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MINING CONSULTANTS

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101 TECHNICAL REPORT

AUGUST 2023

Allkem Limited

Report Number: NI43-101

Principal Author(s):

Daniel Donald – General Manager and Principal Mining Consultant
Aidan Giblett – Mineral Processing Consultant
Albert George Thamm – Exploration Manager

Principal Reviewer:

Dan Donald BEng Mining (Hons) MBA FAusIMM MSME AWASM

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Document Sign Off

Version	Competent Person	Position	Signature	Date
0	Dan Donald	Principal Consultant		09/08/2023

Certificate of Author

I, Daniel Donald BEng(Hons) MBA FAusIMM MSME do hereby certify that:

1. I am currently employed as a General Manager and Principal Mining Consultant with Entech Pty Ltd, located in Perth, Western Australia;

2. This certificate applies to the Technical Report titled "NI 43-101 Technical Report Mt Cattlin Spodumene Project Ravensthorpe, Western Australia, Australia" (the "Technical Report") prepared for Galaxy Resources Ltd ("the Issuer"), which has an effective date of 31 March 2023 – the date of the most recent technical information;

3. I am a graduate of the Curtin University (BEng(Hons), 1995; MBA, 2010). I am a Professional in the discipline of Mining Engineering and am a registered Fellow of the Australasian Institute of Mining and Metallurgy. I have practiced my profession continuously since January 1996. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101;

4. I completed a personal inspection of the Property on 10th of May 2023;

5. I am responsible for Items 15, 16, 19, 21 and 22, and sections pertaining thereto in Items 1, 2 and 3, and Items 25 to 27;

6. I am independent of the Issuer and related companies applying all of the tests in Section 1.5 of the NI 43-101;

7. I have had prior involvement with the property that is the subject of the Technical Report in my role as Principal Mining Consultant at Entech Pty Ltd;

7. I have not had prior involvement with the property;

8. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1;

9. As of the effective date of the Technical Report and the date of this certificate, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading;

Effective Date: 30 June 2023

Signing Date: 16 August 2023

(Signed) Daniel Donald, BEng (Hons) MBA FAusIMM MSME

Certificate of Author

I, Aidan Giblett, BSc Engineering (Minerals), FAusIMM CP(Met) do hereby certify that:

1. I am currently employed as a Mineral Processing Consultant with Strategic Metallurgy, located in Perth, Western Australia;

2. This certificate applies to the Technical Report titled "NI 43-101 Technical Report Mt Cattlin Spodumene Project Ravensthorpe, Western Australia, Australia" (the "Technical Report") prepared for Galaxy Resources Ltd ("the Issuer"), which has an effective date of 31 March 2023 – the date of the most recent technical information;

3. I am a graduate of the Western Australian School of Mines, Curtin University (BSc Engineering (Minerals Engineering), 1994). I am a professional in the discipline of mineral processing and a registered Fellow of the Australasian Institute of Mining and Metallurgy. I have practiced my profession continuously since February 1994. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101;

4. I completed a personal inspection of the Property on 10th of May 2023;

5. I am responsible for Items 13 and 17;

6. I am independent of the Issuer and related companies applying all of the tests in Section 1.5 of the NI 43-101;

7. I have not had prior involvement with the property;

8. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1;

9. As of the effective date of the Technical Report and the date of this certificate, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading;

Effective Date: 30 June 2023

Signing Date: 16 August 2023

(Signed) Aidan Giblett, BSc Engineering (Minerals), FAusIMM CP (Met)

Certificate of Author

I, Albert George Thamm [B.Sc., B.Sc. (Hons), M.Sc.] do hereby certify that:

1. I am currently employed as the [Exploration Manger] with [Galaxy Resources Pty. Ltd.], located in [Perth, West Australia];

2. This certificate applies to the Technical Report titled "NI 43-101 Technical Report Mt Cattlin Spodumene Project Ravensthorpe, Western Australia, Australia" (the "Technical Report") prepared for Galaxy Resources Ltd ("the Issuer"), which has an effective date of 31 March 2021 – the date of the most recent technical information;

3. I am a graduate of the University of Cape Town (B.Sc., BSc (Hons) M.Sc, graduated 1988) I am a Professional in the discipline of exploration and mineral resources and am a registered Fellow of the Australian Institute of Mining and Metallurgy. I have practiced my profession continuously since January 1989. I have read the definition of "qualified person" set out in National Instrument 43-101 (NI 43-101) and certify that by reason of my education, affiliation with a professional association (as defined in NI 43-101) and past relevant work experience, I fulfil the requirements to be a "qualified person" for the purposes of NI 43-101;

4. I have completed numerous personal inspection of the Property, including from April 11-13, 2022, April 21-25, 2022, July, 11-13 2022, to 12-14 December 2022;

5. I am responsible for Items 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 ,14, 18, 20 and Chapters 23 and 24, parts of Chapters 1, 25 and 26;

6. I am NOT independent of the Issuer and related companies applying all of the tests in Section 1.5 of the NI 43-101;

7. I have ongoing involvement with the property that is the subject of the Technical Report in my role as Exploration Manager of Galaxy Resources Pty Ltd and I have had prior involvement with the property from 2016 onwards in various roles, including General Manager Development Geology;

8. I have read NI 43-101, and the Technical Report has been prepared in compliance with NI 43-101 and Form 43-101F1;

9. As of the effective date of the Technical Report and the date of this certificate, to the best of my knowledge, information and belief, this Technical Report contains all scientific and technical information that is required to be disclosed to make the Technical Report not misleading;

Effective Date: 30 June 2023

Signing Date: 09 August 2023

(Signed) Albert G Thamm, M.Sc., F.Aus.IMM

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MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

AUGUST 2023

CHAPTER 1: SUMMARY

1 SUMMARY

1.1 Introduction

Allkem Limited (Allkem or the Company) engaged Entech to assist in the preparation, alongside various members of the Allkem team, of this Technical Summary Report for the Mt Cattlin Lithium Project (the Project). This report provides all the supporting details for the Mt Cattlin NI43-101 Technical Report, complimenting the JORC compliant Mineral Resource and Mineral Reserve Estimate released to the Australian Stock Exchange on 1 August 2023 and has built on previous work carried out on the Project.

This report supports mineral resources and mineral reserves estimates using the standards and definitions in the NI43-101 requirements. It presents these mineral resource, mineral reserve estimates and capital and operating costs. An economic assessment is based on open pit mining operations with on-site processing to produce spodumene and tantalite concentrates.

All units of measurement within this report are metric unless otherwise stated. Monetary Units are in US dollars, unless stated otherwise.

1.2 Property Description, Mineral Rights and Ownership

The Mt Cattlin operations is located 2 km North of the township of Ravensthorpe, 450 km southwest of Perth, Western Australia. There is established access to the site via major road networks (Figure 1-1).

Mt Cattlin was commissioned in 2010 and has been operated since, except for approximately three years between 2012 to 2016 when the operation was placed into care and maintenance due to market conditions.

Figure 1-1 Location Map of Mt Cattlin

The Project is situated on the Mining lease M74/244 which covers 1830 Ha and was granted on 24 December 2009 and is due to expire in December 2030. The leases are wholly owned by Allkem who also holds freehold title of the land subject to the current mining operations.

Royalties are payable to the Western Australian State Government of 5% of the revenue realised from the spodumene concentrate, and an additional royalty of US$1.05 per tonne of crushed ore is paid to Lithium Royalty Corp.

1.3 Accessibility, Climate, Local Resource, Infrastructure and Physiography

As an existing operation, Mt Cattlin is serviced by established infrastructure, including sealed roads to site, and a highway network to Perth and the nearest regional centres of Albany and Esperance, both of which support heavy industry and have regional airports, as well as an export port located at Esperance.

Ravensthorpe has a Mediterranean climate, featuring moist, mild winters and hot, dry summers. The area receives an average annual rainfall of 113 mm with annual average minimum and maximum temperatures at 10.5 °C and 22.8 °C respectively.

The local topography is undulating, with the maximum elevation at 265 m above sea level. The Cattlin Creek passes through the Project area and separates the Eastern and Western Mining Areas. The region has largely been cleared for livestock and grain production.

1.4 History

Mt Cattlin is owned by Galaxy Lithium Pty Ltd, a wholly owned subsidiary of Allkem Limited, the current ownership structure is illustrated in Figure 1-2.

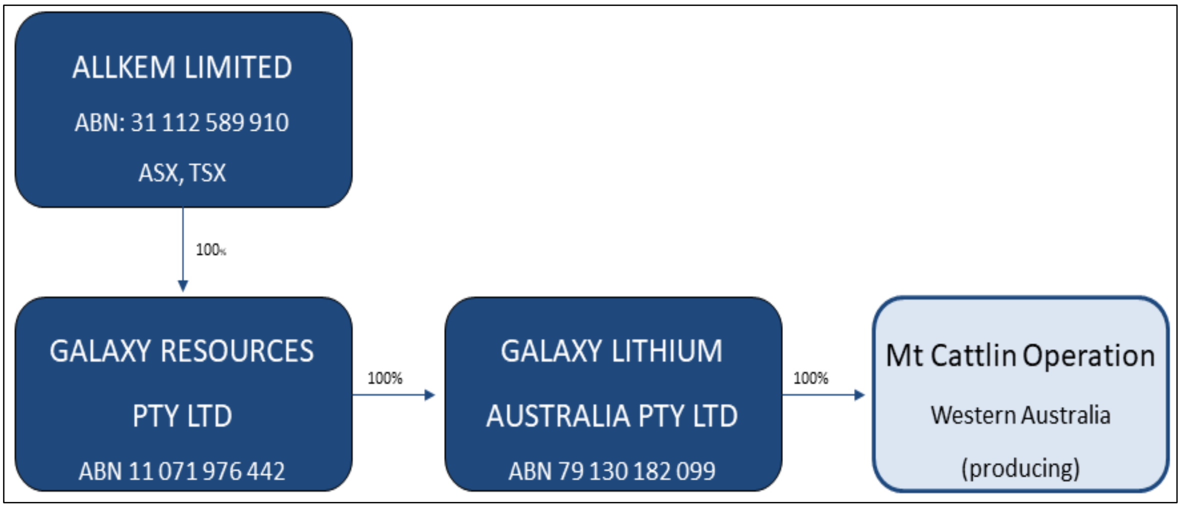

Figure 1-2 Mt Cattlin Corporate Ownership Structure

The tenements were held by numerous companies since the 1960s until Galaxy Resources acquired the mining Lease M74/12 from the administrators of Sons of Gwalia Limited in 2006. Each of these companies conducted exploration activities through reverse circulation (RC) drilling and diamond drilling (DD) exploration methods.

Extensive test work was carried out by WMC, who completed an internal feasibility study on mining the deposit in the 1960s.

Galaxy Resources established the mining operation, and a processing plant was commissioned in 2010 and was in production until 2012 when the operation was placed into care and maintenance due to market conditions. The operation was re-commissioned in 2016 and has been in continuous production since.

A maiden Ore Resource Estimate for Mt Cattlin by Galaxy Resources was released in 2009 prior to the company listing on the ASX.

1.5 Geological Setting, Mineralisation

The Mt Cattlin deposit is a spodumene-rich tantalite-bearing pegmatite within the Ravensthorpe Terrane, with host rocks comprising both the Annabelle Volcanics to the west and the Manyutup Tonalite to the east. The contact between these rock types transects the deposit area.

The pegmatites host the lithium-rich mineralisation and are of the albite-spodumene sub-type (Wells et al, 2022) and occur as a series of gently dipping sub-horizontal sills surrounded by both volcanic and intrusive rocks. Several dolerite or quartz gabbro dykes trending roughly east-northeast and north cut all the lithologies including the pegmatite units. A significant sub-vertical fault with a north-northwest trending orientation transgresses the western side of the currently defined orebody and offsets the pegmatite as well as the main east-northeast trending dolerite dyke. Displacement across this fault appears to be oblique, with a west block down sinistral movement. The weathering profile across the Mt Cattlin area is typically shallow, with fresh rock encountered sometimes at depths of less than 20 m below the surface.

Lithium and tantalum mineralisation occurs almost exclusively within the pegmatites. In places, the pegmatite occurs as stacked horizons that overlap in cross-section. The current extent of mineralisation covers an area of around 1.6 km east-west and 1 km north-south. The main pegmatite units drilled to date generally lie between 30 m and 60 m below the surface, although in some locations they can be found as surface outcrop. Pegmatite units have been noted to occur up to 140 m below the surface to the northwest of the main orebody and may have the potential to be mined from underground.

The pegmatites have a diverse mineralogy hosting a rich array of minerals with spodumene as the dominant lithium ore mineral. Several types of spodumene are observed, which include light green and white varieties. Tantalum occurs as the manganese-rich end members of the columbite-tantalite series, including manganotantalite and microlite (Sweetapple, 2010).

Allkem has acquired several other tenements in the Ravensthorpe area. The Company has an active exploration program that includes surface geology mapping, rock chip and soil sampling, remote sensing, and airborne and ground geophysics.

Tenements to the east of Ravensthorpe comprising the West Kundip and McMahon Projects contain manganese and copper/gold targets. To the north of Mt Cattlin, rock chip sampling of outcropping pegmatites returned highly anomalous tantalum values and elevated lithium values at the Enduro Prospect. Further evaluation and drilling returned the best intercept of 2 m at 1.45% Li_2O. Further drilling is planned.

Projects to the west and south of Mt Cattlin, which have been explored for pegmatite-hosted lithium and tantalum mineralisation include the Bakers Hill, Floater and Sirdar projects. Programs of mainly surface sampling and geological mapping have been carried out over these tenements in addition to airborne geophysics.

1.6 Deposit

Pegmatites form the host rock to the Li_2O and Ta_2O_5 mineralisation at Mt Cattlin. It is generally accepted that pegmatites form by a process of fractional crystallisation of an initially granitic composition melt.

Based on apparent mineral assemblages and textures, Mt Cattlin has been categorised as an albite-spodumene type with the LCT classification. Moreover, the relatively highly coarse nature of spodumene at Mt Cattlin compared to that of other LCT pegmatites in WA suggests that these pegmatites crystallised from a high-fluxing agent melt (Wells et al., 2022).

1.7 Exploration

Allkem has acquired several tenements and has an active exploration program that includes surface geology mapping, rock chip and soil sampling, remote sensing, and airborne and ground geophysics.

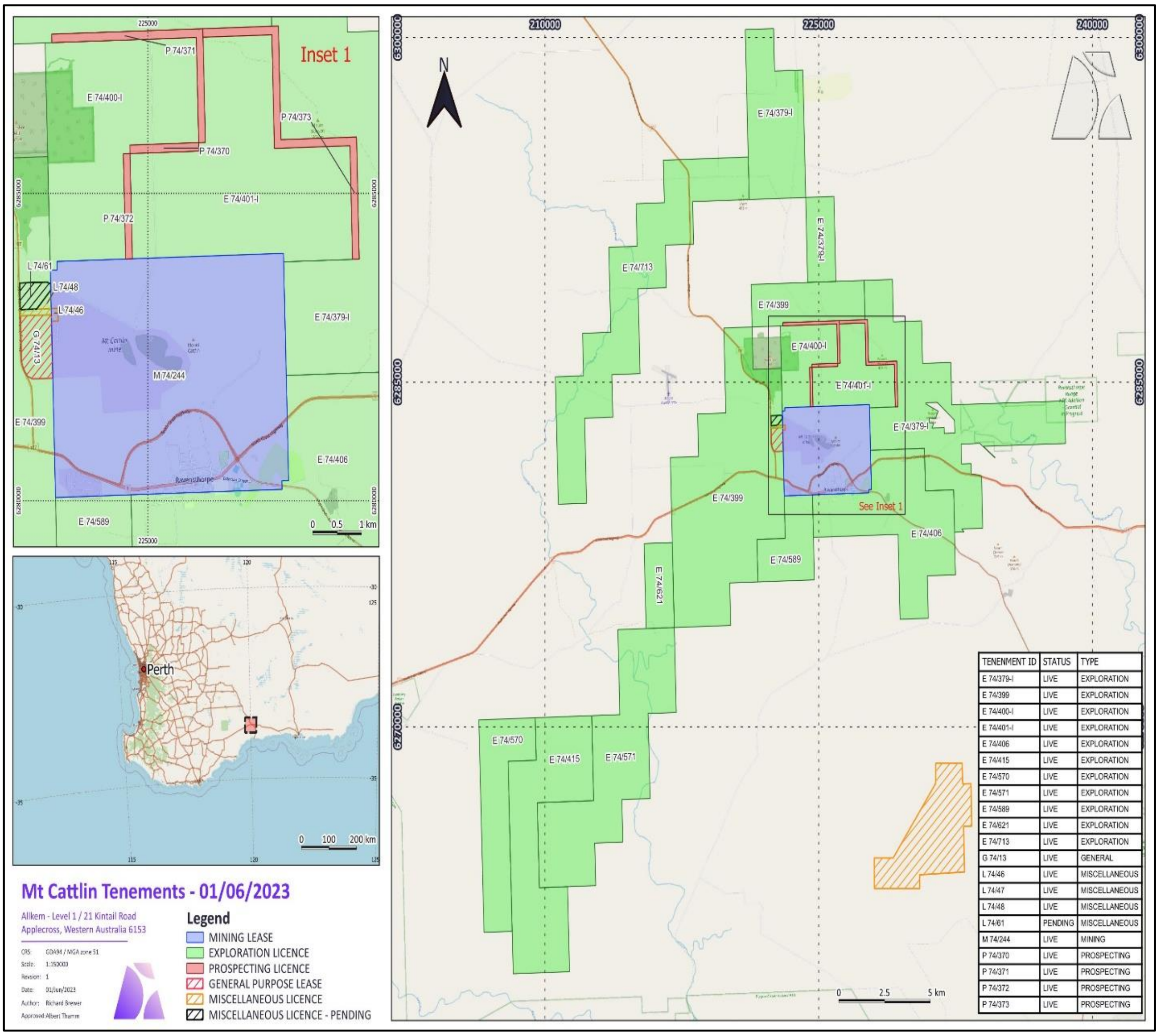

Figure 1-3 Location of granted exploration licences, prospecting licences and mining leases in the Ravensthorpe area

Tenements to the east of Ravensthorpe comprising the West Kundip and McMahon Projects contain manganese and copper/gold targets. To the north of Mt Cattlin, rock chip sampling of outcropping pegmatites returned highly anomalous tantalum values and elevated lithium values at the Enduro Prospect. Further evaluation and drilling returned the best intercept of 2 m at 1.45% Li_2O. Further drilling is planned.

Projects to the west and south of Mt Cattlin, which have been explored for pegmatite-hosted lithium and tantalum mineralisation include the Bakers Hill, Floater and Sirdar projects. Programs of mainly surface sampling and geological mapping have been carried out over these tenements in addition to airborne geophysics.

1.8 Drilling

The drillhole dataset within the Mineral Resource estimate extents contains 3,956 drillholes for a total of 181,895.45 m. Summary drillhole details have been provided for all drilling inside the resource limits in Table 1-1 and for all other Mt Cattlin tenements in Table 1-2.

Table 1-1 Summary Drillhole Data within the Resource Extents

Hole Type	Avg (m)	Count	Total (m)
RC	*79.0*	*2,825*	*223,197*
RABR	*55.9*	*5,651*	*3,131*
DDH	*86.6*	*9,697*	*8,319*
RC_DD	*114.6*	*4,718*	*5,390*
PC	*21.9*	*120*	*2,627*

Table 1-2 Summary Drillhole Data for all Mt Cattlin Tenements

Hole Type	Avg (m)	Count	Total (m)
RC	*81*	*494*	*40,037*
RAB	*23*	*112*	*2,575*
DDH	*63*	*63*	*5,971*
RC_DDT	*97*	*9*	*874*

From 2017 onwards, field geological logging data has been predominantly captured using the Maxwell LogChief logging program, which is then transferred directly to the main SQL database. LogChief logging templates are consistent between exploration and GC drilling programs, with the exception of quality control sampling for which there are slightly differing methodologies.

In 2023, 105 new vertical grade control drillholes were completed for 6,457 m, post the 2022 MRE estimate, to reduce data spacing to approximately 20 x 20 m spacing to support operational ore selectively and material dispatch.

1.9 Sample Preparation, Analyses and Security

At Mt Cattlin, the host pegmatite is visually distinguishable from the surrounding country rock; therefore, sampling is taken selectively within RC chips and diamond core. Currently, 3 m of waste rock is sampled adjacent to the pegmatite to characterise the waste likely to be encountered during mining.

QAQC samples have been submitted routinely into all sample batches sent to the assaying laboratories. Mt Cattlin QAQC protocols have undergone several improvements since 2016. QAQC frequencies since 2017 are provided in Table 1-3.

Table 1-3 Galaxy Phase 2 QC Policies by Year Pre-2022

Grade Control	2017	2018	2019	2020	2021
Standard		*approximately 1 in 60 to 70*	*1 in 25*	*1 in 25*	*1 in 25*
Blank		*approximately 1 in 60 to 70*	*1 in 25 (approximate)*	*1 in 25*	*1 in 25*
Duplicate		*approximately 1 in 60 to 70*	*1 in 25*	*1 in 25*	*1 in 25*
Exploration	**2017**	**2018**	**2019**	**2020**	**2021**
Standard	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 25*
Blank	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 25 or one per mineralised interval minimum*
Duplicate	*1 in 20*	*1 in 20*	*1 in 20*	*1 in 20*	*1 in 20*

1.10 Data Verification

An inspection of the property was made between 11−13 April 2022, 11−13 July 2022, 21−23 September 2022, and 12−14 December 2022. Chapter 12: Data Verification summarises the observations made, plus associated recommendations.

1.11 Mineral Processing and Metallurgical Testing

Mt Cattlin utilises conventional processing techniques to generate spodumene and by-product tantalite concentrates from open pit mining of the pegmatite ore deposit.

The plant has capacity to process up to 1.8 Mt of ore, having been subject to a series of upgrades since the original 1 Mt capacity facility was commissioned in 2010. The processing plant has operated on a continuous basis since restarting after a care and maintenance period between 2013 to 2016 and consists of a multi-stage crushing, screening, optical ore sorting, dense media separation, and gravity concentration.

Internal production reconciliations are performed on a weekly basis by the site metallurgical team who compare surveyed inventory values with the weightometer-based production values and to increase the accuracy of stockpile quantities. A full site reconciliation is conducted monthly using site and port surveys to balance inventory throughout mining, the processing plant, and the port.

Final shipment grades and volumes are determined by a third-party (Intertek) who independently sample the shipment and produce the final certificate for both parties.

1.11.1 Metallurgical Testwork

Metallurgical test work has consisted of a heavy liquid separation (HLS) program on two drill composites to determine the materials amenability to dense media separation. Mineralised core sections were selected with no additional waste dilution, generating head grades of 1.85% and 1.02% Li_2O respectively.

The samples were crushed to plant operating specifications and test work produced recoveries exceeding 70% and concentrate grades of 6.0−6.5% Li_2O. The laboratory recoveries were considered likely to be elevated due to the absence of waste dilution, however the material was demonstrated to be amenable to processing through the Mt Cattlin flowsheet with comparable efficiencies to historical production.

Ore from within the bulk portion of the Stage 3 northwest (NW) pit pegmatite has provided most of the plant feed since February 2023, during which time the plant performance has been in line with, and at times exceeded, historical expectations and production forecasts.

In December 2022 and January 2023 significantly reduced plant recoveries (40−45%) were realised. The cause found to be occurrence of fine-grained material smaller spodumene grains, that was not recoverable at historical efficiencies with the existing flowsheet. Similar issues had previously been encountered with isolated pockets of similar mineralisation in the upper levels of the SW pit. Similar mineralisation is rarely observed at depth within the bulk of the resource.

Three (3) geotechnical holes drilled into the Stage 4 resource were used to generate HLS test work composites representing geometallurgical ore domains, with results received in November 2022. The HLS results are consistent with the expected metallurgical performance of the deposit, with HLS sinks grades and recoveries at a specific gravity of 2.9 demonstrating typical grade-recovery responses. Specifically fine grained, low grade (<0.3% Li_2O) samples demonstrated reduced HLS sinks grade and recovery (5.5–5.8% Li_2O at 43–49% recovery), with sinks grades exceeding 6% Li_2O and recoveries of 65–79% achieved on higher grade (0.9–1.8% Li_2O), coarse grained mineralisation.

The production estimates in this report based on the assumption that the ore will not metallurgically vary from historical mill feed.

1.12 Mineral Resource Estimate

Mining Plus compiled the Mt Cattlin January 2023 Mineral Resource estimate (MRE) by combining two MRE block models into a merged single resource model, which was then depleted for mining undertaken to the end of December 2022.

The spodumene mineralisation at Mt Cattlin is entirely hosted within the numerous flat-dipping pegmatite sills which are cross-cut and offset by late-stage faults. The geological interpretation exercise resulted in a total of 13 individual pegmatite domains and one intrusive dolerite modelled and used to control the block model estimation process. Interpretations for weathering surfaces that differentiate the fresh rock from partially weathered or transitional material, and the transitional material from completely oxidised rock, were supplied by Allkem personnel.

The Li_2O grade distributions within the pegmatite geological domains indicate the presence of mineral zonation and differentiation into high and low-grade lithia zones. Modelling of the Li_2O mineralisation was completed utilising a combination of Leapfrog Geo software to explicitly model the internal coarse-grained, mineralised spodumene using a 0.3% Li_2O cut-off, 4% Na_2O cut-off at the peripheries, and geological logging of course-grained pegmatite.

Ordinary kriging was used to estimate Li_2O, Ta_2O_5 and Fe_2O_3 grades into both the mineralised and un-mineralised pegmatite domains, with domains sub-divided further into oxidised and transitional / fresh domains where applicable.

Dynamic anisotropy was used in the block model estimation to accommodate the highly variable dip of the pegmatites. Dynamically adjusting the search ellipse and variogram orientation, the dynamic anisotropy process attempts to capture the maximum amount of composite data within the search ellipse.

Since the MRE of the NW and SW Areas in January 2023 supersedes the estimation completed in the April 2021 MRE, the two block models have been combined to create one block model, using a block selection wireframe.

Continuing mining operations have resulted in waste rock backfill and tailings backfill being stored in completed open pits. Backfill volumes have been coded into the block model using survey wireframes provided by Allkem. The Mineral Resource block model has been depleted using the surveyed as-built surface as of 1 January 2023.

A thorough series of statistical validation and visual model checks have been completed, indicating the MRE block model is within the error of the informing composite samples.

Classification has been applied on the basis of the data spacing, geology and grade continuity, and the estimation quality parameter of slope of regression. Only areas drilled by Grade Control (GC) methods have been classified as Measured Resources. The Indicated Resource areas are typically drilled at 40 m by 40 m spacing and have been estimated in passes one or two. The Inferred Resource areas are typically drilled at 80 m by 80 m spaced drilling or greater and have been estimated in passes two and three.

The Mineral Resource has been depleted for mining to 30 June 2023 and reported within an optimised Whittle pit shell that meets the requirement for Reasonable Prospects of Eventual Economic Extraction (RPEEE).

The Mineral Resource includes surface stockpiles which comprise interim direct feed mined material, a low-grade stockpile, secondary floats, and pre-2018 tailings. The stockpiles have been classified based on the level of confidence in the grade and tonnage.

The Mt Cattlin Mineral Resource, which reported at a cut-off grade (COG) of 0.3% Li_2O, as of 30 June 2023, is detailed in Table 1-4.

Table 1-4 Mt Cattlin Mineral Resource on 30 June 2023, COG >= 0.3% Li_2O

Class	Tonnes	Li_2o %	Ta_2O_5 ppm	Fe_2O_3 %	Li_2O tonnes	LCE
Global Insitu Resource as of 30 June 2023, Cut -off grade Lithia 0.3%						
Measured	*0.2*	*1.0%*	*172*	*2.0%*	*2,000*	*5,000*
Indicated	*8.8*	*1.4%*	*165*	*2.0%*	*121,000*	*300,000*
Stockpiles	*1.8*	*0.8%*	*95*	*2.1%*	*13,000*	*32000*
Inferred	*1.3*	*1.3%*	*181*	*2.1%*	*17,000*	*42,000*
Total	***12.1***	***1.3%***	***167***	***2.0%***	***153,000***	***379,000***
Insitu Mineral Resource as of 30 June 2023, Cut -off grade Lithia 0.3%, USD 1,500 Shell						
Measured	*0.2*	*1.0%*	*171*	*2.0%*	*2,000*	*5000*
Indicated	*7.2*	*1.4%*	*147*	*2.0%*	*98,000*	*242000*
Inferred	*0.2*	*1.1%*	*133*	*2.1%*	*2,000*	*5000*
Stockpiles	*1.8*	*0.8%*	*95*	*2.1%*	*13,000*	*32000*
Total	***9.4***	***1.2%***	***137***	***2.1%***	***115,000***	***284000***

Notes:

1) Mineral Resource is estimated as of 30 June 2023 and depleted for production through to 30 June 2023
2) Mineral Resources are reported at a cut-off grade of 0.3% Li_2O
3) Estimates have been rounded to a maximum of two significant figures
4) Totals may appear different from the sum of their components due to rounding.

1.13 Mineral Reserves Estimate

A mineral reserve estimate was completed based on the Mineral Resource Estimate and modifying factors including processing inputs determined from analysis of actual operating performance at the Mt Cattlin site, a competitive mining cost tendering process, and a feasibility level study for the Mt Cattlin Stage 4 Expansion.

Based off these modifying factors and the geological block models, pit optimisations were run to select the optimum pit shell which formed the basis of the mine design.

A full mine design was completed to a feasibility study level. The design was based on the optimisations taking into consideration other factors such as ore boundaries, haul roads, infrastructure and key processing and economic parameters at final feasibility level to support an economic evaluation and produce a Mineral Reserve Estimate.

The Mt Cattlin Mineral Reserve estimate as of 30 June 2023 was finalised as set out in Table 1-5.

Table 1-5 2023 Mineral Reserve Update

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	*In-situ*	*0.2*	*0.9*	*120*	*1.4*	*45*
Probable	*In-situ*	*5.2*	*1.3*	*130*	*69*	*1,500*
	Stockpiles	*1.8*	*0.8*	*95*	*13*	*390*
Total Mineral Reserves		***7.1***	***1.2***	***120***	***84***	***1,900***

The previous Mineral Reserve Estimate for the Mt Cattlin operation is provided in Table 1-6 and the absolute and relative comparisons to this estimate, expressed to a maximum of two significant figures, are shown in Table 1-7 and Table 1-8.

Table 1-6 June 2022 Mineral Reserve Estimate (Allkem), 30 June 2022

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	-	-	-	-	-	-
Probable	*2NW only*	*3.3*	*1.1*	*105*	*37*	*750*
	Stockpiles	*2.4*	*0.80*	*120*	*19*	*650*
Total		***5.8***	***0.98***	***110***	***56***	***1,400***

Notes: Reported at a cut-off grade of 0.4 % Li_2O. The proceeding statements of Mineral Reserves conforms with Australasian Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (JORC Code) 2012 edition. All tonnages reported are dry metric tonnes. Reported with a 17% dilution and 93% mining recovery. Revenue factor US$650/tonne applied. Minor discrepancies may occur due to rounding to appropriate significant figures.

Table 1-7 Comparison between 30 June 2023 and 30 June 2022 ORE

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	*In-situ*	*0.2*	*0.9*	*120*	*1.4*	*45*
Probable	*In-situ*	*1.9*	*0.2*	*25*	*32*	*750*
	Stockpiles	*-0.6*	*-0.05*	*-27*	*-5.7*	*-270*
Total		***1.4***	***1.05***	***120***	***28***	***520***

Table 1-8 Relative comparison between 30 June 2023 and 30 June 2022 ORE

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	*In-situ*	∞	∞	∞	∞	∞
Probable	*In-situ*	*58%*	*19%*	*24%*	*87%*	*101%*
	Stockpiles	*-26%*	*-6%*	*-22%*	*-30%*	*-42%*
Relative increase		***31%***	***13%***	***1.9%***	***57%***	***59%***

A comparison has been performed between the 2022 Mineral Reserve and this updated estimate. Figure 1-4 illustrates the sources of changes in the Mineral Reserve from 2022 to 2023. In general, this Mineral Reserve estimate shows an increase in the ore tonnage with the key drivers being the greater inventory of Indicated material available and the higher optimisation price. Offsetting those increases were mining depletion and an increase in operating costs.

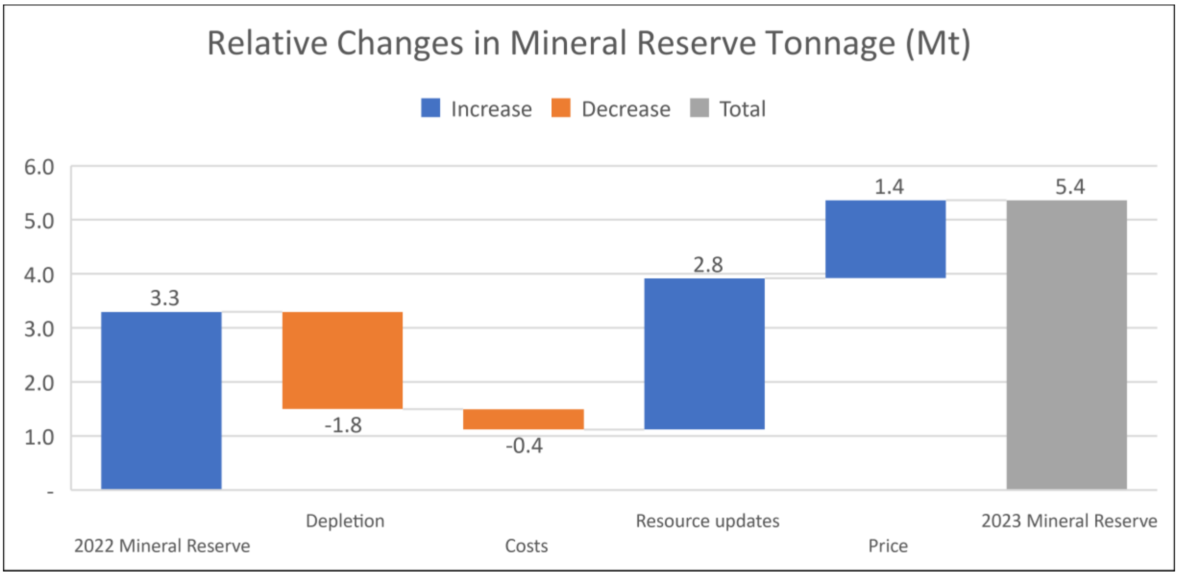

Figure 1-4 Key Changes in Ore Tonnage Waterfall Graph

1.14 Mining Method

Mt Cattlin is a conventional hard rock truck and shovel open pit mine used to extract and transport ore to the processing plant. The mine uses drill and blast methods of rock breakage to advance the pit in 10 m high benches mining 2.5 m horizontal flitches.

Allkem utilise mining contractors for drill and blast as well as load and haul operations with the contractor providing a primary excavation fleet and ancillary support equipment including grader, water cart, service trucks, light vehicles, and lighting plants.

Ore mining rates are based on providing continuous feed to the plant at a rate of 1.8 Mtpa. Waste rock is stored on pre-designed waste dumps or where practical used to back fill completed pits.

The mining method and mine design parameters were selected based on geotechnical properties of the rock, hydrological and hydrogeological factors as well as the economic ore boundaries provided to Mining Plus by Allkem.

1.15 Recovery Methods

The Mt Cattlin processing plant is located immediately to the west of the mining area and utilises conventional processing techniques to generate spodumene and by-product tantalite concentrates.

Spodumene concentrate produced is trucked to the Port of Esperance for loading and shipment to customers predominantly located in China. Tantalite by-product concentrate is bagged on site and freighted to the nearby Global Advanced Metals (GAM) Greenbushes operation.

As Mt Cattlin is a brownfields operating site with historical performance, past operational performance has been used as guidance for future forecasts of plant performance.

Plant recovery estimates are based on a series of grade-recovery curves that are derived from historical plant production data and reflect the typical ranges of plant feed grades.

Plant performance data from January 2017 through March 2022 indicates a consistent performance relative to the realised recovery model predictions. This offset has been accommodated in more recent production forecasts by applying feed grade-based reductions in predicted recovery of 2–5%.

Recent plant recoveries have been in line with expectations and consistently exceeded 60%.

1.16 Operations Infrastructure

Access to the Mt Cattlin site is via sealed road from Ravensthorpe, which is connected to Perth, Albany and Esperance centres via a well-maintained highway network. Concentrate is trucked to the Port of Esperance via the South Coast Highway. The port has capacity for 45,000 tonnes of concentrate storage prior to ship loading.

1.16.1 Site Roads

Mt Cattlin site has internal unsealed roads suitable for mining operations and transport requirement.

1.16.2 Water and Power

Site process water is sourced from the Northeast pit and pumped to the process plant for treatment and distribution, and raw water is sourced from nearby boreholes. In order to utilise the current NE pit as an in-pit tailings storage facility, a new source of process water will be required.

Drilling is currently underway to identify alternative sources of water in the area for use once the Northeast pit is used for tailings storage. A water study has been commissioned, however adequate availability and permitting will be required and is considered a key risk for this Project.

Power is supplied to site via a 7MW diesel generation power plant with onsite power reticulation servicing the site power requirements.

1.16.3 Site Buildings

The administration and ancillary buildings are already on site and in place.

1.16.4 Processing Plant, ROM Pad and TSF

The processing plant is onsite at Mt Cattlin and consists of a crushing circuit, optical beneficiation circuit, dense media separation (DMS) circuit, product handling facilities, and a tailings storage facility (TSF).

There is an explosives magazine on site which is owned and managed by Allkem, and bulk explosives are provide via a contractor.

Ore from the mining operation is stockpiled on the Run of Mine (ROM) Pad until transferred to the adjacent processing plant for crushing and processing. Tailings from the process plant are stored within the completed SW Pit after use of the above ground TSF was discontinued in 2019.

1.17 Market Studies and Contracts

Lithium has traditionally been used for applications such as ceramic glazes and porcelain enamels, glass ceramics for high-temperature applications, lubricating greases, and as a catalyst for polymer production. However, rechargeable batteries represent the dominant application of lithium today, representing more than 80% of global lithium demand in 2022. Within the rechargeable battery segment, 58% was attributed to automotive applications, which has grown at 69% annually since 2020. This segment is expected to drive lithium demand growth in future.

Allkem's shipments of spodumene concentrate are contracted on a spot basis as required to meet customers under existing off-take agreements.

1.18 Environmental Studies, Permitting, Land, Social and Community Impact

1.18.1 Environmental Studies and Permits

Allkem have completed numerous baseline environmental studies (during and prior to operations) and all key studies have been completed and there are no ongoing constraints preventing ongoing development and mining.

Allkem has obtained all relevant permits required to operate as listed below in Table 1-9.

Table 1-9 Mt Cattlin Permits and Key Legislation

Governing Agency	Permit and Governing Legislation
Aboriginal Heritage Act 1972 (Department of Planning, Lands and Heritage - DPLH)	*Section 18 permits*
Environmental Protection Act 1986 (Department of Water and Environmental Regulation - DWER)	*Part V Prescribed Premises Licence: L 8469/2010/2,*

	Part V Clearing Permits: CPS 3045/5, CPS 8052/2, CPS 8049/1
Mines Safety and Inspection Act 1994 (Department of Mines, Industry Regulation and Safety)	*Project Management Plan*
Rights in Water and Irrigation Act 1914 (Department of Water and Environmental Regulation)	*Groundwater Licence: GWL 167439(5)*

To ensure compliance, Allkem submits Annual Environmental Reports to the relevant government agencies. To date there have been no material non-compliance issues with any permit conditions or legislative requirements at Mt Cattlin.

1.18.2 Land Disturbance

Prior to mining development, the site was privately owned and cleared agricultural land. Up to 95 Ha have been cleared of remnant vegetation for the Project development by approved clearing permits. Development of previously disturbed land does not require approval.

The current total area of land disturbance approved for all mining and exploration activities is approximately 380 Ha, sufficient for the expected life of mine, with proposed expansions on previously disturbed agricultural land.

For all land disturbance activities, Allkem conduct baseline environmental and heritage surveys, obtain the relevant approvals, and then clear vegetation and stockpile the topsoil/sub soil away from draining for use in rehabilitation activities.

Allkem is required to pay a per hectare unit rate for land disturbance as part of the Mining Rehabilitation Fund Regulations 2013.

1.18.3 Dust, Noise and Blast Vibrations

Mt Cattlin is proximal to the Ravensthorpe township which increases sensitivity to noise and dust emissions. These aspects are monitored and managed via the Operational Noise Management Plan and the Airborne Material Management Plan respectively as part of their licencing, which includes monitoring, management and protocols for incidents and complaints made.

Allkem has developed a Blast Management Plan and long-term vibration and air blast monitoring programs to manage impacts due to blast vibrations.

1.18.4 Stakeholders and Community Engagement

Allkem has committed to ongoing consultation with its stakeholders, currently demonstrated in Table 1-10.

Table 1-10 Identified Key Stakeholders and their Interest in the Project

Organisation	Interest
Department of Water and Environment Regulation (DWER) *Department of Mines, Industry Regulation, and Safety (DMIRS)* *Department of Planning, Lands, and Heritage (DPLH)*	• *Licensing and closure planning* • *Contaminated site identification and remediation* • *Water supply and groundwater licensing, usage monitoring and aquifer sustainability* • *Disturbance management* • *Evidence of rehabilitation standards* • *Performance securities* • *Closure provisioning* • *Transfer of mine infrastructure to local landowners at closure. Indigenous heritage sites and agreements.*
Shire of Ravensthorpe	• *Community support programmes* • *Infrastructure use including potential transfer and management of former mine infrastructure.*
Southern Noongar and Wagyl Kaip traditional owners *South-West Aboriginal Land and Sea Council*	• *Protection of Aboriginal heritage sites* • *Preservation of the natural landscape.*
Mt Cattlin Community Consultation Group (MTCCCG) representing the broader Ravensthorpe community	• *Conserving the amenity and aesthetic value of Ravensthorpe township and surrounds* • *Community involvement in rehabilitation and closure activities* • *Post mining land use.*
Ravensthorpe business community *Surrounding Property Owners*	• *Land access* • *Exploration activities* • *Post mining land use* • *Infrastructure transfer/retention* • *Weed management.*

Allkem has created a Community Consultation Group, a joint forum between Allkem and the Ravensthorpe community to provide a platform for the community to communicate directly with the Company, who meet regularly with the aim to improve the social well-being of individuals and organisations within the community.

1.18.5 Rehabilitation and Closure

The closure and rehabilitation of the site post operations is prescribed in the Mine Closure Plan prepared in accordance with the Department of Mining, Industry, Regulation and Safety and outlines the closure obligations. The Mine Closure Plan identifies and sets out management of any potential closure issues and defines and outlines the site rehabilitation requirements.

Mt Cattlin has focussed on mine scheduling that allows for progressive rehabilitation to all disturbed land during operations. Annual rehabilitation monitoring is conducted on site and a detailed Closure Cost Estimate (CCE) is completed annually.

1.19 Capital and Operating Costs

1.19.1 Capital Costs

The Life-of-mine capital expenditure has been calculated to total $80.3M (without contingency), which includes a sustaining capital expenditure of $21.5M. The breakdown of project capital costs is listed below in Table 1-11

Table 1-11 Life of Mine Capital Expenditure Summary

Capital Type	USD$M
Site Capital	*41.1*
Closure	*12.3*
Mining	*5.6*
Sustaining	*21.5*
Total Capital Costs	***80.3***

Variances in totals may be due to rounding.

Site capital expenditure includes an allowance for the new NE In-Pit Tailings Storage Facility (IPTSF) as the current SE IPTSF will reach capacity in 2024.

A sum of $35M has been allowed for the construction of a flotation circuit attached to the existing DMS processing plant, to facilitate the retreatment of approximately 900,000 t of tailings at the end of the mine life. Current test work shows the retreatment is feasible, and further test work should enhance the economics and technical robustness of the Project.

Table 1-12 Site Capital Expenditure

Capital Type	USD$M
TSF	*1.4*
Land Purchase	*4.7*
Tailings Retreatment	*35.0*
Total Site Capital Costs	***41.1***

Closure capital costs of US$12.3M has been allocated for the end of the Project life, derived from the existing mine closure plan. The allowance assumes a material amount of progressive rehabilitation is undertaken during the Project’s operational life.

Tailings within the completed 2SW IPTSF will need to be removed prior to the Stage 4 Mine Expansion as it is immediately adjacent to the current Stage 3 pit. A nominal costing of US$14/bcm has been allowed for, over an 8-month period. A provision of $17.5 M has been allocated to this task.

Table 1-13 Sustaining Capital Expenditure

Capital Type	USD$M
Processing Plant	*3.7*
Removing in-pit tailings from 2SW IPTSF	*17.7*
Total Sustaining Capital Costs	***21.5***

1.19.2 Operating Costs

Key operating cost were sourced from Allkem's budget forecasts, which are based off historical operating data and are shown in Table 1-14.

Based off previous data, processing costs have been modelled on a 50% fixed, 50% variable rate totalling $29.12/t when operating at nameplate capacity.

Table 1-14 Key Operating Cost Assumptions

Assumption	Unit	Value
Transport		
Surface Haulage Costs	*US$/wmt concentrate trucked*	*25.57*
Port Costs	*US$/wmt concentrate shipped*	*14.06*
Moisture	*%*	*2.0*
Processing		
Fixed	*US$/month*	*2,184,000*
Variable	*US$/t ore processed*	*14.56*
General and Administration (G&A)		
Fixed	*US$/month*	*1,018,500*
Royalty		
LRC Royalty	*US$/t ore processed*	*1.05*
Western Australian State	*%*	*5.00*

Total operating expenditure over the life of the Project is USD$899 M. The annual expenditure by year, including Capex and Royalties is charted below in Figure 1-5.

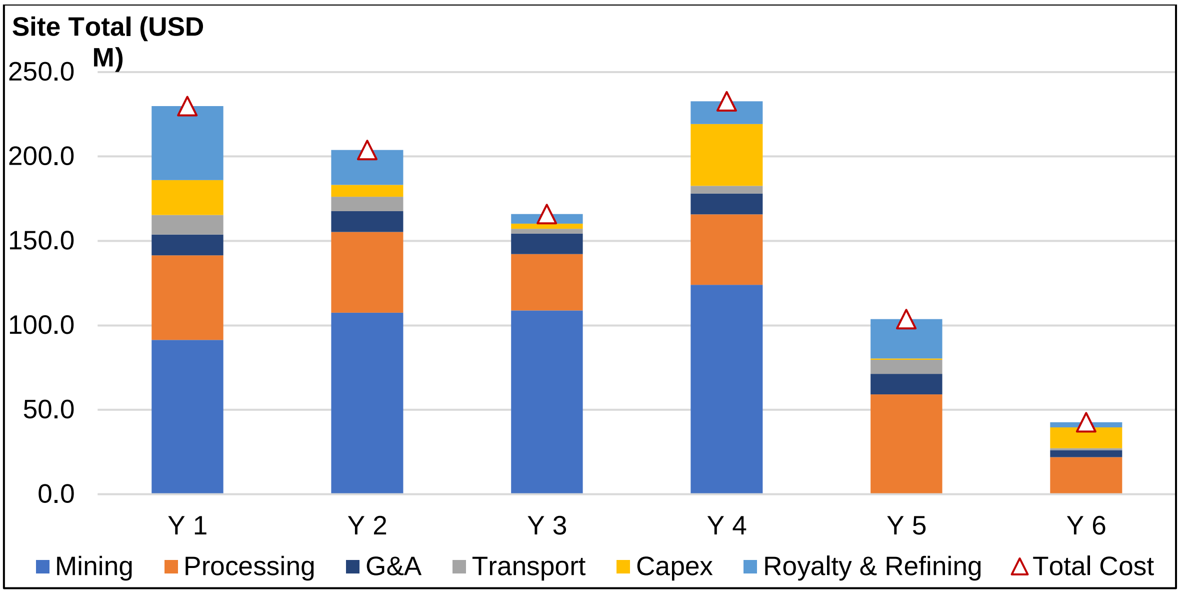

Figure 1-5 Annual Expenditure by Year

1.20 Economic Analysis

Mt Cattlin produces spodumene and tantalite concentrates for sale. The concentrate revenue has been modelled on a Realised Price basis (net of all penalties and/or grade discounts, Free-on-board Esperance, WA) using data supplied by Allkem.

Economic analysis, including NPV calculations have been modelled based on a model commencement from July 2023 and will operate through to mine closure in August 2027.

As an existing operation, the Project has no construction or pre-production period, which is reflected in the financial modelling. The key Project financials are outlined in Table 1-15.

Table 1-15 Key Financial Results

Description	Unit	Value
Revenue	*US$M*	*2,092*
Total capital costs	*US$M*	*80*
Total operating costs (excl. royalties)	*US$M*	*788*
Total Royalties	*US$M*	*110*
Total costs	*US$M*	*979*
Net cash flow (undiscounted pre-tax)	*US$M*	*1,113*
Net Present Value (NPV10)	*US$M*	*947*
Average Spodumene price over LOM (US$/dmt)	*US$/dmt*	*2,271*
Average Tantalite price over LOM (US$/lbs)	*US$/lb*	*24.30*

1.20.1 Revenue

Modelled revenue received from all concentrate sales totals $2,092M, of which spodumene sales contribute 99.5% of the total. The revenue is derived using pricing forecasts for spodumene and tantalite concentrates provided by Allkem.

1.20.2 Costs

As Mt Cattlin is an operating mine and plant, the projected capital costs exclude sunk costs already incurred by Allkem in developing the Project to date, and any ongoing costs that may be incurred by Allkem that are not directly associated with the Mt Cattlin operation such as business development, exploration costs and further resource definition beyond the current Mineral Resources.

The mining cost estimate considered all costs incurred to mine material, deliver it to the stockpiles, waste dumps and ROM pads. The battery limits of the cost estimations were as follows:

- Mining site preparation and establishment
- Mining disestablishment and demobilisation
- Road construction and maintenance between mining areas and the processing facility
- Mine dewatering of the pits
- Mining-specific capital costs only
- Diesel rate of US$0.994 per litre post rebate.

The total mining capital cost estimate without a contingency allowance is USD$5.6M. A breakdown of the total capital estimate by area is shown in Table 1-16

Table 1-16 Total Mining Capital Cost

Description	US$M
Clear & Grub and Topsoil Strip	*0.4*
Establishment	*0.5*
Mobilisation	*3.7*
Demobilisation	*0.9*
Total Mining Capital Costs	***5.6***

Direct mining costs used in the mining cost estimate are from the schedule of rates submitted by contractors in a competitive tender process. The schedule of rates was submitted based on an interim mining schedule provided by Allkem and incorporated into a tender package (3-year term) prepared and issued to five mining contractors.

The operating costs are based on the following assumptions:

- Ramp up to a maximum 12 M bcm a year mining rate
- Open pit mining services provided by the selected mining contractor
- Fixed and variable contract. Variable costs are calculated as a function of the relevant variable.

Resourcing levels vary as new deposits come online in the project. Mining maintenance, staff and safety personnel numbers change with each phase of the operation.

The total mining operating costs by pit for the life of the project is illustrated in Table 1-17.

Table 1-17 Mining Operating Cost by Deposit

Pit	USD$M
Stage_3_Phase_1	*33*
Stage_4_Phase_1	*150*
Stage_4_Phase_2	*250*
Total Operating Costs	***433***

A sensitivity analysis was completed and can be found in the main body of the report.

1.21 Adjacent Properties

Mt Cattlin is the major lithium and tantalum deposit in the Ravensthorpe region and Allkem hold the immediate adjacent exploration tenements surrounding the current mining lease. There are no other lithium operations within the Ravensthorpe area. Bulletin Resources is exploring for lithium 12 km SW of Mt Cattlin and has successfully delineated newly documented spodumene bearing pegmatites.

Numerous companies are actively exploring the area for copper-gold mineralisation or nickel sulphide mineralisation, and there is an open pit nickel mine and processing plant operated by First Quantum Minerals to the South of Ravensthorpe.

1.22 Interpretations and Conclusions

Detailed financial modelling performed for the feasibility study, including operating and capital cost updates during 2023 to reflect the current market conditions, were used to demonstrate the viability of the Project. As a brownfields operational site, Mt Cattlin has historic operating performance parameters which were referenced in the evaluation of this report and the ongoing operation and expansion, along with updated geological and metallurgical data.

The result of the modelling demonstrates the Project's financial viability is robust. Therefore, the mineral reserves have reasonable economic viability for the stated reserves under NI43-101 guidelines.

1.23 Recommendations

The following key recommendations have been made to Allkem with respect to the Mt Cattlin project throughout this report:

- Evaluate the results of the four (4) additional metallurgical drillholes and associated testing to quantify the continuity of the mineralisation and recovery expectations for the bulk of the Stage 4 expansion

- Continue resource drilling to further expand the resource and define the limits of mineralisation
- Investigate underground mining methods as an alternative to open pit mining as the strip ratio increases and analyse a trade-off between open pit and underground mining transition
- Develop a routine grade control program in place ahead of mining activities.

The remainder of the program is to be carried out as per normal operational execution.

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

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CHAPTER 2: INTRODUCTION

2 INTRODUCTION

Allkem Limited (Allkem or The Company) is dual listed on the Australian Securities Exchange (ASX) and the Toronto Stock Exchange (TSX). Allkem has previously reported its operations under the Australasian Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (the JORC Code) published by the Australian Joint Mineral Reserve Committee (the JORC Committee) as well as to the National Instrument 43-101 (NI43-101) the Standards and Disclosure for Mineral Projects within Canada.

This is an update to the 2021 NI 43-101 Technical Summary Report filed by Allkem on the Mt Cattlin Lithium Project.

The Mt Cattlin Project is 100% held by Galaxy Lithium Australia Pty Ltd (Galaxy) a wholly owned subsidiary of Allkem.

2.1 Registrant Information

The registrant for this Report is:

Allkem Limited

Level 1, Kintail Road, Applecross WA 6153

ABN: 31 112 589 910

2.2 Terms of Reference and Purpose of the Report

The co-authors of this Report are Entech and Allkem.

The Report covers the extent of the Mt Cattlin Operation, owned by Galaxy Resources a wholly owned subsidiary of Allkem and is solely concerned with the Mt Cattlin asset.

All units of measurement in this Report are metric unless otherwise stated.

The monetary units are US dollars, unless listed otherwise. Where not stated US dollars should be assumed. An exchange rate of AUD 1.0: USD 0.7 has been used in any conversions which were required to be made.

2.3 Qualified Persons

Table 2-1 lists the firms and individuals who acted as Qualified Persons (QPs) in preparing this Report.

Table 2-1 Lists Firms and Individuals who Acted as Qualified Persons (QPs) in Preparing this Report

Qualified Person	Report Responsibilities	Report Sections
Dan Donald (Entech)	*Property Description & Location, Project History, Mineral Reserve Estimate, Mining Methods, Mine Design, Production Scheduling, Mining Cost Estimates*	*Chapters 1 ,2, 3, 15, 16, 19, 21, 22, 25, 27.*
Albert Thamm, FAusIMM	*History, Geological Setting and Mineralisation, Deposit Type, Exploration Drilling, Sample Prep, Analyses and Security, Data Verification*	*Chapters 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 20, 23, 24, 25, 26.*
Aidan Giblett (Strategic Metallurgy)	*Mineral Processing and Metallurgical Testing, Recovery Methods*	*Chapters 13, 17.*

Daniel Donald and Entech have been involved with the project since 2022, recently completing the feasibility Study to support the Stage 4 Expansion of the mine's operations. Entech, and its personnel, have extensive experience in lithium and similar mineralisation styles, the proposed and operational mining operations at the project and other similar projects over several years.

Mr Thamm, B.Sc. (Hons)., M.Sc. F.AusIMM, a is a full-time employee of Allkem Limited. and has sufficient experience that is relevant to the style of mineralization and type of deposit under consideration and to the activity being undertaken to qualify as a Qualified Person.

Aidan Giblett, BSc Engineering (Minerals), FAusIMM CP(Met), is a Mineral Processing Consultant for Strategic Metallurgy. Prior to assisting with the feasibility study in early 2023 he has had no prior involvement with the Project.

2.4 Site Visits

Dan Donald visited the site in May 2023. During this visit, he inspected the property, surface topography, areas proposed for the open pit, waste rock dumps, and mine infrastructure. Other Entech personnel visited the site over the duration of the feasibility study to complete Geotechnical works, and to inspect other parts of the mine’s operations.

Mr Thamm has visited the site numerous times since 2006, being involved with and present for the drilling programs associated with developing the Mineral Resource Estimates for the Project. Mr Thamm has personally inspected much of the core and RC chips from the Project. In addition, Mr Thamm oversaw the logging and assaying of the geological samples.

Aidan Giblett visited the site on 10th of May 2023 to inspect the site’s processing facility and review the recovery operations.

2.5 Currency of Report

The report is current for work completed until 1 August 2023, when Allkem released the Mt Cattlin Ore Reserve to the Australian Securities Exchange and the current Stage 4 Expansion Feasibility Study Technical Report, dated June 2023.

2.6 Sources of Information

Source information was provided by Allkem where required, which was prepared by the range of consultants and companies listed in Chapter 27: References.

2.7 Previous Reports

Previous reports published on the ASX platform by Allkem and relevant to the current iteration of the Mt Cattlin Operation can be found at www.allkem.co and include those listed in Table 2-2.

Table 2-2 ASX Reports

Date	Title
1 August 2023	*Mt Cattlin Annual Ore Resource and Reserve update at 30 June, 2023*
16 June 2023	*Mt Cattlin Ore Reserve update confirms mine life extension*
17 April 2023	*Mt Cattlin Resource Update with Higher Grade*
21 February 2023	*Mt Cattlin Production Update*
05 October 2022	*Mt Cattlin Resource Drilling Update*
25 August 2022	*Mt Cattlin Resource, Reserve and Operations Update*

2.8 Abbreviations and Acronyms

A list of unit abbreviations used in this Report is provided in Table 2-3. Chemical and elemental symbols and associated acronyms are described in Table 2-4 and all other acronyms and abbreviations used in this report, along with their meanings are provided in Table 2-5.

Table 2-3 Units of Measure

Unit of Measurement	Description
%	*Percent*
µm	*Micrometer (one millionth of a Meter)*
BCM	*Banked cubic meter*
CY	*Calendar Year*
dmt	*Dry metric tonne*
g/t	*Grams per tonne*
H1	*1st half of year 1*
Ha	*Hectares (area)*
kg/m^3	*Kilograms per Meter cubed*
kL	*Kilolitre (thousand litres)*
km	*Kilometer*
Km/hr	*Kilometer per hour*

Unit of Measurement	Description
l/s	*Litres per second*
lb	*Pound*
m	*Meter*
m3/d	*Cubic meter per day*
mg/L	*Milligram per litre*
mm	*Millimetre (one thousandth of a metre)*
Mt	*Million metric tonnes*
Mtpa	*Million tonnes per annum*
MW	*Megawatt (Power)*
oC	*Degrees Celsius*
p.a.	*Per annum*
t	*Metric tonne*
tpa	*Tonnes per annum*
wmt	*Wet metric tonne*

Table 2-4 Chemicals, Elements and Associated Abbreviations

Abbreviation	Mineral or Element
Al	*Aluminium*
H	*Hydrogen*
K	*Potassium*
LFP	*lithium-iron-phosphate*
Li	*Lithium*
Li_2O	*Lithium oxide*
$LiAl(F,OH)PO_4$	*Amblygonite*
$LiAl(SiQ_3)_2$	*Spodumene*
Mg	*Magnesium*
MHO	*Mixed hydroxide*
Na	*Sodium*
NCA	*Nickel-cobalt-aluminium oxide*
NCM	*Nickel-cobalt-manganese oxide*
O	*Oxygen*
SI	*Silica*
Ta	*Tantalum*
Ta_2O_5	*Tantalum oxide*
TaO_5	*Tantalite*

Table 2-5 Acronyms and Abbreviations

Abbreviation	Unit or Term
US$B	*Billion US dollars*
AEP	*Annual Exceedance Probability*
AHD	*Above Height Datum*
ASX	*Australian Securities Exchange*
AUD	*Australian Dollars*
BG	*Battery grade*
BH	*Bore Hole*
CAGR	*Compound annual growth rate*
Capex	*Capital expenditure*
CCE	*Closure cost estimate*
CCG	*Community Consultation Group*
CIM	*Canadian Institute of Mining*
CRM	*Certified reference material*
CV (processing)	*Conveyor*
CV (geology)	*Coefficient of variation*
DMIRS	*Department of Mines, Industry Regulation and Safety*
DMS	*Dense media separation*
DWER	*Department of Water and Environmental Regulation*
EFL	*Esperance Freight Line*
EMP	*Environmental Management Plan*
ENE	*East Northeast*
ESE	*East Southeast*
EV	*Electric vehicles*
FCF	*Free cash flow*
FOB	*Fine Ore Bin*
FOB (shipping)	*Free on board*
FOS	*Fine Ore Stockpile*
FPB	*Flood protection bund*
FS	*Feasibility Study*
FX	*Foreign exchange rate (AUD:USD)*
G & A	*General and Administration*
GST	*Goods and Services Tax*
IPTSF	*In pit tailings storage facility*
JORC	*Joint Ore Reserve Committee*
LCE	*Life Cycle Engineering*
LOM	*Life of Mine*
mE	*Meters east*
mN	*Meters north*
MRE	*Mineral Resource Estimate*

Abbreviation	Unit or Term
mRL	*Meters Relative Level*
NE	*Northeast*
NI-43101	*National Instrumentation Standard 43-101*
NPV	*Net Present Value*
NW	*northwest*
Opex	*Operating Expenditure*
OREAS	*Ore Research and Exploration*
PMF	*Probable Maximum Flood*
PMP	*Probable Maximum precipitation*
ppm	*Parts per million*
ppm	*Parts per million*
QA/QC	*Quality Assurance/Quality Control*
QP	*Qualified Person*
RC	*Reverse circulation*
ROM	*Run of Mine*
RPEEE	*Reasonable Prospect of Eventual Economic Extraction*
SE	*Southeast*
TDS	*Total dissolvable solids*
TG	*Technical grade*
TSF	*Tailings Storage Facility*
TSX	*Toronto Stock Exchange*
UFSMS	*Ultrafine dens media separation*
USA	*United States of America*
USD	*US Dollars*
VSI	*Vertical shaft impactor*
W.A.	*Western Australia*
WD	*Waste dump*
WIMS	*Wet high intensity magnetic separator*
WMC	*Western Mining Corporation*
WNW	*West northwest*
WRL	*Waste Rock Landform*
WSW	*West southwest*
XRD	*X-ray diffraction*

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CHAPTER 3: RELIANCE ON OTHER EXPERTS

3 RELIANCE ON OTHER EXPERTS

The Qualified Persons have not relied upon the work provided by external experts with the exception of details relating to environmental, permitting and social or community aspects described below.

3.1 Environmental Studies, Permitting and Social or Community Impact

Environmental, permitting, and social or community information for this report, specifically Section 20, relies entirely on information provided by James Hesford (Principal Environmental Consultant and Director of Tetris Environmental Pty Ltd).

- Expert: James Hesford, Environmental Advisor, Tetris Environmental Pty Ltd.
- Report, opinion or statement relied upon: Information on environmental, permitting, and social or community impacts
- Extent of reliance: full reliance following a review by the Qualified Person
- Portion of Technical Report to which disclaimer applies: Section 20.

3.2 Mining Dilution Study

Allkem engaged an external consultancy, Orelogy Pty Ltd of Perth Australia, to conduct a mining dilution study. This study prepared a re-blocked mining model based on the Mineral Resource Estimate, which was used for the mining study as described in Chapter 15: Mineral Reserve Estimate.

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CHAPTER 4: PROPERTY DESCRIPTION, LOCATION AND TENURE

4 PROPERTY DESCRIPTION, LOCATION AND TENURE

4.1 Location

The project is located close to the town of Ravensthorpe (population approximately 2,000) near the South Coast Highway which provides access for freight deliveries from Perth as well as direct access to port town of Esperance for product export (see Figure 4-1).

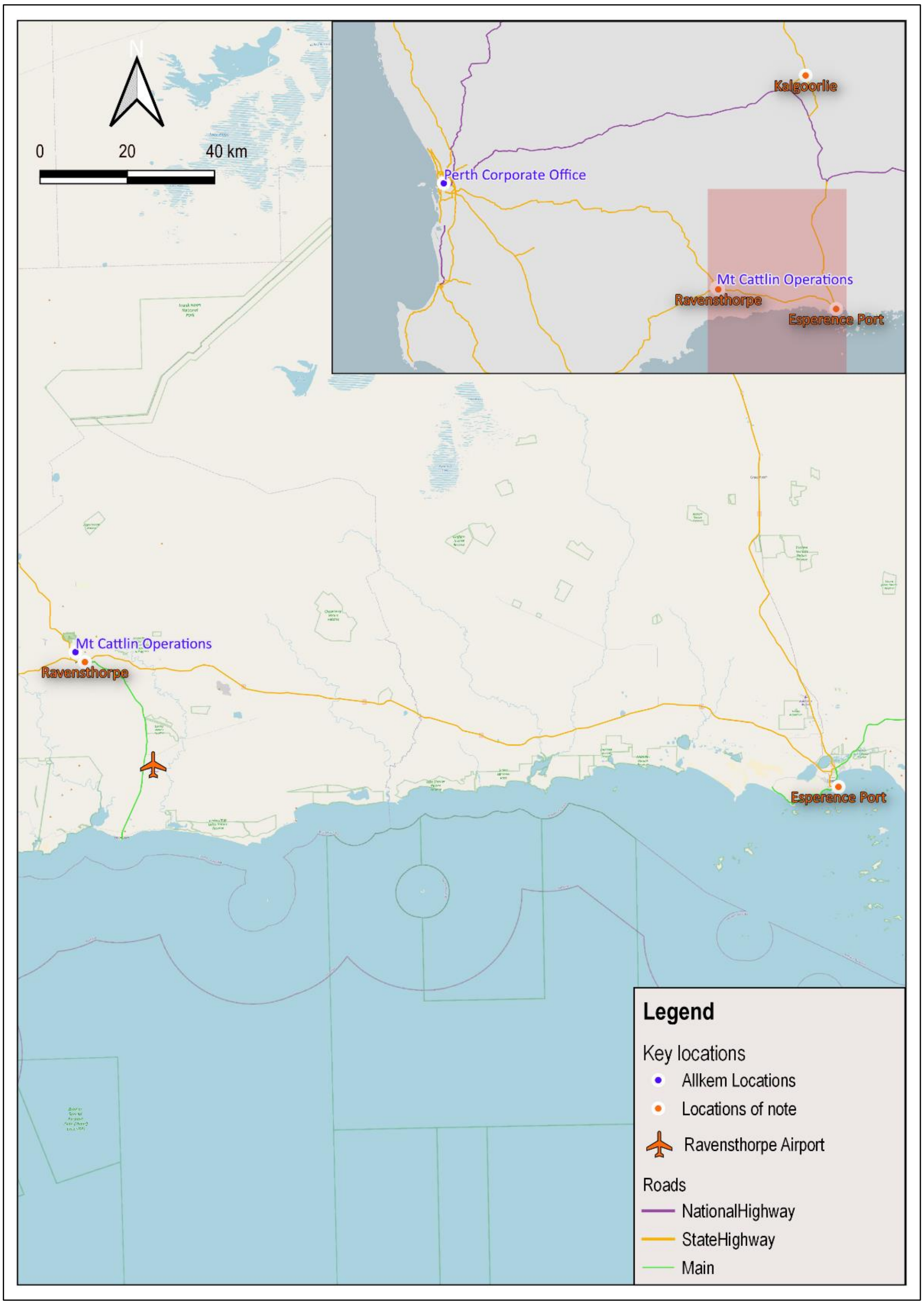

Figure 4-1 Project Location

4.2 Description of Operations

4.2.1 Project History

The Cattlin Creek pegmatites have been the subject of several drilling, sampling and metallurgical test campaigns, as well as feasibility studies dating back to the 1960s. From 1962 to 1966, Western Mining Corporation (WMC) carried out an extensive drilling programme and established a resource of 'green' and 'white' spodumene.

Extensive mineralogical and metallurgical testwork was carried out as part of this programme, culminating in WMC preparing an internal feasibility study on the mining and production of 10,000 t/y to 15,000 t/y of spodumene from the deposit. Since the 1960s, the tenements were owned by several companies, all of which have viewed them as a prospective tantalite resource and conducted drilling and metallurgical testwork accordingly. Allkem acquired the tenure from the Administrators of Sons of Gwalia in November 2006 (via a predecessor company) and in 2009, construction began of mining and plant facilities at the site and in June 2010 mining activities started.

The mine was placed into care and maintenance in 2013, production was restarted in March 2016 and has been continual since then.

Figure 4-2 Mt Cattlin and the Town of Ravensthorpe

Figure 4-2 shows the site and proximity to the Town of Ravensthorpe, as well as the key Mining Tenement M74/244, and the main South Coast Highway.

4.3 Current Operations

4.3.1 Operating Model

Mt Cattlin utilises a contract miner to carry out all the drilling, blasting, excavating and load and haul, and ancillary functions at site. The Allkem mining owner's team supply the management and technical direction to the mining contractor, as well as the statutory Senior Site Executive and Quarry Manager function.

4.3.2 Infrastructure

4.3.2.1 Administration Building

Site has a suitable permanent administration building which the Allkem staff are based in.

4.3.2.2 Processing Plant

The processing plant is nearby and consists of a crushing circuit, Optical beneficiation circuit, Dense Media Separation plant, magnetic waste separator, product handling facilities, and tailings storage facilities.

The original Mt Cattlin crushing circuit has been largely superseded by a contract crushing circuit. This was a pragmatic capital refurbishment cost choice when the operation emerged from care and maintenance in 2016. A study evaluating the business case returning to an Allkem crushing circuit is independently underway at the moment.

4.3.2.3 Mining Contractor

The mining contractor has Allkem supplied workshop and administration building located adjacent to the pit area.

4.3.2.4 Power Supply

The power supply is provided on a contract basis by Pacific Energy via six diesel fuelled Cummins 1.25MW diesel gensets. An independent study is underway to evaluate the business case of upgrading the station to include a meaningful renewables energy penetration and switch the thermal fuel source to natural gas.

4.3.3 Operational Overview

4.3.3.1 Workforce

The Mt Cattlin operation is structured similarly to other medium sized Western Australian mines. The site is independently managed by a Senior Site Executive who will hold dual roles as the senior site company representative as well as the senior regulatory position of Senior Site Executive.

Head office / corporate support is provided in the form of:

- Corporate management via the Executive Australia and Exploration Manager
- Senior support functions such as Exploration Manager, Principal Mining Engineer, Human

Resources, Marketing, and Legal, and
- Cost accounting - accounts payable, accounts receivable, and month-end cost analysis & reporting).

Exploration activities operate out of site and incorporate off mining tenement activities as well as on tenement and provide input into in-mine exploration.

The workforce and contracting strategy is to:

- Directly employ and manage:
  - All administration, compliance roles, and departmental management, including General Manager, Health & Safety, Environmental, and stores/procurement/shipping
  - All management, technical, operating and maintenance staff associated with the processing function, including the site laboratory
  - All technical functions - geology, mining, and processing
- Contractor supplied:
  - Surface mining including all supervisory, operating and maintenance personnel and associated light and heavy equipment
- Specialist sustaining services such as shut-down and campaign maintenance support.

The Allkem workforce are employed on a variety of rosters, and includes a number of local residential roles, which are encouraged by the local shire.

4.3.3.2 Site Organisational Structure

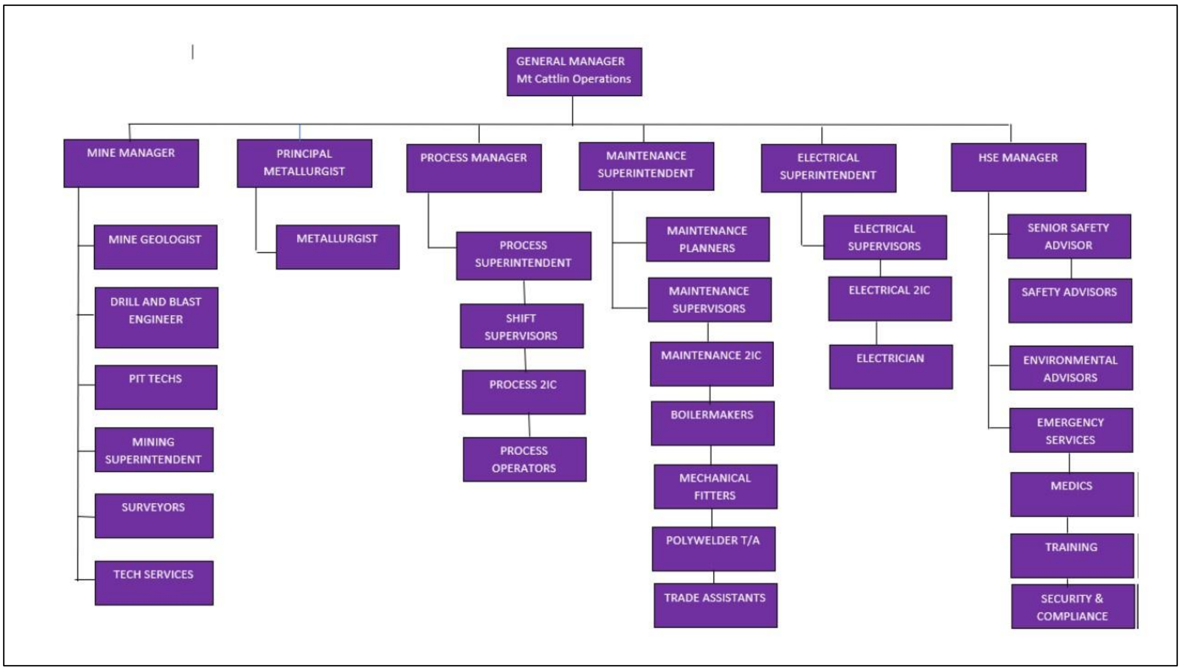

Figure 4-3 Site Organisational Structure

4.3.3.3 Site Management

The operations workforce is under the control of the Senior Site Executive (SSE), who is supported by department heads for the various site functions.

4.3.3.4 Administration

Site administration duties, including flight bookings, contracts, accommodation logistics and various procurement services are handles by a small team led by a Senior Administrative Assistant who reports to the SSE.

4.3.3.5 Health, Safety, Environment and Compliance

The Health, Safety and Environment (HSE) functions are managed by a HSEC Manager with senior environmental and safety advisors as functional leaders, plus emergency response and security roles. The HSE Manager reports to the SSE on site.

4.3.3.6 Mining

The Mining Manager is responsible for managing the mining contractor and Allkem's technical team, including the mine planning and site geology function. The Mining Manager also fulfills the statutory role of Quarry Manager.

4.3.3.7 Processing

The Processing and Metallurgy group is responsible for the operational and technical management of the process plant and quality control of the processing facility. The organisational chart shows the positions of Process Manager reporting directly to the SSE, supported by a Process

Superintendent, as well as a Principal Metallurgist reporting directly to the SSE. The Process Plant is manned by crews on a four-panel rotating roster, as well as an onsite laboratory team.

4.3.3.8 Exploration

The Exploration activities are managed by the Exploration Manager who is based out of the Perth head office. He is responsible for managing the exploration geologists, as well as planning and co-ordinating the various ongoing drilling programs.

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CHAPTER 5: ACCESSIBILITY CLIMATE LOCAL RESOURCES

5 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 Baseline Environmental Data

Prior to and during operations, numerous comprehensive baseline environmental studies have been conducted by external technical experts to support Project permitting. These studies covered factors such as:

- Flora and Vegetation
- Terrestrial Fauna
- Subterranean Fauna
- Hydrogeology
- Hydrology
- Soils
- Mine Waste Characterisation
- Aboriginal Heritage
- European Heritage.

All key studies required to enable the continuation of operations for the remainder of the life of mine have been completed and Mt Cattlin does not have any major environmental constraints to prevent ongoing development and mining.

5.1.1 Climate

The Project is situated within an area classified as a Mediterranean climate featuring moist, mild winters and hot, dry summers. The closest weather station is located at Ravensthorpe (Site number: 010633), approximately 2 km south of the Project (Bureau of Meteorology (BoM) 2019).

Climatic statistics recorded and averaged from 1901–2019 for rainfall and 1962–2019 for temperature at the Ravensthorpe weather station (BoM 2019) are summarised below:

- Mean annual maximum temperature (°C): 22.8, with a high of 29.0 recorded in January
- Mean annual temperature (°C): 10.5, with a low of 6.7 recorded in August
- Average annual rainfall (mm): 429.6 with most rainfall occurring between May–October
- Average annual days with z 1 mm of rainfall: 74.7.

The average wind speeds at Ravensthorpe vary throughout the year from 10.2–14.0 km/h in the morning to 12.2–16.3 km/h in the afternoon (BoM 2019).

5.1.2 Landscape

The Project area is in the Fitzgerald Interim Biogeographic Regionalisation for Australia (IBRA) subregion (ESP1) of the Esperance Plains IBRA bioregion, which totals over one million hectares. The subregion is characterised by ‘myrtaceous and proteaceous scrub and mallee heaths on sandplain overlying Eocene sediments; and herbfields and heaths on abrupt granite tors and quartzite ranges that rise from the plain. Eucalypt woodlands occur in gullies and on alluvial foot-slopes.

The Fitzgerald sub-region has variable relief, comprising subdued relief on the sandplains of the coastal region, punctuated with metamorphosed granite and quartzite ranges both inland and on the coastal plain. It lies mainly on the Bremer Sedimentary Basin and the eastern and western sections of the ESP1 subregion within the Albany-Fraser Orogen of the Yilgarn Craton. It has extensive western plains over an Eocene marine sediment basement with small areas of outcropping gneiss. Archaean greenstones (primarily basaltic rocks) and sand sheets with varying levels of lateritisation with gravelly soils also occur.

The region is dominated by duplex soils and deep and shallow sands on the plains and dissected areas and by shallow sandy soils on the mountain ranges (Comer et al 2001). Several rivers flow south to the coast including the Jerdacuttup River which includes Cattlin Creek as a western sub catchment.

The major towns occurring throughout the region include Ravensthorpe, Hopetoun, Jerramungup, and Bremer Bay.

5.1.3 Geology

The Project lies within the Annabelle Volcanics of Archaean age, consisting of metamorphosed mafic to intermediate tuff and agglomerate and related epiclastic rocks (Witt, 1996), just west of the Manyutup Tonalite. The spodumene is associated with pegmatites that would have been intruded from the tonalite; and dolerite dykes also intrude the volcanic rocks.

Clayey alluvium and colluvium are up to 10 m thick and overlie the volcanic rocks in most of the area.

5.1.4 Materials Characteristics

5.1.4.1 Soils Characterisation

The majority of the land within the proposed disturbance envelope is within the existing disturbed mine footprint. The exception to this is the WD2 footprint expansion area, which is located within land historically cleared for agriculture (Figure 5-1). Productive soils will be stripped and utilised in rehabilitation of the waste dumps.

Keith Lindbeck and Associates (KLA) conducted two rounds of soil assessment in 2008 and again in 2012 (Appendix 2 in Reg ID 73856). KLA confirmed that the surface horizons as well as the subsoils of the agricultural areas at the Mt Cattlin mine area are suitable for rehabilitation purposes.

Figure 5-1 Photographs of Soil Condition at the WD2 Expansion Area (March 2023)

5.1.4.2 Waste Rock Characterisation

There are no changes to the geochemical or physical properties of the waste rock associated with the Project.

The Stage 4 Open Pit expansion and the characteristics of the waste are well known. Waste rock characteristics at the Mt Cattlin Operation have been described in previously approved Mining Proposal applications (e.g., Reg ID 22377, 69112, 73856). Previous Mining Proposals have found that the geology at the Mt Cattlin operations is chemically benign and physically stable.

Geochemical Characterisation

Additional internal analysis in December 2022 of drilling samples from the Stage 4 Open Pit expansion area confirmed the benign nature of the waste rock. This data combined with the Stage 3 Pit assays is summarised in Table 5-1 and sampling points shown in Figure 5-2 and Figure 5-3.

Figure 5-4 depicts the homogeneous extension of the lithologies from the current Stage 3 Open Pit to the proposed Stage 4 Open Pit.

Of 18,651 m of waste rock assayed, 21 m contained sulphides >0.3% and levels of other metals are low.

There have been four (4) cases at Mt Cattlin since 2016 where investigations of suspected asbestiform materials or fibrous minerals have been undertaken. All investigations returned negative results for the presence of potentially harmful asbestiform or fibrous material.

It is considered that no significant or additional fibrous material risks are posed by the proposed mine expansion at Mt Cattlin. Continuing vigilance and ongoing investigation and analysis of any suspected fibrous materials will be undertaken whenever such materials are encountered. These measures will inform appropriate operational risk assessments and will identify whether additional controls or management are required.

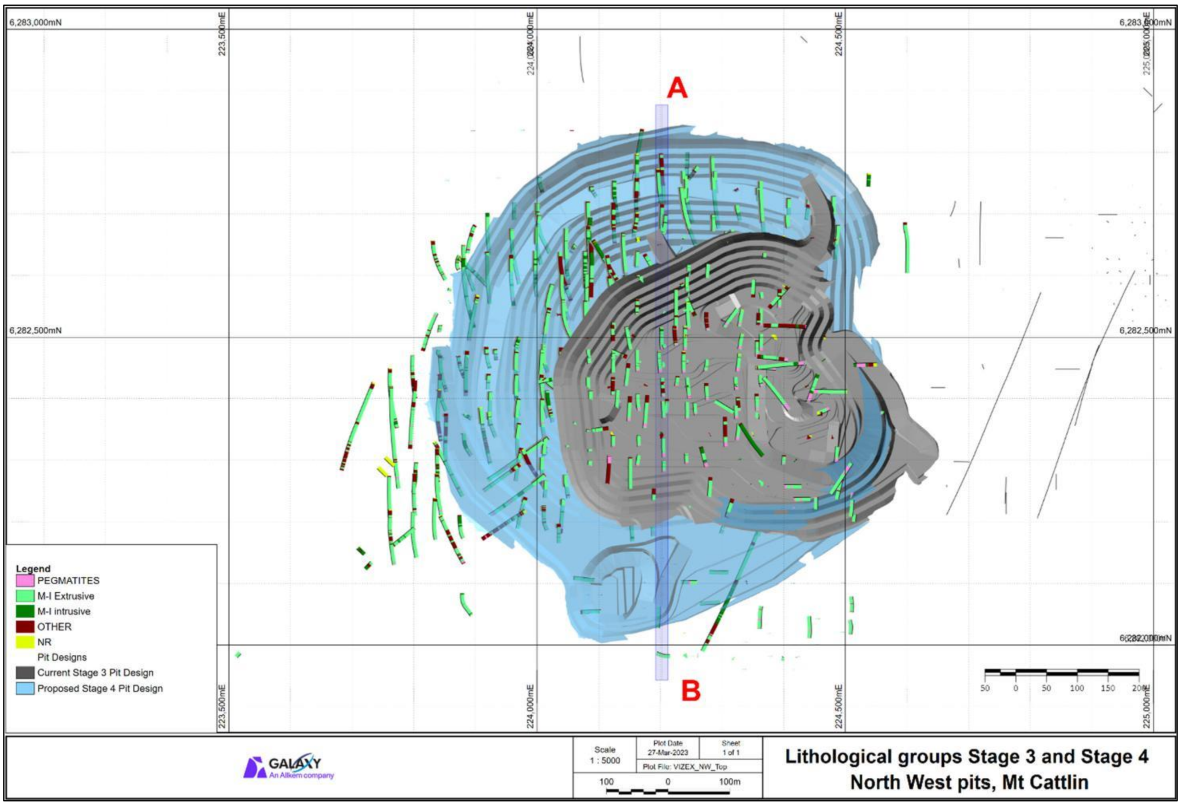

Figure 5-2 Lithology Sampling (Stage 3 and Stage 4 Pit)

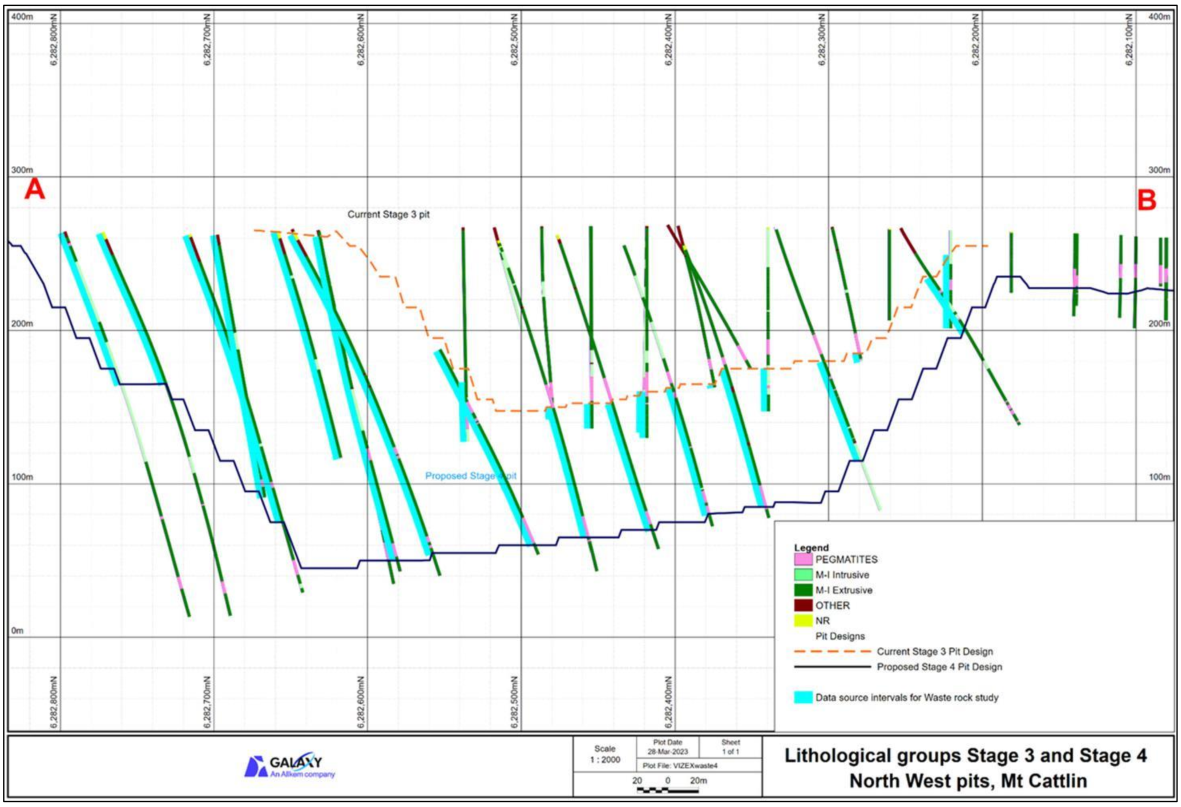

Figure 5-3 Lithology Sampling Cross Section

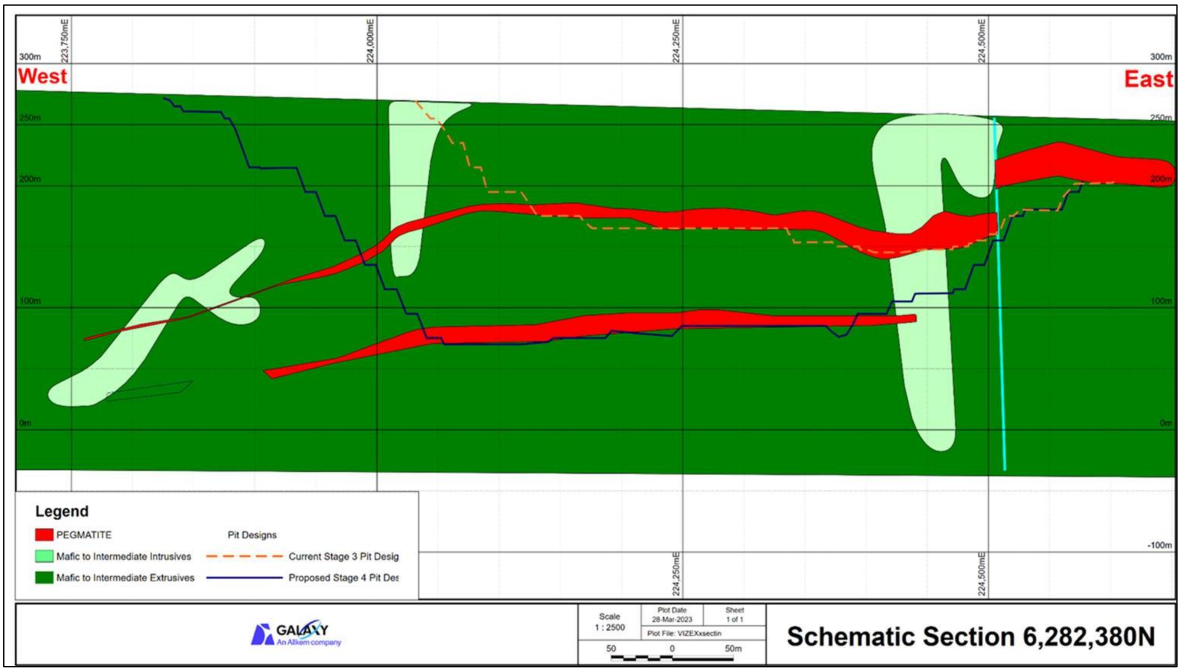

Figure 5-4 Stage 3 to Stage 4 Lithological Extension

5.1.4.3 Tailings Characterisation

Granitic pegmatites are mineralogically simple igneous rock consisting of approximately 65% feldspar, 25% quartz, 5 to 10% mica and proximally 5% of accessory minerals, which include lithium bearing spodumene ($Li_2O.Al_2O_3.4SiO_2$) and tantalite (Ta_2O_5). These proportions typically result in large volumes of quartz and feldspar reject material requiring disposal as tailings waste material post processing. This is further discussed in the Feasibility Study in Chapter 8: Tailings.

5.1.5 Biodiversity

5.1.5.1 Flora and Vegetation

The majority of the land within the proposed Disturbance Envelope is within an already disturbed mine footprint. The WD2 expansion area is located within land historically cleared for agriculture.

As a result, most of the proposed disturbance envelope is devoid of any remnant vegetation. A small corridor of vegetation remains on the eastern boundary of the WD2 expansion area, within M74/244.The vegetation corridor represents approximately 1.3 ha, of which less than 0.05 ha will require disturbance to allow for an access road. Any vegetation clearance is authorised under CPS3045/5.

A small number of isolated trees and shrubs are in the paddock that will accommodate the WD2 expansion (Figure 5-5).

There are no Threatened Flora, Threatened Ecological Communities or Priority Ecological Communities recorded in the vicinity of the Project area. One priority flora species, Acacia bifaria (P3), has been recorded within adjacent vegetation east of the Project and considerable numbers of this species have been established and recorded in rehabilitated areas along the top banks of the creek diversion. No priority flora has been recorded within the Project area.

Figure 5-5 Photograph of Isolated Paddock Trees and Shrubs, WD2 Expansion Area (March 2023)

5.1.5.2 Fauna

The Project area occurs within the exiting disturbed mine footprint and on cleared agricultural land devoid of vegetation resulting in a depauperate fauna assemblage. No threatened fauna species have ever been recorded in any surveys of the Project area and its surrounds.

Areas further to the north and east of the Project area provide valuable remnant habitat, within a broader landscape that has largely been denuded of vegetation for agricultural purposes, including the Project area. A survey by Ninox (2018) of the habitat to the north and east of the Project area (outside the cleared areas of the Project area), described nearby areas as a mosaic of mallee form woodlands of Eucalyptus species over variable shrub and ground cover on the slopes and crests.

Bennelongia Environmental Consultants conducted a Level 1 Subterranean Fauna survey in 2018. Bennelongia concluded that, despite the presence of suitable habitat for stygofauna in the nearby vicinity of Cattlin Creek, the community appears to have only low to moderate richness and that it is unlikely that any species would be restricted to the area of the pit and creek diversion development with the same habitat widespread in the Ravensthorpe area.

Two species of troglofauna were collected as by-catch during stygofauna sampling. Habitat characterisation suggested there is only low-quality habitat, at best, for troglofauna. The two species collected show that some troglofauna habitat is present, but the same habitat is widespread in the Ravensthorpe area. While there is no information on the likely ranges of troglofauna species in the southwest, based on the existence of similar habitat outside the mine pits and the small size of the proposed mine pit expansion, it is unlikely any species would be restricted to the area of pit expansion.

5.1.6 Hydrology

5.1.6.1 Surface Water

The main surface water aspect associated with this Project is the Cattlin Creek which is highly saline, only flows after significant rainfall events and receives most of its runoff from agricultural land, built infrastructure (roads) and vegetated, unallocated Crown Land. The impacts and mitigation of the surface water impacts are further discussed in Section 5.11.

5.1.6.2 Groundwater

The main aquifers are fractures or joints within weathered and fresh volcanic rocks. Cattlin Creek appears to follow zones of weakness in the bedrock that are locally permeable. Open joints and fractures are mostly above 120 m depth, but some have been intersected down to 270 m depth. A drilling program to identify additional potential aquifers to service the projects requirements is underway.

5.1.7 Environmental Threats

Possible environmental threats to the environment from the proposed activities are described in the following sections.

5.1.7.1 Dust Emissions

Mining activities can generate dust to varying degrees during all stages of the mine life and these events are usually visible and readily identifiable. The following activities have been included in this assessment:

- Disturbance of vegetation and topsoil
- Areas cleared of vegetation, exacerbating natural wind erosion
- Surface disturbance during construction activities
- Drilling and blasting programmes
- Excavation and movement of topsoil, waste rock and ore
- Vehicle movements (and travel speeds) along unsealed access and haul roads
- Closure and rehabilitation activities including contouring and ripping of landforms
- Crushing and screening operations.

Most of any airborne particulates from the site are likely to be visible dust, with potential for fine particulate (PM10) material.

Galaxy have developed an Airborne Material Management Plan (GLA-MTC-AMMP-Rev2.3-0720) (Galaxy, 2020) to address the requirements for nuisance dust management and minimise potential impacts to Galaxy site personnel, nearby receptors, and the environment.

Data collection, monitoring and reporting requirements are outlined in this Plan in accordance with any Conditions attached to Prescribed Premises Licence 8469/2010/02 and relevant Australian Standards.

5.1.7.2 Noise Emissions

Residential premises to the south of the mine within the Ravensthorpe Town site are sensitive to noise emissions from the Mt Cattlin Project.

A Condition of Prescribed Premise Licence L8469/2010/1 (amended 7/7/2011) for the Galaxy Ravensthorpe lithium mining and processing operation was the development and implementation of an Operational Noise Management Plan (ONMP) (02-MTC-ENV-PLA-0201) (Galaxy 2019). The Licence condition required that the ONMP shall include but not be limited to:

- An environmental risk assessment of potential sources of noise and possible impacts
- Detail of all management measures taken on site to negate the risks identified in (i)
- A noise monitoring programme including monitoring locations, frequency, methodology, reporting and responsibilities
- Protocols for noise incident/complaint response and notification procedures.

Noise risk management and control measures are outlined in the ONMP as follows:

Noise management measures:

- Consideration of wind conditions in daily planning of operations, with respect to likely noise propagation to key receptors if noise modelling / monitoring indicates potential noise

emissions close to exceedance
- Restriction of mining or dumping activities in specific areas to occur only in favourable wind conditions
- Development of mine plans to optimise the use of acoustic barriers to control noise to key receptors.

Noise control measures:

- Location of the waste rock stockpile to provide an acoustic barrier between mining pits and town site where this is practical
- Replacement of excavator horns signalling dump truck operators, with an alternative 'quiet' signal
- Fit only 'broadband' reversing alarms to mobile equipment
- Use of haul road acoustic bunds on the receptor side of exposed haul roads, to minimise haul truck noise propagation to the Ravensthorpe town site
- During night periods:
  - dumping of waste rock behind acoustic barriers to control noise emissions to the key receptors
  - use of haul truck routes with acoustic barriers on the receptor side of the road
  - use of wheel dozers to minimise generation of track noise.
- Crusher and Processing Plant - Acoustic barrier bunds on the southern sides of the crusher unit and processing plant.

5.1.7.3 Blast and Vibration

Mt Cattlin is a hard rock lithium mine where conventional bench drilling and blasting techniques are used to fracture the rock to allow excavation. Sensitive structures identified as part of blasting risk assessment include residential houses at 810m from the tenement boundary (but 1.5 km from the nearest open pit).

Galaxy has developed a Blast Management Plan (GDMS-02-HSE-PLA-0014) (Galaxy 2020) to manage blasting activities located at the Mt Cattlin mine, inclusive of monitoring, reporting and communication requirements. Long-term vibration and air-blast monitoring records demonstrate compliance with Regulation 11: Blasting Operations, of the Environmental Protection (Noise) Regulations, 1997.

5.1.7.4 Weeds

Increased vehicle traffic has the potential to introduce soil and vegetative material that may contain weeds and seeds from other environments. Introduction and/or increased spread of weeds can degrade the condition and resilience of local vegetation.

Introduction and/or the increased spread of weed species in topsoil stockpiles can also reduce native seedbank, soil viability and the suitability of growth medium required to establish vegetation in rehabilitated areas.

5.1.7.5 Spills and Leaks

Spills, pipeline failure, material containment or equipment malfunction may result in discharge to the local environment. Substances posing a risk of environmental harm if discharged include:

- Hydrocarbons, reagents, and other chemicals used in mining and ore processing. Diesel fuel is brought into the site to power the mining fleet and the site power station
- Process slurries. Handling of most process slurries will largely be restricted to the processing plant area. Overland pipeline/s are installed for transfer of tailings slurry from the processing plant to the operating 2SE Pit TSF. Tailings slurry is typically alkaline (pH 8 - 10) but generates acidity when exposed to oxygen and natural waters, such that recovered TSF decant water is slightly acidic (pH 5 – 7)
- Mine water. Mine water is transferred to storage tanks for use in dust suppression and to the raw water settling pond at the Process Plant, for use in ore processing. Mine water quality tends to be slightly more basic that natural groundwater but is similar to existing groundwater of the mineralised area, in terms of its elevated salinity and metal/metalloid concentrations
- TSF decant water. Water recovered from the TSF decant will be returned to the processing plant area via overland pipeline/s. This water has the potential to be acidic, saline and contain elevated concentrations of metal and metalloids.

Refuelling occurs within a purpose-built facility with bunding and drainage to capture contaminated runoff, which is then directed to oil-water-separator and waste oil storage infrastructure.

Liquid chemical reagents are stored within tanks in appropriately bunded facilities whereby 110% of the largest vessel is contained and 25% of the total volume is contained according to Australian Standards AS1940 and AS1692. Stocks of solid reagents will be stored in a designated reagent shed, appropriately designed to comply with all relevant legislation.

5.2 Environmental Risk Assessment

An environmental risk assessment was conducted for the Project to identify all environmental risk pathways that may affect the DMIRS environmental factors (Table 5-1).

Table 5-2 and Table 5-3 were used to determine the likelihood and consequence of the risk event occurring, which then determined the risk ranking (Table 5-4) that were used to rank the risks defined in Table 5-5.

Table 5-1 DMIRS Environmental Factors and Objectives

Environmental Factor	Objective
Biodiversity	*To maintain representation, diversity, viability and ecological function at the species, population, and community level.*
Water Resources	*To maintain the hydrological regimes, quality and quantity of groundwater and surface water to the extent that existing and potential uses, including ecosystem maintenance, are protected.*
Land and Soils	*To maintain the quality of land and soils so that environmental values are protected.*
Rehabilitation and Mine Closure	*Mining activities are rehabilitated and closed in a manner to make them physically safe to humans and animals, geo-technically stable, geo-chemically non-polluting/noncontaminating, and capable of sustaining an agreed post-mining land use, and without unacceptable liability to the State.*

Table 5-2 Likelihood Descriptors

Descriptor	Frequency	Probability
Almost Certain	*Twice or more per year*	*Event will occur during the Project / period under review.*
		High number of known incidents.
Likely	*Once per year*	*Event likely to occur during the Project / period under review.*
		Regular incidents known.
Possible	*Once in 5 years*	*Event may occur in some instances during the Project / period under review.*
		Occasional incidents known.
Unlikely	*Once in 10 years*	*Event is not likely to occur during the Project / period under review.*
		Some occurrences known.
Rare	*Once in 20 years*	*Event will occur in exceptional circumstances during the Project / period under review.*
		Very few or no known occurrences.

Table 5-3 Consequence Descriptors

Low	Minor	Moderate	Major	Catastrophic
Factor: Biodiversity				
Alteration or disturbance to an isolated area with no effect on habitat or ecosystem. Loss of an individual	*Alteration or disturbance to <10% of a habitat or ecosystem resulting in a recoverable*	*Alteration or disturbance to 10−40% of a habitat or ecosystem resulting in a recoverable*	*Alteration or disturbance to 40−70% of a habitat or ecosystem resulting in a recoverable*	*Alteration or disturbance to >70% of a habitat or ecosystem resulting in a recoverable*

Low	Minor	Moderate	Major	Catastrophic
plant / animal of conservation significance.	*impact within 2 years. Loss of multiple plants / animals of conservation significance.*	*impact within 2 – 5 years. Loss of <50% known local population of plant / animal of conservation significance.*	*impact within 5 – 15 years. Loss of >50% known local population of plant/animal species with possible loss of entire local population.*	*impact >15 years. Local loss of conservation significant or listed species. Extinction of a species.*
Factor: Water Resources				
Negligible change to hydrological processes, water availability or water quality.	*Short-term modification of hydrological processes, water availability and quality within project tenure, but no change in beneficial use.*	*Medium-term modification of hydrological processes, water availability and water quality within project tenure, but no change in beneficial use. Short-term modification of hydrological processes, water availability and water quality outside project tenure, but no change in beneficial use.*	*Long-term modification of hydrological processes, water availability and water quality within project tenure, but no change in beneficial use. Medium-term modification of hydrological processes, water availability and water quality outside project tenure, with change in beneficial use.*	*Long-term or permanent modification of hydrological processes, water availability or water quality outside project tenure, with impacts to a water-dependent environmental value and/or change in beneficial use.*
Factor: Land and Soils				
Clean-up by site personnel, rectified immediately. Confined to immediate area around source.	*Clean-up by site personnel, remediation within 1 year. Confined to operational area.*	*Clean-up by site personnel, remediation within 1 – 3 years. Minor impact outside disturbance envelope or minor impact to soil stockpiles.*	*Clean-up requiring external specialist, remediation within 3 – 10 years. Impact has migrated outside the disturbance envelope or*	*Clean-up requiring external specialist. Remediation >10 years, or permanent residual impact. Impact outside the tenement boundary.*

Low	Minor	Moderate	Major	Catastrophic
			contamination of soil stockpiles.	
Factor: Rehabilitation and Mine Closure				
Site is safe, stable a non-polluting. Post mining land use is not adversely affected.	*Site is safe, all major landforms are stable, and any stability or pollution issues are contained and require no residual management. Post mining land use is not adversely affected.*	*Site is safe, and any stability or pollution issues require minor, ongoing maintenance by end land-user. Post mining land use cannot proceed without some management.*	*Site cannot be considered safe, stable or non-polluting without long-term management or intervention. Post mining land use cannot proceed without ongoing management.*	*Site is unsafe, unstable and/or causing pollution or contamination that will cause an ongoing residual affect. Post mining land use cannot be achieved.*

Table 5-4 Risk Ranking Matrix

	Consequence				
Likelihood	*Low*	*Minor*	*Moderate*	*Major*	*Catastrophic*
Almost Certain	*Medium*	*High*	*High*	*Extreme*	*Extreme*
Likely	*Medium*	*Medium*	*High*	*High*	*Extreme*
Possible	*Low*	*Medium*	*Medium*	*High*	*High*
Unlikely	*Low*	*Low*	*Medium*	*Medium*	*High*
Rare	*Low*	*Low*	*Low*	*Medium*	*Medium*

Table 5-5 Risk Assessment

Project Phase	Environmental Factor	Risk Pathway / Unwanted Event	Impact	Inherent Risk			Risk Treatments / Controls	Residual Risk		
				Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Construction Operations	*Biodiversity Land and Soils*	*Generation of excess noise, and vibration from construction of WD1 expansion and WD2 expansion and during Stage 4 Open Pit operations*	*Disturbance to local environment Disturbance to adjacent land users*	*Possible*	*Moderate*	*Medium*	*Blast Management Plan - GDMS-02-HSE-PLA-0014 Operational Noise Management Plan - 02-MTC-ENV-PLA-0201 Installation of pipelines and tailings deposition will generate less noise and vibration than surrounding general mining and earth moving activities. Preventative maintenance schedules on equipment.*	*Unlikely*	*Moderate*	*Medium*
Construction Operations	*Biodiversity Land and Soils*	*Generation of excess dust from construction of WD1 expansion and WD2 expansion and during Stage 4 Pit operations*	*Disturbance to local environment Disturbance to adjacent land users*	*Possible*	*Moderate*	*Medium*	*Airborne Material Management Plan - GLA-MTC-AMMP-REV2.3 Monitor and report in accordance with Licence 8469/2010/02.*	*Unlikely*	*Moderate*	*Medium*
Construction Operations Closure	*Land and Soils Water Resources*	*Surface water runoff – downstream sedimentation*	*Runoff from disturbed ground resulting in erosion and sedimentation*	*Likely*	*Minor*	*Medium*	*Surface Water Management Plan - 02-HSE-PLA-0021- Containment of mine site area runoff. Appropriate design and rock armouring to ensure stable and non-polluting structures. Sedimentation basins/ponds installed and maintained. Laydown and hardstand areas will be compacted and where possible, constructed away from waterways.*	*Possible*	*Minor*	*Medium*
Construction Operations	*Biodiversity*	*Fauna deaths or injury from site traffic and construction machinery*	*Fauna mortality, injury or entrapment*	*Unlikely*	*Minor*	*Low*	*Depauperate fauna assemblage associated with the Project, perimeter of the Mt Cattlin Operations has been fenced to prevent ingress of large native fauna and livestock. Implement Fauna Protection Procedure – EMP003 Any injury or death of a species of conservation significance will be included in regulatory reports. Dust suppression maintained to ensure visibility. Speed limit of 40 km/h imposed on site roads. Vehicle traffic confined to defined roads and tracks. Personnel required to report fauna injuries and mortality for recording and review. Regular inspections of turkey nests. Fencing will be installed surrounding each turkey nest to restrict fauna from entering. Installation of fauna egress matting in HDPE lined turkey nests. Recording and review of any fauna incidents that occur within the turkey nests, and appropriate corrective/preventative actions.*	*Rare*	*Minor*	*Low*
Construction Operations	*Land and Soils Water Resources*	*Hydrocarbon and fluid leaks from machinery*	*Contamination of soils, or water resources*	*Possible*	*Minor*	*Medium*	*Surface Water Management Plan - 02-HSE-PLA-0021 Dangerous Goods and Hazardous Substances Procedure - EMP010 Spill Clean-up Procedure - EMP011 Chemicals, hydrocarbons and other environmentally hazardous materials will be stored and handled in accordance with the Dangerous Goods Safety Act 2004 and associated regulations. Hydrocarbon storage will be self-bunded. Oil water separators installed and maintained on fixed washdown and refuelling facilities (plant area). Containment and treatment of plant area runoff. Spill control measures in strategic positions with appropriate equipment available to contain and collect/recover hydrocarbon spills. Personnel trained in use of spill kits. Spills will be cleaned up and contaminated soils will either be remediated or removed from site by a licenced third party. Equipment pre-start checks to be undertaken.*	*Unlikely*	*Minor*	*Low*

Project Phase	Environmental Factor	Risk Pathway / Unwanted Event	Impact	Inherent Risk			Risk Treatments / Controls	Residual Risk		
				Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Construction Operations Closure	*Land and Soils Rehabilitation*	*Poor management of topsoil stockpiles Poor quality soil/growth media*	*Poor quality topsoil resulting in reduced topsoil viability and revegetation establishment success*	*Possible*	*Minor*	*Medium*	*Pre-disturbance topsoil occurrence within paddocks historically used for agriculture. Pre-disturbance vegetation cover is non-existent, with all proposed activities to occur on land historically cleared for agriculture and/or mining. Topsoil stockpiles will be paddock dumped and be approximately 2 m in height. All topsoil stockpiles will be located away or protected from stormwater flows, minimising potential losses via erosion. Where practicable, topsoil will not be handled when wet to avoid damaging soil structure and composition. Record location of rehabilitation related stockpiles on site-wide GIS Constraints Register requiring Environmental Manager sign-off (amongst others) prior to disturbance.*	*Possible*	*Minor*	*Medium*
Construction	*Land and Soils*	*Poor construction methods result in geotechnical instability of Waste Dumps*	*Potentially hazardous and unstable WRD unable to meet closure criteria. Erosion and increased sediment load to surface water*	*Possible*	*Major*	*High*	*Prescriptive rehabilitation plans developed for Waste Dumps. Design and construct waste dumps and other landforms to meet appropriate geotechnical standards and approved designs. Waste dump design incorporates results of soil materials characterisation studies. Construct landforms outside the pit ZoI. Handling and construction of waste material incorporated into mine plans. Growth media prioritised to the batters (based on waste rock durability, the availability of growth media) Design and construct adequate controls to manage surface water on and around constructed waste dumps and other landforms. Annual review of all constructed landforms and compliance with design requirements. Inspections of watercourses downstream of infrastructure, recording evidence of erosion and sediment discharge. Inspection and maintenance of sediment basins/sumps.*	*Unlikely*	*Major*	*Medium*
Construction Operations	*Biodiversity Land and Soils*	*Bushfire resulting from malfunction of construction equipment or unauthorised activity*	*Fauna and livestock fatality or injury Loss of biodiversity and impacts on native vegetation*	*Possible*	*Minor*	*Medium*	*Regulated under the Mines Safety and Inspection Act 1994 and Bush Fire Act 1954 Site induction will include information on the prevention and management of fires. Firefighting equipment will be located on site and in all mine vehicles and personnel will be trained in fire response. A Hot Work Permit system will be developed and implemented. Adherence to the Shire of Ravensthorpe fire restrictions and permits. Work with the local landowners/managers and DFES to undertake prescribed burns and install and maintain firebreaks, if required. Manage fuel loads around infrastructure.*	*Unlikely*	*Minor*	*Low*
Operations	*Land and Soils*	*Tailings pipeline or decant water pipeline rupture/failure*	*Tailings discharge to the environment resulting in land contamination from saline water*	*Unlikely*	*Minor*	*Low*	*Tailings and decant pipelines maintained in V trench secondary containment per Prescribed Premises Licence L8469 condition 1.2.7 Loss of pipeline pressure sensors. Daily inspection of pipeline integrity. Pipelines alignment designed to traverse previously disturbed land from mining operations, rare likelihood of saline water migrating to undisturbed environment.*	*Rare*	*Minor*	*Low*

Project Phase	Environmental Factor	Risk Pathway / Unwanted Event	Impact	Inherent Risk			Risk Treatments / Controls	Residual Risk		
				Likelihood	Consequence	Risk Rating		Likelihood	Consequence	Risk Rating
Operations *Closure*	*Water Resources*	*Seepage from 2SE Pit TSF resulting in a deterioration of surface and/or groundwater quality including increased groundwater levels or groundwater mounding*	*Deterioration of surface and/or groundwater quality including increased groundwater levels or groundwater mounding.*	*Possible*	*Minor*	*Medium*	*Process liquor similar quality as groundwater.* *Bedrock of the pit walls has a hydraulic conductivity of 1.0 x 10-8 and considered impermeable. Low hydraulic head will limit risk of mounding.* *Construction of barrier supervised by geotechnical engineer.* *Audit of built construction to confirm compliance with design specifications for 2SE TSF, defined by Coffey (2021) (Appendix 2).* *Conduct ongoing inspection and monitoring in accordance with TSF Design Surface Water Management Plan - 02-MTC-ENV-PLA-0302.*	*Unlikely*	*Minor*	*Low*
Construction *Operation* *Care and Maintenance* *Closure*	*Biodiversity* *Rehabilitation and Mine Closure*	*Vehicle / equipment / material movements bring weed seeds and exotic plant materials to site or spread existing weed populations*	*Loss of biodiversity* *Habitat quality decline / loss of food resources* *Poor rehabilitation performance* *Inability to meet completion criteria*	*Likely*	*Minor*	*Medium*	*Baseline vegetation and flora surveys.* *Weed hygiene and control procedures.* *Environmental induction.* *awareness programs.* *Driving on designated tracks / roads only.* *Land clearing procedure.* *Progressive rehabilitation.*	*Possible*	*Minor*	*Medium*
Closure	*Biodiversity*	*Uncovered dried tailings surface generates dust in high winds*	*Vegetation smothering resulting in plant death.* *Community amenity*	*Possible*	*Moderate*	*Medium*	*TSF surface will be covered with coarse rejects or mine waste material once it has consolidated and is safe for machinery access. Expected to be within a few days of tailings discharge ceasing.* *TSF surrounded by WD1 and protected from prevailing winds at closure Airborne Materials Management Plan.*	*Rare*	*Moderate*	*Low*

5.3 Heritage

Heritage surveys were undertaken by Galaxy in conjunction with the Wagyl Kiap and Southern Noongar Native Title Group representatives in November 2008. One registered Site ID 26270 Mt Cattlin 2 and one other heritage place, Place ID 29352 Cattlin Creek were approved for disturbance to develop the 2SE Pit (Reg ID 73856) via two Section 18 Consents, 34/13042 (2011) and 69/09331 (2018).

In 2010 Galaxy completed negotiations with the South West Aboriginal Land and Sea Corporation (SWALSC) representing the Wagyl Kaip and Southern Noongar People with respect to a Native Title Claim Wide Mining Agreement covering the tenements surrounding Mt Cattlin. The mining agreement involves a range of provisions, including compensation during the life of the project and a commitment by Galaxy to direct employment, contracting and training initiatives for traditional owners. It should be noted that the areas required for project development and operation are covered by granted tenements over which there is currently no native title however, there is however an existing claim by the Wagyl Kaip and Southern Noongar Traditional Owner Groups. In 2018, Galaxy entered a Noongar Standard Heritage Agreement (Non ILUA Proponents) with the SWALSC which defines the requirements for heritage surveys. Both agreements have been adequately upheld by both parties.

An Activity Notice was lodged with SWALSC on 10 February 2023 describing the proposed Waste Rock Dump (WD2) extension over agricultural land and seeking confirmation of Heritage Survey requirements in this area.

No formal response from SWALSC or Wagyl Kaip and Southern Noongar Agreement Group has yet been received. By the terms of the Noongar Standard Heritage Agreement between SWALSC and Galaxy, further notification of the proposed activities may be lodged by Galaxy, giving a further 10 business day notice period, after which Galaxy may presume the Heritage Survey is not required.

Ongoing dialogue with Wagyl Kaip and Southern Noongar representatives will determine whether an additional heritage survey is required on the recently granted G74/13 and the overall site of the WD2 expansion area, prior to construction.

5.4 Environmental Outcomes, Performance Criteria and Monitoring

Galaxy has developed Environmental Outcomes for the risk pathways identified in Table 5-5 that present a moderate to high risk (pre-treatment). These and the Performance Criteria for the Project are provided in Table 5-6.The Objectives and Performance Criteria relating to mine closure are detailed in the Mine Closure Plan (MCP).

Environmental Outcomes and Performance Criteria have not been considered for the environmental threats or risks associated with Noise, Vibration and Air Emissions/Quality as they are regulated by DWER via other legislation and the Project Part V Prescribed Premises Licence.

Table 5-6 Environmental Outcomes and Performance Criteria

Risk Pathway(s)	Environmental Outcome	Performance Criteria	Monitoring/Verification
Factor: Biodiversity			
Uncovered dried tailings surface generates dust in high winds	*Tailings material/surface is contained within the TSF footprint and is not susceptible to dusting.*	*TSF constructed as per design and in accordance with ANCOLD/DMIRS guidelines.* *TSF operating in accordance with TSF Design (Coffey 2021).* *No visible signs of vegetation stress are observed.* *Incidences involving dust are investigated and reported (Incident Reporting and Investigation Procedure) if incidences are deemed to be ongoing despite dust management (Airborne Material Management Plan).* *Vegetation monitoring points installed to monitor vegetation health.*	*Compliance Report to confirm TSF has been built as per ANCOLD/DMIRS guidelines, detailed design and Licence conditions.* *Tailings surface covered with waste rock/coarse rejects once dried and safe to access.* *Conduct ongoing inspection and* *monitoring in accordance with Mt Cattlin Airborne Material Management Plan (GLAL 2020) and TSF Design (Coffey 2021).* *In particular, daily inspections, monthly inspections and annual audits as required for a Category 1 facility in accordance with the DMIRS guidelines for the Management and Closure of Tailings Storage Facilities.* *Vegetation health monitoring at designated locations.*
Factor: Water Resources			
Seepage from TSF resulting in a deterioration of surface and/or groundwater quality including increased groundwater levels or groundwater mounding.	*Contamination of groundwater or surface water as a result of TSF seepage is minimised and managed.*	*Seepage assessment and monitoring confirms that TSF does not cause harm to sensitive groundwater receptors including active stock bores.* *Throughout operation tailings characteristics remains as predicted in test work.* *Operation as per TSF Design (Coffey 2021).* *Surface water control structures on and around landforms are in accordance with engineered designs and surface water models.* *Operating Licence Conditions.*	*Compliance Report to confirm TSF has been built as per ANCOLD/DMIRS guidelines, detailed design, Licence and tenement conditions and are outside the pit Zone of Instability.* *Conduct ongoing inspection and monitoring in accordance with TSF Design (Coffey 2021). In particular, daily inspections, monthly inspections and annual audits as required for a Category 1 facility in accordance with the DMIRS guidelines for the Management and Closure of Tailings Storage Facilities.* *Monthly visual assessment of TSF surrounds, including, physical signs of erosion, seepage, sediment discharge and signs of deteriorating plant health, downstream of infrastructure.* *Periodic sampling and characteristics of tailings.* *Groundwater monitoring as per Groundwater Licence Operating Strategy and Prescribed Premises Licence. Incident Reporting and Investigation Procedure.*
Surface water runoff – downstream sedimentation	*No impact to creek function as a result of sediment loading or increased sediment levels in the creek systems* *Integrity of landforms is maintained with no extensive degradation occurring.*	*Landforms are stable with no significant evidence of erosion.* *No change in the character of sediment deposition or conveyance characteristics of Cattlin Creek.*	*Visual assessment to be undertaken of landforms post heavy rainfall events.* *Visual assessment to be undertaken of watercourses leading from disturbance footprint after heavy rainfall events.* *Surface water management infrastructure inspections Cattlin Creek quality/quantity monitoring.*
Factor: Land and Soils			
Tailings pipeline or decant water pipeline rupture/failure	*Contamination of land from process water leaks and spills minimised.* *If contamination does occur, it is remediated immediately*	*Process Pipelines are bunded and regular inspections are undertaken and reported in accordance with DWER licence and TSF Design (Coffey 2021).* *Process Pond are HDPE lined and located within internally draining processing area.* *Process Ponds and Pipelines built as per design* *Process pipelines are either:* • equipped with telemetry systems and pressure sensors along pipelines to allow the detection of leaks and failures; • equipped with automatic cut-outs in the event of a pipe failure; or • provided with secondary containment sufficient to contain any spill for a period equal to the time between routine inspections. *Freeboard allowance for process water ponds is maintained.*	*Monitoring and Inspection as per Prescribed Premises Licence.* *Incident Reporting and Investigation Procedure.*

Risk Pathway(s)	Environmental Outcome	Performance Criteria	Monitoring/Verification
Poor management of topsoil stockpiles *Poor quality soil/growth media*	*Topsoil supports native vegetation re- establishment*	*Adequate volumes of suitable growth medium available.* *Weeds are being managed.*	*Regular inspections of topsoil stockpiles.* *Survey/check topsoil pick-up and stockpiling during active clearing.* *Annual reconciliation of proposed topsoil recovery volumes and actual volumes recovered, which includes a survey pick up of topsoil locations.*
Poor construction methods result in geotechnical instability in of Waste Dumps	*Waste Dump landforms are safe and stable*	*TSF constructed as per design and in accordance with ANCOLD/DMIRS and Works Approval guidelines and operating in accordance with TSF Design and Operating Manual* *Surface water control structures on and around landforms are constructed and operating in accordance with engineered designs and surface water models.* *No significant* *erosion/gullying from final constructed surfaces.*	*Commissioning Report (TSF) or Annual Review (waste dumps) to confirm TSF and waste dumps has been built as per ANCOLD/DMIRS guidelines, Works Approval and tenement conditions as appropriate.* *Regular inspection of waste dumps and the TSF during construction and operation as per TSF Operating Manual. In particular, daily inspections, monthly inspections and annual audits as required in accordance with the DMIRS guidelines for the Management and Closure of Tailings Storage Facilities.* *Audit constructed surface water control structures against engineered designs.* *Monthly visual assessment of TSF/waste dump surrounds, addressing erosion/sediment mobilisation, seepage and vegetation condition.* *Annual Environmental Reporting waste dump assessments* *Annual rehabilitation monitoring* *Audit of final landform as per Mine Closure Plan and TSF Design and Operating Manual* *Regular inspections of sediment basins/sumps.*
Factor: Rehabilitation and Closure			
Vehicle / equipment / material movements bring weed seeds and exotic plant materials to site or spread existing weed populations	*No introduction of new weed species or increase in existing weed populations*	*Zero introductions of WONS or Declared Weed species.*	*Vehicle / equipment / material movements bring weed seeds and exotic plant materials to site or spread existing weed populations.*

5.5 Environmental Management System

Galaxy has a well-established system of management tools that are implemented across its everyday operations to control unwanted events that may impact the environment. These have been in place since the commencement of operations and have been regularly reviewed and audited by numerous government agencies. Galaxy has a well-established and implemented Environmental Management Plan (GLAL, 2020) and suite of operating procedures consistent with the principles of ISO 14001:2015 Environmental Management Systems and includes, but is not limited to:

- Environmental Policy
- Requirements of approvals, permits and licences
- Environmental responsibilities of site personnel
- Site induction programmes
- Environmental monitoring and reporting requirements
- Inspection and audit process
- Non-conformance, corrective action and risk management of incidents
- Preparation of procedures and work instructions addressing identified elements such as dewatering, saline spillage, waste management and bioremediation
- Stakeholder consultation.

Of relevance to this Mining Proposal and Mine Closure Plan, are the following Management Plans:

- Operational Environmental Management Plan – EMP001
- Airborne Material Management Plan – GLA-MTC-AMMP-REV2.3
- Ground Control Management Plan – 02-HSE-PLA-0012
- Explosives Management Plan – 02-HSE-PLA-0014
- Surface Water Management Plan – 02-HSE-PLA-0021
- Groundwater License Operating Strategy – 02-MTC-ENV-PLA-0301
- Operational Noise Management Plan – 02-HSE-PLA-0015
- Regional Dieback Management Plan – 02E-PLA-0007
- Radiation Safety Management Plan – 02-HSE-PLA-0010
- Native Fauna Protection Procedure – EMP 003
- Vegetation and Flora Protection Procedure – EMP 002.

5.5.1 Public Consultation

The Project understands and accepts the importance of proactive community relations as an overriding principle in its day-to-day operations as well as for future development planning.

Project stakeholders have been identified based on issues related to the scope of works and the geopolitical and traditional setting of the project. This includes regulatory institutions, local government bodies, government agencies, traditional authorities, local communities within a 5 km radius of the Project and those further away from the projects, and non-government organisations with a presence in the Project area.

Extensive stakeholder consultation has been carried out, including distribution of background documentation, a series of information sharing meetings with key stakeholders and all residents, and focus group discussions. Background information on the Project and potential impacts were distributed to stakeholders both locally and nationally.

Public consultation has continued with a wide variety of stakeholders since the draft EIS documents were submitted to EPA in 2017 and 2018 and the process continues. The International Finance Corporation Standard for Stakeholder Public Consultation was adopted. Presentations on the Project including impacts and mitigations were made, and feedback and records were logged. Feedback and comments have been incorporated into the EIS documents submitted to EPA.

Generally, the stakeholders welcomed the Project because they will improve economic conditions in the area and create direct and indirect job opportunities. The local government authorities indicated that they will significantly improve upon their revenue base. The local communities are in expectation of getting jobs for the youth and benefitting from corporate social responsibility arrangements through the provision of boreholes, sanitation and health facilities, shea nut processing plants, corn mills, and dry season gardening amongst others. Stakeholders expressed concern about the adverse or negative impacts especially with regard to air and water pollution concerns, land take and compensation issues, food security issues, noise, vibration and traffic issues, relocation / resettlement, likely increase in some social vices and impacts on cultural sites / shrines. Proposed management and mitigation measures were generally accepted and viewed as satisfactory to address these concerns.

The consultation process is required to run concurrently with the life of the Project. Community Consultative Committees have been established in communities surrounding the Project Site. These Community Consultative Committees create a link between the Project and its stakeholders in the surrounding villages and provides advisory resources to the Project, so that efforts are appropriately directed. The composition of the Committee has been specifically targeted at reflecting the widest possible range of interest groups in the community and includes project employees, traditional leaders, administrative leaders, youth groups, woman's representatives, business leaders and opinion leaders. The Committees meet regularly and acts as a forum and consultative group channelling information to and from the Project.

5.6 Environmental Permit Requirements

5.6.1 Environmental Legislative Framework

Legislation relevant to the operation and management of the Project are described in Table 5-7.

Table 5-7 Project Environmental Legislative Framework

Relevant legislation (Agency)	Environmental factor regulated / affected	Requirement
Dangerous Goods Safety Act 2004 (Department of Mines Industry Regulation and Safety)	*Land and Water*	*DG Licence DGS021330 has been granted for the transport, storage and use of Dangerous Goods.*
Environmental Protection Act 1986 – Part V (Department of Water and Environmental Regulation)	*Native Vegetation Clearing Permit*	*CPS 3045/5 was granted in July 2012, for the period of August 2009 to July 2024. Clearing was authorised for up to 15 ha of native vegetation within M74/244. This CPS is relevant to the area of this Mining Proposal. as some trees will be removed along the western boundary of M 74/244.*
Environmental Protection Act 1986 – Part V Clearing Regulations Regulation 5, Item 19 (Department of Water and Environmental Regulation)	*Clearing of isolated trees.*	*Four isolated Eucalypt (mallee) trees sparsely distributed in the paddock that will accommodate WD2 expansion.* *Regulation 5, item 19 of the clearing regulations allows for the removal of single trees that are more than 50 m from any other native vegetation, on property owned by Galaxy and the clearing does not add up to more than five (5) ha.*
Environmental Protection Act 1986 – Part V (Department of Water and Environmental Regulation)	*Emissions and discharges to the environment from prescribed premises.*	*Licence L8469/2010/2 was granted 11/02/2022 (date of amendment), expiry 13/10/2029.* *Prescribed Premises: Category 5: Processing and beneficiation of metallic or non-metallic ore.* *Approved premises production or design capacity is 2,000,000 tonnes per annual period.* *Monitoring will focus on groundwater levels and quality. Results will be reported in the annual audit and compliance report.* *Daily inspection of tailings and decant pipelines.* *Secondary containment of tailings and decant pipelines.* *Monitoring of air emissions via Passive Sampling and HVAS.* *Implementation of the DWER approved Airborne Material Management Plan.*
Environmental Protection (Noise) Regulations 1997 (Department of Water and Environmental Regulation)	*Noise emissions and impacts to sensitive receptors.*	*Implementation of the DWER approved Operational Noise Management Plan.*
Mines Safety and Inspection Act 1994 (Department of Mines and Petroleum	*Human safety.*	*A Project Management Plan has been approved for the Project and considers in-pit tailings operations.*

5.7 Further Work

The Mining Proposal to conduct operations under the Stage 4-1 mining plan included much of the information above in support.

Further study work will be required for approval processes associated with the Northeast Pit Tails Storage Facility, Additional waste dumps if required, Stage 4-2 mining and potentially an underground mining development.

5.8 Site Hydrology and Hydrogeology Introduction

The Mt Cattlin site is positioned within the upper reaches of the Cattlin Creek catchment. Cattlin Creek is a significant ephemeral creek which passes through the mine site via a diversion constructed in 2019. The catchment area, including Cattlin Creek is show in Figure 5-6.

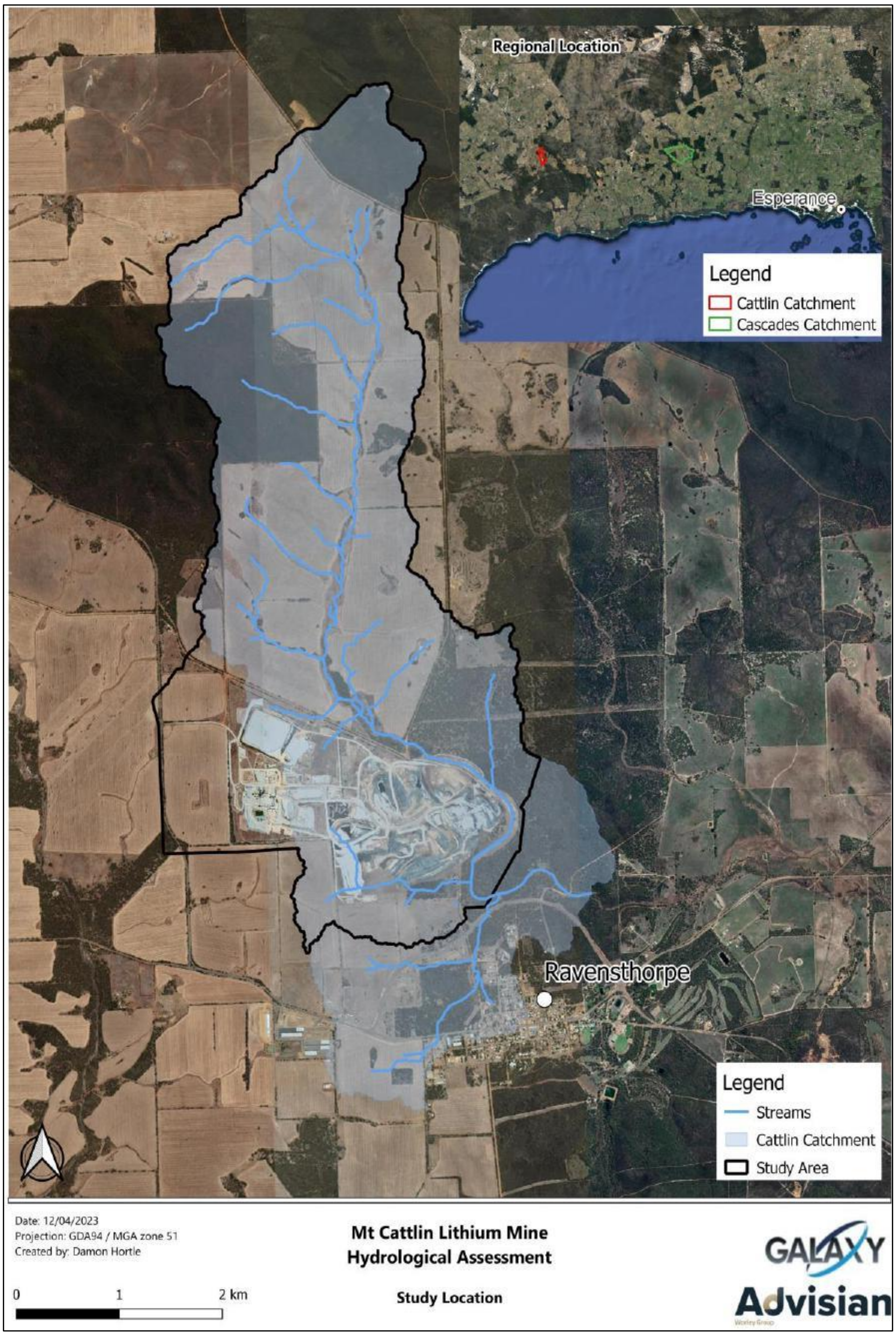

Figure 5-6 Hydrological Assessment Study Location (Advisian, 2023)

5.8.1 Climate

Ravensthorpe has a temperate climate with warm to hot summers and cool winters. Average monthly rainfalls recorded at the Bureau of Meteorology (BoM) station at Ravensthorpe (Station No. 010633) from 1901 to 2022, indicate rainfalls can occur throughout the year with generally more from May to September (Table 5-8). The annual average rainfall recorded is 429 mm, with the average monthly rainfall totals presented in Figure 5-7. Dam evaporation exceeds average rainfall in all months of the year, and by a factor of 3.8 annually (Luke, Burke and O'Brien, 1988).

Table 5-8 Average Rainfall and Dam Evaporation (Ravensthorpe), mm

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Rainfall	*24.2*	*26.4*	*32.5*	*32.4*	*43.7*	*43.2*	*47.0*	*45.5*	*41.6*	*38.4*	*30.4*	*23.5*	*429*
Evap.	*260*	*194*	*169*	*118*	*77*	*55*	*65*	*73*	*93*	*135*	*179*	*226*	*1,644*

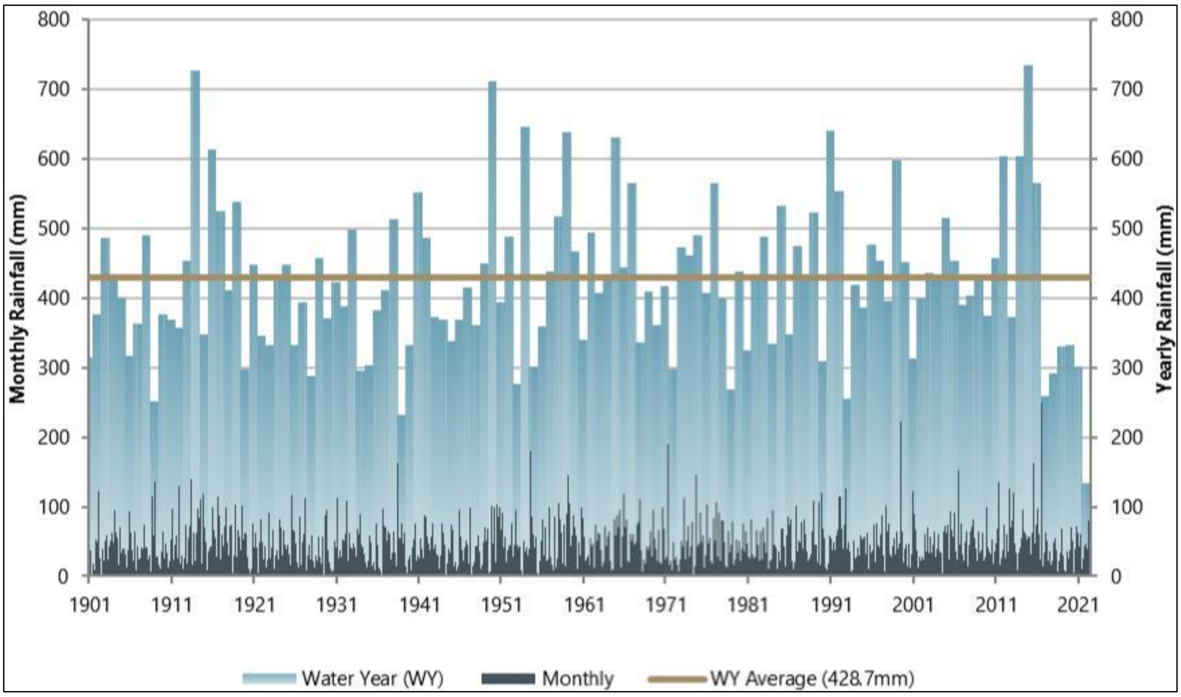

Figure 5-7 Average Monthly Rainfall Recorded at Ravensthorpe Station (BoM ID: 7068) (BoM, 2021a)

Temperatures recorded at Ravensthorpe (1962–2022) indicate monthly mean minimum temperatures ranging from 6.7 °C in August to 14.6 ºC in February; and monthly mean maximum temperatures ranging from 16.4 °C in July to 28.9 °C in January.

The BoM 2016 intensity-frequency-duration (IFD) rainfall data for the site (Latitude: 33.54°S, Longitude: 120.02°E) is presented in Figure 5-8.

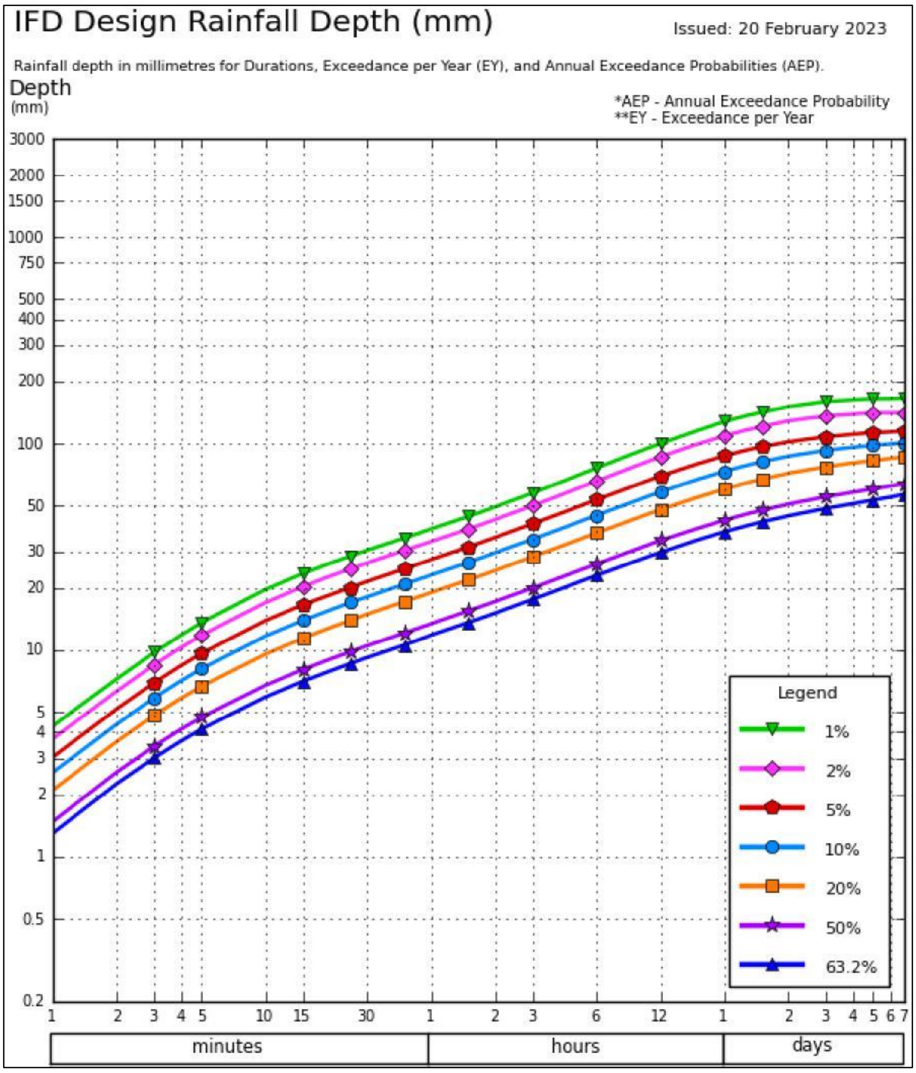

Figure 5-8 IFD Data for Mt Cattlin Study Area (BoM, 2021b)

5.8.2 Geology

The Mt Cattlin mine lies within the Annabelle Volcanics of Archaean age, consisting of metamorphosed mafic to intermediate tuff and agglomerate, and related epiclastic rocks (Witt, 1996), just west of the Manyutup Tonalite. The spodumene is associated with pegmatites that would have been intruded from the tonalite; and dolerite dykes also intrude the volcanic rocks.

Clayey alluvium and colluvium are up to 10 m thick and overlie the volcanic rocks in most of the area.

5.8.3 Topography and Catchment

The ground elevations at the mine site, including pits and stockpiles, currently range from 175 m to 295 m Above Height Datum (AHD).

Cattlin Creek is the most significant watercourse in the area, with a catchment area of 12.1 km^2 upstream of the mine site. The delineated streamlines in Figure 5-9 show Cattlin Creek flowing through the mine site via the creek diversion, as well as a catchment divide running north-south through the western portion of the mine site with a small creek flowing west under the Newdegate-Ravensthorpe Road (via a culvert crossing) to neighbouring farmland. Another small creek flows east around the south boundary of the site before joining the main tributary of Cattlin Creek.

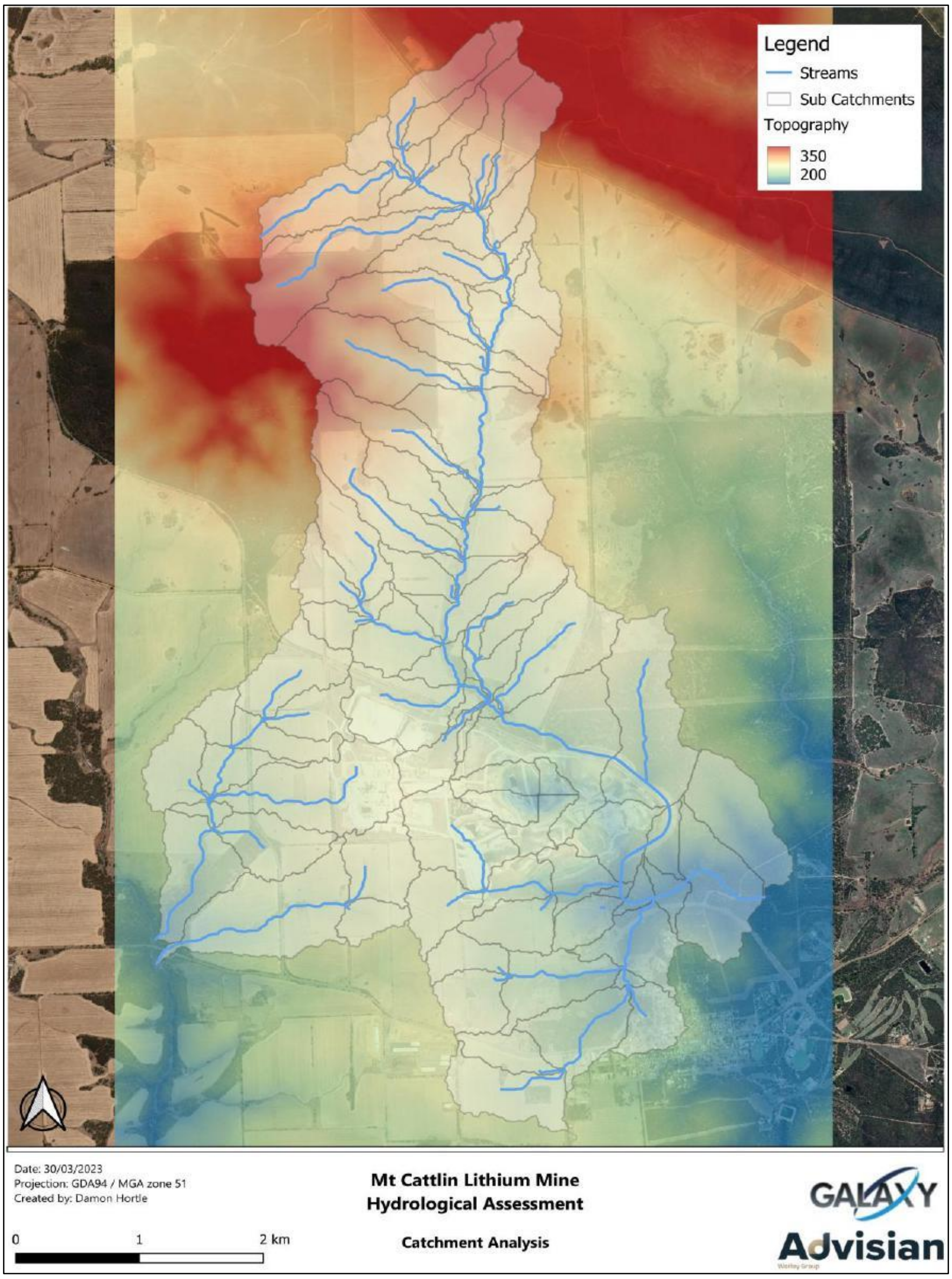

Figure 5-9 Catchment Analysis

5.9 Hydrology

Site wide flood modelling was completed between 2017 and 2018 and the resulting hydrology was used to inform the design of surface water management measures for operations and mine closure (Advisian, 2018 & 2019). This included design of the Cattlin Creek diversion and flood bunds (FPB1 and FPB2), which were constructed in 2019 at the locations shown in Figure 5-10. The Stage 4 works are looking to expand the operations to accommodate the following developments:

- Waste Dump 1 (WD1) Extension
- Waste Dump 2 (WD2) Extension
- Stage 4 pit, an expansion of the existing Northwest Pit
- New mine infrastructure:
    - Access roads
    - Gatehouse.

Advisian completed a hydrological assessment to inform mine planning and support regulatory approvals for the mine expansion. There was a new release of Australian Rainfall and Runoff in 2019 (ARR2019) with revised hydrological methods, therefore the hydrology of the mine site has been updated in this Feasibility Study for consistency with the recommendations of ARR2019.

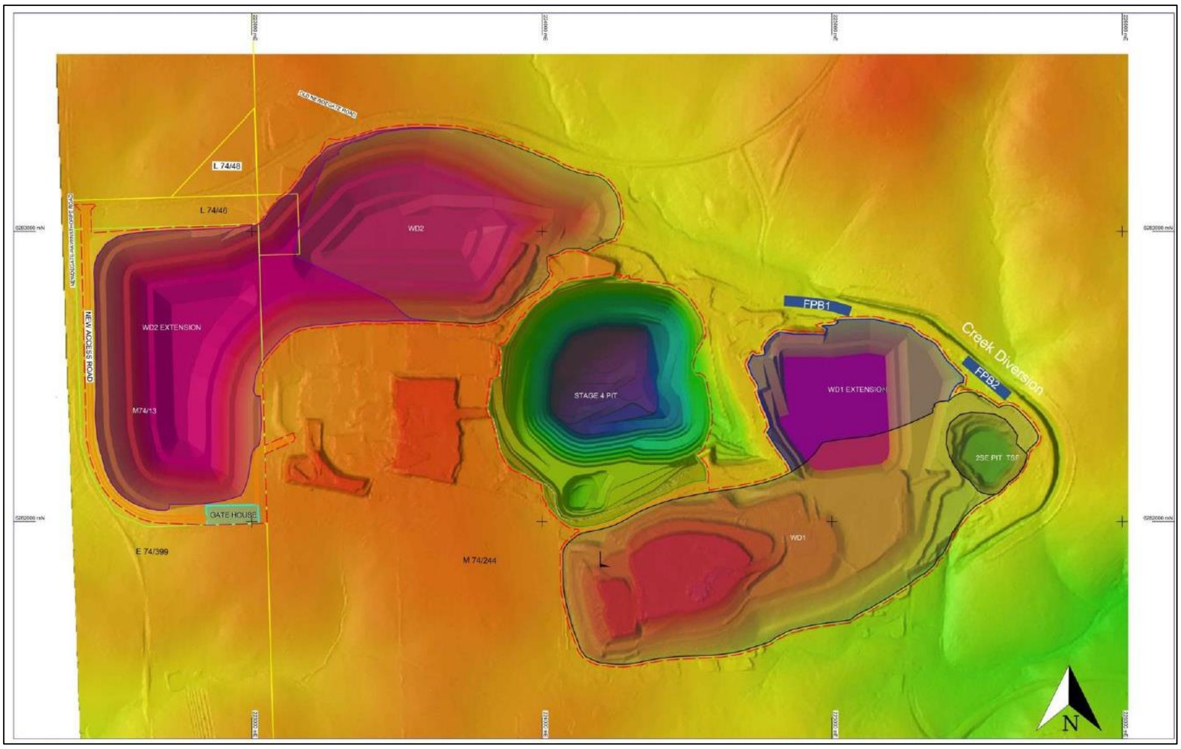

Figure 5-10 Proposed WD and pit expansions and existing Cattlin Creek diversion and flood bunds (FPB1 and FPB2) (Advisian, 2023)

5.9.1 Surface Drainage

The following design Annual Exceedance Probability (AEP) events were adopted when developing concept designs for surface water management measures for operations and closure:

- Operations: 1% AEP (i.e.,1 in 100-year) event
- Closure: Probable Maximum Precipitation (PMP) / Probable Maximum Flood (PMF) events.

5.9.1.1 Existing (Pre-Stage 4) Conditions

The 1% AEP modelling results suggest there is no significant risk of flooding or scour and erosion at the mine site, with the results summarised below.

The 1% AEP flood event in Cattlin Creek is contained in diversion with between 6.5 to 7 m freeboard to the crest of flood bunds, thus satisfying the requirements in the basis of design. No upgrades are required to protect mining operations from flooding.

Peak 1% AEP velocities adjacent to the existing flood bunds (FPB1 and FPB2 shown in Figure 5-10) are less than 2 m/sec, and therefore the existing facing class rock protection on these bunds (Advisian, 2018) is sufficient to protect from scour and erosion. No upgrade to the rock protection is required.

There are some areas within the mine area where minor ponding occurs with depths generally no more than 0.5 m, however there are some localised areas with depths of between 1.5 and 2.0 m. This ponding is mainly due to the grades adopted for cleared areas and construction of haul roads, and it does not pose a significant risk to operations. Site drainage works may be required to manage this nuisance water if required.

Direct rainfall on pits and waste dumps will be contained by perimeter bunding (refer Section 5.11.1) and does not present a risk to operations or downstream environments.

The Western Creek flows around the north-western boundary of the mine site, then west to Newdegate-Ravensthorpe Road. The water flows under the road via a culvert. Flows in this creek are unimpacted by mining.

Minor runoff flowing west of the processing area is captured and retained in an existing pond structure within the mine lease.

The Southern Creek flows along the southern mine site boundary, past WD1 before passing through an existing pond structure and into Cattlin Creek. The pond is likely to trap suspended sediment prior to discharge to the environment. The runoff from WD1 is contained by bunding on the benches, which acts to capture sediment and infiltrate runoff.

5.9.1.2 Post Stage 4 Development Conditions

Operations

The 1% AEP modelling results with the proposed additional waste dumps, Stage 4 pit and infrastructure in place suggest there is no significant risk of flooding or scour and erosion at the mine site, with negligible change in hydrology across the site when compared with the existing conditions. The results are summarised below.

The introduction of the proposed mine infrastructure shows no significant change in modelled 1% AEP flows, flood depths and velocities in the Cattlin Creek diversion and adjacent to the flood bunds. Therefore, no upgrades are required to protect mining operations from flooding.

The introduction of WD2 and Stage 4 pit does result in some minor changes in surface water runoff within the mine area, however the ponding depths are similar to existing conditions. This ponding is mainly due to the grades adopted for laydown areas and haul roads and does not pose a significant risk to operations. Site drainage works may be required to manage this nuisance water if required.

Construction of WD2 does not have a significant impact on flows in the Western Creek (location shown in Figure 5-11), as demonstrated by the comparison of existing and post development 1% AEP flood hydrographs in Figure 5-12. The minor reduction in flow is due to a slight reduction in contributing catchment area due to the proposed developments.

The proposed WD1 expansion works does not have a significant impact on flows in the Southern Creek (location shown in Figure 5-11), as demonstrated by the comparison of existing and post development 1% AEP flood hydrographs in Figure 5-13. The minor reduction in flow is due to a slight reduction in contributing catchment area due to the proposed developments.

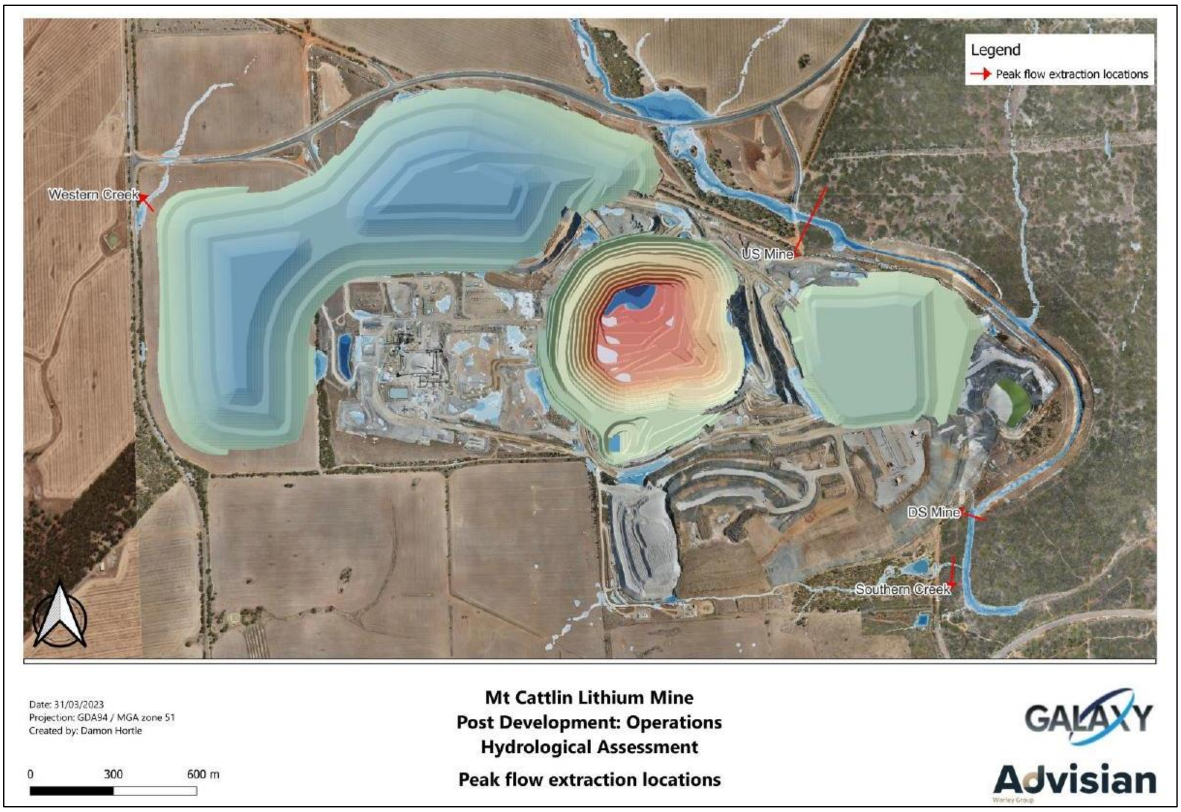

Figure 5-11 Peak Flow Extraction Locations (Advisian, 2023)

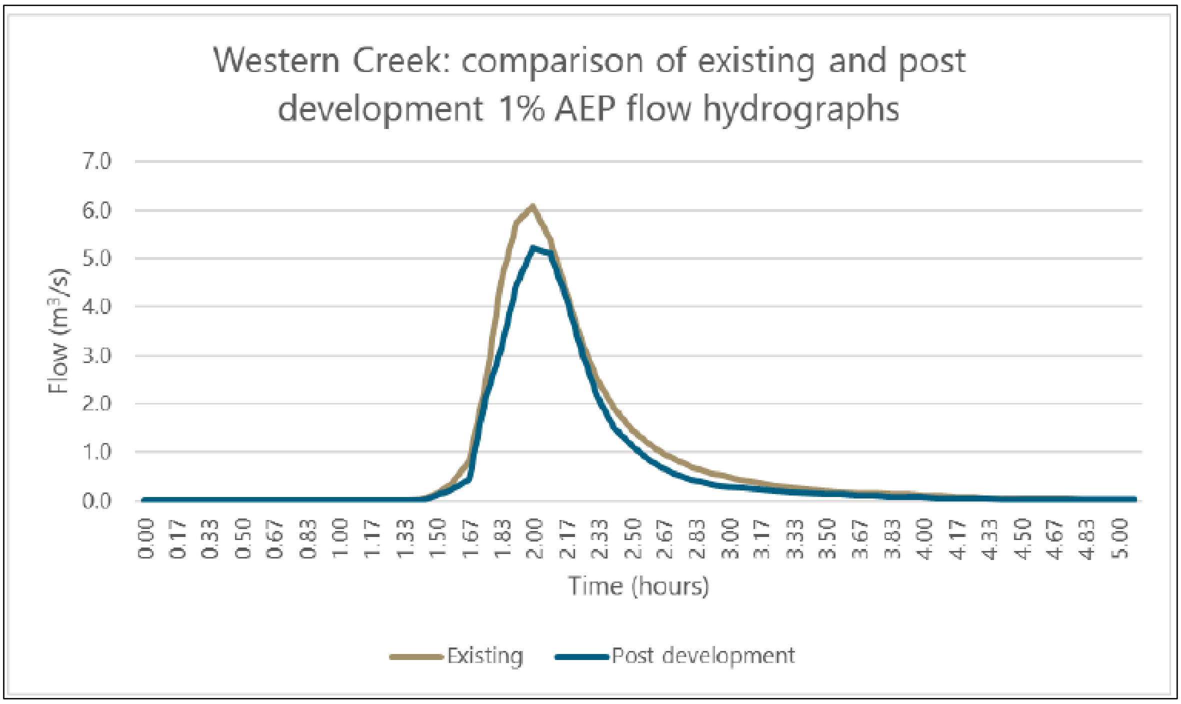

Figure 5-12 Western Creek: Comparison of Existing and Post Development 1% AEP Flow Hydrographs (Advisian, 2023)

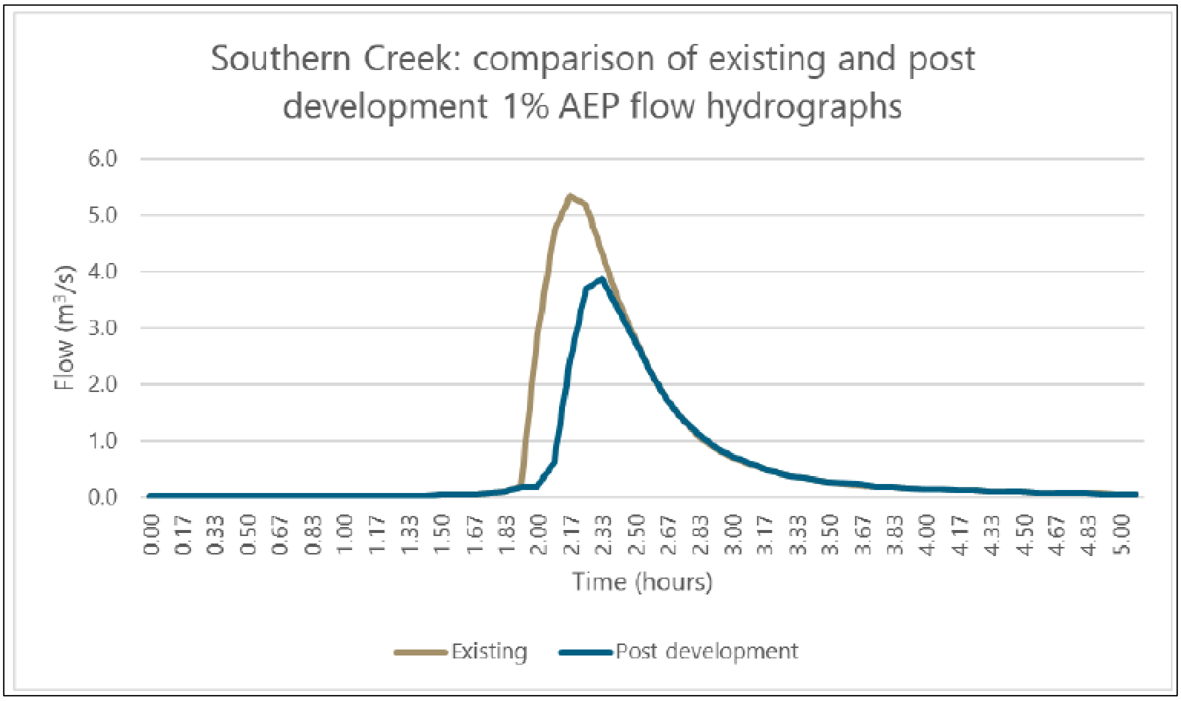

Figure 5-13 Southern Creek: Comparison of Existing and Post Development 1% AEP Flow Hydrographs (Advisian, 2023)

Closure

The PMF modelling of closure conditions, with the proposed additional waste dumps and Stage 4 pit in place, identified surface water management measures required to establish a stable landform design at mine closure. The results and recommendations are summarised below.

The PMF flood event in Cattlin Creek overtops the existing flood bunds (FPB1 and FPB2). These flood bunds were previously designed to contain the PMF event (Advisian, 2018 & 2019), however the hydrological methods and hydraulic modelling have been updated in this study for consistency with ARR2019, resulting in a larger peak PMF flow. Therefore, the flood bunds should be raised and extended at the locations shown in Figure 5-14 to contain the PMF event. Analysis of the flood modelling results suggests the following:

- The existing flood bund crest levels should be raised by:
  - FPB1: 2.0 m at FPB1 and extended approximately 80 m west
  - FPB2: 1.5 m at FPB2 and extended approximately 40 m south-east
- The duration of inundation above the existing bund crest levels is approximately 1 hour and peak velocities are less than 2 m/sec. Therefore, the extended sections of bund are likely to be constructed using inert basalt mine waste which is readily available at the mine site (crushed rock). It is recommended that geotechnical and civil assessment are completed to develop more detailed designs for closure
- The existing facing class rock protection on FPB1 and FPB2 is sufficient to protect from scour and erosion and does not require upgrading for mine closure.

Note that the recommendation to raise and extend FPB1 and FPB2 on Cattlin Creek to prevent overtopping in the PMF event, is a direct result of the updated hydrology and hydraulic modelling methods adopted in the Advisian 2023 Hydrological Assessment to ensure consistency with ARR2019. The proposed mine expansion landforms and infrastructure have no influence on the PMF flows estimated in Cattlin Creek and the associated FPB1 and FPB2 flood bunds.

There are some localised areas within the mine area where minor ponding occurs with depths of up to 2 to 3 m in the PMF event. This ponding is mainly due to the current grades in the LiDAR data provided for this study. At closure the terrain will be reprofiled and graded, as part of rehabilitation works, to prevent ponding and allow free draining conditions where possible. The recommended indicative flow paths to be reinstated at closure are shown in Figure 5-15. Surface water modelling will be completed in future phases of mine closure planning, using the updated closure landform design when available. The size and volume of flows are minor and do not present a significant risk at closure.

Direct rainfall on rehabilitated waste dumps will be contained and infiltrated and thus does not present a risk to operations or downstream environments.

Peak PMF velocities around the southern toe of WD1 exceed 5 m/sec. The existing creek channel is approximately 1 m deep and between 10 and 20 m wide. Therefore, it is recommended that the existing drainage channel is widened to 30 m at closure to reduce peak velocities to no more than 3.9 m/sec, and 1/4 tonne rock protection placed on along the southern toe of WD1 to a height of 1 m to protect from scour and erosion. Further channel widening can be used to reduce rock sizing if required. The location and extent of the WD1 drainage upgrades are shown in Figure 5-16.

Peak PMF velocities around WD2 are less than 2 m/sec therefore no rock protection is required at mine closure to protect the toe from scour and erosion.

Figure 5-14 Locations Where Existing Flood Protection Bunds are to be Upgraded at Mine Closure (Advisian, 2023)

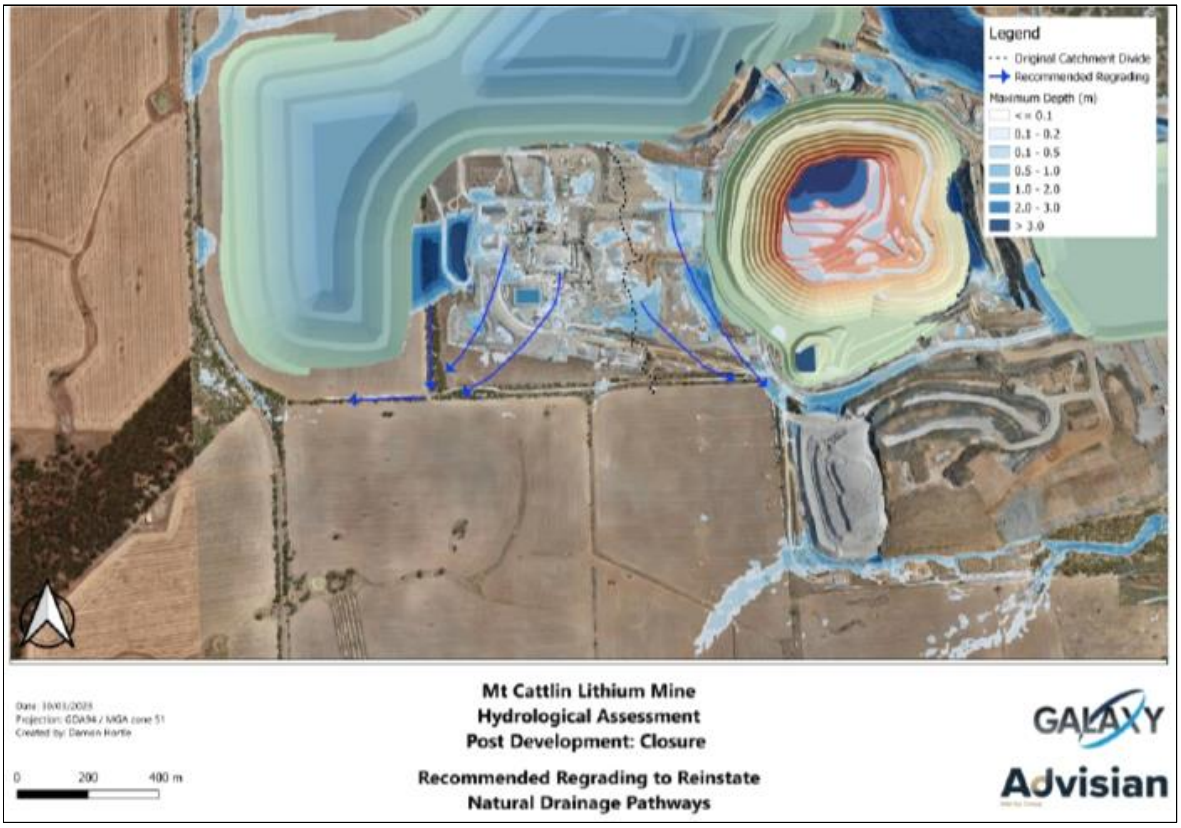

Figure 5-15 Recommendation to Reinstate Natural Drainage Pathways for Mine Closure (Advisian, 2023)

Figure 5-16 WD1: Recommended Drainage Upgrades for Mine Closure (Advisian, 2023)

5.10 Hydrogeology

5.10.1 Aquifers

The main aquifers are fractures or joints within weathered and fresh volcanic rocks, and most of the water bores were sited on air-photo lineaments. Cattlin Creek appears to follow zones of weakness in the bedrock that are locally permeable. Open joints and fractures are mostly above 120 m depth; however, some have been intersected down to 270 m depth.

The pegmatites are generally of low permeability, and the geological characteristics of the main rock units in the Stage 4 development area are expected to be similar to those in the current Stage 3 area. Some targets for testing groundwater yields have been selected within that area based on recorded water intersections in reverse-circulation drillholes.

5.10.2 Recharge and Discharge

Groundwater in the volcanics is recharged by the infiltration of rainfall and runoff following heavy rainfall events. The high salinity of the groundwater (Section 5.10.4) indicates that recharge rates and groundwater throughflow are low.

Groundwater levels prior to mining (Section 5.10.3) were all below the bed level of Cattlin Creek, indicating that the creek in the mining area is a losing stream (i.e., a potential source of groundwater recharge). Enhanced recharge from the creek into the old Mt Cattlin gold mine workings, which are used as a groundwater storage, is accomplished via bore BH01 in the creek bed. Other bores are used to extract water from the workings.

Prior to mining, the groundwater was flowing southwards, and is presumed to discharge along the coast in the Hopetoun region.

5.10.3 Groundwater Levels

Pre-mining groundwater level elevations, measured in exploration, production and TSF monitoring bores, are shown in Figure 5-17. The hydraulic gradient was steeply downwards to the south-east from a groundwater mound centred on the hill west of the mining area.

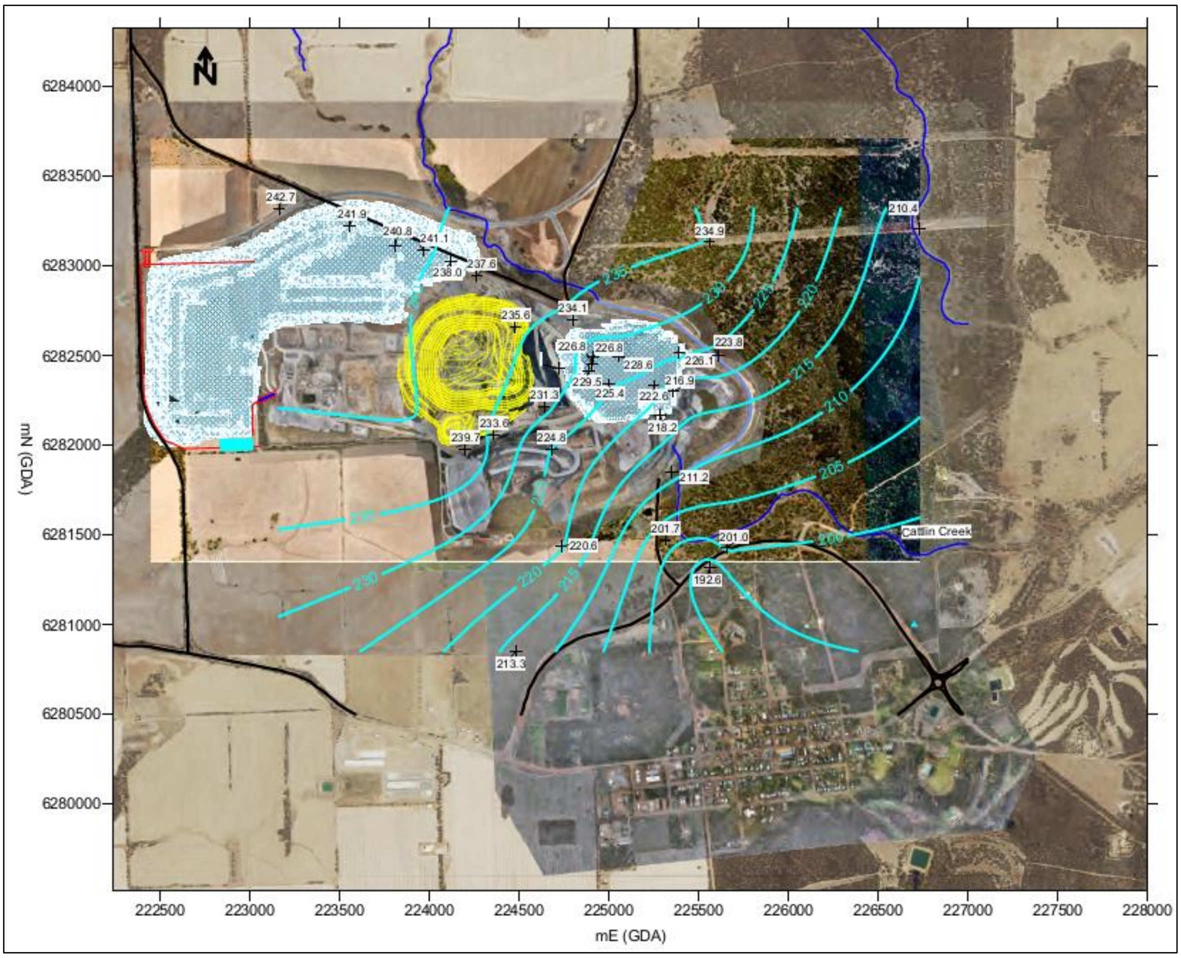

Figure 5-17 Pre-Mining Groundwater Levels (m AHD) (Rockwater, 2023)

The most-recent groundwater monitoring review (Figure 5-18) shows groundwater levels in December 2022 followed a similar pattern to the pre-mining levels. However, they had generally risen by up to 6 m around the mining area; and by up to 12 m around the original TSF due to loading and infiltration of water from the TSF. Groundwater levels would be considerably lower in the mine pits, although there are no monitoring points in or close to the pits, except WTD11 to the south where the groundwater level had fallen by 21 m to December 2022.

Groundwater levels have risen or remained near original levels in most bores near the mining area that were monitored in both 2008-10 and December 2022 (Figure 5-18). Notable is the 6 m rise in bore MB01, resulting from infiltration of water or hydraulic loading from TSF1; and declines of 15 m to 31.5 m in and near the main production bores (WTD22, 23, 28 and 29).

Near the mine pits, groundwater levels will be below the pre-mining levels, however there is no data to show this except for the low level in WTD11 (located approximately 1.3 km south of the active pit).

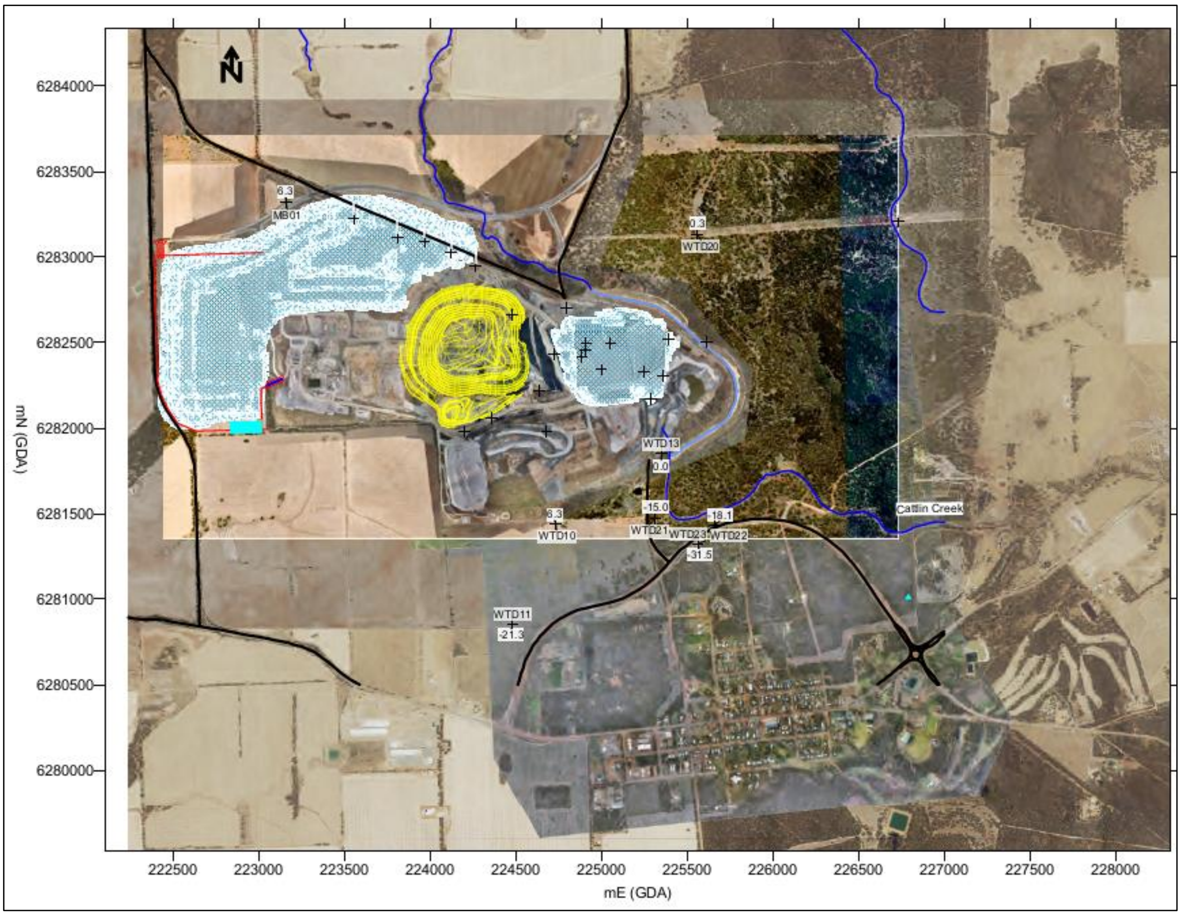

Figure 5-18 Change in Groundwater Levels (m) From 2008-10 to December 2022 (Rockwater, 2023)

5.10.4 Groundwater Quality

5.10.4.1 Prior to Mining

Pre-mining groundwater salinities are shown in Figure 5-19. They cover a relatively small range for groundwater in a fractured rock aquifer, ranging from 24,400 to 37,400 mg/L TDS (similar to seawater). In general, (not in all cases) salinity was lower in elevated areas and higher closer to the creek and other drainage lines.

Laboratory pH values ranged from 7.6 to 8.3, meaning that the water was slightly alkaline.

Groundwater analysis indicated the groundwater was of a sodium chloride type, with elevated magnesium and sulphate. Aluminium, iron, and manganese were at low concentrations, as was nitrogen; and phosphorus was generally below laboratory reference (detection) levels.

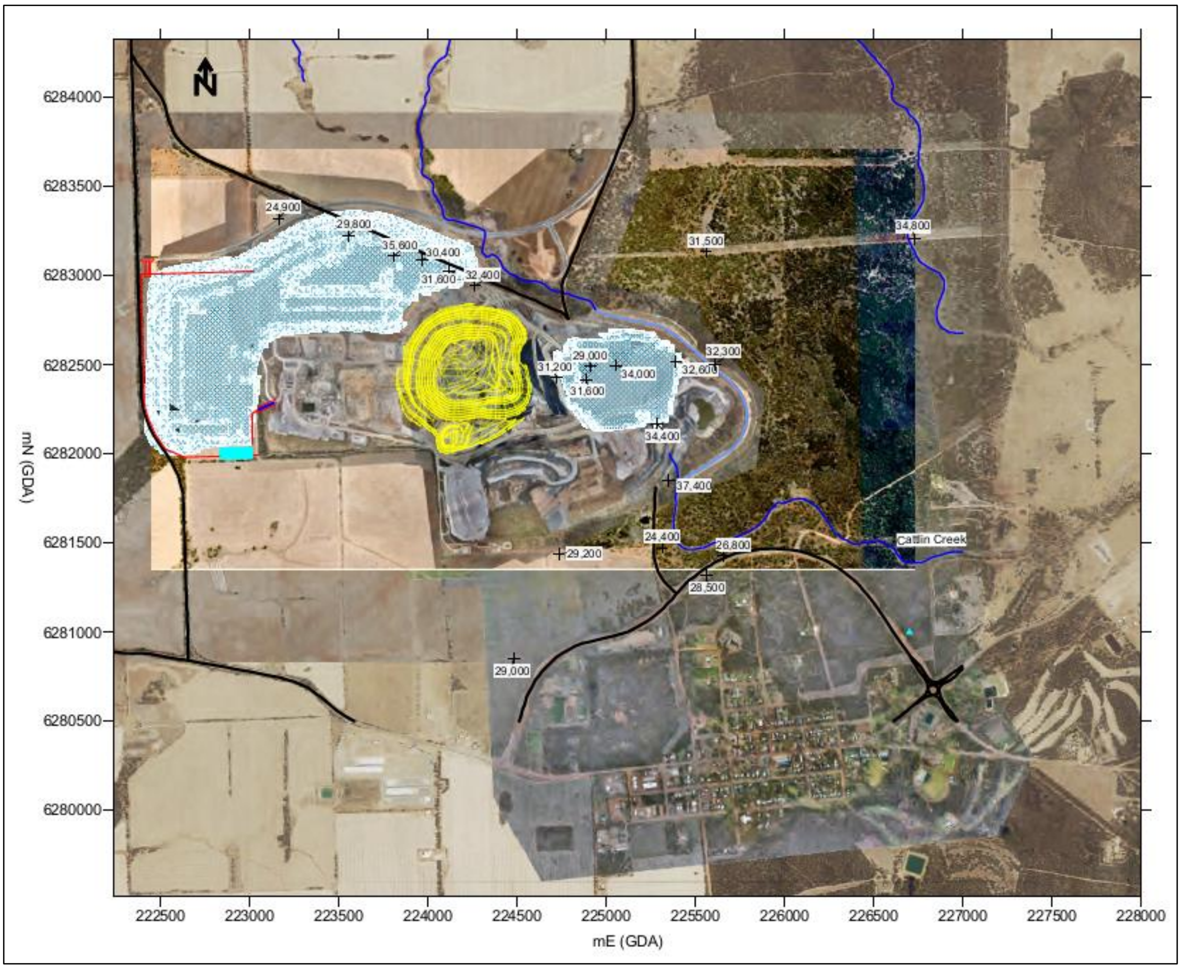

Figure 5-19 Pre-Mining Salinity (mg/L TDS) (Rockwater, 2023)

5.10.4.2 Recent Water Quality

Salinities in November 2022 (the most recent analysis) were generally similar to pre-mining values, with some higher or lower. The largest changes since mining commenced were:

- A decrease in salinity of 12,100 mg/L in WTD13 (located on the south-eastern boundary of active mining operations)
- An increase of 8,900 mg/L in WTD19 (located hydraulically cross-gradient and north-east of the mine, beyond the extent of influence from mining activities).

The groundwater had become acidic (pH < 6) in 10 bores where water levels had risen to above pre-mining levels, in August 2021. The affected bores included MB02 to MB04, MB06 and WTD28 down-gradient (east) of the above-ground “paddock” TSF1; MB09 and MB11 adjacent to the SW pit which has been used for tailings storage; and WTD29 and WTD34 in the old Mt Cattlin gold workings. The acidity near the TSFs has been attributed to localised ferrolysis occurring within the monitored bores where water containing Fe^{2+} reacts with dissolved atmospheric oxygen introduced via the bore casing (Rockwater, 2014), rather than acidic seepage from the TSFs. The water within the old Mt Cattlin workings is probably acidic due to oxidation of sulphides of the mineralised rocks.

In November 2022, when only one of the TSF monitoring bores was sampled, MB01 had a pH of 5.7. In the other WTD-series production and monitoring bores that were sampled, the pH levels were circum-neutral, ranging from 6.8 to 7.4 (all slightly more acidic than when they were first sampled pre-mining).

The only notable change in groundwater quality is the lower pH values and corresponding increases in aluminium, manganese, and iron concentrations around and down-gradient (east) of TSF1. As shown by testing of bore MB04 in 2014, the low pH is localised, and caused by ferrolysis within the bore casings where oxygen introduced via the bores reacts with iron in the groundwater.

There is no other evidence from the 2021 and 2022 monitoring data of any decline in groundwater quality due to infiltration of tailings water from TSF1.

5.11 Impacts of Mining

5.11.1 Surface Water

Runoff from operational waste dumps will contain suspended sediment which has the potential to affect downstream environments if not adequately managed. To mitigate risk, waste dumps will be designed for operations and closure to contain and infiltrate direct rainfall-runoff for the 1% AEP and PMP events respectively. The Advisian 2023 Hydrological Assessment assumed all direct rainfall-runoff is contained.

5.11.2 Groundwater

As discussed in Section 5.10.4.2 above, salinities in August 2021 and November 2022 were similar to those measured prior to mining. There have been no environmental receptors identified that could be impacted by mining activities. It is not expected that the proposed Stage 4 works will result in any significant changes to the local groundwater regime compared to that resulting at closure from the current mining plan.

5.12 Pit Groundwater

5.12.1 Current Pit Groundwater Regime

Groundwater inflows in the planned Stage 4 pit are likely to be similar to those observed in the NW (Dowling) pit area: averaging 4 to 5 L/s during dewatering. Test-pumping of planned bores within the Stage 4 pit area will provide hydraulic conductivity values that will be used in numerical modelling of likely dewatering flow rates, and in updating the nature of the final mine voids.

5.12.2 Post Closure Pit Groundwater Regime

With the likely low values of hydraulic conductivity, except on localised joints and fractures, and the low rainfall and high evaporation rates, the final pit voids are expected to be permanent groundwater sinks. Consequently, pit lake levels after mining would remain below pre-mining groundwater levels. Salinities of water in the pit lakes will gradually increase, however there would be no movement of water from the pit lakes into the surrounding groundwater.

With continuing inflows to the pit after mining estimated to be about 2 to 3 L/s (say, 2.5 L/s = 216 m^3/d average). Using that value, and the average rainfalls and dam evaporation rates given in Table 5-8, a water balance for the final Stage 4 pit void can be estimated with the following assumptions:

- 80 % of the rain falling within the pit perimeter will report to the pit lake
- Evaporation from the pit lake will be 90 % of average dam evaporation (reduced to allow for the high salinity of the water in the lake).

On completion of mining, the water level of the pit lake will rise until there is a balance between groundwater inflows, rainfall accumulation, and evaporative losses. That balance is estimated to be reached at a reduced level of approximately 125 m AHD (i.e., approximately 110 m below the original static groundwater level).

Preliminary estimates indicate that after 100 years, the pit lake will have risen from the pit base at about 45 m AHD, to a level of about 80 m AHD, but the rate of rise will continue to decrease, and it is likely to take about 5,000 years to stabilise at about 125 m AHD.

A north-south section through the Stage 4 pit showing the pre-mining groundwater level and the water level in the final pit void is included as Figure 5-20.

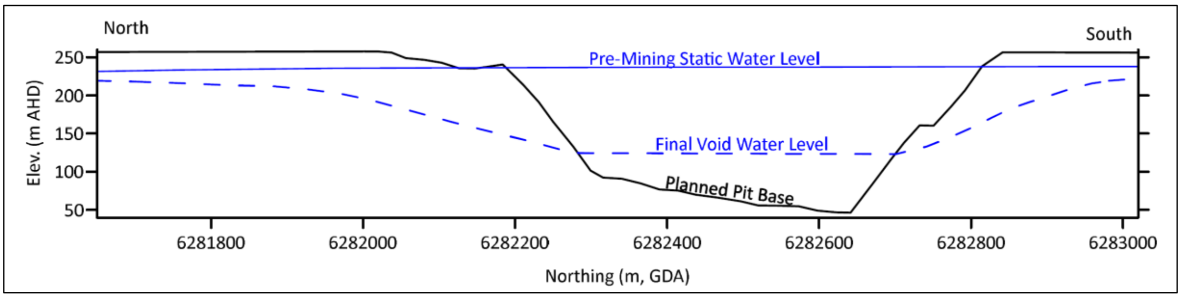

Figure 5-20: Section Through Stage 4 Pit Showing Pre-Mining and Final Void Groundwater Levels

The salinity of the lake water will continue to increase until it becomes supersaturated after about 40 years. The lake will form a permanent groundwater sink, with no possibility of the highly saline water flowing from the lake back into the surrounding groundwater.

It is planned to refine the modelling of the pit voids following further hydrogeological work, including test-pumping of bores to determine hydraulic conductivity values.

5.13 Overall Site Water Balance

The overall site water balance is negative, although there is a paucity of data to reliably quantify the specific quantities. The main water user on site is the processing plant which recycles all process water. The main water losses on site are:

- Evaporation – mine and process plant dust control, and TSF decant pond
- Tailings void water capture.

The pit experiences relatively low levels of seepage (~5L/s) which is collected by floor sumps and used for dust suppression or pumped to the TSF decant pond to enter the process water stream. In addition, the plant draws the remaining required make-up water from a series of licenced bores adjacent to site.

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

AUGUST 2023

CHAPTER 6: HISTORY

6 HISTORY

6.1 Ownership History

The tenements that incorporate Mt Cattlin have been operated by numerous companies since the 1960s, including Western Mining Corporation (WMC), Pancontinental Mining Limited, Greenstone Resources NL, Haddington Resources Limited (Haddington) and Sons of Gwalia Limited. Galaxy acquired M74/12 from the administrators of Sons of Gwalia Limited in November 2006.

6.2 Mining History

The pegmatites which host the Mt Cattlin orebody were first reported in 1843. The Ravensthorpe area was originally known as the Phillips River Goldfield following the discovery of small quantities of gold in association with copper and pyrite. The township of Ravensthorpe was surveyed in 1900 and gazetted in 1901 at which time 15 mines were operating. A total of 53 mines were listed as operating in 1903 by which time it was realised that much of the gold occurred with copper.

The first government smelter was built in 1904 on the east side of the town and a larger smelter was later erected on the Hopetoun Road in 1906, but later closed in 1918. At that time, the Phillips River Mineral Field was Western Australia's principal copper mining centre with 19,000 tonnes being produced. A total of 83,942 ounces of gold was recovered from copper mines with 88,220 tonnes of ore recovered from auriferous quartz reefs.

The population of the Ravensthorpe goldfield peaked in 1911 when there was more than 2,000 people in the area.

The Cattlin Creek pegmatites have been the subject of several drilling, sampling and metallurgical test campaigns as well as feasibility studies dating back to the 1960s. During the period 1962 to 1966, WMC carried out an extensive drilling program and established a resource of green and white spodumene, which is the lithium bearing mineral associated with the pegmatite.

Extensive mineralogical and metallurgical test work was carried out as part of this programme, culminating in WMC preparing an internal feasibility study on the mining and production of 10,000 tpa to 15,000 tpa of spodumene concentrate from the deposit on Mining Lease M74/12.

Since the 1960s, the tenements have been owned by several companies, all of whom have viewed them as a prospective tantalite resource and conducted drilling and metallurgical test work accordingly. Major evaluation programs included the following:

- Pancontinental Mining Limited, July 1989, 101 Reverse circulation (RC) drillholes
- Pancontinental Mining Limited, 1990, additional 21 RC drillholes
- Greenstone Resources NL, 1997, 3 diamond drillholes, 38 RC drillholes and soil sampling, which comprised 23 by 44-gallon drums of freshly blasted mineralised material that was sent to the Nagrom mineral processing facility (based in Kelmscott, W.A.) for crushing, screening, and gravity separation testing

- Haddington Resources Limited, 2001, 9 diamond drillholes for metallurgical test work, and additional RC drillholes for in-fill and sterilisation.

Galaxy acquired M74/12 from the administrators of Sons of Gwalia Limited in November 2006. By 2010, an open pit mine and processing facilities had been established to exploit the 12 million tonnes of ore at a grade of 1.0% Li_2O over a planned 13-to-14-year mine life.

The mine was placed on care and maintenance in 2013. Galaxy restarted mine production during March 2016.

Records of the spodumene concentrate production at Mt Cattlin are presented in Table 6-1.

Table 6-1 Spodumene concentrate production from 2010 to 2020

Year	Concentrate Produced (dmt)
2022	*107,417*
2021	*127,717*
2020	*108,658*
2019	*191,570*
2018	*156,689*
2017	*155,679*
2016	*9,700*
2015	-
2014	-
2013	-
2012	*54,047*
2011	*63,863*
2010	*1,645*

The 2020 production year was moderated due to market conditions and a total of 1,086,364 wet metric tonnes (wmt) of ore was processed at a head grade of 1.1% Li_2O to produce 108,658 dry metric tonnes (dmt) of spodumene concentrate at a grade of 5.95% Li_2O. In early 2021, operations at Mt Cattlin were again ramped up to full rate (2019 rate) in response to improving spodumene prices. Galaxy is now targeting the annual production of 185,000 dmt to 210,000 dmt of spodumene concentrate. Improved prices for spodumene concentrate have prevailed from January 2022 onwards.

Mining at Mt Cattlin is conducted by conventional drill, blast, truck, and shovel methods. Processing is by conventional crush, optical sort, multi-pass dense medium separation (DMS), de-sliming and mica removal. Spodumene is concentrated to greater than 5.5% Li_2O. The DMS pre-screen undersize (-0.5 mm) is treated by gravity and spiral classifiers to produce a tantalite concentrate. Optical sorters are utilised post crushing to preferentially sort and remove dark contaminant country rock in order to produce a cleaner feed for subsequent spodumene recovery. A magnetic sorter, to further improve and remove waste meta-basalt was constructed and deployed in 2022.

6.3 Historical Mineral Resource Estimates

During the 1960s WMC completed drilling campaigns, metallurgical studies and feasibility studies to establish an initial spodumene resource covering part of the eastern portion of the current orebody. The completed WMC internal feasibility study was based on operations producing 10,000 to 15,000 tpa of spodumene concentrate.

In 2001, Hellman and Schofield completed a resource estimate for the tantalum mineralisation which covered a small portion in the northeast of the current orebody. This work was completed for Galaxy Resources NL, before the company listing on the ASX. The first significant published Galaxy Ore Resource estimate that included an estimate of the Li_2O resources was reported to the ASX in December 2007.

The tabulated maiden mineral resource is provided in Table 6-2.

Table 6-2 Mt Cattlin Mineral Resource, Hellman & Schofield (December 2007)

Mineral Resource December 2007			
Resource	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**
Measured	*1,090,066*	*1.07*	*177*
Indicated	*6,417,133*	*1.02*	*125*
Inferred	*4,797,911*	*0.96*	*140*
Total	***12,305,110***	***1.00***	***135***

Note: Li_2O cut-off grade - 0.4% Li_2O. Mineral Resource Estimate compiled by Mr. Rob Spiers of Hellman & Schofield.

Mineral Resource updates were also completed in May 2009 and December 2009. The December 2009 results are detailed in Table 6-3.

Table 6-3 Mt Cattlin Mineral Resource, Hellman & Schofield (December 2009)

Mineral Resource December 2009			
Resource	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**
Measured	*2,672,000*	*1.17*	*150*
Indicated	*9,629,000*	*1.09*	*171*
Inferred	*3,575,000*	*1.00*	*145*
Total	***15,875,000***	***1.08***	***161***

Note: Li_2O cut-off grade - 0.4% Li_2O. The Mineral Resource Estimate was compiled by Mr. Rob Spiers of Hellman & Schofield.

Galaxy commissioned Mining Plus to prepare an updated Ore Resource estimate toward the end of 2017, which was reported to the ASX in March 2018 (Table 6-4).

Table 6-4 Mt Cattlin Mineral Resource, Mining Plus (December 2017)

MRE December 2017					
Material	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**	**Fe_2O_3%**	**Li_2O Metal Tonnes**
Measured In situ	*1,740,000*	*1.21*	*196*	*1.26*	*21,000*
Indicated In Situ	*6,210,000*	*1.26*	*127*	*1.19*	*78,200*
Inferred In Situ	*2,350,000*	*1.25*	*181*	*1.31*	*29,400*
Total In Situ	***10,300,000***	***1.25***	***151***	***1.23***	***128,600***
Measured Stockpiles	*140,000*	*0.98*	*NA*	*NA*	*1,400*
Indicated Stockpiles	*1,180,000*	*0.81*	*NA*	*NA*	*9,600*
Total Stockpiles	***1,320,000***	***0.83***	***0***		***11,000***
Grand Total	***11,620,000***	***1.20***			***139,600***

Note: Fresh material has been reported at a cut-off grade of 0.4% Li_2O. All tonnages are report as dry metric tonnes. Minor discrepancies may occur due to rounding.

Galaxy published an updated Mineral Resource undertaken by Mining Plus in August 2018, which was depleted for mining to 1 June 2018, (Table 6-5).

Table 6-5 Mt Cattlin Mineral Resource, Mining Plus (June 2018)

MRE June 2018					
Material	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**	**Fe_2O_3%**	**Li_2O Metal Tonnes**
Measured In situ	*1,300,000*	*1.28*	*241*	*1.32*	*16,700*
Indicated In Situ	*7,000,000*	*1.34*	*177*	*1.40*	*93,700*
Inferred In Situ	*1,400,000*	*1.44*	*264*	*1.27*	*20,100*
Total In Situ	***9,700,000***	***1.35***	***198***	***1.37***	***130,500***
Measured Stockpiles	*200,000*	*0.78*	*131*	*NA*	*1,500*
Indicated Stockpiles	*1,900,000*	*0.81*	*54*	*NA*	*15,500*
Total Stockpiles	***2,100,000***	***0.81***	***61***		***17,000***
Grand Total	***11,800,000***	***1.25***	***174***		***147,500***

Note: Fresh material has been reported at a cut-off grade of 0.4% Li_2O. All tonnages are report as dry metric tonnes. Minor discrepancies may occur due to rounding.

Galaxy published an updated Mineral Resource undertaken by Mining Plus in January 2019 that was depleted for mining to 31 December 2018, (Table 6-6).

Table 6-6 Mt Cattlin Mineral Resource, Mining Plus (December 2018)

MRE December 2018					
Material	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**	**Fe_2O_3%**	**Li_2O Metal Tonnes**
Measured In situ	*2,200,000*	*1.32*	*208*	*1.17*	*29,000*
Indicated In Situ	*7,200,000*	*1.43*	*165*	*1.48*	*103,000*
Inferred In Situ	*4,600,000*	*1.30*	*156*	*1.67*	*60,000*
Total In Situ	***14,000,000***	***1.37***	***169***	***1.49***	***192,000***
Indicated Stockpiles	*2,700,000*	*0.82*	*110*	*NA*	*22,000*
Grand Total	***16,700,000***	***1.28***	***159***		***214,000***

Note: Fresh material has been reported at a cut-off grade of 0.4% Li_2O and Transition material at 0.6% Li_2O. All tonnages are report as dry metric tonnes. Minor discrepancies may occur due to rounding.

Subsequent published Mineral Resources, including in 2020 and 2021, have not involved re-estimation of the Mineral Resource, but have been adjusted for depletion by mining. These tabulations are not included as part of this report. An up-dated MRE was completed in early 2023, dated December 2022, which included drilling completed in 2022.

6.4 Historical Mineral Reserve Estimates

Galaxy has reported Mineral Reserves for the Mt Cattlin Property from 2009 to 2020. These estimates have been superseded by the current Mineral Reserve estimate which is detailed in this report.

In August 2009 Glenn Williamson of Mining Resources Pty Ltd completed an initial Mineral Reserve based on the May 2009 Mineral Resource estimate (Table 6-7).

Table 6-7 Mt Cattlin Mineral Reserve, Williamson (August 2009)

Mineral Reserve August 2009			
Material	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**
Proven	*2,333,400*	*1.09*	*130*
Probable	*6,949,600*	*1.02*	*140*
Total	***9,283,000***	***1.04***	***138***

Note: Li_2O cut off grade - 0.4% Li_2O. Mineral Reserve Estimate compiled by Mr. Glenn Williamson of Mining Resources Pty Ltd.

An updated Mineral Reserve estimate was completed by Roselt Croeser of Croeser Pty Ltd in March 2010 which appears in Table 6-8.

Table 6-8 Mt Cattlin Mineral Reserve, Croeser (March 2010)

Mineral Reserve March 2010			
Material	**Tonnes**	**Li_2O%**	**Ta_2O_5 ppm**
Proven	*2,683,000*	*1.08*	*135*
Probable	*8,684,000*	*1.04*	*151*
Total	***11,367,000***	***1.05***	***147***

Note: Li_2O cut-off grade - 0.4% Li_2O. Mineral Reserve Estimate compiled by Mr. Roselt Croeser of Croeser Pty Ltd.

Galaxy released an updated Mineral Reserve estimate in March 2018, completed by Mining Plus, which included mining depletion to end December 2017 (Table 6-9).

Table 6-9 Mt Cattlin Mineral Reserve, Mining Plus (December 2017)

Mt Cattlin Mineral Reserve December 2017			
Material	**Tonnes**	**(Li_2O %)**	**Contained Li_2O Metal**
Proven	*1,950,000*	*1.03*	*20.4*
Probable	*5,690,000*	*1.06*	*60.1*
Total	***7,640,000***	***1.05***	***80.5***

Note: Reported at a cut-off grade of 0.4% Li_2O. All figures rounded to reflect the relative accuracy of the estimates. Includes mining dilution and mining recovery. Mineral Reserve includes surface inventory. Pits include 315kT of diluted and recovered Inferred Resource not included in this Table. Mineral Reserves are not additional to Mineral Resources.

Subsequent published Mineral Reserve estimates, including in 2020 and 2021, have not involved re-estimation, but have been adjusted for depletion due to mining. These tabulations are not included as part of this report.

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CHAPTER 7: GEOLOGICAL SETTING AND MINERALISATION

7 GEOLOGICAL SETTING AND MINERALISATION

7.1 Regional Geology

The Mt Cattlin deposit is a spodumene-rich tantalite-bearing pegmatite located in the Phillips River Mineral Field, within the Ravensthorpe Terrane, which forms part of the Archaean Ravensthorpe greenstone belt.

The Ravensthorpe greenstone belt has been subdivided into three distinct tectonostratigraphic terranes by Witt (1998), shown in Figure 7-1.

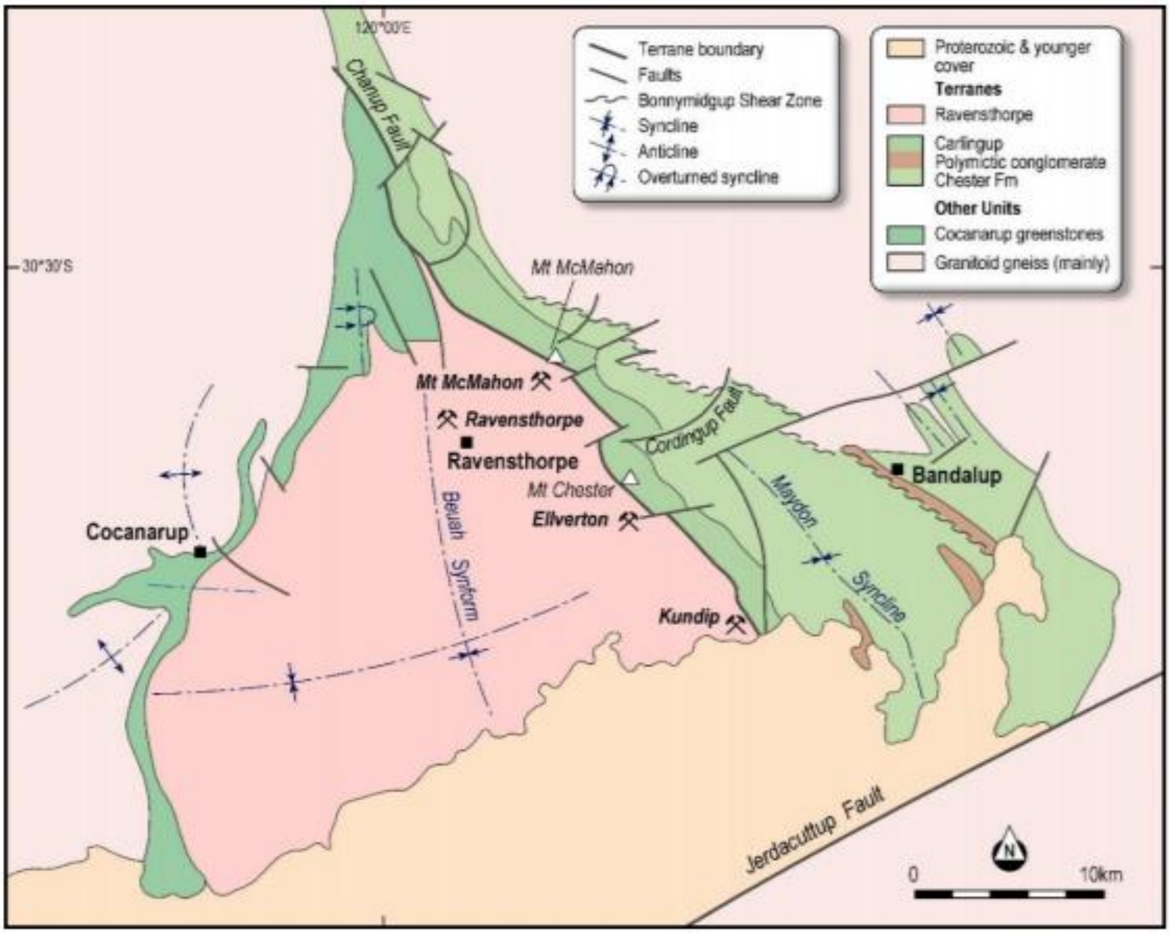


Figure 7-1 Geological Plan Showing the Location and Geological Setting of the Mt Cattlin Deposit

The Carlingup Terrane (c. 2,960 million years) lies to the east and comprises metamorphosed mafic, ultramafic, and sedimentary rocks with minor felsic volcanic rocks. The Ravensthorpe Terrane (c. 2,990 to 2,970 million years), which hosts Mt Cattlin, forms the central portion of the belt, and comprises a tonalitic complex, together with a volcanic association with predominantly andesitic volcaniclastic rocks. The Cocanarup greenstones to the west consist mainly of metasedimentary rocks, with lesser ultramafic and mafic rocks.

The Ravensthorpe Terrane is dominated by an approximately 25 km diameter, oval-shaped calc-alkaline complex, which is subdivided into an intrusive core comprising the Manyutop Tonalite which is flanked by the Annabelle Volcanics. Both sequences show similar chemical and age characteristics.

The Annabelle Volcanic sequence is dominated by volcaniclastic rocks with minor lavas. The sequence comprises roughly 10% to 20% basalt, 50% to 70% andesite and 20% to 30% dacite (Witt, 1998). Witt interprets the Terrane as fault-bounded accreted domains, with subsequent deformation producing the major south-plunging Beulah Synform. The metamorphic grade indicated by metamorphic mineral assemblages varies from greenschist to amphibolite facies.

7.2 Local and Property Geology

Mt Cattlin lies within the Ravensthorpe Terrane, with host rocks comprising both the Annabelle Volcanics to the west and the Manyutup Tonalite to the east. The contact between these rock types transects the Project area.

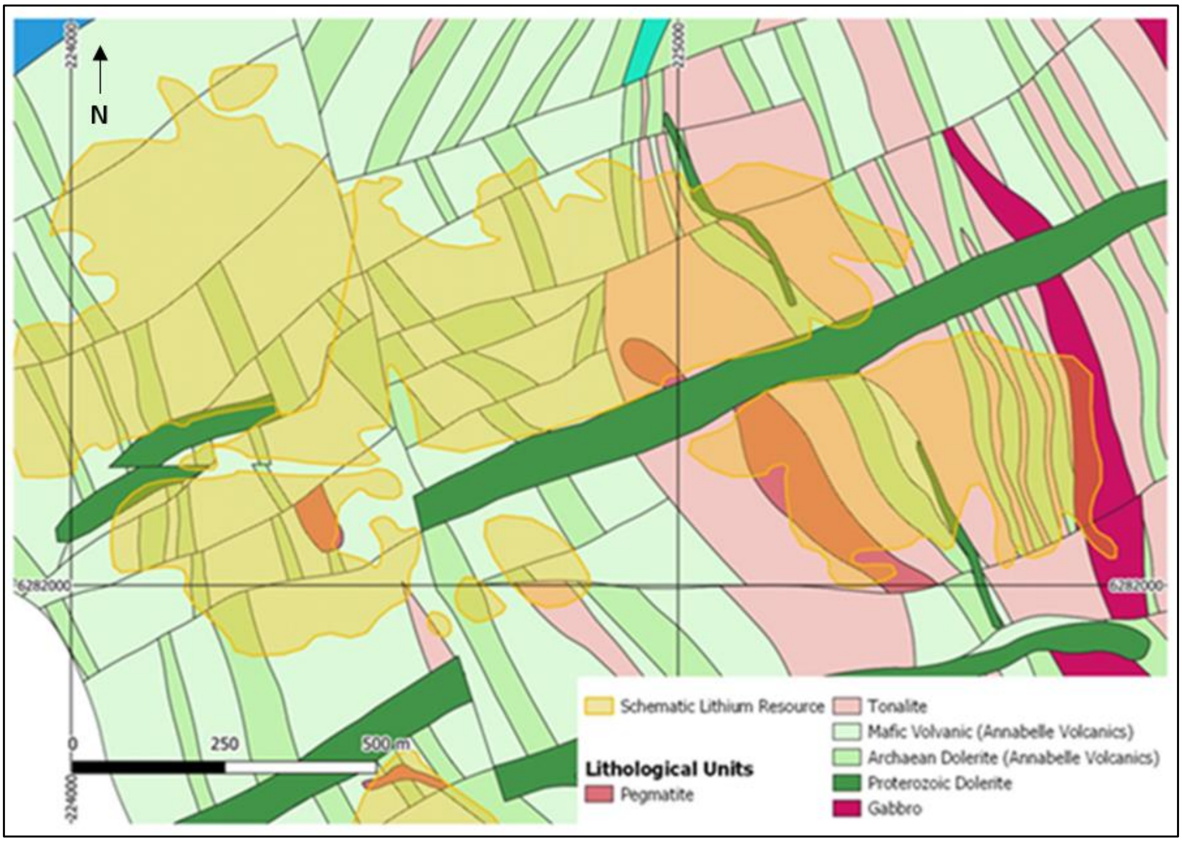
The Annabelle Volcanics at Mt Cattlin includes intermediate to mafic volcanic rocks comprising pyroclastic material and lavas. Several phases of the Manyutup Tonalite were recognised by Witt (1998) in the Ravensthorpe Terrane, but in the Mt Cattlin area, this unit is dominated by tonalite (quartz diorite).

Both the Annabelle Volcanics and the Manyutup Tonalite are intruded by numerous fine to coarse-grained metamorphosed dolerite dykes. A north-northwest trending gabbro, described as a pyroxenite in earlier reports, crosses the eastern edge of the Mt Cattlin pegmatite orebody.

The Archean age Annabelle Volcanics is a sequence of metamorphosed ultramafic, mafic, and felsic rocks (Wells et al., 2022), with dating of rhyolite in the Annabelle Volcanics at 2989 ± 11 Ma. To the east, another swarm of north-trending pegmatites intrude both the Annabelle Volcanics and the adjoining Archean calc–alkaline Manyutup Tonalite. Approximately 8 km southwest of Ravensthorpe, coarse-grained tonalite was dated at 2965 ± 12 Ma (U–P). In the same area, a tonalite porphyry dyke was dated at 2989 ± 7 Ma identical to the reported age of the Annabelle Volcanics. It has been speculated that the pegmatite swarms may be genetically related to a late-phase, Archean quartz-monzonite located approximately 7 km to the northeast.

Metamorphism of the Annabelle Volcanics and Manyutup Tonalite country rocks grades up to amphibolite facies at Mt Cattlin. While the metamorphism of the country rocks up to amphibolite facies grade is evident, the pegmatites remain unmetamorphosed.

A detailed local geology map of the Mt Cattlin Project area was compiled by Dr Mike Grigson of ARC Minerals and has been presented in Figure 7-2.



Lithology sequences and the spatial extent of the lithium resource (compiled M. Grigson, ARC Minerals).

Figure 7-2 Mt Cattlin Local Interpreted Surface Geology Map

The pegmatites, which comprise the orebody, occur as a series of sub-horizontal sills hosted by both volcanic and intrusive rocks. These are of the albite-spodumene subtype (Wells et al., 2022). Several dolerite or quartz gabbro dykes trending roughly east-northeast and north-south crosscut all lithologies including the pegmatite sills and are believed to be Proterozoic in age.

The drilling cross-section depicted in Figure 7-3 and the perspective view in Figure 7-4 illustrates the flat-lying nature of the pegmatite horizons and the relationship to the later cross-cutting dolerite dyke.

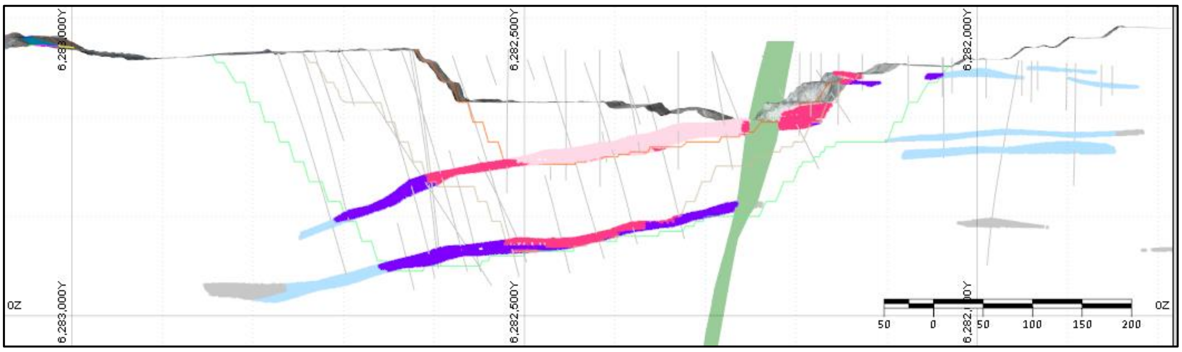


Figure 7-3 Cross-Section Showing Deeper NW Zone Pegmatite Horizon

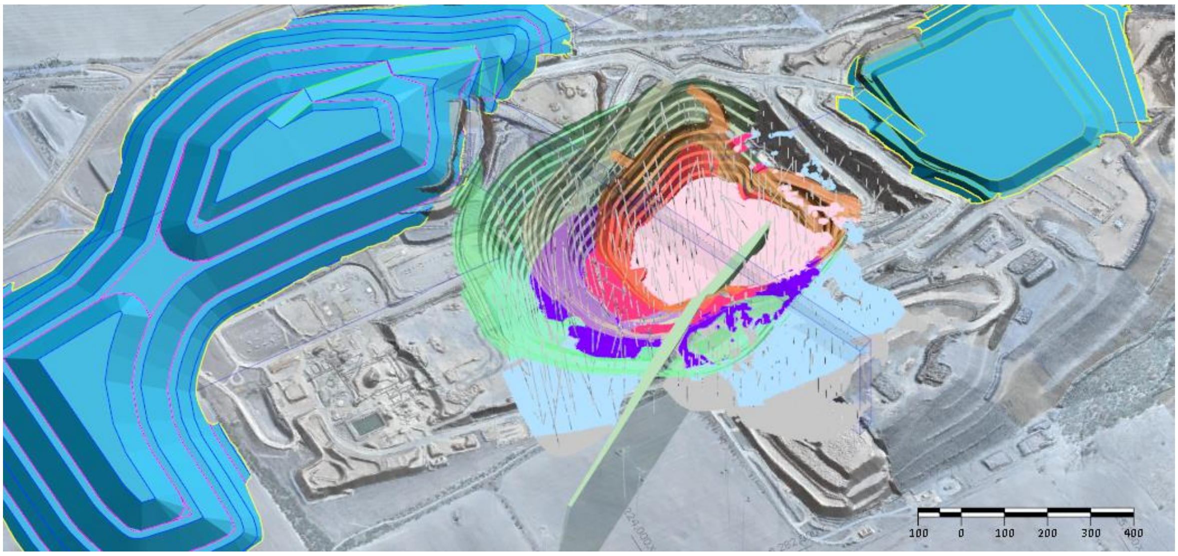


Figure 7-4 Perspective View Looking NE and Cross-Section Showing Deeper NW Zone Pegmatite Horizon

A significant sub-vertical fault with a north-northwest-trending orientation has been confirmed on drilling cross-sections and aeromagnetic data. This fault transgresses the western side of the currently defined orebody and offsets the pegmatite as well as the main east-northeast trending dolerite dyke. Displacement across this fault appears to be oblique, with the west block down and with a sinistral component.

The weathering profile across the Mt Cattlin area is typically shallow, with fresh rock generally being encountered at depths of less than 20 m below the surface.

7.3 Mineralisation

Mt Cattlin hosts spodumene-rich, Ta-bearing pegmatites. They occur as a series of sub-horizontal to shallowly dipping horizons (Figure 7-5) that have intruded both the Annabelle Volcanics and the Manyutup Tonalite in areas close to the contact between these two sequences.

Figure 7-5 Mt Cattlin Pit 1A North Wall Showing Pegmatite and Quartz Tourmaline Veins

In places, the pegmatites occur as stacked horizons that overlap in section. Pegmatite mineralisation defined to date covers an area of approximately 1.6 km east-west and 1 km north-south. The main pegmatite units are generally between 30 m and 140 m below the surface, and outcrop in some locations.

The Mt Cattlin pegmatites have diverse mineralogy with major minerals comprising of the following (Grubb, 1963, Sweetapple, 2010):

- Quartz
- Albite
- Cleavelandite (platy albite)
- Microcline
- Perthite
- Spodumene
- Eucryptite
- Muscovite
- Lepidolite.

Minor minerals include the following (Grubb, 1963, Sweetapple, 2010):

- Tourmaline
- Schorlite
- Elbaite
- Beryl
- Microlite

- Columbite-tantalite
- Sphalerite
- Amblygonite-montebrasite
- Triphylite
- Apatite
- Spessartite
- Fluorite.

Spodumene is the dominant Li_2O ore mineral.

Several varieties of spodumene are recognised including light green and white varieties. Ta_2O_5 occurs as the manganese-rich end members of the columbite-tantalite series including Ta-rich manganotantalite, and as microlite (Sweetapple, 2010). An open pit exposure with spodumene crystals in pegmatite is shown in Figure 7-6.

Figure 7-6 Spodumene Crystals in Pegmatite (arrowed), Mt Cattlin Pit 1A North Wall

Various lithium minerals have been observed within the pegmatites and include the following:

- Spodumene $LiAl(SiO_3)_2$ containing 4% to 8% Li_2O,
- Amblygonite, $LiAl(F,OH)PO_4$, contains 8% to 10% Li_2O
- Lepidolite, (lithium mica) contains 2% to 4% Li_2O
- Cookeite, (lithium bearing chlorite).

The mineralogy within the pegmatites varies laterally and displays a crude zonation oriented perpendicular to the margins, which are identified by changes in mineralogy and grain size.

Northeast portions of the now depleted deposit contain the Li_2O-bearing mica lepidolite. The lepidolite-rich zones contain higher Ta_2O_5 grades, which are mainly microlite, and display more pronounced zonation perpendicular to the margins of the pegmatite. Zonation within the pegmatites include an aplitic rock comprising mainly quartz-albite-muscovite near the contacts with the country rocks, and zones of predominantly light green, and predominantly white spodumene. Lepidolite is generally associated with white spodumene. Quartz-tourmaline veins related to pegmatite emplacement are observed in the country rock up to tens of metres away from the pegmatite.

7.4 Alteration

Mt Cattlin displays zones of high-grade, unaltered spodumene through to zones of low-grade, highly altered spodumene, which post-date pegmatite emplacement. Two distinct styles of alteration in which spodumene is replaced by finely crystalline micas are observed within altered regions of the deposit and comprise the following sections.

7.4.1 Symplectic / Graphic Textured Alteration

Presents as microscopic intergrowths of spodumene and quartz and is abundant on the margins of the pegmatites. Typically occurs where spodumene is proximal to increased amounts of albite.

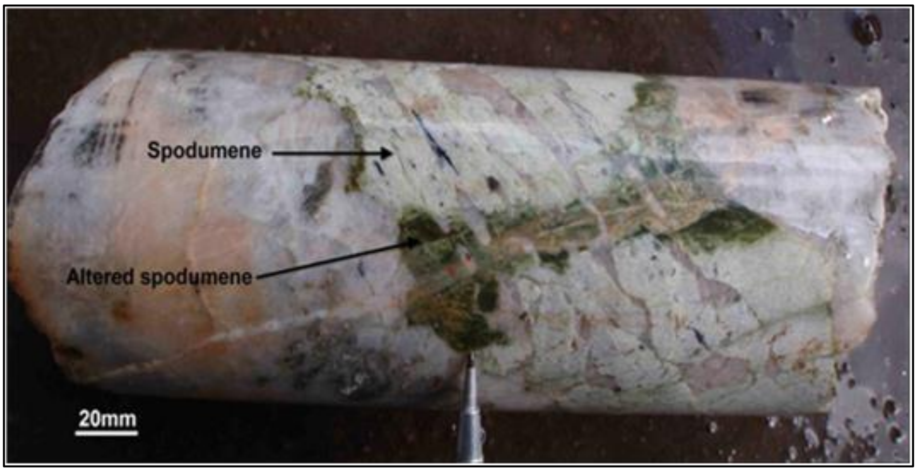
Graphic textured alteration is generally more abundant where the pegmatites contact the host rock, and rapid cooling has occurred.

7.4.2 Pseudomorphic Alteration

Ranging from minor replacement at the crystal margins to complete replacement comprised of a complex assemblage of pumpellyite, cookeite, sericitic mica and secondary feldspars (dark green spodumene). Predominant in coarse-grained, megacrystic (+20 cm) spodumene. The progressive darkening of spodumene is positively associated with the degree of observed alteration. With increases in alteration, lithium content decreases as spodumene crystals are pseudo-morphically replaced by black-green lithium-bearing micas. Spodumene may alter to eucryptite.

Although lithium content within spodumene at Mt Catlin is negatively correlated with post-emplacement alteration (Wells et al., 2022), high degrees of alteration are interpreted to be more limited in occurrence and often connected with fractures or faults cutting through the pegmatite (Sweetapple, 2010).

A sample of drill core displayed in Figure 7-7 is a typical example of the dark green spodumene alteration type which is associated with prehnite-rich veins.



Alteration of light green spodumene to a dark green mineral on the margins of a vein composed predominantly of prehnite.

Figure 7-7 Drill Core from Drillhole GXMCMTD03, 22.5 m

7.5 Geometallurgical Model

A geometallurgical approach to modelling the deposit geology at Mt Cattlin has been adopted. This approach aims to integrate the information required to ensure the produced spodumene concentrate meets product specifications, including requirements for a minimum lithia grade, plus upper limits of deleterious elements Figure 7-8.

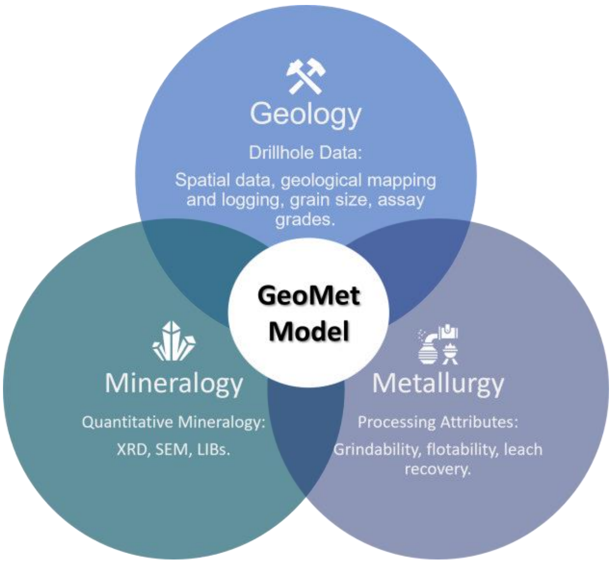


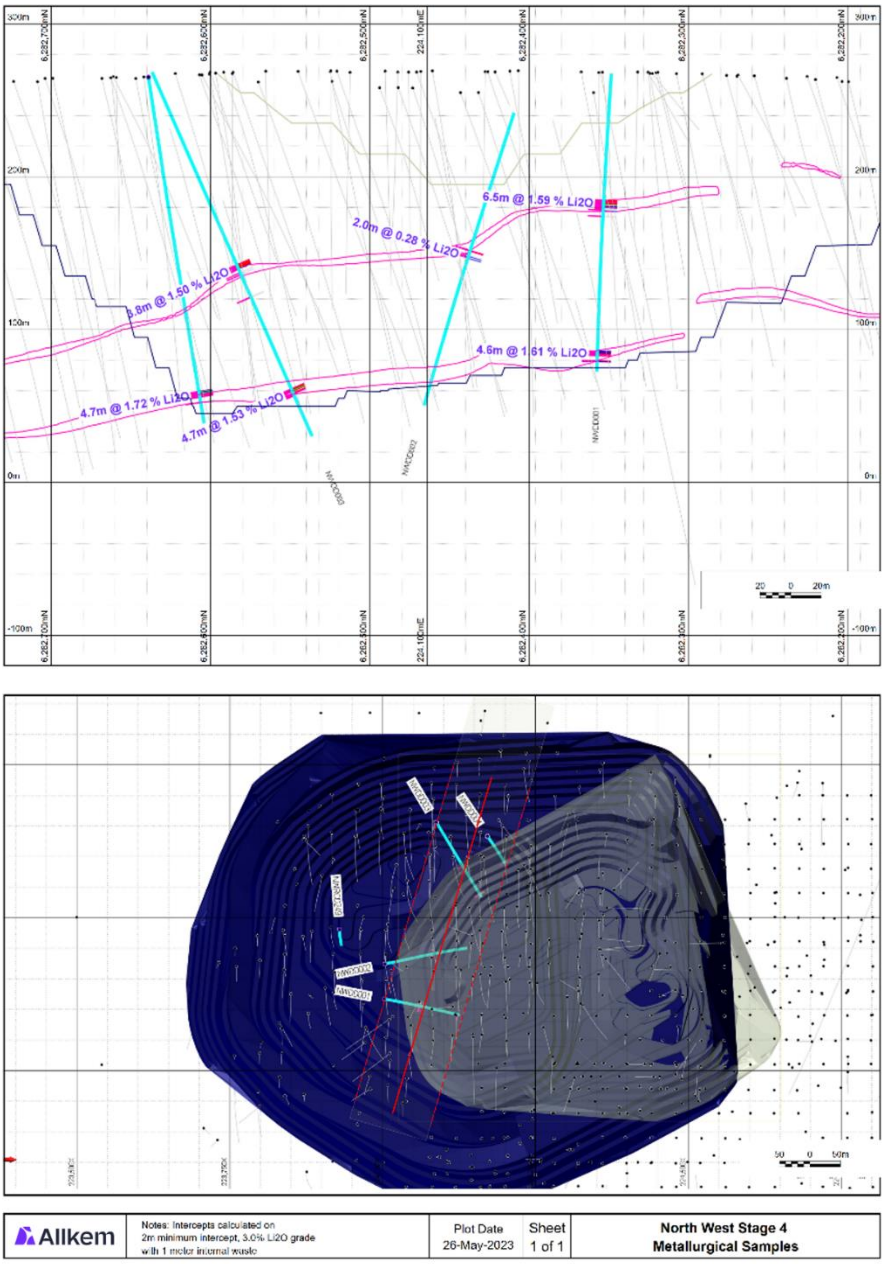
Figure 7-8 Geometallurgical ("GeoMet") Model Venn Diagram

Metallurgical processing methods call for distinct physical properties of the pegmatite material, which varies at the regional and deposit scale. Due to the nature of its emplacement and associated magmatic fractional crystallisation, the skin of a pegmatite contacting the host rock is often physically and chemically unique to that of the coarse-grained spodumene-rich core. This finer-grained and often mineralogically variable material at the margins can lead to reduced recoverability of the spodumene compared to the coarser-grained spodumene in the interior of the pegmatite.

The local and regional chemical variation affects the deportment of lithium and associated deleterious elements. Lithia-bearing minerals such as petalite and/or lepidolite necessitate alternative treatment techniques to that of spodumene. In addition, the post-emplacement alteration of spodumene may impact processing performance and quality due to the pseudo-morphic replacement of spodumene with micaceous mineral assemblages.

Additional HQ diameter diamond drilling was undertaken in 2023 to further understand the results obtained in the 2021 diamond drilling. Generally fine grained spodumene bearing pegmatites have a higher Na_2O content than the metacrystic spodumene and in general, if Na_2O > 4% by assay, then Li_2O is < 0.4%. This relationship has been used to domain out the finer-grained spodumene, which from test work on 2021 samples, has recoveries between 30 to 40%. This is approximately half of that considered normal in the process plant-scale dense media separation process to upgrade spodumene to a commercial concentrate.

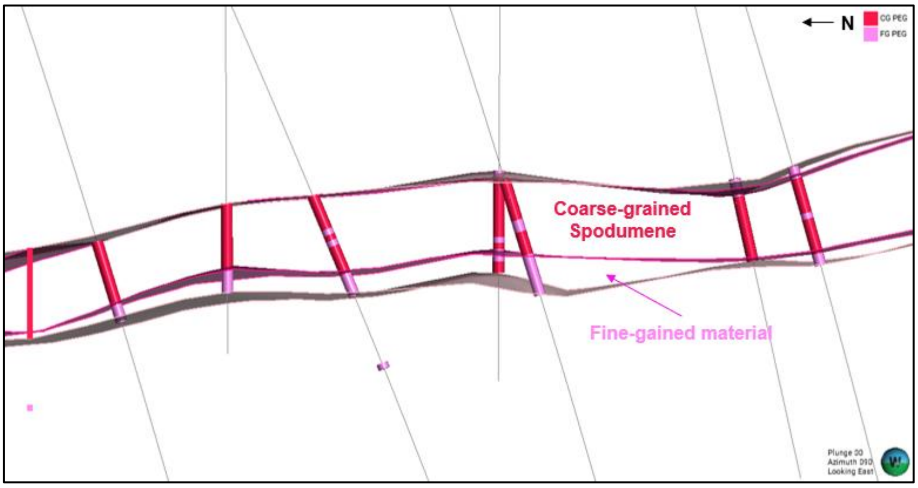
The 2023 geometallurgical drilling that was completed to inform the domains of the geometallurgical model is illustrated in Figure 7-9.



Modelled upper and lower pegmatites and 2023 metallurgical drilling.

Figure 7-9 Cross-Section Looking East

The geometallurgical model at Mt Cattlin sub-domains the physically and mineralogically unique areas within each pegmatite. This includes areas of varying lithia deportments, such as petalite-rich domains, plus the finer-grained material at the margins of the pegmatites (Figure 7-10).



Modelled pegmatite plus sub-domained, spodumene-rich core.

Figure 7-10 Cross-Section Looking East

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CHAPTER 8: DEPOSIT TYPE

8 DEPOSIT TYPE

Pegmatites form the host rock to the Li_2O and Ta_2O_5 mineralisation at Mt Cattlin. It is generally accepted that pegmatites form by a process of fractional crystallisation of an initially granitic composition melt. The fractional crystallisation concentrates incompatible elements, such as light ion lithophile elements and volatiles (such as B, Li, F, P, H_2O, and CO_2) into the late-stage melt phase. The volatiles lower the viscosity of the melt and reduce the solidification temperature to levels as low as 350 °C to 400 °C. This permits fractional crystallisation to proceed to extreme levels, resulting in highly evolved end-member pegmatites. The fluxing effect of incompatible elements and volatiles allows rapid diffusion rates of ions, resulting in the formation of very large crystals characteristic of pegmatites.

The less dense pegmatitic magma may rise and accumulate at the top of the granitic intrusive body. However, typically the more fractionated pegmatitic melt phases escape into the surrounding country rock along faults or other structures to form pegmatites external to the parent intrusive, which is the case at Mt Cattlin.

Highly fractionated pegmatites can occur many kilometres from the parent intrusion and are classified as LCT (lithium, caesium, tantalum) pegmatites (Wells et al., 2022). The fractionation trend with distance from the granitic source is shown diagrammatically in Figure 8-1 (London, 2008).

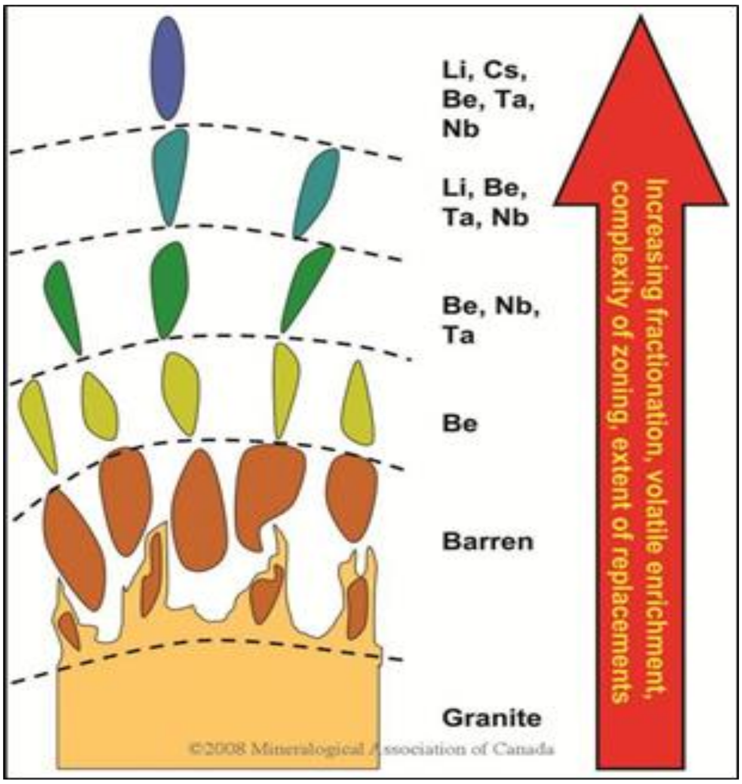

Figure 8-1 Chemical Evolution Through a Lithium-Rich Pegmatite Group with Distance from Granitic Source Intrusion (London, 2008)

Based on apparent mineral assemblages and textures, Mt Cattlin has been categorised as an albite-spodumene type with the LCT classification. Moreover, the relatively highly coarse nature of spodumene at Mt Cattlin compared to that of other LCT pegmatites in WA suggests that these pegmatites crystallised from a high-fluxing agent melt (Wells et al., 2022). Whole rock geochemistry and mineralogy at Mt Cattlin indicate a broad fractionation trend to the northeast. The broad change in mineralogy from spodumene only to spodumene + lepidolite towards the northeast may represent a residual concentration of volatile and incompatible elements in this direction (cf. Sweetapple, 2010).

Various types of internal zonation from the footwall to the hanging wall of the pegmatites, based on variations in mineralogy, grain size and fabric, are reported in the literature (London, 2008). While zonation is not strongly developed in the Mt Cattlin pegmatites, changes in mineralogy and grain size are recognised across the pegmatite in places. In addition, the characteristics of the Mt Cattlin pegmatites vary to some extent laterally and between the different pegmatite sheets. Late stage metasomatism of lithia, in proximity to both the later dykes and post-emplacement faults is recognised.

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CHAPTER 9: EXPLORATION

9 EXPLORATION

9.1 Exploration Work

Galaxy exploration activity is currently focussed on the Mt Cattlin mine lease north of Ravensthorpe in Western Australia. Other exploration has processed a regional understanding of lithia mineralisation in an extensive mature exploration package. Of these the Enduro and Baker Hills tenements and surrounds show the best proposition for lithia in spodumene as an exploration target. The district as a whole is prospective for lode hosted gold and copper mineralisation. Selective areas may be prospective for massive sulphide hosted nickel mineralisation, to the east.

In addition to drilling, various programs of surface geological mapping and sampling, remote sensing, and airborne and ground geophysics have been carried out over the Mt Cattlin mining lease and surrounding exploration leases.

9.2 Geological Exploratory Work

9.2.1 Geological Mapping

Various campaigns of geological mapping of the Mt Cattlin pegmatites and surrounding lithologies have been undertaken, including by Sofoulis (1958), WMC (Cameron and Ross, 1963), and by Pancontinental (Broomfield, 1990).

Dr. Mike Grigson of Arc Minerals conducted a regional mapping program of the Mt Cattlin area in 2010. The interpretative mapping was accompanied by rock chip sampling, which succeeded in identifying several sub-cropping pegmatite units in the area surrounding Mt Cattlin (Figure 9-2).

This regional mapping work has also been supported by various phases of petrological work by consultant Dick England and detailed costean mapping and ongoing mineralogical work completed by Dr Marcus Sweetapple, from 2010 to 2022. Results of this work have been used to develop the interpretative geological and metallurgical models which are currently being used by Galaxy at Mt Cattlin.

9.2.2 Surface Mapping and Sampling

Various campaigns of surface rock chip and soil sampling have been carried out over the area, undertaken by WMC in the 1960s and Pancontinental in the late 1980s (Broomfield, 1990).

Haddington Resources Ltd (Haddington) collected 84 soil samples in 2005 on a 200 m by 100 m grid pattern using a -1.5 mm sieve and collected approximately 200 g of fine soil from around 20 cm below surface (Young, 2005). The Haddington program defined a Li_2O soil anomaly over the area of sub-cropping pegmatite located to the east of Floater Road, in addition to the largely concealed pegmatite to the west of Floater Road. The Li_2O anomaly was further supported by anomalous results in elements Be, Sn, Rb and Cs, Ta and Nb.

Several surface sampling campaigns have been conducted over the Galaxy tenure since the recommencement of operations in 2016. A total of 3,725 surface samples with Li_2O and/or Ta_2O_5

assays have been recorded in the Galaxy exploration database and are displayed on the map presented in Figure 9-1. A total of 2,956 samples have been collected since January 2016, which included rock chip sampling, light vehicle-mounted auger sampling, handheld auger sampling, traditional surface soil sampling, and mobile metal ion (MMI) soil sampling.

Even though the regolith is disturbed by decades of broad acre cropping and fertiliser application, loam geochemical sampling provides good target generation and focus.

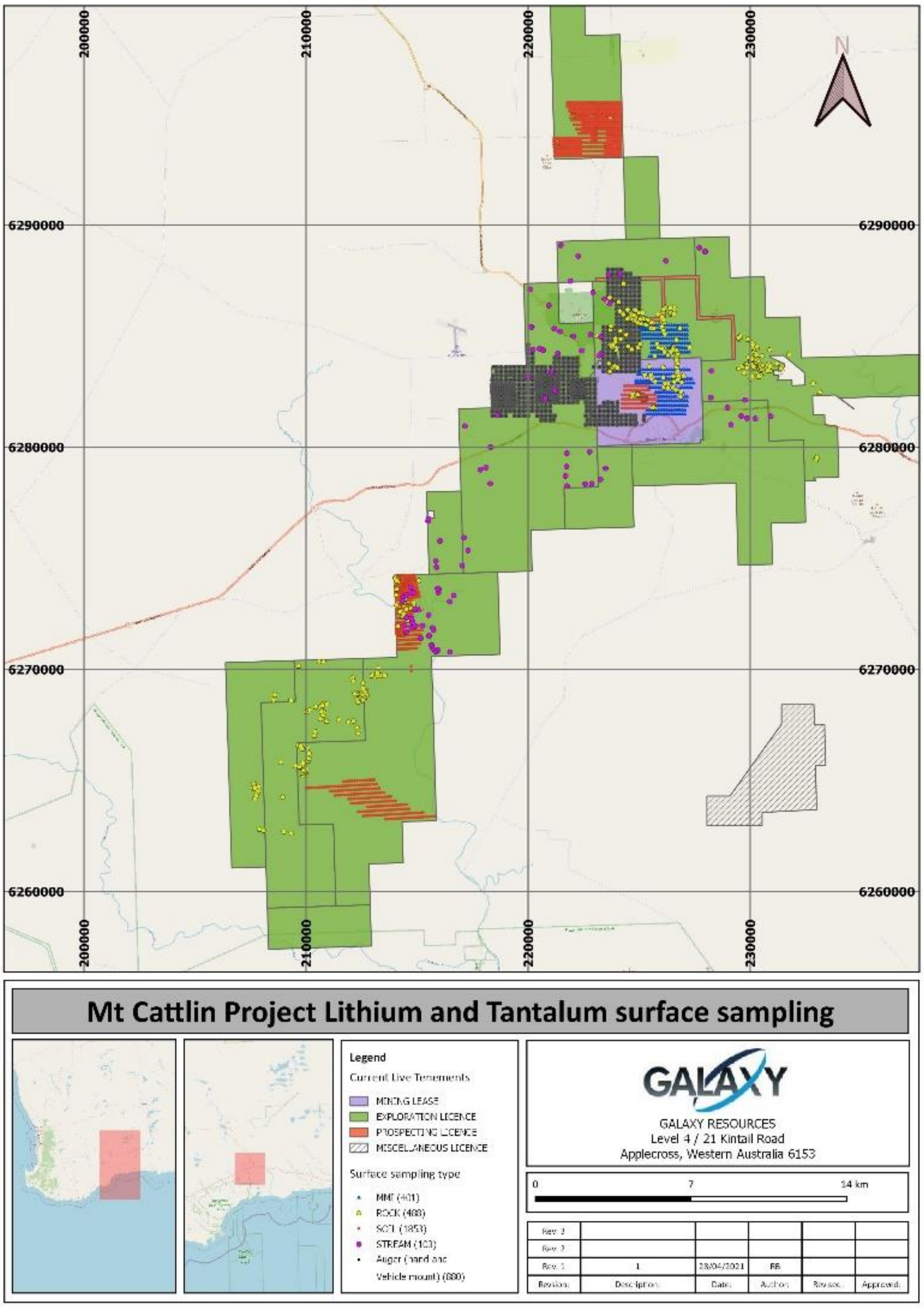

Figure 9-1 Regional Map Showing Various Surface Samples Collected Across the Mt Cattlin Tenements

Auger drilling systems were utilised where the surface soil had been disturbed by farming activities, with the samples collected at blade refusal, which ranged from 0.5 m to 1.5 m below surface. Approximately 300 g of un-sieved soil was collected from the end of the drillhole. The light vehicle mounted auger samples were collected on a 200 m by 200 m grid pattern with the locations presented in Figure 9-2.

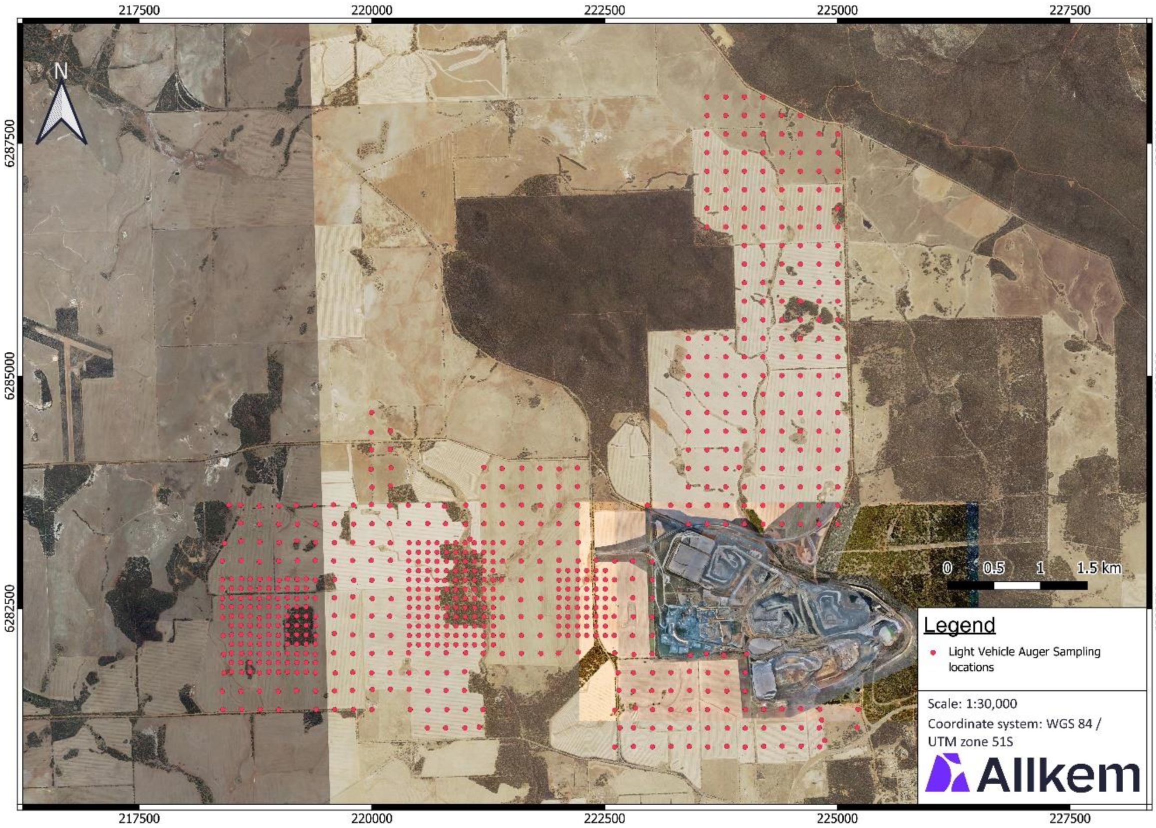

Figure 9-2 Light Vehicle-Mounted Auger Sample Locations

Traditional soil sampling techniques and MMI soil sampling was conducted over areas with an undisturbed regolith. Soil sampling grids were 200 m by 100 m for MMI and 100 m by 100 m for traditional soils. MMI samples were collected between 10 cm and 25 cm below surface, with the sample representing a composite over the 15 cm interval. Approximately 250 g to 350 g of un-sieved material was collected. Traditional soil samples were collected at an approximate sample depth of 20 cm below surface, and a -2 mm sieve was used to collect around 200 g of soil material.

Soil sampling in 2019 defined a moderate Lithium and Tantalum soil anomaly on tenement E74/379 and enabled a contour map of the calculated fractionation index to be developed (Figure 9-3). The anomaly was subsequently named as Mt Short Prospect. The Company has planned a future drilling program to test the anomaly in 2023/4.

Figure 9-3 Mt Short Contours of Calculated Fractionation Index from Soil Sample Assays

Rock chip sampling of outcropping pegmatites, 2 km north of Mt Cattlin, has returned highly anomalous tantalum values and elevated lithium values. Low to very low K/Rb element ratios indicated a highly fractionated pegmatite body (Figure 9-4).

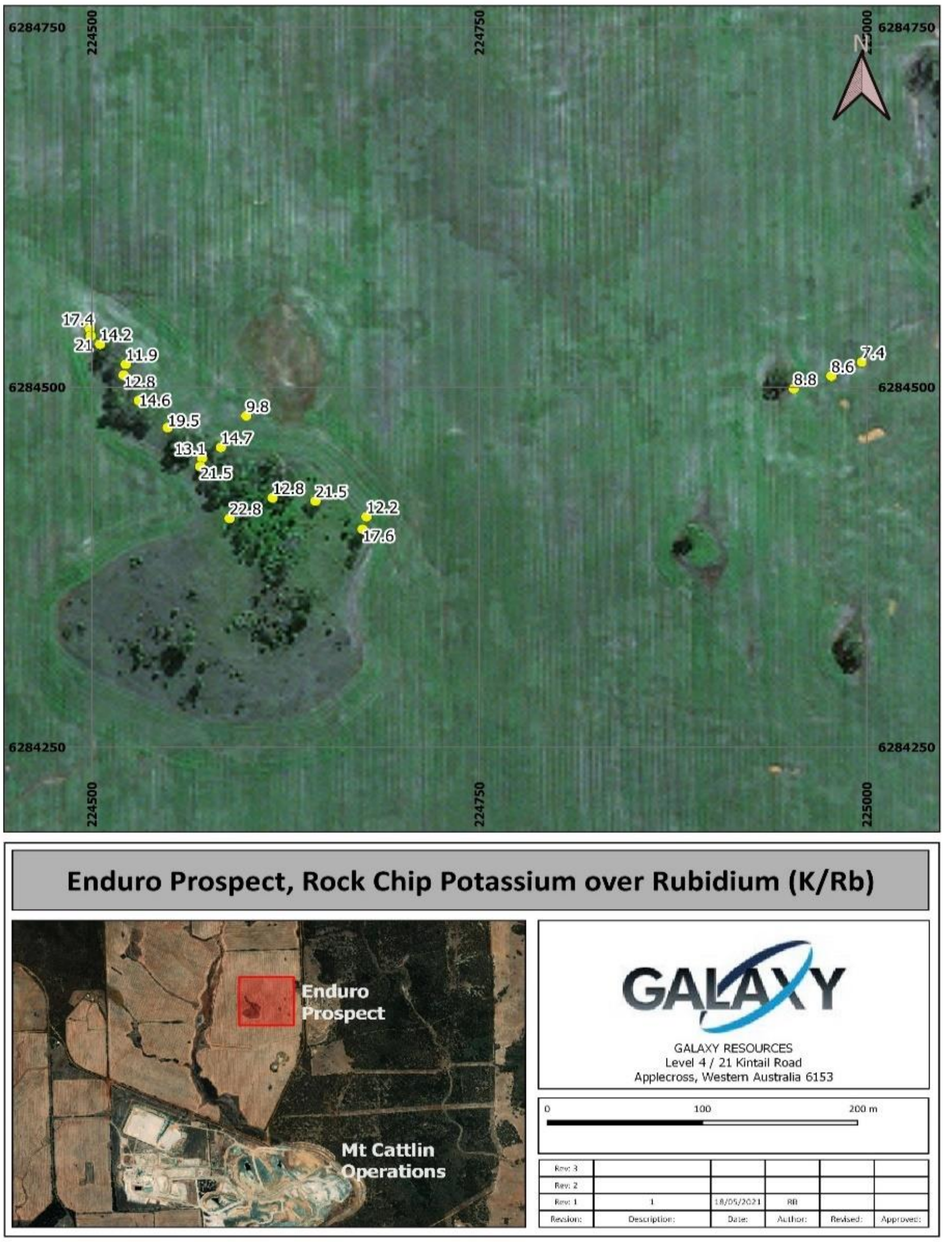

Figure 9-4 Enduro Prospect Location Map and K/Rb Ratios

This anomalous area was given the name Enduro Prospect and the target was further evaluated with drill testing. The completed drilling identified a quartz, albite spodumene muscovite pegmatite at depth. The best intercept recovered in the maiden program was 2 m at 1.45% Li_2O. In 2022/3 Galaxy conducted further drilling, and fourteen (14) new RC drillholes were completed over the Enduro Prospect for 1,785 m. The best intercept recorded was from ENRC 026 from 53 to 54 m at 1.59 % lithia. Whilst mineralised with typical LCT assemblages, Enduro is dominated by fine-grain size and alternation mineralogy.

9.2.3 Remote Sensing

Galaxy has acquired various types of remote sensing imagery over the Mt Cattlin tenements, including Landsat, Quickbird, and Pleiades. The Pleiades satellite imagery was acquired in May

2018, which was captured in July and August 2017 at a 50 cm resolution. The Pleiades image with overlying Galaxy tenements is shown in Figure 9-5.

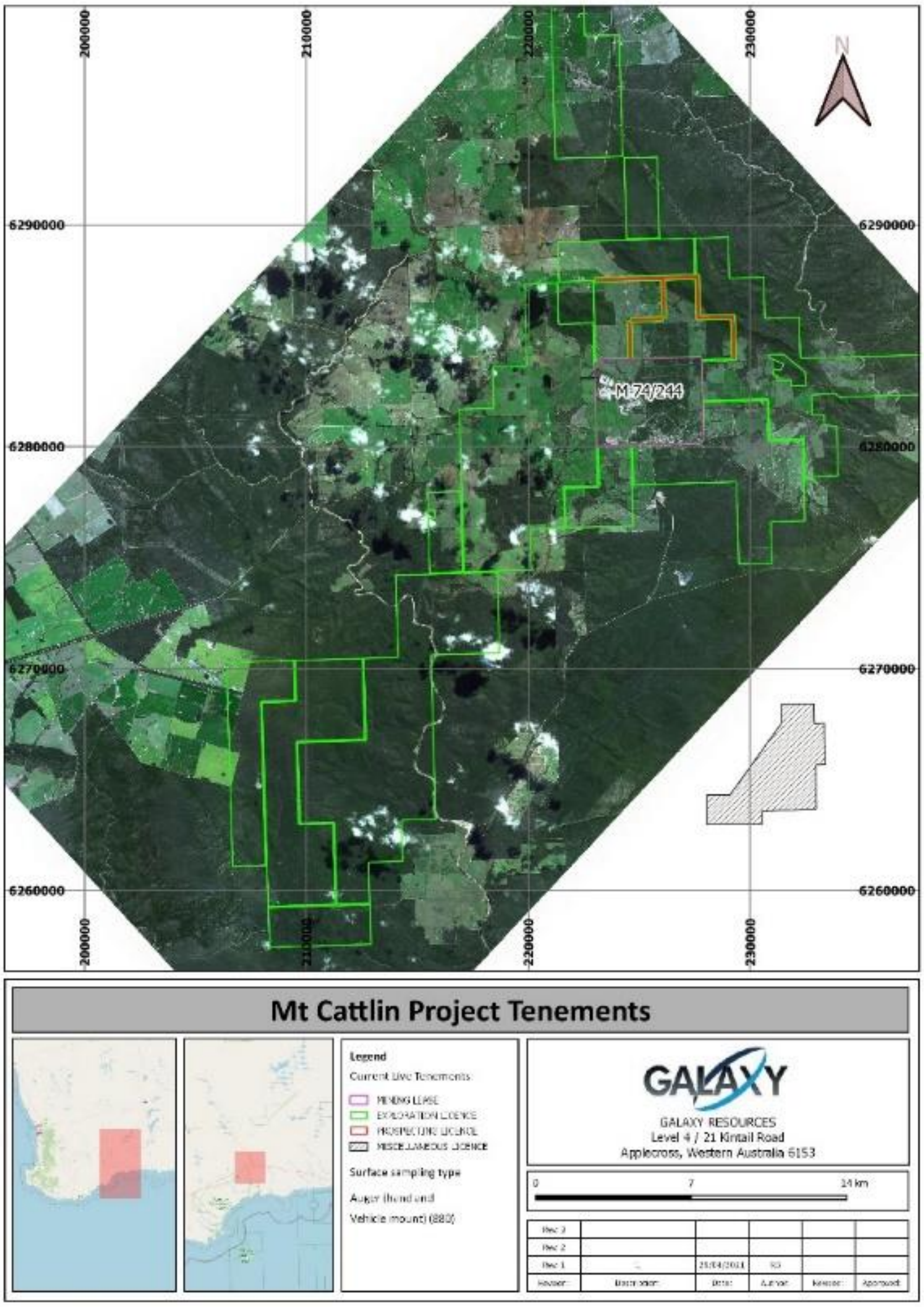

Figure 9-5 Pleiades Satellite Image with Overlying Mt Cattlin Tenements

9.2.4 Airborne Geophysics

Various airborne geophysical surveys have been flown over Mt Cattlin, including airborne magnetics, radiometrics and Versatile Time Domain EM (VTEM). In 2007, an airborne radiometric and magnetic survey was flown over a large area including Mt Cattlin by UTS Geophysics in conjunction with Pioneer Nickel, at a sensor height of 30 m on east-west lines at 50 m spacing.

A helicopter borne VTEM survey was also flown in 2007, by Geotech Airborne Ltd in conjunction with Pioneer Nickel. An image showing total magnetic intensity covering the Mt Cattlin area is shown in Figure 9-6.

These surveys did not directly detect lithium/tantalum mineralisation but assisted in the lithological and structural interpretation of the geology of the area.

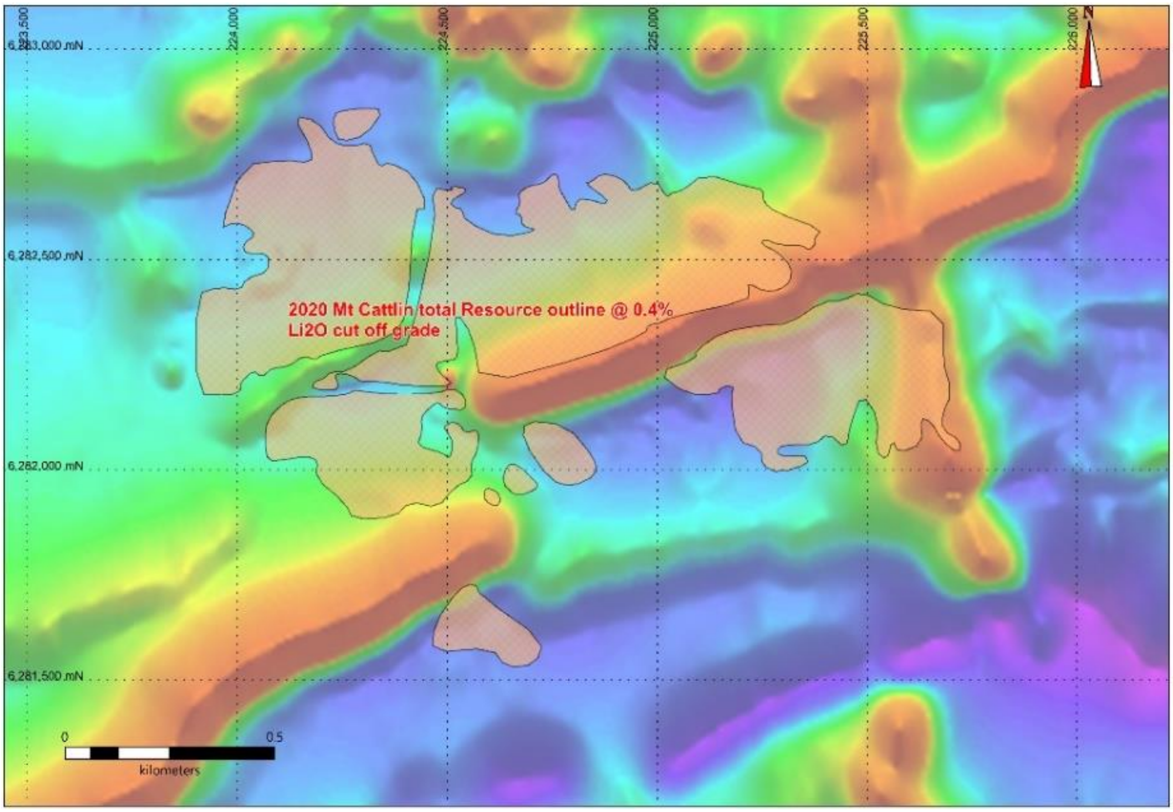

Figure 9-6 Aeromagnetic image of the Mt Cattlin area (TMI)

9.2.5 Ground Geophysics

In late 2010 Galaxy trialled 2D seismic reflection using HiSeis as a contractor. The seismic work crystalised the 2021−2022 resource infill program, when two of the reflectors could be clearly correlated with the two pegmatite orebodies in the Stage 4 development.

In October 2017, Galaxy conducted several ground geophysical surveys over their tenure including ground penetrating radar (GPR) and electrical resistivity imaging. In 2018 a large GPR survey was undertaken by Ultramag Geophysics (Figure 9-7).

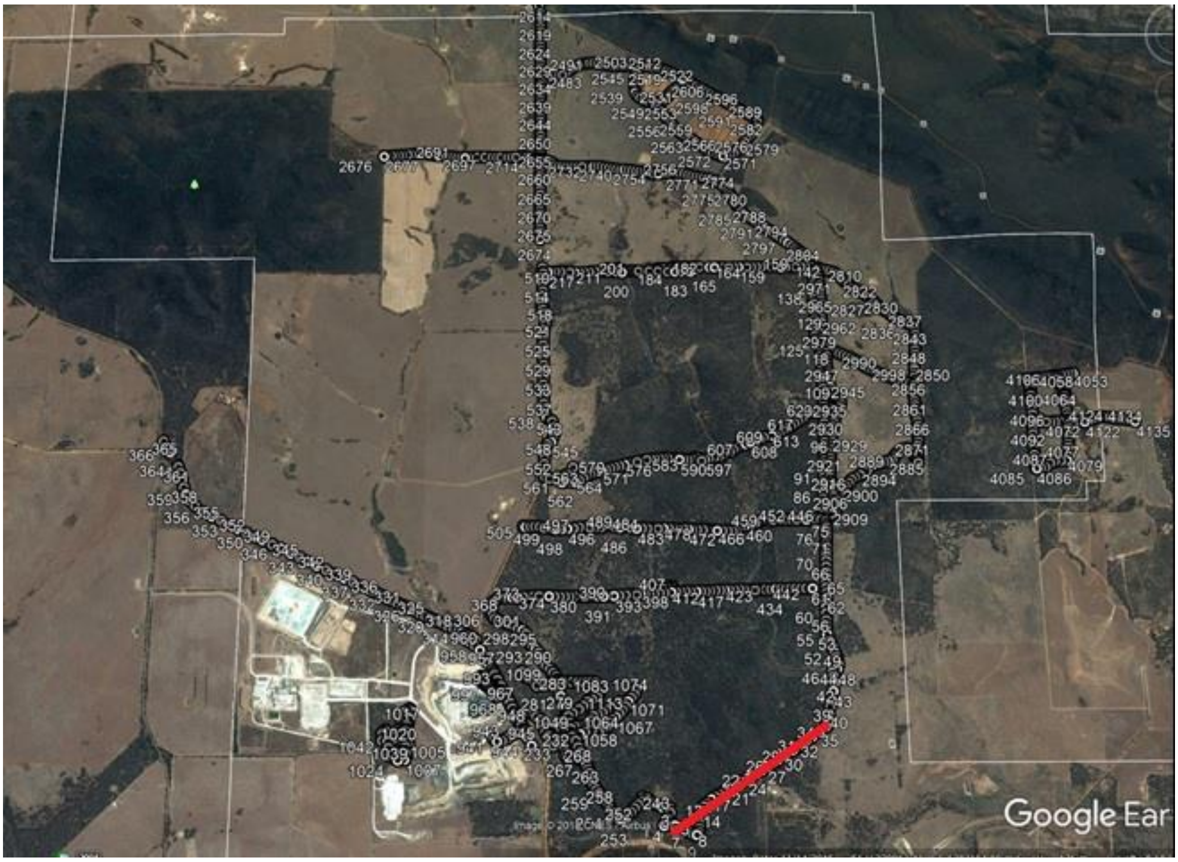

Figure 9-7 Ground Penetrating Radar Survey Location Plan with Profile Location Shown in Red

Several anomalies were identified from the GPR geophysical survey; however, drill testing of these anomalies have not identified any mineralised pegmatites to date. The technique has had moderate success in identifying pegmatites under cover, these are then routinely tested for lithia and associated geochemistry.

Core Geophysics (CORE) was contracted to complete an electrical resistivity imaging survey (ERI) at the Enduro Prospect and around the Mt Cattlin spodumene operation. The survey was completed in December 2020. The objective of the geophysical work was to image near-surface vertical variations in resistivity to aid the geological understanding. The survey was expected to map changes in resistivity across known pegmatites as a possible means for electrical discrimination.

9.2.6 Other Exploration

In 2010, Galaxy Resources consolidated several mining and prospecting leases at Mt Cattlin into a single mining lease, M74/244 which has a total area of 1,830 hectares.

Although Mt Cattlin is the only known major lithium/tantalum deposit in the Ravensthorpe region, other metal occurrences of copper and gold mineralisation are known within the Mt Cattlin mining lease and on adjacent properties. These occurrences have been the subject of historic, small-scale mining. The most important of these are the Mt Cattlin gold-copper mine, which is located approximately 1 km east-southeast of Mt Cattlin, Marion Martin 1.5 km south, Floater 1.5 km north, and Maori Queen 3.5 km northeast (Witt, 1998).

Various open file Department of Mines and Petroleum reports have shown that some small volume, potentially copper-gold resources, remain for these properties. They are currently not the subject of any active exploration or mining.

In 2016 Galaxy acquired Exploration leases E74/406, E74/399 and E74/379 from ACH Minerals (now Medallion Metals) where ACH retained the gold and copper rights over the tenure.

Projects to the west and south of the Mt Cattlin Project, including Bakers Hill, Floater and Sirdar to the north of Mt Cattlin have been explored by Galaxy for pegmatite-hosted lithium/tantalum mineralisation. Various programs of predominantly surface sampling, geological mapping and airborne geophysics have been carried out over the Floater, Sirdar and Bakers Hill tenements. Bakers Hill remains the locus of active exploration.

An RC program testing an outcropping pegmatite unit lying mainly on the Sirdar Project was completed in 2009. This work followed up results from significant pegmatite rock chip samples with assays up to 2.04% Li_2O. While the program encountered subsurface pegmatite, it was not successful in intersecting economic widths of mineralisation.

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CHAPTER 10: DRILLING

10 DRILLING

10.1 Geological Drilling

With regards to this section, all commentary, figures and data refer to the drilling within the extents of the Mineral Resource modelling export unless otherwise stipulated. The extents of the Mineral Resource modelling are mapped in various exports (Figure 10-1) in the Map Grid of Australia (MGA), 1994 co-ordinate system.

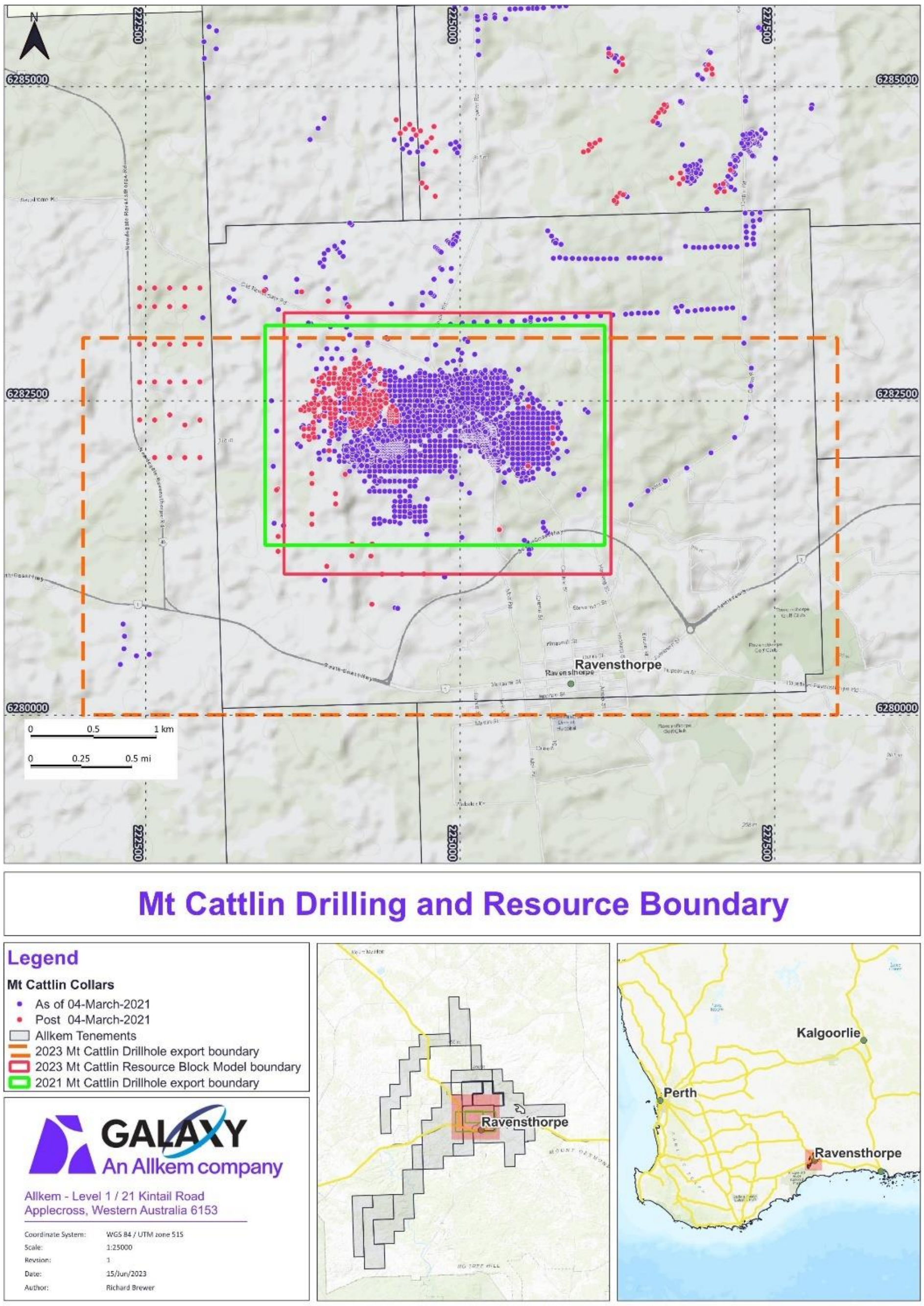

Figure 10-1 Map of the Resource Modelling Export Extents

Samples in the drilling database have been collected using a combination of diamond core (DD), reverse circulation (RC), reverse circulation with diamond drill tails (RC-DD), rotary air blast (RAB) and unspecified open-hole (OH) drilling methods. Data from previous owners has been incorporated into the Mineral Resource database, however the vast majority of data has been generated during Galaxy drilling programs (Table 10-1).

Table 10-1 Details on Drilling Database Data within the Resource Export Extents

Company	Years	Type	Hole-ID	# Drillholes	Total Metres
Greenstone	*1996*	*DD*	*GD018 - GD020*	*3*	*698.5*
Pancon	*1988–1990*	*RC/OH*	*CCP040/000 - CCP720/860*	*120*	*2,627*
Greenstone	*1996?*	*RC*	*GRC060-GRC091, GRC247-GRC254*	*38*	*947*
Metana	*1998?*	*DD*	*RR0095 - RR0131*	*12*	*422*
Haddington	*2001*	*RC*	*CCC10 - CCC58*	*49*	*1,042*
Haddington	*2001*	*DD*	*CCM1 - CCM9*	*9*	*118.56*
Galaxy	*2001*	*RC*	*GX001 - GX141*	*126*	*7,803*
Galaxy	*2001*	*RAB*	*GX220 - GX241, GX297-GX299*	*23*	*402*
Galaxy	*2001*	*DD*	*GXD01 - GXD06*	*6*	*336.4*
Galaxy	*2007*	*RC*	*GX450 - GX799*	*341*	*13,994*
Galaxy	*2007*	*DD*	*GXD09 - GXD13*	*5*	*196.2*
Galaxy	*2008*	*RC*	*GX800 - GX909*	*110*	*6,502*
Galaxy	*2008*	*DD*	*GXMCMTD01-06, GXMCGTD01-04*	*11*	*433.7*
Galaxy	*2009*	*RAB*	*MB01 - MB06 (Water Monitoring Bores, no assays)*	*6*	*284*
Galaxy	*2009*	*RC*	*GX910 - GX1065(ex GX952, GX953)*	*154*	*9,225*
Galaxy	*2008–2017*	*RAB*	*WTD01 - WTD11, WTD13 - WTD17, 'WTD20 - WTD20C, WTD21 - WTD23, WTD25, WTD28-WTD31, WTD34 (water related holes, no assay data)*	*26*	*2,427.80*
Unrecorded	*Unrecorded*	*RC*	*MISC4 - MISC9*	*9*	*710*
Galaxy	*2010–2011*	*RC GC*	*G0050 - G1392*	*1,219*	*45,178*
Galaxy	*2010*	*RC*	*GX1066, GX1076 - GX1128*	*55*	*4,867*
Galaxy	*2010*	*DD*	*GXD014-GXD018*	*5*	*390*
Galaxy	*2010*	*RC GC*	*G1A238001 - G1A238048*	*99*	*2,551*
Galaxy	*2010*	*RAB*	*TS1*	*1*	*17*
Galaxy	*2012*	*RC*	*GX1129 - GX1168*	*40*	*3,258*
Galaxy	*2016*	*DD*	*MTCDD1 - MTCDD6, and MTCDD1W1*	*7*	*3,852*
Galaxy	*2017*	*RC GC*	*GC1A001 - GC1A022*	*6*	*324*
Galaxy	*2017*	*RC*	*GX1169 - GX1191*	*23*	*1,332*

Company	Years	Type	Hole-ID	# Drillholes	Total Metres
Galaxy	*2017*	*DD*	*NEGEO001 - NEGEO002; NEHQ001, NEMT001 - NEMT003*	*6*	*335*
Galaxy	*2017*	*RC*	*NWST001 - NWST012*	*13*	*969*
Galaxy	*2017*	*RC*	*PITST001 - PITST005; PITST006 - PITST0010*	*9*	*450*
Galaxy	*2017*	*DD*	*SEHQ001 - SEHQ003*	*3*	*122*
Galaxy	*2017*	*DD*	*SWMET001 - SWMET004*	*4*	*269*
Galaxy	*2017*	*RC*	*SWRC001 - SWRC072*	*54*	*3,919*
GXY	*2018*	*RC*	*FBRC001 - FBRC014*	*14*	*1,400*
Galaxy	*2017–2018*	*RC GC*	*1EGC001-1EGC084*	*41*	*1,145*
Galaxy	*2017–2018*	*RC*	*NERC005 - NERC170*	*94*	*6,806*
Galaxy	*2017–2018*	*RC-DD*	*NERCDD020 - NERCDD168*	*9*	*561*
Galaxy	*2017–2018*	*RC GC*	*SWGC001 - SWGC742*	*384*	*8,993*
Galaxy	*2017–2018*	*RC*	*GXY060 - GXY259*	*47*	*2,326*
Galaxy	*2018–2019*	*RC, RC-DD*	*NWRC001 - NWRC086*	*87*	*14,760*
Galaxy	*2018–2020*	*RC GC*	*SEGC0003 - SEGC0615*	*343*	*9,504*
GXY	*2018*	*RC*	*STRC011*	*1*	*174*
Galaxy	*2018*	*RC GC*	*1FGC0001 - 1FGC0145*	*138*	*6,707*
Galaxy	*2018*	*DD*	*DIV-H01 - DIV-H02*	*2*	*60*
Galaxy	*2018*	*RC*	*DPSTRC001 - DPSTRC007*	*7*	*570*
Galaxy	*2018*	*RC-DD*	*GXYDD254*	*1*	*69*
Galaxy	*2018*	*DD*	*NEMT003 - NEMT005*	*2*	*92*
Galaxy	*2018*	*DD*	*SEDD081 - SEDD274*	*16*	*367*
Galaxy	*2018*	*DD*	*SEMT001*	*1*	*29*
Galaxy	*2018*	*RC*	*SERC002 - SERC254*	*133*	*7,799*
Galaxy	*2019*	*RC*	*SWRC073 - SWRC083*	*13*	*2,227*
Galaxy	*2019*	*RC*	*GPRC029*	*1*	*44*
Galaxy	*2020*	*RC GC*	*NEGC0001 - NEGC0019*	*19*	*769*
Galaxy	*2021*	*RC-DD*	*GTNW01-GTNW06*	*6*	*747*
Galaxy	*2021*	*RC, RC-DD*	*NWRC087 - NWRC0114*	*28*	*3,363*
Galaxy	*2022*	*RC-DD*	*GTNW07 - GTNW09*	*3*	*650.7*
Galaxy	*2022*	*RC, RC-DD*	*NWRC115 - NWRC252*	*246*	*49,249*
Galaxy	*2022*	*DD*	*NWDD001 - NWDD004*	*4*	*1,031*
Galaxy	*2022*	*RC*	*NWGC001 - NWGC069*	*47*	*2,288*
Galaxy	*2023*	*RC*	*NWGC079 - NWGC145*	*58*	*4,169*
Galaxy	*2022*	*RC*	*MB13 - MB20 (Water Monitoring)*	*8*	*800*

Company	Years	Type	Hole-ID	# Drillholes	Total Metres
Galaxy	*2022*	*RC*	*WTD 21A (Water Related)*	*1*	*100*
Galaxy	*2022*	*RC*	*SWRC089*	*1*	*314*
Galaxy	*2023*	*RC*	*SWRC091-SWRC105, SWRC107*	*16*	*3,942*

Details of the drilling completed outside the resource modelling export are provided in Table 10-2.

Table 10-2 Details for Other Exploration Drilling External to the Resource Export Extents

Company	Years	Type	Hole-ID	# Drillholes	Total Metres
AMOCO	*1978*	*DD*	*KRP-78-4, WA-78-D5, WA-78-D6, WA-78-D8, WA-78-D10-WA-78-D12*	*7*	*1,469.76*
NORSEMAN	*1982*	*RC, RC-DD*	*NFED-H1 - NFED-H8*	*9*	*873.7*
Metana	*1998*	*RC*	*RR0001 - RR0050*	*50*	*1334*
Metana	*1998*	*DD*	*RR0051 - RR0153*	*88*	*4,501.30*
GXY	*2009, 2010*	*RAB*	*WTD11, WTD12, WTD18, WTD19, WTD24, WTD26 - WTD27*	*7*	*695*
GXY	*2009*	*RC*	*GSC001 - GSC021*	*19*	*919*
GXY	*2010*	*RAB*	*MB1 - MB3 (Water monitoring bores)*	*3*	*134*
Galaxy	*2009*	*RC*	*GX952, GX953*	*2*	*89*
GXY	*2010*	*RC*	*GX1067 - GX1075*	*9*	*356*
Metana	*2010*	*RC*	*MMC002 - MMC068*	*56*	*5,038*
GXY	*2016*	*RAB*	*GX262*	*1*	*9*
KINGSTON	*2017*	*RC*	*KRRC001 - KRRC019*	*19*	*1,044*
GXY	*2018*	*RC*	*244M001 - 244M013*	*13*	*1,303*
GXY	*2018*	*RC*	*400EX001 - 400EX008*	*8*	*800*
GXY	*2018*	*RC*	*401EX001 - 401EX038*	*41*	*4,037*
GXY	*2018*	*RC*	*BHRC001 - BHRC019*	*19*	*1,024*
GXY	*2018*	*RC*	*FBRC015 - FBRC068*	*54*	*5,453*
GXY	*2018*	*RC*	*GPRC001 - GPRC024*	*25*	*3,122*
GXY	*2018*	*RC*	*STRC001 - STRC010, STRC012 - STRC016*	*15*	*1,833*
GXY	*2019*	*RC*	*ENRC0001 - ENRC0015*	*15*	*1,366*
GXY	*2019*	*RC*	*GPRC025 - GPRC028*	*4*	*480*
GXY	*2019*	*RC*	*OSRC0001 - OSRC0006*	*6*	*630*
GXY	*2019*	*RC*	*RFRC0001 - RFRC0006*	*6*	*558*

Company	Years	Type	Hole-ID	# Drillholes	Total Metres
GXY	*2019*	*RC*	*SWRC084 - SWRC088*	*5*	*630*
GXY	*2019*	*RC*	*WEBRC001 - WEBRC003*	*3*	*127*
TRAKA	*2020*	*RC*	*RAGC031 - RAGC036*	*7*	*378.3*
Galaxy	*2023*	*RC*	*MCRC001 - MCRC028*	*28*	*3,330*
Galaxy	*2023*	*RC*	*SWRC090 - SWRC090A, SWRC106*	*3*	*793*
Galaxy	*2023*	*RC*	*DVRC001 - DVRC003*	*3*	*465*
Galaxy	*2023*	*RC*	*ENRC016 - ENRC029*	*14*	*1,785*
Unrecorded	*Unrecorded*	*RC*	*SRC001 - SRC015*	*15*	*737*
TRAKA	*Unrecorded*	*RC*	*RAGC001 - RAGC030*	*55*	*2,406*
Unrecorded	*Unrecorded*	*RAB*	*MSR092 - MSR178*	*15*	*192*
GXY	*Unrecorded*	*RAB*	*GX160 - GX281*	*86*	*1,545*

10.1.1 RC Drilling

Drilling from 2001 onwards has been undertaken by Galaxy, however a prolonged period of care and maintenance from 2012 to 2017 has led to two distinct phases of exploration/resource drilling and grade control drilling. Phase 1 drilling was completed prior to 2016, while Phase 2 drilling was completed during and after 2016.

Mineralised pegmatite lenses at Mt Cattlin are generally sub-horizontal with gentle undulations and are largely isotropic in the horizontal plane. Drill traverses are generally aligned perpendicular to the mineralised trend, with mostly vertical drillholes completed.

10.1.1.1 Prior to 2016 – Phase 1

Drilling completed by Galaxy prior to 2016 were dominated by RC drillholes. In general, samples for assay analysis were collected using a riffle splitter, with a cone splitter used for later drilling programs.

During the 2007 field season, samples were collected from the RC drilling via a conventional rig mounted cyclone and bag system, and subsequently split in this instance through a 25/75 two stage riffle splitter for final sample separation in the field. Samples were collected at 1 m intervals.

During the 2008 drilling campaign, samples were collected at 1 m intervals in plastic bags via a conventional rig mounted cyclone and bag system, and subsequently split. Samples were triple-tier riffle split directly from the cyclone into calico bags which reduced the sample size to approximately 2 kg to 4 kg, suitable for laboratory submission.

From 2009 a cone splitter was used on the RC rig, with samples split directly from the cyclone into calico sample bags where the sample size was reduced to 12.5% of the original size producing a 2 kg to 4 kg sub-sample.

RC chips were geologically logged and pegmatite intervals, together with an additional 1 to 2 m zone of country rock either side of the logged pegmatite, despatched for assay analysis.

RC drilling carried out by Galaxy in 2001 and 2007 to 2008 was completed using a 4 5/8-inch conventional face-sampling hammer. During 2009 and 2010 the hammer diameter decreased slightly to 5 1/4-inch.

Sample recovery estimates of RC drilling from the start of 2008 to 2011 was routinely recorded using the measured weight of the split sample, which was collected in a calico bag, however during the period 2007 to 2009, the entire sample from selected drillholes was weighed. Sample recovery from the 2001 RC drilling was reported to be generally average to good, with greater than 80% recovery except when high flow rates of water were encountered.

Historical sample recovery for Pancontinental RC drilling was also reported to have been acceptable at around 80% (Broomfield, 1990).

10.1.1.2 Post 2016 – Phase 2

RC drilling has typically been undertaken using a 5 1/4-inch diameter bit. RC chips have been geologically logged and representative samples stored in chip trays for later validation against assays and general reference.

Samples selected for assay comprise all pegmatite intervals and extends a minimum of 3 m into the adjacent waste rock, both above and below the pegmatite intersection. Oxidation horizons and water tables are also logged using the Galaxy standard lithological and mineralogical observations codes.

A review of the geological logging and sampling procedures was completed by the Qualified Person (QP), while drill rigs were onsite at the time of the various on-site inspections. The Standard Operating Procedures (SOPs) for RC geological logging and sampling have also been reviewed.

Since 2016, sample recovery has been recorded for selected exploration and resource drillholes using a qualitative estimation method. Recovery is routinely accepted to be very good and is reflected in the fact that 98.5% of recorded intervals are noted to have very good recovery at greater than 80%.

10.1.2 Diamond Drilling

Diamond drilling has been undertaken sporadically throughout the life of the Project, typically drilled for metallurgical and geotechnical purposes in addition to geological requirements. The majority of the Galaxy diamond core has been drilled at HQ or PQ size, with several NQ sized diamond drillholes completed in 2016, testing the deepest extents of the pegmatites.

Within the Mt Cattlin Mineral Resource estimate data extent, diamond core samples comprise approximately 3% of all samples.

In total, 46 diamond drillholes have been historically geotechnically logged by either in-house geologists or external geotechnical consultants.

10.1.2.1 Prior to 2016 – Phase 1

Diamond drilling was carried out for metallurgical and geotechnical purposes, in addition to geological purposes, and all Galaxy drill cores were either HQ or PQ size. All angled diamond holes drilled by Galaxy were orientated, using either the Ezy-Mark tool or more recently the Reflex ACT electronic orientation tool.

Diamond core drilled by Galaxy was collected from the rig by Galaxy personnel, then orientated and marked with metre marks. The core was then photographed both wet and dry before being geologically logged.

Core was sampled on an average interval of around 1 m to geologically consistent boundaries. Pegmatite intervals and an additional 1 m to 2 m of waste above and below the pegmatite were sampled. Quarter core samples were collected from HQ and PQ core after being cut with a diamond saw, whilst half-core was occasionally sampled.

Prior to cutting, drillholes GXMCGTD01-04 and GXD014-018 were also geotechnically and structurally logged by Geologists from the Geotechnical consultancy Dempers and Seymour Pty Ltd. (Dempers, 2008).

10.1.2.2 Post 2016 – Phase 2

Diamond core drilled by Galaxy has been collected from the drill rig by Galaxy personnel, orientated and marked with metre marks. Bottom of drillhole orientation lines have been marked up on the diamond core of angled drillholes, using the orientation marks provided by the drillers. Detailed geological and lithological logging of the diamond core has been undertaken before the core has been photographed (wet and dry) and sampled.

Between 2016 and 2019, core samples have been typically sampled as 1 m half-core samples, however after 2019 diamond core was typically sampled as whole core and the sample length reduced to 0.5 m in order to keep the weight of the sample to between 2 kg and 4 kg.

The 2021 geotechnical drillholes have been geotechnically logged by an external consultant from MineGeotech Pty Ltd.

The 2022 geotechnical drillholes have been geotechnically logged by an external sub-consultant from Entech Pty Ltd and test work completed as reported elsewhere in this document.

10.1.3 Grade Control Drilling

All recorded Grade Control (GC) drilling is of the RC type. Drillhole depths are predominately in the 12 m to 50 m range in depth.

The vast majority of GC drilling has been undertaken as vertical drillholes since this is the most appropriate orientation for the predominately sub-horizontal pegmatites, however more recent GC programs have incorporated angled drillholes, designed to drill orthogonal to the pegmatite body in line with best practice.

10.1.3.1 Prior to 2016 – Phase 1

Grade control logging practices prior to 2016 were not documented and it has been assumed that these programs were run in accordance with industry standard practices. This GC drilling consisted entirely of RC drilling and was completed by either InterCept Drilling or TDS Drilling.

10.1.3.2 Post 2016 – Phase 2

After 2017, grade control practices have largely been in line with the routine resource development and exploration drilling practices employed by Galaxy. Logging templates and logging codes are consistent across all groups with some differences in quality control procedures which are documented in Chapter 11: Sample Preparation, Analyses and Security. Cone splitters have been in use throughout all GC drilling on site.

To aid ore categorisation for mining and processing, the lithium mineralisation has been categorised by mineralogy and colour during logging. Spodumene abundance has been separated into the colour categories: dark green, medium green, green, pink, and white. Lepidolite abundance has been logged separately, while the presence of holmquistite, a lithium bearing waste mineral, and cookeite, a green altered spodumene with low-lithium content, have been individually recorded.

GC drillhole spacing has been variable over time ranging from 10 m by 10 m and 15 m by 15 m patterns, in the early years. After 2018, the GC drillhole spacing increased to 20 m x 20 m in the majority of areas, however some areas of complex geology have been drilled to 10 m by 15 m or 10 m by 10 m in order to obtain more close-spaced geological information for mining (Figure 10-2).

At the end of 2022 the drill program had infilled earlier drilling to a 40 x 40 m spacing, with minor 20 x 20 m spacing in the undepleted parts of the SW zone.

10.2 Hydrological Drilling and Sampling

Prior to 2018, Galaxy had completed 32 water bores for 2,712 m of vertical drilling related to water bores, water table monitoring of tails storage facilities, and water quality monitoring.

In 2022 a further nine (9) vertical monitoring bores for 900 m where developed. Groundwater at Mt Cattlin is hyper-saline and developed in an extensive fracture controlled un-confined aquifer. Limited proportions of this are treated by reverse osmosis to potable water standards and subject to regular regulatory checks.

10.3 Geotechnical Drilling

In 2022, four (4) targeted geotechnical diamond holes were completed to support the 2NW Ore Body and open pit development. These total 1,031 m of diamond drill core.

10.4 Survey Grid Details

All the location data presented in this report has been supplied by Galaxy in MGA94 Zone 51 projection coordinates, based upon the GDA94, Geodetic Datum of Australia, with elevations relative to the Australian Height Datum (AHD).

10.5 Drillhole Collar Surveys

Drillhole collars from companies prior to Galaxy were surveyed by various companies. Elevations that were not available for some of the historical drilling, have been estimated from an accurate surface elevation model for use in the corporate drillhole database.

Since 2008, all planned drill collars have been pegged in the field using a handheld GPS. After drilling, collars have been routinely surveyed using more accurate techniques.

In 2021 and 2022 collars were pegged by Mine Site surveyors using RTK precision survey equipment.

10.5.1 Prior to 2016 – Phase 1

Collars from the 2008 Galaxy RC and diamond drill programs were picked up by Cardno Spectrum Survey, using a Real Time Kinematic (RTK) GPS instrument, with accuracy to ±0.025 m.

From 2008 to February 2010, collar surveying was completed by Dave MacMahon Surveys Pty Ltd, using an RTK GPS instrument, with an accuracy to +/- 50 mm.

From February 2010 to closure, all resource drilling collars were surveyed by Galaxy survey staff from the Mt Cattlin operation, using a Trimble R6 GPS system which is accurate to +/- 20 mm or an RTK GPS instrument.

10.5.2 Post 2016 – Phase 2

Once Mt Cattlin reopened in 2016, all drillhole collars have been surveyed by Galaxy Survey personnel exclusively, using either a Trimble R6 GPS system, which is accurate to +/- 20 mm or an RTK GPS accurate to +/- 3 mm.

Galaxy Exploration drillhole collars are typically surveyed with Hand-Held GPS or DGPS units, with accuracies of +/- 10 m and +/- 50 cm respectively.

All 2021−2013 exploration and development drillholes have been surveyed by an on-site mine surveyor using an RTK GPS upon request by the Exploration Manager. Detailed topography by 3D photogrammetry was flown by drone aerial survey to support collar and site landform elevation determination by Rocketmine WA Pty Ltd in February 2023.

10.6 Downhole Surveys

Most resource drillholes at Mt Cattlin are vertical and relatively shallow, with an average depth of 46 m. Within the resource modelling export extent, 3,480 drillholes have no recorded downhole survey, of which 100 drillholes have a collar dip between -85° and -53°.

10.6.1 Prior to 2016 – Phase 1

During 2009 and early 2010, Surtron Technologies Australia Pty Ltd of Welshpool completed downhole surveying of selected RC and DD drillholes to investigate drillhole deviation. The program surveyed a total of 71 drillholes using an electronic multi-shot instrument. As a cross-check on the electronic multi-shot surveys, 25 of the same drillholes were also surveyed with a gyroscope.

The investigation concluded there was minimal deviation to a depth of 50 m, with the results being generally within 2 m horizontally of the planned location at the bottom of drillhole. At depths greater than 100 m, drillhole deviation was seen to increase up to 4 m horizontally. The outcome of the project was the recommendation that downhole surveying continue to be used in all future drilling programs.

The majority of drillholes greater than 100 m in depth, and all Galaxy DD drillholes within the resource modelling export extent were surveyed using either a multi-shot instrument or gyroscope.

10.6.2 Post 2016 – Phase 2

Following the recommencement of activities at Mt Cattlin in 2016, the majority of inclined drillholes, other than GC drillholes, have been downhole surveyed by either a multi-shot instrument or gyroscope, undertaken by the respective drilling companies.

The majority of drillholes in the Northwest Area (NW) drilled since 2016 have been gyroscopically surveyed by Gyro Australia, Kinetic Surveys or the relevant drilling company.

In 2022 Devicloud methodologies were used for all the RC drilling, while Reflex downhole tools were used in diamond and RC pre-collar/diamond hole drillholes, by the relevant drilling company.

No downhole surveying has been undertaken in GC drillholes, due to their short length and vertical orientation.

10.7 Drillhole Data and Database

The drillhole dataset within the Mineral Resource estimate extents contains 3,956 drillholes for a total of 181,895.45 m. Summary drillhole details have been provided for all drilling inside the resource limits in Table 10-3 and for all other Mt Cattlin tenements in Table 10-4.

Table 10-3 Summary Drillhole Data within the Resource Extents

Hole Type	Avg (m)	Count	Total (m)
RC	*79.0*	*2,825*	*223,197*
RABR	*55.9*	*5,651*	*3,131*
DDH	*86.6*	*9,697*	*8,319*
RC_DD	*114.6*	*4,718*	*5,390*
PC	*21.9*	*120*	*2,627*

Table 10-4 Summary Drillhole Data for all Mt Cattlin Tenements

Hole Type	Avg (m)	Count	Total (m)
RC	*81*	*494*	*40,037*
RAB	*23*	*112*	*2,575*
DDH	*63*	*63*	*5,971*
RC_DDT	*97*	*9*	*874*

10.7.1 Drillhole database

Prior to 2017, drillhole data was collated and stored in a Microsoft Access Database and later in a Microsoft SQL database as a Micromine GBIS database.

In 2017, a new Microsoft SQL database was built using the Maxwell Geoservices (Maxwell) DataShed database and associated software. The compilation was performed and managed by Maxwell until January 2019 when Galaxy employed an in-house database administrator.

From 2017 onwards, field geological logging data has been predominantly captured using the Maxwell LogChief logging program, which is then transferred directly to the main SQL database. LogChief logging templates are consistent between exploration and GC drilling programs, with the exception of quality control sampling for which there are slightly differing methodologies.

Site surveyed collar pickups and drillhole downhole survey data have been loaded and validated by an individual data file for each drillhole started into the offsite database by the Allkem database administrator.

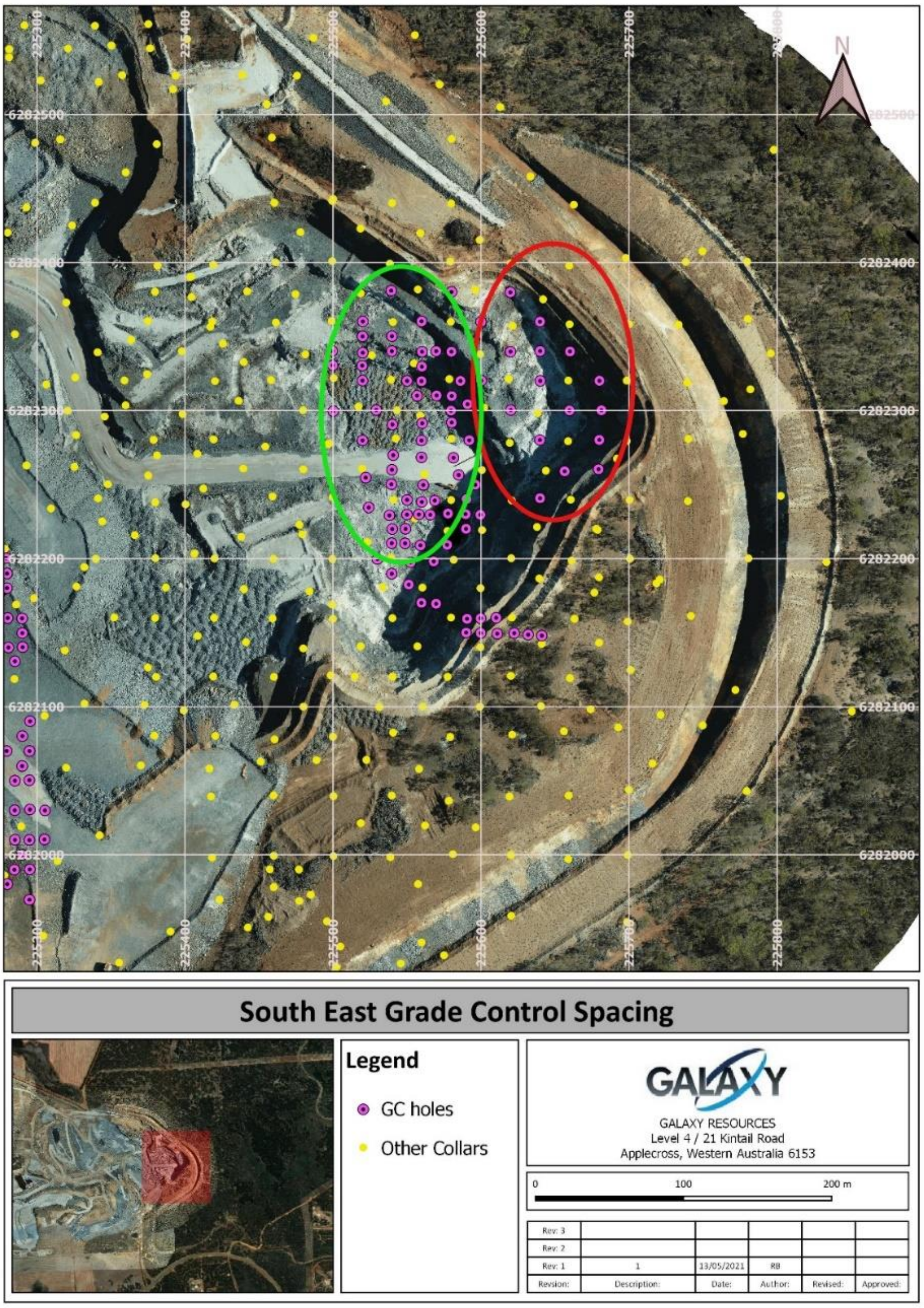

Figure 10-2 Map of Variable Grade Control Drillhole Spacing in the SE Pit

To June 2023, 105 new vertical grade control drillholes were completed for 6,457 m, post the 2022 MRE estimate, to reduce data spacing to approximately 20 x 20 m spacing to support operational ore selectively and material dispatch.

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CHAPTER 11: SAMPLE PREPARATION, ANALYSES AND SECURITY

11 SAMPLE PREPARATION, ANALYSES AND SECURITY

Drilling from 2001 onwards has been undertaken by Galaxy however, a prolonged period of care and maintenance from 2013 to 2017 has led to two distinct phases of exploration, resource development and grade control drilling. The historic drillholes, included in the drillhole database and utilised in current and past Mineral Resource estimations, have drilling, sampling and assaying techniques undertaken by several different entities and various representatives within each entity over time. The continuity of industry-standard techniques and procedures prevailing at that time is assumed and cannot be confirmed. To this end, information on the years before 2016 has been sourced from the previous Galaxy Resources technical report published in 2011 and compiled by Spiers et al. (2011). The historical drilling phase is defined as Phase 1.

At Mt Cattlin, the host pegmatite is visually distinguishable from the surrounding country rock; therefore, sampling is taken selectively within RC chips and diamond core. Currently, 3 m of waste rock is sampled adjacent to the pegmatite to characterise the waste likely to be encountered during mining.

11.1 On-Site Sample Preparation Methods and Security

11.1.1 Phase 1 Sampling Methods and Approach

Historical drilling was completed using a combination of reverse circulation (RC) and diamond drilling (DD) techniques.

11.1.1.1 Phase 1 RC Sampling Protocols

RC samples were split and collected in calico bags from a splitter at the drill rig. Sample bags were individually numbered, and sample numbers and drillhole details were recorded at the drillhole site. Despatched samples were inserted into plastic bags, generally five (5) calico bags per plastic bag, and then sealed with cable ties.

The plastic bags were despatched directly from Mt Cattlin to Esperance Freight Line's (EFL) Ravensthorpe depot by the Field Supervisor or Geologist and transported by EFL to SGS Laboratories (SGS), WA. Upon receipt of the samples, SGS sorted and reconciled the samples compared to the provided paperwork. Reconciliation advice was provided to Galaxy detailing any missing or extra samples.

All sampling was conducted under the supervision of Galaxy senior personnel, either the Exploration Manager or Senior Geologist.

All drill core and RC samples were geologically and structurally logged, sampled, photographed, and stored at the core farm at Mt Cattlin or a storage facility in Perth.

Umpire check samples were submitted to Ultratrace and Genalysis Laboratories in Perth, WA.

11.1.1.2 Phase 1 DD Sampling Protocols

Diamond drilling was carried out mainly for metallurgical, geotechnical, and geological purposes. The drill core size was typically HQ or PQ diameter. All angled diamond holes drilled by Galaxy were orientated using either an Ezy-Mark tool or, more recently, the Reflex ACT electronic orientation tool.

The drill core was collected from the rig site by Galaxy personnel and was orientated and metre marked. The core was then photographed both wet and dry before geological logging.

The drill core was sampled on an average interval of approximately 1 m to geologically consistent boundaries (pegmatite intervals), and an additional 1 m to 2 m of waste above and below the pegmatite was sampled. Samples collected from the drill core were predominantly quarter core with occasional half-core intervals.

Before cutting, drillholes GXMCGTD01-04 and GXD014-018 were also geotechnically and structurally logged by geologists from the geotechnical consultancy (Dempers and Seymour, 2008).

11.1.2 Phase 2 Sampling Methods and Approach

Phase 2 involves Galaxy drilling from 2016 to current. A combination of RC and DD methods have been utilised during the recent drilling programs.

11.1.2.1 Phase 2 RC Sampling Protocols

Most drilling at Mt Cattlin has used RC drilling methods, with the diamond drilling intervals assayed for Li_2O representing 2.3% of the drillhole samples dataset.

RC samples have been collected from the cyclone at the drill rig using a cone splitter that feeds the sample into two (2) calico bags, primary Sample A, and a duplicate Sample B (for QAQC or re-assaying purposes). Drillhole and depth information has been captured on the exterior of the sample bags.

The primary and QAQC samples selected for analysis have been placed into a second uniquely pre-numbered calico bag, ensuring all samples are double bagged. These samples are then placed into poly weave bags, typically 7–10 per bag, with information on the contents written on the outside. The poly weave bags are transported to the core yard and placed in large bulk bags, typically containing 200 samples. Each bulk bag has only one (1) sample submission, and batches are not split between bags. The bulk bags are despatched by freight truck to the assay laboratory. Upon arrival at the assay laboratory, the samples are sorted, and reconciliation advice is provided to Galaxy detailing any missing or extra samples.

All sampling has been carried out under the direction of Galaxy senior personnel comprising either the Exploration Manager or Senior Geologist.

The B Samples not utilised for assay analysis are stored in the sample farm for later analysis if further or repeat analysis is required.

11.1.2.2 Phase 2 DD Sampling Protocols

Samples have been taken to the pegmatite host lithological boundaries, and sample intervals do not cross these boundaries. Mineralisation sample intervals vary from a minimum of 0.25 m to a maximum of 1.25 m; however, sample interval lengths are adjusted to respect geology. Three metres of non-mineralised sample intervals are taken on either side of the pegmatite horizon.

Between 2016 and mid-2018, diamond drill core samples were sawn, predominately into half core with some into quarter core. Since 2019, diamond sampling has been whole-core and used primarily for metallurgical testing.

Sample information has been recorded onto the field Toughbook laptop logging system using LogChief logging software which controls data input via a pick list, ensuring adherence to logging legends. The diamond drilling sampling information has been synced directly to the database.

Upon arrival at the assay laboratory, the samples are sorted, and reconciliation advice is provided to Galaxy detailing any missing or extra samples. The Geologist is responsible for the secure shipment to the laboratory of the samples at all times.

All sampling has been carried out under the supervision of Galaxy senior personnel comprising either the Exploration Manager or Senior Geologist.

11.2 Laboratory Sample Preparation and Analytical Methods

11.2.1 Phase 1 Sample Preparation

All samples sent to SGS were sorted, dried, crushed and pulverised to 90% passing 75 µm in a Labtech Essa LM5 pulveriser. Samples weighing over 3.5 kg were riffle split to 50% of the original weight. An approximately 200 g sub-sample was scooped from the entire pulverised sample.

The laboratory stored the sample pulps and coarse reject material. It returned them to Galaxy upon request, only after completing the initial sample analysis, and any additional checks Galaxy may have requested.

11.2.2 Phase 1 Analytical Methods

Samples from 2007 through to 2012 were analysed at SGS Laboratories, WA, with check assaying undertaken by Ultratrace and Genalysis Laboratories in WA. Samples were routinely analysed for Li_2O by 4-Acid Digest with AAS measurement. Samples over the Li_2O upper limit were re-analysed using method AAS42S.

Additional elements were analysed from selected diamond core samples including Cs, Rb, Ga, Be, and Nb by digesting samples using 4-Acid Digestion and element concentration determined by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method.

SGS undertook routine internal QAQC analyses and reported the internal laboratory pulp duplicate/repeat sample results to Galaxy.

11.2.3 Phase 2 Sample Preparation and Analytical Methods

Since 2016, three laboratories have been used to analyse samples from Mt Cattlin.

11.2.3.1 SGS Perth, WA (NATA Accreditation 1036)

SGS Perth was initially used to conduct an analysis of samples from a small drilling program consisting of six (6) diamond drillholes. The sample preparation and analytical methods adopted are as follows:

- Diamond drill core samples were crushed to produce less than 3 kg samples which were pulverised to 90% passing 75 µm using an LM5 mill
- Several methods have been used to determine Li_2O grades including:
    - Li_2O analytical technique 4 acid Digest AAS:
        - Samples have been digested using Mixed 4-Acid Digest method with AAS Finish to determine Li_2O concentration, with lower and upper detection limits of 5 ppm and 20,000 ppm respectively.
    - Li_2O and Ta_2O_5 (also Cs, Nb and Rb) Mixed 4-Acid Digest analytical technique, ICP-MS:
        - Samples have been digested using Mixed 4-Acid Digest method with ICP-MS Finish to determine Li_2O concentration with lower and upper detection limits of 5 ppm and 20,000 ppm respectively.
    - Li_2O and Ta_2O_5 (also Cs, Nb and Rb) Sodium Peroxide Fusion analytical technique:
        - Samples are digested using the sodium peroxide fusion method with ICP-MS Finish to determine Li_2O concentration.
    - Multi-element analysis for Fe_2O_3, K_2O, MgO, Mn, Na_2O, P_2O_5, S, SiO_2, SnO_2, TiO_2, V_2O_5, Nb, Rb, Ta using XRF:
        - Samples are fused into glass beads and analyzed for the suite of elements Fe_2O_3, K_2O, MgO, Mn, Na_2O, P_2O_5, S, SiO_2, SnO_2, TiO_2, V_2O_5, Nb, Rb and Ta.

11.2.3.2 Intertek Perth WA Sodium peroxide fusion Ni crucible / MS, OES FP6-Li/OM19

Intertek Perth, WA (Intertek) was used from 2017 to 2018 for both exploration and grade control sample preparation and analysis. The sample preparation and analysis comprised of:

- RC samples were dried and pulverised in an LM5 to produce less than 3 kg at 85% passing 75 µm. Samples greater than 3 kg were dried and pre-split with a rotary splitting device prior to pulverising
- Diamond drill core samples were dried, crushed 10 mm and less than 3 kg pulverised to 85% passing 75 µm using an LM5 mill
- Li_2O and Ta_2O_5 were analysed by subjecting samples to sodium peroxide fusion in a zircon crucible with ICP-MS/OES instrument finish.

11.2.3.3 Nagrom Perth WA (ISO9001 certified)

Nagrom Perth WA laboratory (Nagrom) is one to two analytical laboratories and has been used since 2018 for both development and metallurgical drilling programs.

The sample preparation and analytical techniques adopted by Nagrom are as follows:

- RC chips are dried to 105 °C and crushed to a nominal top size of 2 mm in a Terminator Jaw crusher. Subsamples up to 3 kg are pulverised in an LM5 mill to 80% passing 75 µm. If samples are greater than 3 kg, they are dried and split with a rotary splitting device before analysis
- Diamond core is dried, crushed in a Terminator Jaw crusher to top size 6.3 mm, and pulverised in an LM5 mill up to 2.5 kg. If a sample is greater than 2.5 kg, the sample is riffle split after drying to reduce the sample size
- For resource development drillholes sample pulverisation is undertaken using an LM5 fitted with a tungsten carbide bowl to minimise iron contamination. Crushed materials are split to 0.5 kg prior to pulverising using a stainless-steel riffle splitter
- The analysis of Li_2O and Ta_2O_5 was undertaken using method ICP004 or ICP005 and was completed as follows:
    - Samples are digested using a sodium peroxide fusion digest in an alumina crucible (ICP004) or zirconium crucible (ICP005)
    - Analysis by ICP-MS/OES

11.2.3.4 Genalysis/Intertek (NATA Accreditation 3244)

Both Intertek Perth and Intertek Kalgoorlie were used to speed up sample turnaround during 2022–2023:

- RC chips are dried at 105 °C, crushed to nominal top-size of 2 mm in a Boyd or Orbis Jaw crusher (Code CRF01). Samples less than 1.2 kg are pulverised in an LM2 type mill with various bowls depending on the sample mass, at 85% or better passing 75 µm. Samples 1.2 k to 3 kg in a LM5 pulveriser mill at 85% or better passing 75 µm. If the sample mass exceeds 3 kg, the crusher product is split with a rotary splitter prior
- The analysis was completed as follows, the samples were digested in a sodium peroxide fusion within a Ni crucible with a MS, OES finish. The package is FP6-Li/OM19 for 19 elements (Lithium is the OES finish, all others are MS).

11.3 Quality Assurance and Quality Control Procedures

11.3.1 Phase 1 QAQC Procedures

The exact Quality Assurance and Quality Control (QAQC) methodologies for some of the early protocols are not well documented, however, their approximate frequencies have been provided in Table 11-1 below.

11.3.2 Phase 2 and Later QAQC Procedures

QAQC samples have been submitted routinely into all sample batches sent to the assaying laboratories. Mt Cattlin QAQC protocols have undergone several improvements since 2016. QAQC frequencies since 2017 are provided in Table 11-1 and Table 11-2.

Table 11-1 Galaxy Phase 2 QC Policies by Year Pre-2022

Grade Control	**2017**	**2018**	**2019**	**2020**	**2021**
Standard		*approximately 1 in 60 to 70*	*1 in 25*	*1 in 25*	*1 in 25*
Blank		*approximately 1 in 60 to 70*	*1 in 25 (approximate)*	*1 in 25*	*1 in 25*
Duplicate		*approximately 1 in 60 to 70*	*1 in 25*	*1 in 25*	*1 in 25*
Exploration	**2017**	**2018**	**2019**	**2020**	**2021**
Standard	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 25*
Blank	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 50*	*1 in 25 or one per mineralised interval minimum*
Duplicate	*1 in 20*	*1 in 20*	*1 in 20*	*1 in 20*	*1 in 20*

Table 11-2 Galaxy QA-QC by year -2022/33

Laboratory	Samples	Field Duplicates	Field Duplicate Frequency	Blind CRM	Blind CRM frequency (inc. Filed Duplicates)	Blind Blank (OREAS 27d) (inc. Filed Duplicates)	Blind Blank Frequency	Lab Internal CRM	Grand Total CRM/ BLANKS
Intertek Kalgoorlie	*4,794*	*364*	*13*	*287*	*18*	*224*	*23*	*226*	*737*
Intertek Perth	*50*	*2*	*25*	*2*	*26*	*-*	*-*	*-*	*2*
Nagrom	*1,216*	*77*	*16*	*54*	*24*	*43*	*30*	*140*	*237*
Grand Total	***6,060***	***443***	***14***	***343***	***19***	***267***	***24***	***336***	***976***

For 2022, two laboratories were used, Intertek/Genalysis (Kalgoorlie) and Nagrom (Perth). Overall field duplicate frequency was 1 per 14 samples, blind, 1 per 19 samples and blind blanks 1 per 24 samples, in line with 2021 frequency rates.

11.3.3 Certified Reference Materials

Since 2016, matrix-matched certified reference material (CRM) supplied by African Mineral Standards (AMS) has mostly been used in the determination of the underlying accuracy of the laboratory's assaying procedures of exploration and resource development drilling. The CRMs were submitted with routine samples at the frequency indicated in Table 11-3, for 2022 drilling.

Table 11-3 Galaxy QA-QC CRM 2022–3

Laboratory	Submitted by Allkem	Laboratory Standards
Intertek Kalgoorlie	*AMIS0339*	*MAIS0341*
	AMIS0340	*MAIS0342*
	Blink Blank (OREAS 27d)	*OREAS 146*
	OREAS 147	*OREAS 147*
	OREAS 148	*OREAS 148*
	OREAS 750	*OREAS 753*
	OREAS 751	
Intertek Perth	*OREAS 750*	
	OREAS 751	
Nagrom	*AMIS0339*	*OREAS 147*
	AMIS0340	*OREAS 751*
	Blink Blank (OREAS 27d)	*OREAS 999*
	OREAS 148	

Ore Research and Exploration (OREAS) CRMs were used for monitoring drilling analytical accuracy. The OREAS CRMs used are Li_2O and Ta_2O_5 bearing standards sourced from the Greenbushes mine in WA.

Not all CRM standards utilised are certified for Li_2O analysis via by sodium peroxide fusion. Some of the CRMs were assigned only provisional values by AMS and were not relied on in assessing the analytical laboratory's performance.

11.3.4 CRM Standard Transcription Errors

Since 2016, 376 CRM transcription errors occurred. Investigations confirmed the errors to be due to the misallocation of CRMs with Blanks. The remaining errors are attributed to either typographic errors or standard swaps. All transcription errors have been rectified in the database and a record kept for all the remediation actions.

11.3.5 Nagrom Li_2O Results

A total of 237 Li_2O CRMs were submitted with routine samples to Nagrom for analysis, at a rate of approximately one (1) per 24 routine samples. The overall performance of this CRM is considered satisfactory and indicates no significant bias or precision issues with the underlying assays reported by Nagrom.

11.3.6 Nagrom Ta_2O_5 Results

A total of 237 CRMs have been used to monitor the accuracy and precision of Ta_2O_5 of samples submitted to Nagrom for analysis, at an insertion rate of one (1) per 24 routine samples. The overall performance of the CRM is considered satisfactory, revealing no significant issues with the bias and precision of the underlying Ta_2O_5 assays reported.

11.3.7 Intertek Li_2O Results

A total of 739 CRMs have been submitted with routine samples over the period to monitor the accuracy of reported Li_2O results by Intertek. CRMs were submitted at a rate of one (1) per 23 routine samples. Analysis of QAQC results indicates the satisfactory performance of Intertek laboratory with no significant grade bias underlying the assays.

11.3.8 Intertek Ta_2O_5 Results

To assess the accuracy of the reported Ta_2O_5 assays from Intertek, 739 CRMs were included with routine samples at a rate of one (1) CRM per 23 routine samples. Analysis of the results received indicated satisfactory standard performance revealing no significant issues with the accuracy underlying the Ta_2O_5 assays.

11.3.9 SGS Li_2O Results – Pre-2022

A total of 60 CRMs have been used to monitor the accuracy of the SGS laboratory over the period. The CRMs were inserted at a rate of approximately one (1) CRM per nine (9) routine samples. All but 13 of the CRMs returned assays within the expected range of ± thrice the standard deviation of the certified CRM value.

The Qualified Person considers the performance as acceptable as the risk to the Mineral Resource Estimate is minimal, since SGS has only been used for the analysis of only six (6) drillholes over a short period of time.

11.3.10 SGS Ta_2O_5 Results

A total of 60 CRMs have been submitted with routine samples for the analysis of Ta_2O_5 at SGS at a rate of approximately one (1) CRM per nine (9) routine samples.

Similar to the Li_2O performance, all but 17 of the CRMs returned values that were outside the expected range.

11.4 Field Duplicates

11.4.1 RC Field Duplicates

Sample B sample bags have been submitted as blind field duplicates from RC drillholes, at a rate of approximately one (1) per 14 samples. During 2022 drilling, a total of 443 field duplicates were submitted with routine RC samples for assaying.

Analysis of field duplicate samples indicates satisfactory agreement between the original assay and the duplicate assay.

11.4.2 DD Field Duplicates

Blind field duplicates are collected from diamond drillholes as quarter core samples and submitted at a rate of approximately one (1) per 16 routine samples. A total of 77 diamond core blind field duplicates were submitted for analysis during last phase of drilling.

Analysis of the diamond core field duplicate samples indicates that the original assay and the duplicate assay are in acceptable agreement.

11.5 Field Blanks

Two different blanks have been included in batches submitted to Intertek to monitor contamination during sample preparation. From 2016 to December 2022, a coarse blank of unknown source and Li_2O content was used, along with certified OREAS and AMIS coarse blanks. Two OREAS coarse blanks certified for 4 acid digests have been used at Mt Cattlin since April 2018.

Assays returned for blanks are generally satisfactory indicating no routine contamination during the sample preparation at any of the participating laboratories.

11.6 Bulk Density Determinations

Most drilling at Mt Cattlin has been completed using RC drilling which limits the opportunity to complete bulk density measurements. Bulk density determinations have been completed on the available diamond core to determine values using the water immersion method for use in Mineral Resource estimates.

The selection of bulk density samples is determined by the logging Geologist and the interval selected for bulk density measurement is dictated by material types. The diamond drill core is competent and does not display evidence of voids or vugs.

The method used for determining the bulk densities was the water immersion method. A coherent segment of diamond core, around 10 cm in length and representative of the metre interval, was selected for analysis. The weight of the segment of core was measured dry in air, and then measured when submerged in water.

The bulk density values have been calculated using the formula from this data:

$$BD = \frac{Wair}{(Wair - Wwater)}$$

Where Wair equal dry weight in air and Wwater equals weight submerged in water.

Samples in the weathered zones were wrapped in plastic wrap before being analysed.

11.6.1 Site Bulk Density Determinations

Several phases of bulk density determinations have been undertaken in the past. Five (5) density determinations were completed in 2001 and 2002 on un-waxed 10 cm lengths of HQ diamond core dried at 110 °C for 2 hours, using the water immersion method. The samples were all from Ta_2O_5 mineralised pegmatite intervals.

In 2009, 270 bulk density measurements were completed on the diamond core from each metre of diamond drillholes GXMCMTD01 to GXMCMTD05, and GXD009 to GXD013. Using this data, Tornatora (2009) recommended values of 2.05 kg/m³ for soil/weathered material, down to a depth from 0 m to 7 m, (in the absence of a regolith model), 2.65 kg/m³ for fresh pegmatite, and 2.8 kg/m³ for fresh un-mineralised material.

During 2009/2010 bulk density measurements were completed on every metre of all additionally available diamond drill core, including the recently completed diamond drillholes. This work included drillholes GXD01 to GXD06, GXMCGTD01 to GXMCGTD04, and GXD014 to GXD018, and the data was added to the existing database of 270 readings, for a total of 963 measurements.

Results from the combined bulk density determination programs for the various regolith units and main rock types are summarised in Table 11-4.

Table 11-4 Bulk density details by regolith and lithology

Regolith	Rock Type	Min Density (kg/m³)	Max Density (kg/m³)	Average Density (kg/m³)	Number of Readings	Approx. depth range of geological unit
TPD+SAP	*All*	*1.745*	*3.018*	*2.098*	*67*	*0 m – 7 m*
FR	*Pegmatite*	*2.427*	*3.082*	*2.693*	*369*	*>10 m*
FR	*Waste*	*2.419*	*3.105*	*2.892*	*467*	*>10 m*

Regolith type descriptions:
TPD = Transported – transported surficial material.
SAP = Saprolite – in situ material, mostly weathered to clay minerals, (generally after basalt).
FR = Fresh – unweathered, can include some staining along fractures.

11.6.2 Nagrom Bulk Density Determinations

Two (2) drillholes, NWRC064D and NWRC067D drilled in 2018, were submitted to Nagrom and tested using the Specific Gravity by hydrostatic weighing method - uncoated. The results of 95 pegmatite samples resulted in an average of 2.716 kg/m³. One single basalt reading returned a result of 2.84 kg/m³.

Non-mineralised lithology densities ranged from an average of 2.76 kg/m³ for felsic and intermediate volcanic rock to 3.00 kg/m³ for the Proterozoic dolerite. The predominant lithologies in the western portion of the orebody are basalt and dolerite, which average 2.88 kg/m³ and 2.94 kg/m³ respectively, while tonalite, with a bulk density of 2.82 kg/m³ is more common in the eastern portion of the Project area.

11.7 Qualified Person's Opinion

This section summarises the Qualified Person’s opinion on the adequacy of sample preparation and analytical procedures.

The Qualified Person (QP) believes the sample preparation methods, security, assaying and QAQC control measures are appropriate for the type and style of mineralisation at Mt Cattlin. The assay QAQC results, when taken together, demonstrates sufficient accuracy and precision for use in estimating Mineral Resource. Sampling and analysis have occurred within a chain of custody from the drill site to site dispatch and to laboratory receipt.

The historic sampling, assaying and QAQC data, which is related to a small portion of the data within the relevant drillhole database, has not been reviewed in detail or verified since a large portion cannot be located. The QP does not consider this a risk to the Mineral Resource or operation since most areas with large volumes of historical drillholes have already been mined.

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

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CHAPTER 12: DATA VERIFICATION

12 DATA VERIFICATION

12.1 Data Verification Procedures Used by the Qualified Person

An inspection of the property was made between 11−13 April 2022, 11−13 July 2022, 21−23 September 2022, and 12−14 December 2022. This section summarises the observations made, plus associated recommendations.

12.1.1 Geological Data Review

The following prior activities at the Property in review:

- Verified seven (7) NW Area drillhole collars on the surface against the database entries, using the Allkem Survey department RTK GPS
- Checked approximately 6% of the NW Area database entries against the csv and PDF certificates received directly from the assay laboratory, with no errors identified
- Performed a review of the database entries against the downhole surveys noted in the driller's logs and provided by external surveying companies, with three (3) errors identified in one (1) drillhole
- Undertook check-logging to confirm database entries in eleven (11) NW Area drillholes, with no errors identified
- Observed sample storage and chain-of-custody procedures
- Discussed the geological interpretation with key people on site
- Maintained an active drilling tracker during the 2022 program that monitored the progress of drilling, logging and assay dispatch and receipt.

A review of the geological logging and sampling procedures was completed as drill rigs were onsite at the time of the inspection. In addition, the Standard Operating Procedures (SOPs) for RC geological logging, drillhole establishment and sampling have been reviewed.

The data verification checks were completed on pre 2022drillholes located in the NW Area since the majority of drillholes located in the other portions of the deposit have been impacted by surface disturbance and/or mining.

The following observations where then made:

- Checking the collar coordinates between the RTK GPS resurvey collar locations and the database entries did not reveal any inconsistencies, with all results within 10 cm of the original survey, (Table 12-1)
- Cross-checking of the assays between the database and original PDF certificates did not reveal any database errors, however the source data for one (1) drillhole could not be located, (Table 12-2)
- Checking the downhole survey source data files against the database was completed on five (5) of the eleven (11) selected drillholes, since the source data files for several drillholes could not be located or the drillhole had not been downhole surveyed. The audit identified three (3) inconsistencies in one (1) drillhole, (Table 12-3)

- Drillhole RC chip trays were reviewed for logging in the eleven (11) NW Area audit drillholes, and no issues were identified, (Table 12-4)
- A secure RC chip library is located on-site within which a large percentage of the RC chip trays from drillholes completed within the Project area are stored. Pulps are typically stored in an undercover area adjacent to the core logging and sampling sheds. The QP has in place security procedures or equipment set-up processes around the core shed/sampling facility or the sample dispatch area. The operation has a manned security gate which all staff and visitors must pass through in order to gain access to the property
- Good communication between the Exploration and Mining departments has ensured that experience within the pits has been used to guide resource definition and resource extension drilling
- In 2021−2022 the use of a bespoke Power BI application integrated and validated drill hole planning, drilling progress, collar and survey data when presented for validation, via Logchief data entry, assay dispatch, geological logging entry, assay integration on receipt with logging, intercept creation by drillhole once complete. The same application tracked assay QAQC by sample batch against expected standard tolerance for referenced standards against lithia and tantalum grade. All data is maintained in a secure SQL database which is exported at set cut-off dates. For the purposes of the 2022 MRE, the cut-off date was 24 December 2022. The majority of the 2022 MRE infill drilling occurred within an open pit in active development with its outer perimeter which was actively being pre-stripped. Most collars have since been destroyed by ongoing mining.

Table 12-1 NW Area Collar Resurvey Results

Database				Re-survey				Difference (m)			
Hole ID	**East**	**North**	**RL**	**Hole ID**	**East**	**North**	**RL**	**Hole ID**	**East**	**North**	**RL**
NWRC085	*224,120.195*	*6,282,340.116*	*268.191*	*NWRC085*	*224,120.209*	*6,282,340.165*	*268.262*	*NWRC085*	*-0.01*	*-0.05*	*-0.07*
NWRC091	*224,207.655*	*6,282,399.086*	*267.894*	*NWRC091*	*224,207.604*	*6,282,399.017*	*267.949*	*NWRC091*	*0.05*	*0.07*	*-0.06*
NWRC100	*224,219.87*	*6,282,518.488*	*266.851*	*NWRC100*	*224,219.846*	*6,282,518.554*	*266.902*	*NWRC100*	*0.02*	*-0.07*	*-0.05*
NWRC101	*224,222.251*	*6,282,578.99*	*265.351*	*NWRC101*	*224,222.274*	*6,282,579.038*	*265.419*	*NWRC101*	*-0.02*	*-0.05*	*-0.07*
NWRC106	*224,202.124*	*6,282,487.564*	*267.775*	*NWRC106*	*224,202.128*	*6,282,487.589*	*267.733*	*NWRC106*	*0.00*	*-0.02*	*0.04*
NWRC108	*224,356.812*	*6,282,465.845*	*260.381*	*NWRC108*	*224,356.866*	*6,282,465.922*	*260.447*	*NWRC108*	*-0.05*	*-0.08*	*-0.07*
NWST003	*223,898.977*	*6,282,834.78*	*259.16*	*NWST003*	*223,898.983*	*6,282,834.817*	*259.157*	*NWST003*	*-0.01*	*-0.04*	*0.00*

Table 12-2 Drillhole Assay Audit Results

Hole ID	Hole Type	Max Depth	Date Started	Date Completed	Assay Data Status	Audit Outcome
GX1097	*RC*	*135*	*24/02/2010*	*24/02/2010*	*Supplied*	*No errors identified*
GX1113	*RC*	*120*	*20/04/2010*	*20/04/2010*	*Source file could not be located*	*NA*
NWST012	*RC*	*84*	*19/09/2017*	*19/09/2017*	*Supplied*	*No errors identified*
NWST003	*RC*	*84*	*23/09/2017*	*24/09/2017*	*Supplied*	*No errors identified*
NWRC022	*RC*	*225*	*26/08/2018*	*28/08/2018*	*Supplied*	*No errors identified*
NWRC051	*RC*	*180*	*5/10/2018*	*6/10/2018*	*Supplied*	*No errors identified*
NWRC066	*RC*	*186*	*20/10/2018*	*22/10/2018*	*Supplied*	*No errors identified*
NWRC071	*RC*	*222*	*30/10/2018*	*31/10/2018*	*Supplied*	*No errors identified*
NWRC085	*RC*	*228*	*5/02/2019*	*6/02/2019*	*Supplied*	*No errors identified*
NWRC100	*RC*	*130*	*23/02/2021*	*23/02/2021*	*Supplied*	*No errors identified*
NWRC108	*RC*	*170*	*8/03/2021*	*8/03/2021*	*Supplied*	*No errors identified*

Table 12-3 Drillhole Downhole Survey Audit Results

Hole ID	Hole Type	Max Depth	Date Started	Date Completed	Survey Data Status	Audit Outcome
GX1097	*RC*	*135*	*24/02/2010*	*24/02/2010*	*Source file could not be located*	*NA*
GX1113	*RC*	*120*	*20/04/2010*	*20/04/2010*	*Source file could not be located*	*NA*
NWST012	*RC*	*84*	*19/09/2017*	*19/09/2017*	*Source file could not be located*	*NA*
NWST003	*RC*	*84*	*23/09/2017*	*24/09/2017*	*Source file could not be located*	*NA*
NWRC022	*RC*	*225*	*26/08/2018*	*28/08/2018*	*Supplied*	*No errors identified*
NWRC051	*RC*	*180*	*5/10/2018*	*6/10/2018*	*Supplied*	*3 errors identified*
NWRC066	*RC*	*186*	*20/10/2018*	*22/10/2018*	*Source file could not be located*	*NA*
NWRC071	*RC*	*222*	*30/10/2018*	*31/10/2018*	*Supplied*	*No errors identified*
NWRC085	*RC*	*228*	*5/02/2019*	*6/02/2019*	*Not surveyed*	*NA*
NWRC100	*RC*	*130*	*23/02/2021*	*23/02/2021*	*Supplied*	*No errors identified*
NWRC108	*RC*	*170*	*8/03/2021*	*8/03/2021*	*Supplied*	*No errors identified*

Table 12-4 Drillhole Geological Logging Audit Results

Hole ID	Chip Trays Present	Chips Match Database Geology
GX1097	*Yes*	*Yes*
GX1113	*Yes*	*Yes*
NWRC022	*Yes*	*Yes*
NWRC051	*Yes*	*Yes*
NWRC066	*Yes*	*Yes*
NWRC071	*Yes*	*Yes*
NWRC085	*Yes*	*Yes*
NWRC100	*Yes*	*Yes*
NWRC108	*Yes*	*Yes*
NWST003	*Yes*	*Yes*
NWST012	*Yes*	*Yes*

12.1.2 Qualified Person's Opinion

This section summarises the Qualified Person's opinion on the adequacy of the data used for the purpose of the Technical Report Summary.

In the Qualified Person's opinion, the geological data used to inform the Mt Cattlin mineral resource estimate was largely collected, validated, and stored in line with industry best practice as defined in the CIM Mineral Exploration Best Practice Guidelines (CIM, 2018) and the CIM Estimation of Mineral Resources and Mineral Reserves Best Practice Guidelines (CIM, 2019), with some minor issues identified. Therefore, the Qualified Person considers that the data is suitable for use in the estimation of Mineral Resources.

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CHAPTER 13: MINERAL PROCESSING AND METALLURGICAL TESTING

13 MINERAL PROCESSING AND METALLURGICAL TESTING

13.1 Introduction

The Mt Cattlin processing plant was originally designed and constructed based on the Definitive Feasibility Study metallurgical test work completed in 2009. The constructed plant effectively processed mined ore to produce saleable spodumene product until entering a period of care and maintenance due to depressed lithium prices in 2013.

Following the recommencement of operations in 2016, the Mt Cattlin operation has demonstrated the ability to produce saleable spodumene concentrate from fresh pegmatite ore at recoveries in the range of 55−60% as per Table 13-1. Periods of lower plant recoveries have been attributable to processing weathered mineralisation from the early phases of the SW pit in (Q3/4 2018) and processing predominantly contaminated ore stocks through the majority of 2022 prior to processing fresh ore from the NW pit in late 2022.

Table 13-1 Mt Cattlin Spodumene Concentrate Production and Recovery Data

Period	Concentrate Tonnes	Grade Li_2O	Recovery %
CY 2017	*155,679*	*5.7*	*55.7*
CY 2018	*156,689*	*5.8*	*50.2*
CY 2019	*191,660*	*5.9*	*55.3*
CY 2020	*108,659*	*5.9*	*54.3*
CY 2021	*230,065*	*5.7*	*59.8*
CY 2022	*97,417*	*5.3*	*47.6*
Q1, 2023	*38,915*	*5.3*	*60.0*

Since 2017, several metallurgical test work programs and plant optimisation projects have been undertaken to optimise plant throughput, recovery, and product quality.

13.2 Plant Optimisation Projects

13.2.1 Yield Optimisation Project

In 2017, heavy liquid separation (HLS) test work was initiated at the Nagrom commercial laboratory to study the potential to recover spodumene from the secondary DMS floats reject material through additional liberation and reprocessing of fines, which is where the majority of spodumene losses occur. Samples of crushed ore and secondary floats were collected from the plant in July 2017 and submitted to Nagrom for testing. HLS test work was performed on the +5.6 mm and 1 mm to 5.6 mm fractions of the crushed ore, the secondary floats material as received and after further crushing to 0.5 mm to 4.0 mm and 1.7 mm to 3.0 mm size fractions. The HLS results are shown in Figure 13-1 and demonstrate the improvement in recovery from the secondary floats material after crushing.

The reliberation circuit was consequently implemented in the processing plant in 2018 and featured a Vertical Shaft Impactor (VSI) crusher to crush the secondary floats stream and recycle the resulting material through the DMS circuits. This circuit contributes up to 2−3% additional plant recovery.

The second component to the yield optimisation project (YOP) was the addition of the ultrafines dense media separation circuit (UFDMS), to recover material below -1.8 mm previously reporting to tailings after the Tantalite recovery process. Since commissioning, the UFDMS has run when operationally beneficial adding approximately a further 2−3% recovery overall, often at slightly lower product grades to the main DMS at approximately 4.5% Li_2O%. The UFDMS circuit provides most benefit when the plant is processing clean, high-grade ore, and is less effective on basalt contaminated low-grade plant feed.

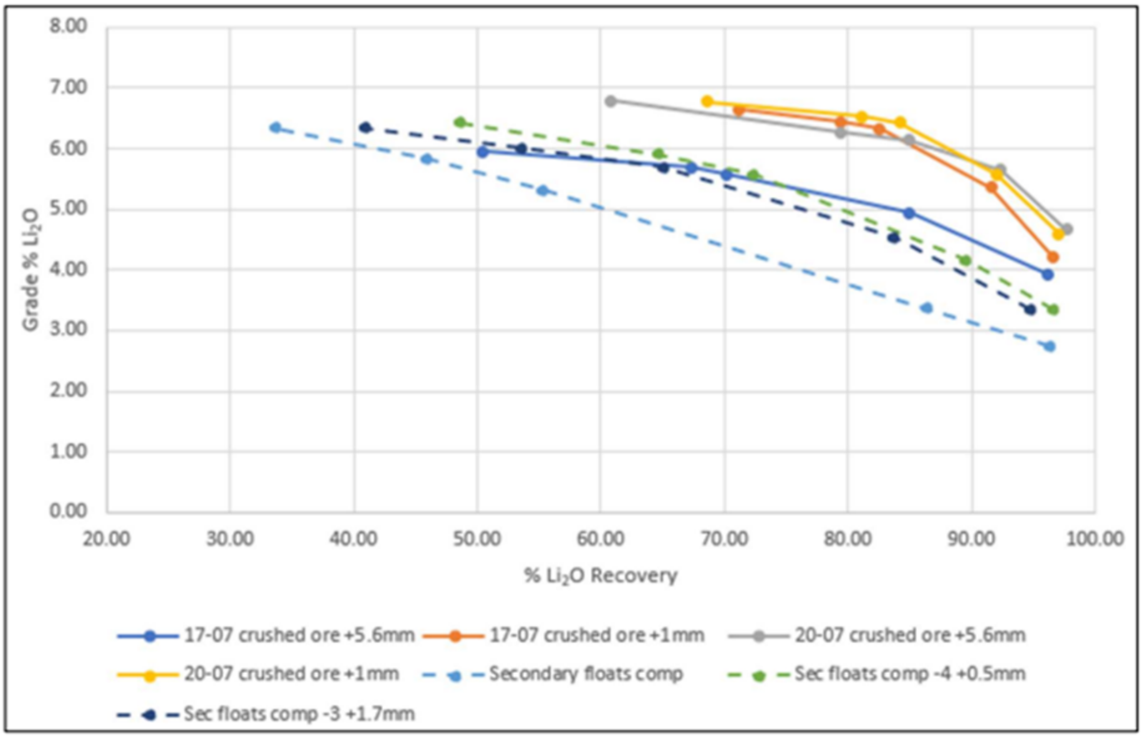

Figure 13-1 2017 HLS Test Work Results

13.2.2 Recovery Improvement Project

In early 2020 it was determined that mined contaminated ore stocks and other ore sources stockpiled would need to be processed due to the size of the stockpiles and restrictions in the mining sequence for fresh ore. A program of laboratory test work was conducted to evaluate the optimum DMS plant settings for processing this material. Once the optimum recovery parameters were established, batch tests were conducted to determine the spodumene recovery that could be achieved as a function of subprime ore (Contaminated ore) blend composition. Results of these evaluations are shown in Table 13-2. The Project allowed the subsequent economic processing of stockpiled material that was previously defined as waste or unrecoverable. In CY 2022 the high basalt contaminated ore and oxidised ore were processed economically either through the optical sorter or where possible directly feed to the plant.

Table 13-2 Feedstock and Plant Samples – HLS and DMS Results

Material	Feed grd	BP Feed	d50	% Yield	% Recov	Prod Grd HLS	BP Prod	Prod Grd Plant
Feed Stock - HLS results								
OS P FS			2.98	12	78	6.0		
CO FS			3.01	9	58	6.0		
SF DST FS			2.98	5	35	6.0		
OS P FS			2.90	13	88	5.0		
CO FS			2.90	14	81	4.5		
SF DST FS			2.90	10	56	4.8		
DMS Feed D/S - HLS results								
4OS/1SF/5ROM	0.99	7.5	2.90	14.5	73.2	5.0	10.9	
4OS/1SF/5ROM	1.03	7.9	2.90	16.5	79.9	5.2	11.6	
4OS/1SF/5ROM	1.02	10.1	2.90	16.0	77.5	5.0	11.4	
4OS/1SF/5ROM	1.06	8.3	2.90	18.1	86.3	5.3	9.5	
4OS/1SF	1.01	6.7	2.90	16.9	76.1	4.7	11.8	
OS only	1.00	12.3	2.90	16.1	72.9	4.7	16.3	
DMS Feed D/S - Plant results								
4OS/1SF/5ROM	1.05			9.1		5.9		5.6
4OS/1SF/5ROM	1.06			8.8		5.8		5.6
4OS/1SF/5ROM	0.92			9.7		5.5		5.8
4OS/1SF/5ROM	0.92			9.7		5.5		5.9
4OS/1SF (D/S average data)	1.22			9.1		6.0		5.6
OS only (D/S average data)	1.22			9.1		6.0		5.4

13.2.3 Optical Sorting

A significant portion of the ore mined at Mt Cattlin contains basalt content between 10% and 24%. A basalt head grade of higher than ~3% to the process plant presents major processing challenges, as it has a similar SG to spodumene and is therefore not effectively separated by DMS.

Optical sorter test work was undertaken by Optosort in Austria in 2017 on Mt Cattlin ROM crushed product and final product. The test work results indicated the basalt material could be rejected to produce a final stream sufficiently low in basalt to feed to the processing plant. Two crushing optical sorter units and a single Product Quality Upgrade (PQU) sorter were purchased during 2018 for Mt Cattlin.

A series of test programs on the crushing optical sorter application through 2018 and 2019 demonstrated the design throughput and basalt rejection could not be achieved in a single stage of sorting. This led to the revision of the design basis from two sorters in parallel to two sorters operating in series, as summarised in Table 13-3.

Table 13-3 Crushing Ore Sorter Design Basis

	t/h	Feed % Basalt	Product Yield %	Product Stream % Basalt	Total Basalt Rejection %	% Product / Spodumene Loss to Reject Stream
Coarse -75 +25 mm						
Stage 1	*80.0*	*19.0*	*78.0*	*6.6*	*73.0*	*10.0*
Stage 2	*62.4*	*6.1*	*90.4*	*1.8*	*75.0*	*5.0*
Overall Product	*56.4*	*-*	*70.6*	***1.8***	*93.3*	*14.5*
Midds -25 +14 mm						
Stage 1	*30.0*	*22.6*	*78.3*	*11.0*	*62.0*	*10.0*
Stage 2	*23.5*	*10.4*	*88.4*	*4.3*	*65.0*	*5.0*
Overall	*20.8*	*-*	*69.2*	***4.3***	*86.7*	*14.5*

The front-end optical ore sorters were commissioned in early 2020 and by Q3 had consistently achieved targets of contributing 1 ktpd of ore sorted and up to 30% of total plant throughput.

Due to the requirement to process a large stockpile of basalt contaminated ore that had been accumulated over several years, further test work was conducted with a TOMRA laser sorter and in October 2021 Mt Cattlin commissioned a hire unit to significantly increase ore sorting capacity. The TOMRA optical sorter preformed above expectations consistently producing below 3% basalt with less than 5% spodumene loss. This significant improvement led to the replacement of the parallel optical sorters with a single TOMRA laser unit in February 2022.

13.3 Metallurgical Test Work

13.3.1 NW Pit HLS Test Work

Heavy liquid separation (HLS) is a technique used to separate materials of different specific gravity (SG) through the effects of buoyancy. A mineral sample is added to a liquid with a very high SG such as bromoform, tetrabromoethane or a tungsten-based heavy liquid. Particles with an SG lower than that of the liquid will float to the surface, whereas particles with an SG higher than that of the liquid will separate and sink to the bottom. HLS is used in metallurgical test work to determine a sample's amenability to dense medium separation (DMS), which is the principal method in use in the Mt Cattlin processing plant.

In April 2021, HLS test work was performed on drill core samples from the NW Pit, which was intended to become the primary plant feed source from mid-2022. Mineralised sections of drill core consisting of spodumene-containing pegmatite were selected for testing. This is the only mineralisation being targeted for mining and processing, and it is comparable to material which has already been successfully processed through the processing plant as well as the remaining mineralisation in the NW Pit.

The samples were crushed to -14 mm and wet screened at 1.8 mm. The oversize material was separated at specific gravities of 2.7, 2.8 and 2.9 using HLS. The 2.9 SG results are shown in Table 13-3 and demonstrate the mineralised ore upgrades well with high sinks grades achieved (6.0−6.5% Li_2O). The recoveries observed in the test work were higher than likely plant recoveries due to the absence of dilutant material in the test work samples. Typical Mt Cattlin plant grade-recovery relationships are shown in Figure 13-2. Nonetheless the results were deemed to demonstrate the NW pit ore was likely to demonstrate comparable metallurgical performance to historical Mt Cattlin operations.

Table 13-4 NW Pit HLS Results Summary (2.9 SG)

Sample	Head Grade % Li_2O	Yield %	Sinks Grade % Li_2O	Sinks Grade % Fe_2O_3	Recovery %
NWRCD090	*1.85*	*22.1*	*6.46*	*1.24*	*77.1*
NWRCD102	*1.05*	*12.7*	*6.06*	*1.34*	*72.8*

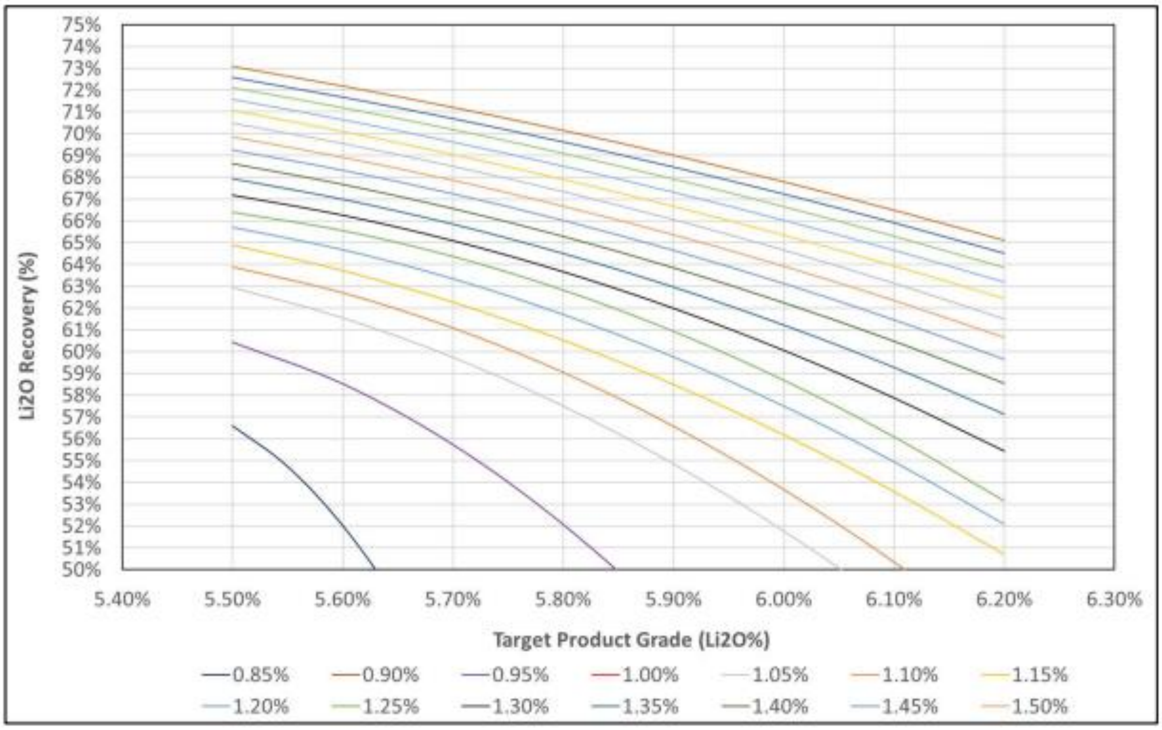

Figure 13-2 Mt Cattlin Grade-Recovery Curves

In 2022, four metallurgical test samples were selected from three (3) geotechnical drill holes from the Stage 4 NW pit, with the results from HLS test work received in November 2022. The metallurgical samples were selected to reflect major geometallurgical domains, targeting fine-grained mineralisation (FPEG10/FPEG12 domains) and coarse-grained mineralisation represented by the FPEG20 and FPEG>30 domains. The results of the HLS work are shown in Table 13-5, which presents combined grade and recovery from the HLS sinks at a specific gravity of 2.9 to allow direct comparison with the 2021 results shown in Table 13-4. Concentrate grade and recovery values also combine results received for individual HLS analysis of the coarse (-14 mm / +6.3 mm) and fine

(-6.3 mm / + 2.0 mm) fractions, providing further consistency with the results reported in Table 13-4.

Table 13-5 NW Stage 4 HLS Results

Sample	Head Grade % Li_2O	Yield %	Sinks Grade % Li_2O	Sinks Grade % Fe_2O_3	Recovery %
FPEG10A	*0.26*	*2.2*	*5.86*	*1.17*	*49.6*
FPEG12B	*0.19*	*1.5*	*5.50*	*1.47*	*43.0*
FPEG20S	*1.81*	*22.6*	*6.33*	*1.29*	*79.1*
FPEG>30	*0.88*	*9.0*	*6.34*	*0.90*	*65.0*

The 2022 HLS results are consistent with the expected metallurgical performance of the deposit, with HLS sinks grades and recoveries at a specific gravity of 2.9 demonstrating typical grade-recovery responses. Specifically fine grained, low grade (<0.3% Li_2O) samples demonstrated reduced HLS sinks grade and recovery (5.5–5.8% Li_2O at 43–49% recovery), with sinks grades exceeding 6% Li_2O and recoveries of 65–79% achieved on higher grade (0.9–1.8% Li_2O), coarse grained mineralisation.

Five drill core intervals have been selected from the NW Stage 4 pit resource and submitted to Nagrom for HLS testing in 2023. The core intervals are illustrated in Figure 13-3. Test work results are pending at the time of writing.

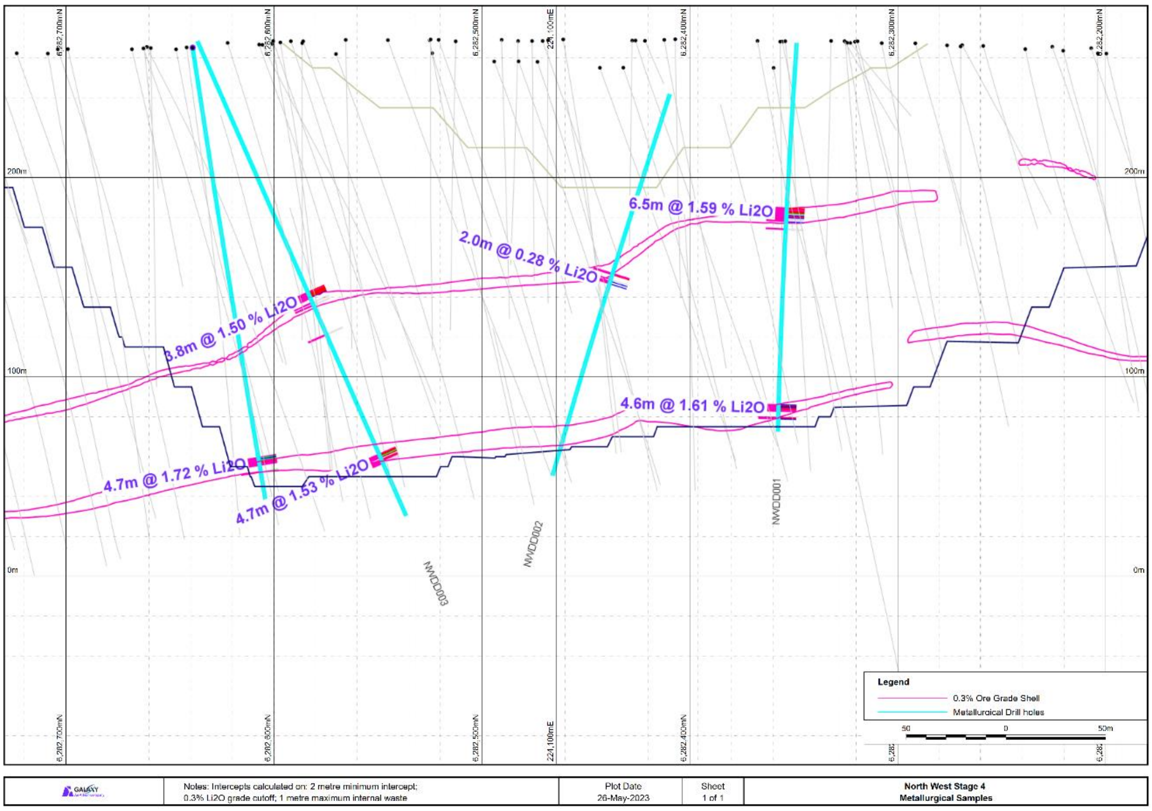

Figure 13-3 NW Pit Stage 4 Metallurgical Samples

13.3.2 Tailings Recovery Test Work

A number of test work programs have been undertaken to evaluate the potential to recover spodumene from the -1.5 mm component of the Mt Cattlin tailings. These programs have evolved to target a more economically viable solution than conventional flotation, which is the typical approach to fine spodumene recovery. The use of coarse particle flotation, such as the Eriez HydroFloat® technology, has the potential to substantially reduce capital and operating costs by eliminating conventional grinding and multiple stages of flotation from the flowsheet. Results from HydroFloat® test work performed on Mt Cattlin tailings samples has demonstrated the potential to produce a saleable spodumene concentrate grade as shown in Table 13-6.

Table 13-6 HydroFloat Results, Mt Cattlin Tailings

Process	Size Class	Stage 1 Program (Grade + Recovery)	Stage 2 Program (Grade + Recovery)
HydroFloat	*+ 710 µm*	*2.6% Li_2O @ 3.7%*	*4.7% Li_2O @ 27.4%*
HydroFloat	*+ 500 µm*	*4.6% Li_2O @ 11.8%*	*4.3% Li_2O @ 18.2%*
HydroFloat	*+ 212 µm*	*5.4% Li_2O @ 46.7%*	*4.4% Li_2O @ 43.7%*
Conventional Flotation	*- 212 µm*	*2.7% Li_2O @ 49.3%*	*2.6% Li_2O @ 59.9%*

Ongoing test work is evaluating the combination of the CrossFlow® separator technology to remove ultrafine ahead of the HydroFloat stage, and to replace deslime cyclones in the tailings treatment flowsheet. CrossFlow® test work to date demonstrates the ability to reject 30−40% of the material at 90% passing 212 µm fines, upgrading the product material as shown in Figure 13-4. Test work is ongoing to demonstrate the impact of operating the CrossFlow® and HydroFloat® processes in series.

Figure 13-4 First Stage CrossFlow® Test Work Results

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CHAPTER 14: MINERAL RESOURCE ESTIMATES

14 MINERAL RESOURCE ESTIMATES

The Mt Cattlin 2023 Mineral Resource Estimate (MRE) update represents the combination of two Mineral Resource Estimate updates completed at different times by Mining Plus. The updates were made to the Northwest (NW or Area 6) and Southwest (SW or Area 3) region of the deposit which have then been merged with the pre-existing block model and supporting data.

This section documents the work undertaken on the most recent MRE update for Mt Cattlin effective 30 June 2023.

14.1 Key Assumptions, Parameters, and Methods

14.1.1 Drillhole Data

The drillhole database provided for the Mt Cattlin Mineral Resource update contains 4,158 drillholes, many of which are historical drillholes.

The drillhole dataset for the NW and SW areas contains 3,232 drillholes, for 175,950 metres, comprised of a combination of RC, DD, and RC with a diamond tail (RC_DDT) drillholes. The dominant drillhole type is RC, representing over 95% of the drill metres being from RC drillholes (Table 14-1).

Table 14-1 NW and SW Area Drillhole Details

Hole Type	Count	Metres	% Drillholes	% Metres
DDH	*45*	*5,437.8*	*1.4%*	*3.1%*
RC	*3,173*	*169,037.8*	*98.2%*	*96.1%*
RC_DDT	*14*	*1,474.4*	*0.4%*	*0.8%*
TOTAL	***3,232***	***175,950***	***100%***	***100%***

Mining Plus has undertaken only high-level validation of this data, including checking for overlapping intervals, non-matching end-of-hole records, obvious downhole survey discrepancies, and obvious collar location issues.

All below-detection assay results have been set to half the detection limit and set to positive.

The drillhole spacing for the NW and SW areas has been predominantly a 40 mE by 40 mN grid (Figure 14-1).

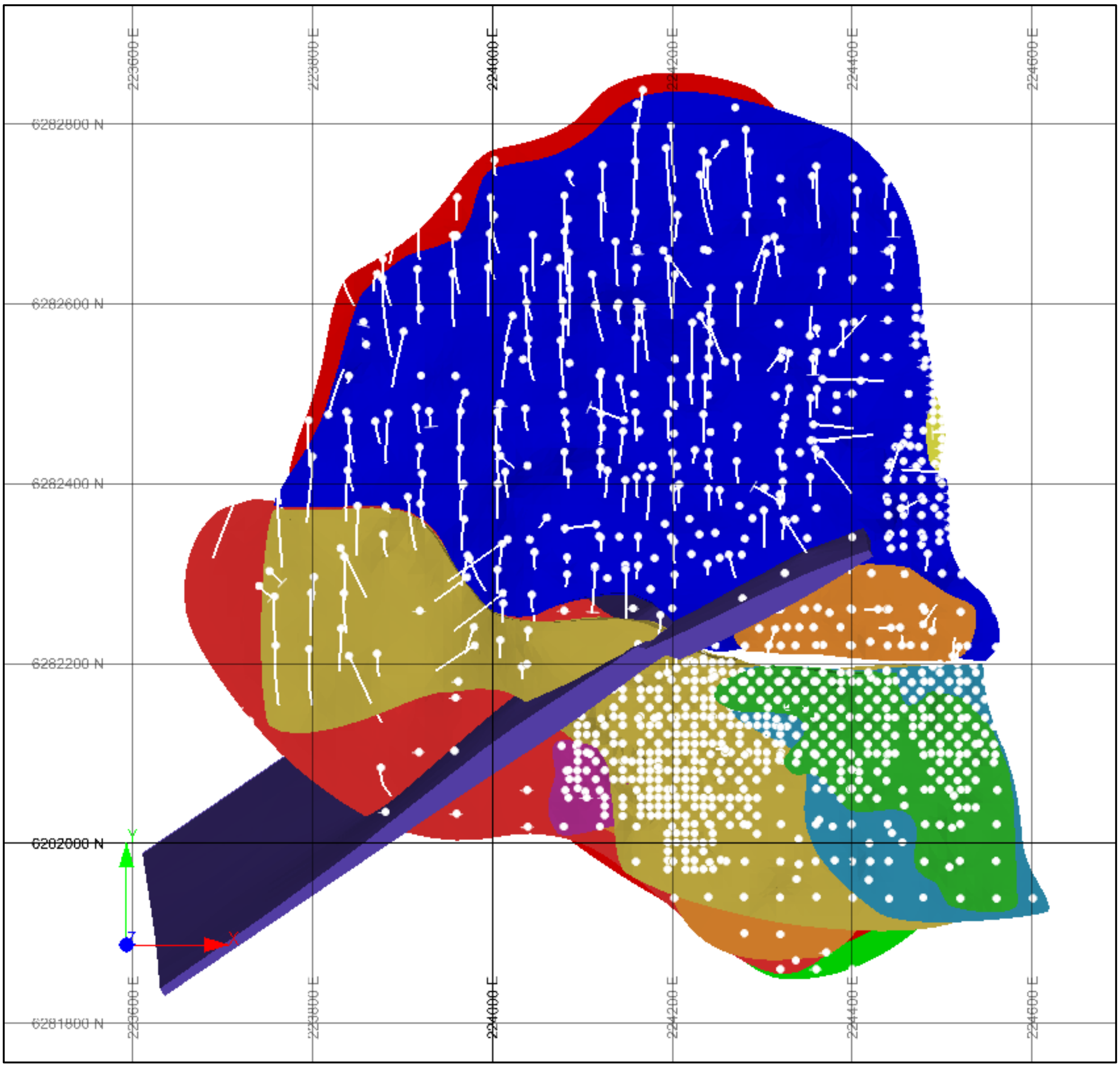


Figure 14-1 Plan View of the Drillhole Collars and Updated Pegmatite Wireframes, as of 01 January 2023

14.1.2 Interpretation and Modelling

14.1.2.1 Geological Domains

Mining Plus has updated the pre-existing geological wireframe interpretations incorporating the additional drillholes within the NW and SW areas and improved geological understanding of the region.

As the size of the spodumene crystals within the pegmatites can cause issues during processing, Mining Plus has differentiated the coarse and fine-grained spodumene zones within the NW and SW areas by creating separate wireframe domains to delineate the coarse-grained mineralised spodumene within the pegmatite wireframes.

The geological interpretation exercise resulted in a total of thirteen (13) individual pegmatite domains and one (1) intrusive dolerite modelled and used to control the block model estimation process.

14.1.2.2 Weathering Surfaces

Allkem provided Mining Plus with two (2) weathering wireframe surfaces, to delineate fresh rock, partially weathered or transitional material, and completely oxidised rock horizons. Mining Plus undertook a review of these surfaces and accepted that the surfaces are reflective of the oxidation and weathering states observed.

14.1.2.3 Mineralised Domains

The Li_2O grade distributions, within the pegmatite geological domains interpreted and wireframed by Mining Plus, indicate the presence of mineral zonation and differentiation into high and low-grade lithia zones. Mining Plus utilised the following indicators to generate wireframes that capture the internal mineralised portion of the pegmatite:

- Na_2O less than 4% excluded on the periphery
- Geology logging of coarse-grained pegmatite
- Li_2O less than 0.3% excluded on the periphery.

The modelling of these zones has been completed utilising Leapfrog Geo software and explicitly modelling the internal coarse-grained and mineralised spodumene (Figure 14-2).

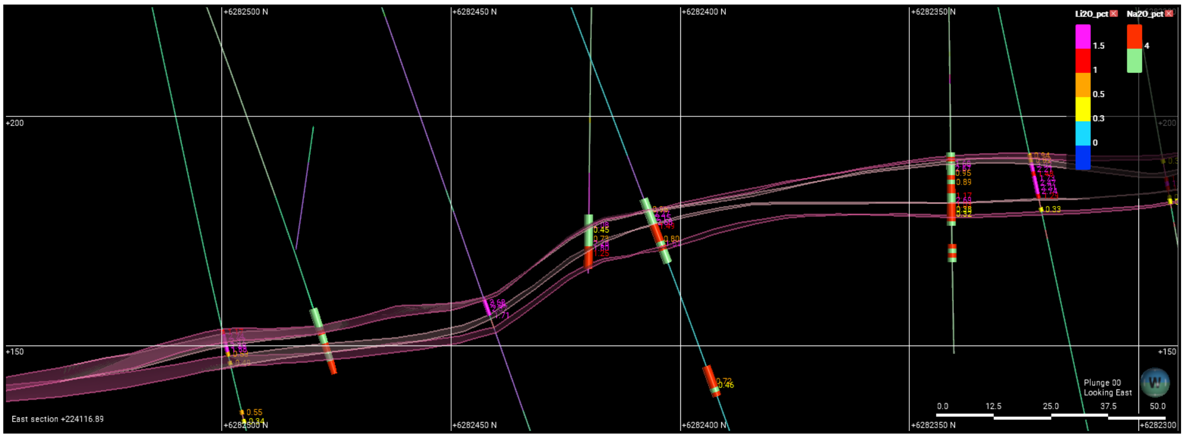


Figure showing an example of Na_2O grades informing the boundary between the mineralised pegmatites and the fine-grained skins.

Figure 14-2 Cross-Section Example of Na_2O Grades

The mineralisation modelling exercise resulted in a total of thirteen (13) individual pegmatite mineralisation domains for the Northwest and Southwest area MRE Update.

14.1.2.4 Domain Coding

The wireframes and surfaces have been used to code the drillhole database and block model by pegmatite, mineralisation, and weathering. Coding was applied to the drillhole data and block model to define the following:

- Pegmatite flag – modelled pegmatite domain code
- Mineralisation –low-grade Li_2O and high-grade Li_2O domains
- Weathering – oxidised, transitional, or fresh material.

14.1.2.5 Statistical Analysis and Variography

A contact boundary analysis has been undertaken to confirm the treatment of samples across the weathering zones during estimation for each element estimated. In domains where there is no statistical difference across the weathering boundaries, domains have been grouped for estimation purposes.

A grouped code flag has been generated to enable domains to be grouped by weathering profile and pegmatite domains to analyse and estimate Li_2O%.

Boundary analysis on Ta_2O_5 and Fe_2O_3 showed no requirement to control the estimation by weathering profile.

14.1.2.6 Data Compositing

Analysis of the raw drillhole sample intervals indicates the predominant sampled length is 1 m, with more than 99% of the total samples being 1 m or less.

A composite sample length of 1 m was considered appropriate and has been used in the Mineral Resource estimate update. Domain-flagged 1 m downhole composites have been extracted for all mineralised domains in the compositing process with a 0.1 m residual.

A comparison between the raw and composite sample statistics for the estimation domains by element are provided in Table 14-2, Table 14-3, and Table 14-4. Highlighted cells indicate domains with high coefficients of variation (CV).

Table 14-2 Comparison Statistics Between Raw and Composite Samples for the Li_2O Estimation Domains

Element	Li_2O								
Code	No. Samples		Mean Grade			Std Dev		Coeff Variation	
	Raw	Comp	Raw	Comp	% Diff	Raw	Comp	Raw	Comp
3103	216	203	0.42	0.40	4.0%	0.60	0.57	1.63	1.41
3113	295	276	1.25	1.24	0.2%	0.87	0.87	0.75	0.70
3203	72	71	0.33	0.33	-0.9%	0.42	0.42	1.27	1.26
3213	35	31	1.09	1.06	2.5%	0.65	0.66	0.60	0.62
3301	51	49	0.55	0.54	1.3%	0.72	0.73	1.31	1.35
3302	452	428	0.27	0.27	1.1%	0.46	0.46	1.70	1.70
3303	455	435	0.35	0.35	-2.0%	0.48	0.49	1.39	1.39
3311	99	95	1.44	1.44	0.1%	0.67	0.68	0.47	0.47
3312	419	389	1.01	1.01	-0.5%	0.68	0.67	0.67	0.67
3313	778	736	1.19	1.18	0.6%	0.78	0.77	0.65	0.65
3401	51	51	0.38	0.38	0.8%	0.57	0.57	1.51	1.51
3402	393	378	0.20	0.20	-0.5%	0.36	0.36	1.84	1.81
3403	6	6	0.03	0.03	0.0%	0.03	0.03	0.92	0.92
3411	14	14	0.87	0.87	0.0%	0.42	0.42	0.49	0.49
3412	144	138	1.09	1.10	-0.8%	0.71	0.70	0.65	0.64
3502	140	130	0.27	0.29	-4.2%	0.52	0.54	1.91	1.88
3503	69	65	0.12	0.11	4.5%	0.14	0.14	1.24	1.26
3512	85	84	0.82	0.82	0.9%	0.59	0.59	0.72	0.72
3513	42	42	0.91	0.91	0.0%	0.67	0.67	0.74	0.74
3603	16	15	0.32	0.32	-1.6%	0.43	0.44	1.37	1.38
3613	7	6	0.68	0.73	-6.8%	0.50	0.53	0.74	0.73
3703	104	101	0.61	0.61	-0.2%	0.64	0.65	1.05	1.07
3713	119	115	1.25	1.26	-0.3%	0.82	0.81	0.65	0.64
3803	24	23	0.35	0.36	-1.9%	0.39	0.40	1.11	1.11
3813	24	23	1.81	1.76	2.7%	0.86	0.85	0.48	0.48
3903	15	15	0.19	0.19	0.0%	0.22	0.22	1.15	1.15
3913	9	8	1.02	1.14	-10.6%	0.87	0.84	0.85	0.74
6103	1000	902	0.39	0.38	1.6%	0.54	0.52	1.39	1.37
6113	1602	1463	1.39	1.39	-0.4%	0.88	0.87	0.63	0.63
6203	696	615	0.48	0.50	-3.0%	0.66	0.68	1.38	1.37
6213	751	685	1.57	1.56	0.8%	1.10	1.10	0.67	0.70
6303	100	91	0.81	0.75	7.5%	0.80	0.75	1.00	1.00
6313	147	139	1.46	1.47	-0.7%	0.77	0.78	0.53	0.53
6403	23	16	0.30	0.27	8.4%	0.49	0.49	1.64	1.79
6413	9	8	1.68	1.78	-5.3%	0.73	0.71	0.43	0.40
33023303	907	863	0.31	0.31	-0.6%	0.47	0.48	1.53	1.53
33123313	1349	1125	1.13	1.13	0.2%	0.75	0.74	0.67	0.66
34023403	399	384	0.19	0.20	-1.0%	0.36	0.36	1.86	1.82
35023503	209	195	0.22	0.23	-3.1%	0.44	0.46	2.00	2.00

Table 14-3 Comparison Statistics Between Raw and Composite Samples for the Ta_2O_5 Estimation Domains

Element	Ta_2O_5								
Code	No. Samples		Mean Grade			Std Dev		Coeff Variation	
	Raw	Comp	Raw	Comp	% Diff	Raw	Comp	Raw	Comp
3103	215	202	155.2	156	-0.5%	143.6	146.8	0.9	0.9
3113	293	274	183.8	183.4	0.2%	181.2	174	1	0.9
3203	71	70	121.8	123.5	-1.4%	85.8	85.3	0.7	0.7
3213	34	30	130.7	134.3	-2.7%	80.2	83.6	0.6	0.6
3301	47	45	105.8	104	1.7%	68.1	67.4	0.6	0.6
3302	732	409	144.9	142.9	1.4%	131.1	130.5	0.9	0.9
3303	446	426	155.1	156.5	-0.9%	111.2	112.3	0.7	0.7
3311	98	94	107.4	109.1	-1.6%	89.5	90.9	0.8	0.8
3312	416	387	199.3	201.6	-1.1%	375.7	384.1	1.9	1.9
3313	767	726	188.4	190.5	-1.1%	296	303.2	1.6	1.6
3401	50	50	193.2	193.2	0.0%	165.6	165.6	0.9	0.9
3402	388	373	244.4	243.9	0.2%	246.6	248.5	1.0	1.0
3403	6	6	328.1	328.1	0.0%	252.6	252.6	0.8	0.8
3411	14	14	251.6	251.6	0.0%	168.6	168.6	0.7	0.7
3412	143	137	263.9	265	-0.4%	148.4	150.8	0.6	0.6
3502	132	123	176.1	178.9	-1.6%	169	173.1	1.0	1.0
3503	68	64	182.3	185.3	-1.6%	130.4	132.9	0.7	0.7
3512	82	81	214.5	213.1	0.7%	146.2	144.1	0.7	0.7
3513	43	43	248.3	248.3	0.0%	128.9	128.9	0.5	0.5
3603	15	14	167.9	173.2	-3.1%	68.4	67.8	0.4	0.4
3613	7	6	222.3	228.8	-2.8%	87.69	83.4	0.4	0.4
3703	103	100	169.4	168.1	0.8%	89.6	90.1	0.5	0.5
3713	113	109	157.4	158.9	-0.9%	73.3	74	0.5	0.5
3803	24	23	160.4	164.1	-2.3%	80.4	80.1	0.5	0.5
3813	22	21	145.9	150.9	-3.3%	93.3	92.6	0.6	0.6
3903	14	14	148.9	148.9	0.0%	93.6	93.6	0.6	0.6
3913	9	8	166.3	164	1.4%	62.7	65.8	0.4	0.4
6103	938	843	131.9	131.3	0.5%	92	94.2	0.7	0.7
6113	1439	1314	113.7	116	-2.0%	214.6	222.8	1.9	1.9
6203	689	609	151	150.6	0.3%	101.9	103.2	0.7	0.7
6213	747	681	215.5	221.2	-2.6%	699.9	731.6	3.2	3.3
6303	97	88	227.5	226	0.7%	120.2	123.5	0.5	0.5
6313	146	138	205.3	203.9	0.7%	72.6	73.6	0.4	0.4
6403	19	12	155.9	145.5	7.1%	60.7	62.5	0.4	0.4
6413	8	7	122.1	109.4	11.6%	59.9	36.2	0.5	0.3

Table 14-4 Comparison Statistics Between Raw and Composite Samples for the Fe_2O_3 Estimation Domains

Element	*Fe_2O_3*								
Code	No. Samples		Mean Grade			Std Dev		Coeff Variation	
	Raw	Comp	Raw	Comp	% Diff	Raw	Comp	Raw	Comp
0	277225	19838	7.7	7.49	2.8%	4.05	4.12	0.53	0.55
98	37	31	9.04	8.68	4.1%	3.36	3.52	0.37	0.41
3103	216	203	2.64	2.66	-0.8%	2.51	2.56	0.95	0.96
3113	295	276	1.87	1.87	0.0%	1.15	1.16	0.61	0.62
3203	72	71	2.54	2.56	-0.8%	2.21	2.22	0.87	0.86
3213	35	31	2.06	2.11	-2.4%	1.23	1.29	0.6	0.61
3301	51	49	2.02	2.02	0.0%	1.82	1.85	0.9	0.92
3302	452	428	2.07	2.08	-0.5%	2.14	2.16	1.04	1.04
3303	455	435	2.76	2.81	-1.8%	2.79	2.86	1.01	1.02
3311	99	95	1.51	1.52	-0.7%	0.76	0.77	0.5	0.51
3312	419	389	1.36	1.36	0.0%	1	0.99	0.74	0.73
3313	778	736	1.49	1.5	-0.7%	1.26	1.28	0.85	0.85
3401	51	51	2.54	2.54	0.0%	1.97	1.97	0.77	0.77
3402	393	378	3.07	3.09	-0.6%	2.79	2.79	0.91	0.91
3403	6	6	2.55	2.55	0.0%	1.59	1.59	0.62	0.62
3411	14	14	3.15	3.15	0.0%	2.67	2.67	0.85	0.85
3412	144	138	1.55	1.57	-1.3%	1.45	1.48	0.94	0.94
3502	140	130	3.43	3.41	0.6%	2.9	2.9	0.85	0.85
3503	69	65	2.28	2.2	3.6%	2.1	2.01	0.92	0.91
3512	85	84	2.66	2.68	-0.7%	2.11	2.12	0.79	0.79
3513	42	42	1.52	1.52	0.0%	0.84	0.84	0.56	0.56
3603	16	15	4.33	3.97	9.1%	3.32	3.12	0.77	0.79
3613	7	6	2.8	2.56	9.4%	1.11	1.02	0.4	0.4
3703	104	101	2.46	2.51	-2.0%	2.65	2.67	1.08	1.07
3713	199	115	1.76	1.75	0.6%	1.23	1.23	0.7	0.71
3803	24	23	1.85	1.87	-1.1%	1.48	1.51	0.8	0.81
3813	24	23	1.94	1.98	-2.0%	1.31	1.33	0.67	0.67
3903	15	15	3.69	3.69	0.0%	3.22	3.22	0.87	0.87
3913	9	8	2.76	2.72	1.5%	1.93	2.02	0.7	0.74
6103	1000	902	2.33	2.38	-2.1%	2.62	2.6	1.12	1.09
6113	1602	1463	1.67	1.7	-1.8%	1.23	1.23	0.73	0.73
6203	696	615	2.37	2.37	0.0%	2.02	1.9	0.85	0.8
6213	751	685	1.84	1.86	-1.1%	1.07	1.05	0.58	0.56
6303	100	91	2.38	2.55	-6.7%	2.91	3	1.22	1.18
6313	147	139	1.51	1.55	-2.6%	0.8	0.8	0.53	0.52
6403	23	16	3.35	4.39	-23.7%	4.22	4.68	1.26	1.07
6413	9	8	1.79	1.82	-1.6%	0.49	0.51	0.27	0.28

For all the domains, the compositing process has resulted in either no change or a minor decrease to the element grade and CV.

14.1.2.7 Top Cutting

Composites within the various estimation domains have been analysed to ensure the grade distributions are indicative of a single population, with no requirement for additional sub-domaining, and to identify any extreme values which could have an undue influence on the estimation of grade within these domains.

For Li_2O domains that have a coefficient of variation (CV) greater than 1.8, log histograms, log probability and mean-variance plots have been used to assess the influence of extreme values and to determine the appropriate top cut where applicable. Where the top cut is applied, all grade values greater than the top cut grade was set to the top cut value (grade cap).

Top cut analysis indicated capping was only required for two (2) Li_2O estimation domains, and three (3) Ta_2O_5 domains (Table 14-5).

Table 14-5 Summary Statistics for the Li_2O Estimation Domains

Element	Domain	No. of Samples		Mean Grade			Top-Cut Value	Standard Deviation		Coeff of Variation	
		Un-Cut	Top-Cut	Un-Cut	Top-Cut	% Diff		Un-Cut	Top-Cut	Un-Cut	Top-Cut
Li_2O	*34023403*	*374*	*1*	*0.20*	*0.20*	*0%*	*2.0*	*0.36*	*0.35*	*1.81*	*1.78*
	35023503	*183*	*4*	*0.24*	*0.22*	*-7%*	*1.8*	*0.47*	*0.36*	*1.99*	*1.69*
Ta_2O_5	*3312*	*385*	*1*	*201.20*	*195.70*	*-3%*	*3800*	*385.00*	*310.20*	*1.91*	*1.59*
	6113	*1313*	*2*	*115.90*	*112.60*	*-3%*	*2000*	*222.90*	*150.90*	*1.92*	*1.34*
	6213	*681*	*1*	*221.20*	*201.80*	*-9%*	*4300*	*731.60*	*347.00*	*3.31*	*1.72*

14.1.2.8 Variography

Variographic analysis has been undertaken using the top-cut composite data for the various estimation domains for Li_2O, Fe_2O_3 and Ta_2O_5. The variogram study was integrated with mineralised domain models. The resulting variogram continuity directions have been checked against the pegmatite wireframes to ensure they are geologically robust such that the orientation of strike, dip and plunge directions of the ellipsoid are compatible with known mineralisation or structural orientations. Where variogram rotations were found to not be compatible with the modelled pegmatite orientations, the rotations were adjusted to fit the appropriate variogram to the pegmatite.

14.1.3 Block Model and Grade Estimation

Mining Plus undertook the update of the NW and SW areas, using the same drillhole / block model coding logic and estimation methodology as utilised in the April 2021 MRE. The NW and SW areas have been updated to include additional drillholes completed in the area since the April 2021 MRE update (Figure 14-3).

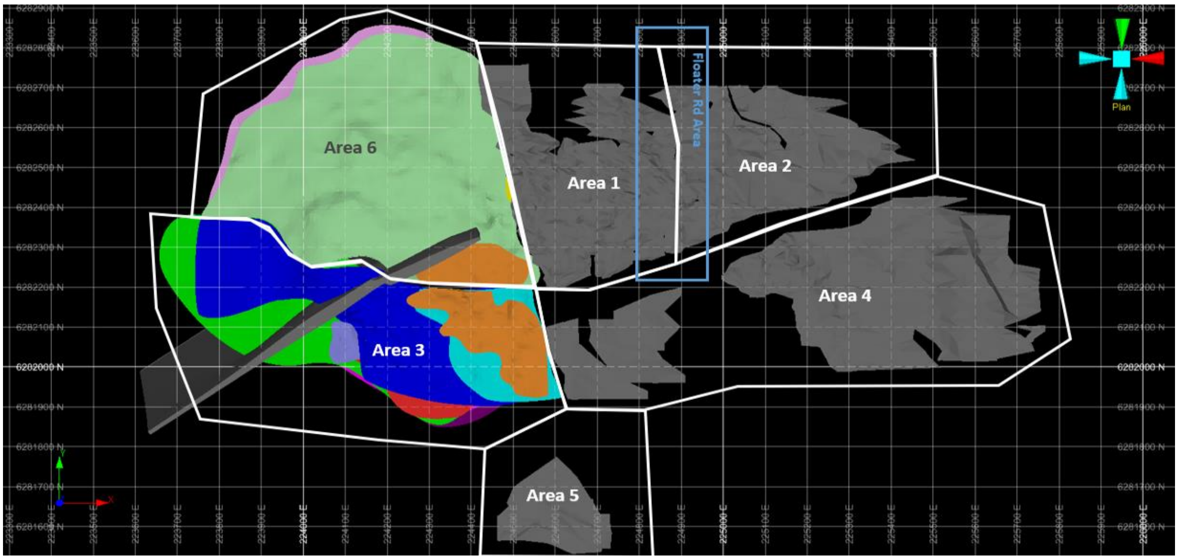


Figure 14-3 Plan View of the NW and SW Areas and Updated Wireframes in the Jan 2023 MRE Update

14.1.3.1 Block Model Construction

The block model construction applied to Mineral Resource estimation has been completed within Datamine™ Studio RM software. A three-dimensional non-rotated block model was constructed to cover the limits of the deposit indicated in Table 14-6 into which the estimate was completed. The block model extents and block sizes are also presented in Table 14-6 for the mineralisation and non-mineralised areas.

The parameters used for the construction of the block model are summarised in Table 14-6.

Table 14-6 Block Model Construction Parameters

Scheme	Block Model Origin			Block Model Maximum			Parent Block Size			No. of cells		
	X	Y	Z	X	Y	Z	X	Y	Z	X	Y	Z
parent	*223,600*	*6,281,800*	*-125*	*224,700*	*6,283,200*	*300*	*20*	*20*	*5*	*55*	*70*	*85*
subblock	*223,600*	*6,281,800*	*-125*	*224,700*	*6,283,200*	*300*	*2.50*	*2.50*	*0.625*			

The parent block sizes selected are approximately half the dominant drillhole spacing within the northwest and southwest area and are sub-celled to account for the variable thicknesses of the pegmatites. The parent block and sub-cell sizes are considered suitable for estimating the Mineral Resource.

Sub-celling has been used to accurately represent the wireframe volumes. Parent block estimation has been undertaken and therefore, all sub-cells within a single parent block have the same estimated grade as the parent cell.

The block model is coded with mineralised domain attributes that correspond with a geological and mineralisation domain as defined by the wireframe solids.

14.1.3.2 Grade Estimation

The variogram models were used for the Li_2O, Ta_2O_5, and Fe_2O_3 estimations using ordinary kriging estimation methods into both the mineralised and un-mineralised pegmatite domains. The grade estimations have generally been completed in three (3) passes, although some of the more sparsely drilled domains have required a fourth interpolation run to estimate a grade.

The search ellipse ranges applied have been based on the grade continuity within each domain or grouped domain. Fe_2O_3 has been estimated in the pegmatites, external waste, and dolerite domains. Li_2O and Ta_2O_5 have only been estimated in the pegmatites. The estimation parameters are summarised in Table 14-7.

Table 14-7 Northwest and Southwest Area Estimation Parameters

Estimation Pass	Distance	# Samples	Drillhole Limit
First Pass	*Approximates half of the variogram range*	*7–27*	*4*
Second Pass	*Approximates the variogram range*	*7–27*	*4*
Third Pass	*4 x the approximate variogram range*	*2–24*	-

Due to the variable dips of the pegmatites, the dynamic anisotropy method was utilised in the block model estimation. The dynamic anisotropy process allows the orientation for the search ellipsoid to be defined individually for each cell in the model so the search ellipsoid is aligned with the orientation of the mineralisation in an attempt to ensure optimum search of composite data for the estimation.

14.1.3.3 Bulk Density

A bulk density data review has been undertaken by Mining Plus during the estimation of the entire Mt Cattlin MRE in November and December 2018 (Mining Plus, 2018).

No additional bulk density data has been collected in the NW and SW areas since the review was completed in 2018, therefore the bulk density values determined in 2018 have been applied to the NW and SW area for this MRE update (Table 14-8).

Material within the waste dumps, haul roads and bunds above the topographic surface have been assigned a bulk density of 1.8 g/cm^3 within the block model.

Table 14-8 Summary of Bulk Density Data by Geology And Weathering Domain

Lithology Group	Weathering	Bulk Density Assigned (g/cm³)
Waste Lithologies	*Oxide*	*2.50*
	Transitional	*2.70*
	Fresh	*2.86*
Unmineralised Pegmatite	*Oxide*	*2.42*
	Transitional	*2.62*
	Fresh	*2.78*
Mineralised Pegmatite	*Oxide*	*2.47*
	Transitional	*2.71*
	Fresh	*2.72*

14.1.4 Block Model Validation

Validation checks have been undertaken at all stages of the modelling and estimation process. The final grade estimates of all three (3) elements have been validated using:

- Visual comparison of block grade estimates and the input drillhole data
- Global comparison of the average composite and estimated block grades
- Moving window averages comparing the mean block grades to the composites.

14.1.4.1 Visual Validation

Visual comparison of composite sample grade and block grade has been conducted in cross-section and in plan view. In general, there is a reasonable consistency between high / low-grade blocks and drillholes. The block grades show no gross grade smearing (Figure 14-4).

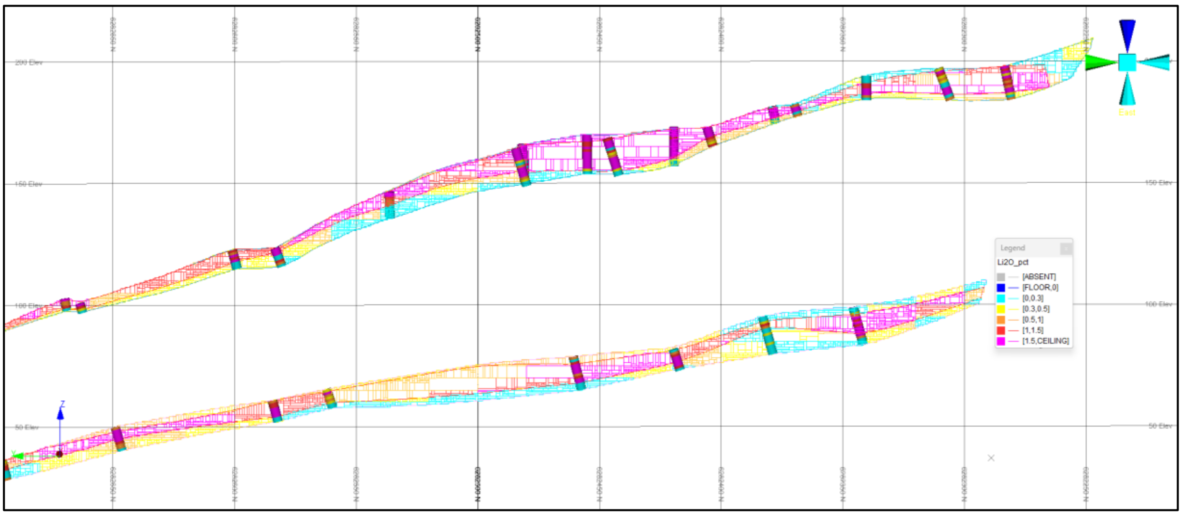


Figure 14-4 Cross Section Looking North at 224,202 E, Through Pegmatite 61 and 62

14.1.4.2 Global Comparisons

The global block estimated mean grade was checked against de-clustered composite data. The estimates show an acceptable reproduction of the mean reasonable to support the Mineral Resource classification applied.

A comparison of the estimated grades compared to the input grades within each pegmatite are provided in Table 14-9 to Table 14-11.

Table 14-9 NW and SW Area block model Li_2O global validation statistics, by estimation domain

Element	Li_2O							
Pegmatite	**Code1**	**Estimated Tonnes**	**Estimated Grade (cut)**	**No. Composites**	**Composite Grade (cut)**	**Tonnes per composite**	**% Diff Est vs Comp**	**Comments**
31	*310*	*2,570,082*	*0.37*	*252*	*0.39*	*10,199*	*-4.3%*	
31	*311*	*1,916,306*	*1.16*	*276*	*1.22*	*6,943*	*-4.5%*	
32	*320*	*825,067*	*0.27*	*71*	*0.33*	*11,621*	*-19.3%*	*Low sample support.*
32	*321*	*353,709*	*1.11*	*31*	*1.06*	*11,410*	*5.5%*	
33	*330*	*1,142,341*	*0.25*	*863*	*0.27*	*1,324*	*-8.6%*	
33	*331*	*718,912*	*1.09*	*1,220*	*1.13*	*589*	*-4.2%*	
34	*340*	*349,951*	*0.20*	*435*	*0.23*	*804*	*-15.2%*	*Non-mineralised pegmatite. Rescat 0.*
34	*341*	*76,612*	*1.09*	*152*	*1.13*	*504*	*-3.6%*	
35	*350*	*304,206*	*0.16*	*195*	*0.18*	*1,560*	*-9.6%*	
35	*351*	*137,609*	*0.81*	*126*	*0.82*	*1,092*	*-1.8%*	
36	*360*	*28,028*	*0.33*	*15*	*0.30*	*1,869*	*11.3%*	*Low sample support. Non-mineralised. Rescat 0.*
36	*361*	*6,086*	*0.70*	*6*	*0.75*	*1,014*	*-6.4%*	
37	*370*	*66,513*	*0.56*	*101*	*0.62*	*659*	*-9.3%*	
37	*371*	*56,297*	*1.29*	*115*	*1.26*	*490*	*1.7%*	
38	*380*	*798,389*	*0.33*	*23*	*0.35*	*34,713*	*-4.6%*	
38	*381*	*258,128*	*1.77*	*23*	*1.76*	*11,223*	*0.6%*	
39	*390*	*783,633*	*0.16*	*15*	*0.17*	*52,242*	*-7.5%*	
39	*391*	*218,511*	*1.20*	*8*	*1.01*	*27,314*	*18.3%*	*Low sample support. Rescat 3.*
61	*610*	*3,393,765*	*0.38*	*902*	*0.36*	*3,762*	*7.1%*	
61	*611*	*4,293,816*	*1.40*	*1463*	*1.38*	*2,935*	*1.1%*	
62	*620*	*4,400,746*	*0.54*	*615*	*0.51*	*7,156*	*6.1%*	
62	*621*	*3,949,229*	*1.51*	*685*	*1.54*	*5,765*	*-1.6%*	
63	*630*	*169,706*	*0.66*	*91*	*0.72*	*1,865*	*-8.8%*	
63	*631*	*150,411*	*1.42*	*139*	*1.49*	*1,082*	*-4.8%*	
64	*640*	*82,929*	*0.23*	*16*	*0.31*	*5,183*	*-26.6%*	
64	*641*	*30,658*	*1.77*	*8*	*1.82*	*4,029*	*-2.8%*	

Table 14-10 NW and SW Area Block Model Ta_2O_5 Global Validation Statistics, by estimation domain

Element	Ta_2O_5							
Pegmatite	Code1	Estimated Tonnes	Estimated Grade (cut)	No. Composites	Composite Grade (cut)	Tonnes per composite	% Diff Est vs Comp	Comments
31	311	2,570,082	155	247	152	10,405	1.6%	
31	310	1,916,306	182	274	185	6,994	-1.7%	
32	321	825,067	122	70	128	11,787	-4.6%	
32	320	353,709	135	30	137	11,790	-1.5%	
33	331	1,142,341	151	835	151	1,368	0.0%	
33	330	718,912	176	1207	178	596	-0.9%	
34	340	349,951	242	429	248	816	-2.4%	
34	341	76,612	284	151	276	507	3.1%	
35	350	304,206	220	187	211	1,627	4.4%	
35	351	137,609	282	124	251	1,110	12.2%	Low sample support.
36	361	28,028	173	14	168	2,002	3.2%	
36	360	6,086	222	6	214	1,014	3.9%	
37	371	66,513	171	100	168	665	1.8%	
37	370	56,297	147	109	158	516	-7.0%	
38	380	798,389	167	23	165	34,713	1.2%	
38	381	258,128	147	21	151	12,292	-2.6%	
39	390	783,633	147	14	142	55,974	3.1%	
39	391	218,511	161	8	141	27,314	14.3%	Low sample support.
61	611	3,393,765	131	843	131	4,026	0.6%	
61	610	4,293,816	110	1314	111	3,268	-1.1%	
62	621	4,400,746	152	609	150	7,226	1.2%	
62	620	3,949,229	220	681	200	5,799	10.2%	Non-mineralised pegmatite. Rescat 0.
63	631	169,706	234	88	221	1,928	6.1%	
63	630	150,411	203	138	205	1,090	-1.1%	
64	640	82,929	139	12	141	6,911	-1.0%	
64	641	30,658	113	7	101	4,605	12.5%	Low sample support.

Table 14-11 NW and SW Area Block Model Fe_2O_3 Global Validation Statistics, by estimation domain

Element	Fe_2O_3							
Pegmatite	Code1	Estimated Tonnes	Estimated Grade (cut)	No. Composites	Composite Grade (cut)	Tonnes per composite	% Diff Est vs Comp	Comments
0	0	1,031,998,450	7.84	25782	7.75	40,028	1.2%	
98	98	16,240,271	6.66	35	8.86	464,008	-24.8%	
310	310	2,570,082	2.64	252	2.54	10,199	3.7%	
311	311	1,916,306	1.93	276	1.87	6,943	3.5%	
320	320	825,067	2.54	71	2.56	11,621	-0.9%	
321	321	353,709	1.83	31	2.11	11,410	-13.5%	
330	330	1,142,341	2.75	863	2.45	1,324	12.4%	
331	331	718,912	1.60	1220	1.46	589	9.8%	
340	340	349,951	3.08	435	3.02	804	1.9%	
341	341	76,612	1.80	152	1.72	504	4.6%	
350	350	304,206	3.29	195	3.01	1,560	9.4%	
351	351	137,609	2.27	126	2.29	1,092	-1.1%	
360	360	28,028	3.71	15	3.97	1,869	-6.5%	
361	361	6,086	2.07	6	2.56	1,014	-19.1%	
370	370	66,513	2.30	101	2.51	659	-8.3%	
371	371	56,297	1.74	115	1.75	490	-0.8%	
380	380	798,389	1.81	23	1.87	34,713	-3.2%	
381	381	258,128	1.88	23	1.98	11,223	-5.0%	
390	390	783,633	3.37	15	3.69	52,242	-8.5%	
391	391	218,511	1.54	8	2.72	27,314	-43.5%	
610	610	3,393,765	2.52	902	2.38	3,762	5.9%	
611	611	4,293,816	1.74	1463	1.70	2,935	2.1%	
620	620	4,400,746	2.41	615	2.37	7,156	1.6%	
621	621	3,949,229	1.95	685	1.86	5,765	4.7%	
630	630	169,706	2.53	91	2.55	1,865	-0.7%	
631	631	150,411	1.62	139	1.55	1,138	4.4%	
640	640	82,929	3.91	16	4.39	5,184	-11.0%	
641	641	30,658	1.68	8	1.82	4,029	-7.7%	

14.1.4.3 Swath Plots

Sectional validation graphs have been created to assess the reproduction of local means and to validate the grade trends in the block model by Easting, Northing and Elevation.

The swath plots show satisfactory correlation between the estimated and actual drillhole grades and indicate the absence of significant global bias.

14.1.4.4 Un-Estimated Blocks

Un-estimated blocks have been assigned grades as outlined in Table 14-12. Un-estimated blocks are typically located at the furthest extents of each of the domains.

Table 14-12 Grades Assigned to Un-Estimated Blocks, by Element and Domain

Domain	Element	Grade Assigned
Waste Domains	*Li_2O*	*0%*
Pegmatites		*0.01%*
Waste Domains	*Ta_2O_5*	*0 ppm*
Pegmatites		*0.01 ppm*
Waste Domains	*Fe_2O_3*	*0.01%*
Pegmatites		*0.01%*

14.2 Mineral Resource Classification

The Mineral Resource has been classified as Measured, Indicated and Inferred primarily based on the drilling data spacing, grade and geological continuity, and quality of the estimation as indicated by the geostatistical slope of regression (Table 14-13).

Table 14-13 Resource Classification Criteria

Category	Rescat	Drill Density		Pass	SOR	Other
		X (m)	Y (m)			
Measured	*1*	*GC @ 20 by 20*		*1, 2*	*>0.8*	
Indicated	*2*	*40*	*40*	*1, 2*	*>0.5*	
Inferred	*3*	*40*	*40*	*all*	*<0.5*	*Remaining blocks estimated in passes 1 to 3*
Unclassified	*4*	*>40*	*>40*	*all*	*any*	*Blocks estimated in pass 4*

The Mineral Resource has been classified on the following basis:

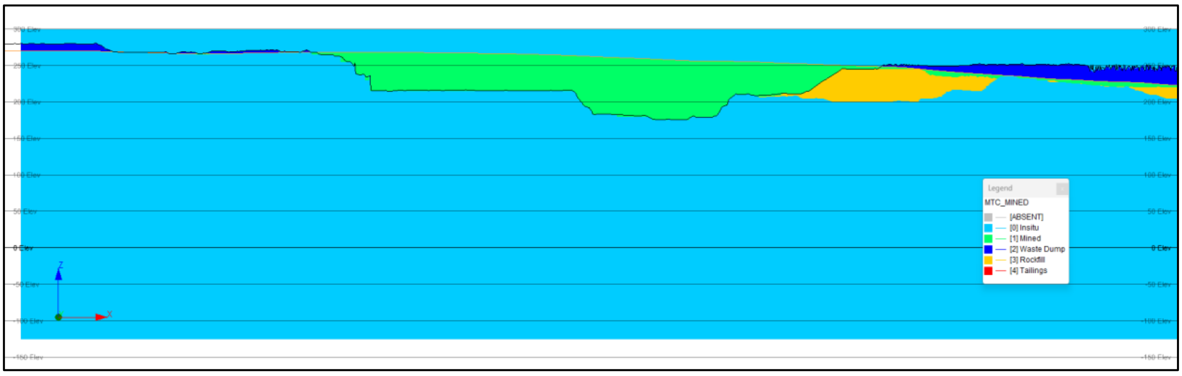
- Areas of the in-situ Mineral Resource, that have been defined by grade control drilling on a 20 m by 20 m pattern and with a high level of confidence in the estimation quality, have been classified as Measured Mineral Resources. The mined areas of each pegmatite have also been classified as Measured Resources
- Pegmatites which have been defined by drillholes spaced less than 40 m by 40 m, estimated on the first two passes, up to the range of the variograms, and have returned a slope of

regression value above 0.5 have been classified as Indicated Mineral Resources. In order to avoid the generation of a 'spotted dog' classification, each pegmatite domain has been individually assessed and wireframes have been created to black flag the block model and classify the Indicated blocks

- The blocks that have been populated with a grade on either the first, second or third pass and have been defined by drillholes spaced greater than 40 m by 40 m with lower levels of confidence in the quality of the estimate and hence in the continuity of the grade have been classified as Inferred Mineral Resources
- Blocks that have not been estimated within three passes or have an assigned grade have remained unclassified.

14.3 Depletion

The Mineral Resource has been depleted using the surveyed asbuilt surface as of 30 June 2023, which has been coded into the model. Previously coded tailings and rockfill from below the depletion surface remain within the updated model, Figure 14-5.



Model displayed as "mined" with depletion surface (black) and natural topography (orange) displayed.

Figure 14-5 Cross-Section 6282329N

14.4 Basis for Establishing the RPEEE for Mineral Resources

As part of the evaluation for a Mineral Resource, and in line with JORC reporting standards, Reasonable Prospects of Eventual Economic Extraction (RPEEE) was completed. The RPEEE analysis was completed using Whittle optimisations to determine an optimised resource pit shell determined by applying the following parameters in Table 14-14.

Table 14-14 Optimisation Parameters Used

Parameter	Value
Mining Recovery	93%
Mining Dilution	17%
Li_2O % Price/tonne 6% concentrate	USD$1,500
Li_2O % recovery	75%
Ta_2O_5ppm Price/pound concentrate	USD$40
Ta_2O_5ppm recovery	25%
Transport and port Cost/tonne	USD$34.76
State Royalty	5%
Processing Cost/tonne	USD$23.21
Mining Cost/tonne	USD$3.00
USD exchange rate	0.7

A cut-off grade of 0.4% Li_2O has been applied to the fresh material in the Whittle optimisation. The optimisation captures fresh material only, therefor there has been no cut-off grade applied to material from other weathering domains.

14.5 Mineral Resources Statement

Surface stockpiles surveyed as of 30 June 2023 have been included in the Mineral Resource and have been classified based on the level of confidence in the grade and tonnage assigned to surface stocks (Table 14-15). The Mineral Resource has been reported inside the USD 1,500 RPEEE pit shell at a cut-off of 0.3% Li_2O as of 30 June 2023, which is provided in Table 14-15.

Table 14-15 Mt Cattlin Mineral Resource as of 30 June 2023, COG >=0.3% Li_2O%"

Class	Tonnes	Li_2o %	Ta_2O_5 ppm	Fe_2O_3 %	Li_2O tonnes	LCE
Global Insitu Resource as of 30 June 2023, Cut -off grade Lithia 0.3%						
Measured	*0.2*	*1.0%*	*172*	*2.0%*	*2,000*	*5,000*
Indicated	*8.8*	*1.4%*	*165*	*2.0%*	*121,000*	*300,000*
Stockpiles	*1.8*	*0.8%*	*95*	*2.1%*	*13,000*	*32000*
Inferred	*1.3*	*1.3%*	*181*	*2.1%*	*17,000*	*42,000*
Total	***12.1***	***1.3%***	***167***	***2.0%***	***153,000***	***379,000***
Insitu Mineral Resource as of 30 June 2023, Cut -off grade Lithia 0.3%, USD 1,500 Shell						
Measured	*0.2*	*1.0%*	*171*	*2.0%*	*2,000*	*5000*
Indicated	*7.2*	*1.4%*	*147*	*2.0%*	*98,000*	*242000*
Inferred	*0.2*	*1.1%*	*133*	*2.1%*	*2,000*	*5000*
Stockpiles	*1.8*	*0.8%*	*95*	*2.1%*	*13,000*	*32000*
Total	***9.4***	***1.2%***	***137***	***2.1%***	***115,000***	***284000***

Notes:

1) Mineral Resource is estimated as of 30 June 2023 and depleted for production through to 30 June 2023
2) Mineral Resources are reported at a cut-off grade of 0.3% Li_2O
3) Estimate have been rounded to a maximum of two significant figures
4) Totals may appear different from the sum of their components due to rounding.

14.6 Mineral Resource Uncertainty Discussion

Mining Plus is not aware of any environmental, permitting, legal, title, taxation, socio-economic, marketing, or political factors that could materially influence the Mineral Resources other than the modifying factors already described in other sections of this report.

14.7 Qualified Person's Opinion

This section summarises the Qualified Person's opinion on the factors likely to influence the RPEEE. Mt Cattlin is an operating mine and the 2NW open pit is the fifth and final open pit to be developed. Options for underground extraction are under study. The most likely factors to influence the RPEEE are input concentrate price assumption and foreign exchange conversion to USD. Further permitting by the WA State Government is required to progress the 2NW open pit development beyond Stage 3 to Stages 4a and 4b.

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

AUGUST 2023

CHAPTER 15: MINERAL RESERVE ESTIMATE

15 MINERAL RESERVE ESTIMATE

Entech has based its assessment of the Mineral Reserves upon consideration of:

- An update of the Mineral Resource Estimate described in Section 14
- The modifying parameters, pit designs and stockpile inventories described herein
- The life of mine plan and financial modelling relating to the production plan described herein and in Items 21 and 22.

The Mineral Reserves have been estimated as of 30 June 2023 and are a subset of the Mineral Resource Estimate of the same date.

The information in this report that relates to the Mineral Reserves is based on information compiled by Entech. Entech's consultants have reviewed the information supplied by Allkem and third parties as well as the assumptions and production data used to derive these figures and have in this document commented on the validity and reliability thereof. Mr Daniel Donald of Entech acts as a Qualified Person as defined under NI 43-101 for this section.

15.1 Summary and Mineral Reserve

Mt Cattlin is an existing open cut operation using crushing, ore sorting, and heavy media separation to beneficiate mined ore into saleable products. The operation began in 2010 before low prices forced a three-year hiatus between 2013 and 2016. The site has operated continuously and expanded in capacity since restarting in 2016.

Pit optimisations have been carried out using a fixed spodumene concentrate sale price of US$1,500/t and an exchange rate of 0.7 USD:AUD. Whittle pit optimisation software has been used to identify the preferred pit shell on which the pit design was based.

The target design shells were selected in collaboration with Allkem to provide a logically phased mine life that maintains future optionality to further evaluate the trade-off between the larger second phase cutback compared to, or in conjunction with, underground mining.

The current mine sequence is based on:

- Continuing to mine the current Stage 3 NW pit to provide near-term ore supply
- Phasing of Stage 4 into two separate cutbacks to manage the strip ratio and provide smoother ore supply to the processing plant
- Estimated permitting approval timelines for both cutbacks.

All material was subjected to an economic evaluation in a financial model compiled by Entech, with pricing supplied by Allkem. The mine plan is shown to be technically and financially feasible. A suitable cashflow positive buffer exists below the assumed product prices to provide confidence that the Mineral Reserve estimate will be financially viable within a reasonably expected range of possible product prices.

A variety of surface stockpiles exist on site from current and past works which have been financially evaluated and shown to be economically viable. The stockpiles include current stocks such as Run of Mine (ROM) pad ore and semi-processed crushed ore, as well as lower grade, lower return stockpiles that are scheduled for processing just prior to closure.

A Mineral Reserve estimate (MRE) has been reported and tabulated below (Table 15-1).

Table 15-1 2023 Mineral Reserve Update (Entech, 2023)

Classification	Location	Ore Tonnes (Mt)	Grade Li_2O (%)	Grade Ta_2O_5 (ppm)	Contained Metal ('000) t Li_2O)	Contained Metal ('000) lbs Ta_2O_5
Proven	*In-situ*	*0.2*	*0.9*	*120*	*1.4*	*45*
Probable	*In-situ*	*5.2*	*1.3*	*130*	*69*	*1,500*
	Stockpiles	*1.8*	*0.8*	*95*	*13*	*390*
Total Mineral Reserve		**7.1**	**1.2**	**120**	**84**	**1,900**

Mineral Reserves are reported above a cut-off grade of 0.3% Li_2O. Estimates have been rounded to two significant figures, thus sum of columns may not equal.

Prior to this estimate, the most recent Mt Cattlin Mineral Reserves were a depletion update by Allkem as of 30 June 2022. This MRE shows the total Mineral Reserves have increased despite the mining depletion and the increase in operating costs that has occurred since the previous estimate record date. Mineral Resource conversion from Inferred to Indicated classification, and the improved economic environment around Lithium supply have been the major contributors to the increase in Mineral Reserves. The relative effect of the major variables can be seen below in Figure 15-1.

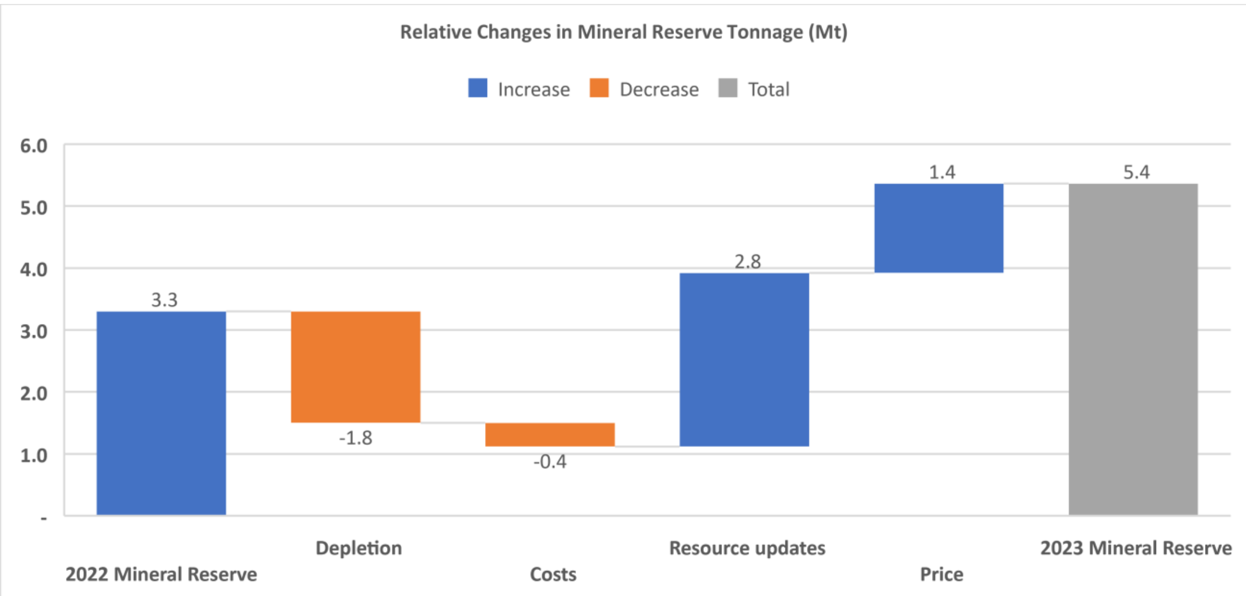


Figure 15-1 Relative Change in Mineral Reserves Tonnage

The studies presented in this report are based on an updated Mineral Resource estimation for the Mt Cattlin deposit, which incorporates additional geological, drilling, and reconciliation data to revise the geological interpretation and update the Mineral Resource estimate. Additionally, depletion for mining as of 30 June 2023, is also incorporated in the updated Mineral Resource estimate upon which this work is based (refer to Item 14).

This MRE is depleted for mining as of 30 June 2023, and incorporates updated cost inputs, product pricing and other study assumptions to reflect the current project operating status.

15.2 Geology and Mineral Resources

The regional, local, and site geology and Mineral Resources are discussed in Item 14.

For mine planning purposes, a diluted, regularised block model was created by Orelogy Mine Consulting Pty Ltd (Orelogy) from the Mining Plus MRE, which is described in more detail in section 15.3.1.7.

15.3 Pit Optimisation

Pit optimisation of the Mt Cattlin deposit was undertaken using the following workflow:

1) Model Net Value Calculation; followed by
2) Pseudoflow pit optimisation; and
3) Shell scheduling for discounted cash flow.

The Model Net Value calculation was performed using GEOVIA Surpac software, consistent with the native format of the supplied Mining Model. Pit optimisation and shell scheduling was undertaken with GEOVIA Whittle software.

15.3.1 Evaluation Factors

15.3.1.1 Evaluation Models

The resource models used in this study were provided to Entech by Allkem in Surpac format:

- Conversion of the Mining Plus Datamine model:
    - "mtc_jan23_nwsw_engmod_v3_alisami_230308.mdl", (March 2023)
- Orelogy regularised, diluted Mining Model:
    - "mt_cattlin_jan2023_v3_diluted.mdl", (May 2023)

15.3.1.2 Cut-Off Grade

A cut-off grade of 0.3% Li_2O has been applied when reporting the model inventory. An economic assessment results in a lower potential cut-off grade but 0.3% Li_2O has been maintained as a conservative practical lower limit of processing recovery and geological interpretation.

15.3.1.3 Depletion

The Mining Model used for reporting of this MRE has been depleted to the site supplied topography as of 30 June 2023.

15.3.1.4 Revenue Factors

A Realised Price of US$1,500/dmt Li_2O spodumene concentrate was used for the optimisation, inclusive of discounts and penalties, making the pricing used effectively a net A$ FOB rate. The US$1,500/dmt Li_2O is considered a conservative view of the forward pricing given the sale prices achieved in the open market (and market price linked contracts) over the past year, and the continuing strong price forecasts. The optimisation price assumption conservatism also provides protection against high market volatility seen recently and is forecast to continue.

Tantalite concentrate is a by-product that contributes meaningful, but not material, revenue to the Project. A flat sale price based on existing contracts has been applied to expected production.

A flat forward exchange rate forecast of 0.7 USD:AUD was provided by Allkem for use in this analysis, and an annual discounting rate of 10% was used for Net Present Value calculations.

Table 15-2 Product Pricing

Period	Realised Li_2O	Exchange rate	Realised Li_2O	Realised Ta_2O_5
	US$/dmt	AUD:USD	A$/dmt	A$/dry lb
Average	*1,500*	*0.70*	*2,143*	*34.72*

15.3.1.5 Mining Factors

The Net Value modelling and optimisation process uses modifying factors and processing inputs determined from analysis of actual operating performance at the Mt Cattlin site, a competitive mining cost tendering process, and an FS level geotechnical study. No external mining recovery or mining dilution factors are applied as the designs are evaluated by a regularised, diluted mining model that has dilution and metal loss consistent with historical values incorporated into the re-blocked models.

15.3.1.6 Geotechnical Analysis

Entech undertook a geotechnical assessment for the NW Stage expansion (“Mt Cattlin” and “the Project”) as part of the Feasibility Study (“FS”). The geotechnical assessment evaluates the potential for slope instabilities and derives slope design parameter recommendations for the proposed open pit mining of the NW Stage 4 pit at Mt Cattlin.

Data Availability

A geotechnical drilling program was designed by Entech to investigate ground conditions specific to the NW Stage 4 cutback. In addition, a geotechnical material properties testing program was designed to capture information pertinent to characterising and understanding the mechanical behaviour of the different materials expected to be encountered.

A total of three dedicated geotechnical diamond drill holes, totalling 651 m, were drilled in the vicinity of the Stage 4 pit walls as seen in Figure 15-2 (which used a preliminary version of the Stage 4 design for drillhole planning) with hole details listed in Table 15-3. Detailed geotechnical data, including rock mass and structure characterisation, and oriented structure data were collected from these drill holes and used in the analysis. In addition to these holes, photogrammetric modelling of the current pit, structure digitisation, in-pit mapping and data from previous studies was utilised.

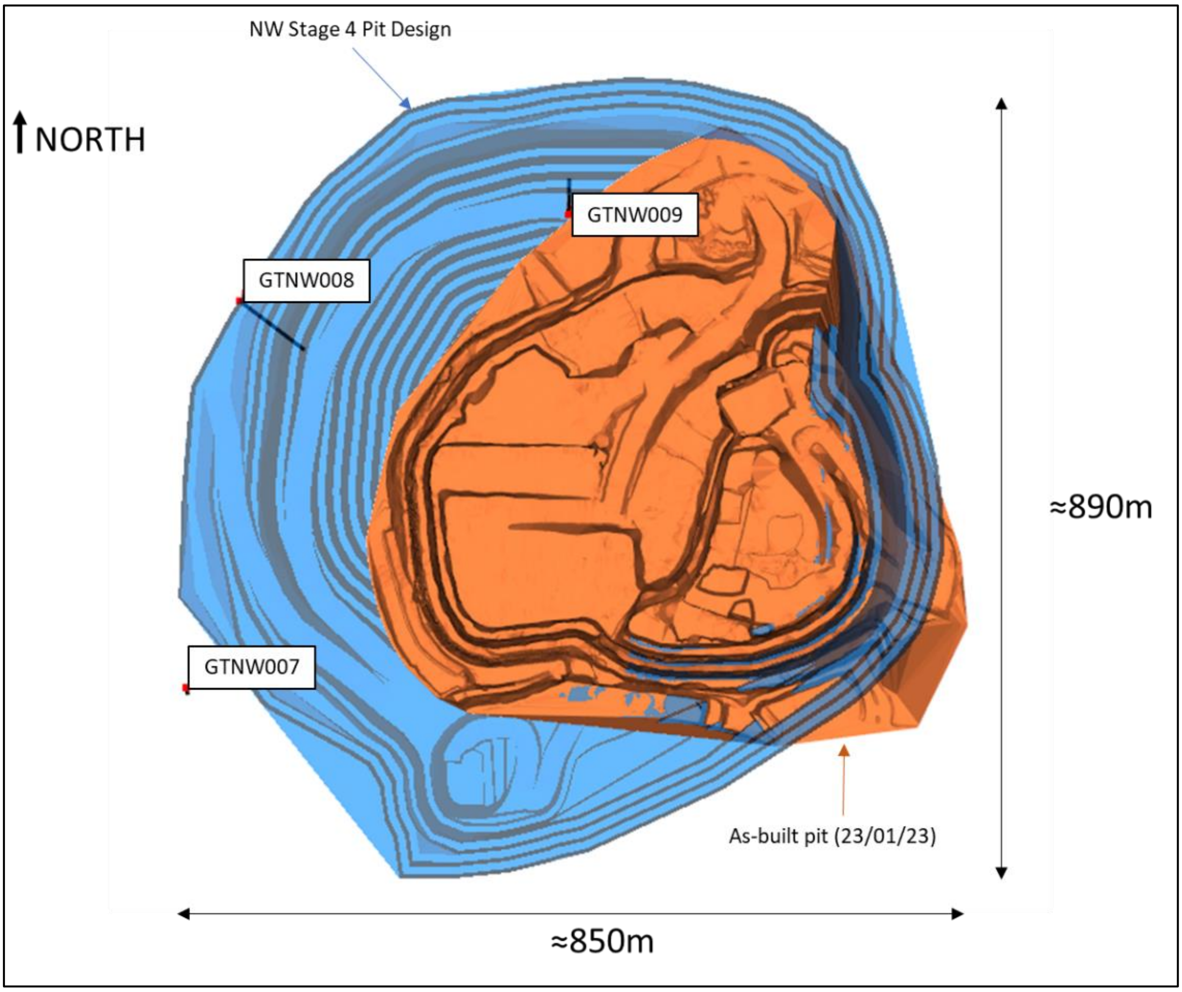


Figure 15-2 Plan view of Mt Cattlin, with the location of the geotechnical drill holes and basic pit dimensions

Table 15-3 Summary of the dedicated geotechnical diamond drill holes used for the project

DHID	X	Y	Z	Depth[1]	Dip	Dip-Dir
GTNW007	*223,799*	*6,282,192*	*271*	*200*	*-78*	*229*
GTNW008	*223,861*	*6,282,628*	*270*	*249*	*-75*	*133*
GTNW009	*224,231*	*6,282,724*	*260*	*202*	*-70*	*2*

[1]Downhole depth.

According to Bieniawski's Rock Mass Rating 1989, the major rock types encountered can be summarised as shown in Table 15-4.

Table 15-4 Major Rock Types

Rock Type	Weathering	RMR-89 Classification
Andesite	*Transitional*	*Good rock*
	Fresh	*Good rock*
Basalt	*Transitional*	*Fair rock*
	Fresh	*Good rock*
Dacite	*Fresh*	*Good rock*
Dolerite	*Fresh*	*Good rock*
Intermediate volcanic	*Transitional*	*Good rock*
	Fresh	*Good rock*
Pegmatite	*Fresh*	*Good rock*
Tonalite	*Fresh*	*Very good rock*

Rock mass conditions encountered are relatively uniform with minor variation between the dedicated geotechnical diamond drill holes. However, relatively poorer rock mass conditions are encountered in the highly weathered zones and locally within proximity to dykes and faults.

Samples were selected from the drill core of the dedicated geotechnical diamond drill holes to perform material properties testing. This program included the following (as shown in Figure 15-3 and Figure 15-4):

- Six (6) particle size distributions
- Six (6) Atterberg Limits
- Five (5) multi-stage consolidated undrained triaxial tests
- 34 uniaxial compressive strength tests
- 35 uniaxial tensile strength tests
- 28 elastic constant (Young's Modulus and Poisson's Ratio) test
- One (1) ring shear test
- 18 direct shear tests of natural defects

The following colour coding has been applied in Figure 15-3 and Figure 15-4:

- Red = UCSE, Uniaxial Comprehensive Strength and Uniaxial Tensile Strength test
- Orange = Direct Shear test
- Light blue = Atterberg Limits, Particle Size Distribution and consolidated Undrained Triaxial test sample
- Dark blue = Ring Shear test.

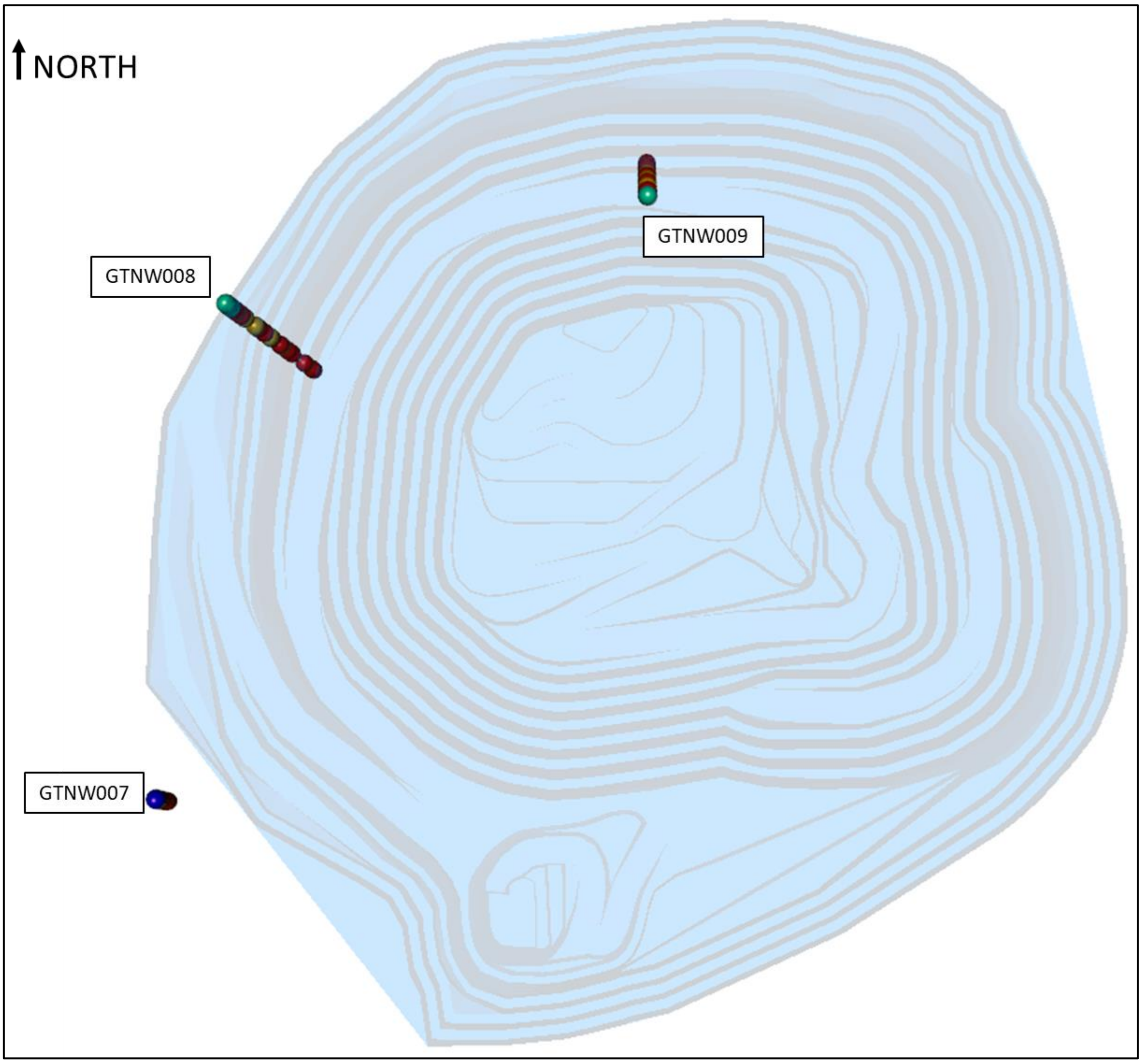


Figure 15-3 Plan view of preliminary Stage 4 pit design, with the location of laboratory test samples along each drill hole

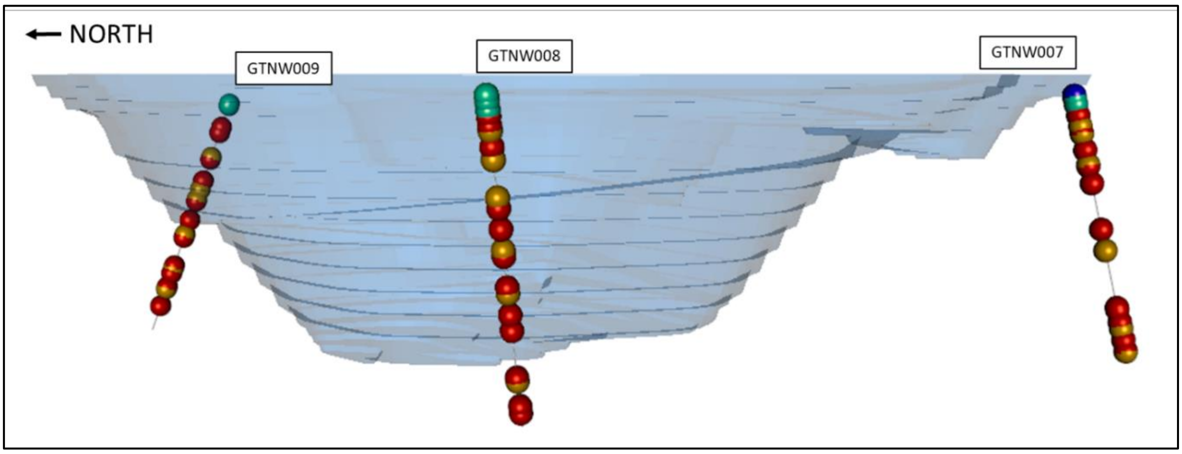


Figure 15-4 Long-section view of preliminary Stage 4 pit design (looking east), with the location of laboratory test samples along each drill hole

Geotechnical Conditions

Volcanic rockmass dominates the local geology, with a high portion represented as andesite, basalt, and dacite rock types. This sequence is locally known as the Annabelle volcanic sequence with the relative proportions of rock types, according to Witt (1998), being approximately as follows:

- 5% dolerite
- 10−20% basalt
- 50−70% andesite
- 20−30% dacite (Witt, 1998).

The lithium rich mineralisation is hosted within the pegmatite and occurs as a series of sub-horizontal sills overlapping in sections and surrounded by both volcanic and intrusive dolerite dykes. Two major faults have been modelled as steeply dipping and striking north north-west and east south-east, respectively.

The depth to the Base of Complete Oxidation (BOCO) wireframe at the Mt Cattlin pit walls is on average 6.5 meters below surface (mbs). The geotechnical logging encountered the BOCO at an average depth of 5 mbs at Mt Cattlin. The depth to the Top of Fresh Rock (TOFR) wireframe at the Mt Cattlin pit walls is on average 25 mbs. The geotechnical logging encountered the TOFR at a depth of 43 mbs at Mt Cattlin. It is noted that the geological TOFR wireframe has been modelled shallower than Entech's interpretation of the drill core data. The likely cause of this difference is due to the weathering classification system used during the geotechnical logging which is based on the International Society of Rock Mechanics (ISRM) classification system (1982). The interpretation of 'Fresh Rock' under the ISRM method requires no visible signs of weathering, perhaps slight discolouration on major discontinuity surfaces. This is often not possible to distinguish from reverse circulation drilling chips.

The structural model contains structures that were observed at a drill core scale (Figure 15-5), as well as structures that were digitised on a 3D photogrammetric model (Figure 15-6). A total of 812 structure measurements were collected from drill core, with an additional 1,123 structure measurements collected from photogrammetric model digitisation and 42 structures from pit wall mapping (total of 1,977).

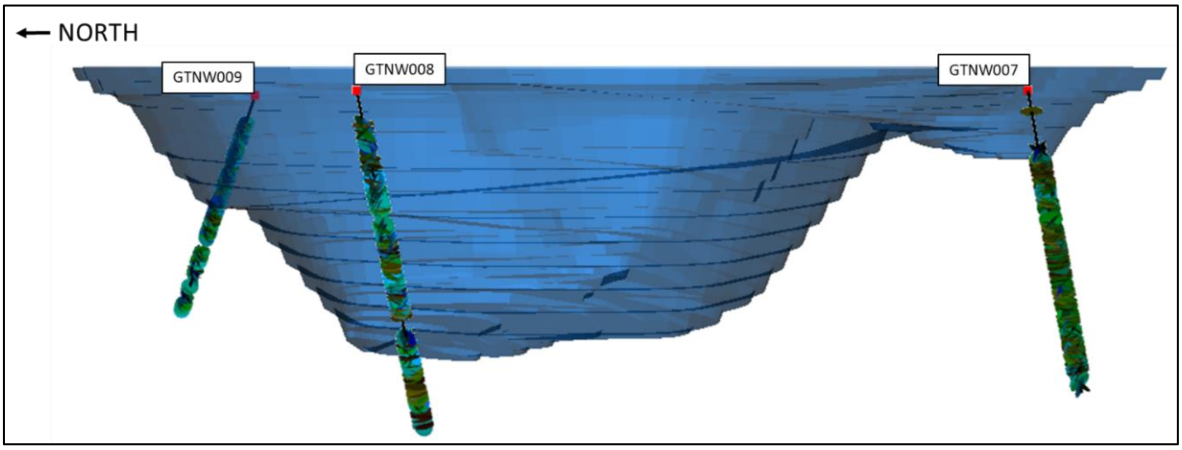


Figure 15-5 Long-section view of a preliminary Stage 4 pit design (looking east)

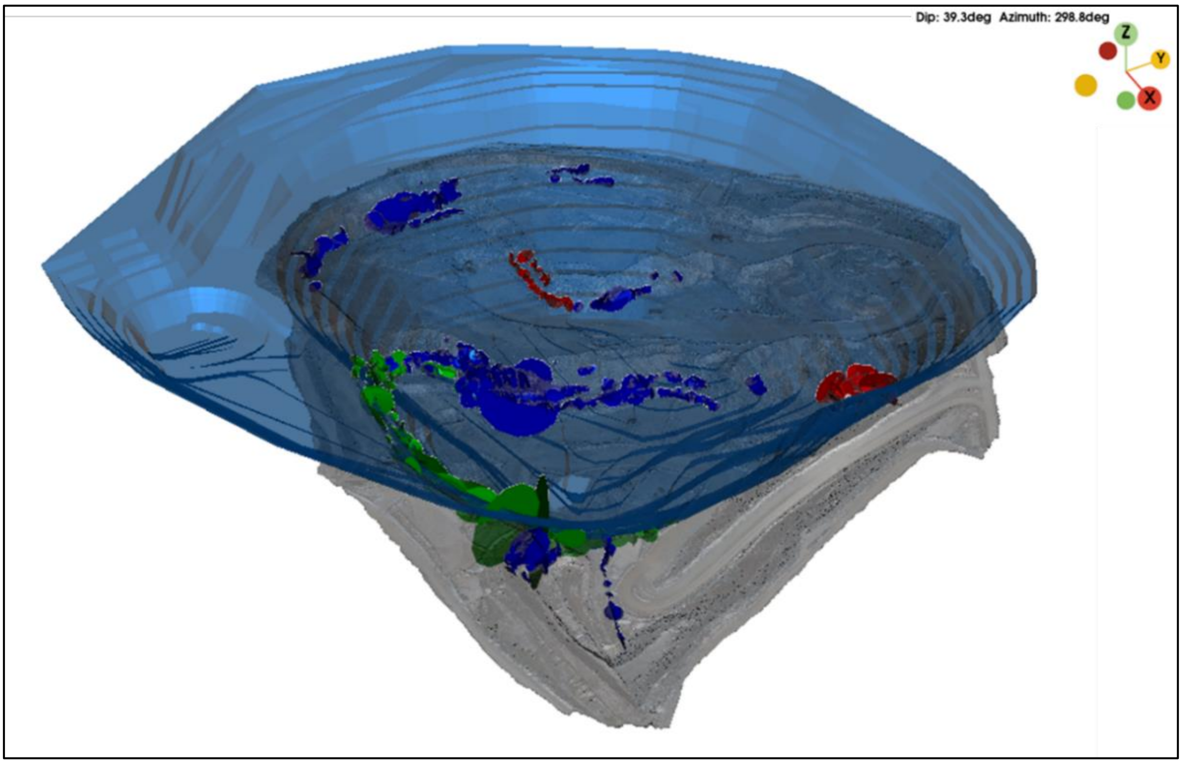


Figure 15-6 Photogrammetric model and digitised structures in the Stage 4 pit

All structure data has been grouped together (Figure 15-7), with the assumption that it is possible for any structure set to be able to occur anywhere within the given pit. This is a simplification and conservative approach. However, the structure sets are largely represented spatially throughout the deposit. Ongoing geotechnical mapping of the pit walls during mining will be required to confirm and improve the structural model.

Joints make up the major rock mass structure at Mt Cattlin. Various joint sets were identified within the data gathered, these have been analysed and presented below.

The structure data is deemed to be a good indication of the structure sets present. The drill holes were orientated in varying directions; ~90° variation between the dip direction of each hole.

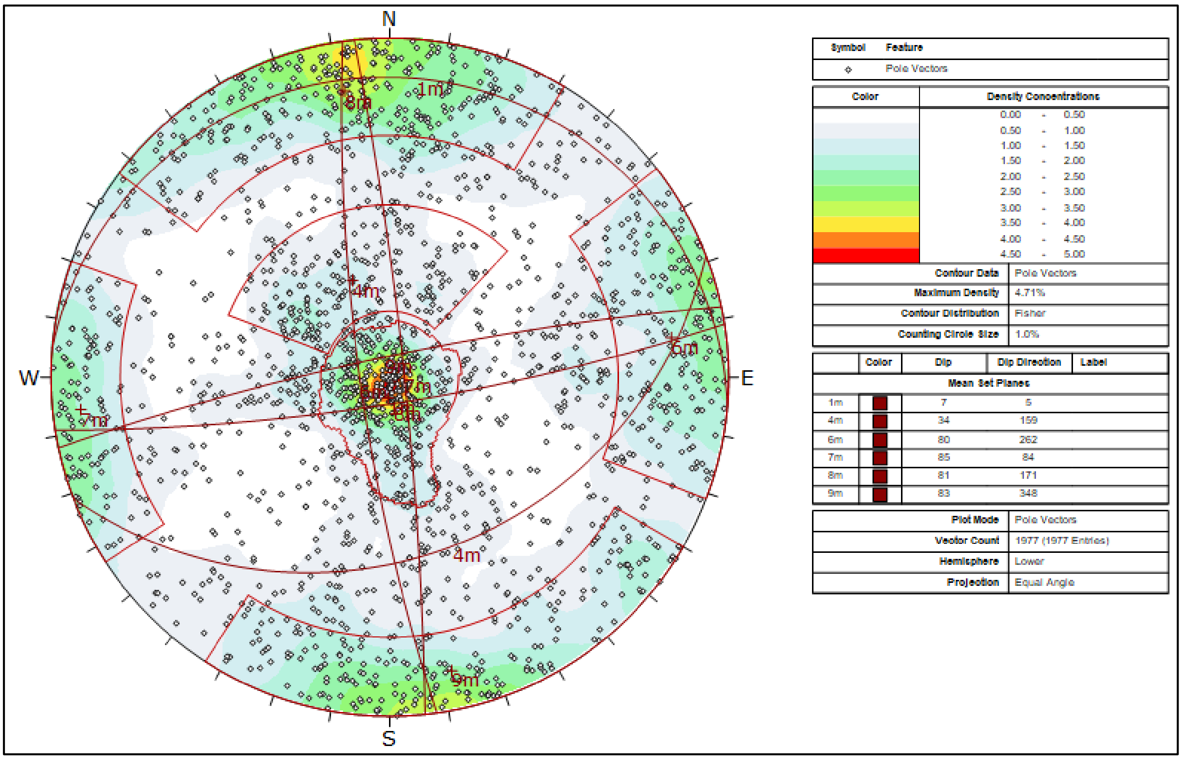


Figure 15-7 Stereonet plot generated in Dips 8.0 displaying all major structures at Mt Cattlin (based on all data sources combined)

The structure sets defined at Mt Cattlin are summarised as follows:

1) 07 / 005
2) 34 / 159
3) 80 / 262
4) 85 / 84
5) 81 / 171
6) 83 / 348.

Geotechnical Model

Geotechnical input parameters for intact rock and rock mass strength have been developed based on information gathered from the geotechnical logging and laboratory testing programs. Lithological and structural wireframes utilised in the geotechnical model created can be seen in Figure 15-8.

The suite of geotechnical logging and material properties testing provides a robust overview of the variable nature of rock types encountered. In addition, Entech's judgement has been used in conjunction with experience in similar settings, and review of similar geotechnical engineering literature, to derive fit-for-purpose parameters for the analysis.

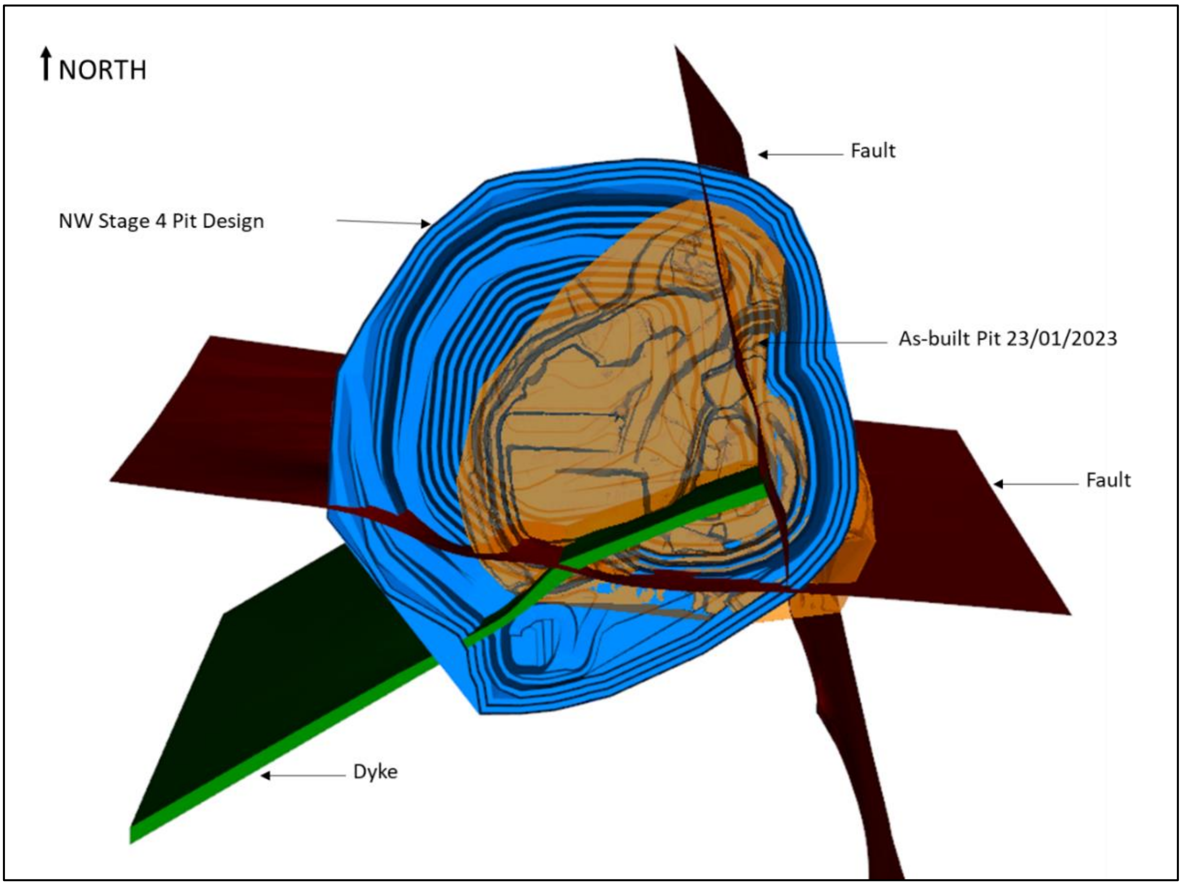


Figure 15-8 Plan view of a preliminary Stage 4 pit design with related dyke and fault models provided by Allkem

Geotechnical Domains

The geotechnical domains created for the purpose of the stability analysis have been expressed in terms of material type and weathering state, with a "likely" (average) condition and a "lower bound" (average less one standard deviation) condition to capture the range of potential materials encountered. The parameters for each of these cases have been displayed in Table 15-5.

Due to the varying material types identified during logging within the oxide and transitional zone, simplified domains were created. The oxide domain has considered rock types classified as completely weathered or extremely weathered, and the transitional domain has considered rockmass classified as highly weathered, moderately weathered, and slightly weathered. This is to ensure the input parameters for the analysis completed below accounts for all rock types within the domain.

Andesite was used as the primary host rock within the fresh domain. This is due to Andesite material being the most frequently occurring rock type during the logging of the three (3) geotechnical holes, slightly ahead of Basalt. It is also noted that Andesite is deemed to be the more conservative material type in relation to Basalt when considering the laboratory testing data.

The geotechnical domains for Mt Cattlin are described as:

- Oxide – lower bound
- Oxide – likely
- Transitional – lower bound
- Transitional – likely
- Andesite (Fresh) – lower bound
- Andesite (Fresh) – likely
- Pegmatite (Fresh) – lower bound
- Pegmatite (Fresh) – likely
- Dolerite Dyke – lower bound
- Dolerite Dyke – likely.

Table 15-5 Summary of the 'likely' and 'lower bound' geotechnical input parameters for slope stability analysis

Geotechnical Domain	Unit Weight (kN/m^3)	Hoek-Brown					Mohr-Coulomb	
		UCS (MPa)	GSI	mi	E (GPa)	D	C' (kPa)	Φ' (°)
'Likely'								
Oxide	*18.0*	-	-	-	-	-	*52*	*31*
Transitional	*27.6*	*172*	*58*	*12*	*84*	*1*	*1,602*	*40*
Fresh – Andesite	*28.2*	*261*	*70*	*12*	*96*	*1*	*3,839*	*49*
Fresh – Pegmatite	*25.9*	*102*	*71*	*17*	*58*	*1*	*2,122*	*47*
Dolerite Dyke	*18.5*	-	-	-	-	-	*60*	*43*
Fault	*28.2*	-	-	-	-	-	*50*	*20*
'Lower bound'								
Oxide	*17.0*	-	-	-		-	*21*	*24*
Transitional	*26.6*	*67*	*46*	*12*	*57*	*1*	*669*	*26*
Fresh – Andesite	*26.3*	*223*	*62*	*10*	*87*	*1*	*2,137*	*43*
Fresh – Pegmatite	*25.6*	*59*	*64*	*9*	*47*	*1*	*1,075*	*33*
Dolerite Dyke	*18.5*	-	-	-	-	-	*60*	*43*
Fault	*26.3*	-	-	-	-	-	*50*	*20*

Design Analysis

Slope design modelling and analysis was undertaken, including kinematic and limit equilibrium slope stability analysis, to develop the slope design parameter recommendations.

Entech adopted the Slope Design Acceptance Criteria outlined within the publication, Guidelines for Open Pit Slope Design (Read and Stacey, 2009).

Table 15-6 Typical design Factor of Safety (FoS) and Probability of Failure (PoF) acceptance criteria for open pit mining (Read and Stacey, 2009)

Slope Scale	Consequence of Failure	Minimum FoS – Static Conditions	Minimum FoS – Dynamic Conditions	Maximum PoF (that FoS < 1)
Bench	*Low–high*	*1.1*	*NA*	*25–50*
Bench Stack or Inter-Ramp	*Low*	*1.15–1.2*	*1.0*	*25*
	Medium	*1.2*	*1.0*	*20*
	High	*1.2–1.3*	*1.1*	*10*
Overall	*Low*	*1.2–1.3*	*1.0*	*15–20*
	Medium	*1.3*	*1.05*	*5–10*
	High	*1.3–1.5*	*1.1*	*≤5*

Geotechnical input parameters for intact rock and rock mass strength were developed based on information gathered from the geotechnical logging and material properties testing programs. In addition, Entech's judgement has been used in conjunction with experience in similar settings, and review of geotechnical engineering literature, to derive fit-for-purpose parameters for the analysis.

The kinematic analysis was conducted on slope directions ranging from 0° to 360° to cover all major pit wall exposures. The results indicated the probability of any of the three batter-scale failure modes (planar, wedge and toppling (flexural and direct)) occurring on the major pit walls at a bench face angle between 40° and 75° is generally low with results being within 0.2% and 12.36%. This is deemed to be within the acceptable limits of design. A failure mode type of "wedge sliding failure" reported the highest percentage of failures across the three batter-scale failure modes, particularly in the north-east wall sector within fresh material. Planar sliding recorded the lowest percentage failures with all Batter Face Angles (BFA) and slope direction combinations recording below 5.16%.

Bench and berm configurations developed in the kinematic and spill berm width analysis, as well as Entech's judgement in conjunction with experience in similar settings and review of similar geotechnical engineering literature, were used when creating the inter-ramp and overall slope angles in the limit equilibrium slope stability models. The limit equilibrium analysis indicated slope instability at an inter-ramp or overall (pit) scale is unlikely within the designed pit.

Stability analysis was undertaken using the software package Slide 9.0 (Rocscience, 2022). Slide is a 2D limit equilibrium slope stability program for evaluating the FoS of circular or non-circular failure surfaces in soil or rock slopes. Slide analyses the stability of slip surfaces using vertical slice or non-vertical slice limit equilibrium methods. Stability sections were analysed at an inter-ramp and overall scale. Dry conditions, as well as cases including a water table (phreatic surface), were analysed. Seismic cases were ignored.

The design analysed within this report was provided by Entech. The highest/steepest slopes for the major pit walls were chosen for analysis. The sections for the stability analysis are shown in Figure 15-9.

Design slope angles have been used when creating the Slide model. The geotechnical input parameters for intact rock and rock mass strength have been developed based on information gathered from the geotechnical logging and material properties testing programs. Due to lithological wireframes for Mt Cattlin being unavailable, andesite was selected as the major rock type within the fresh domain. Andesite was the highest percentage logged rockmass in the geotechnical drilling program completed as part of this Project and it has been stated that the Annabelle volcanics (the primary host rock) are made up of 5% dolerite, 10−20% basalt, 50−70% andesite and 20−30% dacite (Witt, 1998).

To understand the effect of the modelled faults on the proposed open pit design, scenarios for both the "likely" and "lower bound" material properties were investigated. However, it should be noted that the effect of faults on pit slope stability is expected to be very spatially limited, and results with fault planes modelled should be viewed with this in mind.

Numerous search and analysis methods for circular and non-circular failure surfaces were computed to determine the global/critical minimum failure surfaces. Cuckoo search and Janbu analysis methods for non-circular failure surfaces are reported in the results, which generally compute the lowest global/critical minimum failure surfaces.

Results for the stability analysis are presented in Table 15-7, and indicate the current design will be stable for inter-ramp and overall slope scales. An example of a Slide analysis for the major pit walls is shown in Figure 15-10 (section A) and Figure 15-11 (section B).

The results from the Slide analysis indicate:

- For all cases, the FoS values achieve the acceptance criteria in Table 15-6 for inter-ramp and overall slope scales.
- The lower bound critical path for the south-west wall (in both the dry and wet scenario) achieved a FoS of 1.24, with the failure path occurring across multiple benches. This failure is primarily driven by the interaction with the modelled fault; however, the results sit within the minimum acceptance criteria.
- As this failure is solely driven by the interaction with the modelled fault, it is recommended that further investigative works are completed to confirm the presence and potential impact of the fault to ensure the pit wall does not interact with this structure unfavourably. This may include (but is not limited to) bench by bench pit wall mapping, further investigative drilling (where appropriate), re-interpretation of the fault (if/where ground-truthing has occurred) and update of the pit design accordingly.
- The slopes are largely not sensitive to water. However, this may in part be due to over-simplification of the model and lack of available hydrogeological information. The drawdown of the water table with mining should be closely monitored to confirm this, and remodelled if it deviates significantly from assumptions contained in this report.
- Failure mechanisms influencing slope stability that cannot be captured in 2D Slide analysis, including geometry, structure, time-dependence, and reactivity to water, must be factored into the design in other ways.

To determine the appropriate design parameters for all walls of the pit, the Stage 4 NW pit was divided into four geotechnical pit design sectors. These sectors are known as North, East, South and West and are illustrated in Figure 15-9. As a result of the testing completed utilising various scenarios and material property parameters, the slope design parameters deemed suitable for each pit sector have been provided in Table 15-7.

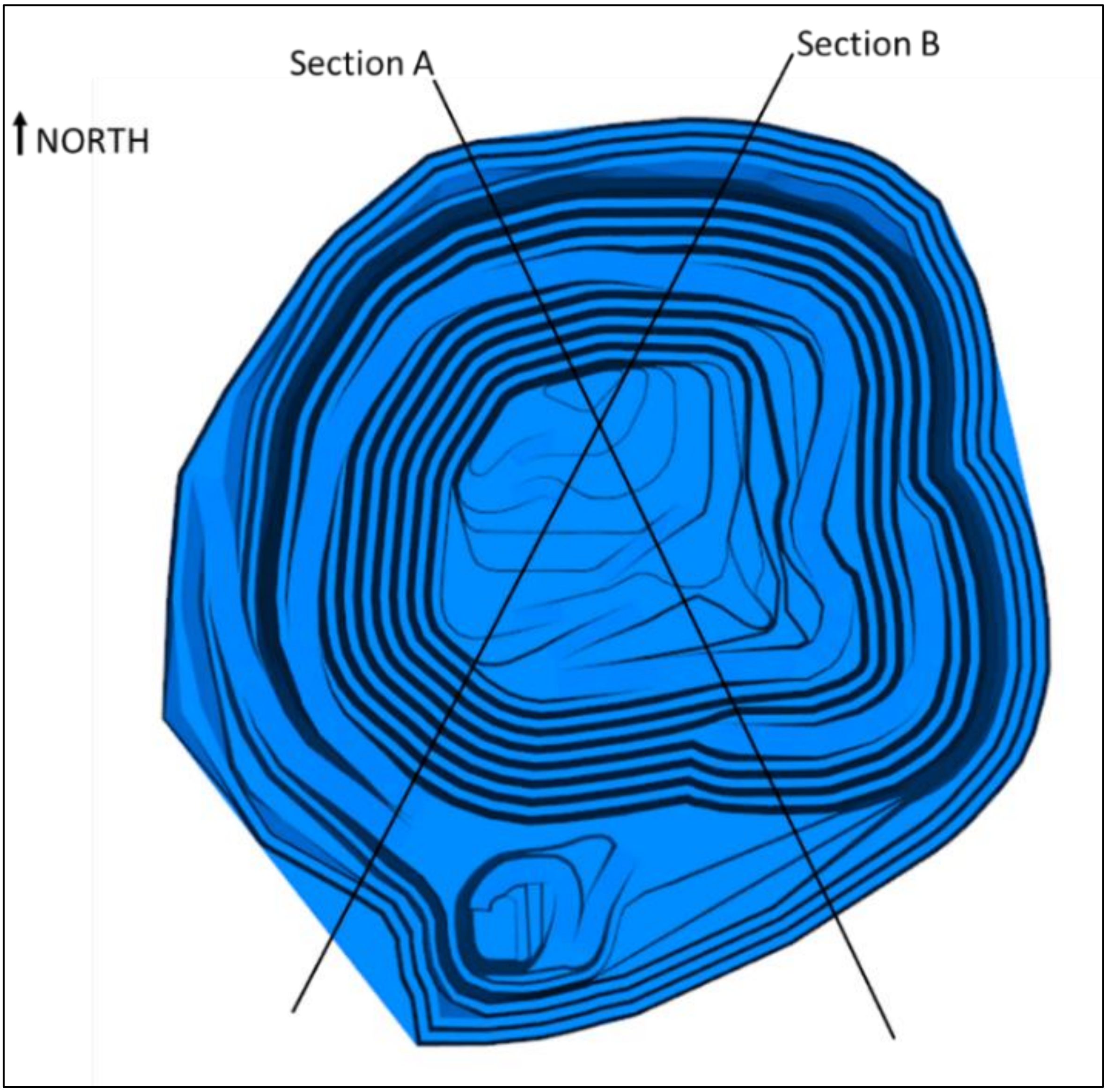
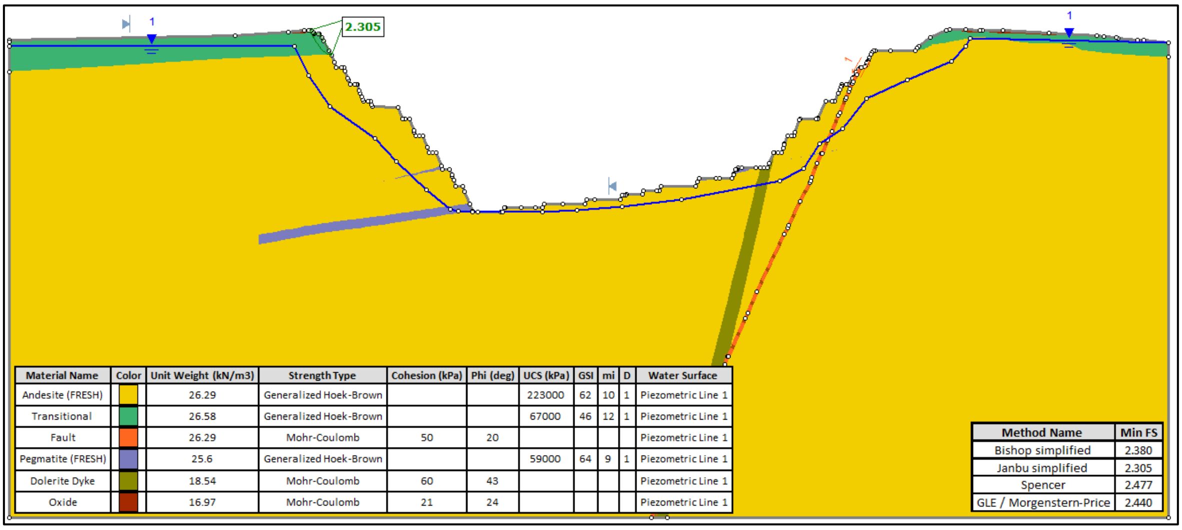


Figure 15-9 Plan view of the preliminary Stage 4 pit design, with the location of Section A and Section B for stability analysis

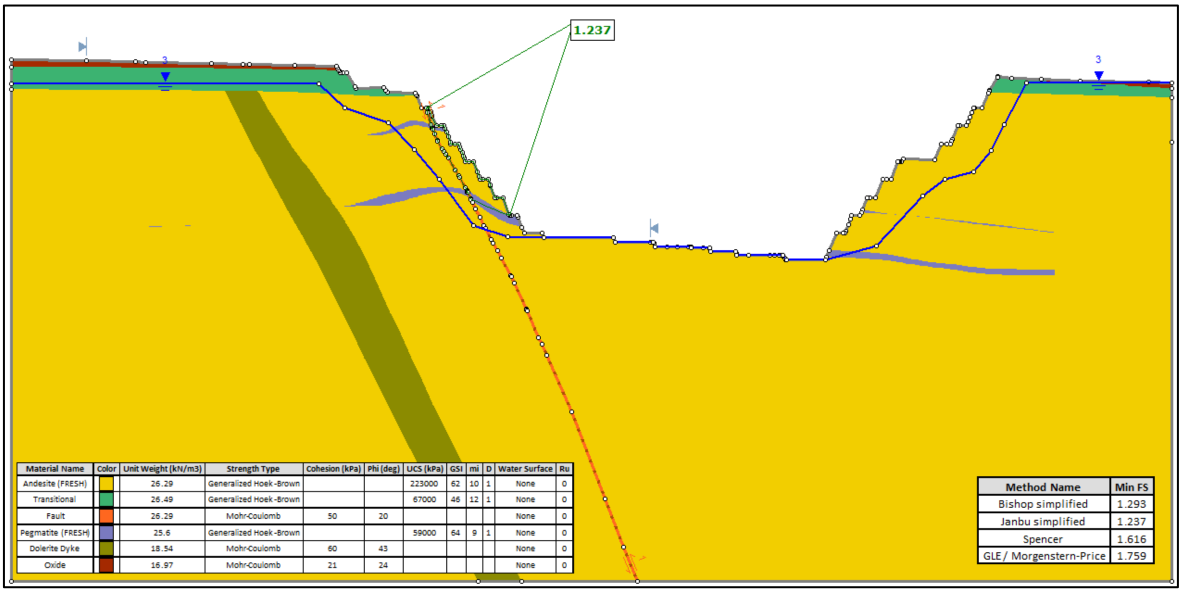
Table 15-7 Summary of Stability Analysis Results

Section	Material Properties	Water	FoS	
			Critical Path	Overall
Section A (North-west wall)	*Lower bound*	*Dry*	*2.30*	*3.06*
Section A (North-west wall)	*Lower bound*	*Wet*	*2.31*	*2.39*
Section A (North-west wall)	*Likely*	*Dry*	*4.82*	*4.82*
Section A (North-west wall)	*Likely*	*Wet*	*4.04*	*4.05*
Section B (South-west wall)	*Lower bound*	*Dry*	*1.24*	*3.22*
Section B (South-west wall)	*Lower bound*	*Wet*	*1.24*	*3.22*
Section B (South-west wall)	*Likely*	*Dry*	*2.32*	*4.27*
Section B (South-west wall)	*Likely*	*Wet*	*2.30*	*4.11*
Section A (North-west wall)	*Lower bound (no faults)*	*Dry*	*2.30*	*3.06*
Section A (North-west wall)	*Lower bound (no faults)*	*Wet*	*2.31*	*2.39*
Section A (North-west wall)	*Likely (no faults)*	*Dry*	*4.82*	*4.82*
Section A (North-west wall)	*Likely (no faults)*	*Wet*	*4.04*	*4.05*
Section B (South-west wall)	*Lower bound (no faults)*	*Dry*	*2.79*	*3.22*
Section B (South-west wall)	*Lower bound (no faults)*	*Wet*	*2.78*	*3.22*
Section B (South-west wall)	*Likely (no faults)*	*Dry*	*4.27*	*4.27*
Section B (South-west wall)	*Likely (no faults)*	*Wet*	*3.55*	*4.11*



Condition: North-west wall – critical failure – lower bound material properties – wet.

Figure 15-10 Slide section for Section A, looking north-east



Condition: south-west wall – critical failure – lower bound material properties – wet.

Figure 15-11 Slide section for Section B, looking north-west Slope Design Parameters

The design analysed within this report was a preliminary design provided by Entech and based upon design parameters developed within this report. The final design was very similar in size and almost identical in location and was reviewed by Entech's Lead Geotechnical Engineer for compliance with the criteria developed in the geotechnical study. The only material variation in pit geometry was the final design utilising switch back ramps predominantly on the southern side, creating a western highwall more than 150 m vertical, which in the preliminary design was bisected by a wrap-around ramp. Without the ramp, the highwall was required to be modified by the inclusion of a 12 m wide berm to geotechnically decouple the upper and lower portions of the slope.

From the analysis conducted, it was identified that the modelled steeply dipping faults interact with the designed pit wall in the south sector of the pit. This interaction may cause local instability which will inevitably reduce the overall stability of the pit wall. It is recommended that further investigative works are completed to confirm the exact presence of the faults to ensure the pit wall does not interact with this structure unfavourably.

The design criteria for the various pit sectors and domains are shown in Table 15-8.

Table 15-8 Slope Design Parameter Recommendations for Mt Cattlin NW Stage 4

Sectors	From/To	Domains	Bench Height (m)	Bench Face Angle (°)	Spill Berm Width (m)	Inter-Ramp Angle (°)
North	*Surface to 5mbs*	*Oxide*	*10*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*
East	*Surface to 5mbs*	*Oxide*	*10*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*
South	*Surface to 5mbs*	*Oxide*	*5*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*
West	*Surface to 5mbs*	*Oxide*	*5*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*

15.3.1.7 Mining Dilution and Ore Loss

A dilution study was undertaken by Orelogy to determine the appropriate methodology to create a Mining Model that incorporated dilution and ore loss and could be readily used in General Mine Planning (GMP) software. The key steps and outcomes from the dilution study and modifications to create the Mining Model were:

- Regularising the block size into Selective Mining Unit (SMU) dimensions of 5.0 m x 5.0 m x 2.5 m (East, North, Elevation) (the smallest sub-blocks within the original model were 0.5 m x 0.5 m x 0.625 m), as shown in Figure 15-12 below

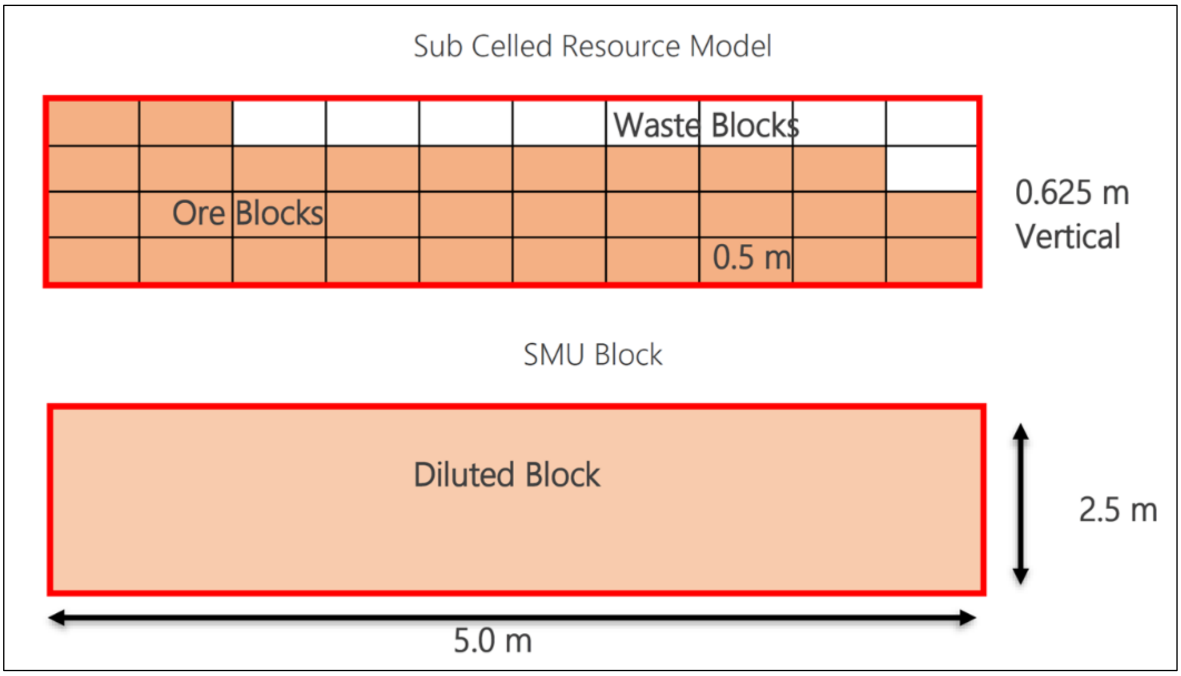


Figure 15-12 SMU Re-Blocking Process

- The SMU size was selected based on the size of the equipment, the parent and sub cell block sizes in the resource model, and as it matched the existing mining bench height to the vertical dimensions of the block
- The regularisation results in a single SMU diluted block containing a single diluted value that honours the average grade of the constituent smaller ore and waste blocks
- The incorporation of waste grades with lower grade blocks can result in the new SMU block having an average grade now below the cut-off value, and thus not reporting to the model inventory, resulting in an overall metal loss
- The number of blocks within the regularised model were decreased dramatically from ~150 M blocks to ~37 M blocks which improved the efficiency of mine planning activities.
- The ore blocks were flagged as either "Clean" (minimal contamination with mining dilution) or "Contaminated" (significant mining contamination with basalt country rock and requiring beneficiation by optical sorting prior to being processed) ore types depending upon the proportion of clean ore within the SMU block. Historical mining reconciliation data showed 17% of ore mined was classified as Contaminated, so the Clean / Contaminated flag was manipulated to mimic that result. It was found that if at least 55% of the SMU block contained clean ore, then the entire block was flagged as clean, otherwise the block was flagged as contaminated ore type. Figure 15-13 shows a typical east-west section through the Mount Cattlin deposit with the orebody coloured by Clean (blue) or Contaminated (colloquially known as Dirty) (red) ore types

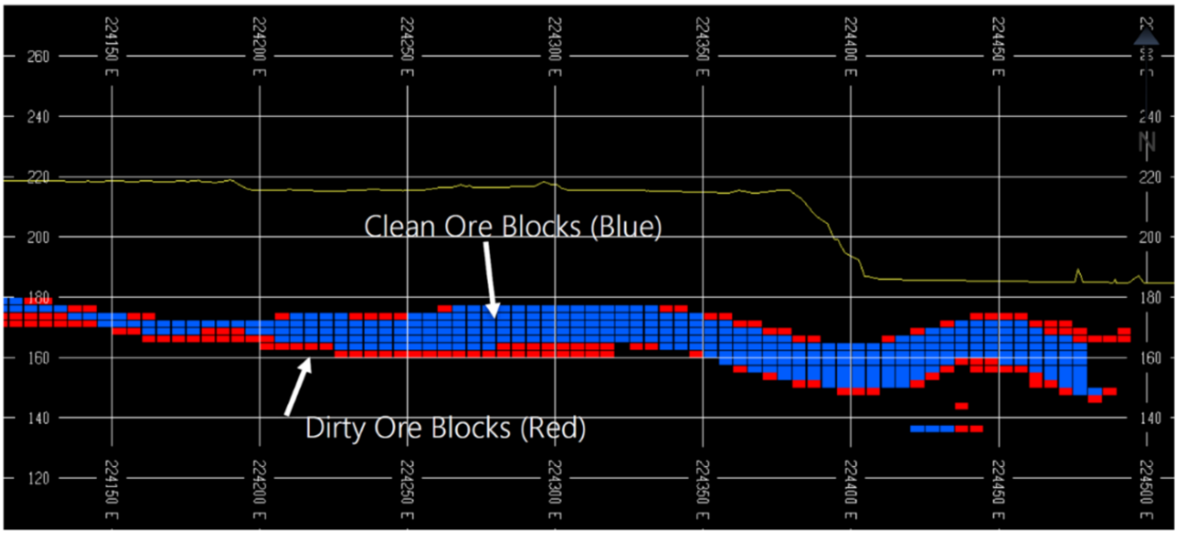


Figure 15-13 Clean and Contaminated Ore Blocks After Re-Blocking

- The overall model reports 82% of the ore to the Clean category and 18% to the Contaminated category
- The overall model has a back calculated metal loss factor of 5.7% and a dilution factor of 16%.

15.3.2 Cost Factors

15.3.2.1 Contract Mining Costs

Mining is conducted using backhoe configuration hydraulic excavators and medium sized rigid trucks (Caterpillar 785, 777, and equivalent), supported by a typical ancillary fleet. This fleet is considered appropriate for the geometry of the deposits at Mt Cattlin, providing both flexibility and cost efficiency. The fleet is owned and operated by mining contractors with employees drawn from local residential and Fly In – Fly Out (FIFO) commute sources.

Mining costs are calculated on rates supplied in a competitive market tender which were estimated based on a scheduled mine plan. The rates are incremented for weathering type, material type, and the haul profile (e.g., excavating bench depth and dumping location). Comparison to the recent actual mining costs confirms these rates are appropriate. Table 15-9 summarises the contractor mining input rates used.

Table 15-9 Contractor Mining Costs

Parameter	Unit	Material Type	Rate (from)	Rate (to)
Drill and Blast	*USD/BCM*	*Ore*	*$2.28*	*$2.72*
		Waste	*$2.28*	*$2.72*
Load and Haul	*USD/BCM*	*Ore*	*$7.80*	*$8.66*
		Waste	*$7.08*	*$8.49*

15.3.2.2 Owner's Costs

The non-contractor mining costs such as Allkem technical services and management, compliance, dewatering, and grade control are wrapped into the site-wide General and Administration (G&A) costs which are shown in Table 15-10.

Site G&A costs, whilst largely fixed in character, are conveniently expressed as a unit rate denominated by processed tonnes and grouped with other similarly denominated costs. G&A captures all Allkem's non-mining contractor costs required to operate the site, and includes general management, departmental management, employee costs (excluding processing staff), accommodation and commuting, compliance, safety, environmental, community relations, power generation.

A legacy third-party royalty is payable on a "per dry metric tonne processed" basis. This means this royalty is better represented as a 'processing' cost rather than a 'selling' or post-processing cost.

These processing denominated costs are applied only to blocks that are selected for processing in the optimisation process.

Table 15-10 Processing Costs

Parameter	Unit	Rate
Processing	*USD/t*	*29.12*
General and Administration	*USD/t*	*6.79*
Third Party Royalty	*USD/t*	*1.05*

After processing of ore, additional costs are incurred upon the sale of product. These costs include the transport of product to port, port costs including ship loading, sea freight and business administration. Western Australian State royalties are applied on the total revenue available from the product (in the form it is first sold), less reasonable transport costs to get the product to the point of sale. These costs are summarised in Table 15-11.

Table 15-11 Post Processing Costs

Parameter	Unit	Rate
Surface Haulage	*USD/t*	*25.57*
Port Costs	*USD/t*	*14.06*
State Royalty	*%*	*5.0*

15.3.3 Metallurgical Factors

Table 15-12 summarises the processing rates and recoveries applied to the optimisation, and further detail can be found in Chapter 13: Mineral Processing and Metallurgical Testing.

Table 15-12 Process Rates and Recoveries

Parameter	Unit	Rate
Mining Dilution	*%*	*Incl. in Mining Model*
Mining Recovery	*%*	*Incl. in Mining Model*
Processing plant capacity	*tpa*	*1.8 M*
Spodumene concentrate recovery	*%*	*By regression formula*
Tantalite concentrate recovery	*%*	*20*

Ore processing is carried out through a crushing, ore sorting, screening, and heavy media separation (HMS) plant with a nominal capacity of 1.8 Mt per annum, although the processing rate may be reduced at sustained high feed grades (>1.3% Li_2O) to avoid overloading the wet plant and reducing plant recovery.

Plant recovery is calculated from regression formulas that have been developed on site from historical performance data, with examples for 5.2% Li_2O and 5.4% Li_2O concentrate grades shown in Figure 15-14. The regression formula inputs are plant head grade and target concentrate product grade, with unique curves (and data tables) generated for a specific concentrate grade.

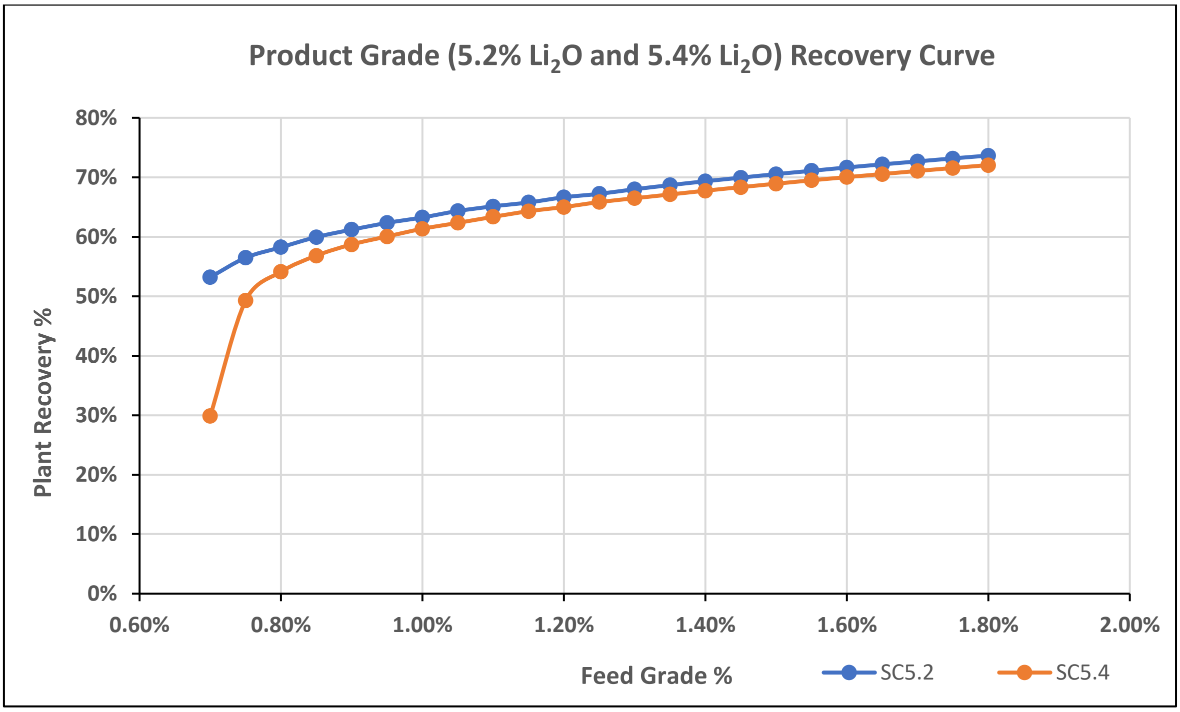


Figure 15-14 Product Grade - Recovery Curve (SC5.2 and SC5.4)

The Whittle optimising software calculates a metal recovery, and then the yield (final tonnage) of the product on a block-by-block basis, which then allows revenue, and a dollar value (revenue – costs) to be derived for that block. The value of the block is then used to optimise a pit shell by evaluating the cost of removing waste blocks above that ore block. If value of the block exceeds the cost of removing those above it (as well as honouring other rules including pit wall angles), then the software will mine that block, and progress on.

A small volume of tantalite concentrate by-product is produced, bagged, and transported offsite for sale. From historical performance, tantalite metal recovery is assigned an average plant recovery of 20%.

15.3.4 Optimisation Results

The significant rise in the price of lithium over the past year means the pit optimisation can produce very large, high stripping ratio potential pits, to the point where the optimisation process becomes resource constrained at prices substantially below the current spot price.

Analysis of the pit shell progression allows selection of the appropriate ultimate shell in relation to the revenue factor and, importantly, consideration of the 'fit' of the potential excavation within existing site infrastructure, associated wasted dumps, and company strategy. This has meant that a shell smaller than the Revenue Factor 1 was chosen as the ultimate shell to take into the design process.

A significant step in strip ratio was identified between two shells, revenue factor 0.735 and revenue factor 0.74, during the analysis of the optimisation results. These shells were selected based on their inventory and geometry for progression to pit design. Whilst these shells yield less potential cashflow compared to the optimum Revenue Factor 1 shell, they meet Allkem's strategy of delivering a reasonable mine life and a more practical footprint than a RF1 shell-based design. Optionality remains to consider larger shells in the future should it be considered appropriate.

Figure 15-15 shows the shell progression chart. These progression charts are used to determine the appropriate shell along with geo-spatial validation to align the selected shell with minimum mining widths. The chosen shell 45 is highlighted in orange with the smaller shell (44) chosen as an interim stage as part of an overall strategy to manage the large strip ratio associated with shell 45.

Figure 15-16 shows the C1 Cost and Incremental Ore Tonnes by Shell.

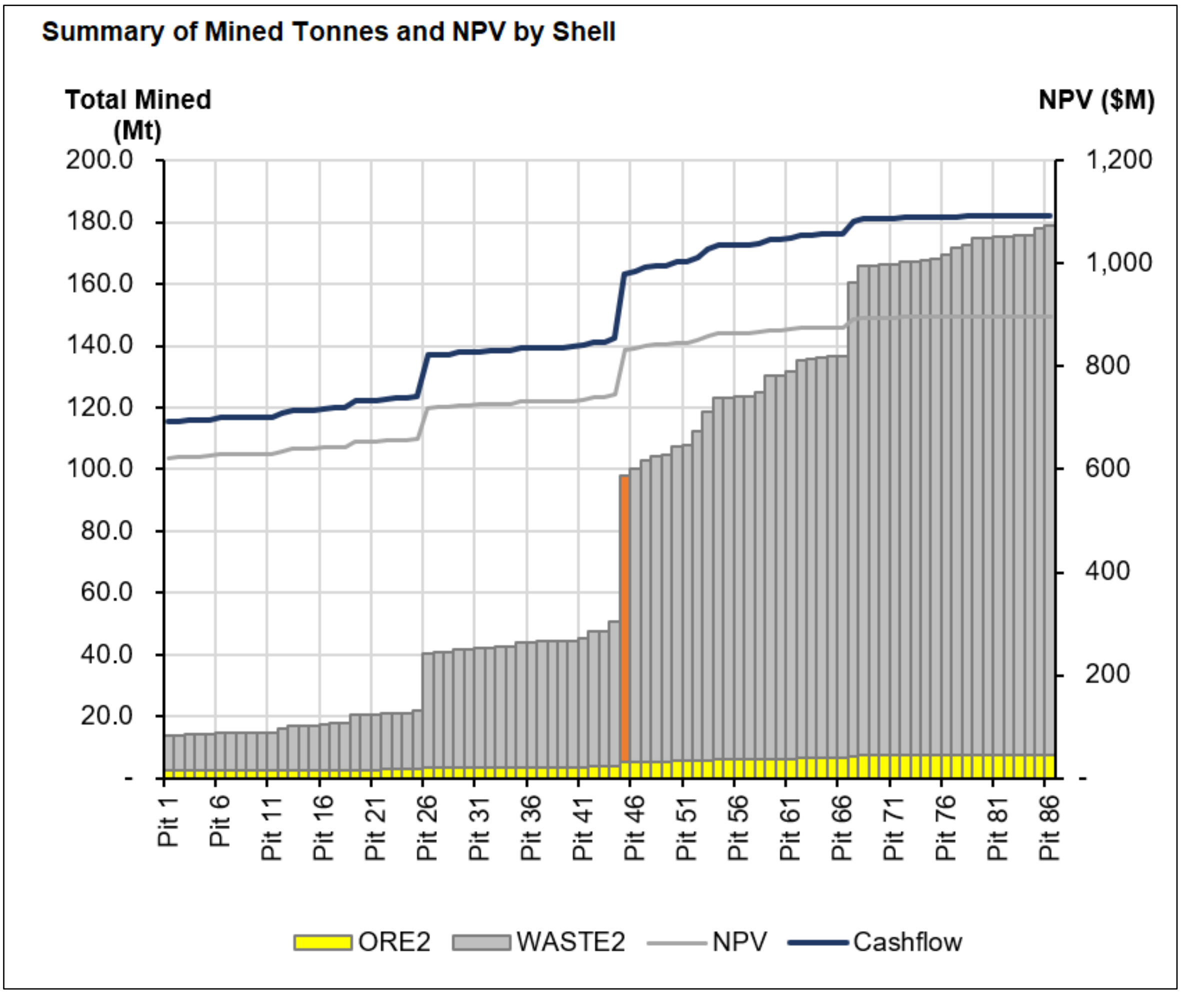


Figure 15-15 Summary of Mined Tonnes, Cashflow, and NPV by Shell (NB reported in Australian Dollar currency)

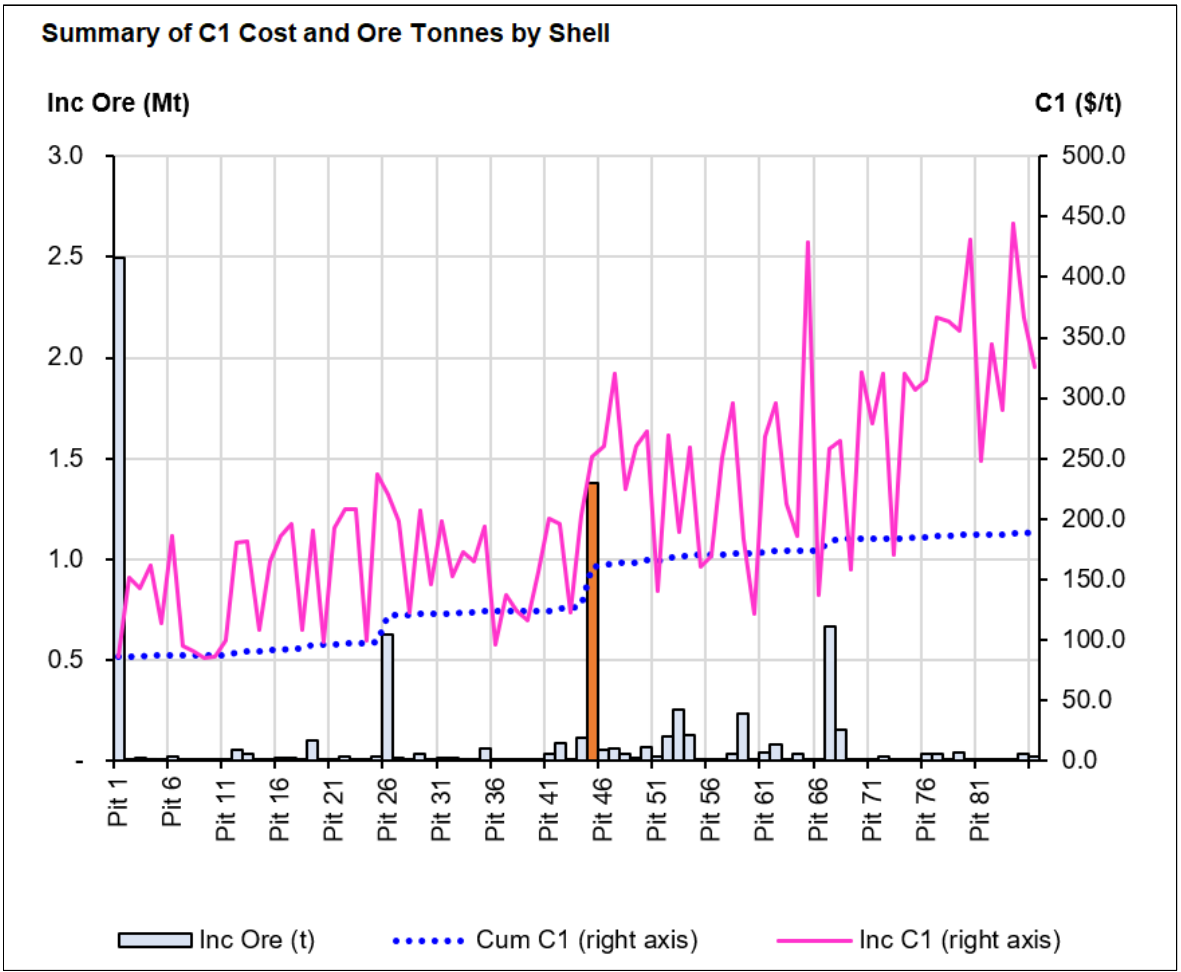


Figure 15-16 Summary of C1 Cost and Ore Tonnes by Shell (NB reported in Australian Dollar currency)

Table 15-13 compares key data from the selected shells to the RF1 shell.

Table 15-13: Optimisation Shell Summary

Shell Number	Revenue Factor	Ore (kt)	Undiscounted Cashflow (USD$M)
44	*0.735*	*3,900*	*600*
45	*0.740*	*5,300*	*690*
86	*1.000*	*7,600*	*760*

15.4 Mine Design

Mine design was performed using GEOVIA Surpac software. Optimisation shells and the existing mining plan (Stage 3 pit) were used as a guide to identify a practical design for economic extraction.

Entech undertook a detailed Feasibility Study level geotechnical assessment that evaluated the potential for slope instabilities and derived slope design parameter recommendations for the Stage 4 expansion (refer to the Feasibility Study in Chapter 5: Geotechnical for full discussion, and section 15.4.2 of this document for summary detail).

Using the selected shells (44 and 45) as a guide to economic extraction limits, detailed designs of each shell were conducted, tying into the existing Stage 3 pit design and ramp strategy. A minimum mining width of 50 m is used based on equipment with the final cut width of 25 m where trucks are not required to enter ("goodbye cut").

Ramp width and gradients were chosen to match the existing pit and the existing/proposed mining fleet. The ramp system has been designed to minimise waste haulage costs while maintaining easy access to the ROM pad.

15.4.1 Haul Road Parameters

Haul road width is determined by the safe operating procedures in addition to efficiency trade-offs related to single/double lanes and the impact this has on overall pit strip ratio. Haul road width sizing is based on a multiple of the largest truck used (in this case the Caterpillar 785 or equivalent) allowing for a drain, sufficient clearance on both sides, and a safety berm constructed to axle height as shown in Figure 15-17. The total haul road design width used was 20 m for single lane, and 35 m for double lane. These widths have been used for all the in-pit haul road designs.

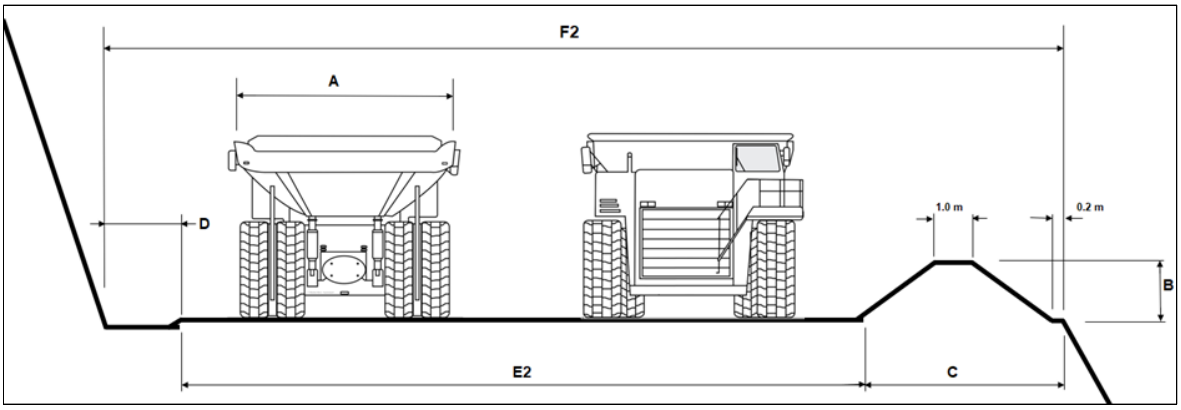


Figure 15-17 Haul Road Schematic

Table 15-14 Haul Road Parameters

Model – Caterpillar 785		Unit	Value
A	*Operating Width*	*m*	*8*
B	*Bund Height*	*m*	*1.2*
C	*Bund Width*	*m*	*3.8*
D	*Drain Width*	*m*	*1.0*
E1	*Minimum Pavement (2.0 x A) – Single Lane*	*m*	*16*
E2	*Minimum Pavement (3.2 x A) – Dual Lane*	*m*	*25.6*
Design Width			
F1	*Single Lane*	*m*	*20*
F2	*Dual Lane*	*m*	*35*

15.4.2 Geotechnical Considerations

Rock mass conditions encountered are relatively uniform with minor variation between the dedicated geotechnical diamond drill holes. However, relatively poorer rock mass conditions are encountered in the highly weathered zones and locally within proximity to dykes and faults.

According to Bieniawski's Rock Mass Rating 1989, the major rock types encountered can be summarised as shown in Table 15-15.

Table 15-15 Rock Type Characterisation

Rock Type	Weathering	RMR-89 Classification
Andesite	*Transitional*	*Good rock*
	Fresh	*Good rock*
Basalt	*Transitional*	*Fair rock*
	Fresh	*Good rock*
Dacite	*Fresh*	*Good rock*
Dolerite	*Fresh*	*Good rock*
Intermediate volcanic	*Transitional*	*Good rock*
	Fresh	*Good rock*
Pegmatite	*Fresh*	*Good rock*
Tonalite	*Fresh*	*Very good rock*

Slope design modelling and analysis was undertaken, including kinematic and limit equilibrium slope stability analysis, to develop the slope design parameter recommendations. The Stage 4 NW pit was divided into four geotechnical pit design sectors with the slope design parameters deemed suitable for each pit sector shown in Table 15-16 with slope terminology illustrated in Figure 15-18.

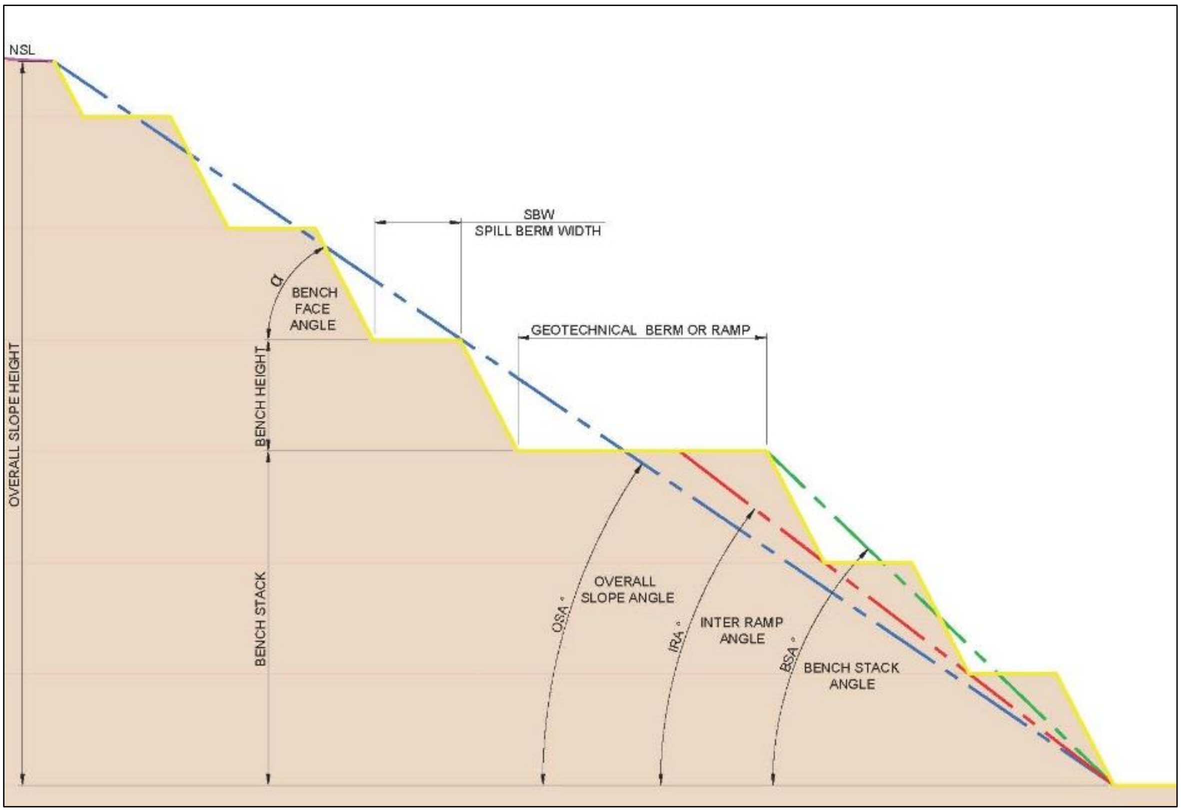


Figure 15-18 Pit Slope Design Elements, Geometries, and Terminology

Table 15-16 Slope Design Criteria

Sectors	From/To	Domains	Bench Height (m)	Bench Face Angle (°)	Spill Berm Width (m)	Inter-Ramp Angle (°)
North	*Surface to 5mbs*	*Transported/ Oxide*	*10*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*
East	*Surface to 5mbs*	*Transported/ Oxide*	*10*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*
South	*Surface to 5mbs*	*Transported/ Oxide*	*5*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*
West	*Surface to 5mbs*	*Transported/ Oxide*	*5*	*50*	*6.5*	*33.9*
	5mbs to 40mbs	*Transitional*	*20*	*60*	*8.5*	*44.9*
	40mbs to Base of Pit	*Fresh*	*20*	*70*	*8.5*	*51.7*

From the analysis conducted, it was identified that the modelled steeply dipping faults interact with the designed pit wall in the south sector of the pit. This interaction may cause local instability which will inevitably reduce the overall stability of the pit wall. It is recommended that further investigative works are completed to confirm the presence of the fault to ensure the pit wall does not interact with this structure unfavourably.

15.4.3 Pit Designs

The pit design process as described above and using the various criteria detailed above produced practical layouts that can be seen in the section below in plan view and long section and illustrated with ore blocks coloured by grade.

The Stage 3 open pit design is per the current pit being excavated onsite which aligns with the 2022 Mineral Reserve. The remaining Stage 3 inventory as of 31 March 2023 is reported in Table 15-17.

Table 15-17 Stage 3 Inventory as of 30 June 2023

Summary	Units	Pit Design
Ore	*Mt*	*1.9*
Waste	*Mt*	*6.7*
Strip Ratio	*w:o*	*3.5*
Grade	*% Li_2O*	*1.5*
Yield	*%*	*0.19*
Concentrate	*kt*	*340*

The Stage 4-1 open pit design utilises a double lane ramp at the pit crest entry on the north-eastern wall, ramping down to the west then south before continuing to circle around to the south wall, where the dual ramp system ends at the 130 m RL. A single lane ramp system starts again at the 130 m RL on the north wall before circling down to the 70 m RL.

The Stage 4-1 open pit design is approximately 650 m long (WSW-ENE), 580 m wide (ESE-WNW) and 210 m deep mining a total of 60 Mt of material, inclusive of Stage 3 as shown in Figure 15-19 and Figure 15-20.

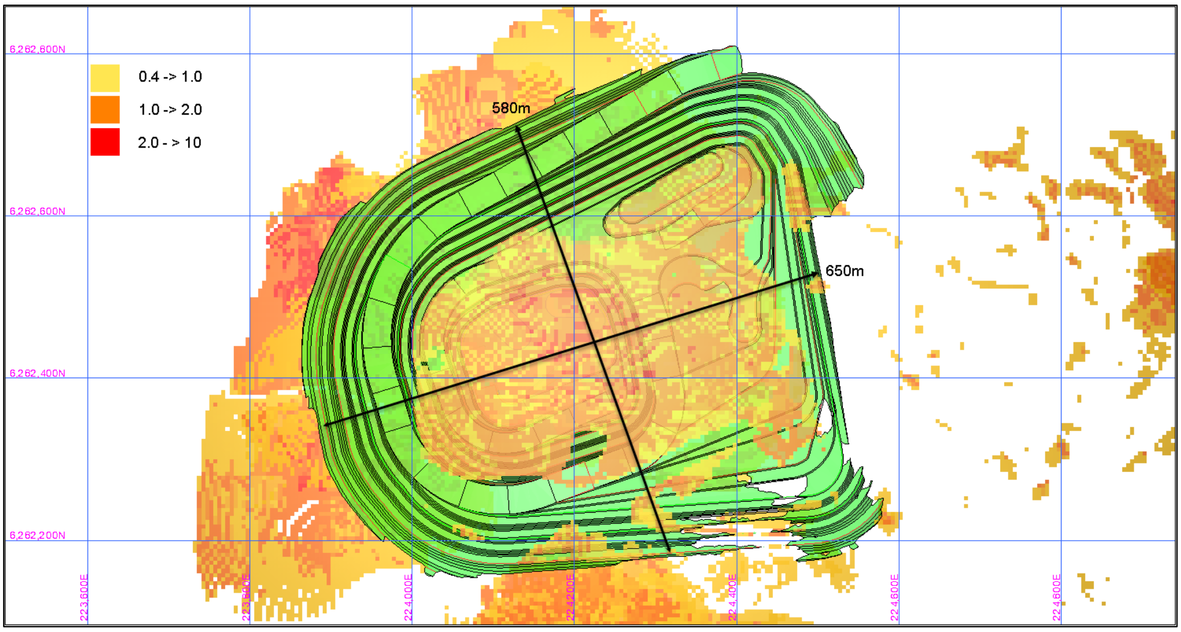


Figure 15-19 Stage 4-1 Showing Dimensions in Plan View with Ore Blocks Coloured By Li_2O Grade

The Stage 3 pit is currently mining ore at approximately 155 m RL. The pit extends to the base of the orebody contact but the guiding optimisation shell did not carry the additional waste required the higher-grade material to the west at depth (seen as ore blocks outside the pit in Figure 15-19). Conversely the lower grade material to the south (below old workings) does not have the grade required to be cash flow positive and is therefore ignored in the shell and resultant design. The

Stage 3 inventory is listed in Table 15-17, and a comparison of the Stage 4-1 designed pit (inclusive of Stage 3) to the optimisation shell metrics are listed in Table 15-18.

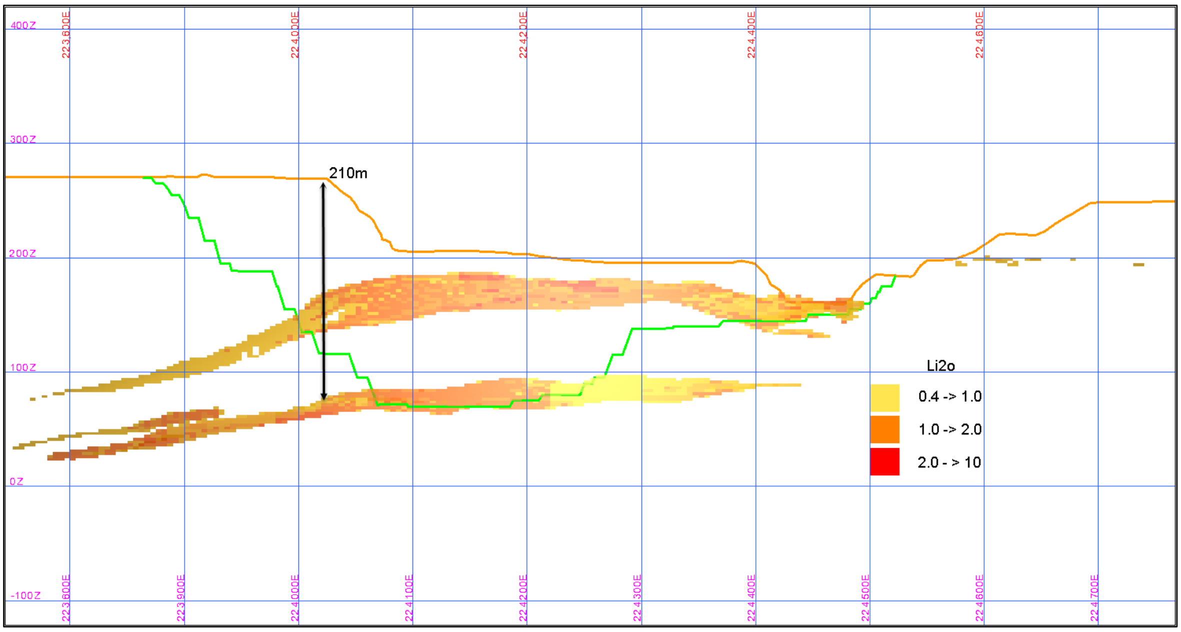


Figure 15-20 Stage 4-1 Long Section 6,282,520 mN showing Pit Depth

The pit design captures 3% less ore at a similar grade when compared to the optimised shell due to practical constraints honoured by the design (see Table 15-18).

Table 15-18 Stage 4-1 Inventory and Whittle Shell. Values include Stage 3 below June Topography

Summary	Units	Pit Design	Whittle Shell #44	Delta
Ore	*Mt*	*3.4*	*3.4*	*87%*
Waste	*Mt*	*53.3*	*43.1*	*124%*
Strip Ratio (overall)	*w:o*	*15.8*	*12.8*	*123%*
Grade	*% Li_2O*	*1.37*	*1.37*	*100%*
Yield	*%*	*0.18*	*0.18*	*100%*
Concentrate	*kt*	*546*	*681*	*98%*

The Stage 4-2 pit design utilises a double lane ramp at the pit crest entry on the north-western wall, ramping down the west wall then to the south before switching backing at the 175 m RL and again at the 135 m RL and 100 m RL. At this point the ramp switches to a single lane ramp which continues down to the 40 m RL as can be seen in Figure 15-21.

The Stage 4-2 design is approximately 850 m long (WSW-ENE), 760 m wide (SSE-NNW) and 245 m deep mining a total of 131 Mt of material, inclusive of Stage 3 and Stage 4-1 (Figure 15-21 and Figure 15-22). The design captures 15% more ore at a 4% lower grade than the optimised shell and the lower grade additional ore has reduced the overall head grade slightly (Table 15-19).

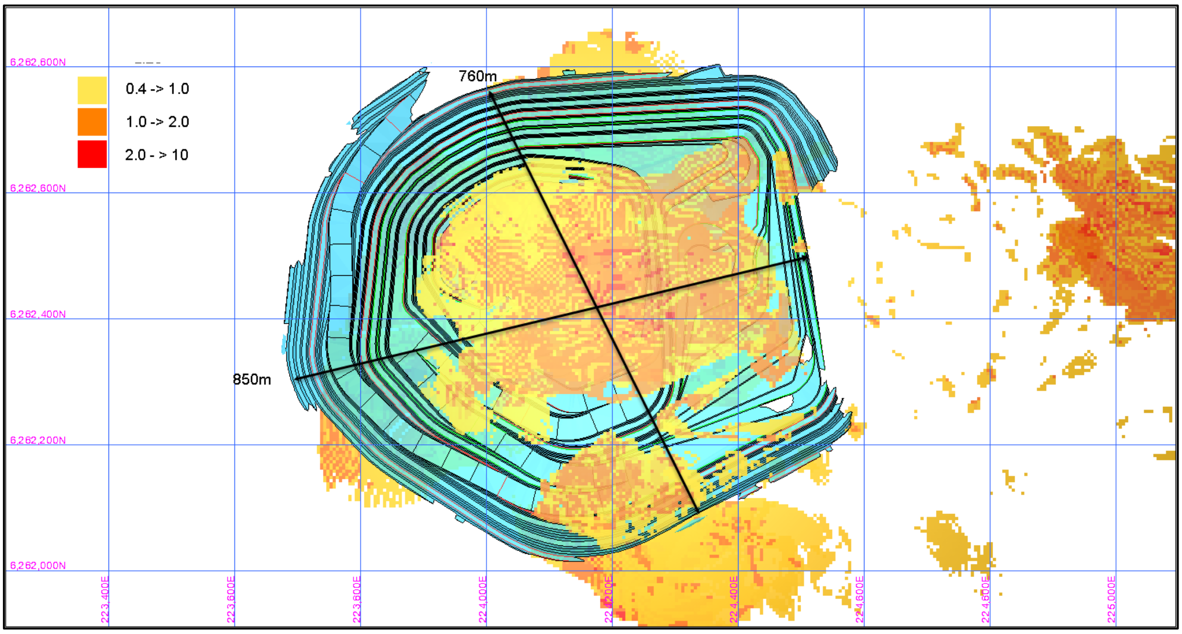


Figure 15-21 Stage 4-2 Showing Dimensions in Plan View with Ore Blocks Coloured By Li_2O Grade

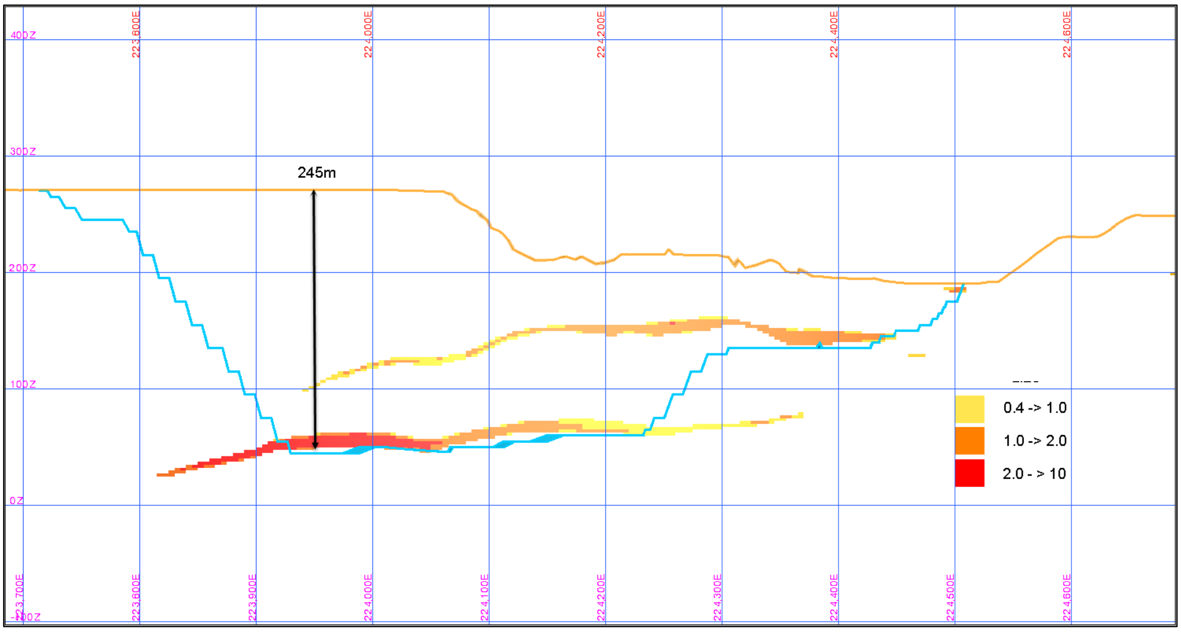


Figure 15-22 Stage 42 Long Section 6,282,520 mN

Table 15-19 Stage 4-2 Inventory and Whittle Shell. Values include Stage 41 and Stage 3 below June Topography

Summary	Units	Pit Design	Whittle Shell #45	Delta
Ore	*Mt*	*5.4*	*4.6*	*117%*
Waste	*Mt*	*121*	*84*	*144%*
Strip Ratio (overall)	*w:o*	*22.6*	*18.1*	*125%*
Grade	*% Li_2O*	*1.32*	*1.37*	*96%*
Yield	*%*	*0.17*	*0.17*	*100%*
Concentrate	*kt*	*823*	*734*	*110%*

Figure 15-23 and Figure 15-24 show an overview of the interaction between the pit design Stage 4-1 and Stage 4-2 in plan view and long section.

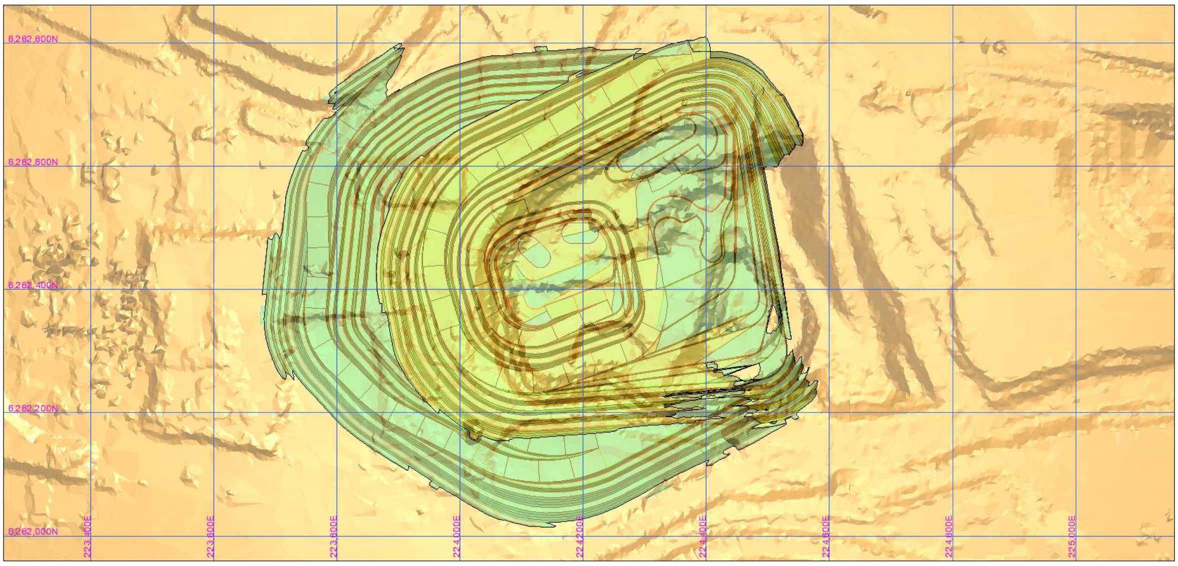


Figure 15-23 Interaction of Stage 4-1 and Stage 4-2 Designs in Plan View

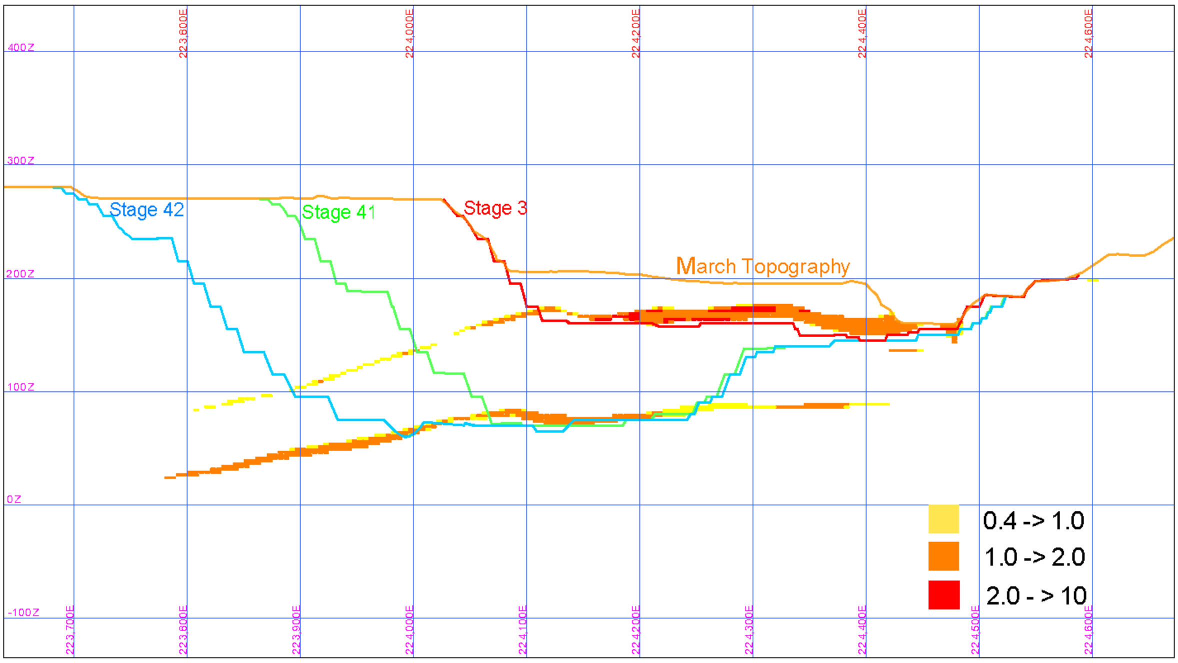


Figure 15-24 Cross section showing the Pit Design Stages Including Ore Zones Coloured by Li_2O Grade, and 31 March 2023 Topography

15.4.4 Waste Rock Disposal

The waste rock disposal sequence is optimised by the scheduling software to define the most cost-effective approach available, while honouring the applied waste dumping constraints. The layout of the dumping locations and pit design rims is shown in Figure 15-25.

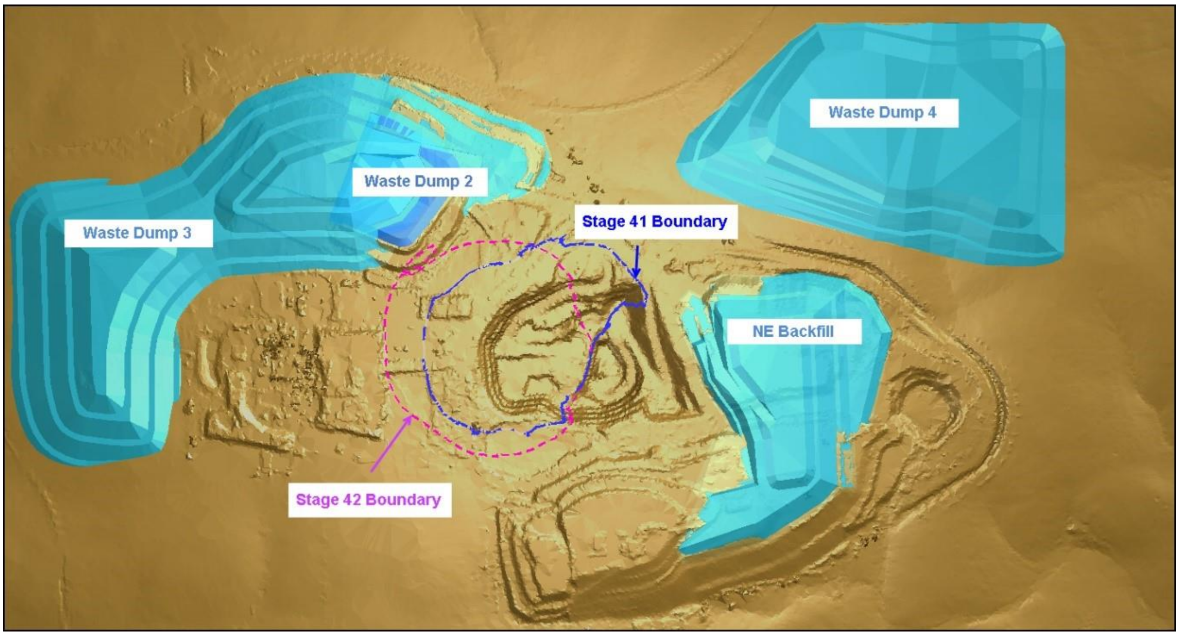


Figure 15-25 Pit Design Outlines and Waste Dump Locations

Allkem supplied the waste dumping constraints and sequence shown below in Table 15-20 to be implemented in the schedule.

Table 15-20 Waste Dumping Constraints

Priority	Dumping by Stage	Capacity	Unit	Stage Allocation
1	*Waste Dump 2 - NW Part 1*	*1.9*	*M bcm*	*Stage 3*
2	*Waste Dump 2 - NW Part 2*	*0.8*	*M bcm*	*Stage 3*
				Stage 4-1
3	*NE Void Backfill 270 mRL Design*	*4.2*	*M bcm*	*Stage 3*
				Stage 4-1
				Stage 4-2
4	*Waste Dump 3*	*16.7*	*M bcm*	*Stage 4-1*
				Stage 4-2
5	*Waste Dump 4*	*17.1*	*M bcm*	*Stage 4-1*
				Stage 4-2
Total		***40.8***	***M bcm***	

15.5 Stockpiles

The site stockpiles are a mix of immediate plant feed such as Run of Mine (ROM) pad ore and crushed ore, as well as ores that will be treated at the end of mine life, pre-closure, or when plant capacity is available such as low-grade ore, fine grained ore, and tailings suitable for retreatment. Final product stocks onsite on 30 June 2023 have been ignored from the cashflow as they have already been processed and are attributable to a period prior to this study, however they are shown in the tabulation below for completeness.

Each stockpile has been assigned a specific grade and recovery, and tested to ensure economic viability at a forecast price appropriate to the likely time the product would be sold into market.

Table 15-21 Stockpile Summary at End of June 2023

Stocks	Tonnage	Grade	Grade	Cont. Metal	Cont. Metal
	Mt	% Li_2O	ppm Ta_2O_5	('000) t Li_2O	('000) lb Ta_2O_5
Ore	*0.15*	*1.0*	*110*	*1.5*	*36*
Fine grained ore	*0.13*	*0.9*	*150*	*1.2*	*44*
Product	*0.01*	*5.2*	*680*	*0.5*	*13*
Low grade ore	*0.59*	*0.5*	*67*	*3.2*	*87*
Tailings	*0.90*	*0.8*	*103*	*7.5*	*200*
Total	***1.8***	***0.8***	***95***	***14***	***385***

15.5.1 Run of Mine Stocks

The Run of Mine (ROM) stocks are grouped into the Ore category in Table 15-21, and sourced from end of month survey data. Detail is shown in Table 15-22. Recovery was assigned as per the plant recovery regression curve for the applicable head grade.

Table 15-22 ROM Stockpile Balance 30 June 2023

Material	Run of Mine Pad		Crushed (kt)		Total	
	(kt)	% Li_2O	(kt)	% Li_2O	(kt)	% Li_2O
Clean Ore	*24,000*	*1.2*	*16,000*	*1.05*	*39,000*	*1.13*
Contaminated Ore	*61,000*	*0.99*	*45,000*	*0.90*	*106,000*	*0.95*
Total	***85,000***	***1.04***	***61,000***	***0.94***	***150,000***	***1.00***

15.5.2 Fine Grained Stockpile

Fine grained spodumene has a poorer recovery in the DMS plant than the usual coarse-grained ore. In late 2022 when an unexpected amount of fine grained was mined when first exposing the Stage 3 pit ore, and it was stockpiled rather than treated, with preference given to 'normal' ore. The stockpile, with approximately 134,000 t or ore has been modelled with a conservatively low (assumed) 20% recovery to be treated at the end of the mine life.

15.5.3 Low Grade Stockpile

The low-grade stocks form the base of the RoM pad and will be treated on mine closure. The tonnage and grade data has been sourced from historical records and the economic test has applied a 40% plant recovery to produce a SC5.2 concentrate.

15.5.4 Pre-2018 Tailings

Testwork has been ongoing developing a flowsheet for treating the tailings in TSF #1, which were deposited prior to recovery enhancements being made to the plant, and as such have a material amount of recoverable lithia. It is likely the flowsheet will include a flotation circuit, so an assumed capital amount of USD$35M has been modelled prior to treatment. There is potential for the flotation circuit to be brought on-stream earlier in the mine life if other sources of applicable feed are available, or if current feeds could undergo improved recovery.

15.6 Mineral Reserve Estimate

The Mt Cattlin Mineral Reserve estimate (as of 30 June 2023), expressed to a maximum of two significant figures, is provided in Table 15-23.

Table 15-23 Mineral Reserve Estimate June 2023

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	*In-situ*	*0.2*	*0.9*	*120*	*1.4*	*45*
Probable	*In-situ*	*5.2*	*1.3*	*130*	*69*	*1,500*
	Stockpiles	*1.8*	*0.8*	*95*	*13*	*390*
Total Mineral Reserves		***7.1***	***1.2***	***120***	***84***	***1,900***

15.6.1 Comparison to Previous Estimates

The previous Mineral Reserve Estimate for the Mt Cattlin operation is provided in Table 15-24 and the absolute and relative comparisons to this estimate, expressed to a maximum of two significant figures, are shown in Table 15-25 and Table 15-26.

Table 15-24 June 2022 Mineral Reserve Estimate (Allkem), 30 June 2022

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	-	-	-	-	-	-
Probable	*2NW only*	*3.3*	*1.1*	*105*	*37*	*750*
	Stockpiles	*2.4*	*0.80*	*120*	*19*	*650*
Total		***5.8***	***0.98***	***110***	***56***	***1,400***

Notes: Reported at a cut-off grade of 0.4 % Li2O. The proceeding statements of Mineral Reserves conforms with Australasian Code for Reporting of Exploration Results, Mineral Resources and Mineral Reserves (JORC Code) 2012 edition. All tonnages reported are dry metric tonnes. Reported with a 17% dilution and 93% mining recovery. Revenue factor US$650/tonne applied. Minor discrepancies may occur due to rounding to appropriate significant figures.

Table 15-25 Comparison between 30 June 2023 and 30 June 2022 ORE

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	*In-situ*	*0.2*	*0.9*	*120*	*1.4*	*45*
Probable	*In-situ*	*1.9*	*0.2*	*25*	*32*	*750*
	Stockpiles	*-0.6*	*-0.05*	*-27*	*-5.7*	*-270*
Total		***1.4***	***1.05***	***120***	***28***	***520***

Table 15-26 Relative comparison between 30 June 2023 and 30 June 2022 ORE

Category	Location	Tonnage Mt	Grade % Li_2O	Grade ppm Ta_2O_5	Cont. Metal ('000) t Li_2O	Cont. Metal ('000) lb Ta_2O_5
Proven	*In-situ*	∞	∞	∞	∞	∞
Probable	*In-situ*	*58%*	*19%*	*24%*	*87%*	*101%*
	Stockpiles	*-26%*	*-6%*	*-22%*	*-30%*	*-42%*
Relative increase		***31%***	***13%***	***1.9%***	***57%***	***59%***

A comparison has been performed between the 2022 Mineral Reserve and this updated estimate. Figure 15-26 illustrates the sources of changes in the Mineral Reserve from 2022 to 2023. In general, this Mineral Reserve estimate shows an increase in the ore tonnage with the key drivers being the greater inventory of Indicated material available and the higher optimisation price. Offsetting those increases were mining depletion and an increase in operating costs.

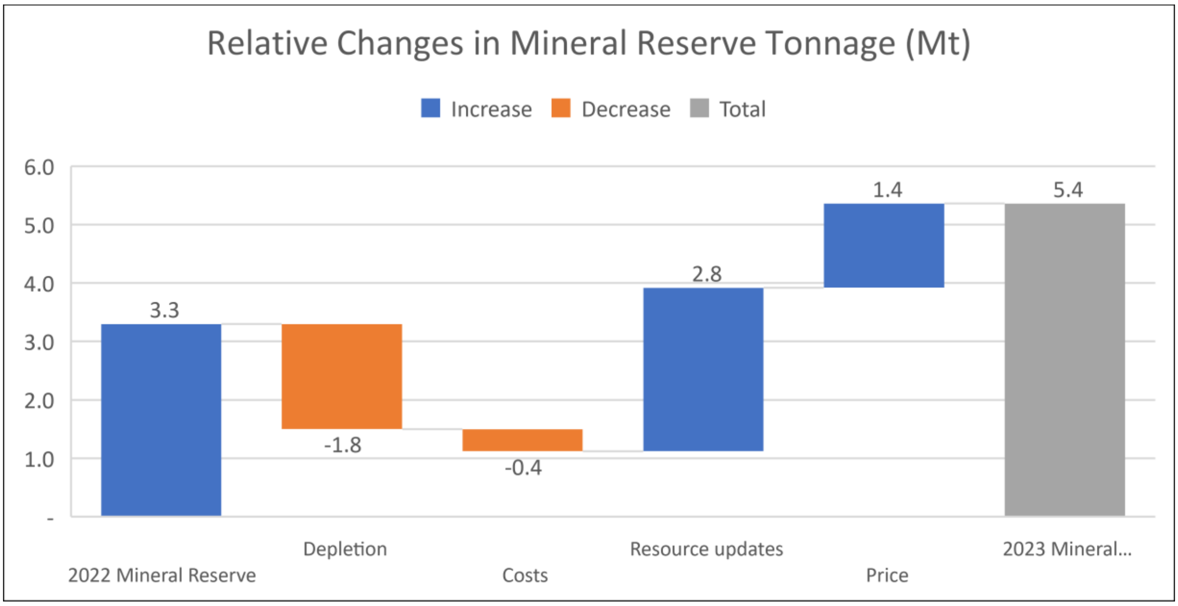


Figure 15-26 Key Changes in Ore Tonnage Waterfall Graph

15.7 Conclusions and Recommendations

Mt Cattlin has sustainable mining reserves for the next four to five years, with the underlying resource drill constrained and warranting continued exploration. The increasing stripping ratio with the greater depths to access ore via open pit mining methodology should now be evaluated against the option of underground mining.

Compared to last year the total Mineral Reserves have increased despite the depletion that occurred from mining. Mineral Resource conversion of Inferred material to Indicated classification from recent infill drilling, and substantial increases in revenue pricing for spodumene concentrate have contributed to the increase in reserves.

The pit staging as applied in this assessment (e.g., Stage 3, Stage 4-1, Stage 4-2) individually have quite different stripping ratios and risk characteristics to the overall project average. Stage 3 is very low risk and generates the 72% of the overall cashflow, whilst Stage 4-1 which generates 5% of the overall cashflow and Stage 4-2 which generates 18% of overall cashflow have higher stripping ratios and lower returns. The End of Project Stockpiles generate 5% of overall cashflow.

Entech recommend that Allkem consider the following areas for enhancing future Mineral Reserve updates at Mt Cattlin:

- Strengthen the QA/QC processes with the Mining Models
- Continue to evaluate the Mining Model performance against site reconciliation results
- Continue permitting works to ensure the planned access to cut-backs, waste rock storage and tailings storage facilities does not impede planned operations
- Progress geotechnical trials of pit wall control techniques e.g., pre-splitting to demonstrate the case for safer and steeper wall angles
- Investigate underground mining methods as an alternative to open pit mining as the strip ratio increases
- Continue to develop geo-metallurgical grade control techniques to define and segregate fine grained spodumene for future processing
- Progress the business case for processing the potential low grade fine grained spodumene
- Consider routine grade control programs ahead of ore mining
- Undertake business case analysis of new crushing circuit, power station facilities with at least 40% renewable penetration, and an accommodation village
- Continue progressing the tailings re-treatment flowsheet and economics to build a robust business case
- Continued resource drilling to further expand the resource and define the limits of mineralisation.

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

AUGUST 2023

CHAPTER 16: MINING METHODS

16 MINING METHODS

The open pit mining method employed at Mt Cattlin is detailed in the following sections. No underground mining is required or backfill of underground voids.

The Mt Cattlin mine currently operates using a conventional open pit mining method to deliver ore to the processing plant from a series of open pits adjacent to the plant facility. The mining method is industry standard involving drilling and blasting of all material before loading and hauling using backhoe excavators and rear dump rigid trucks. The ore and waste rock are drilled and blasted with 10 m high benches, and mined on 2 m to 2.5 m flitches.

Vegetation, topsoil, and overburden is stripped and stockpiled for future reclamation use.

The ore is delivered to a conventional crushing and dense medium separation (DMS) circuit. During mining operations, a portion of the mined ore is diluted with basalt which is considered a contaminant. The processing plant includes a separate circuit during crushing and screening that utilises optical sorters to remove basalt material from the process stream.

Earthmoving operations use a mining contractor to conduct all drilling, blasting, load, haul, and ancillary work for the open-cut mining operation.

16.1 Mine Scheduling

A Life of Mine (LOM) schedule to economically extract the Mineral Reserve material was developed in GEOVIA MineSched software using the physical quantities reported from the optimised pit designs.

As the operation is located close to the town of Ravensthorpe, strict noise emission limitations ultimately effect the overall size of the fleet and the size of the individual items of machinery. Sensitive noise receptors, located to the south of the mine, require a waste dumping sequence that builds a southern noise barrier, and then progresses dumping northwards. Wind direction can have a significant short-term effect on the perception of noise and must be managed by daily scheduling flexibility.

The mining fleet configuration is nominally based on the current active mining fleet, which consists of the 360 t, 200 t, and 150 t excavator fleets as shown in Table 16-1. Two additional large excavators have also been available on site to provide back-up, undertake ancillary work, and bolster production as needed. The mining fleet configuration is influenced by the production rate, mill throughput, strip ratio and the extents of the proposed pit designs.

Table 16-1 Load and Haul Equipment Fleet by Class

Equipment Type	Equipment Model	Quantity	Class
Excavator	*Hitachi EX3600 excavator*	*1*	*360t*
Excavator	*Hitachi EX1900 excavator*	*1*	*200t*
Excavator	*Leibherr 9150 excavator*	*2*	*150t*
Truck	*Caterpillar 785C*	*4*	*140t*
Truck	*Caterpillar 777*	*14*	*90t*
Truck	*Komatsu 785*	*5*	*90t*
Blasthole Drill Rig	*Epiroc Atlas Copco D65/T45*	*6*	
Water Cart		*1*	
MPU Charge Unit		*1*	
Service Truck		*1*	

The 360 t excavator fleet will remove the majority of the bulk waste in each stage, assisted by the smaller fleets when working area allows. The smaller fleets will focus on selective ore mining, and waste removal in the more constrained working areas of the lower benches.

High strip ratios and ramp access will occasionally limit the production rate due to a practical bench turnover constraint and limited working space. The mining sequence must be executed in order from the existing Stage 3 to Stage 4-1, and then onto the final Stage 4-2. There are several factors influencing the sequence, including managing the interface between the current active pit/s and the cut-backs, access to feed material, and minimum working area.

A mining fleet production target of 12 M bcm (approximately 32 Mt) total material movement per annum including availability, utilisation, and efficiency factors has been applied in conjunction with a 1.8 Mt per annum processing target.

Due to the constraints placed on the mining sequence with integrating the existing Stage 3 pit, permitting approval timelines, practical bench turnover rates, practical vertical advance, and high stripping ratios, the process plant does not always have ore available at the nominal capacity.

Figure 16-1 and Figure 16-2 show the process plant feed by pit stage, by Clean and Contaminated ore, and by head grade.

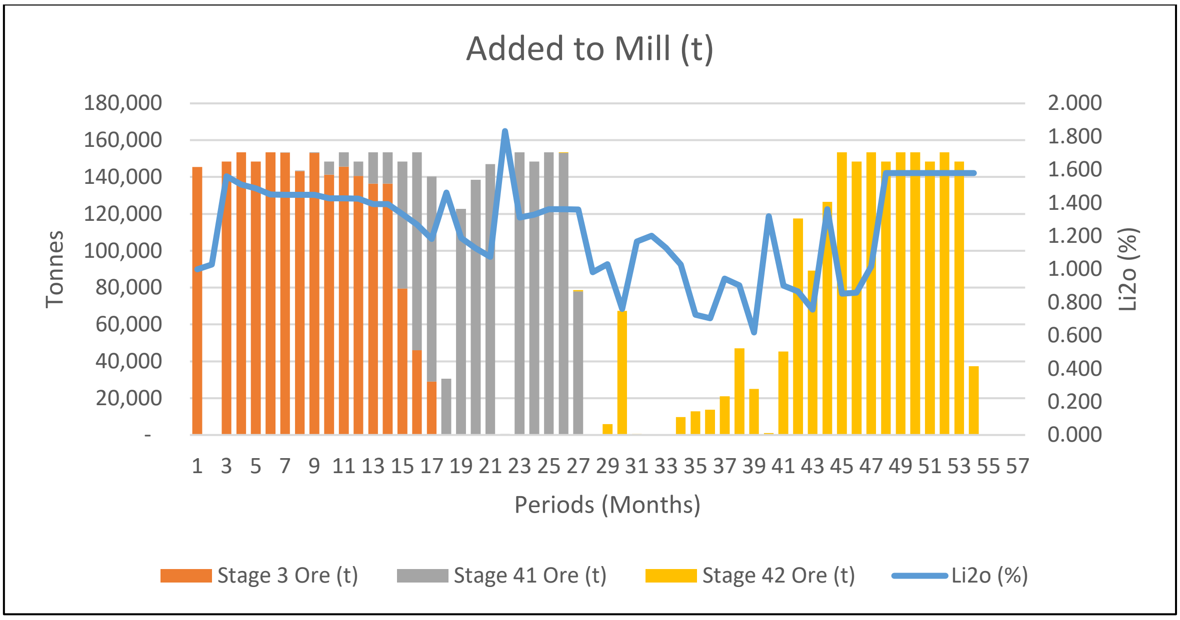


Figure 16-1 Scheduled Process Plant Feed by Pit Stage

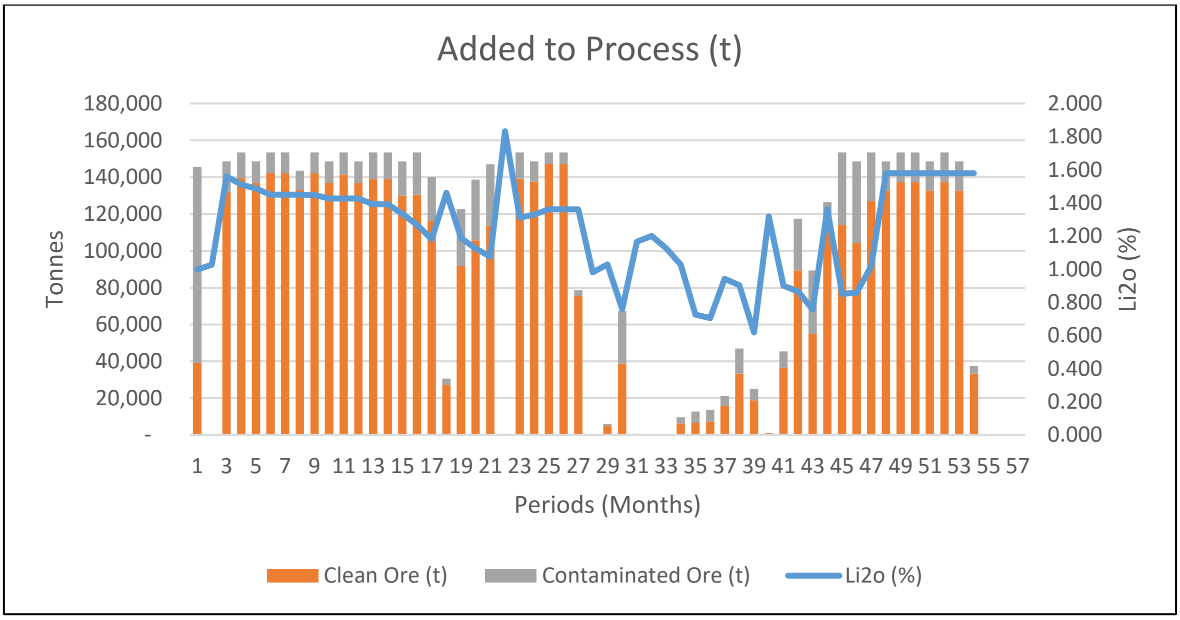


Figure 16-2 Scheduled Process Plant Feed by Clean and Contaminated Ore

The mine schedule start is defined as of 1 July 2023. Scheduling has been undertaken on monthly schedule periods to provide appropriate resolution for downstream financial modelling and for use in site production planning.

Figure 16-3 shows total excavation by period and cut-back stage. The total potential fleet capacity is not always achieved, due mainly to practical bench turn-over constraints.

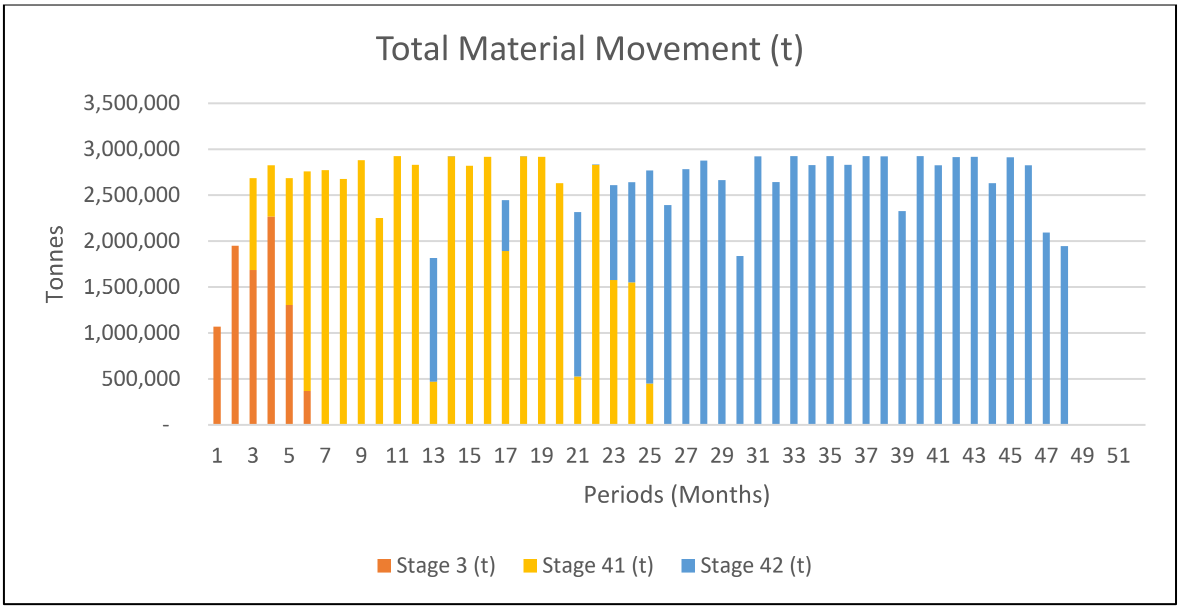


Figure 16-3 Total Material Movement by Pit Stage (bcm)

Figure 16-4 shows the timing of in-situ ore presentation in the mining sequence by stage. The high strip ratios for Stage 4-1 and Stage 4-2 means there are periods of no ore due to the volume of waste to be removed and bench turnover limits.

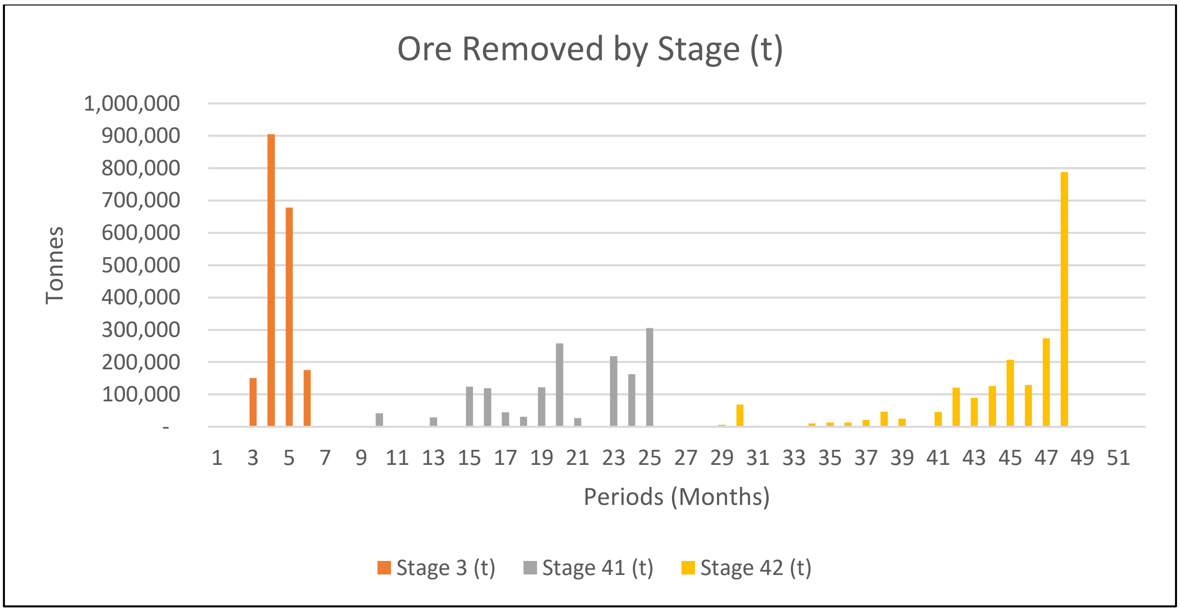


Figure 16-4 Ore (t) Removed by Pit Stage

Figure 16-5 is a long section through the pit stages, March 2023 topography and the diluted ore blocks coloured by grade. It highlights the depth and breadth of the waste movement required to access ore in both Stage 4-1 and Stage 4-2.

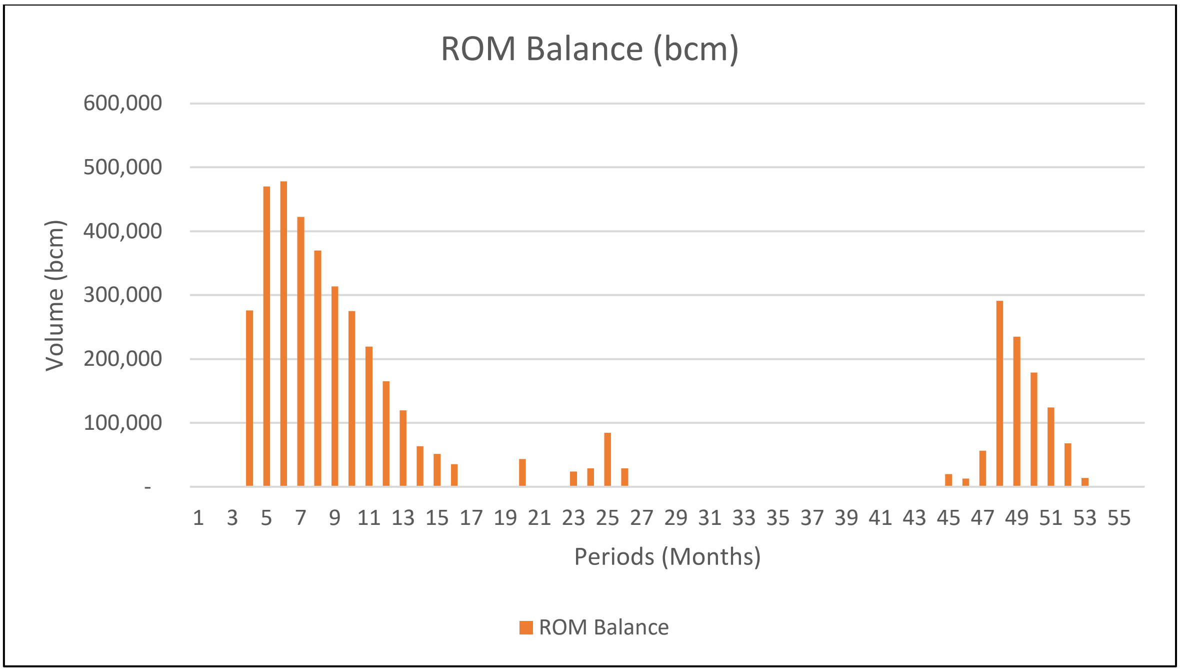


Figure 16-5 ROM Balance (bcm)

Contaminated ore is taken to the Tomra optical ore sorter for beneficiation to become Clean ore. During this process 50% of the mass in the form of basalt is removed from the material. The metal is also reduced by half, maintaining the Li_2O diluted head grade of the cleaned material. The clean material is now added to the Clean ore RoM feed for processing. Results from the schedule can be seen in Table 16-2.

Table 16-2 Tomra Beneficiation and Mill Feed (incl. RoM Stocks)

Process	Material Description	Mass (Mt)	Li_2O
Tomra	*Contaminated ore feed*	*0.72*	*0.66*
DMS	*Clean ore from Tomra*	*0.35*	*0.66*
	Clean ore in situ	*4.6*	*1.4*
Total DMS Feed		***5.0***	***1.3***

Opening ROM stocks as seen in Table 16-2 has been taken from the provided site monthly production / survey reconcile spreadsheet as of 31 March 2023, and applied to the ex-pit schedule in the cashflow model.

16.2 Mine Services and Infrastructure

As an existing operation, Mt Cattlin has in place all the required services and infrastructure to cater for the Stage 4 mine expansion as detailed in this study.

The pit rim cutbacks for Stages 4-1 and 4-2, and establishment of Waste Dump 3 (WD3) will require clearing and grubbing of the expanded footprints, and retention of vegetation and topsoil for rehabilitation use. A new site access road including a gatehouse facility for site security will be required to be developed around WD3.

The existing contractor workshop and administration facilities may require some upgrading but will be largely sufficient. The Allkem administration facilities and site capability will also be largely sufficient to manage and deliver the mining schedule described.

Minor changes to internal site roads, pipelines, and power reticulation may be required.

16.3 Mining Method and Current Operation

A conventional hard-rock truck and shovel mining method is currently employed at Mt Cattlin to mine and deliver ore to the processing plant. This mining method is assumed to be continued for the life-of-mine described in this study.

Mining operations involve drilling and blasting the competent ore and waste rock on 10 m high benches, and then mining 2.5 m high horizontal flitches. Mining contractors are utilised for all drill and blast, excavate, load, and haul operations. Three main excavating fleets are generally utilised:

- One (1) 360 t class backhoe configuration excavator with 140 t and 90 t trucks
- One (1) 200 t class backhoe configuration excavators matched with 90 t trucks
- One (1) 150 t class backhoe configuration excavators matched with 90 t trucks.

Additional excavation fleet will be used as required, and ancillary support equipment includes grader, water cart, service trucks, light vehicles, and lighting plants. The drilling and blasting fleet comprise the following, with 165 mm production hole diameter and 115 mm diameter batter/buffer holes:

- Five (5) Atlas Copco D65 down the hole hammer drills
- One (1) Atlas Copco T45 down the hole hammer drill
- One (1) Multi-Purpose Unit explosives truck.

Typical explosive density is 1.2 g/cc, production drilling spacing nominally 5.1m on 4.4 m burden and 0.8 kg/bcm powder factor.

Ore is contained within the gently dipping white pegmatite intrusions which are visually distinct from the dark volcanic waste rocks. Grade control is undertaken by visual geological inspection of blast hole chips, and visual geological control of the excavator when mining ore (“ore spotting”). Ore mining rates are based on providing continuous feed to the nominal 1.8 Mtpa processing plant.

The current North-West pit (Stage 3 NW) mines only one (1) pegmatite at the base, whilst the Stage 4 NW extension will deepen to capture a second lower pegmatite, as well as progressing down dip to further access both ore zones. The current pit depth of approximately 100 m below surface will extend to approximately 220 m below surface in the ultimate pit which has a 20:1 stripping ratio.

Waste rock is deposited in pre-designed Waste Rock Landforms or is used to backfill retired pits where practical.

Ground water is relatively scarce, and approximately 5 l/s of overall seepage is captured in floor sumps and pumped to the process water circuit for use in the plant.

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CHAPTER 17: RECOVERY METHODS

17 RECOVERY METHODS

The Mt Cattlin processing plant is located to the west of the mine, approximately 2 km northwest of the Ravensthorpe town site.

17.1 Process Development

17.1.1 Early Operations (2010−2016)

Mt Cattlin operations commenced in October 2010 with the ramp-up continuing throughout 2011. The original plant consisted of a four-stage crushing circuit producing a -6 mm product from ROM ore at a treatment rate of 1 million tonnes per annum. The crushing plant ran on day shift only, providing feed to an ore bin, which fed the concentrator on a continuous 24 hour per day basis.

The concentrator included a reflux classifier for mica removal, and dual size stream, two stage Dense Medium Separation (DMS) cyclones. The final spodumene concentrate was stacked on a pad adjacent to the plant area, drained and then hauled by road to Esperance Port for shipment in bulk. Coarse waste DMS plant float material was conveyed to the Rejects Load Out Bin and hauled by truck to mined portions of the pit(s) to be used as back-fill or as road base.

The DMS pre-screen undersize (-0.5 mm) was treated by gravity separation using spiral classifiers and shaking tables to recover a tantalite concentrate, which was contract dressed and sold, or stockpiled at site depending on the price.

Tantalite circuit tailings and other plant spillage streams were directed to a thickener for process water recovery. The thickener underflow was pumped to the tailings storage facility, approximately 500 m north of the plant.

17.1.2 Operations (2016−2018)

In 2016, process modifications were implemented to target an increased processing throughput of 1.6 million tonnes per annum of ROM ore. The significant process changes implemented included:

- Change from 4 stage to 3 stage crushing
- Change of crusher top size from -6 mm to -12 mm
- Modified wet screen to cut at 1 mm
- Other size fraction changes for spirals and DMS plant
- Addition of reflux classifiers and vacuum belt filter following the spirals to recover product from the wet screen undersize
- DMS reflux classifier only used for fine size fraction of DMS feed.

17.1.3 Yield Optimisation Project (2018–Present)

Beginning in 2019, additional improvements were made to the flowsheet as part of the Yield Optimisation Project (YOP), which was designed to improve yield and increase throughput of ROM ore to 1.8 million tonnes per annum.

These changes included:

- Further optimisation of size fractions for Wet Plant feed and feed to the DMS Plant
- Reliberation circuit for the Secondary DMS rejects to recover spodumene composited with gangue material
- Replacement of the Vacuum Belt Filter with Wet High Intensity Magnetic Separation and an Ultrafine DMS circuit for recovery of spodumene from the Wet Screen undersize
- Introduction of a Product Quality Upgrade (PQU) circuit containing a Wet Belt Magnetic Separator and an Optical Sorter for removal of basalt to improve product grade.

Ongoing plant optimisation led to the PQU circuit being shutdown (2021).

In early 2019, two in-series optical sorters were introduced in the crushing circuit to utilise ongoing and previous material classed as 'contaminated' and not suitable for plant feed. Subsequent optimisation exercises and equipment upgrades allowed for parallel sorter operation and increased processing rates. This circuit produces plant feed from previously unsuitable contaminated basalt material.

The current process flowsheet is summarised in Figure 17-1.

17.2 Detailed Process Description

17.2.1 ROM Pad and Crushing Circuit

Ore from the mine is stockpiled on the Run of Mine (ROM) pad based on Li_2O grades and basalt content. A visual classification between 'clean' and 'contaminated' ore is made by ore spotters in the pit, with clean ore containing <3% by weight basalt hauled to the ROM for crushing. Problematic ores with basalt contents estimated between 3 to 30% are directed by the spotters to a separate area on the ROM for primary crushing to 14−100 mm and additional beneficiation by optical sorting prior to rejecting the majority of the basalt from the plant feed.

Clean ore is reclaimed from the ROM stockpile or the optical sorter product pile by front end loader and fed into the ROM Bin, from where it passes over a grizzly feeder into a single toggle jaw crusher. Material coarser than 125 mm feeds the jaw crusher where it is broken down to progress to the secondary crushing stage. Grizzly undersize passes directly onto a triple-deck sizing screen which produces secondary crusher feed (+50 mm), tertiary crusher feed (-50 to +14 mm) and -14 mm material which reports to the Fine Ore Stockpile (FOS) or the Fine Ore Bin (FOB). The FOB has a nominal capacity of 2,500 tonnes and directly feeds the main wet plant. Material sent to the FOS is either stockpiled for later reclamation, or directly fed into the FOB.

Contaminated ore is batch processed through the crushing circuit, with the secondary crusher product and -50 + 14mm screen product directed towards two parallel triple-deck sizing screens that feed the optical sorters and tertiary crushers. Any -14 mm material reports to the plant rejects streams. The two individual triple-deck sizing screens, which are set up with 40 mm, 22 mm, and 14 mm apertures respectively, separate the feed to the optical sorters to achieve the required size distribution for optimum contaminant rejection. The +40 mm reports to the Optical Sorters where contaminant basalt is removed. The +40 mm optical sorter product and the -40 +14 mm progress to the tertiary crusher, and -14 mm reports to the FOS.

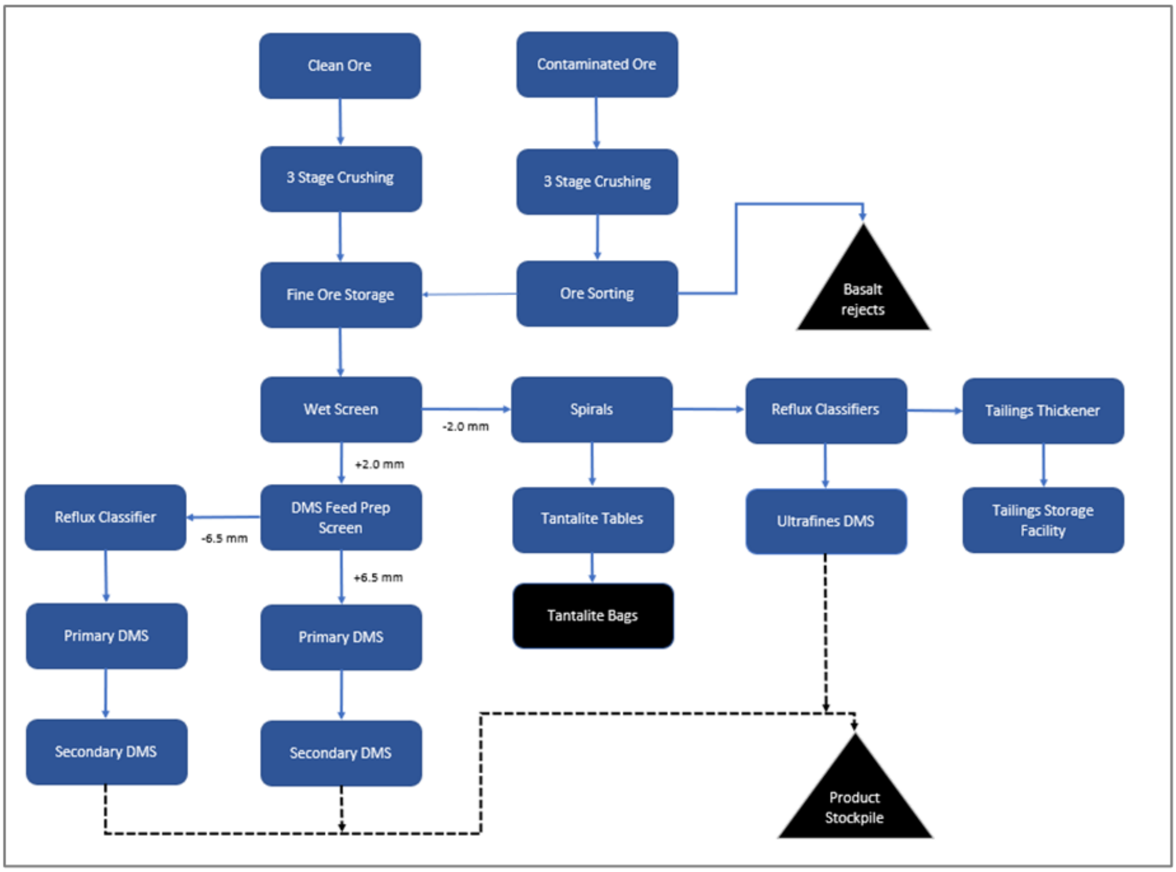

Figure 17-1 Mt Cattlin Process Flowsheet

17.2.2 Wet Plant Feed Classification

Ore from the FOB is fed over a wet screen with the oversize, nominally +2.0 mm, dewatered and conveyed to storage bin (Bin 10) and then control fed to the DMS plant. Screen undersize (-2.0 mm) material is collected in a hopper and pumped to the Fines Circuit.

17.2.3 Fines Circuit

The fines plant receives approximately 15% of the total feed which is split into coarse (+710 µm to 2.0 mm) and fine (less than 710 µm) streams by Derrick Stack Sizer screens. The coarse stream is pumped directly to the coarse spiral concentrators. The fines material is pumped to deslime cyclones ahead of the fines spiral concentrators.

The concentrate from both coarse and fines spirals combines on a single Wilfley shaking table to separate the tantalite product further for bagging and dispatch. The resulting table concentrate averages approximately 5% Ta_2O_5 and is collected in a one tonne bulk bag.

The fine spirals waste material is transported via the thickener to tailings while the coarse spirals product material is transported to the ultrafine circuit for further spodumene recovery.

17.2.4 Ultrafines Circuit

The coarse spirals waste is pumped to the wet high intensity magnetic separator (WIMS). Magnetic material is sent to rejects, while non-magnetic material is fed to a reflux classifier for mica removal. The mica containing stream is pumped to the tailings thickener. The classifier underflow is dewatered by a screw feeder and fed to the ultrafine DMS (UFDMS) feed bin.

UFDMS feed is added to a ferrosilicon slurry and pumped through the UFDMS cyclone cluster, which produces an underflow of spodumene concentrate or sinks, as well as an overflow of reject material or floats.

Ferrosilicon is recovered from both the sinks and floats via sieve bends followed by magnetic separation. The density of the ferrosilicon slurry is maintained by pumping a portion of it through primary and secondary densifying cyclones. Fresh ferrosilicon is added when required to replace losses during processing.

The UFDMS floats are pumped to a dewatering screw and fed onto the rejects conveyor. The sinks are combined with the concentrate from the main DMS plant and report to final product. The UFDMS product is generally slightly lower grade, making up about 2−3% of the total recovery and 25−35% of the Li_2O in the UFDMS feed.

17.2.5 DMS Plant

Plus 2.0 mm material from the wet plant feed preparation stage is split into 2.0 mm to 6.5 mm (fines) and 6.5 mm to 14 mm (coarse) size fractions by the DMS feed preparation screen. Each size fraction is added to a ferrosilicon slurry, then pumped through two separate stages of DMS cyclones to produce spodumene containing concentrate (sinks).

Ferrosilicon is recovered from both product and waste streams by screening and magnetic separation. It is then recycled to the DMS process. Fresh ferrosilicon is added as required, to make up for losses incurred in processing.

After separation from the ferrosilicon, the spodumene concentrate reports to the product stockpile.

Primary DMS float material is conveyed to the rejects load out bin. It is hauled by truck to the rejects stockpile. Secondary DMS float material is either directed to a stockpile bunker or sent to the reliberation circuit to liberate spodumene particles that are locked in composites with gangue material.

17.2.6 Reliberation Circuit

Secondary DMS plant float material is directed to a Vertical Shaft Impactor (VSI) crusher, followed by a dual layer screen. Plus 8 mm material is diverted to the secondary stockpile, while -8/+1.8 mm material is transferred back to the DMS feed preparation screen to be processed again through the DMS circuit. Minus 1.8 mm material is combined with the DMS plant effluent and recycled back to the Ultrafines circuit via the fines circuit.

17.2.7 Product Handling

Spodumene concentrate is stacked on a concrete pad adjacent to the plant area, prior to transport to the Esperance Port facility of the haulage contractor. The concentrate is weighed on site either by weighbridge or Loadrite weighing systems, with each mechanism being subject to routine calibration and certification. This defines the weight of the material hauled from site with the grade allocated to each parcel based on daily metallurgical accounting data. Once the material reaches the Esperance Port facility it is stored in one of three bins which are used to produce a sufficient stockpile of the correct grade required to meet customer needs.

The spodumene concentrate is sampled by an independent laboratory before being moved in half-height sea containers for loading onto a dedicated compartment on a bulk material ship. Shipment size is generally in the range of 15,000 to 20,000 wmt.

An independent representative working on behalf of both Allkem and the concentrate buyer is then responsible for defining the weight of the parcel through a draft survey, determining moisture content and establishing the final sales grades. The final sample parcel is split into several portions that can be utilised for dispute resolution if required via another independent umpire laboratory.

Tantalite concentrate is stored in 1 m^3 bulk bags and shipments conducted periodically in 50 tonne parcels. Allkem initiates the shipment process on an as required basis and conducts approximately 13 to 15 shipments per year at approximately 5% Ta_2O_5.

17.3 Concentrate Production

Mt Cattlin performance summary and concentrate production since 2018 is shown below in Table 17-1.

Table 17-1 Mt Cattlin Spodumene Concentrate Production and Recovery Data

Financial Year	Plant Feed		Concentrate		Recovery
	kt (dry)	%Li_2O	Kt (dry)	%Li_2O	
2018/2019	*1,647*	*1.1*	*163*	*5.8*	*50*
2019/2020	*1,417*	*1.1*	*146*	*6.0*	*54*
2020/2021	*1,371*	*1.4*	*187*	*5.8*	*58*
2021/2022	*1,666*	*1.1*	*177*	*5.6*	*53*

17.4 Tailings and Utilities

Tantalite circuit tailings, along with the -75 µm slimes, mica and plant spillage streams are directed to the tailings thickener for process water recovery. Thickener underflow is pumped to the Tailings Storage Facility. Since mid-2022, all tailings have been pumped to Stage 3 the SE Pit, which has been repurposed as a Tailings Storage Facility. Prior to this, tailings were discharged to the SW in pit storage facility and the original dedicated surface tailings storage facility located 500 m north of the processing plant.

17.5 Process Water and Power

Electrical power is provided by five (5) dedicated 1,250 kVa Cummins diesel generators under a contract with Contract Power Australia.

Site process water is sourced from a combination of pit dewatering, borefields and TSF recovery, and is pumped back to the process plant for treatment and distribution.

Table 17-2 Water Usage and Power Consumption per Period

Period	Water Usage (t)	Power Consumption (kWh)
2020	*819,624.5*	*14,984,163*
2021	*1,064,522.0*	*18,865,569*
2022	*844,037.0*	*15,792,497*

17.6 Metallurgical Accounting and Sample Processing

Conveyor samples are taken by automatic crosscut belt samplers on the DMS feed (CV-06), final rejects (primary floats) and final products conveyors as the primary metal accounting points, with sample-cuts being collected at regular intervals throughout the day to produce a shift composite. The only exception to this is the final product for which four-hourly composite samples are produced on day shift to allow spot checks on grades using Xray diffraction (XRD).

Incoming plant feed from the fine ore reclaim system is measured by a weightometer installed on conveyor CV-06. The assay from the automatic sampling process ahead of the wet plant classifying screen is used as the basis to determine incoming metal content and to calculate total plant recovery.

Two hourly manual sample cuts of the tantalite concentrate stream are composited during the course of filling a 1 m^3 bulk bag with concentrate. Pulverised samples are sent off site to a commercial laboratory for analysis. After draining, the tantalite bulk bags are weighed and stored in the tantalite storage yard pending shipment.

Material reporting to the final spodumene concentrate stockpile is measured by a weightometer installed on CV-11 and CV-18 (UFDMS), before being sampled by an automatic sampler installed on CV-12 giving a combined concentrate grade for the twelve-hour shift. This process defines the grade and volume of concentrate added to the stockpile on a per-shift basis. An additional automatic sampler monitors the grade of the ultrafine DMS sinks ahead of CV18, which is used in the internal accounting and monitoring of the UFDMS circuit.

Spodumene concentrate removed for haulage is accounted for on a first in first out basis due to the typically small site stockpile volumes. If it becomes necessary to build larger concentrate stockpiles on site, a cumulative stockpile grade is used to define the grade of material as it is reclaimed.

Material reporting to coarse rejects is monitored by a weightometer installed on CV-14, and automatically sampled from CV-13. Manual sampling of the tailings thickener underflow is performed every two hours and the in-line density meter and flowmeter are used to calculate the tonnage reporting to the TSF.

Samples are processed in the onsite laboratory by drying in an industrial oven and rotary split, followed by pulverising with a ring mill and assaying by atomic absorption spectroscopy (AAS). Portions of each sample from the rotary splitter are stored for later analysis if required, with secondary analysis of concentrates by inductively coupled plasma (ICP) routinely performed off site by an independent laboratory. The ICP grade determinations are then used for building shipment and as final concentrate grades.

Metallurgical accounting data is compiled in an excel spreadsheet-based system which is managed by the site metallurgical team.

17.7 Processing Workforce

The operation is primarily supported by a fly-in fly-out workforce from Perth, with some of the workforce additionally on a residential basis in the regional towns of Ravensthorpe and Hopetoun.

The processing plant operations and maintenance workforce comprises nominally 90 personnel that perform the following roles:

- Processing Manager
- Processing Superintendent
- Principal Metallurgist
- Senior Metallurgist (2)
- Maintenance Superintendent
- Maintenance Planner (3)
- Electrical Superintendent
- Electrical Supervisor
- Maintenance Supervisors (2)
- Maintenance staff (20) comprising fitters, electricians, boilermakers, and trade assistants in two rotations
- Contract crushing plant operators (21)
- Process plant operators (28), including shift supervisors on four shifts of six operators
- Process Coordinators (2)
- Laboratory personnel (5), including the Laboratory Supervisor.

The processing plant operations staff are supported by on-site management, administration, and safety personnel.

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CHAPTER 18: OPERATIONS INFRASTRUCTURE

18 OPERATIONS INFRASTRUCTURE

The existing infrastructure and service facilities available and accessible to Mt Cattlin within WA are sufficient to maintain the ongoing operations of the mining and processing works. The two nearest population centres of Albany and Esperance both provide heavy industry support including construction, engineering and manufacturing services. These resources will continue to be utilised throughout the life of the mine including planned shutdown maintenance personnel and lifting machinery, as well as providing ready access for emergency breakdown repairs.

The townships of Ravensthorpe and Hopetoun are also able to provide these services on a more limited scale, since both towns also service the extensive Ravensthorpe Nickel Project.

Other facilities within Ravensthorpe include a hospital, police station, primary and secondary school, a large recreation facility, hotel, motel, and caravan park, in addition to a number of small business enterprises and a telecentre. A fully sealed airstrip capable of accepting commercial jet aircraft has been established south of the town near the Hopetoun Road.

18.1 Roads

Transport from Perth to Mt Cattlin can be via either the Brookton Highway (540 km) or the Albany and South Coast Highways (690 km). These highways do not typically present any difficulties in carrying materials and equipment to site.

Concentrate transport occurs via the South Coast Highway to Esperance, over a distance of 187 km. A new access road from the Lake King Road was constructed to provide heavy vehicle access from the site for concentrate transport.

18.2 Concentrate Transport

Spodumene concentrate from Mt Cattlin is trucked in bulk by Qube Logistics to Esperance Port and stored in a Qube facility with a capacity of 45,000 tonnes prior to ship loading (Figure 18-1).

Figure 18-1 Concentrate Loading Operations at Esperance Port

Shipments to China are typically in bulk quantities of 15,000 tonnes or 30,000 tonnes per shipment. Ships are contracted on a spot basis as required to meet spodumene concentrate shipments sold to customers under existing off-take agreements. Typically, 180,000−200,000 tpa of spodumene concentrate is shipped to China.

Monsoon Agencies Australia Pty Ltd has been appointed as shipper's agent at the Esperance Port. The agent's responsibility includes coordinating shipping activities with Mt Cattlin, the vessel's owner and the Esperance Port.

18.3 Rail

There are no railway lines in the vicinity of Mt Cattlin.

18.4 Water and Power

Site process water is sourced from the Northeast pit and pumped to the process plant for treatment and distribution, and raw water is sourced from nearby boreholes. In order to utilise the current NE pit as an in-pit tailings storage facility, a new source of process water will be required.

Drilling is currently underway to identify alternative sources of water in the area for use once the Northeast pit is used for tailings storage. A water study has been commissioned, however adequate availability and permitting will be required and is considered a key risk for this Project.

Power is supplied to site via a 7MW diesel generation power plant with onsite power reticulation servicing the site power requirements.

18.5 Mine Stockpiles

Ore from the mining operation is delivered to the ROM Pad adjacent to the processing plant in readiness for crushing and processing. The ore is split into various stockpiles determined by the material characteristics. An image of the ROM Pad and ore stockpile is shown in Figure 18-2.

Figure 18-2 Aerial Image of the ROM Pad and Ore Stockpiles as of 31 March 2021

A portion of the ore from the contact zone between the ore and waste rock has a higher proportion of basalt than is optimal to feed to the processing plant directly. This ore material is stockpiled separately to allow crushing and feeding to Optical Sorters prior to then blending in the Fine Ore Stocks which are fed to the processing plant.

18.6 Tailings Storage Facility

Until 2019, tailings from the process plant reported to a regulated tailings storage facility located 500 m north of the processing plant. The original design comprised an above ground storage facility formed by a primary embankment on three sides and a natural hillside slope forming the fourth side. The original design storage capacity, based on the planned maximum design crest was 2 million m^3 and covered a surface area of approximately 17 Ha. The maximum embankment height was 13 m for the starter embankment and 18 m for the final crest height. Adjustments made to the original 2009 design included a change from one large cell to two smaller cells which reduced the active pond area and simplified operating requirements.

Use of the original above ground facility was discontinued in 2019 and the site has been partly rehabilitated, (Figure 18-3). Investigations are underway to determine the viability for reprocessing of this tailings material. Recent modifications to the process plant configuration are likely to allow the pre-2018 tailings to be re-processed in order to recover residual spodumene.

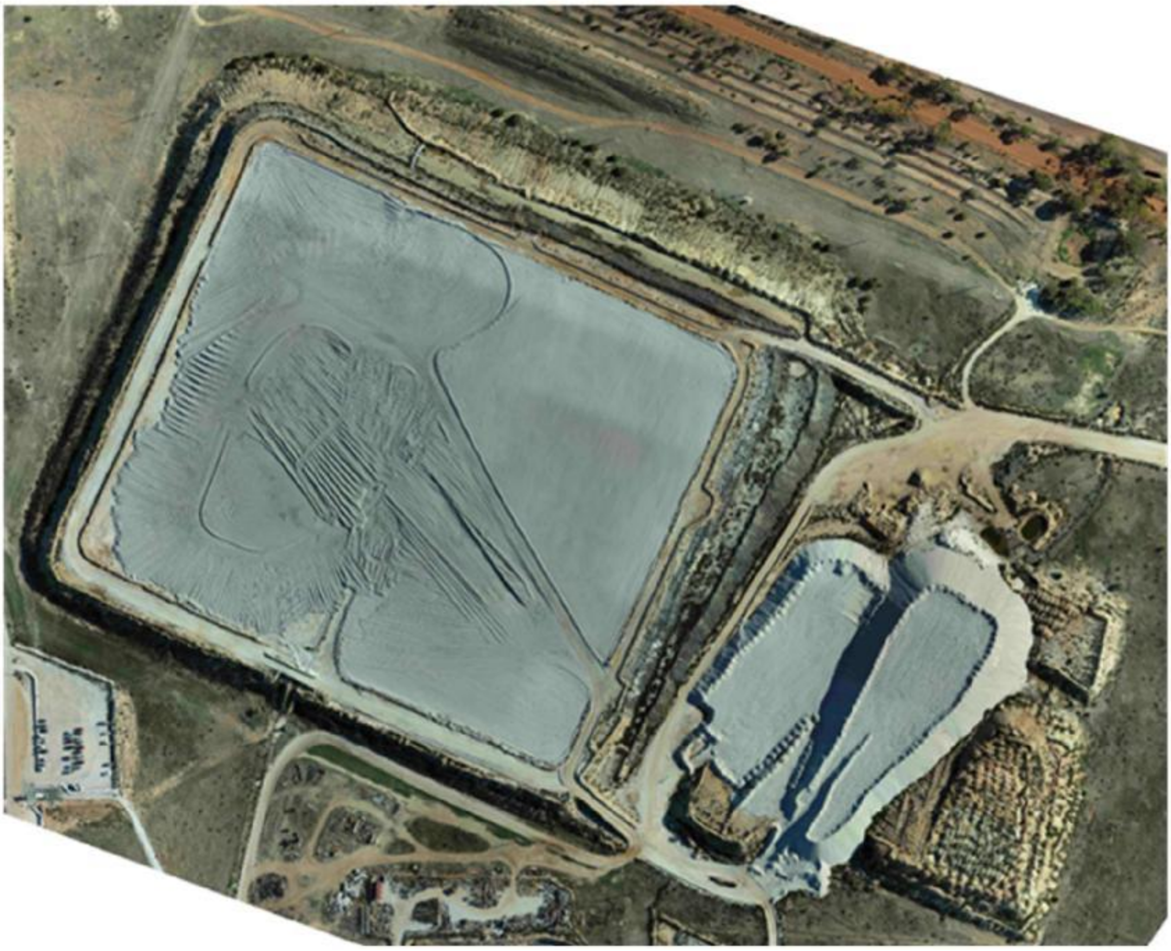

Figure 18-3 Aerial image of the currently decommissioned TSF as of March 2021

After mid-2019, all tailings have been pumped to the completed Stage 2 SW Pit which has been repurposed as a Tailings Storage Facility (Figure 18-4).

Figure 18-4 Aerial image of the existing in-pit tailings storage as of March 2021

MT CATTLIN STAGE 4 EXPANSION PROJECT

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CHAPTER 19: MARKET STUDIES AND CONTRACTS

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 [$Li(Al,Li,Mg)_4((Si,Al)_4O_{10})_2(OH,F)_4nH_2O$].

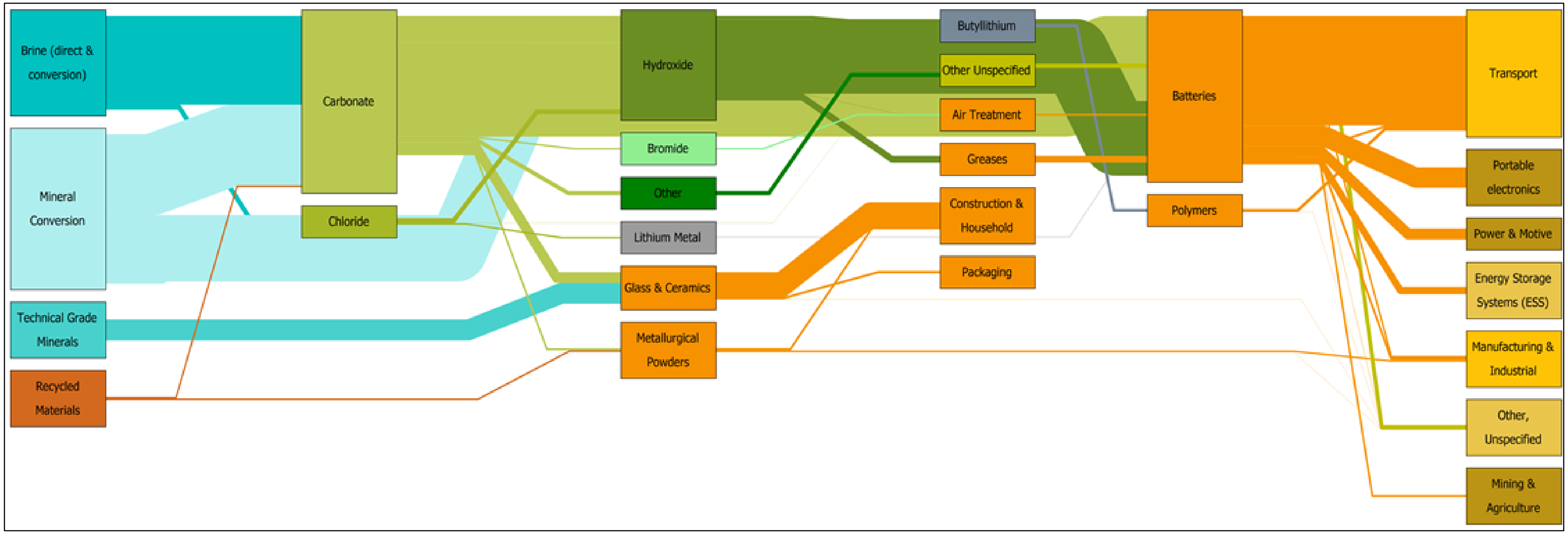
19.1.1.3 Lithium Brines

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 Technical grade mineral products consumed directly in industrial applications. Refined lithium products are distributed into various compounds displayed in green. Refined products may be processed further into specialty lithium products, such as butyllithium or lithium metal displayed in grey. Demand from major end-use applications is shown in orange, and the relevant end-use sectors are shown in yellow.



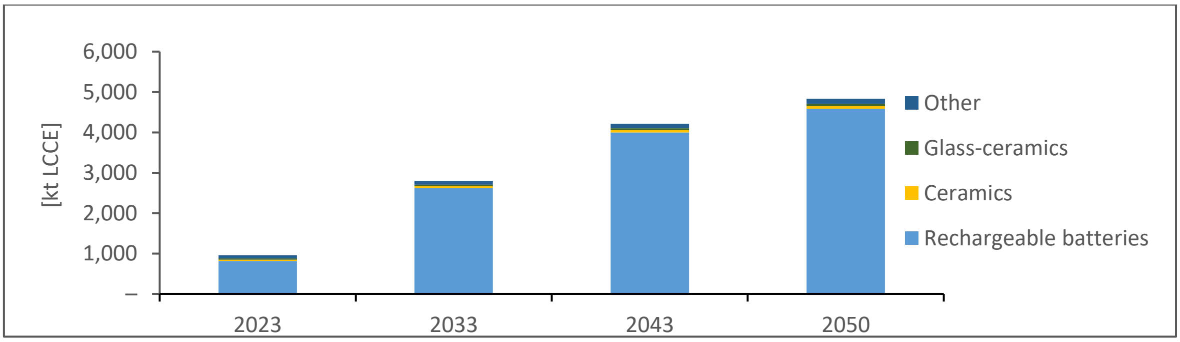
Source: Roskill, 2021.

Figure 19-1 Lithium Industry Flowchart

19.2 Global Demand for Lithium

Lithium demand has traditionally been used for applications such as in ceramic glazes and porcelain enamels, glass-ceramics for use in high-temperature applications, lubricating greases and as a catalyst for polymer production. Between 2020 and 2022, demand in these sectors rose steadily by approximately 4% CAGR. Growth in these applications tend to be highly correlated to industrial activity and macro-economic growth. Wood Mackenzie forecast the combined growth of lithium demand from industrial markets is likely to be maintained at approximately 2% per annum from 2023 to 2050.

Rechargeable batteries represent the dominant application of lithium today representing more than 80% of global lithium demand in 2022. Within the rechargeable battery segment, 58% was attributed to automotive applications which has grown at 69% annually since 2020. This segment is expected to drive lithium demand growth in future. To illustrate, Wood Mackenzie forecast total lithium demand will grow at 11% CAGR between 2023 and 2033: of this lithium demand attributable to the auto-sector is forecast to increase at 13% CAGR; whilst all other applications are forecast to grow at 7% CAGR. Growth is forecast to slow in the following two decades as the market matures.

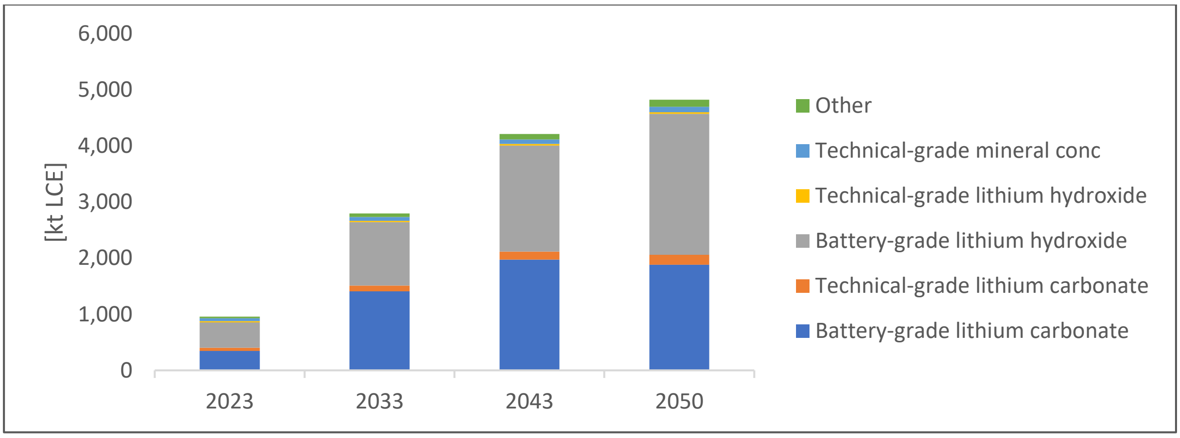


Source: Wood Mackenzie, Q1 2023 Outlook.

Figure 19-2 Global Demand for Lithium by End Use, 2023–2050 (kt LCE)

Lithium is produced in a variety of chemical compositions which in turn serve as precursors in the manufacturing of its end use products such as rechargeable batteries, polymers, ceramics, and others. For rechargeable batteries, the cathode, an essential component of each battery cell, is the largest consumer of lithium across the battery supply chain. Demand profiles for lithium carbonate and hydroxide is determined by the evolution in cathode chemistries. The automotive industry mainly uses NCM and NCA cathodes, often grouped together as “high nickel”; and LFP cathodes. High nickel cathodes consume lithium in hydroxide form and generally has a higher lithium intensity; whilst LFP cathodes mainly consume lithium in carbonate form and lithium content is lower. LFP cathodes are predominantly manufactured in China.

Lithium in the form of lithium hydroxide and lithium carbonate collectively accounted for 90% of refined lithium demand in 2022. These two forms are expected to remain important sources of lithium in the foreseeable future reflecting the share of the rechargeable battery market in the overall lithium market (Figure 19-3). The remaining forms of lithium include technical grade mineral concentrate (mainly spodumene, petalite and lepidolite) used in industrial applications accounting for 7% of 2022 demand; and other speciality lithium metal used in industrial and niche applications.



Source: Wood Mackenzie, Q1 2023 Outlook.

Figure 19-3 Global Demand for Lithium by Product, 2023–2050 (kt LCE)

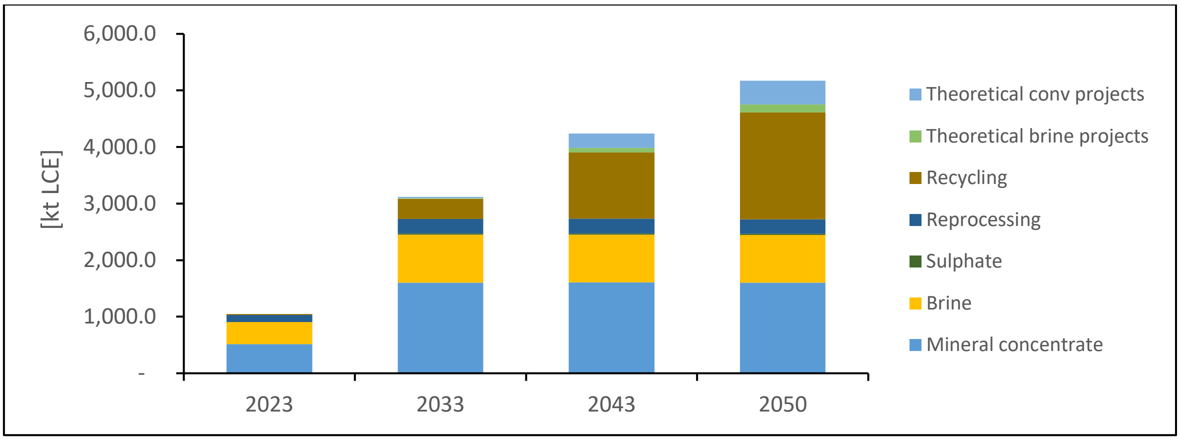
Lithium products are classified as 'battery-grade' ("BG") for use in rechargeable battery applications and 'technical-grade' ("TG") which is primarily used in industrial applications. TG lithium carbonate can also be processed and upgraded to higher purity carbonate or hydroxide products.

Lithium hydroxide is expected to experience exponential growth on the back of high-nickel Li-ion batteries. Demand for BG lithium hydroxide is expected to grow at 10% CAGR 2023−2033 to reach 1,133kt LCE in 2033, up from 450 kt LCE in 2023. Wood Mackenzie predict lithium hydroxide to be the largest product by demand volume in the near term. However, growth of LFP demand beyond China may see BG lithium carbonate reclaim its dominance.

Wood Mackenzie forecast LFP cathodes will increase its share of the cathode market from 28% in 2022 to 43% by 2033. This drives growth in lithium carbonates demand. Wood Mackenzie predict lithium carbonate demand will grow at 14% CAGR between 2023 and 2033; slowing as the market matures.

19.3 Global Supply of Lithium

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 a small proportion of global supply (2% in 2022) but as the industry matures and recycling technology develops, supply from recycling will play an increasing role in global supply expected to growth up to 36% of the global supply by 2050.



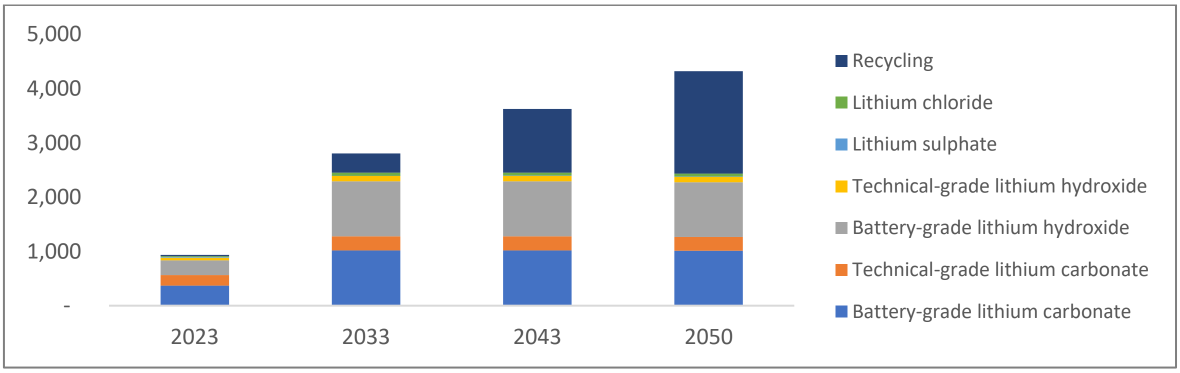
Source: Wood Mackenzie, Q1 2023 Outlook.

Figure 19-4 Refined Lithium Production by Raw Material Source, 2023–2050 (kt LCE)

Mineral concentrates are the world's largest source of lithium. In 2022, refined lithium production sourced close to half production from mineral concentrates. Spodumene is the dominant form of mineral concentrate, followed by lepidolite, representing 82% and 17% of total mined production in 2022 respectively. Mineral concentrates may be divided into two further categories: chemical grade and technical grade. Chemical grade mineral concentrate is exclusively used in the conversion process to produce refined lithium chemicals such as carbonate and hydroxide, by conversion facilities. Technical grade mineral concentrate is used directly in ceramic, glass, and metallurgical applications.

Lithium supply from mineral concentrate is supplemented by production from brine resources, where expansions and new projects in South America will add significant supply to the market. In 2022, 38% of refined lithium production was sourced from Brine. Wood Mackenzie forecast brine based refined lithium production will grow at 8% CAGR between 2023 and 2033. Brine's share is expected to fall to 27%, losing share to mineral concentrates and recycling sources by 2033.

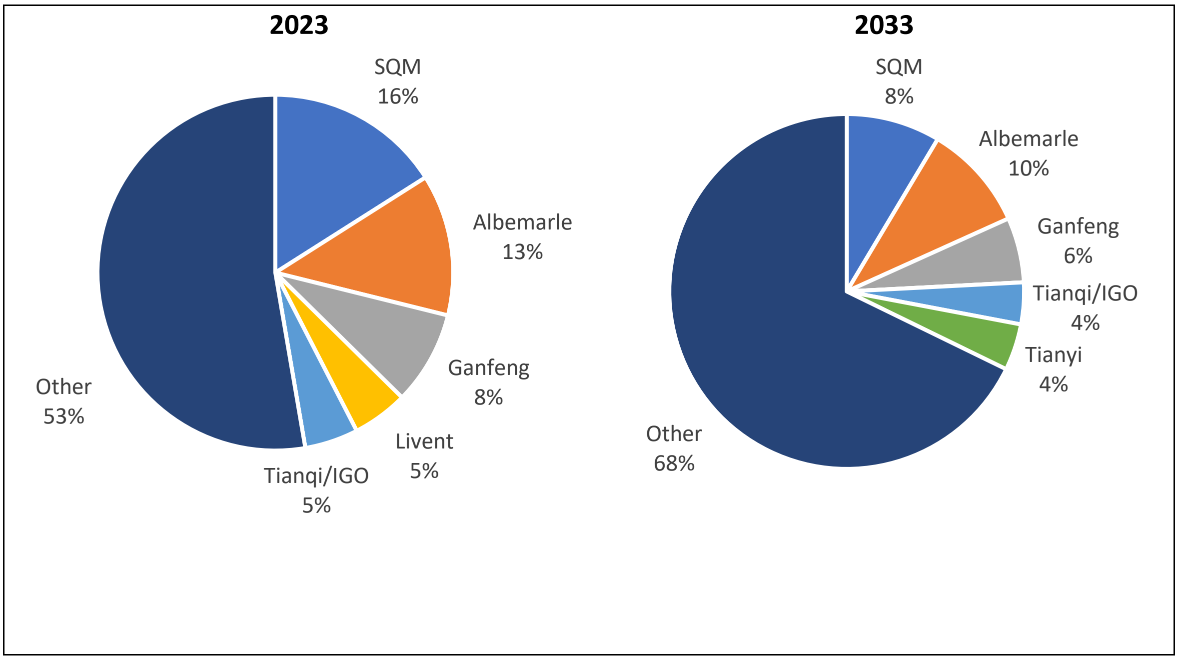
Total refined production of final lithium product in 2022 is estimated at 701kt LCE. Wood Mackenzie forecast this to increase at a rate of 12% per annum between 2023 and 2033. As primary sources of lithium decline, recycling is expected to increase to meet growing demand.



Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure-19-5 Refined production by Final Product, 2023–2050 (kt LCE)

In 2023, the top five operators are estimated to account for 47% of the total refined lithium output. Over the next decade, the share of the top five producers is forecast to decrease to 28% 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.



Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-6 Top 5 Global Lithium Producers of Refined Lithium, 2023 and 2033 (%)

19.4 Market Balance

The lithium market balance has shown high volatility in recent years. A large supply deficit resulted from historical underinvestment relative to strong demand growth in EVs. The rise in prices over the last few years has incentivised investment in additional supply. However, the ability for supply to meet demand remains uncertain given the persistence of delays and cost increases across both brownfield and greenfield developments.

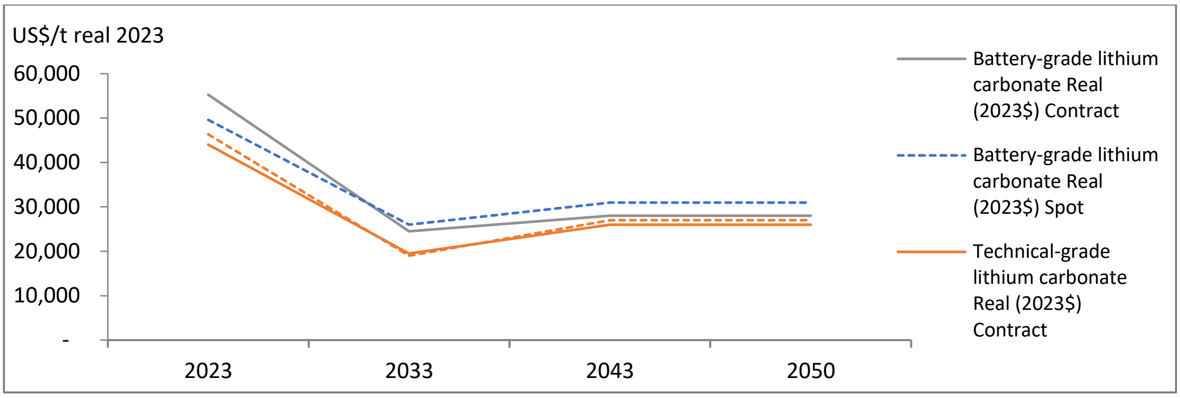
For BG lithium chemicals, Wood Mackenzie predict the market will remain in deficit in 2024. In 2025, battery grade chemicals are expected to move into a fragile surplus before falling into a sustained deficit in 2033 and beyond. Notably, technical grade lithium chemicals may be reprocessed into battery grade to reduce the deficit. However, capacity and ability to do so is yet unclear.

19.5 Lithium Prices

Lithium spot prices have experienced considerable volatility in recent months. Prices peaked in 2022, with battery grade products breaching US$80,000 / t. However, spot prices fell significantly during the Q1 2023 before stabilising in Q2 2023. A combination of factors can explain the price movements including the plateauing EV sales, slowdown of cathode production in China; and destocking through the supply chain, partially attributed to seasonal maintenance activities and national holidays.

Contract prices have traditionally been agreed on a negotiated basis between customer and supplier. However, in recent years there has been an increasing trend towards linking contract prices to those published by an increasing number of price reporting agencies ("PRA"). As such, contracted prices have tended to follow spot pricing trends, albeit with a lag.

19.5.1 Lithium Carbonate



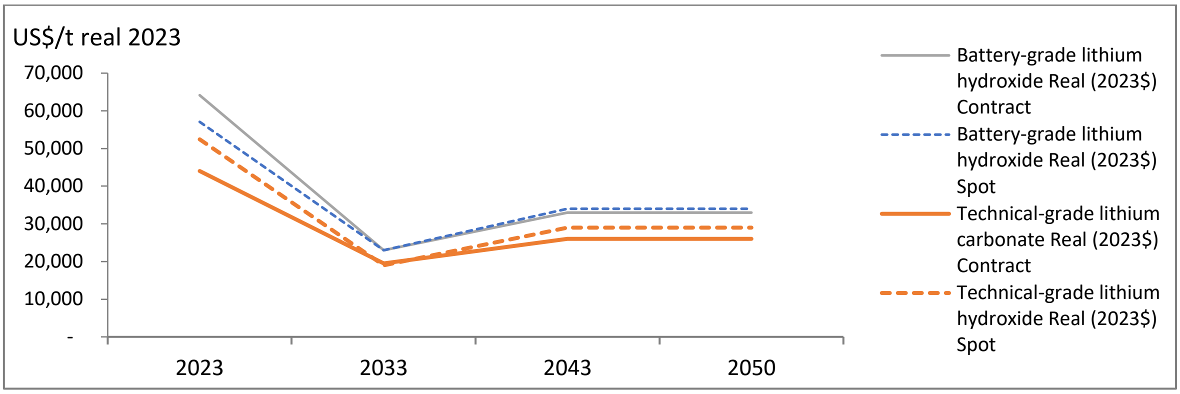
Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-7 Lithium Carbonate Price Outlook, 2023–2050

Continued demand growth for LFP cathode batteries will ensure strong demand growth for BG lithium carbonate. This demand is expected to be met predominantly by supply from brine projects. Given the strong pricing environment, a large number of projects have been incentivised to come online steadily over the coming years. Wood Mackenzie forecast prices to decline as additional supply comes online. However, Wood Mackenzie forecast a sustained deficit in battery-grade lithium chemicals to commence from 2031. Over the longer term, Wood Mackenzie expect prices to settle between US$26,000/t and US$31,000 / t (real US$ 2023 terms).

Notably, the market for BG carbonates is currently deeper and the spot market more liquid than hydroxide due to the size and experience of its main market of China. In addition, BG carbonates are used in a wider variety of batteries beyond the EV end use. TG lithium carbonate demand for industrial applications is forecast to grow in line with economic growth. However, TG lithium carbonate lends itself well to being reprocessed into BG lithium chemicals (either BG carbonate or BG hydroxide). The ability to re-process the product into BG lithium chemicals will ensure that prices will be linked to prices of BG lithium chemicals.

19.5.2 Lithium Hydroxide

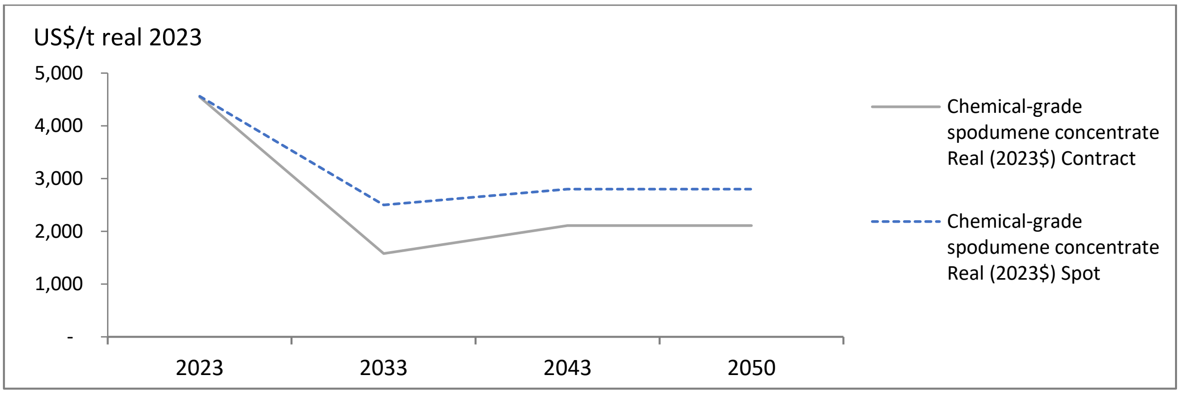


Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-8 Lithium Hydroxide Price Outlook, 2023–2050

The market for BG lithium hydroxide is currently small and relatively illiquid compared to the carbonate market. Growth in high nickel cathode chemistries supports a strong demand outlook. Most BG hydroxide is sold under long term contract currently, which is expected to continue. However, contract prices are expected to be linked to spot prices and therefore is likely to follow spot price trends albeit with a lag. Over the longer term, Wood Mackenzie expect hydroxide prices to settle at between US$25,000 and US$35,000 / t (real US$ 2023 terms).

19.5.3 Chemical-Grade Spodumene Concentrate



Source: Wood Mackenzie, 1Q 2023 Outlook.

Figure 19-9 Chemical-Grade Spodumene Price Outlook, 2023–2050

In 2022, demand from converters showed strong growth resulting in improved prices. After years of underinvestment, new capacity has been incentivised and both brownfield and greenfield projects are underway. Notably, these incremental volumes are observed to be at a higher cost and greater difficulty, raising the pricing hurdles required to maintain supply and extending timelines for delivery.

Wood Mackenzie forecast a short period of supply volatility in the years to 2030, moving from surplus to deficit, surplus before entering into a sustained deficit beyond 2031. Reflecting this dynamic, prices are expected to in line with market imbalances. Wood Mackenzie forecast a long-term price between US$2,000/t and US$3,000/t (real US$2023 terms).

19.6 Offtake Contracts

Allkem currently sells Mt Cattlin's spodumene concentrate through offtake agreements mainly to Chinese convertors. Offtake agreements have pricing conditions reflecting spodumene market prices.

19.7 Data Source, Reliance, and Disclaimer

"The data and information provided by Wood Mackenzie should not be interpreted as advice and you should not rely on it for any purpose. You may not copy or use this data and information except as expressly permitted by Wood Mackenzie in writing. To the fullest extent permitted by law, Wood Mackenzie accepts no responsibility for your use of this data and information except as specified in a written agreement you have entered into with Wood Mackenzie for the provision of such of such data and information."

MT CATTLIN STAGE 4 EXPANSION PROJECT

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AUGUST 2023

CHAPTER 20: ENVIRONMENTAL STUDIES, PERMITTING, LAND, SOCIAL AND COMMUNITY IMPACT

20 ENVIRONMENTAL STUDIES, PERMITTING, LAND, SOCIAL AND COMMUNITY IMPACT

20.1 Stakeholder Engagement

20.1.1 Key Stakeholders

Allkem has successful history of meaningful consultation with identified stakeholder and decision-making authorities throughout the life of the Project. Allkem is committed to continuing the consultation process as part of ongoing operations, as well as through the site closure process, and finally tenement relinquishment. Current stakeholders are included in Table 20-1.

Table 20-1 Identified Key Stakeholders and their Interest in the Project

Organisation	Interest
Department of Water and Environment Regulation (DWER) *Department of Mines, Industry Regulation, and Safety (DMIRS)* *Department of Planning, Lands, and Heritage (DPLH)*	• *Licensing and closure planning* • *Contaminated site identification and remediation* • *Water supply and groundwater licensing, usage monitoring and aquifer sustainability* • *Disturbance management* • *Evidence of rehabilitation standards* • *Performance securities* • *Closure provisioning* • *Transfer of mine infrastructure to local landowners at closure Indigenous heritage sites and agreements.*
Shire of Ravensthorpe	• *Community support programmes* • *Infrastructure use including potential transfer and management of former mine infrastructure.*
Southern Noongar and Wagyl Kaip Traditional Owners *South-West Aboriginal Land and Sea Council*	• *Protection of Aboriginal heritage sites* • *Preservation of the natural landscape.*
Mt Cattlin Community Consultation Group (MTCCCG) representing the broader Ravensthorpe community	• *Conserving the amenity and aesthetic value of Ravensthorpe township and surrounds* • *Community involvement in rehabilitation and closure activities* • *Post mining land use.*
Ravensthorpe business community *Surrounding Property Owners*	• *Land access* • *Exploration activities* • *Post mining land use* • *Infrastructure transfer/retention* • *Weed management* • *Individual property access agreements.*

20.1.2 Stakeholder Engagement Strategy

Allkem has committed to effectively consult with its identified stakeholders through the following processes:

- Regular update meetings with the Shire of Ravensthorpe and Ravensthorpe Business Association
- Ongoing consultation with local neighbours
- Ongoing consultation with Traditional Owner groups and presentations at the South-West Aboriginal Land and Sea Council working party meetings
- Appointment of an Environmental and Community Liaison Officer
- Regular quarterly presentations to the Ravensthorpe community
- Establishment of the Mt Cattlin Community Consultation Group in 2018 with members consisting of respected leaders of the community and Allkem senior management. Minutes of meetings and presentations are made publicly available https://www.mtcattlin.com.au/ccg

Allkem will continue to engage with stakeholders on all mining matters including closure issues and will update the engagement strategy where feasible, following consultation with the local community.

20.1.3 Record of Project Stakeholder Engagement

A record of consultation relevant to the Project, grouped by stakeholder, is provided in Table 20-2.

Table 20-2 Stakeholder Consultation Register

Stakeholder	Who	Date	Method	Outcome
DMIRS	*Laura Copeland*	*20/07/2021*	*Phone Call*	*Introduced the 2SE Pit TSF Project*
	Felicity Huxtable	*10/08/2021*	*Phone Call*	*Introduced the Project, discussed the options of utilising Part 1 or Part 2 of the 2020 MP Guidelines.*
	Laura Copeland	*16/08/2021*	*Phone Call*	*Update on progress of the Project, confirmed utilising Part 1 of the 2020 MP Guidelines.*
	Laura Copeland	*05/10/2021*	*Phone Call*	*Discussed requirements to obtain approval for drilling of monitoring bores.*
	Matt Boardman & Dan Endacott	*13/02/2023*	*Online Meeting*	*Project introduction, mine expansion scope, tailings relocation requirements and overall waste capacity limitations discussed. Geotechnical requirements for disposing waste on top of TSF1 to be included with submission.*

Stakeholder	Who	Date	Method	Outcome
	Lindsay Bourke, Ana Mesquita & Corey Boivin	*19/04//2023*	*In person, DMIRS*	*Introduction of the Allkem project team to DMIRS. Discuss the scope and technical details of the Stage 4 mine expansion. DMIRS advised key aspects for consideration are community engagement, waste and tailings characterisation, geotechnical considerations for the open pit. Confirmed there is a heavy workload in front of the Department.*
DWER	*Carmen Standring*	*29/06/2021*	*Phone Call*	*Advised intent to transfer tailings deposition from 2SW Pit to 2SE Pit.*
	Carmen Standring	*18/08/2021*	*Phone Call*	*Update on the in-pit tailings Licence amendment application and supporting studies.*
	DWER & Carmen Standring	*19/10/2021*	*Email*	*Lodgement of the in-pit tailings Licence amendment application and supporting studies.*
SWALSC	*General Admin*	*10/02/2023*	*Activity Notice and email*	*Activity Notice lodged describing proposed Waste Rock Dump (WD2) extension over agricultural land. Sought SWALSC consideration of the need for Heritage Survey, with the involvement of Wagyl Kaip and Southern Noongar Agreement Group.* *Heritage survey not required (no response received).*
Community Consultation Group (CCG)	*CCG*	*14/09/2022* *09/11/2022* *15/02/2023* *12/04/2023*	*Meetings*	*Scheduled updates on company performance and proposed mine developments.* *Disclosure of intended Stage 4 mine expansion provided since September 2022.* *No issues raised by CCG, although further details requested.*

20.2 Public Consultation

Allkem understand the importance of proactive community relations as a key principle in its day-to-day operations as well as for future development planning.

Stakeholders have been identified based on issues related to the scope of works and the geopolitical and traditional setting of the Project, including:

- Regulatory institutions
- Local government bodies
- Government agencies
- Traditional Owner groups and authorities
- Local communities within a 5 km radius of the Project, and then those further away from the projects
- Non-government organisations with a presence in the Project area
- State agencies publish licence applications and variations in state-based public media as a matter of regulation for comment.

Extensive stakeholder consultation has been carried out since 2010, including distribution of background documentation, a series of information sharing meetings with key stakeholders and all residents, open days, and focus group discussions. Background information on the Project and potential impacts have distributed to stakeholders both locally and nationally at different times.

20.2.1 Community Consultative Group

Allkem established the Community Consultation Group (CCG) in August 2018 to provide a platform for the community to communicate directly with the Company. The CCG conducts regular meetings with the aim to improve the social well-being of individual groups and organisations of the local community.

The CCG consists of ten members, eight from the community of Ravensthorpe and two from Galaxy's management team at Mt Cattlin. The CCG Terms of Reference sets out the group's:

- Purpose
- Objectives
- Roles and responsibilities
- Membership selection, terms, and requirements
- Code of conduct
- Draft meeting agenda.

Community members are encouraged to contact a CCG member directly for any concerns or issues they have regarding Mt Cattlin's operations.

The specific objectives of the CCG are to:

- Provide a forum to develop and strengthen long-term relationship between Allkem and the community

- Build trust and confidence in Allkem by members of the community
- Provide timely transfer of information, comments, concerns, and feedback between Allkem and the community
- Provide accurate and effective communication between Allkem and the community
- Make Allkem more accessible to the community
- Support Allkem with delivering an effective community engagement process during all phases of mining
- Enable Allkem to consider community feedback for everyday operation activities
- Provide transparency to the community
- Allow collaboration regarding the management of issues.

20.3 Local Community Engagement

The local Ravensthorpe community is recognised as a key stakeholder and the community of many residential employees. Mt Cattlin regularly engages with the people of the Ravensthorpe area in a variety of ways as shown by the following examples.

Figure 20-1 Smoking ceremony – typically used to cleanse an area, and to wish health and success.

Figure 20-2 Community updates

Figure 20-3 Site Open Day for the Community

Figure 20-4 Support of local groups

20.4 Ownership and Legal Aspects

20.4.1 Corporate Structure

The Mt Cattlin operation is wholly owned by Allkem Limited, which is a public company with dual listings on the Australian Securities Exchange (ASX) and the Toronto Stock Exchange (TSX) (ticker AKE). The corporate headquarters are in Argentina and Australian headquarters are in Brisbane. A regional Western Australian head office is in Applecross, Perth. Allkem have operating and development projects in Argentina, Australia, Japan, and Canada. The corporate structure relevant to Mt Cattlin is show in Figure 20-5.

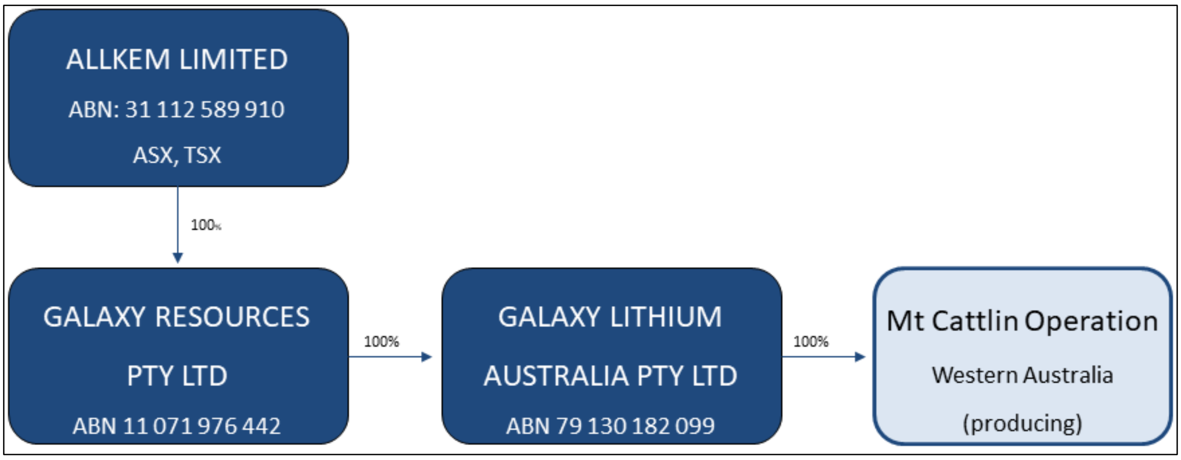

Figure 20-5 Mt Cattlin Corporate Structure

20.4.2 Land Tenure and Tenements

Mt Cattlin is an operating mine, and the NW pit development is the fifth separate open pit to be developed. The underlying land ownership tenure in the district is a mixture of freehold title and Crown Land.

The greater project area comprises one mining lease, one general purpose lease, four miscellaneous licences, four prospecting licences and eleven exploration licences. In Western Australian tenements are permitted by the Department of Mines, Industry, Regulation and Safety (DMIRS). Mining leases are issued for 21 years, then renewable, as are miscellaneous and general-purpose licences.

Prospecting licences are generally issued for 8 years. Exploration licences are issued for 5 years, renewable once, thereafter 2-year extension of terms if justified by reasonable progress.

Allkem is the freehold title owner of several Torrens title land lots that underly the mine site or are adjacent to it. In areas of freehold ownership, Native Title is extinguished. All tenements are subject to an existing Indigenous Land Use Agreement in terms of the Noongar Boodja settlement between the West Australian government and the Noongar native title claimants which applies to the South-Western part of Western Australia.

The operating site holds as a Prescribed Premises Licence for the processing facility of 1.8 million metric tonne design capacity, as well as other permitted discharges, issued by the Department of Water and Environment Protection (DWER). Other licenced infrastructure, (site power, water bores, tails dams) are licenced by other WA government agencies.

The local government area is the Shire of Ravensthorpe. Tenement titles, area, and expiry dates are tabulated in Table 20-3.

Table 20-3 Tenement Listing

Tenement Id	Current Area	Area Unit	Expiry Date
E74/0379	*25*	*SB*	*3/10/2025*
E74/0399	*23*	*SB*	*4/28/2025*
E74/0400	*3*	*SB*	*3/13/2024*
E74/0401	*4*	*SB*	*3/13/2024*
E74/0406	*10*	*SB*	*8/11/2023*
E74/0415	*11*	*SB*	*3/9/2025*
E74/0570	*6*	*SB*	*6/26/2026*
E74/0571	*13*	*SB*	*6/26/2026*
E74/0589	*3*	*SB*	*11/6/2026*
E74/0621	*2*	*SB*	*8/15/2023*
E74/0713	*14*	*SB*	*4/26/2027*
L74/0046	*10*	*HA*	*3/17/2031*
L74/0047	*1,580*	*HA*	*12/13/2032*
L74/0048	*5*	*HA*	*3/15/2033*
M74/0244	*1,830*	*HA*	*12/23/2030*
P74/0370	*20*	*HA*	*3/21/2025*
P74/0371	*67*	*HA*	*3/21/2025*
P74/0372	*24*	*HA*	*2/22/2025*
P74/0373	*95*	*HA*	*3/21/2025*
G74/13	*63*	*HA*	*5/24/2044*
L74/61	*23*	*HA*	*APPLICATION*
HA		*METRIC HECTARES*	
SB		*SUB BLOCK: 2,892 m^3*	

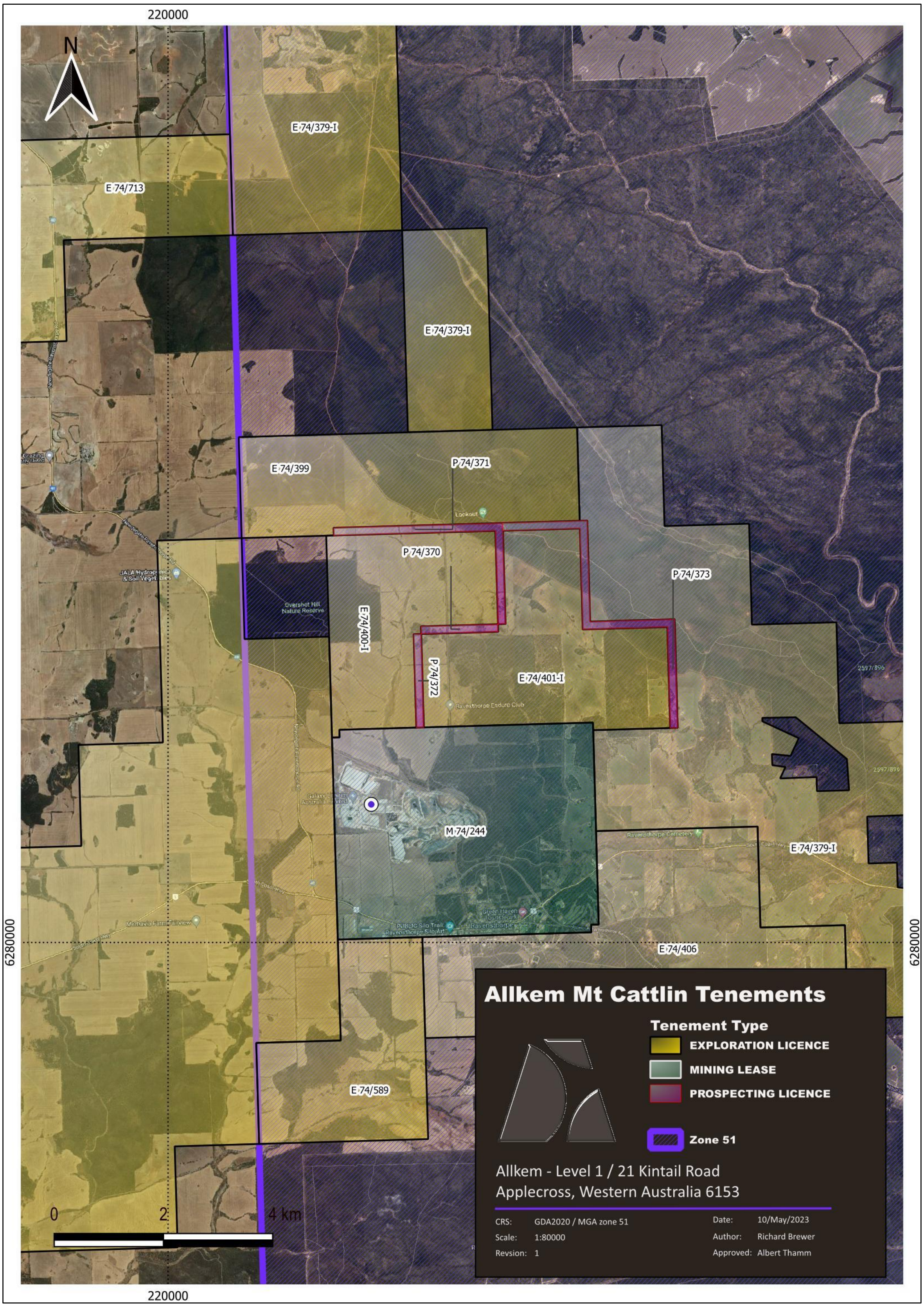

Figure 20-6 Tenement Locations Showing Underlying Aerial Image

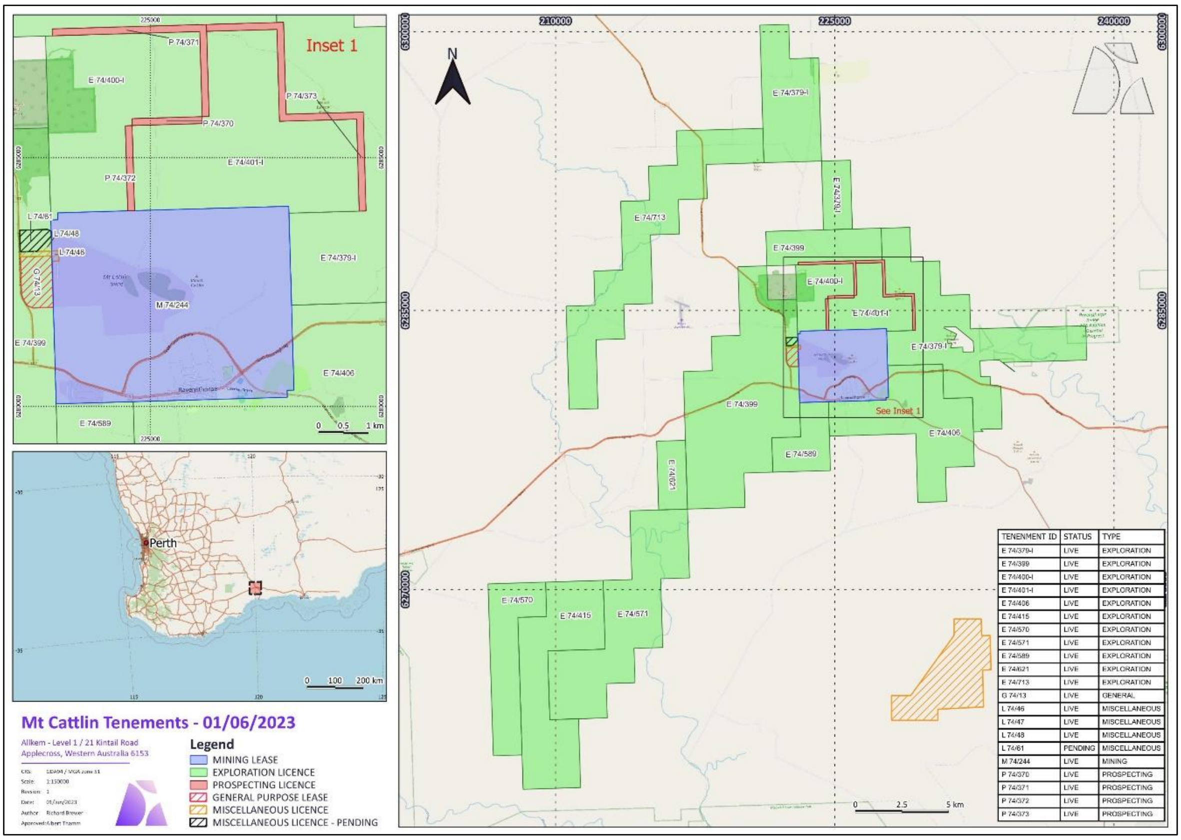

Figure 20-7 Tenement Locations Showing Prospecting Licence Detail and Regional Context

20.5 Key Permits

20.5.1 Mining proposal

A Mining Proposal to support the Stage 4 expansion activities outlined in this study has been submitted to DMIRS. This document contains much of the same environmental, mining and layout information as contained in this study report. There is an allowance in the schedule for the Mining Proposal to take four months to be approved before activities on site may be impacted. At the time of writing, the approval timeline was well advanced and DMIRS had not indicated any issue that may delay approval as expected.

20.5.2 Mine Closure Plan

A Mine Closure Plan has been submitted, as required, with the Mining Proposal. It is a renewed version of the previously submitted and accepted version by DMIRS, outlining the remediation that Allkem will undertake upon the closure of the mine.

20.5.3 Prescribed Premises Licence

The site holds a Prescribed Premises Licence L8469/2010/2 issued by DWER under Part V of the Western Australian Environmental Protection Act which permits activities, and sets out the monitoring and reporting requirements, associated with:

- Tailings disposal
- Water bores
- Fugitive dust emissions
- Waste disposal (industrial waste and tyres)

The PPL has been updated numerous times since first issuance in October 2010. The PPL expiry date is October 2029.

20.5.4 Future Permits

An updated Mining Proposal, along with an Environmental Protection Agency (EPA) referral will be required to be submitted should waste dump space to the Northeast of the site be required to accommodate the full bulk of mine waste in Stage 4-B. The EPA referral is required as the area being considered for extra waste dumping would require clearing a significant area of native vegetation.

This new Mining Proposal process will commence upon the successful receipt of the under-assessment Mining Proposal discussed above, to provide optionality for the project whilst the technical, economic, and social trade-offs of a pit cut-back for Stage 4-2 and/or an underground operation are assessed as the most appropriate mining methodology.

The new Mining Proposal will also seek DMIRS approval for a new In-Pit Tailings Storage Facility and Stage 4-2 of the open pit (only Stage 4-1 is covered in the current Mining Proposal).

Other Stage 4 capital projects, such as the development of a dedicated staff village on freehold, a new and modernised power supply, and groundwater abstraction will require a series of new and/or altered Works Approvals or modifications to Licences, issued by the WA State Department of Water and Environmental Regulation (DWER).

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CHAPTER 21: CAPITAL AND OPERATING COSTS

21 CAPITAL AND OPERATING COSTS

This chapter discusses the results of the Project financial analysis which includes capital and operating cost estimates that have been developed by Entech as a part of the Stage 4 Feasibility Study.

The cost estimation is judged to have an accuracy range of ±15% which is reflective of the level of development of the Project and is typical for a Feasibility Study.

21.1 Basis of Costing

Entech have calculated the monthly capital and operating costs in an Excel based financial model. No contingency allowance has been allowed in the development and operating costs, or the capital cost estimates. All costs have been calculated monthly for the life of the Project.

Mt Cattlin is an operating mine and capital costs exclude sunk costs (i.e., costs already incurred by Allkem in developing the Project to date) and any ongoing costs that may be incurred by Allkem that are not directly associated with the Project (e.g., business development, exploration costs and further resource definition beyond the current Mineral Resources).

No allowances have been included within the estimates for the following items:

- Goods and Services Tax (GST) – this is a refundable expense
- Withholding taxes
- Escalation or inflation
- Financial charges of any description
- Interest
- Contingencies.

All cost estimates are expressed in United States Dollars ($), unless noted otherwise.

21.2 Mining Cost Estimation

The Entech mining cost estimate considered all costs incurred to mine material, deliver it to the stockpiles, waste dumps and ROM pads. Battery limits were as follows:

- Mining site preparation and establishment
- Mining disestablishment and demobilisation
- Road construction and maintenance between mining areas and the processing facility
- Mine dewatering of the pits
- Mining-specific capital costs only
- Diesel rate of USD$0.99 per litre post rebate.

The cost basis for the estimate has been developed to represent the mining methods outlined within this report. Cost estimates represent expenditures required to develop and mine the Mt

Cattlin Stage 4 Expansion. Operating cost estimates are supported by information from the following sources:

- Mining Services Contract Tendered Schedule of Rates
- Entech/Allkem – Other surface mining assumptions from historical actuals or first principles/benchmarks.

Where possible, parties have sought quotations for costs, however in some instances, costs have not been available by quotation. In these instances, costs have been worked up from first principles or the parties have used in-house database information available from cost estimates for similar projects.

21.3 Mining Capital Cost Estimate

The total mining capital cost estimate without a contingency allowance is $5.6M. A breakdown of the total capital estimate by area is shown in Table 21-1. These capital costs include:

- Clear and grub, and topsoil stripping – Clearing material over the waste dump and pit footprint to a 300 mm depth. This cost also includes movement of the material to a designated topsoil dump
- Establishment – Setting up mining facilities as outlined in the contract miner's Responsibility Matrix
- Mobilisation and Demobilisation – Movement of the mining contractor's equipment and personnel.

Table 21-1 Total Mining Capital Cost

Description	USD$M
Clear & Grub and Topsoil Strip	*0.4*
Establishment	*0.5*
Mobilisation	*3.7*
Demobilisation	*0.9*
Total Mining Capital Costs	***5.6***

21.4 Mining Operating Cost Estimate

The operating cost estimate was developed by Entech, in conjunction with Allkem.

Direct mining costs used in the mining cost estimate are from the schedule of rates submitted by contractors in a competitive tender process. An interim mining schedule was prepared by Entech and Allkem and incorporated into a tender package (3-year term) prepared and issued to five contractors.

The returned submissions were then evaluated by Entech and Allkem based on the following criteria:

- Completeness
- Conformance to specifications
- Price
- Relevant experience.

The mining cost model incorporates one selected bid from the latest pricing.

21.4.1 Summary of Operating Cost

The operating costs are based on the following assumptions:

- Ramp up to a maximum 12 M bcm a year mining rate
- Open pit mining services provided by mining contractor
- Fixed and variable contract. Variable costs are calculated as a function of the relevant variable.

Manning levels vary as new deposits come online in the project. Mining maintenance, staff and safety personnel numbers change with each phase of the operation.

The total mining operating costs by pit is illustrated in Table 21-2.

Table 21-2 Mining Operating Cost by Deposit

Pit	USD$M
Stage_3_Phase_1	*33.4*
Stage_4_Phase_1	*150.2*
Stage_4_Phase_2	*247.8*
Total Operating Costs	***431.4***

21.4.2 Open Pit Mining Costs

Open pit mining operating costs have been determined by the schedule of rates provided by the selected mining contractor. The mining cost is based on working 365 days per year, seven (7) days per week, with two (2) 12-hour shifts per day and includes allowances for the following items:

- All mobile machinery
- Dayworks
- Drill consumables (in D&B rates)
- Dewatering
- Explosives
- Manpower for contractor operators and supervisors/managers
- PPE
- Tooling for the workshop
- Preliminary and ongoing primary pit dewatering
- Supply of diesel fuel to the contractor

- All flights, accommodation and messing for management and contractor personnel if applicable.

The following is captured in the Entech Financial model:

- General owner costs including management, safety and environmental services
- Grade control.

21.4.3 Open Pit Load and Haul

Load and haul costs include all consumables, equipment, labour, and ancillary equipment required for the loading and hauling of all waste and ore material from the open pits to the waste dumps and ore stockpiles at each pit. Costs were calculated on a unit cost per Bank Cubic Metre (bcm) basis, with the unit cost increasing with depth below the pit crest.

Ancillary equipment costs include all equipment and labour contingency for supporting the primary fleet. This includes a consideration for lighting towers, service truck, dewatering and other miscellaneous equipment.

The open pit load and haul cost (ore plus waste) averaged $6.27/bcm of total pit production. In terms of plant feed, open pit mining costs average $47.56/t ore processed. Open pit mining costs by deposit are presented in Table 21-3.

Table 21-3 Load and Haul Cost by Deposit

Pit	USD$M	$/BCM
Stage_3_Phase_1	*19.9*	*6.51*
Stage_4_Phase_1	*94.5*	*5.91*
Stage_4_Phase_2	*165.5*	*6.58*
Total Operating Costs	*279.9*	*6.34*

21.4.4 Open Pit Drill and blast

The overall drill and blast unit cost across all volume moved equated to $2.94/BCM using rates generated by the open pit contractor. The drill and blast costing also has an allowance for diesel, a breakdown is shown in Table 21-4.

Table 21-4 Drill and Blast Cost by Deposit

Pit	USD$M	$/BCM
Stage_3_Phase_1	*11.0*	*3.61*
Stage_4_Phase_1	*46.3*	*2.92*
Stage_4_Phase_2	*67.9*	*2.82*
Total Operating Costs	***125.3***	***2.91***

21.4.5 Dayworks

A dayworks allowance of 1% of the total load and haul, drill and blast, and fuel costs has been costed. Dayworks cost over the life of mine equated to $4.2M.

21.4.6 Diesel Usage

Diesel usage has been modelled and costed. Diesel usage for the open pit was based on the tender estimates received from the mining contractors.

21.4.7 Mine Overheads

Open pit mine contracting personnel oncosts including camp and FIFO costs have been included in the mining cost estimate. No company-based mine overheads were included within the mining estimate, as these have been captured in the G&A costs in the Entech Financial model.

21.4.8 Mine Services

Mine services costs were included in the mining contractor variable rates, and the scope is outlined below.

The following is captured in the Entech Financial model:

- Mining management and administrative personnel
- Pit pumping / dewatering (Contractor responsible for pumping to the main dewatering line installed by Allkem at the pit crest).

Messing, accommodation and FIFO costs for all the mining service team's personnel are considered within the mining cost overheads estimate.

21.4.9 Light Vehicles

Light vehicle costs were included in the mining contracting rate estimates and includes vehicles for the contract mining team.

21.4.10 Grade Control

Grade control is conducted by visually inspecting cuttings from the blast hole rigs, and geological 'ore spotting' when excavating pegmatite. An allowance for this has been captured in the G&A costs in the Entech Financial model.

21.5 Overall Capital Expenditure

Table 21-5 shows the Life of mine capital expenditure totals $80.3M (without contingency), which includes a sustaining capital expenditure of $21.5M summarises LOM total capital costs by department / area.

Table 21-5 Life of Mine Capital Expenditure Summary

Capital Type	USD$M
Site Capital	*41.1*
Closure	*12.3*
Mining	*5.6*
Sustaining	*21.5*
Total Capital Costs	***80.3***

Table 21-6 details expenditure for site capital and includes an allowance for the new NE In-Pit Tailings Storage Facility (IPTSF) as the current SE IPTSF will reach capacity in 2024.

To create a buffer zone around the Mt Cattlin site, a provision of $4.7M has been allowed for neighbouring land purchases. Due to the operation's proximity to the town of Ravensthorpe and location in an active cropping and grazing farming district, the site has more interaction with neighbours than is typical in Western Australia. Creation of a buffer zone will lessen potential impacts such as noise, dust, and light spill, as well as provide land for future growth should it be needed.

A nominal sum of $35M has been allowed for the construction of a flotation circuit attached to the existing DMS processing plant, to facilitate the retreatment of approximately 900,000 t of tailings in TSF#1. Current testwork shows the retreatment is feasible, and further testwork should enhance the economics and technical robustness of the Project. It is assumed the retreatment happens at the end of the mine life and the expenditure accounted for at that time.

Table 21-6 Site Capital Expenditure

Capital Type	USD$M
TSF	*1.4*
Land Purchase	*4.7*
Tailings Retreatment	*35.0*
Total Site Capital Costs	***41.1***

A closure capital cost of $12.3M has been allowed for at the end of the Project life. The source of the sum was from the existing mine closure plan, as is deemed reasonable based on the site footprint size and nature of tasks at hand. The allowance assumes a material amount of progressive rehabilitation is undertaken during the Project's operational life.

Table 21-7 shows a general sustaining capital expenditure of $0.7M per annum has been allowed for equipment replacements typically seen on sites such as Mt Cattlin that have been operating for around 10-years. The expenditure can be thought of as 'lumpy opex', for example expenditure that is operational in nature, however occurs at times in excess of one year, such as the casing of a key pump – the internal wear parts are replaced several times a year as operating expenditure, but the casing may need replacement every 3-years.

A pre-cursor to the Stage 4 mine expansion is the removal of tailings within the completed 2SW IPTSF which is immediately adjacent to the current Stage 3 pit. A nominal costing of $14/bcm has been allowed for, over an 8-month period. The task is likely to be slow and bespoke, and unsuited to being included in the main mining contract. The task totals $17.7 M.

Table 21-7 Sustaining Capital Expenditure

Capital Type	USD$M
Processing Plant	*3.7*
Removing in-pit tailings from 2SW IPTSF	*17.7*
Total Sustaining Capital Costs	***21.5***

21.6 Operating Expenditure

The key operating cost inputs are shown in Table 21-8, and were predominantly sourced from Allkem's budget forecasts, which have their basis in the site's historical operating data.

Processing cost was originally modelled as a fully variable unit rate of $29.12/t of ore processed. The costs of operating the processing facility are a combination of fixed and variable elements, and when reviewing the ore supply schedule which at various times did not keep the plant operating at nameplate capacity, use of a fully variable rate would understate the true total costs. From previous experience a split of 50% fixed cost and 50% variable cost has been found to accurately reflect the cost build-up, and this was applied to the model.

The General and Administration (G&A) costs represent the site operating costs less processing and contract mining. Essentially it is Mt Cattlin administration, power, accommodation, flights, and management, technical, administrative, and compliance staff costs. It does not include any Allkem corporate costs. G&A was originally modelled at a fully variable rate of $6.79/t ore processed. Similarly, to the Processing cost centre, if the plant was not operating at nameplate capacity, the total true G&A costs of running site would be understated. A more robust method was to convert the fully variable rate to a fixed charge of $1,018,500 per month.

Table 21-8 Key Operating Cost Assumptions

Assumption	Unit	Value
Transport		
Surface Haulage Costs	*USD$/wmt concentrate trucked*	*25.57*
Port Costs	*USD$/wmt concentrate shipped*	*14.06*
Moisture	*%*	*2.00*
Processing		
Fixed	*USD$/month*	*2,184,000*
Variable	*USD$/t ore processed*	*14.56*
General and Administration (G&A)		
Fixed	*USD$/month*	*1,018,500*
Royalty		
LRC Royalty	*USD$/t ore processed*	*1.05*
Western Australian State	*%*	*5.00*

Operating expenditure totals $966.7 M over the life of the Project. Table 21-9 shows the key LOM operating cost centres by mine stage, including the end-of-life stockpiles (low grade, fine-grained, and tailings retreatment) that are scheduled to be processed.

Table 21-9 LOM Operating Costs by Stage

Operating Expenditure (USD$M)	*Stage 3*	*Stage 4-1*	*Stage 4-2*	*Stockpiles*	*Total*
Mining	*33.4*	*150.2*	*247.8*	*0.0*	*431.4*
Transport	*14.4*	*8.3*	*11.2*	*3.1*	*37.0*
Processing	*61.9*	*48.3*	*86.2*	*58.1*	*254.5*
G&A	*14.9*	*12.6*	*26.7*	*11.0*	*65.2*
Royalty	*51.9*	*17.8*	*31.6*	*9.1*	*110.4*
Total Operating Expenditure Costs	***176.6***	***237.2***	***403.5***	***81.2***	***898.5***

Figure 21-1 shows the annual expenditure by major category over the life of mine.

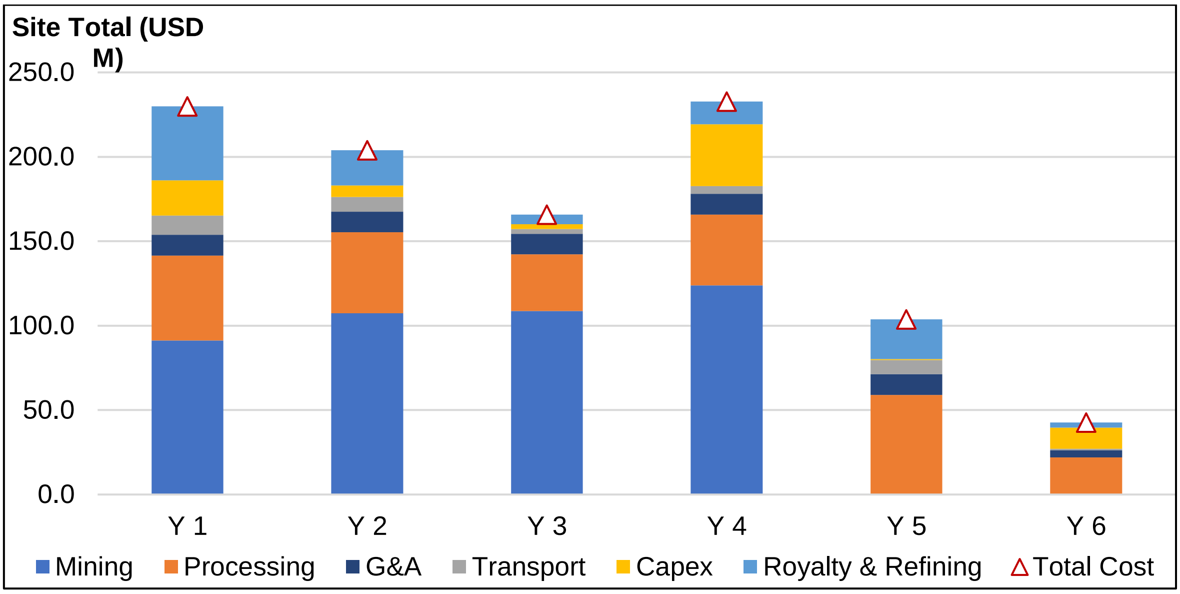

Figure 21-1 Annual Expenditure by Major Category

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CHAPTER 22: ECONOMIC ANALYSIS

22 ECONOMIC ANALYSIS

This section presents the results of the economic analysis completed for Mt Cattlin. Financial modelling was completed on a 100% project basis, using the discounted cash flow (DCF) method of analysis to assess the estimated economics and to evaluate the sensitivity of key input parameters on the expected returns. The financial assessment was completed on an unlevered basis.

22.1 Basis of Analysis

The financial evaluation is based on a DCF model, which involves projecting estimated revenues and subtracting estimated cash outflows such as operating costs including mining, crushing, processing, maintenance and general and administrative (G&A) costs, capital costs, and royalties to obtain the estimated net free cash flows. These net cash flows are discounted back to the valuation date using a discount rate of 10%, and then summed to determine the net present value (NPV) of Mt Cattlin. 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, and resulting free cash flows occur at the end of each month.

The DCF model is constructed on a real basis and none of the inputs or variables are escalated or inflated. For discounting purposes, 01 July 2023 is the first period (valuation date). All cash expenditures before this date have been excluded.

22.2 Summary

The Project's key financial results are shown in Table 22-1.

Table 22-1 Key Financial Results

Description	Value
Revenue from concentrate (USD$M)	*2,092*
Total operating costs over the LOM (life of mine USD$M)	*899*
C1 cash operating cost (USD$M)	*788*
All in sustaining cash cost (USD$M)	*932*
LOM net cash flow (undiscounted USD$M)	*1,113*
The NPV (pre-tax) using a discount rate of 10.0% (USD$M)	*947*
Average Spodumene price over LOM (USD/dmt)	*2,271*
Average Tantalite price over LOM (USD/lbs)	*24.30*

The Project produces Spodumene and Tantalite concentrates for sale. The concentrate revenue has been modelled on a Realised Price basis (i.e., net of all penalties and/or grade discounts, FOB Esperance, WA) using data supplied by Allkem.

Mining commencement is modelled from April 2023 and will operate through to mine closure in August 2027, being approximately four years from commencement. As an existing operation, the Project has no construction / pre-production period.

22.3 Revenue

Revenue received from all concentrate sales totals $2,092M, of which Spodumene sales contribute 99.5% of the total. The revenue is derived using pricing forecasts for Spodumene and Tantalite concentrates provided by Allkem that average $2,271/dmt and $24.30/lbs over the life of the Project.

The Spodumene pricing varies significantly over time (less so with the target concentrate grade) and is based on Wood Mackenzie forecasts. Spodumene concentrate sales total 916 kt.

Period	Realised Li_2O US$/dmt	Exchange rate AUD:USD	Realised Li_2O A$/dmt	Realised Ta_2O_5 A$/dry lb
H2 CY23	*4,048*	*0.70*	*5,783*	*34.72*
CY24	*2,074*	*0.70*	*2,963*	*34.72*
CY25	*1,425*	*0.70*	*2,036*	*34.72*
CY26	*2,375*	*0.70*	*3,393*	*34.72*
CY27	*2,103*	*0.70*	*3,004*	*34.72*
CY28	*1,762*	*0.70*	*2,517*	*34.72*

The US$/AU$ exchange rate used is a constant $0.70 flat over the life of the analysis.

The following graph (Figure 22-1) shows the revenue by month over the Life of Mine (LOM) (Grey line – referenced to the right scale).

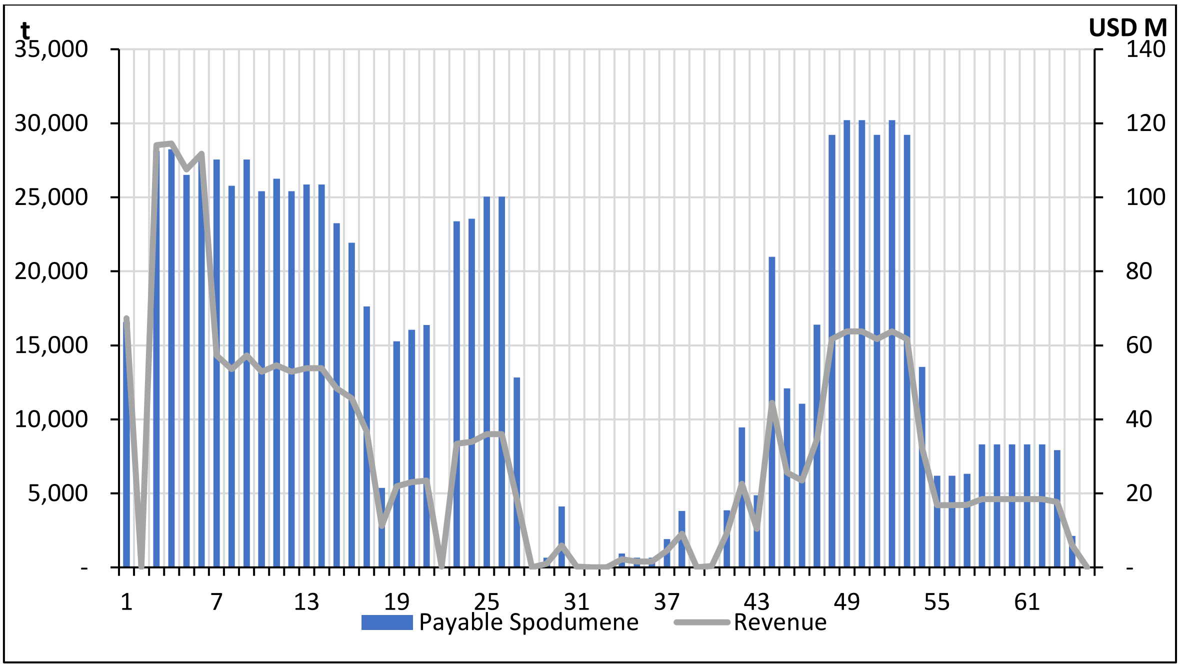

Figure 22-1 Monthly Project Revenue

22.4 Project Free Cashflow and Net Present Value

The Project cashflow as shown by mine stage in Table 22-2 and then by year in Table 22-3 and by month in Figure 22-2 assumes there is no opening cash on hand at the start of the Project. LOM total net cash flow is $1,113 M over the period from 1 July 2023 to November 2028 (mine closure). The Net Present Value (NPV) of the cashflows pre-tax are $947 M using a discount rate of 10.0%.

All stages of the Project are cashflow positive, however the metrics between the stages, and that of the overall Project average are markedly different. The current mine, Stage 3 is effectively pre-stripped by past operations and is now entering a period of very strong cash generation shown by the steep ramp up in the cumulative cash balance curve in Figure 22-2. The first phase of the Stage 4 expansion, Stage 4-1 requires a large waste stripping program to access the down-dip portion of the upper pegmatite and sink down to expose the lower pegmatite, and at times the mill is ore constrained, limiting cash generation during the phase of high expenditure (refer to Chapter 16: Mining Methods). A similar pattern is seen in Stage 4-2 and Figure 22-2 shows a long period of flat cumulative cash balance, before a late accumulation as Stage 4-2 and the closure stockpiles deliver sustained positive cash flows.

Table 22-2 Project Cashflow by Stages

Cashflow (USD$M)	Stage 3	Stage 4-1	Stage 4-2	Stockpiles	Total
Gross Revenue	*993.7*	*325.9*	*591.3*	*181.2*	*2,092.0*
Capital Expenditure	*28.4*	*7.3*	*8.9*	*35.6*	*80.3*
Operating Expenditure	*176.6*	*237.2*	*403.5*	*81.2*	*898.5*
Total Cashflow	***788.7***	***81.3***	***178.9***	***64.3***	***1,113.2***

Table 22-3 Annual Cashflow

Annual Cashflow (USD$M)	Total LOM	1	2	3	4	5	6
Capex	*80.3*	*20.7*	*6.9*	*2.9*	*36.6*	*0.7*	*12.5*
Mining	*431.4*	*91.3*	*107.4*	*108.7*	*124.0*	*0.0*	*0.0*
Transport	*37.0*	*11.5*	*8.7*	*2.8*	*4.6*	*8.3*	*1.1*
Processing	*254.5*	*50.2*	*47.9*	*33.4*	*41.9*	*59.0*	*22.0*
G&A	*65.2*	*12.2*	*12.2*	*12.2*	*12.2*	*12.2*	*4.1*
Royalty & Refining	*110.4*	*43.9*	*20.8*	*5.7*	*13.4*	*23.5*	*3.0*
Total Costs	***978.9***	***229.9***	***204.0***	***165.8***	***232.7***	***103.8***	***42.7***
Gross Revenue	***2,092.1***	***843.8***	***385.5***	***103.1***	***246.3***	***452.9***	***60.5***
FCF	*1,113.2*	*613.9*	*181.5*	*-62.7*	*13.5*	*349.1*	*17.8*
Corporate Tax @ 30%	*352.8*	*184.2*	*54.5*	*0.0*	*4.1*	*104.7*	*5.4*
Post-Tax Cashflow	*760.4*	*429.7*	*127.1*	*-62.7*	*9.5*	*244.4*	*12.5*

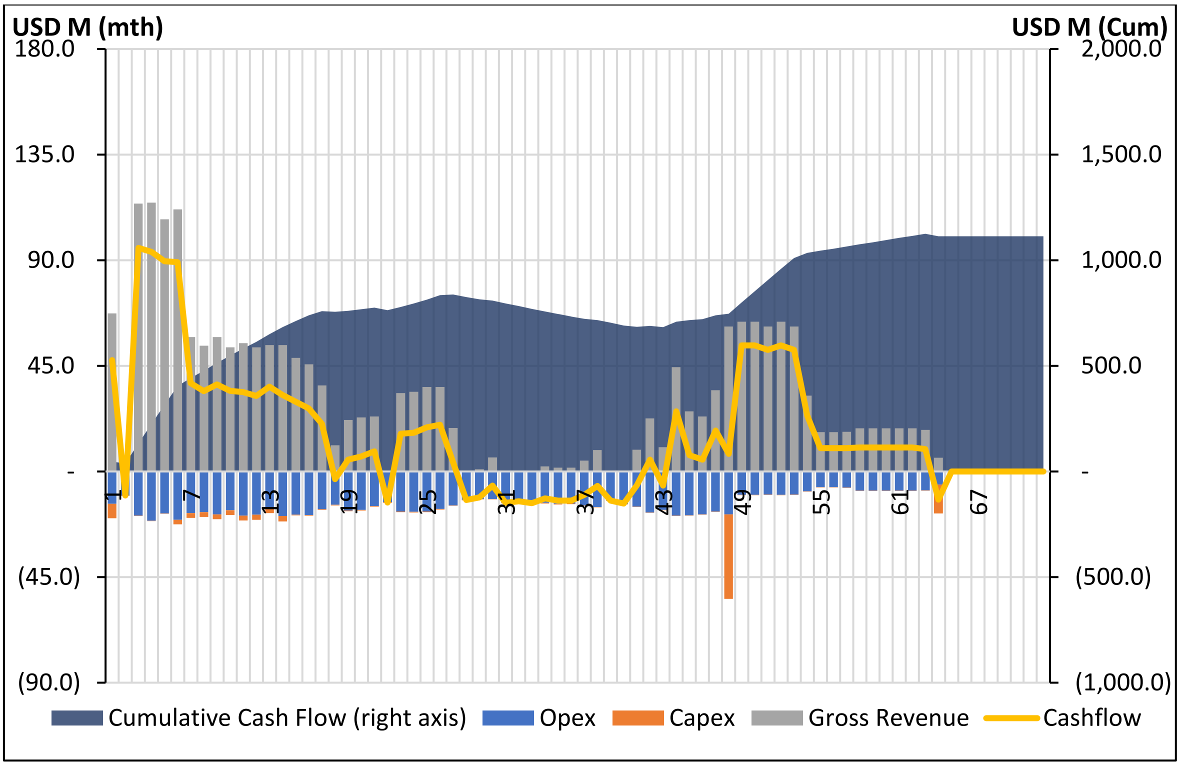

Figure 22-2 Period Revenue and Costs, and Cumulative Cash Balance

22.5 Other Key Assumptions

The USD/AUD exchange rate applied in the model is 0.70 (flat, over the LOM) and is an Allkem provided internal forecast.

The financial model uses real 2023 values for revenue and expenditure. No account has been made for price escalation.

Project expenditure does not include contingency amounts or factors.

The LOM financial model does not include corporate office recharges, business development, exploration, or resource development expenditure.

Income tax expense / payments have not been considered in this model.

Project funding has not been considered in preparing this financial model, mainly because the cash positive from the outset. As a result of this, no allowance is made for debt service costs or interest expense. At times the period cashflow is negative and it is assumed this will be met from retained earnings. Overall, the Project is strongly cashflow positive.

22.6 Sensitivity Analysis

Sensitivity analysis was conducted on the following variables (+/-20%) and quantified with the financial model Free Cashflow (FCF) and Net Present Value (NPV) outputs:

- Revenue factors:
  - Spodumene concentrate price
  - Currency exchange rate
  - Process plant recovery
- Cost factors:
  - Mining operating costs
  - Processing operating costs.

The results are graphically summarised Figure 22-3 and Table 22-4 for cashflow, correspondingly in Figure 22-4 and Table 22-5 for NPV, which is also shown as relative changes in Table 22-6.

The outputs show the expected heightened sensitivity to revenue factors compared to cost factors. The plant recovery and revenue trends mimic each other, and currency exchange rate is the inverse. The cost sensitivity trends of the mining and processing operating costs mimic each other with mining being somewhat more influential on cashflow and NPV due to being a larger overall cost.

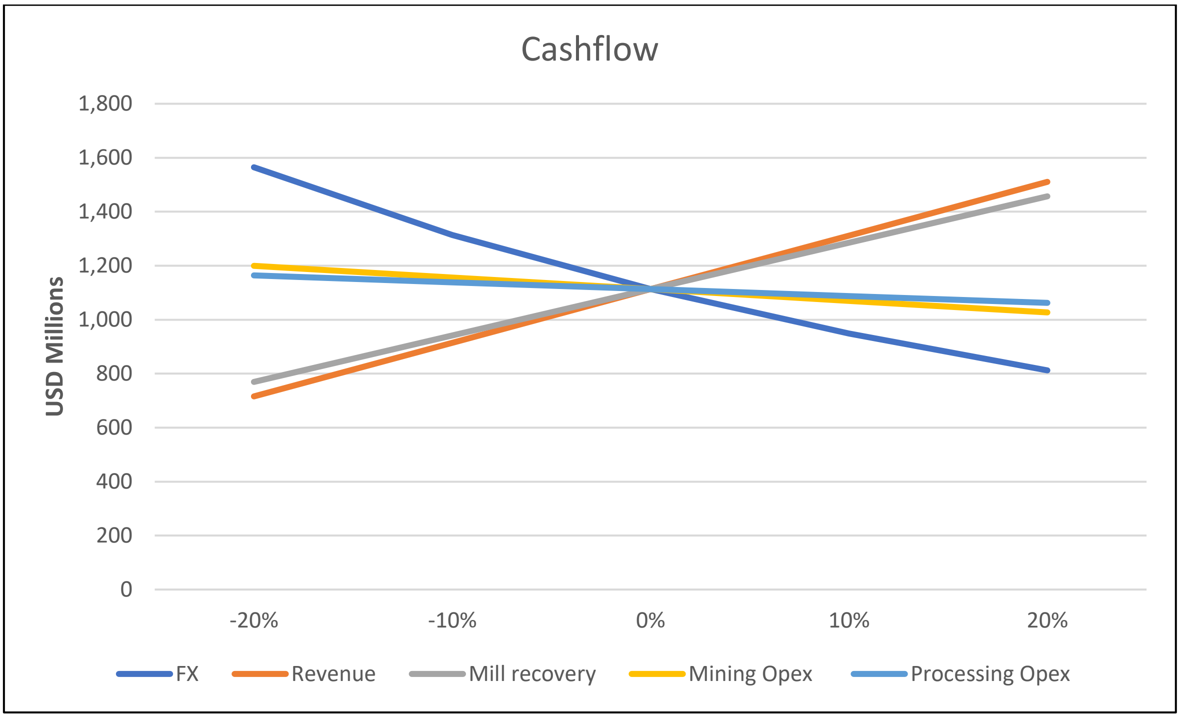

Figure 22-3 Cashflow Sensitivity to Key Revenue and Cost Factor Variables

Table 22-4 Cashflow Sensitivity (USD$M)

Item/ Range	Unit	-20%	-10%	0%	10%	20%
FX	*USD$M*	*1,565*	*1,314*	*1,113*	*949*	*812*
Revenue	*USD$M*	*716*	*914*	*1,113*	*1,312*	*1,511*
Mill recovery	*USD$M*	*769*	*941*	*1,113*	*1,285*	*1,457*
Mining operating cost	*USD$M*	*1,199*	*1,156*	*1,113*	*1,070*	*1,027*
Processing operating cost	*USD$M*	*1,164*	*1,139*	*1,113*	*1,088*	*1,062*

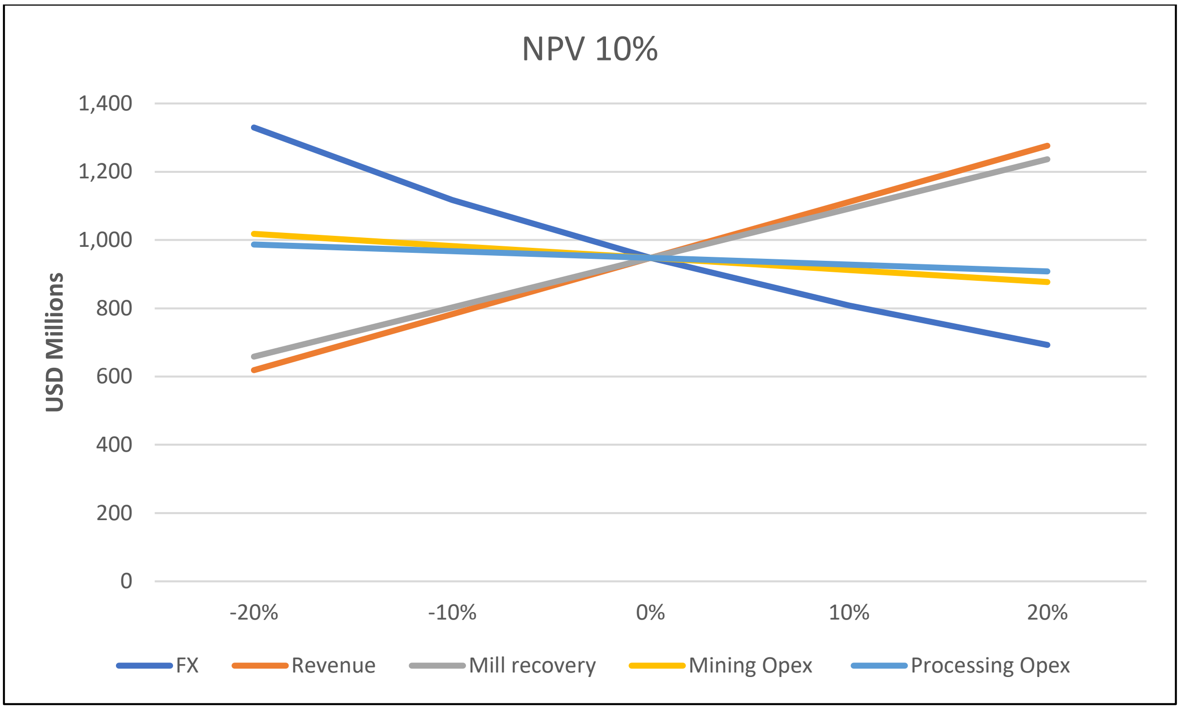

Figure 22-4 NPV Sensitivity to Key Revenue and Cost Factor Variables

Table 22-5 NPV Sensitivity (USD$M)

Item/ Range	Unit	-20%	-10%	0%	10%	20%
Currency exchange rate	*USD$M*	*1,330*	*1,117*	*947*	*808*	*693*
Revenue	*USD$M*	*619*	*783*	*947*	*1,112*	*1,276*
Mill recovery	*USD$M*	*658*	*803*	*947*	*1,092*	*1,237*
Mining operating cost	*USD$M*	*1,018*	*983*	*947*	*912*	*877*
Processing operating cost	*USD$M*	*987*	*967*	*947*	*928*	*908*

Table 22-6 NPV Sensitivity data and relative changes

Parameter	Unit	-20%	-10%	0%	+10%	+20%
Currency exchange rate	*Δ%*	*140*	*118*	*100*	*85*	*73*
Revenue	*Δ%*	*65*	*83*	*100*	*117*	*135*
Mill recovery	*Δ%*	*69*	*85*	*100*	*115*	*131*
Mining operating cost	*Δ%*	*107*	*104*	*100*	*96*	*93*
Processing operating cost	*Δ%*	*104*	*102*	*100*	*98*	*96*

The pit staging as applied in this assessment (e.g., Stage 3, Stage 4-1, Stage 4-2) individually have quite different stripping ratios, ore capture, and occur at times of quite different forecast product prices. Therefore, the risk characteristics of the individual stages is quite different to the overall Project average as shown below in Table 22-7.

Table 22-7 Comparative Risk Metrics - Stage vs. Overall

Pit Stage	Strip Ratio w:o (t)	Concentrate % of Total (t)	Revenue % of Total ($)	Cost % of Total ($)	Cashflow % of Total (%)
Stage 3	3.5	37	47	21	71
Stage 4-1	31.1	22	16	25	7
Stage 4-2	29.5	30	28	42	16
Closure Stockpiles	n/a	10	9	12	6
Overall	**21.5**	**100**	**100**	**100**	**100**

Stripping Ratio is a useful proxy for risk, and Stage 3 has a stripping ratio of 3.5:1, whilst Stage 4-1 and 4-2 are both approximately 30:1 (the overall Project LOM stripping ratio is 20:1). Clearly the two Stage 4 phases carry more risk and are more sensitive to variations in assumptions and actual performance than Stage 3, as can be clearly seen in the cashflow contributions relative to the cost burden.

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CHAPTER 23: ADJACENT PROPERTIES

23 ADJACENT PROPERTIES

Mt Cattlin is the only known major lithium / tantalum deposit in the Ravensthorpe region. Galaxy holds most of the adjacent exploration tenements that surround the mining lease. No other lithium operations are in production in the Ravensthorpe district.

Occurrences of copper and gold mineralisation are known from within the Mt Cattlin mining lease and on adjacent properties, and they have been the subject of historic, small-scale mining. The most important of these are the following (Witt, 1998):

- Mt Cattlin gold-copper mine located 1 km east-south-east of the Mt Cattlin lithium deposit
- Marion Martin 1.5 km to the south
- Floater 1.5 km to the north
- Maori Queen 3.5 km to the northeast.

Traka Resources is actively exploring for economic gold and copper mineralisation on exploration lease E74/401. Various open file government reports quote small remnant, non-compliant copper-gold resources for these properties.

Tenement G74/13 was awarded on 26 May, 2023 on Galaxy owned freehold, for 21 years as part of the Stage 4 expansion. Tenement E 74/621 expires on 15 August, 2023.

The tenement map in Figure 23-1 shows the Galaxy tenement holdings relevant to the adjacent properties.

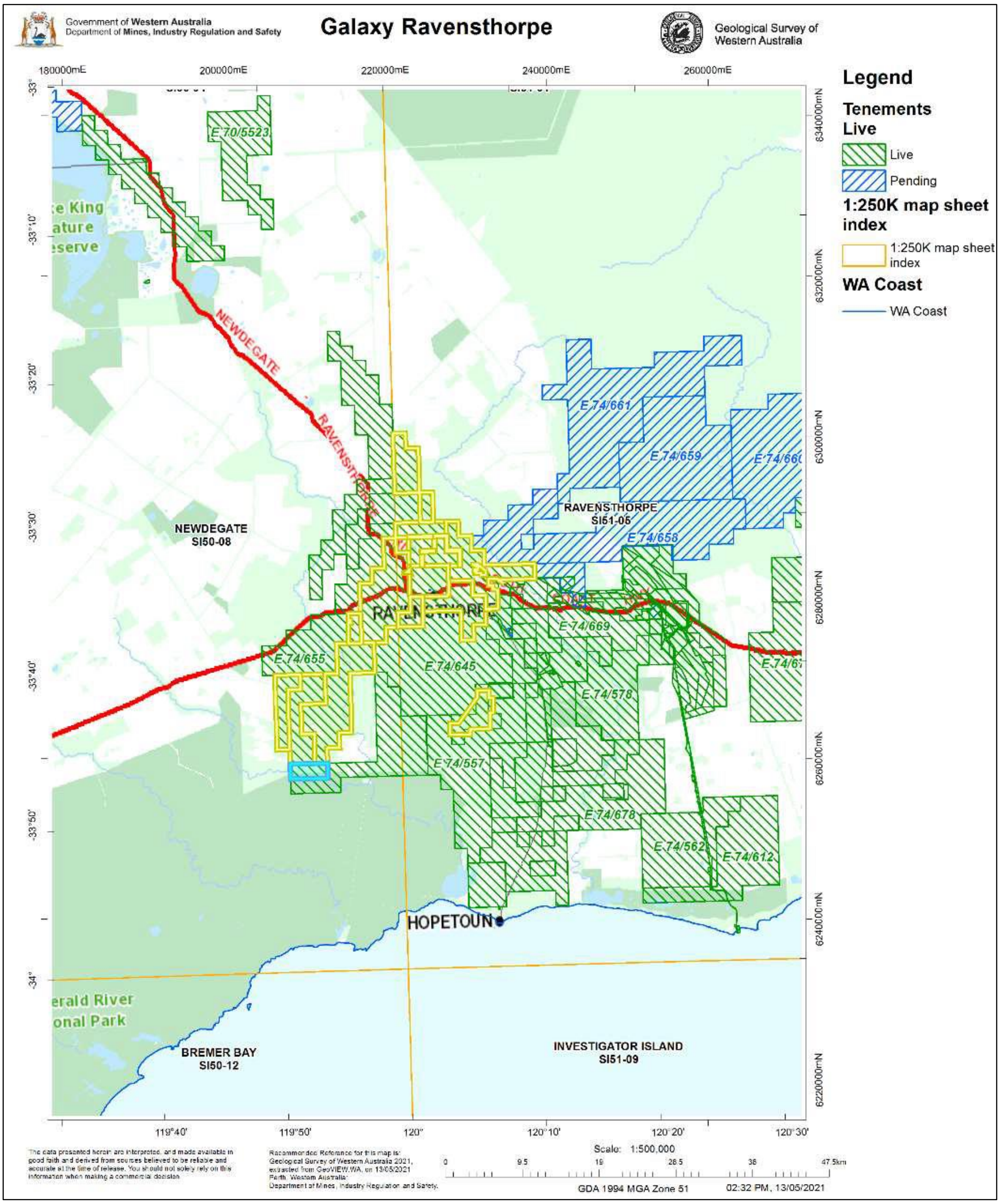

Figure 23-1 Tenement Map Showing Properties Adjacent to the Mt Cattlin Tenements

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CHAPTER 24: OTHER RELEVANT DATA

24 OTHER RELEVANT DATA

There is no other relevant data or information material to Mt Cattlin that has not been documented in the other sections of this Technical Report.

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CHAPTER 25: INTERPRETATION AND CONCLUSIONS

25 INTERPRETATION AND CONCLUSIONS

In this section, the Qualified Person (QP) summarises the results and interpretations of the information and analysis being reported upon.

25.1 Geology and Mineral Resource

Entech makes the following observations regarding the geology and mineral resource:

- Geological information is being collected routinely within the active pits. Mine Geologists are mapping bench faces where possible and logging blasthole drillholes
- The geological setting and complexity are well understood. The pegmatites are offset and juxtaposed relative to each other by numerous late-stage faults. Several large dolerite dykes and dyke swarms intersect and stope the pegmatites
- The Mineral Resource estimation has been undertaken within detailed geologically controlled wireframes. Mineralised pegmatite wireframes have been generated in Leapfrog Geo modelling software at a cut-off of 0.3% Li_2O. The majority of drillhole samples have been drilled by Reverse Circulation (RC) drilling methods and sampled at a length of 1 m. Compositing has been undertaken at a length of 1 m. Modelling has been undertaken in Leapfrog Geo and Leapfrog Edge using Na20 to wireframe out finer grained pegmatite. No top-cuts have been applied to. A variographic analysis has determined variographic parameters for use in the estimation, with domains which contain too few composites either grouped for variographic analysis or assigned variographic parameters from other domains. The estimation has been undertaken within hard boundary domains using ordinary kriging at the scale of the parent block. The block model validates well compared to the input composite data, with the majority of domains being within +/- 10% relative difference. The Mineral Resource has been classified on the basis of geological and grade continuity, and data support. The estimate has been depleted for mining as of 31 December, 2022.
- The QP for the Mineral Resource considers that the geological and assay data used as input to the Mineral Resource Estimate have been collected, interpreted and estimated in line with best practice as defined by the CIM (CIM 2018, 2019). Data verification work undertaken by the QP identified minor errors, however, these have not materially impacted the accuracy of the Mineral Resource Estimate. Monthly and end-of-pit reconciliations display good agreement between the 2022-3 mill-reconciled production tonnes and grades when compared to the equivalent tonnes and grades reported out of the December 2022 MRE block model and GC block models
- The QP for the Mineral Resource considers the key risk to the operation is the loss of pegmatite mineralisation due to dolerite dyke stoping in areas of wide-spaced drilling. In addition xenolith protoliths stoped from the pegmatite hanging wall are known, as are internal zones of either barren pegmatite, metasomatically altered pegmatite and fine-grained pegmatite. Other significant risks or uncertainties could reasonably be expected to affect the reliability or confidence in the drilling information or Mineral Resource Estimate include late-stage alteration to non-spodumene bearing mineralogies.

25.2 Mining and Mineral Reserve

Entech makes the following observations regarding the Mineral Reserve and mining operations:

- Inferred resources have not been included in the economic evaluation
- There has been a history of conversion of Inferred to Indicated Resources resulting in additional Resources from outside the Mineral Reserve being included into the life of mine (LOM) plan, which has the potential to improve the Project economics. There is a small quantity of mineralisation outside the 2022 Mineral Resource Estimate that lies within the designed pits. This material is excluded from the 2023 Mineral Reserve Estimate, however it is included in the LOM Plan
- Galaxy has demonstrated an ability to improve the mining method and productivity by continuing to collect geological information and therefore improving the geological understanding of the deposit and thus the mine designs and planning.
- Galaxy continues to reconcile local grade control models against the un-diluted Mineral Resource, the diluted Mineral Reserve to improve forecasting.

25.3 Mineral Processing and Metallurgical Test Work

Galaxy Resources make the flowing observations regarding the mineral processing and test work:

- The method for concentrate production at Mt Cattlin is conventional and has been operated successfully by Galaxy for many years. The throughput, recovery and costs model in the financial analysis are in-line with that demonstrated by current and historical operating results
- The metallurgical test work undertaken on the remaining Mineral Reserves is in-line with previous test work and current operating parameters of the processing plant.

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CHAPTER 26: RECOMMENDATIONS

26 RECOMMENDATIONS

26.1 Introduction

This Feasibility Study evaluates exploiting the recently updated Mineral Resource as a continuing operation. Opportunities to develop the resource further and extend the lifespan of the mine are in the process of being investigated in parallel with this study.

This section contains a summary of works that are currently ongoing or may be instituted in the future to optimise and/or further extend the life of the Mt Cattlin Project. Discussion of these opportunities is contained in the respective chapters of this report.

26.2 Environmental Studies and Permitting

The current Mining Proposal submitted for approval with DMIRS only considers Stages 4-1 and part of 4-2 of the proposed mine plan.

The highest priority next regulatory approval needed is to operate the planned North-East In-Pit Tailings Storage facility (which is currently being used as a water aggregation 'dam') and associated infrastructure.

In order to continue with either Stage 4-2 and/or a transition to underground mining, a further Mining Proposal will be required, this proposal will also have to incorporate the construction of additional waste dumping capacity should more open pit mining be contemplated 9the current Mining Proposal will only accommodate Stage 4-1 waste).

Additional and/or amended permits will also be required to construct a new power facility, as well as the accommodation village.

26.3 Geology and Mineral Resource

Allkem has an active exploration and sterilisation drilling program in place as the Mineral Resource is currently drilling constrained. Grade control specific drilling has been used intermittently under direction of the Exploration Manager. Opportunity exists to imbed dedicated grade control definition into the mining cycle to address risk of short-term ore mismatches with the resource model. Grade control drilling is scheduled for calendar 2023.

The Mineral Resource remains open at depth to the NW and to the SW at shallower depths.

To support underground studies, further geotechnical and metallurgical drilling is recommended. An 8,000 m combined reverse circulation and diamond tail program has been proposed for FY 2024.

Further resource estimation work, incorporating the 2023 grade control drilling should investigate fine grade pegmatite with lithia grade above cut-off, for either end of mine processing or blending into ore grade stockpiles to maintain process plant nameplate run rates while meeting product specifications.

26.4 Processing

26.4.1 Crushing Circuit Recommissioning

The original Mt Cattlin crushing circuit was decommissioned when the plant went into care and maintenance during 2013 and was not recommissioned when the plant was restarted in 2016 due to the capital cost involved, relative to the Spodumene concentrate sales price at the time. Since that time a permanent contact crushing contractor has been in place on site, and whilst giving generally good service, is relatively expensive. Given the mine life extension proposition of this Feasibility Study, a project to re-institute the fixed plant crushing circuit has been initiated, with a view to assessing the suitability of the current plant capacity and commissioning a facility that can serve Allkem's life of mine needs.

26.4.2 Flotation Circuit

A test work program to investigate the potential of retreating tailings stockpiles to extract residual lithium is underway. This test work program has had encouraging results, and the potential business case deserves evaluation as the technical program concludes.

26.5 Tailings

The current South-East In-Pit Tailings Storage facility will reach capacity in mid-2024 or possibly sooner. At this point tailings deposition will need to be transferred to the North-East Pit. In order to accommodate this shift, permitting and preparatory works need be completed as a priority. These works include establishing and protecting the future tailings lines through the area that is soon to be used in the expansion of Waste Dump #1.

26.6 Hydrogeology and Water Management

To maintain adequate water supply to the site process plant, recycled TSF decant water is pumped from the current North-East pit through a decant line back to the processing plant. When this pit it converted to being used as a Tailings Storage Facility in 2024 the cleanliness and easy access to this water will be disrupted. In preparation, bore casings need to be installed from the top of the adjacent waste dump to tap into this resource and allow pumping to continue. Alternatively, a planned drilling program to identify potential alternative water sources on the mining site is soon to commence.

26.7 Infrastructure and Services

26.7.1 Hybrid Power Station

The current site power supply of multiple diesel fuelled generators, while fit for purpose, is relatively expensive and has comparatively large carbon emissions compared to similar sized alternative fuel power sources. A project to replace or supplement the current plant with a hybrid natural gas / renewable energy installation is underway, with an expected timeline of 12−15 months.

26.7.2 Village Accommodation

To consolidate the Mt Cattlin workforce and reduce the reliance on multiple third-party accommodation sources, Allkem have commenced the process of constructing their own accommodation village for Allkem staff and primary contractors. The village has had a Development Approval application submitted, a tender for the accommodation and central facility modules let, and planning for utilities and construction has commenced.

26.8 Underground Feasibility Study

A Feasibility study to investigate the viability of developing the resource as an underground mine was commissioned in May 2023. This study is being completed by Orelogy Mine Consulting with the intention of having a finalised study document by January 2024. The goal of this study is to determine if there is value in changing mining methodology prior to committing to open pit extraction of the Stage 4-2 pit, and to determine the required infrastructure modifications that would be associated with such a change.

26.9 Overall Recommendations

The following recommendations have been made to Allkem with respect to the Mt Cattlin project.

- Complete drilling to source alternative water source and subsequent permitting for processing operations to provide processing to water currently sourced from the SW Pit, which is scheduled for use as IPTSF in 2024. This source of water remains a key project risk until alternate source of water is available
- Evaluate the results of the 4 additional metallurgical drillholes and associated testing to quantify the continuity of the mineralisation and recovery expectations for the bulk of the Stage 4 expansion
- Continue permitting works to ensure the planned access to cut-backs, waste rock storage and tailings storage facilities does not impede planned operations
- Continue to evaluate the Mining Model performance against site reconciliation results
- Continue to develop geo-metallurgical grade control techniques to define and segregate fine grained spodumene for future processing
- Continue resource drilling to further expand the resource and define the limits of mineralisation
- Investigate underground mining methods as an alternative to open pit mining as the strip ratio increases and analyse a trade-off between open pit and underground mining transition
- Develop program for routine grade control programs in place ahead of mining activities
- Progress the business case for processing the potential low grade fine grained spodumene
- Further expand the current study level of the tailings re-treatment from the IPTSF to sure up processing and support forecast capital expenditure of additional floatation cells to process the tailings.

The remainder of the program is to be carried out as per normal operational execution.

MT CATTLIN STAGE 4 EXPANSION PROJECT

NI43-101

AUGUST 2023

CHAPTER 27: REFERENCES

27 REFERENCES

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