clay barriers, including lateral extension over the modeled area. This will further improve decisions on future drillings locations and screened zones, understanding of the connectivity with shallower aquifers and surface, and estimate drawdown effects over time;
- Modeling Li and other elements of interest as distinct solutes in the model, rather than relying on the best fit linear curves with TDS. This will further improve confidence in the model predictions and will allow for the determination of extracted concentrations of other solutes that are not well correlated to TDS (e.g., magnesium and sulfate);
- Upon additional deeper drilling, updating the deeper portions of the numerical model with improved information including the hydraulic conductivity and storage zones;
- Collection of quarterly streamflow measurements along the Río de los Patos at multiple locations in order to improve its representation in the numerical model and better evaluate the gaining and losing reaches of the river;
- Continued monitoring of water levels and water chemistry data from wells and surface water;
- Further improvement of the model calibration in the Río de los Patos sub-basin if a detailed evaluation of freshwater extraction is needed;
- Further vertical refinement of the upper model layer to better represent evapotranspiration and changes in water density at the surface;
- Recalibration of the flow model after at least 1 year of production wellfield pumping and monitoring.

This program is estimated at US$ 250,000.

26.3.2 Engineering Studies

Engineering and process related recommendations include:

- Complete the testwork, design work and investigations planned for 2022, especially developing the maintenance system for pond to pond flow weirs
- Advance and complete detailed engineering of the process plant and non-process infrastructure of Stage 1;
- Proceed with FEED and detailed engineering of Stage 2 at an appropriate time;
- Finalize the energy trade-off study considering renewable power from a photovoltaic solar power station
- Evaluate potential connection to the gas pipeline that is located 20 km away from the Project;
- Perform a geotechnical investigation to confirm the suitability of the ground for the Stage 2 evaporation ponds.

This program is estimated to cost US$ 8.0 M:

Table 26-2: Estimated Engineering Studies Cost

Program	Cost (US$ M)
Stage 1 FEED + DE	3.9
Stage 2 FEED + DE	3
Stage 2 Geotech	0.3
Gas pipeline	0.5
Energy	0.3

26.3.3 Environmental Studies

Environmental-related recommendations include:

- Identify potential gaps in environmental baseline studies in those areas where Stage 2 infrastructure is likely to be developed. Undertake geotechnical, hydrological, biodiversity and engineering studies of the river crossing between the Plant and the Stage 2 infrastructure;
- Establish the alternative analysis study for sustainable localization for the different Project components for Stage 2 and consider the environmental risks for each area;
- Develop understanding of closure considerations and include environmental design criteria in feasibility-level planning of infrastructure;
- Advance environmental permitting for Stages 2 of the Project; (this implies the entire process of creating an IIA and approval of a new DIA which could take more than 1 year);
- Re-size energy consumption resources to ensure idem supply for drinking water, aggregates, etc.;
- Investigate the re-use/recycling technologies, and other innovative technologies that will allow to decrease the water and brine consumptions;
- to decrease out carbon footprint;
- Update the study of potential accumulative and residual impacts integrating Stage 2 (synergy);
- Update the environmental offset or compensations if residual impacts are generated;
- Emphasize scaling the capacity of the Solar Plant to produce clean energy for the stage with the greatest production and the benefits this would imply;
- Develop closure cost estimate for Stages 2 of the Project. This must be included in the Mine Closure Plan update;
- Continue the monitoring work using international guidelines and standards;
- Consider the social aspects in communicating the work and voluntary commitments in the development of suppliers and local staffing.

27 REFERENCES

27.1 Document References

Ausenco – OWN (Open Work Nature), 2021. *Actualización del Informe de Impacto Ambiental para la Etapa de Explotación. Proyecto Sal de Vida. Departamento Antofagasta de la Sierra. Salar del Hombre Muerto*. *Galaxy Lithium (Sal de Vida) S.A*.

Australasian Joint Ore Reserves Committee (JORC), 2012. Australasian Code for Reporting of Exploration Results, Minerals Resources and Ore Reserves. Australasian Joint Ore Reserves Committee, 1 December 2013.

Blue Pampa, 2019. Update of the Preliminary Review & GAP Analysis: Environmental and Operating Permits.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM), 2003. Estimation of Mineral Resources and Mineral Reserves, Best Practice Guidelines. Canadian Institute of Mining, Metallurgy and Petroleum, November 23, 2003.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM), 2012. CIM Best Practice Guidelines for Resource and Reserve Estimation for Lithium Brines. Canadian Institute of Mining, Metallurgy and Petroleum, November 1, 2012.

Canadian Institute of Mining, Metallurgy and Petroleum (CIM), 2014. CIM Standards for Mineral Resources and Mineral Reserves, Definitions and Guidelines. Canadian Institute of Mining, Metallurgy and Petroleum, May 10, 2014.

Conhidro S.R.L., 2017a. *Informe técnico pozo SVPW17-21 Salar del Hombre Muerto, Departamento Antofagasta de la Sierra, Provincia de Catamarca*. Report prepared for Galaxy Resources, August 2017, 17 p.

—————, 2017b. *Informe Técnico Pozo SVWW17-22 Salar del Hombre Muerto, Departamento Los Andes, Provincia de Salta*. Report prepared for Galaxy Resources, December 2017, 16 p.

—————, 2017c. *Informe Técnico Pozo SVWW17-23 Salar del Hombre Muerto, Departamento Los Andes, Provincia de Salta*. Report prepared for Galaxy Resources, December 2017, 16 p.

Conhidro S.R.L., 2018. *Informe Técnico Pozo SVWW18-24 Salar del Hombre Muerto, Departamento Los Andes, Provincia de Salta*. Report prepared for Galaxy Resources, May 2018, 13 p.

Conhidro SRL, 2019. *Estudio Hidrogeológico de la Cuenca del río Los Patos, Salar del Hombre Muerto*.

ERM, 2011. *Línea de Base Ambiental y Social Salar de Hombre Muerto*.

Freeze, R.A., and Cherry, J.A., 1979. Groundwater: Prentice-Hall, Inc., 1979, 624 p.

Galaxy Lithium (Sal de Vida) S.A, 2021. Pre-Feasibility Study Stage 2 and 3, 14 May 2021.

Galaxy Lithium (Sal de Vida) S.A, 2022. Pre-Feasibility Study Stage 2 (30ktpa), Abril 2022.

Hogan et al, 2004. Groundwater Recharge in a Desert. Environment: American Geophysical Union, 2000 Florida Avenue, N.W., Washington, DC.

Houston, J., 2006. Evaporation in the Atacama Desert: An Empirical Study of Spatio-Temporal Variations and Their Causes: Journal of Hydrology, v. 330, pp. 402 – 412.

Houston, J., and Jaacks, J., 2010. Technical Report on the Sal De Vida Lithium Project Salar De Hombre Muerto Catamarca, Argentina. Report prepared for Lithium One, effective date 5 March, 2010.

Houston, J., Butcher, A., Ehren, P., Evans, K., and Godfrey, L., 2011. The Evaluation of Brine Prospects and the Requirement for Modifications to Filing Standards: Economic Geology, v. 106, pp. 1225–1239.

Johnson, A.I., 1967. Specific Yield - Compilation of Specific Yields for Various Materials: Geological Survey Water-Supply Paper 1662-D, prepared in cooperation with the California Department of Water Resources; https://pubs.usgs.gov/wsp/1662d/report.pdf.

Kelley, R.J., Burga, E., Lukes, J., 2011. NI 43–101 Technical Report for: Preliminary Assessment and Economic Evaluation of the Sal de Vida Project Catamarca & Salta Provinces, Argentina. Report prepared by Worley Parsons for Lithium One, effective date 18 November 2011.

Knight Piésold, 2021a. Wetlands Monitoring in Sal de Vida Project. Baseline Campaign - March 2021.

————— , 2021b. Wetlands Monitoring in Sal de Vida Project. Baseline Campaign - November 2021.

Kopplin, F., Schneider, B., Diaz, J.C., and Rosko, M., 2020. Technical Memorandum - Impact Evaluation of Leakage from Evaporation and Waste Disposal Ponds in Groundwater Nearby Río Los Patos.

Montgomery and Associates, 2016: Phase III Resource Characterization, Sal de Vida Project, Salar del Hombre Muerto, Argentina: internal technical memo and press release prepared on behalf of Galaxy Resources Limited, August 1, 2016, 8 p.

Montgomery and Associates, 2020. Water Balance of Sal de Vida Project.

Montgomery and Associates, 2021. *Estudio de escorrentías máximas en área 4. Memorandum interno. Proyecto Sal de Vida*.

Munk, L., Hynek, S.A., Bradley, D.C., Boutt, D., Labay, K., and Jochens, H., 2016. Society of Economic Geologists, Inc. Reviews in Economic Geology, v. 18, pp. 339 – 365.

Ontario Securities Commission, 2011. OSC Staff Notice 43-704 – Mineral Brine Projects and National Instrument 43-101 Standards of Disclosure for Mineral Projects. Ontario Securities Commission, 6 p.

Patané Aráoz, 2020. Monitoring of Heritage Assets. Mining Footprints Bypass. Production/Exploitation Phase, Sal de Vida Project – Catamarca Province.

Regalado, C.D., 2018. *Informe de Impacto Ambiental, Actualización—Proyecto Sal de Vida*

Rosko., M., and Jaacks, J., 2011. Inferred Resource Estimate for Lithium and Potassium Sal de Vida Project Salar del Hombre Muerto Catamarca-Salta, Argentina. Report prepared by Montgomery and Associates for Lithium One, effective date 25 April 2011.

Rosko., M., and Jaacks, J., 2012. Measured, Indicated and Inferred Lithium and Potassium Resource, Sal de Vida Project Salar del Hombre Muerto Catamarca-Salta, Argentina. Report prepared by Montgomery and Associates for Lithium One, effective date 7 March 2012.

SEIMCAT S.A., 2020. *Monitoreo de Biodiversidad - Campaña de Verano 2020 Proyecto Sal de Vida*.

SEIMCAT S.A., Meliá, Caraffini, 2021. *Monitoreo Arqueológico. Proyecto Sal de Vida*.

Taging Ingenieria, 2013. Feasibilily Study for the Sal de Vida Lithium and Potassium Project, Salta and Catamarca, Argentina. Report prepared on behalf of Galaxy Resources Limited, May 2013, 529p.