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ARCADIA MINERALS LIMITED

COMPETENT PERSONS REPORT ON THE SWANSON TANTALUM AND LITHIUM DEFINITIVE FEASIBILITY STUDY, NAMIBIA

Base Date: **31st March 2023**

Release date: **29th May 2023**

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Release Date : **29th May 2023**

PROJECT No.: **MPP22001**

VERSION: **0**

STATUS: **Final**

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May 2023

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1.0 EXECUTIVE SUMMARY

1.1 INTRODUCTION

M.Plan International Limited (M.Plan), a Canadian mining and minerals advisory company, was engaged by duel listed, Australian Stock Exchange (ASX:AM7) and Frankfurt Stock Exchange (DAX:8OH), Arcadia Minerals Limited (Arcadia), to compile the results of a Definitive Feasibility Study (DFS), prepared by independent expert advisors, on the Swanson Tantalum and Lithium Project (the Swanson Project), into this Competent Person (CP) Report (CPR), termed "the DFS Report".

Arcadia is a Namibia focused diversified mineral exploration company mainly focussed on battery metals. Its projects comprise the flagship Swanson Project, the Kum-Kum Nickel Project, the Bitterwasser Lithium in Brines and Lithium in Clays Project and the Karibib Copper Project. The focus of the DFS Report is limited to only the Swanson Project.

Arcadia's interest in the Swanson Project is through their subsidiary, Orange River Pegmatite (Proprietary) Limited (ORP), in which Arcadia holds an 80% interest.

ORP is a Namibian registered company and sole owner of an exclusive prospecting licence (EPL) 5047 located in the Karas Region of the southern part of Namibia, some 15 km north of the Orange River. The Orange River forms the international border between South Africa and Namibia.

Arcadia engaged the DFS through their subsidiary ORP. As such, this report presents the DFS work as being performed by ORP and their independent expert advisors.

On 19th May 2022, ORP was granted a Mining Licence (ML) 223 on a portion of EPL 5047. ML 223 was granted for 15 years, subject to certain terms and conditions, in respect of base and rare metals, industrial minerals and precious metals. ML 223 comprises the area of the Swanson Project (the Swanson Property).

The Swanson Project neighbours the active tantalite mining operation (African Tantalum (Pty) Ltd) owned by Alternative Investment market of the London Stock Exchange (AIM) listed, Kazera Global Plc (AIM: KZG), which is located within the boundaries of EPL 5047. During December 2022, KZG announced that it had signed a definitive agreement to sell its 100% interest in African Tantalum to Hebei Xinjian Construction CC (Hebei).

The focus of the DFS has been limited to the open-castable D, E and F-pegmatites since these pegmatites have been the subject of detailed exploration to date.

The DFS Report presents the results of the DFS and includes Mineral Resource and Ore Reserve Estimates (D-pegmatites and EF-pegmatites) for the Swanson Project which have been prepared in accordance with the guidelines of the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and

Ore Reserves prepared by the Joint Ore Reserve Committee (JORC) of the Australasian Institute of Mining and Metallurgy, the Australian Institute of Geoscientists and the Minerals Council of Australia (the JORC Code).

On 23rd March 2023 a letter of intent was concluded between ORP and Hebei to purchase the lithium containing Spiral Plant tailings (waste) when processing RoM material from the Swanson Mine D-pegmatite. The Economic Analysis on the Swanson Project includes this additional revenue stream.

On 29th May 2023, Arcadia informed the market in a ASX Announcement that construction funding of not less than US$7 million has been secured from Hebei in return for an interest in the Swanson Project in terms of which:

- Hebei is to construct a plant, infrastructure, roads and do mine development and commissioning of a multi gravity separation (MGS) Plant according to detailed engineering specifications to consistently produce a minimum 25% Ta_2O_5 concentrate from a minimum feed of 12,500mt per month; and,
- Hebei is to receive a 38% interested in the owner of the Swanson Mine, Orange River Pegmatite (Pty) Ltd.

Construction of the MGS Plant is to commence following the fulfilment of conditions pertaining to approval by the shareholders of ORP and the passing of the required resolutions by the directors of ORP and Hebei, which Arcadia expects to be completed before the end of May 2023.

1.2 PROJECT SCOPE

The purpose of this assignment was to compile the results of a DFS prepared by Arcadia's independent expert advisors on the Swanson Project into a JORC (2012) CPR.

The Swanson Project consist of the open cast mining of the D-pegmatite and EF-pegmatite deposits, primary and secondary contractor crushing and screening, a spiral concentrator plant, dry stacking of the spiral tailings and mine waste and associated bulk infrastructure supply and other services normally associated with open cast mining in Southern Africa.

The DFS includes engineering, design and capital expenditure (CAPEX) and operating expenditure (OPEX) cost estimation of the Swanson Project, in accordance with Class 3 of the Association for the Advancement of Cost Engineering (AACE), assessment of environmental and social impacts, an independent market assessment, legal opinion of the ML223 and the corporate status of ORP and an independent Economic Analysis in the form of a discount cashflow (DCF) model.

The advisors providing expertise in the different DFS specialist areas are outlined in Table 1.1.

Table 1.1: Independent Expert Advisors for the DFS

Description	Expert Advisors
Geology and Mineral Resource estimation	Snowden Optiro
Mining and Ore Reserve estimation	Snowden Optiro
Contractor mining and crushing cost estimation	SPH Kundalila
Metallurgical testwork	CoreMet Mineral Processing
Process Plant engineering design and cost estimation	Obsideo Consulting
Spiral tailings and mining waste design and cost estimation	Prime Resources
Tantalite market report	Argus Media Group
Environmental studies, permitting and social impacts	Impala Consulting
Economic analysis	M.Plan International
Legal opinion of mining title and corporate status	ENSafrica (Namibia)

1.3 SITE VISIT

Table 1.2 outlines the CPs who visited the site of the Swanson Property. The purpose of the visits was for the CPs to familiarise themselves with the general conditions of the site. Mr. Mullins and Mr. Jarvis also inspected the pegmatite exposures. In addition, Mr. Mullins also inspected the sampling in the field, and the borehole core.

All site visits were accompanied by site and senior personnel from ORP.

Table 1.2: Site Visit Team Members

Name	Title	Responsibility	Site Visit
Matthew Mullins	Head of Advisory – EMEAA, Snowden Optiro	CP Geology and Mineral Resource	17th to 20th August 2021
Matthew Jarvis	Associate Consultant, Snowden Optiro	CP Mining and Ore Reserve	17th to 20th August 2021
Peter Theron	Principal Civil Tailings Engineer and Managing Director, Prime Resources	CP Tailings Storage and mining waste rock dump	7th to 9th March 2022
Lisias Negonga	Environmental Assessment Practitioner, Impala Environmental Consulting	CP Environmental studies, permitting and social impacts	7th to 8th May 2020

1.4 PROPERTY DESCRIPTION AND LOCATION

The Swanson Property is located in southern Namibia, and is situated 100 km south of Karasburg, 30 km southwest of Warmbad and 15 km to the north of the Orange River, that forms the international border between South Africa and Namibia

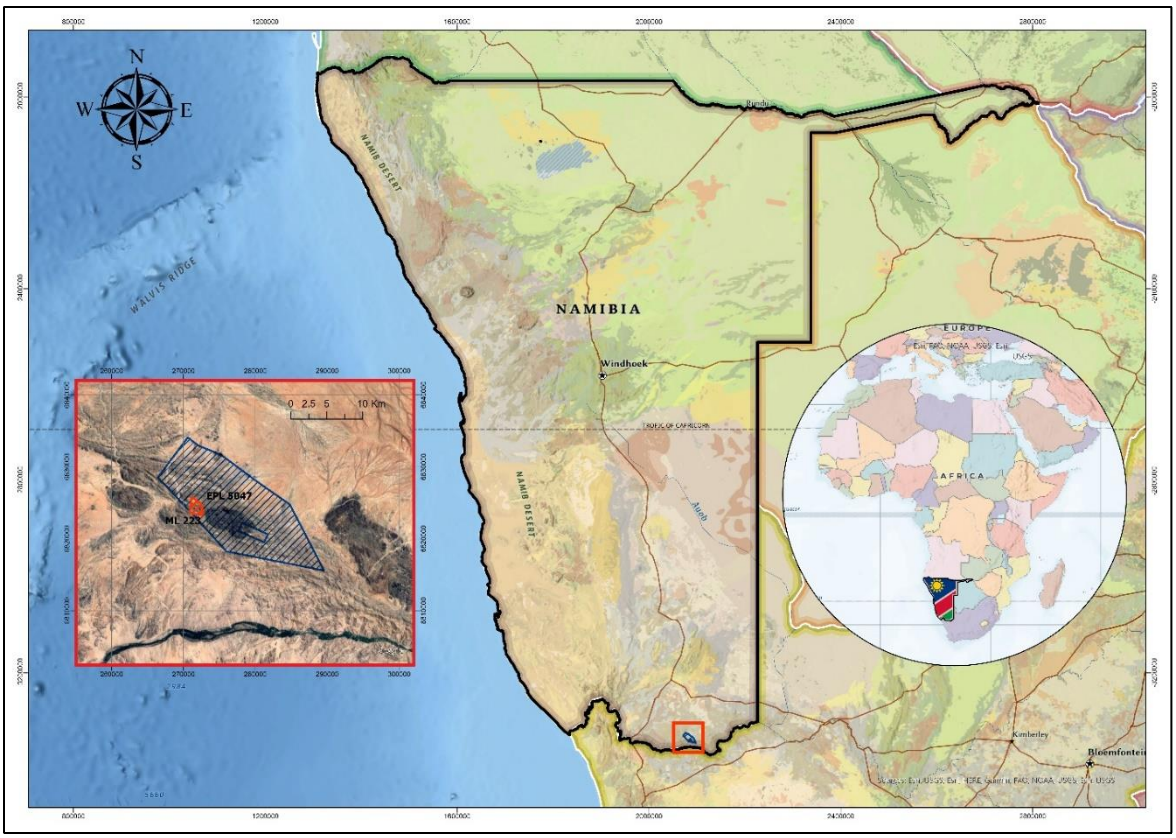
The Swanson Property is located 250 km southeast of the nearest port at Lüderitz. Although the B1 main national road from Noordoewer to Windhoek is some distance away, the area is serviced by well-maintained, secondary dirt roads which make the area accessible all year round.

The Swanson Property is situated in a mountainous desert setting with reasonable road access and is characterised by a complex geological and structural setting with good mineralisation potential amplified in the presence of large shear zones (Tantalite Valley Shear Zone) and a neighbouring intrusive mafic-ultramafic body with appreciable Cu and Ni mineralisation. A large number of well-mineralized pegmatites are also present on the property and the potential of these occurrences is highlighted by extensive, small-scale mining activities where tantalum, tungsten, beryl and spodumene were extracted from these pegmatites. The name Tantalite Valley is also indicative of the extent of mineralization. An active tantalite mining operation owned by KZG is present within the boundaries of EPL 5047.

The Swanson Project is located on farms Umeis 110, Kinderzitt 132 and, Norechab 130.

A location map of the licenses of the Swanson Project is provided in Figure 1.1.

Figure 1.1: Location Map of the Swanson Project and Licences EPL 5047 and ML 223



1.5 GOVERNMENTAL LICENSING REGIME

ENSafrica (Namibia) (ENS) performed an independent legal opinion in respect of the holdership of ML 223, and the corporate status of ORP. The work by ENSafrica is presented in a "Corporate Status and Mining Title Opinion", dated 23rd August 2022 (the ENSafrica Opinion).

The ENSafrica Opinion reports, advises and opines, as the case may be, as follows:

- ORP is validly incorporated in accordance with and validly exists as a private company with limited liability under the laws of Namibia. More specifically, Orange River was incorporated under the Companies Act, 2004;
- ORP is the sole (100%) holder of ML 223, which, has been validly granted and issued;
- ML 223 was granted on 19th May 2022, over a certain portion of land situated in the Karas Region in the magisterial district of Karasburg in respect of base and rare metals, industrial minerals and precious metals;
- ML 223 is granted for a period of fifteen years, subject to certain terms and conditions and is in our opinion, active;
- ENSafrica was provided on 22nd August 2022, with a good standing certificate from the Business and Intellectual Property Authority in relation to ORP, confirming that ORP is still operational, and the relevant annual duties have been paid;
- ENSafrica found no records indicating that ORP has been placed into provisional or final liquidation or judicial management, or that any resolution for ORP's liquidation or winding-up has been passed, nor have we found any records indicating that there are legal proceedings for the provisional or final liquidation or judicial management of ORP pending before the High Court of Namibia;
- ORP was granted an environmental clearance certificate (ECC) on 19th May 2022, to undertake "The Proposed Development of a Tantalite Mine in the Karas Region, Southern Namibia". The certificate expires on 14th May 2025; and,
- The Register of Mineral Licences records no encumbrances over ML 223.

1.6 HISTORY

1.6.1 Mining History

A tantalite mine with a long productive history is located within the southern central part of EPL 5047 on ML 77, which is surrounded by ORP's larger EPL 5047. The ML 77 contains a number of well known, economic pegmatites which are being mined for tantalum and is currently owned by the AIM listed KZG. In addition to the mining operation on ML 77, there is abundant evidence of historical mining that took place in the area covered by EPL 5047.

Swanson Enterprises held various claims on the farms Kinderzit 132 and Umeis 110 within the EPL 5047 licence area and mined tantalite, beryl, spodumene and tungsten on these claims in the 1970s to early 1990s.

1.6.2 Previous Exploration

In 1980, Southern Sphere Mining drilled 168 percussion holes to investigate several pegmatites in the Tantalite Valley.

Following a field visit in March 1981, Placer Development Limited (Placer), a Canadian company, initiated mapping and sampling exploration activities on the Swanson Property. These exploration activities were focused on the A to G pegmatites, named from west to east. In August 1981, Placer reported on these activities.

Of importance to the Mineral Resource estimate, Placer noted that the pegmatites were more continuous and less irregular where they intruded into the amygdaloidal lavas, schists and phyllites, and were more irregular where they intruded into acid volcano-sedimentary lithologies.

Placer identified "possible reserves" in the seven pegmatites of 2.5 Mt at a grade of 299 ppm Ta_2O_5, with 0 ppm Ta_2O_5 cut-off. This reduced to 0.9 Mt at a grade of 467 ppm Ta_2O_5, with a 300 ppm Ta_2O_5 cut-off. The highest Ta_2O_5 grades were found in the D-pegmatite and EF-pegmatites.

1.7 Geology and Mineralisation

A total of 15 Tantalum (Ta_2O_5) mineralised tabular pegmatites have been identified on the property. These have been named by group (A to G) and by number.

The pegmatite bodies are of uniform thickness (generally approximately 1.5 m to.2.5 m thick), are tabular, non-zoned, dip gently to the east, and contain tantalum (Ta), niobium (Nb) and lithium (Li) mineralisation, together with quartz, sugary albite, spodumene and a number of other minerals. They intrude into competent gabbros and are bound on the northern side by a northwest trending mylonitic shear zone.

Mineralogically the four main constituents of the pegmatites are white to grey massive quartz, perthitic feldspar, Li-bearing muscovite, and sugary albite. Minor constituents are tantalite, spodumene, beryl, lepidolite, muscovite, apatite, fluorite, biotite and microlite. The mineralogy gives the pegmatites a whitish appearance, which contrasts strongly with the dark-coloured gabbroic host rock.

1.8 Deposit Type

Pegmatites are defined by several geological, textural, mineralogical and geochemical parameters, and are broadly classified as either simple/common or complex based on the presence or absence of internal zonation. Simple/common pegmatites are un-zoned, poorly fractionated and thus usually un-mineralised.

Complex pegmatites often contain potentially economic concentrations of minerals/elements (including lithium, tantalum, niobium, tin, beryllium and REE).

According to Simmons (2021)[1], the Černý (1991) classification scheme is the most widely used classification of pegmatites today. His classification is a combination of depth of emplacement, metamorphic grade and minor element content, and it has four main categories, namely Abyssal (high grade, high to low pressure), Muscovite (high pressure, lower temperature), Rare-Element (low temperature and pressure), and Miarolitic (shallow level).

The Rare-Element classes are subdivided based on composition into three broad families based on other petrological, paragenetic and geochemical data:

- Lithium-Caesium-Tantalum (LCT);
- Niobium-Yttrium-Fluorine (NYF); and,
- Mixed LCT – NYF families.

The Swanson pegmatites are classified as LCT pegmatites.

The Tantalite Valley pegmatites belong to the LCT family of pegmatites and can be classified as a mixture of the spodumene, lepidolite and albite-spodumene subtypes of complex type, lithium subclass, rare-element class pegmatites.

The pegmatites on the Swanson Property are not zoned, with the exception of isolated instances, and are banded to massive, are dominated by quartz, sugary albite and muscovite, and exhibit variable concentrations of tantalite, spodumene and lepidolite.

1.9 Exploration and Drilling

At least fifteen individual pegmatite bodies >1 m thick have been identified within the Swanson Pegmatite Swarm and ORP targeted these for additional mapping and sampling. A high-resolution drone survey was performed in 2020 to assist with the planning and mapping of these pegmatites.

Recent geological mapping was conducted by the Geological Survey of Namibia in collaboration with the Council of Geoscience of South Africa. This was done as a five year (2012 to 2017) detailed mapping programme on a 1:50,000 scale over large parts of Southern Namibia including EPL 5047. ORP purchased the geological database and re-interpreted the data. Based on this analysis it was decided to focus exploration efforts on the north-western strain shadow of the mafic to ultramafic Tantalite Valley Complex, i.e., the Swanson Project, and on the Tantalite Valley Complex itself.

[1] Snowden Optiro Report, August 2022.

A total of 52 holes have been drilled on the Swanson deposit area by ORP totalling 1,568.9 m of drilling. This has been undertaken in two drilling phases, the first in 2019/2020 and the second in 2021/2022.

1.9.1 ORP 2019/2020 Campaign

ORP's first drilling phase of 23 vertical diamond drill holes comprising 349.85 m of HQ (63.5 mm core) commenced in June 2020 and was completed in August 2020.

Drilling was limited to pegmatites at two locations targeting the D1, D2 and F1 pegmatites.

Most of the 23 boreholes intersected the target pegmatite bodies.

The average thickness from the drilling of the F1 pegmatite is 2.1 m, of the D1 pegmatite is 4.27 m, and of the D2 pegmatite is 4.50 m, all markedly thicker than that measured in outcrop.

A marked increase in true thickness of some 10% for the F1 pegmatites and 100% for and 86% for the D1 and D2 pegmatite respectively was observed.

1.9.2 ORP 2021/2022 Campaign

From mid to late 2021, twenty-nine additional boreholes were drilled at the Swanson deposit with a combined depth of 1,219.07 m.

Twenty-six of these holes were drilled in the E area.

All boreholes drilled during this campaign were vertically HQ (63.5 mm) oriented. Drilling was not conducted on a regular grid. Only three holes were drilled deeper than 60 m. The average depth of the rest of the holes was 33.49 m, and mainly targeted the upper E pegmatites, as well as the F1 Pegmatite.

Additional channel samples were also collected during this time, which also included previously unsampled pegmatites such as E1, D3 and D4.

1.9.3 Future Exploration

The Mine Geological Department (MGD) will be responsible for all the exploration operations taking place on the Swanson Property. Three proposed drilling programmes will be implemented over the life of mine (LoM), to extend the 1st May 2022 Mineral Resource Estimate.

1.10 Sample Preparation, Analyses And Security

For the Swanson deposit area the following three types of sampling were performed: channel sampling, chip sampling; and, spodumene sampling.

ORP maintained strict chain-of-custody procedures during all segments of sample handling and transport.

Samples prepared for transport were bagged and labelled to prevented tampering. Samples remained in ORP’s control until released to the laboratory.

Sample preparation and analysis was undertaken at the Scientific Services laboratory in Cape Town, South Africa. The sample laboratory list was checked against the samples received and Scientific Services then took custody after all the samples on a sample registration list were verified.

Retained samples including duplicate and reject material and pulps were collected by ORP from the laboratory after acceptance of the quality assurance and quality control (QA/QC) data and were then securely stored in a storage facility.

1.11 Data Verification

The ORP exploration geologist was responsible for the collating, validating, recording and distributing information on site.

The database was structured in a format suitable for importing into ArcGIS and three-dimensional (3D) modelling software. The data was then sent to the ORP offices where the data was plotted in ArcGIS to verify the sample locations in relationship to the drone survey results. The laboratory results were also double checked, and QA/QC analyses completed on the results.

QA/QC samples consisting of blanks and certified reference materials (CRMs) were regularly inserted in the sampling stream at random positions, with the aim of obtaining 10% to 15% of QA/QC sample inclusion into the total pegmatite sample population.

Three field duplicate samples of channel samples F1_3, F1_25 and F1_37 were collected on the F Pegmatite. The field duplicate samples were collected with the aim of testing vertical Ta_2O_5 grade variability within the original channel sample and to test the precision of the channel sampling method at marked sampling sites on the F pegmatite.

The field duplicate samples showed an acceptable reproducibility.

1.11.1 Standards

There were 234 core samples analysed at the Scientific Services laboratory. A total of 33 AMIS standards were added representing 10.6% of the total samples analysed.

Results indicated that the analysed values for all three elements of interest (tantalum, niobium and lithium) fall within the acceptable two standard deviations.

1.11.2 Blanks

A total of 17 blanks (AMIS0439 Blank Silica Chips) were added to the two batches of core samples. The blanks were added at the start of each batch as well as at the start of samples from a new pegmatite. This represents 7.2% of the total number of samples. All the blanks reported were below the detection limited for both tantalum and niobium (<10 ppm) and less than 0.0041% Li. The results for the blanks show no indications of systematic cross-contamination.

1.12 Mineral Processing and Metallurgical Testing

ORP commissioned CoreMet Mineral Processing (CoreMet) to perform mineralogical and metallurgical testwork to develop a DFS process flow to produce commercial grade (>25.0% Ta_2O_5) tantalum concentrate. The testwork also quantified recovery of lithium that will be sold as run of mine (RoM) process tailings. The lithium RoM tailings will be sold separately as a by-product when ore containing spodumene is processed through the process plant.

The focus of the DFS has been limited to the D, E and F-pegmatites since these pegmatites can be extracted by open cast mining methods. The testwork included ore variability to determine whether the DFS flowsheet, developed from ore from F pegmatite, will accommodate D and E pegmatites within the DFS mine production schedule.

From the mineralogical information it was determined that a coarse grind should be sufficient for initial tantalum recovery. A 1 mm top size was selected and tested by vertical shaft impactor (VSI), rod mill and high-pressure grinding rolls (HPGRs). The VSI was selected since it provided the best liberation and does not generate excessive fines (<45 µm).

Results from gravity separation testwork indicates the following:

- Crushing to 1,000 µm is required to achieve maximum recovery;
- Approximately 30% tantalum loss to <45 µm occurs due to spiral inefficiency; and,
- Most of the tantalum losses occurred to the >150 µm fraction due to poor liberation. Liberation testwork indicated that at 300 µm, 50% additional Ta_2O_5 can be recovered. Crushing smaller does improves Ta_2O_5 recovery. This will require further assessment in future. However, it is proposed that the VSI should be designed to crush to a top size of 600 µm and space is left for a possible future milling circuit to grind to <212 µm.

There are significant tantalum losses within the <45 µm fraction of the spiral tails. To improve recovery, the spiral tails were screened at 106 µm. The oversize requires further grinding to improve recovery and the undersize requires specific technology suited to this size range.

It was determined that the addition of a fines circuit can improve overall recovery by between 10% and 13%. However, this will require additional CAPEX and add complexity to the process flow. Consequently, the proposed DFS flowsheet excludes fines recovery.

The testwork confirmed that magnetic separation is not viable due to poor recoveries.

Spiral concentrate 1 and 2 were milled to 100% passing 150 µm. The concentrate was then processed through the MGS. More than 90% of the tantalum was recovered in the concentrate.

Analysis by quantitative evaluation of materials by scanning electron microscopy (QEMSCAN) indicated, successful tantalum liberation at 150 µm.

The MGS produced a concentrate grade at the commercial grade of 25% Ta_2O_5. It was observed that small changes in operational parameters had a large impact on concentrate grade and recovery. For this reason, the DFS flowsheet included a cleaner MGS.

The findings of the bulk testwork are as follows:

- The proposed DFS flowsheet consists of comminution to -600 µm, followed by primary recovery spirals. The concentrate from the spirals is milled to 150 µm to produce a final product grade of ≥25% Ta_2O_5 in an MGS circuit;
- By crushing to a smaller top size (<600 µm) there is significant recovery upside. This will require further testwork after the plant is operational. Consequently, it is proposed that the VSI should be designed to crush to a top size of 600 µm and that space is left for a possible future milling circuit to <212 µm;
- All technologies proposed for the DFS flowsheet are well established within tantalum recovery;
- It was determined that the proposed DFS flowsheet will produce a concentrate grade containing at least 25% Ta_2O_5 at a minimum recovery of 65%;
- The addition of a fines circuit to recover Ta_2O_5 lost to the spiral tails can add an additional 10% to 13% recovery. However, will require additional CAPEX, and as such has been excluded from the DFS process flow to first perform a trade-off to assess the increase in cost versus revenue improvement;
- MGS testwork indicated that it was possible to recover at least 80% on all the different samples;
- Variability testwork indicates that similar recoveries are achieved when ore from the D and E pegmatites are treated, compared to F pegmatite on which the DFS flowsheet is based;
- Based on the testwork, it can be concluded that the overall Ta_2O_5 recovery of 65% is plausible regardless if the ore originates from the D, E or F pegmatites; and,

- Based on the testwork, it can be concluded that an overall Li_2O recovery of 99% to the process plant tailings is achievable when treating ore from the D-pegmatite and EF-pegmatites.

1.13 Mineral Resource Estimation

ORP commissioned Snowden Optiro to produce a Mineral Resource Estimate (dated 1st May 2022) of the open cast minable D-pegmatite and EF-pegmatites within the Swanson Property.

A total of 15 Tantalum (Ta_2O_5) mineralised tabular pegmatites have been identified on the property. These have been named by group (A to G) and by number.

The 1st May 2022 Mineral Resource Estimate has incorporated all geological knowledge and exploration information to 30th April 2022 and is an updated estimate following additional drilling conducted between October 2021 and April 2022. A total of 105 diamond drill holes drilled from surface have been used in this estimate.

These holes have been supplemented by geological information gained from surface outcrops, including from detailed mapping, and from channel and chip sampling of these outcrops.

Geological continuity of the pegmatites has been established through mapping and sampling (chip and channel) of surface exposures, and the extension of these pegmatites under shallow cover has been established by diamond drilling.

The thickness of the pegmatites has been established through modelling of the hanging wall and footwall contacts. Ta_2O_5 ppm, Nb_2O_5 ppm and Li_2O % grades have been estimated using ordinary kriging, with geostatistical continuity of the Ta_2O_5 grades being established through mapping and variography.

Two models were created for the 1st May 2022 Mineral Resource Estimate, one for the D-pegmatite, and another for the E and F pegmatites combined (EF-pegmatites).

The summary of the Mineral Resources for the Swanson Deposit are shown in Table 1.3.

Table 1.3: Summary Mineral Resource Statement for the Swanson Deposit as at 1st May 2022 (in accordance with the guidelines of the JORC Code (2012))

Category	Pegmatite	Tonnage (kt)	Grade Ta_2O_5 (ppm)	Ta_2O_5 (t)	Grade Nb_2O_5 (ppm)	Grade Li_2O (%)
Indicated	Total area D	568	365	207	87	0.27
	Total area E-F	577	578	334	65	0.07
	Total	**1,145**	**472**	**541**	**76**	**0.17**
Inferred	Total area D	444	365	162	79	0.34
	Total area E-F	995	557	554	69	0.05
	Total	**1,439**	**498**	**716**	**72**	**0.14**

Notes:

1. The 1st May 2022 Mineral Resource Estimate has been prepared in accordance with the guidelines of the JORC Code (2012).
2. The Mineral Resources are estimated based on 105 diamond drill holes.
3. Density average value is 2.64 g/cm^3.
4. The block model grades were estimated using Ordinary Kriging.
5. Mineral Resources are not Ore Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the estimated Mineral Resources will be converted into Ore Reserves.
6. The Mineral Resources volume and tonnage have been rounded to reflect the accuracy of the estimate, and numbers may not add up due to rounding.
7. Inferred Mineral Resources are that part of a Mineral Resource for which quantity and grade can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity.
8. The cut-off grade of 236 ppm Ta_2O_5 has been used to estimate the Mineral Resources.

The geological and grade continuity of the pegmatites was sufficient to classify the reasonably well-explored area as Indicated Resources, with Inferred Resources being extrapolated 50 m beyond the last line of sampling.

1.14 Ore Reserves Estimation

The 15 mineralised pegmatites identified on the Swanson Property are of uniform thickness (generally about 1.5–2.5 m thick), tabular, non-zoned, gently-dipping, and contain tantalum, niobium and lithium mineralisation, together with quartz, sugary albite, spodumene and a number of other minerals. They intruded into competent meta-gabbros and are bound on the northern side by a northwest trending mylonitic shear zone.

The Mineral Resources and Ore Reserves are contained within two distinct deposits:

- The D-Pegmatite, located to the north of the Swanson Property, is characterised by 3 gently dipping pegmatite horizons (D0, D1 and D2) of around 2.5 m in thickness and relatively shallow with an overall stripping ratio of ~ 2. The Ta_2O_5 grades in the D-pegmatite deposit are around 360 ppm and Li_2O of 0.25%.
- The EF-Pegmatites, located to the central and southern region of the Swanson Property is characterised by more steeply dipping pegmatite horizons (E2,E3,E4,E6,E7,E8 and F1) with an overall stripping ratio of around 14. The Ta_2O_5 grades in the EF-pegmatites are around 500 ppm and low Li_2O of 0.07%.

1.14.1 Ore Reserve Estimate

The 1st May 2022 Mineral Resource Estimate used to generate the 31st December 2022 Ore Reserve Estimate is presented in Table 1.3.

The Ore Reserve Estimate is reported in Table 1.4. No Proved Ore Reserves were declared.

Table 1.4: Proved and Probable Ore Reserves for the Swanson Pegmatites

D & EF Ore Reserve	Area	Mass (kt)	Ta_2O_5 (ppm)	Li_2O (%)	Ta_2O_5 (tonnes)
Proved	Total D	0	0	0	0
	Total EF				
	Subtotal	**0**	**0**	**0**	**0**
Probable	Total D	409	347	0.23%	142
	Total EF	457	550	0.07%	251
	Subtotal	**866**	**454**	**0.15%**	**393**

Note: Ore Reserves are reported at 236 ppm Ta_2O_5 cut-off. Only Lithium from D Pegmatites will be recovered.

In arriving at an in-situ, dry Probable Ore Reserve Estimate, the following steps were taken to ensure the estimates were reasonable, practical and robust for the current stage of the Swanson Project:

- A subjective analysis of the Swanson Property was undertaken. This resulted in certain Mineral Resources being excluded from potential consideration based on their location in challenging terrain or relatively deeper below water-courses where the Mineral Resources would not immediately be extracted.
- Mining related modifying factors were applied to the Ore Reserve Estimate. These included ore-losses (from mine design, terrain and pit constraints) of ~ 17% and a dilution factor of 5%. These losses were 0.5% in the D Pegmatite pit and 17.6% in the EF-pit. the loss within the EF-pit could potentially be slightly reduced if smaller block sizes are considered in future whereby mining along pegmatite contacts can be carefully controlled, limiting the need to remove excessive waste from below the dipping pegmatite floor required to ensure a level pit floor operating surface.
- Pit shells for the D-pegmatite and EF-pegmatite deposits respectively were derived using macro-economic assumptions (including a tantalite concentrate price of US$220/kg and costs as outlined in Table 16.3). Key technical assumptions including the general overall geotechnical slope and bench data as further detailed in the Feasibility Study; a dilution factor of 5%; processing recoveries of 65% and concentrate grade of 25%; cut off grades of 236 ppm Ta_2O_5. The economic results were assessed using a 10% discount rate and the pit shell was selected based on the results.

  A summary of the selected pit shell results are provided in Table 1.5.

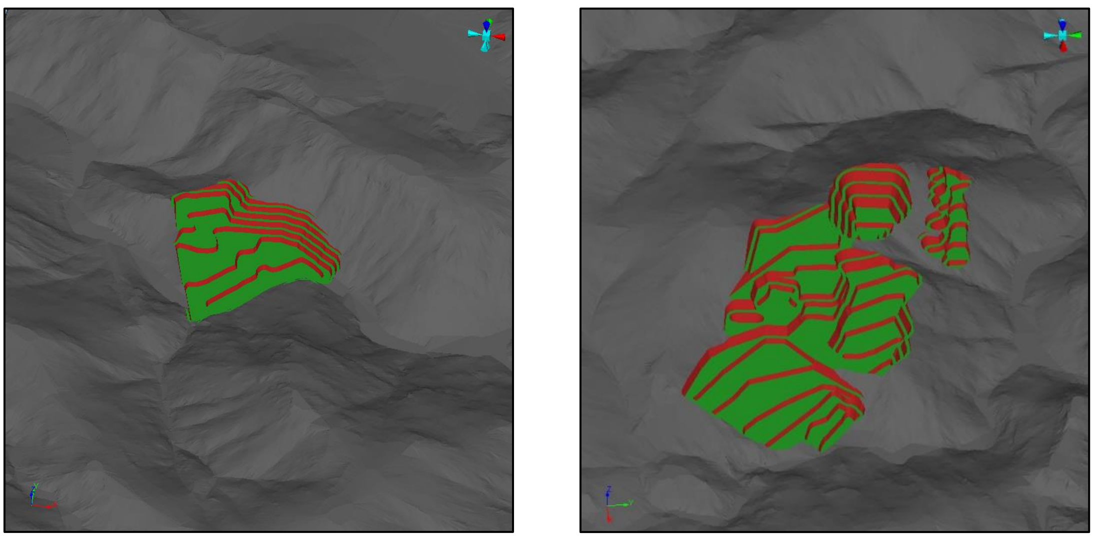
Table 1.5: Selected Pit Shell Summary

	D-pegmatite	EF-pegmatites	Total
Pit shell	43	48	-
Revenue factor	96%	100%	98%
Ore tonnes (Mt)	0.41	0.55	0.96
Waste tonnes (Mt)	0.90	7.72	8.62
Ave strip ratio	2.2	14.2	12.9
Average Ta_2O_5 grade (ppm)	364	503	444
Average Li_2O (%)	0.25	0.07	0.15

- Pit design (Figure 1.2) for each pit was undertaken, taking into consideration the mining blocks, specific geotechnical inputs, bench designs, ramps and other overall pit shapes while adhering to overall economic strip ratios determined from the initial pit optimisation process.

Of the 1,145 Mt of Indicated Resources (by tonnage mass) grading 472 ppm Ta_2O_5, 866 kt has been converted into a Probable Ore Reserve with a grade of 454 ppm Ta_2O_5.

Figure 1.2: D-pit Design (LHS) and EF-pit Design (RHS)



1.15 Mine Schedule

A monthly mine schedule was also determined which included Indicated Mineral Resources and, where deemed reasonable, some Inferred Mineral Resources.

The inclusion of Inferred Mineral Resources has explicitly been shown and is largely only those Inferred Mineral Resources that fall within the pit shells of the Ore Reserve Estimate. These pit shells were developed using the economic analysis of including only the Mineral Resources within the Indicated category.

Table 1.6: Resources Categories Included in the ORP Mine Schedule

Description	Unit	D-pegmatite	EF-pegmatites	Total
Total ore	Mt	0.492	0.668	1.16
Indicated	Mt	0.405	0.445	0.85
Inferred	Mt	0.088	0.223	0.31
Inferred % of total	%	17.8%	33.0%	26.8%

Table 1.7 provides a summary of the mining schedule.

Table 1.7: Mining Schedule Summary

Description	Unit	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Total
Total ore	Mt	0.12	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.01	1.16
Total waste	Mt	0.40	0.35	2.78	1.50	2.03	1.40	1.01	0.95	0.07	10.50
Strip ratio	t/t	3.36	2.36	18.53	10.21	14.07	9.46	6.76	6.34	28.64	9.04
Ta_2O_5	ppm	350.7	367.8	367.3	451.5	619.3	504.1	589.4	604.0	524.0	484.9

1.16 Recovery Methods

The RoM will be concentrated through a spiral plant to produce a concentrate with a minimum grade of 25 wt% Ta_2O_5.

The Spiral Plant will process secondary crushed stockpile material with a top size of 25 mm to beneficiate 143 520 tpa RoM at a head grade of 487 ppm Ta_2O_5. This requires tertiary crushing and gravity separation to produce the concentrate containing 25 wt% Ta_2O_5.

The Spiral Plant consists of a tertiary crushing circuit, a rougher circuit, a cleaner circuit, a filtration and drying circuit, and a tailings handling and water recovery circuit. The rougher and cleaner circuits comprise of gravity separation processes to exploit the high density of the Ta_2O_5 minerals. The concentrate will have a minimum grade of 25 wt% Ta_2O_5. Tantalite metal is extracted from this concentrate. Tantalite is a metal with extensive applications in the growing electronics market.

The process flow diagrams, mechanical equipment lists, and piping and instrumentation diagrams, covering all five processing areas, were generated to obtain the civil, structural, and electrical bill of quantities.

The planning and costing are based on an engineering, procurement, construction and management (EPCM) model. Budget quotes were obtained for all the identified components to compile CAPEX and OPEX cost estimates for the plant, in accordance with AACE Class 3.

Construction has been estimated to require 246 business days from the commencement date to final commissioning and hand-over (approximately 11.5 months). The detail design phase requires 106 business days (approximately 5 months) and procurement 188 business days (approximately 9 months).

To optimise the implementation time, the detail design and procurement phases will be executed simultaneously to be able to complete construction and commissioning within 11.5 months.

The Spiral Plant is designed with a nominal feed capacity of 40 tph dry feed with a top size of 25 mm. It is scheduled to operate 3 588 hours per annum to process 143 520 tonnes of feed material. The plant design has a target recovery of 65% Ta_2O_5 and with a nominal feed grade of 487 ppm Ta_2O_5. The Spiral Plant will produce 176 715 kg of concentrate at a minimum Ta_2O_5 concentration of 25 wt%.

The CAPEX estimate for the Spiral Plant was completed in accordance with a basis of estimate methodology (the BoE) which conforms to AACE Class 3.

Approximately 23 wt% of the Ta_2O_5 entering the plant, reports to the thickener. The Ta_2O_5 smaller than 45 µm is liberated, but the current rougher circuit only recovers Ta_2O_5 down to 45 µm. The addition of a fine beneficiation circuit targeting the Ta_2O_5 smaller than 45 µm can recover more than 50 wt% of the Ta_2O_5 reporting to the thickener and increase the overall Ta_2O_5 recovery to 78 wt%.
This will require an additional CAPEX investment of approximately US$2.2 million. A cost-benefit analysis must be completed to determine if the increased investment will provide a higher return on investment.

1.17 PROJECT INFRASTRUCTURE

The DFS on the Swanson Project includes for bulk infrastructure to supply water and electricity, a new access road and dry stacking of the tailings generate from the Spiral Plant.

1.17.1 Bulk Infrastructure Supply

Following granting of ML 223, ORP received confirmation from Nampower, the Namibian national electric power utility company, that the mine can be fed up to 2.7MVA from the substation located at the town of Warmbad. The EIA for the new ~40km 33 kV or 66 kV line from the Warmbad substation to the Mine is included in a separate Environmental Scoping Report and Management Plan entitled "Environmental Impact Assessment for the proposed construction of a powerline, pipeline and road in support of tantalite mining on ML 223".

A good, unsealed (gravel), access road exists to the operational offices. The Environmental Scoping Report makes provision for new unsealed roads to support the mining and recovery plant areas. The provision of unsealed roads is standard practice in Namibia.

The main access road will connect the C10 secondary gravel road with the Swanson Property. The water pipeline, new access road, and power line will run parallel to each other from Warmbad to the proposed Swanson Mine.

The proposed preliminary designs for the access road to service the Swanson Property, process plant area, and the haul road to transport RoM from the mining area to the processing plant are feasible options.

The access road will be designed for a design speed of 70 km/h with an 8.6 m wide gravel wearing course surface.

The haul road will have a 15 m wide gravel wearing surface and is designed for rigid dump trucks, 10 m wide and 14 m long. The construction will entail cuts with depths up to 14 m and fills with heights up to 6 m high.

The Environmental Scoping Report for infrastructure development makes provision for water to be sourced from two localities namely, a pipeline from Warmbad or otherwise extracting water from local underground aquifers. ORP elected to source water from Warmbad. In the environmental impact assessment (EIA) report, it was proposed that the water pipeline will be less than 40 km long with a diameter of 160 mm.

1.17.2 Spiral Plant Tailings and Waste Rock

ORP engaged Prime Resources to perform the feasibility design and cost estimation of the tailings storage facility (TSF) of the Spiral Plant and the waste rock dump (WRD) of the open cast mining operation for the Swanson DFS.

The mining operation involves the development of two opencast pits i.e., the D-pegmatite pit (the D-pit) and the E and F-pegmatite pit (EF-pit).

The Spiral Plant produce two tailings streams, a fine tailings (-45 µm dewatering oversize) and a coarse tailings (+45 µm filter cake). The TSF includes separate disposal of fine and coarse tailings produced from the Spiral Plant to allow for the sale of the fine tailings as lithium RoM tailings as a by-product. However, the separate tailings are disposed to a single TSF site.

The scope of work for the TSF and WRD included site selection, confirmation of design criteria, geotechnical investigation of the TSF site, design of the TSF and WRD, CAPEX and OPEX cost estimates, as well as generation of layout, section and detail drawings.

1.17.2.1 Design Criteria

The design criteria for the TSF and WRD are summarised in Table 1.8.

Table 1.8: Design Criteria

Description	Units	Qty	Source
General			
LoM	months	97	Snowden Optiro
Total RoM feed	tonnes	1,160,159	Snowden Optiro
Total waste rock	Mt	7.58	Snowden Optiro
Tailings/plant waste			
Fine tailings	t	696,096	Calculation
Coarse tailings	t	464,064	Calculation
Tailings (fine and coarse) placement dry density	t/m^3	1.6	Prime Resources
Fine tailings volume/ storage requirement	m^3	435,060	Calculation
Coarse tailings volume/ storage requirement	m^3	290,040	Calculation
Tailings moisture content	% (w/w)	15 to 20	CoreMet
Waste rock			
Waste rock bulk density	t/m^3	1.62	Prime Resources
Total waste rock tonnage	t	10,496,643	Snowden Optiro
Total waste rock volume	m^3	6,492,368	Calculation

1.17.2.2 Site Selection

The TSF site selection was undertaken to position the facility in close proximity to the Spiral Plant, located to the north of the mining area, on the plateau. The area to the west of the Spital Plant was selected as the preferred site for the TSF.

The site selection of the WRD also included minimising of haulage distance, which led to the area adjacent and to the south of the EF-pit being selected as the preferred site.

1.17.2.3 Geotechnical Investigation

A surface geotechnical assessment was undertaken over the footprint of the proposed TSF site which included the hand-excavation of trial pits to depths ranging from 200 mm to 600 mm where refusal on coarse grained gneiss rock occurred. Soil samples were collected for laboratory testing. The profile consists of gravelly sand between outcropping medium hard rock gneiss and granite. The material from the basin can be used in the construction of nominal embankments. The excavation of channels will be to a limited depth as a result of the shallow and outcropping medium hard rock.

1.17.2.4 Tailings Material Characterisation

The geochemical characterisation and classification of the Spiral Plant tailings has been undertaken to assess the potential for pollutant release, and to determine the appropriate management and mitigation measures, and barrier requirements for the tailings impoundment. The outcome of the assessment (undertaken to South African legislative requirements), indicated that the tailings classify as an inert waste, only requiring a compacted in-situ basal layer.

1.17.2.5 Waste Rock Deposition

The waste rock from the open pit mining operations is deposited on the WRD south of the EF-pit. The D-pit is mined first, followed by the EF-pit. The WRD is developed by placing the waste rock in 10 m lifts with 10 m wide benches and intermediate slide slopes having a vertical to horizontal ratio of 1 to 1.5 (1V:1.5H). The WRD will reach a final elevation of 765 meters above mean sea level (mamsl), with a maximum height of 96 m and a footprint of approximately 24 ha. The D-pit is partially backfilled with waste rock to elevation 590 mamsl.

The WRD is contained and defined with a toe embankment, constructed with waste rock. The runoff from the valleys within which the WRD are developed, will be attenuated in the early stages, with waste rock berms positioned at 10 m elevation intervals. Any runoff and seepage reporting to the toe of the WRD are dissipated with waste rock berms and rock mattresses before being released to the downstream environment.

An ephemeral river course intersecting the D-pit, will be diverted by means of an engineered diversion structure on a selected bench, to ensure the continued seasonal flow.

The rehabilitation of the WRD will include the flattening and reshaping of the side slope profile. The benches and safety berms will be used in cut and fill works to create a final overall 1V:2.5H profile.

1.17.2.6 Tailings Deposition

The fine and coarse Spiral Plant tailings are stored separately to allow for the sale of the fine fraction as lithium RoM tailings as a by-product.

The fine and coarse tailings are collected from the Spiral Plant and hauled by trucks to the TSF site. The coarse tailings are deposited on the southern section of the TSF, and the fine tailings on the northern section of the facility. Both tailings streams are dumped, levelled, and compacted within their respective areas. The TSFs will be developed as an upstream dry stack facility, with 5 m vertical lifts, intermediate side slopes of 1V:1.5H (≈33.7°), and to a final elevation of 663 mamsl. This will require a total of four lifts for a total height of 20 m.

Each of the fine and coarse TSF areas are confined and defined by a perimeter toe wall. Any runoff and seepage from the respective tailings footprints are collected in perimeter collector drain channels and conveyed to a low point, from where it is released to the downstream environment via an energy dissipator.

Stormwater from the area upstream of the TSF are diverted with a diversion trench and berm positioned on the upstream side of the facilities and extends around the external perimeter, to positions downstream of the facilities. The stormwater diversion trenches also terminate in an energy dissipator.

Rehabilitation will be limited to only the coarse tailings as the fine tailings is planned to be sold as lithium RoM tailings. The rehabilitation of the coarse tailings includes flattening of the side slopes to an overall slope of 1V:3H.

The CAPEX estimate of the TSF is determined from the required works and have been based on a schedule of quantities for the works and construction rates provided by SPH Kundalila.

1.18 MARKET ASSESSMENT

The Market Assessment of the Swanson DFS Report, unless indicated differently, is based on a presentation report on the tantalite market by Argus Media Group (Argus), dated March 2022. The Argus Tantalite Market Report was independently prepared for ORP by Argus to present independent market and forecasting analysis of the global tantalite market.

Salient points of the Argus Tantalite Market Report are summarised as follows:

- Historically, much of the world's tantalum has been located in the Democratic Republic of Congo (DRC) where it has financed armed conflict or are mined using forced labour. Initiatives to prevent the trade in conflict minerals sought to stop funding to militias;
- Total 2020 tantalum Ore Reserves were between 300 kt and 350 kt - sufficient for 140 years at current production levels. South America holds the majority, 40% of global tantalum Ore Reserves. Australia, at 20% of global Ore Reserves, is the country with the largest tantalum Ore Reserves;
- Global mine tantalum production increased at 8.5% per year to 2,080 t between 2011 and 2021. Most of this growth came from the DRC which tripled output to 780 t. Other significant producing countries are Brazil (23% of global output), Rwanda (13%) and Nigeria (12%). Australia is a growing producer of tantalum a by-product of lithium mining;
- The ratio between receipts of primary and secondary materials has averaged 75:25 over the last decade. Secondary material supply peaked at 30% in 2013;
- Tantalum demand increased at 6.4% compound annual growth rate to 2,410 t between 2013 and 2017. It then declined year on year to 1,775 t in 2020. Demand for tantalum recovered strongly back to 2017 levels in 2021;
- Competition for tantalum metal by industry can be intense because of its narrow supply chain. Of the 2021 tantalum consumption, about 70% was from electronics. In particular, the capacitor sector which in 2020 represented almost 45%. A further 25% was to produce high temperature alloys used to manufacture jet aircraft and industrial (power generation) turbine blades;

- The tantalum outlook continues to remain robust, regardless of its international supply chain scrutiny. Its application in electronics, aircraft, medical, and especially thermal batteries assure its continued global consumption;
- Tantalum production has held steady in central Africa, the world's largest producing region, although continuing concerning practices remains. This could potentially create pressure on supply from the region until compliance and traceability improve. Lithium expansion could bring large increases in tantalum production which will cause stability to the tantalum industry;
- Tantalum supply is poised to grow strongly due to lithium battery demand over the coming years. Argus predicts that on balance, supply is likely to outgrow demand, although the impact of a stable and secure supply should not be overlooked and could potentially spur faster demand growth; and,
- After a small dip in tantalum prices toward the end of 2021, it has rallied on the current geopolitical situation to average US$202.50/kg (25% Ta_2O_5 inclusive of cost, insurance, and freight delivered to main port Europe) in March 2022.

1.19 ENVIRONMENTAL STUDIES, PERMITTING AND COMMUNITY IMPACTS

The Namibian Environmental Regulations procedure (GN 30 of 2012) state that mining may not be performed without an ECC.

The environmental proponent must conduct a public consultation process in accordance with regulation 21 of the 2012 environmental procedure. Also, the proponent must perform an Environmental Impact Assessment (EIA) over the area covered by ML 223. For this an Environmental Scoping Report and an Environmental Management Plan Report (EMPR) needs to be submitted.

ORP was granted ML 223 on 3rd June 2022. ML 223 authorise ORP to commence development work towards mining operations for base and rare metals, industrial minerals and precious metals for 15 years (19th May 2022, to 18th May 2037).

ORP was granted an ECC 02187 to undertake the proposed development of the Swanson Mine, and to commence with activities specified in their Environmental Assessment Report and the filed EMPR.

The National Heritage Council of Namibia has Consent to mining operation over ML 223, valid for a year from 14th October 2021, to 13th October 2022. ORP is not aware of any reason why renewal for another year will not be granted.

Impala Environmental Consulting cc was appointed by ORP to perform an EIA of the proposed Swanson Mine. The EIA included preparation of an Environmental Scoping Report and EMPR for the development of the proposed Swanson Mine.

The Environmental Scoping Report outlines standard methods and practices normally applied by mining operations in Namibia.

To note is that following the granting of ML 223, ORP revised the initial plan proposed in the Environmental Scoping Report that all waste will only be stockpiled temporarily (for the first three years) after which material will be mixed (fines, plus coarse mine waste) and returned to the mined-out areas for rehabilitation. Section 18.4 outlines the revised plan for disposal and storage of mine waste and process tailings.

The Environmental Scoping Report does not make provision for acid mine drainage since sulphides are not associated with any of the deposits and thus no acid mine leaching will therefore be present.

The Environmental Management Principles and proposed mitigation measures, outlined in the EMPR, is standard for mining operations within Namibian. These do not impose any stricter requirements on ORP for the development of the proposed Swanson Mine. Similarly, proposed monitoring, auditing and reporting to ensure compliance with the EMPR and recommended closure and rehabilitation activities post mining, conforms to standard mining practices.

The Environmental Scoping Report concludes as follows:

- The proposed Swanson Mine has great potential to improve livelihoods and contribute to sustainable development within the area surrounding the town of Warmbad; and,
- Potential negative impacts associated with the proposed Swanson Mine are expected to be low to medium in significance.

The report on the archaeological survey (Kinahan, September 2021) presents that no sites of heritage significance were found, and proposed that the ORP be given consent to proceed with exploration and mining activities.

The report on the water specialist study (Hamutoko, no date) suggests little or no impact on groundwater resources from the proposed Swanson Mine.

The report on the flora specialist study (Mannheimer, August 2021), state that only one plant species of high conservation concern would be substantially affected by the proposed Swanson Mine. It proposes that if mitigation measures are followed, then the impact of the proposed Swanson Mine on vegetation is likely to be minor.

The report on air quality and noise study (Ameh, no date) state environmental deterioration of air quality and noise pollution can be addressed through implementing the recommended Environmental Management and Monitoring Plans.

ORP committed their socio-economic development plan in a document dated 20th June 2022. The socio-economic development plan conforms to standard mining practices in Namibia, does not propose more onerous commitments for the development of the Swanson Mine and conforms to the guideline of Namibia's 5th National Development Plan.

1.20 Capital and Operating Costs

The purpose of the cost estimate is to determine CAPEX and OPEX costs for use in the Economic Analysis of the Swanson DFS.

The CAPEX and OPEX costs prepared for the Swanson DFS qualifies as a Class 3 - Recommended Practice 47R-11.

The accuracy of the CAPEX and OPEX have been assessed at between +15% and - 15%. The overall contingency provision for CAPEX and OPEX are 10.0% and 7.5%, respectively.

All cost, commodity princes and exchange rates are as the DFS Base Date of 31st March 2023. The cost estimates applied a 4.0% escalation to allow for price increases from estimation completion in Q3 2022 to the DFS Base Date.

The DFS costs are presented in United State dollar (US$). The estimate was performed in Namibian Dollar (NAD) which is pegged to the South African Rand (ZAR) at a rate of 1:1. An exchange rate of NAD18.30/US$ was used to convert the NAD estimate to US$.

DFS costs are based on contractors performing the mining and the operation and maintenance of the Primary and Secondary Crushing and Screening Plant (Primary/Secondary Crushing Plant) and Spiral (Concentrator) Plant.
The DFS costs were estimated by the various specialist consultants as outlined in Table 1.9.

Table 1.9: CAPEX and OPEX Responsibility Matrix

Discipline	Responsibility
Geology and grade control	LexRox Exploration
Contractor mining	SPK Kundalila
Contract crushing and surface material handling	SPH Kundalila
Access and haulage roads and road maintenance	SPH Kundalila
Spiral Plant	Obsideo Consulting
Spiral Plant tailings	Prime Resources
Water pipeline and maintenance	Spes Bona Engineering
Electrical power line	Walters Electrical Services
Reagents	Obsideo
Laboratory	LexRox Exploration
Geology	LexRox Exploration
Survey	LexRox Exploration
Environmental monitoring	Impala Consulting
Owner's cost (salaries, wages, admin, vehicles)	ORP
Concentrate transport and CIF shipping to Hamburg	Kuehne and Nagel
Site security	Southern Security
IT hardware, software, communication, and CCTV	LexRox Exploration
Accounting	Fellowship
Office, furniture, and owner's vehicles	ORP
Insurance and policies	Namrisk

1.20.1 Capital Costs

The total CAPEX for the Swanson DFS was estimated to total **US$9,870,850**. This cost includes accuracy provisions and excluding Owner's contingency allowance which has been estimated at 5.0% of the total CAPEX. The 10.0% contingency has been included separately in the DCF model.

The CAPEX by work breakdown structure (WBS) is summarised in Table 1.10.

Table 1.10: Total CAPEX

Description	Cost (US$)
Geology and grade control	58,520
Access road	559,050
Haulage road	315,000
Mine establishment (equipment and workshop)	947,590
Primary/secondary crushing establishment	85,250
Spiral Plant	6,362,280
Spiral Plant Tailings	298,970
Water pipeline	514,320
Power supply	524,860
IT hardware, software, communication, and CCTV	13,180
Office and furniture	123,630
Owner's vehicles	68,200
Total	**9,870,850**

1.20.2 Operating Costs

The Swanson DFS OPEX consist of a fixed monthly and a variable component. The variable component is charged on a per tonne basis.

The OPEX (fixed monthly and variable per tonne material) per WBS are presented in Table 1.11. These costs exclude the 7.5% contingency which were included separately in the DCF model.

Table 1.11: Total OPEX (Fixed and Variable)

Description	Fixed Monthly (US$)	Variable (US$/t material)
Geology and grade control	10,910	-
Haulage road and road maintenance	1,700	-
Mining contract cost	87,200	-
mining contract cost ore D pegmatite	-	2.08
mining contract cost waste D pegmatite	-	2.08
mining contract cost ore EF pegmatite	-	2.09
mining contract cost waste EF pegmatite	-	1.96
Crushing cost	62,140	1.42
Mining equipment to be used in plant	-	0.88
Spiral plant CAPEX and OPEX	76,840	4.23
Spital plant tailings	2,984	-
Plant waste transport	-	1.02
Environmental monitoring	1,700	-

Description	Fixed Monthly (US$)	Variable (US$/t material)
Water pipeline and maintenance	1,700	-
Ore transport to port and shipping Hamburg	-	668.97
Site security	9,390	-
IT hardware, software, communication and CCTV	930	-
Accounting and land use	3,410	-
Insurance and policies	5,650	-
Owner's team salaries and wages	18,750	-
Total	**283,480**	

1.21 ECONOMIC ANALYSIS

The economics potential of the proposed Swanson Mine was assessed by performing of an Economic Analysis in the form of real (constant US$) DCF model.

The Economic Analysis were based on annual cash flow projections that were estimated over the life of mine (LoM). The Mineral Resources, Ore Reserves, mine production schedule, recoveries, CAPEX, OPEX, commodity prices, and other inputs to the DCF model were determined during the DFS or provided by ORP.

The net present value (NPV) of the proposed Swanson Mine is derived on post-tax estimates that are likely to approximate the true investment value. Tax estimates can only be accurately calculated during operations. Consequently, the after-tax results are at best approximations.

Sensitivity analyses were performed for changes in sales revenue (metal prices and head grade), OPEX, CAPEX and discount rate to determine their relative importance as value drivers.

Revenue is derived from the sale of tantalum concentrate, containing ≥25.0% Ta_2O_5, and separate sales of lithium RoM tailings as by-product. The tantalum concentrate is expected to attract a credit for contained niobium oxide content.

The Economic Analysis evaluate if the proposed Swanson Mine have "reasonable prospects for economic extraction" and will be an important part of documentation during final investment decision (FID) to guide decision-making whether to proceed with the development of the Swanson Mine.

During the operation, lithium RoM tailings will be produced, when ore containing spodumene is processed through the process plant. This will be sold as a by-product. Niobium oxide contained within the tantalum concentrate is credited to the sales price of the tantalum concentrate.

The DCF determine an appropriate economic basis of value. Due to the various subjective inputs involved in generating a DCF, it is standard for the outcome to be regarded as an opinion, and not as a fact. For this reason, the resultant of the Economic Analysis is most appropriately stated as a lower and upper range.

The Concluding Opinion of Value Range is based on material inputs outlined in Table 22.1 and general assumptions and exclusions to develop the DCF model is presented in Section 22.7 and Section 22.8, respectively.

The Economic Analysis was performed at 100% attributable to ORP, in which Arcadia has an 80% interest. The Effective Date of the Economic Analysis is 30th November 2022.

The NPV is based on a real discount rate of 8% which the Specialist responsible for the Economic Analysis believe is appropriate for the risks and development stage of the proposed Swanson Mine.

The Economic Analysis is based on JORC (2012) compliant Mineral Resources and Ore Reserves, from which a mine production schedule was developed. The mine production schedule does include Mineral Resources in the Inferred classification.

The JORC Code (2012) sate: "An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to an Ore Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Caution should be exercised if Inferred Mineral Resources are used to support technical and economic studies".

Using the Cash Flow Approach, the proposed Swanson Mine has an 100% attributable value range of between US$8.0 million and US$11.0 million at a 8% real discount rate, to the post-tax un-escalated cash flows. The upper and lower value range was determined, using varying discount rates, as well as sensitivities on sales revenue, CAPEX and OPEX.

The undiscounted IRR varies between 24% and 27%.

Since the NPV is positive, it can be concluded that:

- Mineral Resources and Ore Reserves can be declared since it meets the JORC-code (2012) definition of having "reasonable prospects for economic extraction"; and,
- Excluding other material factors, the proposed Swanson Mine can proceed to the next phase basic engineering and design.

1.22 Risk Identification

The overall risks rating to develop the Swanson Project and operate the proposed Swanson Mine is acceptable for a DFS and is classified as moderate to low due to:

- Well understood geology;

- Mining will be by low-risk open cast method. However, to note is the high variability between the D-pit and EF-pits and increasing stripping ratios at depth;
- The design of the Spiral Plant is "modular" and based on a simplistic process flow - all technologies proposed for the DFS flowsheet are well established within tantalum recovery;
- The execution schedule is short (13 months);
- Low total CAPEX requirement (~US$10 million excluding contingency);
- The Swanson Project is located in a country with low-risk rating and has an established mining industry;
- The Swanson Project produce a commodity that has extensive applications in the growing electronics market, that will be a reliable source of supply from an area not associated with the finance of armed conflict or using forced labour and thus may incur a price premium;
- Although, the geotechnical foundation profile of the area selected for the WRD is unknown, it is likely to comprise shallow rock with a thin soil cover as with the rest of the Swanson Property; and,
- Based on the planned compaction of the material, side slope profile and low-seismic hazard zone, the TSF site is considered to be stable under static conditions and pseudo-static conditions.

1.23 INTERPRETATIONS AND CONCLUSIONS

A summary of the interpretations and conclusions of Swanson Project are as follows:

- On 19th May 2022 ORP was granted ML 223 on a portion of EPL 5047, in respect of base and rare metals, industrial minerals and precious metals;
- The focus of the DFS has been limited to the D, E and F-pegmatites since these pegmatites can be extracted by open cast mining method;
- The geological and grade continuity of the pegmatites was sufficient to classify the reasonably well-explored area of the Swanson deposit as Indicated Mineral Resources, with Inferred Mineral Resources being extrapolated 50 m beyond the last line of sampling;
- For the D-pegmatite the 1st May 2022 Mineral Resource Estimate identified a total of 568 kt of Indicated Mineral Resources at an average grade of 365 ppm Ta_2O_5, 87 ppm Nb_2O_5 and 0.27% Li_2O, and a total of 444 kt of Inferred Mineral Resources at an average grade of 365 ppm Ta_2O_5, 79 ppm Nb_2O_5 and 0.34% Li_2O;
- For the EF-pegmatites the 1st May 2022 Mineral Resource Estimate identified a total of 577 kt of Indicated Mineral Resources at an average grade of 578 ppm Ta_2O_5, 65 ppm Nb_2O_5 and 0.07% Li_2O, and a total of 995 kt of Inferred Mineral Resources at an average grade of 557 ppm Ta_2O_5, 69 ppm Nb_2O_5 and 0.05% Li_2O;
- At the proposed RoM production rate of 12,000 tpm, the LoM is ~8 years;

- The Ore Reserve Estimate reports for the D-pegmatites 409 kt of Ore in the Probable category containing 347 ppm Ta_2O_5, 0.23% Li_2O and 142 tonnes Ta_2O_5 and for the EF-pegmatites 457 kt Ore in the Probable category containing 550 ppm Ta_2O_5, 0.07% Li_2O and 251 tonnes Ta_2O_5. No Proved Ore reserves were declared;
- All technologies proposed for the DFS flowsheet are well established within tantalum recovery;
- The proposed DFS flowsheet will produce a concentrate grade containing at least 25% Ta_2O_5 at a minimum recovery of 65%. Variability test indicates that the DFS flowsheet achieves similar recoveries to the F pegmatite when treating ore from the D and E pegmatites;
- Based on the testwork, it can be concluded that an overall Li_2O recovery of 99% to the process plant tailings is achievable when treating ore from the D-pegmatite and EF-pegmatites;
- The Spiral Plant was designed with technology that was used during metallurgical testing;
- Recovery can be increased to ~78% by introduction of a fines beneficiation circuit. However, a trade-off will be required to compare the increase in recovery against the required CAPEX increase;
- The total execution duration for the Spiral Plant has been estimated to be approximately 11.5 months;
- The DFS includes for the standard bulk infrastructure supply and other services normally associated with open cast mining in Southern Africa;
- ORP received confirmation from Nampower, that the mine can be fed up to 2.7MVA from the substation located at the town of Warmbad. The DFS includes for ~40 km 33 kV line from the Warmbad substation;
- A good, unsealed (gravel), access road exists to the operational offices;
- ORP elected to source water via a pipeline from Warmbad instead of extracting water from local underground aquifers;
- The WRD is positioned to the south of the EF-pits to save on haul distances from the three open pits;
- The majority of the waste rock from the open cast pits are deposited on the WRD, with a portion of the waste rock being used to backfill the D-pit and to construct the toe wall, attenuation berms and energy dissipaters of the WRD;
- A stream diversion is required as the D-pit is positioned within an ephemeral river course;
- The beneficiation of the pegmatite ore produces fine and coarse tailings which are separately stored since it is planned that the fine tailings will be sold to a third party (Hebei) as lithium RoM tailings;

- A suitable site for the disposal of the fine and coarse tailings has been identified to the north-west of the Spiral Plant, within a short haul distance;
- The tailings are contained by perimeter embankments, with perimeter drainage measures to control any runoff and seepage from rain events;
- The DFS design and cost estimation includes for stormwater. The rehabilitation of the coarse tailings facility includes the flattening of the side slopes to 1V:3H;
- The tantalum outlook continues to remain robust, regardless of its international supply chain scrutiny. Its application in electronics, aircraft, medical, and especially thermal batteries assure its continued global consumption;
- Tantalum supply is poised to grow strongly due to lithium battery demand over the coming years. Argus predicts that on balance, supply is likely to outgrow demand, although the impact of a stable and secure supply should not be overlooked and could potentially spur faster demand growth;
- After a small dip in tantalum prices toward the end of 2021, it has rallied on the current geopolitical situation to average US$202.50/kg (25% Ta_2O_5 inclusive of CIF delivered to main port Europe) in March 2022;
- ML 223 authorise ORP to commence development work towards mining operations for base and rare metals, industrial minerals and precious metals for 15 years (19th May 2022 to 18th May 2037);
- ORP was granted an ECC 02187 to undertake the proposed development of the Swanson Mine, and to commence with activities specified in their Environmental Assessment Report and the filed EMPR;
- The Environmental Management Principles and proposed mitigation measures, outlined in the EMPR, is standard for mining operations within Namibian. These do not impose any stricter requirements on ORP for the development of the proposed Swanson Mine. Similarly, proposed monitoring, auditing and reporting to ensure compliance with the EMPR and recommended closure and rehabilitation activities post mining, conforms to standard mining practices;
- The Environmental Scoping Report by Impala Environmental Consulting concludes that the proposed Swanson Mine has great potential to improve livelihoods and contribute to sustainable development within the area surrounding the town of Warmbad; and potential negative impacts associated with the proposed Swanson Mine are expected to be low to medium in significance;
- The independent legal opinion by ENSafrica opine:
    - ORP is the sole holder of ML 223, which, has been validly granted and issued on 19th May 2022 for fifteen years, subject to certain terms and condition, in respect of base and rare metals, industrial minerals and precious metals;

  - ENSafrica found no records indicating that ORP has been placed into provisional or final liquidation or judicial management, or that any resolution for ORP's liquidation or winding-up has been passed, nor have we found any records indicating that there are legal proceedings for the provisional or final liquidation or judicial management of ORP pending before the High Court of Namibia;
  - ORP was issued an ECC on 19th May 2022, to undertake "The Proposed Development of a Tantalite Mine in the Karas Region, Southern Namibia". The certificate expires on 14th May 2025; and,
  - the Register of Mineral Licences records no encumbrances over ML 223.
- The DFS cost estimates qualifies as AACE Class 3, in accordance with Recommended Practice 47R-11;
- The accuracy of the cost estimates has been assessed at between +15% and -15%. The overall contingency provision for CAPEX and OPEX are 10.0% and 7.5%, respectively;
- All cost, commodity princes and exchange rates are as the DFS Base Date of 31st March 2023. The cost estimates applied a 4.0% escalation to allow for price increases from estimation completion in Q3 2022 to the DFS Base Date;
- DFS costs are based on contractors performing the mining and the operation and maintenance of the Primary/Secondary Crushing Plant and Spiral Plant;
- The total CAPEX for the Swanson DFS was estimated to total US$9,870,850. This cost includes accuracy provisions and excluding Owner's contingency allowance which has been estimated at 5.0% of the total CAPEX. The 10.0% contingency has been included separately in the DCF model;
- The Swanson DFS OPEX consist of a fixed monthly and a variable component. The variable component is charged on a per ton basis;
- The fixed monthly OPEX equates to US$283,304 per month. The variable costs equate to about US$28.60/t RoM processed;
- Using the Cash Flow Approach the proposed Swanson Mine has an 100% attributable value range of between US$8.0 million and US$11.0 million at a 8% real discount rate, to the post-tax un-escalated cash flows;
- The undiscounted IRR varies between 24% and 27%;
- Since the NPV is positive, it can be concluded that:
  - Mineral Resources and Ore Reserves can be declared since it meets the JORC-code (2012) definition of having "reasonable prospects for economic extraction"; and,
  - excluding other material factors, the proposed Swanson Mine can proceed to the next phase basic engineering and design.

- The overall risks rating to develop the Swanson Project and operate the proposed Swanson Mine is acceptable for a DFS and is classified as moderate to low since:
  - the geology is well understood;
  - mining will be by low-risk open cast method. However, to note is the high variability between the D-pit and EF-pits and increasing stripping ratios at depth;
  - the design of the Spiral Plant is "modular" and is based on a simplistic process flow with a short execution schedule that require relative low CAPEX and OPEX;
  - the Swanson Project is located in a country with low-risk rating and has an established mining industry; and,
  - the Swanson Project produce a commodity that has extensive applications in the growing electronics market, that will be a reliable source of supply from an area not associated with the finance of armed conflict or using forced labour.

1.24 Recommendations

The following are recommended to improve understanding, decrease risk, and improve the engineering and design. It is proposed to perform these prior to commencement of basic engineering and design:

- Some highly prospective areas on EPL 5047 have not been surveyed and has the potential to increase the 1st May 2022 Mineral Resource Estimate;
- Additional drilling to increase the classification of the Inferred Mineral Resources can extend the LoM;
- Drilling to increase the classification to the Measured category will improve confidence and reduce uncertainty;
- Down-hole structural logging of orientated boreholes is recommended to better understand the nature and true displacement of the faults and structures;
- Upgrading of the Inferred Mineral Resources can allow conversion to Ore Reserves and improve the LoM;
- The Ore Reserve is sensitive to the geotechnical assumptions regarding overall slope angles. Geotechnical assumptions should be continually assessed as mining of the D-pit commences for potential cost reduction and ore extraction. Due to the nature of mining being against a hillside, overburden stripping can easily be accelerated or reduced, as required;
- Optimisation of the production schedule is possible. The current mine production schedule focus to first mine the D-pegmatite that has a lower Ta_20_5 but higher Li_2O and lower strip ratio. This is then followed by mining of the EF-pits. This schedule does result in some high and erratic stripping volumes that will require smoothing to yield a operational schedule;

- It is recommended that a detailed trade-off study be performed to smoothing waste stripping versus the benefit of prioritising mining from the D-pit that has lower Ta_2O_5 and higher Li_2O grades;
- By crushing to a smaller top size (<600 µm) there is recovery upside. This will require further testwork after the plant is operational. Consequently, it is proposed that the VSI should be designed to crush to a top size of 600 µm and that space is left for a possible future milling circuit to <212 µm;
- During the next phase, detail engineering and design, the plant configuration should be optimised with regards to grind and screen sizes;
- Additional tailings testwork is required to perform the basic engineering of the tailings handling and dewatering circuit;
- The opportunity exists to increase the tantalum recovery by introducing a fines beneficiation step. The addition of a fines circuit to recover Ta_2O_5 lost to the spiral tails can add an additional 10% to 13% recovery. However, will require additional CAPEX and as such a trade-off will be required to assess the increase in cost versus revenue improvement;
- The opportunity exists to reduce the CAPEX and OPEX of the Spiral Plant and to improve recovery. The DFS identified the following value engineering initiatives that could realise these benefits:
    - valuation of instrumentation requirements;
    - fines beneficiation;
    - finer grinding of coarse tails; and,
    - tailings handling and water recovery.
- Bulk water, electricity and access road require geotechnical and topographical surveying before commencing of basic engineering to ensure appropriate design and accurate cost estimation;
- Perform further assessment of the geochemical profile, physical characteristics and properties of the fine and coarse tailings. Long-term kinetic testing is proposed to assess pollutant release to determine appropriate mitigation measures;
- Undertake slope stability analysis on the respective tailings streams and confirm the design criteria to ensure correct detail engineering and design;
- Optimisation of the required footprint of the fine tailings since the DFS propose selling the fine tailings as lithium RoM tailings and thus different footprint size may be required should this option not materialise;
- Undertaken flow modelling and analysis of the ephemeral river course to determine the peak flood discharge to assess the required capacity of the diversion measure;
- Undertake a detail engineering and design of the diversion measure of the ephemeral river course;

- Assess the potential release of nitrates from the waste rock as a resulting of the blasting activities to assess the need and to propose appropriate mitigation measures;
- Undertake slope stability analysis of the waste rock material and confirm the design criteria to ensure correct detail engineering and design;
- Due to the opaque nature of the tantalum industry and market it is recommended that ORP have the Argus Tantalite Market Report revised annually to ensure key technical and economical decision are based on the latest pricing, market dynamics and outlook and price forecasts. This will be a prerequisite for proper planning, budgeting and forecasting;
- Review the EMPR after basic and detail engineering to ensure conformance and to identify any changes that may require amendments or addendums;
- Review proposed monitoring, auditing and reporting to ensure compliance with the EMPR and recommended closure and rehabilitation activities post mining, to ensure compliance;
- It is proposed that prior to FID to update the various searches performed by ENSafrica to identify changes that can materially impact the FID;
- The legal opinion should be updated annually to ensure compliance with changes in mining, environmental and other applicable legislation;
- The Economic Analysis should be kept up to date with changes in costs, commodity prices and discount rate (risk) thereby ensuring decisions are correctly made and changes implement proactively to ensure the profitability of the Proposed Swanson Mine;
- Following detail and basic engineering the Economic Analysis should be updated to revise the economics of the Swanson Project, to proactively assess the need to implement cost improvements, or changes in operation and procurement strategies;
- All engineering disciplines should contribute throughout the basic and detail engineering phases towards the risk register which should be discussed during design review meetings and formal HAZOP to ensure appropriate mitigating or corrective actions are applied;
- To have influence on the design, it is proposed to keep the risk register up to date and to perform a HAZOP as a final check prior to finalising the detailed design;
- A HAZOP should also be performed during construction and installation to ensure recommendations are implemented; and,
- Also, a HAZOP should be performed regularly during the operational phase to identify modifications that should be implemented to reduce risk and operability problems.

2.0 INTRODUCTION

M.Plan International Limited (M.Plan), a Canadian mining and minerals advisory company, was engaged by duel listed, Australian Stock Exchange (ASX:AM7) and Frankfurt Stock Exchange (DAX:8OH), Arcadia Minerals Limited (Arcadia), to compile the results of a Definitive Feasibility Study (DFS), prepared by independent expert advisors, on the Swanson Tantalum and Lithium Project (the Swanson Project), into this Competent Person (CP) Report (CPR), hereafter referred to as "the DFS Report".

Arcadia is a Namibia focused diversified mineral exploration company mainly focussed on battery metals. Its projects comprise the flagship Swanson Project, the Kum-Kum Nickel Project, the Bitterwasser Lithium in Brines and Lithium in Clays Project and the Karibib Copper Project. The focus of the DFS Report is limited to only the Swanson Project.

Arcadia's interest in the Swanson Project is through their subsidiary, Orange River Pegmatite (Proprietary) Limited (ORP), in which Arcadia holds an 80% interest.

ORP is a Namibian registered company and sole owner of an exclusive prospecting licence (EPL) 5047 located in the Karas Region of the southern part of Namibia, some 15 km north of the Orange River, the border between Namibia and South Africa.

Arcadia engaged the DFS through their subsidiary ORP. As such, this report presents the DFS work as being performed by ORP and their independent expert advisors.

On 19th May 2022, ORP was granted a Mining Licence (ML) 223 on a portion of EPL 5047. ML 223 was granted for 15 years, subject to certain terms and conditions, in respect of base and rare metals, industrial minerals and precious metals. ML 223 comprises the area of the Swanson Project (the Swanson Property).

The Swanson Project neighbours the active tantalite mining operation (African Tantalum (Pty) Ltd) owned by Alternative Investment market of the London Stock Exchange (AIM) listed, Kazera Global Plc (AIM: KZG), which is located within the boundaries of EPL 5047. During December 2022, KZG announced that it had signed a definitive agreement to sell its 100% interest in African Tantalum to Hebei.

The focus of the DFS has been limited to the open-castable D, E and F-pegmatites since these pegmatites have been the subject of detailed exploration to date.

The DFS Report presents the results of the DFS and includes Mineral Resource and Ore Reserve Estimates (D-pegmatites and EF-pegmatites) for the Swanson Project which have been prepared in accordance with the guidelines of the 2012 edition of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves prepared by the Joint Ore Reserve Committee (JORC) of the Australasian Institute of Mining and Metallurgy, the Australian Institute of Geoscientists and the Minerals Council of Australia (the JORC Code).

On 23rd March 2023 a letter of intent (LoI) was concluded between ORP and Hebei to purchase the lithium containing Spiral Plant tailings (waste) when processing RoM material from the Swanson Mine D-pegmatite (Section 25.1). The Economic Analysis on the Swanson Project includes this additional revenue stream.

On 29th May 2023, Arcadia informed the market in a ASX Announcement that construction funding of not less than US$7 million has been secured from Hebei in return for an interest in the Swanson Project. The details of the ASX Announcement are summarised in Section 25.2.

The key terms of the construction funding are:

- Hebei is to construct a plant, infrastructure, roads and do mine development and commissioning of a multi gravity separation (MGS) Plant according to detailed engineering specifications to consistently produce a minimum 25% Ta_2O_5 concentrate from a minimum feed of 12,500mt per month; and,
- Hebei is to receive a 38% interested in the owner of the Swanson Mine, Orange River Pegmatite (Pty) Ltd.

Construction of the MGS Plant is to commence following the fulfilment of conditions pertaining to approval by the shareholders of ORP and the passing of the required resolutions by the directors of ORP and Hebei, which Arcadia expects to be completed before the end of May 2023.

2.1 Purpose and Scope of the Report

The purpose of this assignment was to compile the results of a DFS prepared by ORP's independent expert advisors on the Swanson Project into a JORC (2012) CPR.

The Swanson Project consist of the open cast mining of the D-pegmatite and EF-pegmatite deposits, primary and secondary contractor crushing and screening, a spiral concentrator plant, dry stacking of the spiral tailings and mine waste and associated bulk infrastructure supply and other services normally associated with open cast mining in Southern Africa.

The DFS includes engineering, design and capital expenditure (CAPEX) and operating expenditure (OPEX) cost estimation of the Swanson Project, in accordance with Class 3 of the Association for the Advancement of Cost Engineering (AACE), assessment of environmental and social impacts, an independent market assessment, legal opinion of the ML223 and the corporate status of ORP and an independent Economic Analysis in the form of a discount cashflow (DCF) model.

The advisors providing expertise in the different DFS specialist areas are outlined in

Table 2.1.

Table 2.1: Independent Expert Advisors for the DFS

Description	Expert Advisors
Geology and Mineral Resource estimation	Snowden Optiro
Mining and Ore Reserve estimation	Snowden Optiro
Contractor mining and crushing cost estimation	SPH Kundalila
Metallurgical testwork	CoreMet Mineral Processing
Process Plant engineering design and cost estimation	Obsideo Consulting
Spiral tailings and mining waste design and cost estimation	Prime Resources
Tantalite market assessment	Argus Media Group
Environmental studies and social impacts	Impala Consulting
Economic analysis	M.Plan International
Legal opinion of mining title and corporate status	ENSafrica

2.2 SITE VISIT

Table 2.2 outlines the CPs who visited the Swanson Property. Mr. Matthew Mullins (CP Mineral Resources) and Mr. Matthew Jarvis (CP Ore Reserves) from Snowden Optiro visited the site of the Swanson Project between 17th August and 20th August 2021. Mr. Peter Theron from Prime Resources visited the site between 7th March and 9th March 2022.

All site visits were accompanied by site and senior personnel from ORP.

The purpose of the visits was for the CPs to familiarise themselves with the general conditions of the site. Mr. Mullins and Mr. Jarvis also inspected the pegmatite exposures. In addition, Mr. Mullins also inspected the sampling in the field, and the borehole core.

Table 2.2: Site Visit Team Members

Name	Title	Responsibility	Site Visit
Matthew Mullins	Head of Advisory – EMEAA, Snowden Optiro	CP Geology and Mineral Resource	17th to 20th August 2021
Matthew Jarvis	Associate Consultant, Snowden Optiro	CP Mining and Ore Reserve	17th to 20th August 2021
Peter Theron	Principal Civil Tailings Engineer and Managing Director, Prime Resources	CP Tailings Storage and mining waste rock dump	7th to 9th March 2022
Lisias Negonga	Environmental Assessment Practitioner, Impala Environmental Consulting	CP Environmental studies and social impacts	7th to 8th May 2020

A total of 211.36 m of borehole core was viewed. The core had been stored in sturdy core boxes, in sturdy core racks, in a secure shed in the core yard. A diamond saw in good condition for splitting the core was inspected.

The following general observations were made:

- The core boxes were in good condition, markings were distinct, and sample intervals were clearly shown;
- The metagabbro into which the pegmatites intruded is competent, with the hanging wall sequence having a similar appearance to the footwall sequence, for each pegmatite;
- Hangingwall and footwall contacts are sharp and exhibit a distinct colour contrast with the gabbro;
- There was no evidence of shearing or movement along these contacts;
- A chill margin about 5 cm thick was observed in one hole only, indicating that the pegmatites in the majority were intruded into a hot sequence of rocks;
- The pegmatites themselves are white in colour, and dominated by quartz, sugary albite and micas;
- Tantalite was readily observed in all the core, as small, 2 mm to 5 mm long elongated laths with sharp crystal boundaries; and,
- Spodumene and lepidolite was observed in most of the cores.

An example of the borehole core is shown in Figure 2.1.

Figure 2.1: Box 2 of Borehole D1-DDH02 from 3.87 m to 8.84 m

Source: Snowden Optiro Report (August 2022).

The borehole number is clearly indicated on the side of the box, as are the hole coordinates, the box from and to depths, and the sampling undertaken. The core itself is clearly marked with the sample numbers, in this case samples Y0955, Y0956, and Y0957. From the top contact, metre-thick samples were taken, with the remnant thickness at the base of the core. Samples were taken of the pegmatite itself, and no samples were taken of the host rock.

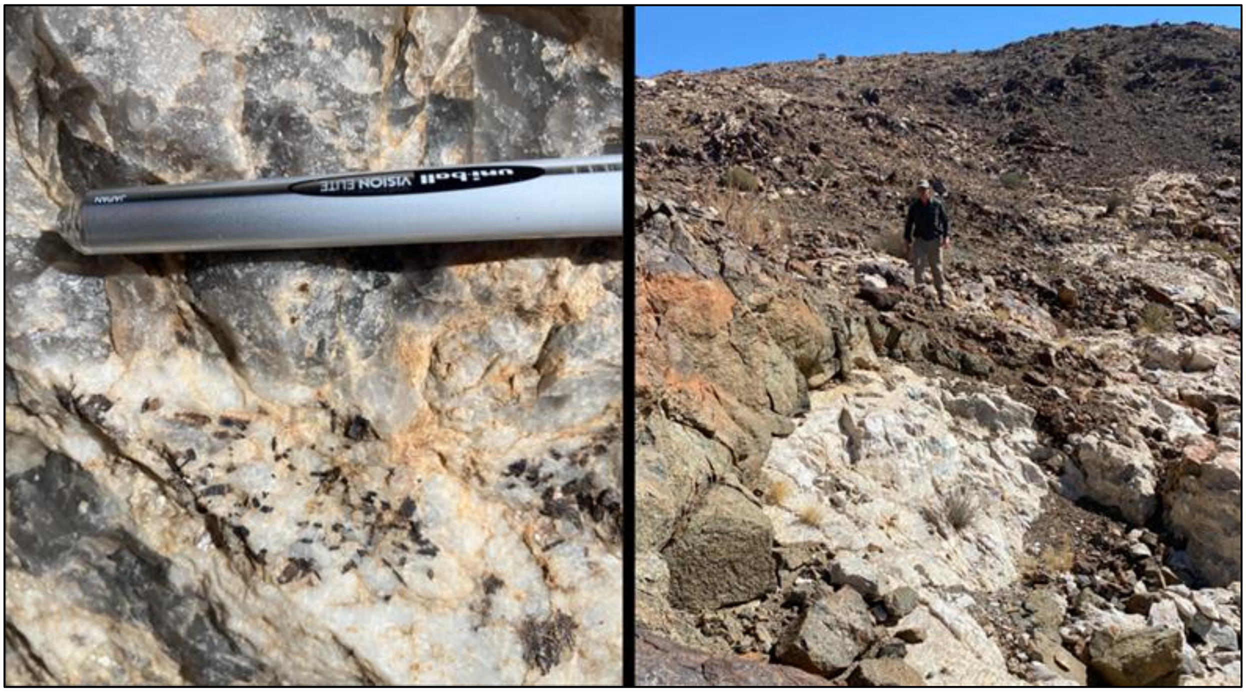
Borehole depths are clearly marked by green plastic chocks, enabling the efficient calculation of borehole recovery. In this example, and in other core observed, the host rock and the pegmatites comprise competent rocks, with a high (>95%) core recovery. Jointing can occasionally be viewed in the core.

The site visit by Snowden Optiro also comprised a visit to the E-pegmatite, F-pegmatite and D-pegmatite. The following observations were made:

- The pegmatites comprise regular tabular bodies, usually up to 2 m thick;
- The pegmatites thin towards the lateral extents of the main pegmatite swarm, and especially towards the mylonite zone;
- Hanging wall and footwall contacts are sharp, with a clear colour contrast;
- Individual pegmatites are laterally extensive;
- Bifurcation was observed in the area of the D-pegmatite;
- It is possible that the F pegmatite is the lateral equivalent of one of the E pegmatites;
- The pegmatites are crosscut by minor post-emplacement faulting, with throws of up to 2 m;
- Sampling positions and borehole collars are prominently marked;
- Placer sample positions from 1981 can be clearly seen;
- The vertical topographical differences were greater than expected, and will pose challenges from an access and a stripping ratio point of view; and,
- The plant location is on a flat area to the north of the pegmatite swarm and appears to be well chosen.

Figure 2.2 shows two views of the F pegmatite. On the left is a cluster of tantalite crystals, with the pen for scale. On the right the hangingwall contact of the pegmatite can be clearly seen.

Figure 2.2: Clustered Tantalite Crystals (F) and the Hangingwall Contact of the F Pegmatite (Looking West)



Source: Snowden Optiro Report (August 2022).

Figure 2.3 shows a view looking west of the E pegmatite swarm. The pegmatites are clearly tabular, laterally persistent, and cut by minor faulting.

Figure 2.3: View of the E Pegmatite Swarm (Looking West)

Source: Snowden Optiro Report (August 2022).

General observations made by Snowden Optiro from the site visit include the following:

- Access to the site is excellent, with only the last 5 km being on recently completed dirt roads;
- The proposed plant site is a well situated and chosen flat area;
- Water supply will be from the Warmbad artesian wells;
- The topography will be challenging; and,
- The exploration camp, activities and offices are well organised.

2.3 Competent Persons and Responsibilities

Table 2.3 present the details of the CPs responsible for the various sections of the DFS Report. All the CPs meet the requirements defined by the JORC Code (2012).

2.4 Reliance on Other Experts

In generating the DFS Report, M.Plan relied on ORP's independent expert advisors (see Table 2.3), the CPs and their respective Sections as outlined in Table 2.3, and the following Subject Matter Specialist:

- Argus Media Group (Argus Media), compiled a Tantalite Market Report, dated March 2022 (Section 19.0);
- ENSafrica (Namibia) (ENSafrica), performed a legal opinion of the mining title and corporate status, dated 23rd August 2022 (Section 3.1); and,
- SPH Kundalila estimated contractor mining and contract crushing and surface material handling costs (Section 21.2.5).

The conclusions and recommendations in the DFS Report reflect the CPs best judgment considering the information available to them at the time of writing. The CPs and M.Plan reserve the right, but will not be obliged, to revise the DFS Report and conclusions if additional information becomes known to them after the date of the DFS Report. Use of the DFS Report acknowledges acceptance of the foregoing conditions.

Table 2.3: Competent Persons, Responsible Sections, Qualification and Associations

Section	Company	Competent Person	Qualifications	Associations
1.0 Executive summary	All	Each respective CP	n/a	n/a
2.0 Introduction	M.Plan	Derick R. de Wit	MBA, BTech (Chem. Eng.), PMP (PMI®)	FAusIMM, FSAIMM
3.0 General information				
4.0 Property description and location	Snowden Optiro	Matthew Mullins	BSc (Hons) (Geology)	FAusIMM, FSAIMM, FGSSA, FGSL, Pr. Sci. Nat.
5.0 Accessibility, climate, local resources, infrastructure, etc.				
6.0 History				
7.0 Geological and mineralization				
8.0 Deposit type				
9.0 Exploration				
10.0 Drilling				
11.0 Sample preparation, analyses and security				
12.0 Data verification				
13.0 Mineral processing and metallurgical testing	CoreMet	Jac Grobler	M Eng (Met. Eng.)	Pr Eng ECSA
14.0 Mineral Resource estimation	Snowden Optiro	Matthew Mullins	See 4.0 above	
15.0 Ore Reserve estimation		Matthew Jarvis	BSc Eng (Mining), MBA	MSAIMM
16.0 Mining methods				
17.0 Recovery methods (Spiral Plant)	Obsideo Consulting	Derick R. de Wit	See 2.0 above	
18.1 to 18.3 Bulk supply infrastructure and access road	M.Plan	Derick R. de Wit	See per 2.0 above	
18.4 Tailings storage facility and waste rock dump	Prime Resources	Peter Theron	B Eng (Civil Eng.), GDE	Pr Eng ECSA, MSAIMM
19.0 Market assessment	M.Plan	Derick R. de Wit	See 2.0 above	
20.0 Environmental studies and social impacts	Impala Consulting	Lisias Negonga	BSc (Hons) Geology	MSGA and MSEG
21.0 CAPEX and OPEX cost	M.Plan	Derick R. de Wit	See 2.0 above	
22.0 Economic analysis				
23.0 Risk identification				
24.0 Adjacent properties	Snowden Optiro	Matthew Mullins	See 4.0 above	
25.1 Offtake	M.Plan	Derick R. de Wit	See 2.0 above	
25.2 Construction funding	M.Plan	Derick R. de Wit	See 2.0 above	
25.3 Other (Benchmarking)				
26.0 Interpretation and conclusions				
27.0 Recommendations				

2.5 Sources of Information and Data

M.Plan has not reviewed any of the documents or agreements under which ORP holds ML 223 that is the subject of the DFS Report. M.Plan offers no opinion as to the validity of the mineral titles claimed. A description of the properties, and ownership thereof, is provided for general information purposes only. The existing environmental conditions, liabilities and remediation have been described where required by the JORC Code (2012). These statements also are provided for information purposes only and M.Plan offers no opinion in this regard.

Additional sources of information are found in Section 30.0 References.

2.6 Previous Competent Persons Reports

Arcadia has previously published the following CPRs on the Swanson Property:

- Dr Johan Hattingh, Director of Creo Design, issued an independent geological report on the geology and exploration results of the Swanson Property in March 2021, and this report was incorporated in Arcadia's ASX listing prospectus dated 15th April 2021;
- Snowden Optiro issued a report in October 2021 which described the geology, exploration activities and Mineral Resources of the Swanson Project. The exploration results were based on the compilation and sign-off undertaken by Dr Hattingh, and the Mineral Resources were based on the geological modelling and grade estimation undertaken by Snowden Optiro.
- Snowden Optiro issued a report in May 2022 that outline the 1st May 2022 Mineral Resource Estimate for the Swanson Project, and incorporates drilling undertaken between October 2021 and March 2022.

During Q3 2021 M.Plan was engaged by Eos Capital (Proprietary) Limited (Eos Capital) to perform an independent fatal flaw and material due diligence review of the Scoping Study on the Swanson Project. M.Plan has no other involvement with the Swanson Project, or the properties or deposits comprising the Swanson Project and has not authored or provided any inputs to any previous CPRs.

2.7 Units and Measurements

The units used in the DFS Report are metric and the currency used is the Canadian Dollar (CAD) unless otherwise stated.

Table 2.4: Definition of Units

Unit	Definition
%	Percent
˚C	Degree Celsius
g/L	Gram per litre
kg/m^3	Kilogram per cubic metre
km	Kilometre
km^2	Kilometre squared
kPa	Kilopascal
kt	Kilo tonnes
kV	Kilovolt
kW	Kilowatt
m	Metre
m^3/d	Cubic metre per day
mg/L	Milligram per litre
m^3/h	Cubic metre per hour
m/L^3	Metre per cubic litre
m^3/m	Cubic metre per metre
m/s	Metre per second
mm	Millimetre
M/t^2	Metre per squared tonne
Pa.s	Pascal-second (pascal=one newton per square metre)
ppb	Parts per billion
ppm	Parts per million
t	Tonne

2.8 GLOSSARY AND ABBREVIATIONS

A glossary of terms and abbreviations are provided in Section 31.0.

3.0 GENERAL INFORMATION

This section contains general information related to the Swanson Project, in particular the Namibian environmental and governmental licensing regime, the required licences to commence development work towards the mining operation of the proposed Swanson Mine, and the legal ownership (holdership) of ML 223.

ENSafrica was engaged by ORP to perform an independent legal opinion in respect of the holdership of ML 223, and the corporate status of ORP.

ENSafrica reports, advises and opines, as the case may be, in a "Corporate Status and Mining Title Opinion", dated 23rd August 2022 (the ENSafrica Opinion). The ENSafrica Opinion is based on documents made available to and inspected by ENSafrica. In addition, ENSafrica conducted further searches of public registers and have also considered the laws regarded necessary for the purpose of performing the engagement.

The following sections are based on the ENSafrica Opinion.

3.1 MINERAL LICENCING REGIME

In terms of Article 100 of the Constitution of the Republic of Namibia, 1990 (the Constitution) all natural resources below and above the surface of the land, in the continental shelf, within the territorial waters and the exclusive economic zone of Namibia shall belong to the State if they are not otherwise owned.

In 1992 the Namibian parliament enacted the *Minerals (Prospecting and Mining) Act*, which established the current mineral rights licensing regime in Namibia, and which regime is administered by the Minister of Mines and Energy (the Minister). The essential features of the system are as follows:

- In terms of section 2 of the *Minerals (Prospecting and Mining Act),* 1992, all rights in relation to the reconnaissance, prospecting for or mining and sale or disposal, and the exercise of control over any mineral or group of minerals vests in the State, unless they are otherwise owned.
- In terms of section 3 (1) (a) of the *Minerals (Prospecting and Mining Act),* 1992, no person may carry out any reconnaissance operations, prospecting operations or mining operations in, on or under any land in Namibia, except under and in accordance with a mining claim or a mineral licence.
- In terms of section 3 (1) (b) of the *Minerals (Prospecting and Mining Act),* 1992, no person may transfer a mining claim or a mineral licence, or grant, cede or assign any interest to any other person, or be joined as a joint holder of such mining claim or mineral licence otherwise than in writing and with the approval in writing of the Minister.

- In terms of section 1 of *the Minerals (Prospecting and Mining) Act,* 1992, a mineral is any substance, whether in solid or gaseous form, occurring naturally in, on or under any land and having been formed by, or subjected to, a geological process, but excludes water, petroleum, and also clay, gravel or stone when used for certain described purposes.

It must be noted that the holder of a mineral licence granted and issued in terms of the *Minerals (Prospecting and Mining) Act,* 1992, essentially holds a bundle of rights against and obligations towards the State, but that such rights are not rights in land per se.

3.1.1 Types of Licences

In terms of the *Minerals (Prospecting and Mining) Act,* 1992, there are two main categories of licences relating to minerals, Category 1 and Category 2.

3.1.1.1 Category 1

Non-Exclusive Prospecting Licences and Mining Claims, which are reserved for Namibian citizens or corporate entities in which only Namibian citizens may hold an interest. These licences are issued by the Mining Commissioner.

3.1.1.2 Category 2

Mineral licences, under which category fall the following licences: exclusive prospecting licences (EPLs), reconnaissance licences (RLs), exclusive reconnaissance licences (ERLs), mining licences (MLs) and mineral deposit retention licences (MDRLs).

In terms of the *Minerals (Prospecting and Mining) Act,* 1992, the licences referred to in the DFS Report in paragraph 3.1.1.1 and 3.1.1.2, respectively, are to be granted by the Minister, and to be issued by the Mining Commissioner. In practice, however, and since the inception of the *Minerals (Prospecting and Mining) Act,* 1992, the Mining Commissioner has executed the so-called "*Notice of Preparedness to Grant*" (presumably on behalf of the Minister) and the Minister has issued the mineral licence by executing the final document evidencing the mineral licence.

3.1.2 Eligible Licence Holders

In terms of section 46 of the *Minerals (Prospecting and Mining) Act,* 1992, mineral licences and interests in mineral licences may only be granted to the following:

- A Namibian citizen who has reached the age of 18 (eighteen) years; or,
- A company incorporated under the laws of Namibia, including an external company.

There is no restriction on the percentage of foreign shareholding in a Namibian company holding a mineral licence.

3.1.3 Mining Licences

Mining Licences are granted and issued under Part XII of the *Minerals (Prospecting and Mining) Act,* 1992.

In terms of section 90(1) of the *Minerals (Prospecting and Mining) Act,* 1992, the rights of the holder of an EPL comprise inter alia the entitlements to the following:

- Carry on mining operations in the mining area to which such licence relates for such mineral or group of minerals as may be specified in such licence;
- Carry on in such mining area any mining operations and any prospecting operations in relation to any mineral or group of minerals;
- To remove any mineral or group of minerals other than a controlled mineral or sample of such mineral or group of minerals, for any purpose other than sale or disposal, from any place where it was found or won or mined in the course of mining operations or found or incidentally won in the course of prospecting operations to any other place within Namibia;
- Remove, with the permission of the Mining Commissioner, minerals or groups of minerals for various purposes (for example sampling, sale or disposal) from Namibia;
- Construct accessory works; and,
- Sell or dispose of minerals or groups of minerals with the permission of the Mining Commissioner.

In terms of section 90(2) of the *Minerals (Prospecting and Mining) Act,* 1992, the holder of a Mining Licence shall not erect or construct any accessory works without the prior permission in writing of the Commissioner.

In terms of section 94 of the *Minerals (Prospecting and Mining) Act,* 1992, a Mining Licence may be granted and issued for an original period of 25 years or shorter period which in the opinion of the Minister represents the estimated LoM or for such further periods not exceeding 15 years at a time, which in the opinion of the Minister represents the remaining period of the estimated LoM.

Sections 96(4) of the *Minerals (Prospecting and Mining) Act,* 1992 limits the Minister's powers to refuse renewal of a Mining Licence within the twelve-month period of renewal provided for by the *Minerals (Prospecting and Mining) Act, 1992*. By way of a generalised summary, the Minister may not refuse the renewal of a Mining Licence if the licence holder has complied with all the terms and conditions of the Mining Licence, has complied with the proposed program of mining operations, and expended the agreed expenditure.

In terms of section 94 (3) of the *Minerals (Prospecting and Mining) Act,* 1992, Mining Licences shall not expire during a period in which an application for the renewal of such licence is being considered, until such application is refused, is withdrawn or lapses.

Various conditions attach to the Mining Licence, the principal sources are as follows:

- The general provisions of the *Minerals (Prospecting and Mining) Act,* 1992 applicable to all Mining Licences; and,
- The general statutory licence conditions contained in section 50 of the *Minerals (Prospecting and Mining) Act,* 1992, applicable to all EPLs. These include, inter alia, the principal obligations to:
    - Exercise all rights under the licence reasonably and in such a manner that the interests of the owner of the land are not adversely affected;
    - Give preference to Namibian citizens in employing employees;
    - Carry out training programmes to encourage and promote development of Namibian citizens;
    - With due regard to technical and economic efficiency, make use of products or equipment manufactured or produced and services available in Namibia; and,
    - Prepare environmental impact assessments and environmental management plans.

The individual licence conditions contained in the licence documents (more specifically the "*Notice of Preparedness to Grant*"), also known as the Supplementary Terms and Conditions.

3.1.4 Cancellation of Mineral Licences

In terms of section 55 of the *Minerals (Prospecting and Mining) Act,* 1992 the Minister may by notice in writing addressed to a licence holder cancel a mineral licence in the case of:

- The non-compliance by the licence holder with the terms and conditions of the mineral licence or the provisions of the *Minerals (Prospecting and Mining) Act,* 1992; or,
- The winding-up of the licence holder if it is a company.

The Minister may, however, in the case of non-compliance, not cancel the mineral licence until such time as the Minister has addressed a written notice to the licence holder, specifying the particulars of the alleged non-compliance, and calling on the licence holder to make representations, and has taken into account any steps taken by the holder to remedy the non-compliance.

3.1.5 Environmental Issues

In terms of section 31(1) of the *Environmental Management Act,* 2007, and despite any other law to the contrary, a competent authority (including the Minister), may not issue an authorisation (including an EPL) unless the proponent (meaning the person intending to conduct a listed activity), in this case the licence holder, has obtained an environmental clearance certificate (ECC) under the *Environmental*

Management Act, 2007, and any authorisation issued contrary to section 31(1) is "invalid". In this regard:

- The provisions of section 31(1) of the *Environmental Management Act,* 2007 are inconsistent with the current practice and the obligations imposed on the holder of a Mining Licence, which usually involves the licence holder to prepare an assessment scoping study over the area, formulate and forward to the Ministry of Mines and Energy for approval an Environmental Management Plan Report within six months of the date of issue of a Mining Licence;
- In the experience of ENSafrica, and to their knowledge, and the experience of other mining law practitioners in Namibia, that in practice, it is not possible for the applicant of a mineral licence to access land to conduct an environmental impact assessment or environmental management plan for the purposes of obtaining an ECC. This essentially means that there can in fact, be no compliance with the provisions of section 31(1) of the *Environmental Management Act,* 2007 in respect of a Mining Licence;
- The *Minerals (Prospecting and Mining) Act,* 1992 distinguishes between the "grant" of a licence and the "issue" of a licence, and section 31(1) of the *Environmental Management Act,* 1992 can arguably mean that it is not the (administrative) grant of the mineral licence that is invalidated, but only the issue of the actual physical licence document; and,
- The Ministry of Environment and Tourism has been made aware of this issue, which would affect every mineral licence issued by the Minister since the 7th February 2012, and we are given to understand that the Ministry of Environment and Tourism is pursuing legislative retroactive effect intervention.

3.1.6 Land

In terms of section 52(1) of the *Minerals (Prospecting and Mining) Act,* 1992, the holder of a mineral licence shall not exercise any rights conferred upon such licence holder by the *Minerals (Prospecting and Mining) Act,* 1992 in, on or under any private land until such time as either:

- Such holder has entered into an agreement in writing with the owner of such private land, containing terms and conditions relating to the payment of compensation; or,
- The owner of such private land has in writing waived any rights to such compensation, and such agreement or waiver has been submitted to the Mining Commissioner.

Regulation 30 of the *Communal Land Reform Act,* 2002, states that every person who wants to carry out any prospecting or mining operations contemplated in terms of the *Minerals (Prospecting and Mining) Act,* 1992, on communal land must notify, prior to the making of any application in terms of the *Minerals (Prospecting and Mining) Act,* 1992, the Chief or Traditional Authority of the traditional community of his or her intention to apply for the aforementioned. In practice, however, this consent is not sought by mineral licence holders.

3.1.7 Registers

In terms of section 51 of the *Minerals (Prospecting and Mining) Act,* 1992, the Mining Commissioner is required to keep a Register of Mineral Licences. The Register of Mineral Licences only exists as a computer database at the Ministry of Mines and Energy, which can be inspected and from which printouts can be made.

Past experience has shown that the Register of Mineral Licences is not always in all respects accurate.

3.1.8 Assumptions

The ENSafrica Opinion is based on various assumptions as outlined in the ENSafrica Opinion, most notably are the following:

"3.1.6 where the Opinion Documents impose any duty or obligation on a party, that each party to such Opinion Documents, other than Orange River, has duly complied with the provisions, terms and conditions of the relevant Opinion Documents, and, more specifically, that Orange River has in respect of the Licences duly complied with any and all of their obligations in terms of the provisions of the *Minerals (Prospecting and Mining) Act*, 1992, and that Orange River is not in breach of any of their statutory or other obligations, and the terms and conditions applying to the Licences."

"4.18 We assume that the relevant conditions of the ECC have been (as far as possible, bearing in mind the recent issuance of the certificate) complied with to date and therefore opine that Orange River has duly complied with section 31(1) of the *Environmental Management Act*, 2007."

3.1.9 Executive Risk Summary

The ENSafrica Opinion reports, advises and opines, as the case may be, as follows:

- ORP is validly incorporated in accordance with and validly exists as a private company with limited liability under the laws of Namibia. More specifically, Orange River was incorporated under the *Companies Act*, 2004;
- ORP is the sole (100%) holder of ML 223, which, has been validly granted and issued;
- ML 223 was granted on 19th May 2022, over a certain portion of land situated in the Karas Region in the magisterial district of Karasburg in respect of base and rare metals, industrial minerals and precious metals;
- ML 223 is granted for a period of fifteen years, subject to certain terms and conditions and is in our opinion, active;
- ENSafrica was provided on 22nd August 2022, with a good standing certificate from the Business and Intellectual Property Authority in relation to ORP,

confirming that ORP is still operational, and the relevant annual duties have been paid;

- ENSafrica found no records indicating that ORP has been placed into provisional or final liquidation or judicial management, or that any resolution for ORP's liquidation or winding-up has been passed, nor have we found any records indicating that there are legal proceedings for the provisional or final liquidation or judicial management of ORP pending before the High Court of Namibia;
- ORP was granted an ECC on 19th May 2022, to undertake "The Proposed Development of a Tantalite Mine in the Karas Region, Southern Namibia". The certificate expires on 14th May 2025; and,
- The Register of Mineral Licences records no encumbrances over ML 223.

4.0 PROPERTY DESCRIPTION AND LOCATION

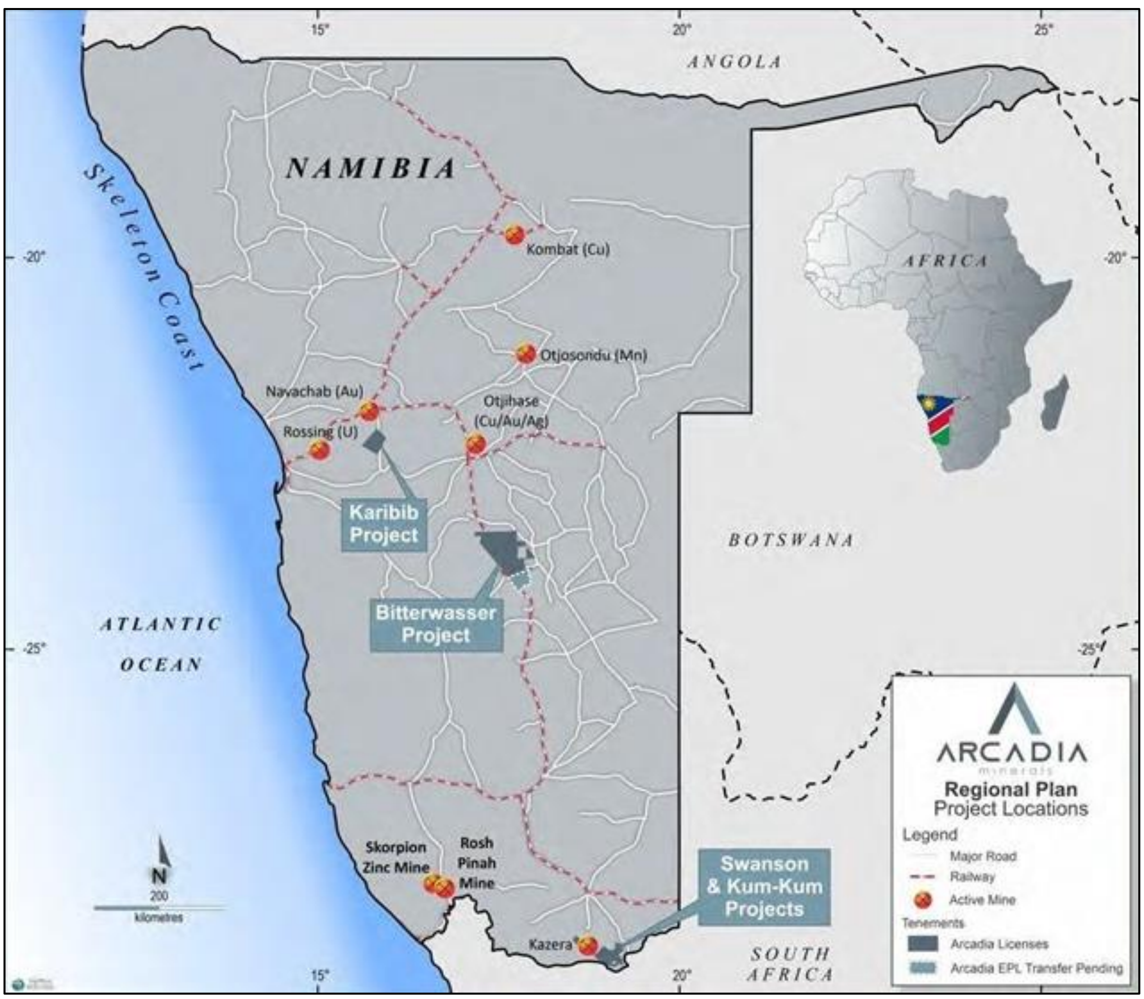
4.1 PROPERTY DESCRIPTION

Arcadia owns an 80% interest in the Swanson Project. The Acadia listing prospectus filed in June 2021 identified four exploration projects and associated minerals located in Namibia listed below:

- Swanson Tantalum and Lithium Project – tantalum and lithium;
- Kum-Kum Project – nickel, copper, and platinum group elements (PGEs);
- Karibib Project – copper and gold; and,
- Bitterwasser Project – lithium-in-brines and lithium-in- clays.

Figure 4.1 illustrates the locations of Arcadia's Projects in Namibia.

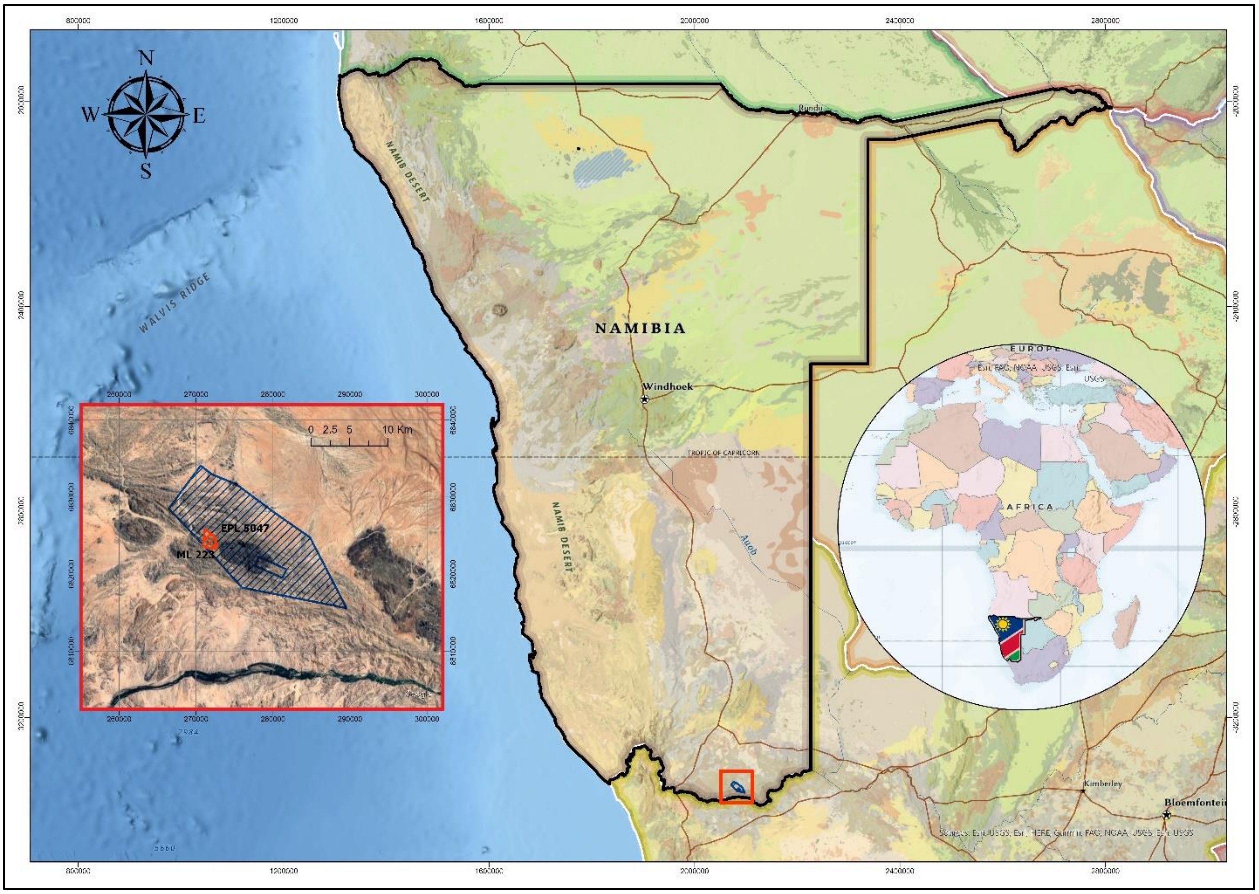
Figure 4.1: Location Map of Arcadia's Projects in Namibia



4.2 LOCATION

The Swanson Project area is located in southern Namibia, and is situated 100 km south of Karasburg, 30 km southwest of Warmbad and 15 km to the north of the Orange River. A location map of the licences of the Swanson Project is provided in Figure 4.2.

Figure 4.2: Location Map of the Swanson Project and Licences EPL 5047 and ML 223



ORP owns the EPL 5047 and ML 223 for the Swanson Project.

4.3 ORANGE RIVER PEGMATITE (PROPRIETARY) LIMITED

K Malherbe, a Senior Associate of ENSafrica, performed an independent examination of ORP's company documentation provided by the company secretary on 25th July 2022 and 23rd August 2022. He confirmed that the incorporation details of ORP, as reflected in the various Report Documents examined, are as follows:

- Name of the Company: Orange River Pegmatite (Proprietary) Limited;
- Registration Number: 2018/0020;

- Date of Incorporation: 18th January 2018;
- Registered Office: Unit 5 Bohemian Office, Erf 7650 Friedrich Giese Street, Klein Windhoek, Windhoek, Namibia; and,
- Postal Address: P.O. Box 25365, Windhoek.

On 22nd August 2022, ENSafrica were provided with a good standing certificate from the Business and Intellectual Property Authority in relation to ORP, confirming that ORP is still operational, and the relevant annual duties have been paid.

ENSafrica found no records indicating that ORP had been placed into provisional or final liquidation or judicial management, or that any resolution for ORP's liquidation or winding-up has been passed, nor did they find any records indicating that there are legal proceedings for the provisional or final liquidation or judicial management of ORP pending before the High Court of Namibia.

4.3.1 Share Capital Structure and Shareholding

According to the share register, the share capital structure of ORP is as follows:

- ORP's authorized share capital comprises of 10,000 (ten thousand) ordinary par value shares of NAD1.00 each (the Namibian Dollar (NAD) is pegged to the South African Rand (ZAR) at a rate of 1:1 The NAD1.00 equates to ~US$0.0546 at the exchange rate of NAD18.30/US$); and,
- ORP's issued share capital comprises of 7,000 (seven thousand) ordinary par value shares of NAD1.00 (US$0.0546) each.

According to the Register of Members Share Accounts the following are the ORP shareholders:

- Russell Brooks Limited holds 548 (five hundred and forty-eight) shares (7.83%);
- Willem Johannes Koekemoer holds 18 (eighteen) shares (0.26%);
- Johan van der Westhuizen holds 18 (eighteen) shares (0.26%);
- Albertus Pepler holds 91 (ninety-one) shares (1.30%);
- Laubser Pepler holds 46 (forty-six) shares (0.66%);
- Lisias Pius holds 80 (eighty) shares (1.14%);
- SPH Kundalila (Proprietary) Limited holds 546 (five hundred and forty-six) shares (7.80%);
- Morning-Star Ndapandula Omagano Champion holds 53 (fifty-three) shares (0.76%); and,
- Arcadia 5,600 (five thousand, six hundred) shares (80%).

4.4 LICENCES

4.4.1 Property Licence

The deposit area was originally part of an EPL 5047 which had an area of 19,672 ha, and was licensed for the prospecting of base and rare metals, industrial minerals (lithium and tantalum) and precious metals on the farms named Kinderzit 132, Umeis 110 and Norechab 130 (Figure 4.3).

Licence EPL 5047 was originally issued to Mr. Lisias Pius, a Namibian national on 30th January 2013; the licence was valid for 3 years from 18th December 2012 to 17th December 2015. Following ORP's assessment, an agreement was signed with Mr. Lisias on 11th October 2017. The EPL was then transferred to ORP during August 2018.

The EPL was renewed by the Minister and Mines and Energy on 8th May 2019 for a period of two years and valid until 9th May 2021. A renewal application was lodged with the Ministry of Mines and Energy on 29th January 2021, and this was granted on 4th June 2021 and renewed until 3rd June 2023.

During the renewal of the EPL 5047 licence the area was reduced from the original size of 19,672 ha to its current size of 14,672 ha. The apices for this licence are listed in Table 4.1.

Table 4.1: EPL 5047 Licence Area Apices

No.	Latitude (S)			Longitude (E)		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-28	46	12.57	18	50	40.01
2	-28	44	36.70	18	42	19.89
3	-28	39	25.12	18	37	5.65
4	-28	39	2.89	18	38	53.06
5	-28	39	11.31	18	39	41.87
6	-28	38	52.15	18	39	44.96
7	-28	38	33.29	18	38	4.97
8	-28	37	34.31	18	38	19.96
9	-28	37	54.08	18	39	54.91
10	-28	42	32.78	18	48	36.44

Subsequently ORP applied for ML 223, which is contained within the EPL 5047 licence area, to enable mining to commence on the deposit area (Figure 4.3). This licence was issued on 19th May 2022 and is valid until 18th May 2037. The licence area for ML 223 has an area of 312.9 ha. The apices for this licence are listed in Table 4.2.

Figure 4.3: Location Map of Licence No. EPL 5047 and ML 223

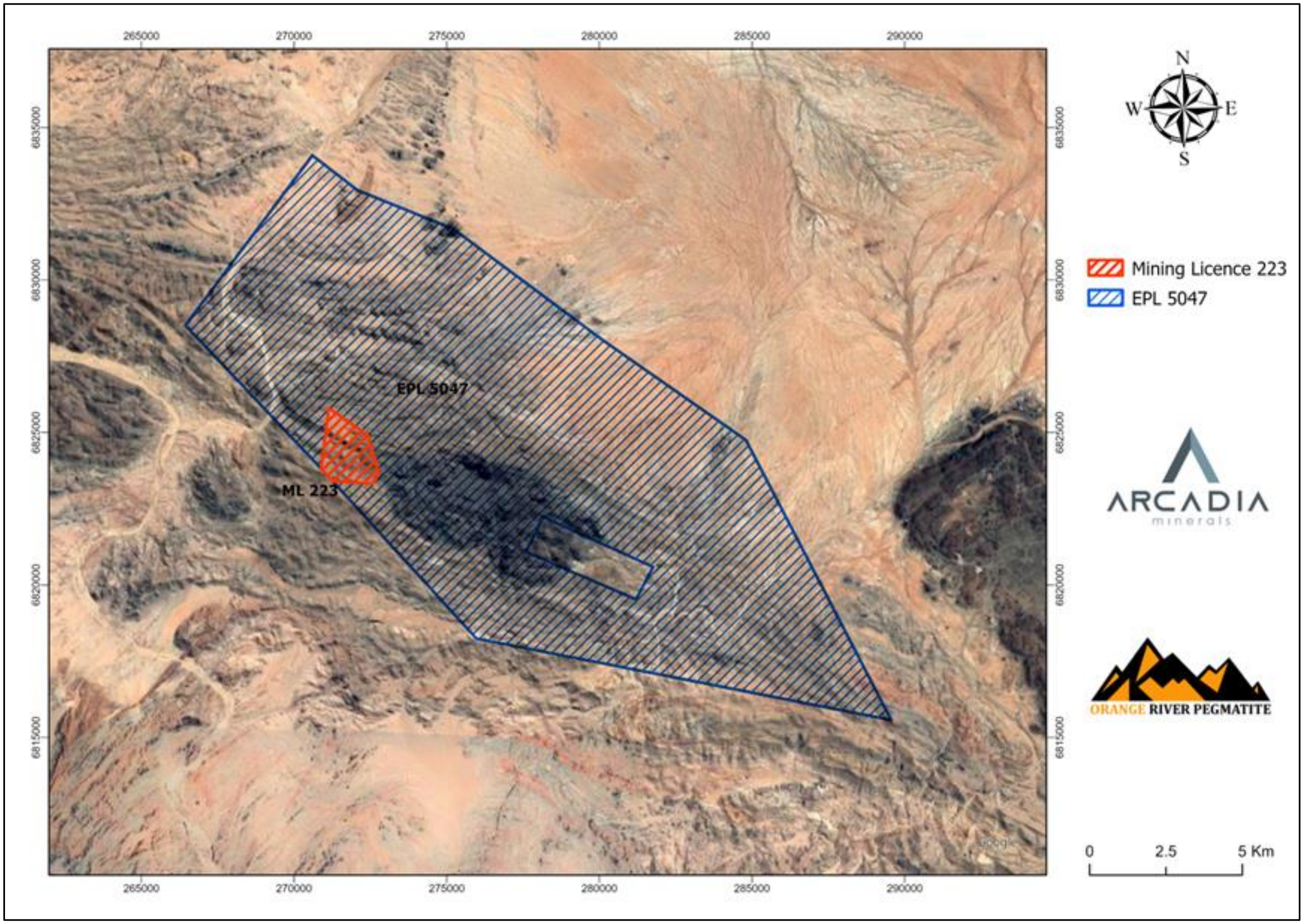


Table 4.2: ML 223 Licence Area Apices

No.	Latitude (S)			Longitude (E)		
	Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
1	-28	40	29.40	18	39	28.62
2	-28	40	58.92	18	40	15.00
3	-28	41	39.84	18	40	27.71
4	-28	41	50.70	18	40	20.24
5	-28	41	47.09	18	39	31.56
6	-28	41	33.33	18	39	17.88

K Malherbe of ENSafrica independently examined relevant extracts from the Register of Mineral Licences on the 22nd August 2022 from the Namibian Register of Mineral Licences. He confirmed that ORP is duly reflected in the Register of Mineral Licences as sole ("100%") holder of the ML 223 Licence.

A land-use agreement, including access to the property for exploration, has been signed with the owners of the farms Norechab 130, Kinderzit 132 and Umeis 110, which fall under ML 223.

4.4.2 Environmental Licence

In addition, K Malherbe of ENSafrica performed an independent examination of Environmental Records from the Namibian Register of Mineral Licences on the 22nd August 2022. He confirmed that ORP were issued with an ECC on 14th May 2022 to undertake "*The Proposed Development of a Tantalite Mine in the Karas Region, Southern Namibia*." This licence is valid until 14th May 2025.

5.0 ACCESSIBILITY, CLIMATE, LOCAL RESOURCES, INFRASTRUCTURE AND PHYSIOGRAPHY

5.1 ACCESSIBILITY

The Swanson deposit is located 100 km south of Karasburg and 250 km southeast of Lüderitz. Lüderitz is the nearest port. Although the B1 main national road from Noordoewer to Windhoek is some distance away, the area is serviced by well-maintained, secondary dirt roads which make the area accessible all year round. Access to the site is excellent, with only the last 5 km being on recently completed dirt roads. It is only on the property itself where access is poor and mainly restricted to farm and mountain tracks that require a 4x4 vehicle. The Karasburg – Lüderitz railway line is located 90 km to the north of the Swanson Property. Windhoek is serviced by daily commercial flights from South Africa.

5.2 CLIMATE

Namibia's climate is one of the driest in Africa, with sunny, warm days and cool nights, especially during the winter months. Nationally, the country has a semi-desert climate, with extreme heat in the months between December and March.

There are two rainy seasons, one during December and a second between January and April. The average annual rainfall varies from 250 mm in the southern region and the western highlands, to 700 mm in the extreme northeast.

The Swanson Property is located within an arid to semi-arid climatic area with an average rainfall that ranges between 50 mm to 100 mm per annum. It can be described as semi-desert with occasional thunderstorms experienced during the summer rainfall months of December to April. The average sunshine hours per day ranges between 9 hours to 10 hours. The annual average temperature is between 18°C to 19°C, however summer temperatures can exceed 50°C.

5.3 LOCAL RESOURCES

5.3.1 Electricity

As discussed in Section 18.3, ORP received confirmation from Nampower, the Namibian national electric power utility company, that the mine can be fed up to 2.7MVA from the substation located at the town of Warmbad.

5.3.2 Water

As discussed in Section 18.4, water will be sourced by pipeline from Warmbad.

5.3.3 Population

Labour is available from the nearby towns of Karasburg and Warmbad with populations of approximately 4,400 and 7,300, respectively. Karasburg and Keetmanshoop, situated approximately 270 km to the north, are able to supply most exploration requirements necessary to implement an exploration program. Major items can be sourced from Windhoek and what is not available there can be obtained in South Africa.

5.4 INFRASTRUCTURE

All the roads leading to the property are well maintained gravel roads and are passable all year round. It is only on the property itself where a 4x4 vehicle is required.

As part of the land use agreement, ORP has renovated an old farmhouse. This currently serves as the operational office and accommodation for key staff members. In addition, the necessary infrastructure was put in place for core and sample management of material recovered during the drilling program.

An on-site camp was created for ORP's sampling teams, drilling personnel and for general exploration items and equipment. These structures will be preserved to be used during operation of the proposed Swanson Mine.

ORP will negotiate directly will all suppliers of consumables such as grease, oil etc. to remove these materials for disposal once they have been used and need to be discarded. ORP will provide adequate temporary sanitary facilities and such facilities must be maintained in a hygienic condition. Sewerage must be disposed in a manner not polluting the environment. ORP will remove all refuse pertaining to the mining activities, domestic or otherwise, from the property. Domestic waste will be disposed of at a waste dump in Warmbad or Karasburg. ORP will undertake environmental rehabilitation, both during and at the conclusion of the mining operations. Unusable oil will be collected in drums and sold to dealers for recycling.

5.5 PHYSIOGRAPHY

On a national scale, three distinct regional features dominate the Namibian topography. The west of the country is characterized by a narrow coastal plain that extends inland for approximately 120 km, also known as the Namib Desert. An eroded escarpment, which forms part of southern Africa's great escarpment lies at the eastern edge of this coastal plain, stretching in a north-south direction from the Kunene River on the Angolan border, southwards and terminating against the Huab River. This plateau continues southwards towards the Orange River, on the border with the Republic of South Africa.

More locally the licence is located, at the nearest point, approximately 11 km to the north of the Orange River, with elevations ranging from 300 masl on the river to

850 masl within the higher topography areas. The area to the north and east of EPL 5047 is relatively flat and in the south the relief gradually slopes towards the Orange River. Uneven and high relief is present within the boundaries of EPL 5047, primarily as a result of the weather resistant, mafic and ultramafic rocks of the Tantalite Valley Complex that outcrops within the boundaries of EPL 5047.

Drainage systems in the deposit area form part of the head water streams of southward-draining tributaries of the Orange River. All the streams are perennial.

5.6 FLORA AND FAUNA

Vegetation is sparse, typically xerophytic and consists mainly of occasional karoo-type shrubs and succulents in rocky areas. This semi-desert environment also supports sparse grass cover, as well as camelthorn (*Acacia erioloba*), ebony and Shephard trees (*Boscia albitrunca*) in a shallow sandy soil. The camelthorn and ebony trees are normally more prevalent along the dry watercourses where underground water supports them. These trees are however common in the region.

The area includes numerous faunal species such as gemsbok, kudu, zebra and some other small game, but none of these species are exclusive to the study area.

6.0 HISTORY

Tantalum mineralisation has been known to occur in the area since the 1940s, and there is abundant evidence of historical extraction of economic minerals from pegmatites within the EPL 5047 licence area, although no production figures exist. The remains of permanent structures such as personnel accommodation and a processing plant is still evident. The Namibian Ministry of Mines reports workings here as far back as 1984.

Literature and previous exploration activities also refer to historic tungsten/scheelite mining that took place within the EPL 5047 licence area.

6.1 PREVIOUS EXPLORATION

Swanson Enterprises held various claims on the farms Kinderzit 132 and Umeis 110 within the EPL 5047 licence area and mined tantalite, beryl, spodumene and tungsten on these claims in the 1970s to early 1990s. The primary mining was for tantalum that took place on several shallow dipping pegmatites in the north-western strain shadow of the Tantalite Valley Complex (coinciding with the area identified by ORP).

In 1980, Southern Sphere Mining drilled 168 percussion holes to investigate several pegmatites in the Tantalite Valley. The tantalum-lithium pegmatite deposits on ML 77 are currently being mined by the AIM-listed company Kazera Global PLC.

6.2 PLACER DEVELOPMENT LTD EXPLORATION PROGRAMME

Following a field visit in March 1981, Placer Development Ltd (Placer), a Canadian company, initiated mapping and sampling exploration activities on the Swanson Property. These exploration activities were focused on the A to G pegmatites, named from west to east.

In August 1981, Placer reported on these activities. The pegmatites had been named A to G from west to east, and 91 samples were taken from the A to G pegmatites. Placer noted that the northerly extent of the pegmatites was marked by a mylonitic shear zone and speculated that the pegmatites occupied tension fractures developed adjacent to the shear. The strike of the pegmatites is northeast-southwest, the dip averaged between 15° to 20° to the southeast, and in the area of interest the pegmatite bodies averaged between 1 m and 3 m thick.

Placer noted two modes of tantalite occurrence:

- As medium to coarse grained crystals, associated specifically with spodumene, lepidolite, quartz and perthitic feldspar (rare); and,
- As very fine-grained acicular crystals, associated with albite-rich parts of the pegmatite.

Placer noted that the B2 pegmatite, known as the Witkop pegmatite, was the only one that showed distinct zoning. C1 and D4 showed possible zoning. All the pegmatites have a "ribbony or banded" appearance.

Of importance to the Mineral Resources estimate, Placer noted that the pegmatites were more continuous and less irregular where they intruded into the amygdaloidal lavas, schists and phyllites, and were more irregular where they intruded into acid volcano-sedimentary lithologies.

Four bulk samples were taken; from the B2, C2, D1 and A2 pegmatites from selected chip sample points with three to five tonnes of material obtained by drilling and blasting. From this material, a sample was obtained (every 10th shovel).

The programme concluded that the bulk of the tantalum mineralisation is disseminated and occurs as small crystals, averaging <1.0 mm. The larger crystals (1 cm to 3 cm) are rare and only occur locally, with the Ta_2O_5 grade and the Ta_2O_5: Nb_2O_5 ratio increasing from west to east.

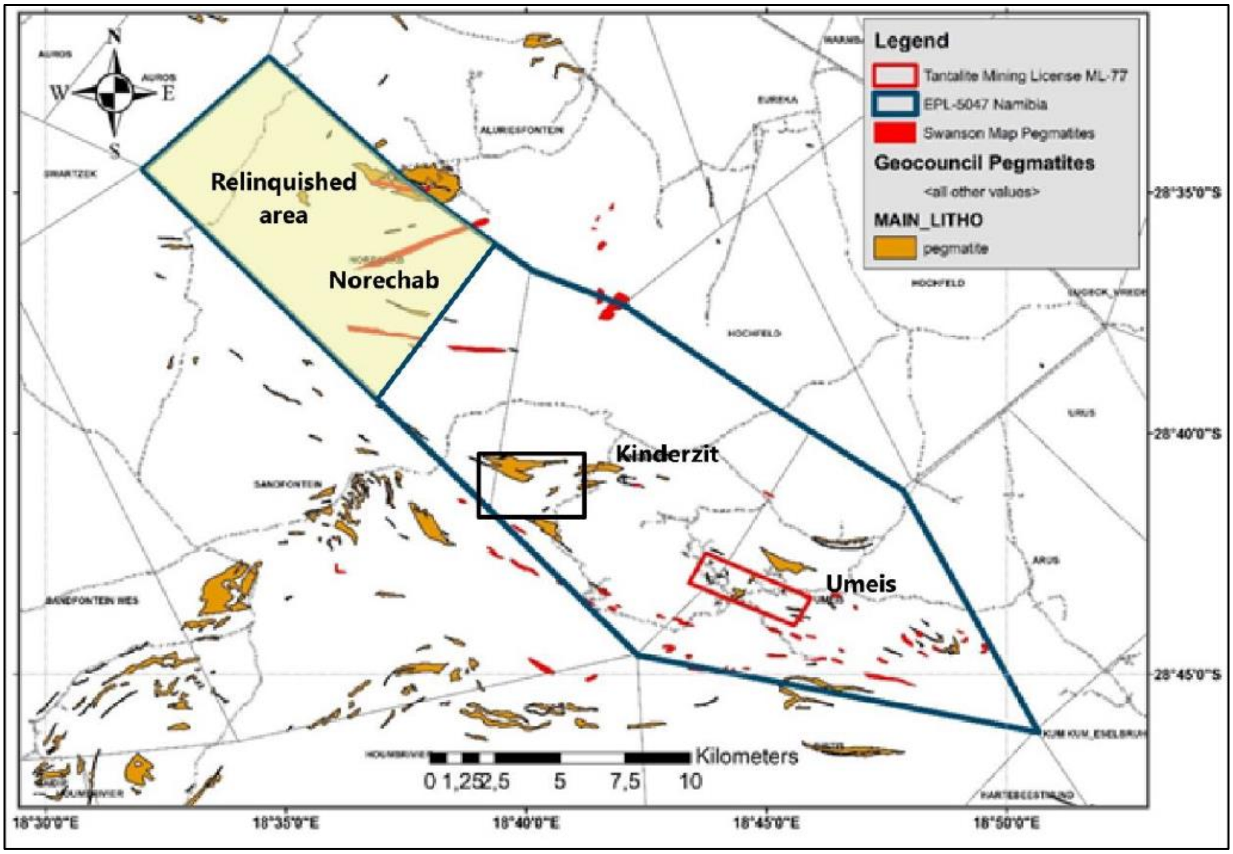
Placer identified "possible reserves" in the seven pegmatites of 2.5 Mt at a grade of 299 ppm Ta_2O_5, with 0 ppm Ta_2O_5 cut-off. This reduced to 0.9 Mt at a grade of 467 ppm Ta_2O_5, with a 300 ppm Ta_2O_5 cut-off. The highest Ta_2O_5 grades were found in the D-pegmatite and EF-pegmatites.

6.2.1 Geological Survey of Namibia Investigation

Although substantial historical reports are available for the area, the only additional work during more recent times was completed by the Geological Survey of Namibia in collaboration with the Council of Geoscience of South Africa. This was carried out as part of a five-year detailed mapping programme between 2012 and 2017 on a 1:50,000 scale conducted over large parts of Southern Namibia. The mapping included the EPL 5047 licence area, thereby providing detailed information of all the pegmatites that are present within the EPL 5047 licence area (Figure 6.1).

ORP purchased the geological database (ArcMap™ shape files) from the Geological Survey of Namibia which were subsequently re-interpreted by the company's principal geologist, Philip le Roux. The shapefiles were found to be accurate to approximately 5 m which was sufficient to identify all the known pegmatites.

Figure 6.1: Mapping Conducted by the Geological Survey of Namibia



Source: Arcadia June 2021 Prospectus.

7.0 GEOLOGY AND MINERALISATION

7.1 Regional Geology

The regional geology of the area has been well described by Kartun (1979), Lambert (2013), Hattingh (2019)[2] and Pepler (2021), amongst others.

According to Hattingh (2019)[2] the Namaqua Metamorphic Complex (NMC) in Namibia and South Africa forms the western sector of the 100 km to 400 km wide Namaqua-Natal metamorphic belt (Figure 7.1) that spans southward across the subcontinent. It forms a small, but significant segment of the global network of Grenville-aged orogenic belts that were created during the assembly of the supercontinent Rodinia in the late Mesoproterozoic (circa 1,350 Ma to 1,050 Ma).

Hattingh (2021)[2] refers to the Namaqua-Natal Metamorphic Province (NNMP) and describes the NNMP as the result of accretion of juvenile Mesoproterozoic (circa 1,600 Ma to 1,200 Ma) supracrustal and plutonic rocks and the reworking of existing Kheisian age (circa 2,000 Ma) continental crust along the southwest edge of the Archaean (>2,500 Ma) Kaapvaal Craton. The amalgamation has traditionally been interpreted to be the result of continent-continent and/or arc-continent-continent collisional tectonics that culminated between 1,200 Ma and 1,100 Ma (Lambert, 2013).

The final convergent/collisional stages are referred to as the Namaqua Orogeny and are thought to be dominated by early north-verging folding and thrusting followed by oblique trans-current shearing because of southwest-directed indentor tectonics. Subsequent deformation during the Neoproterozoic Pan African orogenic event is believed to have only affected the West Coast Belt.

Based on variations in depositional environments and metamorphic grade, the NNMP has been subdivided into various terranes and sub-provinces, separated by major structural breaks. The ages of structures of the purported terranes are, however, similar and both the presence and the significance of supposedly terrane-bounding faults remain controversial.

The presently accepted subdivision of the NNMP includes, from west to east, the Richtersveld Sub-Province, Bushmanland Sub-Province, Kakamas, Areachap and Kaaien Terranes (Lambert, 2013).

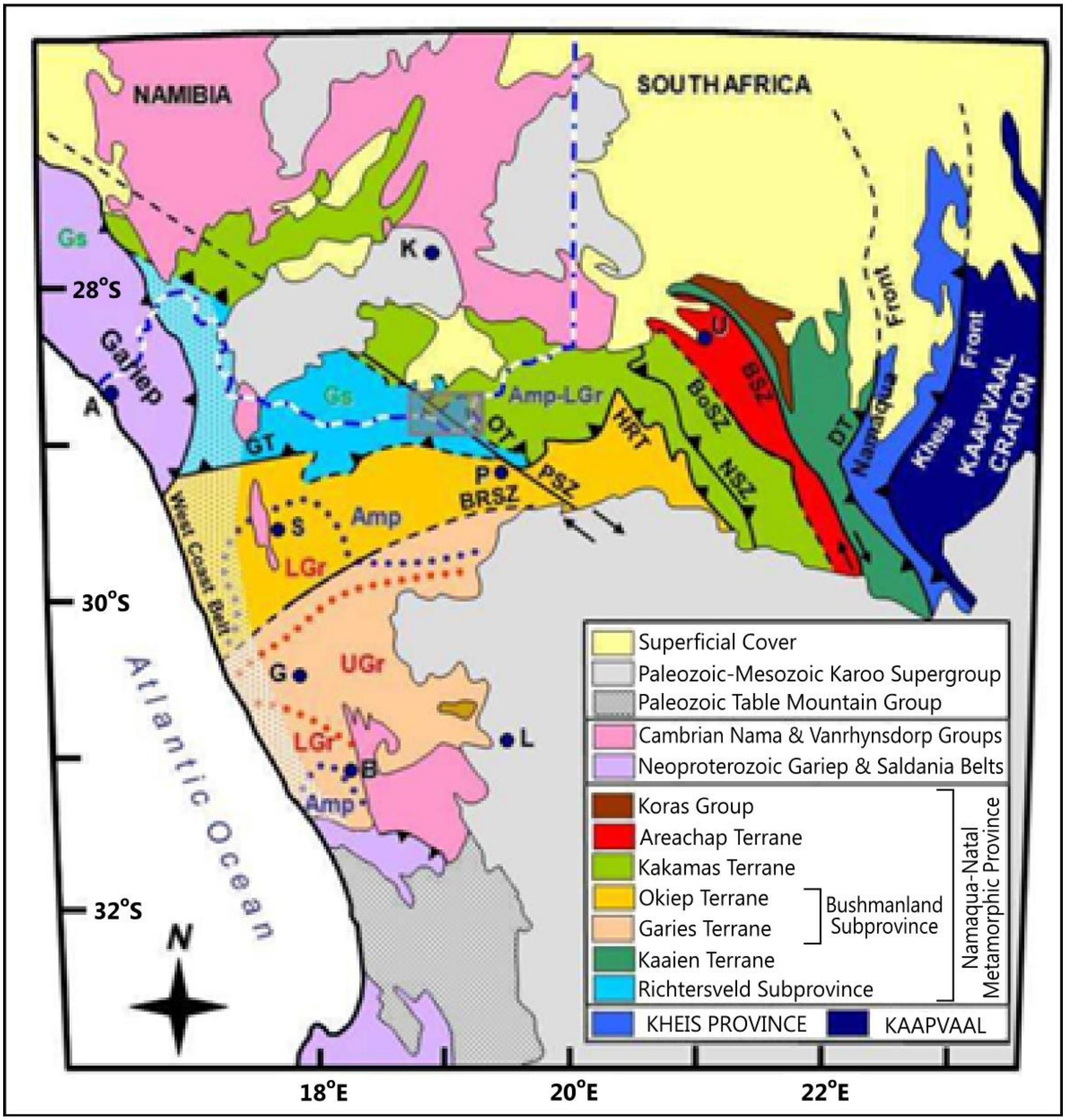
7.1.1 Richtersveld Sub-Province

The Richtersveld Sub-Province according to Hattingh (2019) represents a Palaeoproterozoic (1,700 Ma to 2,000 Ma) block within the NNMP that largely escaped Mesoproterozoic reworking, experiencing only low-grade to medium-grade (greenschist-facies) metamorphism in its centre. Metamorphic grades and the extent of the

[2] Snowden Optiro Report, August 2022.

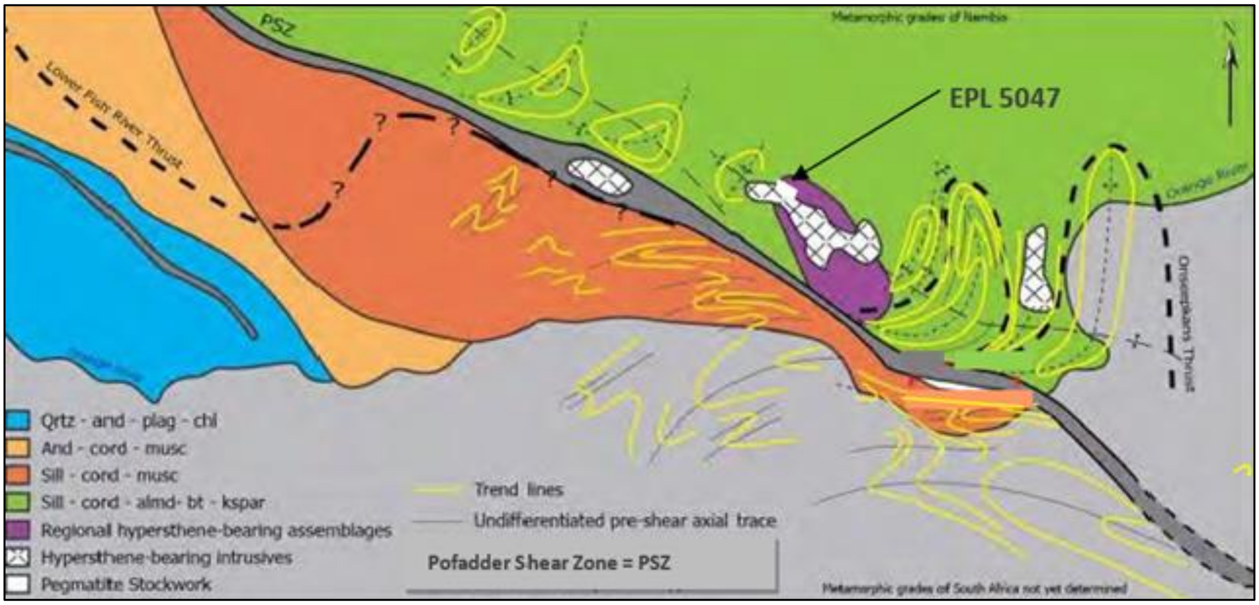
Namaquan overprint increase eastwards (Figure 7.2) to reach that were attained at around 1,200 Ma.

Figure 7.1: Regional Geological Map of the Namaqua Metamorphic Province Area



Source: Arcadia June 2021 Prospectus
Note: The Swanson Project area is shaded in grey.
OT = Onseepkans Thrust; PSZ = Pofadder Shear Zone (Lambert, 2013).

Figure 7.2: Structural and Metamorphic Map of the Eastern Areas of the Richtersveld Sub-Province in the Vicinity of the Pofadder Shear Zone



Source: Arcadia Resources June 2021 Prospectus; Lambert (2013)
Note: Illustrating the progressive increase in regional metamorphic grade from west to east.

The Richtersveld Sub-Province consists of volcano-sedimentary successions (approximately 2,000 Ma) that were intruded by voluminous granites and granodiorites between 1,730 Ma and 1,900 Ma interpreted to represent the relics of a Palaeoproterozoic island arc (Hattingh, 2019). The stratigraphic subdivision is highly debated with models largely based on age correlations of units across shears and the contentious existence of bounding shear-zones separating the sub-province from the other terranes. The structural ambiguity has led to further subdivision of the sub-province into smaller lithostratigraphic terranes and/or incorporation of the sub-province into the Bushmanland Sub-Province (Lambert, 2013).

7.1.2 Pegmatite Belt

The mainly transcurrent late-stage shearing and un-roofing, according to Hattingh (2019) of the NNMP was accompanied by the emplacement of late-stage granites and the development of regionally widespread pegmatites throughout the NNMP and across terrain boundaries. A very close association of the Pofadder Shear Zone (PSZ) exists with the pegmatite belt. The north-westerly trending PSZ intersects the broadly undulating, easterly trending belt in its southern portion.

In the Northern Cape Province of South Africa and the southern Karas Region of Namibia, the pegmatites form an extensive 16 km wide, approximately 450 km long, continuous west-east trending belt extending from Vioolsdrif to Kenhardt in South Africa. The extent of the belt in Namibia is not well documented, but is proposed to extend as far as Ai-Ais.

The pegmatites mainly occur as several 100 m long and up to 20 m wide, lenticular to sheet-like bodies with the majority occurring concordant to the regional fabric and a few as smaller discordant bodies. The pegmatites vary in composition and internal structure, ranging from simple, homogeneous and un-zoned quartz-feldspar-muscovite-bearing assemblages to complexly zoned, heterogeneous bodies containing more exotic minerals such as beryl, lepidolite, columbite-tantalum, sillimanite, together with uranium and rare earth element (REE) bearing minerals.

The structural setting of the belt is not yet well constrained, and the belt has previously been correlated with tectonostratigraphic boundaries such as the Groothoek thrust and the Southern Front. The emplacement of the pegmatite belt is considered to have occurred between 1,025 Ma and 945 Ma.

Older generations of pegmatites have, however, been dated at 1,104 Ma in the Prieska region, but are related to earlier metamorphic phases. In the past detailed studies on the pegmatites within the belt have been focused on their economic potential.

Hattingh (2019) describes regional fabrics surrounding the PSZ have been well documented in numerous studies that distinguishes six (D1–D6) different phases of deformation. The D5 and D6 episodes relate to deformation along the PSZ. Differences in the nomenclature between the terminologies relate to the recognition of the progressive nature of deformation events, particularly shearing associated with the PSZ. Deformation stages D1 – D3 are associated with regional deformation events in the Bushmanland and Gordonia Sub-Provinces, whereas the D4 deformation is related to deformation along the PSZ and exclusively to the structures associated with the PSZ.

There are clear overprinting relationships from earlier amphibolite-grade and ductile to greenschist-facies and more brittle fabrics, indicating that deformation occurred under progressively lower-grade conditions during a prolonged period of exhumation. Hence, D4 fabrics and structures describe a polyphase deformation history related to progressive shearing along the PSZ. The largely co-axial nature of high-grade and lower-grade planar and linear fabrics indicates the progressive nature of the deformation. Based on overprinting relationships, mineral assemblages and deformation textures of the D4 event it has been subdivided by Hattingh, 2019 into separate stages, representing the progressive evolution of the shear-zone and related fabrics.

7.2 Local Geology

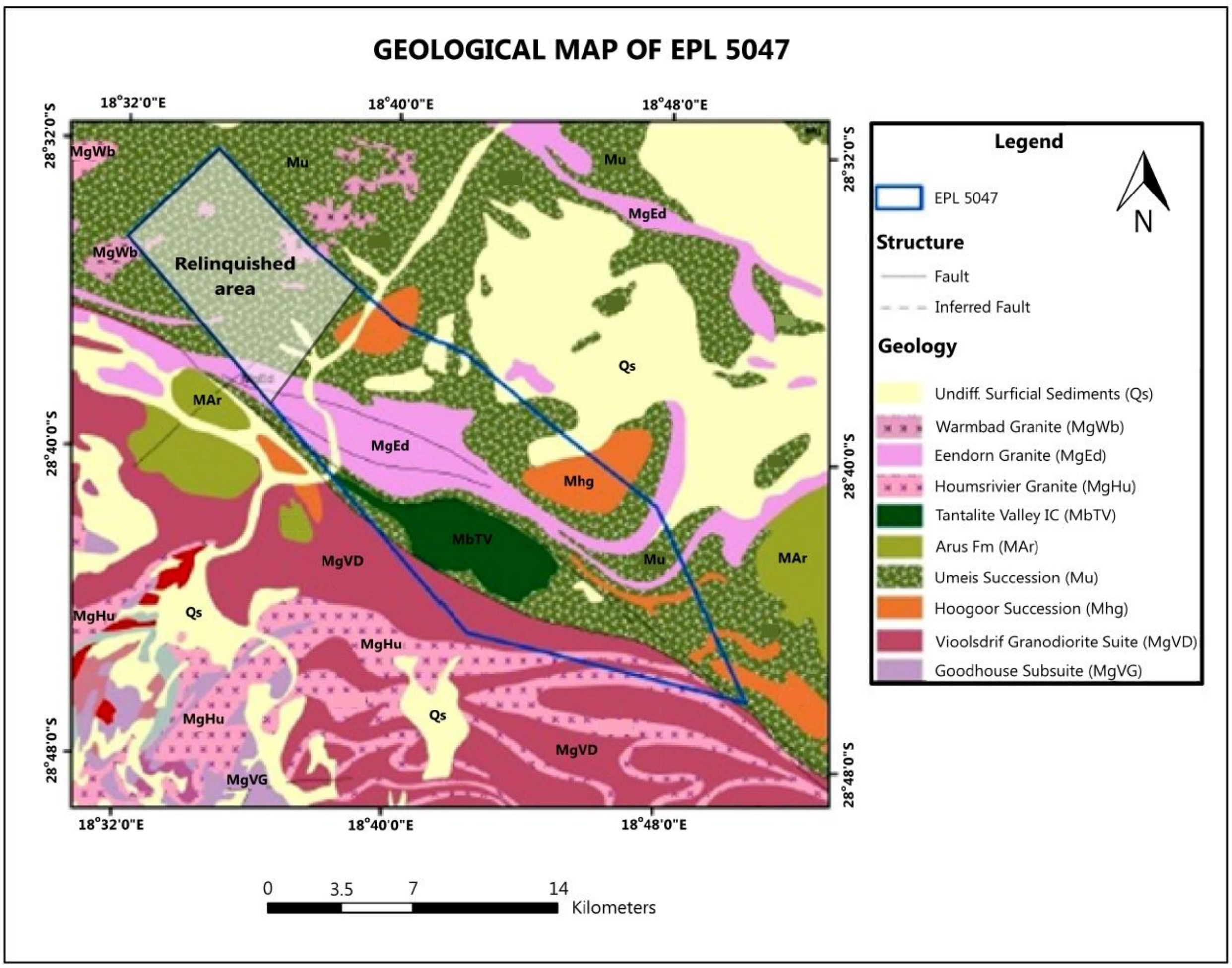
The area of EPL 5047 is underlain by rocks of the NNMP with the lithology of EPL 5047 comprising units from the Gordonia Sub-province, which is separated from the Richterveld Sub-province by the north-westerly trending PSZ. Although the most prominent feature of EPL 5047 is the PSZ, numerous other structural zones can be noted with predominantly northeast and east-west trends. The host rocks comprise a volcano-sedimentary sequence intruded by a coarse-grained gabbroic rock.

The main lithologies comprise volcanic rocks, chlorite schists and phyllites, all metamorphosed to varying degrees.

Numerous concordant (younger) and discordant pegmatites were intruded into these lithologies. They are aligned within the pegmatites that are associated with the PFZ and are invariably discordant to the regional schistosity of the country rock within which they are emplaced. Pinch and swell structures are associated with the pegmatites.

Figure 7.3 presents the local geology of the licence area. This figure also illustrates the relinquished area as described in Section 4.4.1 when the licence area was reduced.

Figure 7.3: Local Geological Map of Licence No. EPL 5047



In the Tantalite Valley area, the rocks into which the pegmatites intruded consist of basic amygdaloidal lavas, volcanic rocks, chlorite schists and phyllites, some interbedded acid volcano-sedimentary rocks (felsite, sandstone), and intrusive acid dykes of diorite to quartz diorite and metagabbro compositions.

The general strike of these lithologies is approximately 120° northeast. Towards the east the strike varies, due to the proximity to a large intrusive gabbro complex (Hattingh, 2021).

The pegmatites are structurally limited on the northern side by a mylonite shear zone and appear to occupy tension fractures adjacent to the zone. Mineralogically the four main constituents of the pegmatites are white to grey massive quartz, crystalline perthitic feldspar, Li-bearing muscovite, and sugary albite. Minor constituents are spodumene, beryl, lepidolite, muscovite, apatite, fluorite, biotite, tantalite and microlite (Hattingh, 2021)[3].

[3] Snowden Optiro Report, August 2022.

8.0 DEPOSIT TYPE

A pegmatite is defined as "an essentially igneous rock, commonly of granitic composition, that is distinguished from other igneous rocks by its extremely coarse but variable grain size or by an abundance of crystals with skeletal, graphic, or other strongly directional growth habits. Pegmatites occur as sharply bounded homogenous to zoned bodies within igneous or metamorphic host rocks." (London, 2008).

Pegmatites are defined by several geological, textural, mineralogical and geochemical parameters, and are broadly classified as either simple/common or complex based on the presence or absence of internal zonation. Simple/common pegmatites are un-zoned, poorly fractionated and thus usually un-mineralised. Complex pegmatites often contain potentially economic concentrations of mineral/elements (including lithium, tantalum, niobium, tin, beryllium and REE).

According to Simmons (2021)[4], the Černý (1991) classification scheme is the most widely used classification of pegmatites today. His classification is a combination of depth of emplacement, metamorphic grade and minor element content, and it has four main categories, namely Abyssal (high grade, high to low pressure), Muscovite (high pressure, lower temperature), Rare-Element (low temperature and pressure), and Miarolitic (shallow level).

The Rare-Element classes are subdivided based on composition into three broad families based on other petrological, paragenetic and geochemical data:

- Lithium-Caesium-Tantalum (LCT);
- Niobium-Yttrium-Fluorine (NYF); and,
- Mixed LCT – NYF families.

The Swanson pegmatites are classified as LCT pegmatites.

It should be noted that pegmatites often occur as a combination/hybrid of the subtypes listed, but with one or two of the minerals dominating over the other(s).

Simmons (2021)[4] points out that attempts to relate pegmatite types or subtypes to magma genesis or tectonic regimes as has been attempted in granite classifications are not satisfactory. He also notes that the classification fails to address the possibility of pegmatites forming by direct anatexis.

Rare-Element pegmatites are often intruded into metamorphic rocks where the peak metamorphic conditions attained are upper greenschist to amphibolite facies (London, 2008) and have temporal and spatial associations with granitic plutons. Most pegmatites occur in swarms or pegmatite fields and occupy areas ranging from tens to hundreds of square kilometres; they may be associated with a discrete granite

[4] Snowden Optiro Report, August 2022.

source around which they are systematically distributed, from the least fractionated granite to the most highly evolved pegmatites are the greatest distance from the granite source (London, 2008); however, this is not always the case. The possibility of pegmatites forming by direct anatexis of the host rock should also be considered.

With increasing fractionation, there is also often an increase in the complexity of the internal pegmatite zonation. The most highly evolved distal pegmatites are usually the most complexly zoned and associated with potentially economic concentrations of the elements and associated minerals identified above.

Pegmatites may vary from a few metres to hundreds of metres in length with variable widths ranging from <1 m to tens of metres wide and may have simple to complex internal structures. A number of different internal units may be present within a pegmatite based on differences in mineral assemblage, modes and textures. These may include zones of primary crystallisation forming more or less concentric shells (asymmetric zonation also common), complete or incomplete, from the margin inwards; replacement bodies formed at the expense of pre-existing units with or without lithologic and/or structural control; and fracture fillings associated with primary zones or replacement units.

The main rock forming minerals in a granitic pegmatite include quartz, mica (muscovite and biotite) and feldspar. Other minerals may occur in economic concentrations and include, but are not limited to, various lithium minerals, beryl, tourmaline, cassiterite, coltan, topaz, garnet and various rare-earth minerals.

The Tantalite Valley pegmatites belong to the LCT family of pegmatites and can be classified as a mixture of the spodumene, lepidolite and albite-spodumene subtypes of complex type, lithium subclass, rare-element class pegmatites.

The pegmatites on the Swanson Property are not zoned, with the exception of isolated instances, and are banded to massive, are dominated by quartz, sugary albite and muscovite, and exhibit variable concentrations of tantalite, spodumene and lepidolite.

9.0 EXPLORATION

9.1 INTRODUCTION

ORP have identified at least fifteen individual pegmatite bodies >1 m thick within the Swanson Pegmatite Swarm and these were targeted for additional mapping and sampling. ORP undertook a high-resolution drone survey in 2020 to assist with the planning and mapping of these pegmatites.

9.2 GEOLOGICAL MAPPING

Recent geological mapping was conducted by the Geological Survey of Namibia in collaboration with the Council for Geoscience of South Africa. This was done as a five year (2012 to 2017) detailed mapping programme on a 1:50,000 scale, conducted over large parts of Southern Namibia. The mapping included the EPL 5047 licence area, thereby providing detailed information of all the pegmatites that are present on EPL 5047.

ORP purchased the geological database (ArcMap™ shape files) from the Geological Survey of Namibia and the company principal geologist Philip le Roux re-interpreted the data. Based on this analysis it was decided that exploration efforts would be focussed on two high priority areas:

- The north-western strain shadow of the mafic to ultramafic Tantalite Valley Complex (referred to as a "very high potential" area), also referred to as the Swanson Project; and,
- The Tantalite Valley Complex.

The ORP exploration work focussed exclusively on the north-western strain shadow of the Tantalite Valley Complex. This area is also referred to as the Swanson Pegmatite Swarm. Additional exploration work is still outstanding on the other target areas.

9.3 CHANNEL AND CHIP SAMPLING

9.3.1 Placer Development Ltd (1981)

Placer determined the grade of the pegmatites by cutting 5 cm wide channels continuously at right angles to the pegmatite. Pegmatites less than 3 m thick were covered by one sample, while those greater than 3 m thick were sampled over 2 m thicknesses. A total of 189 m of sample consisting of 91 samples were cut in this way; the average sample weight was 14.22 kg.

The Placer sample localities are visible in the field. The depth (approximately 5 cm to 10 cm), width (approximately 5 cm to 10 cm) and perpendicularity of the channel sampling are readily observed, and would pass scrutiny under current standards.

Placer estimated "possible reserves" in 1981 for pegmatites A to G, using a minimum pegmatite thickness of 1 m. Placer estimated these "reserves" at Ta_2O_5 cut-off grades of 0 ppm, 300 ppm and 500 ppm.

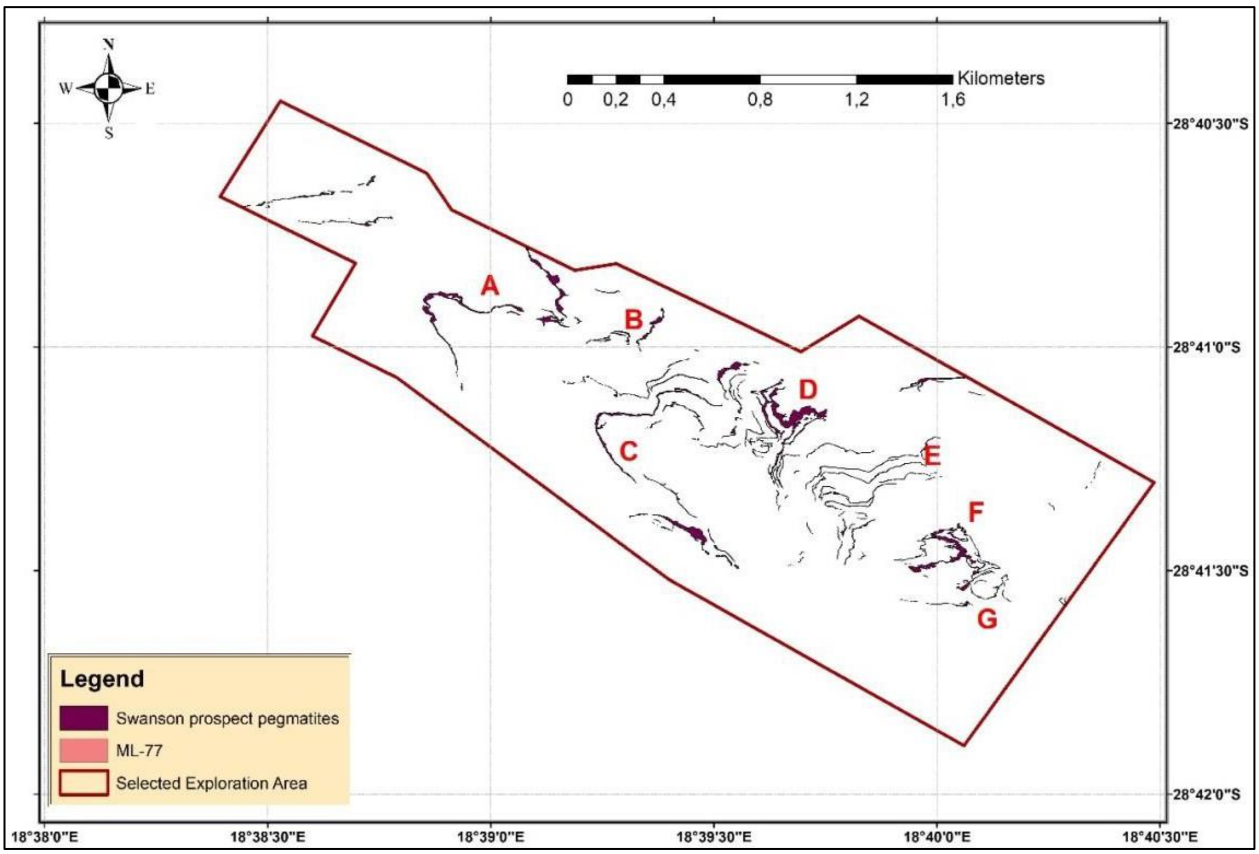
9.3.2 ORP 2019-2020 Campaign

9.3.2.1 Sampling

A total of 15 of the previously sampled pegmatites (+1 m thick) were targeted for additional, more detailed, mapping and sampling. This area was delineated, and a high-resolution drone survey was undertaken to assist with the planning and mapping of these pegmatites.

The pegmatite units were clustered and named "A" to "F" in a west to east direction as shown in Figure 9.1.

Figure 9.1: Swanson Pegmatite Swarm Area Targeted for the Exploration Campaign



Source: Creo Design "Independent Geological Report on the Tantalum and Lithium Mineralization within EPL 5047"

A total of 283 samples (204 channel and 79 chip) were taken in all pegmatites. The Mineral Resources in the DFS Report are focused on the D and F pegmatite clusters, where the following channel and chip samples were taken.

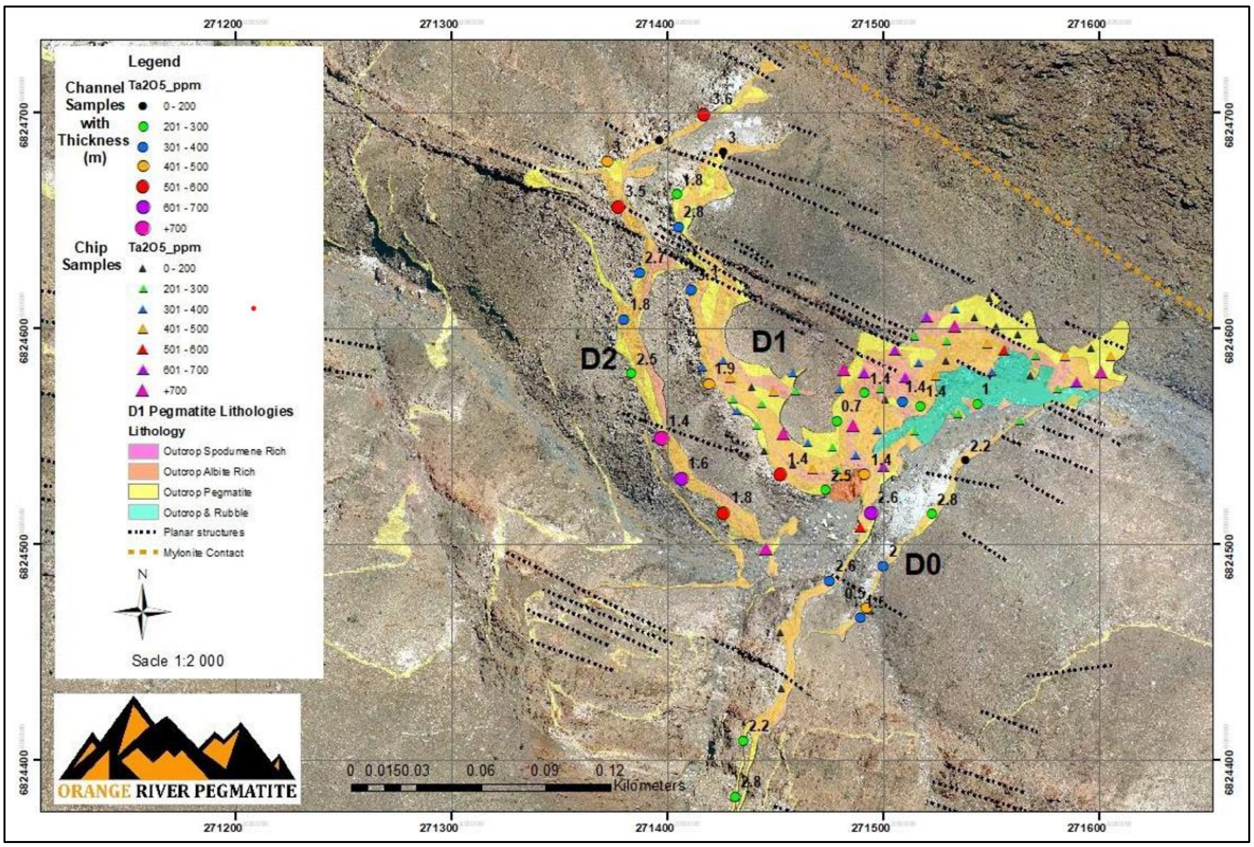
Details of the samples taken from the D1, D2 and F1 pegmatites are as follows:

- D1 Pegmatite: 77 samples (17 channel and 60 chip);
- D2 Pegmatite: 11 samples (10 channel and one chip); and,
- F1 Pegmatite: 75 samples (67 channel and eight chip).

The G pegmatites are visible in the field, but were not sampled.

Outcrop positions of the D and F pegmatites are shown respectively in Figure 9.2 and Figure 9.4.

Figure 9.2: Outcrop Positions of D0, D1 and D2 Pegmatites Showing Channel and Chip Samples



Source: Creo Design "Independent Geological Report on the Tantalum and Lithium Mineralization within EPL 5047".

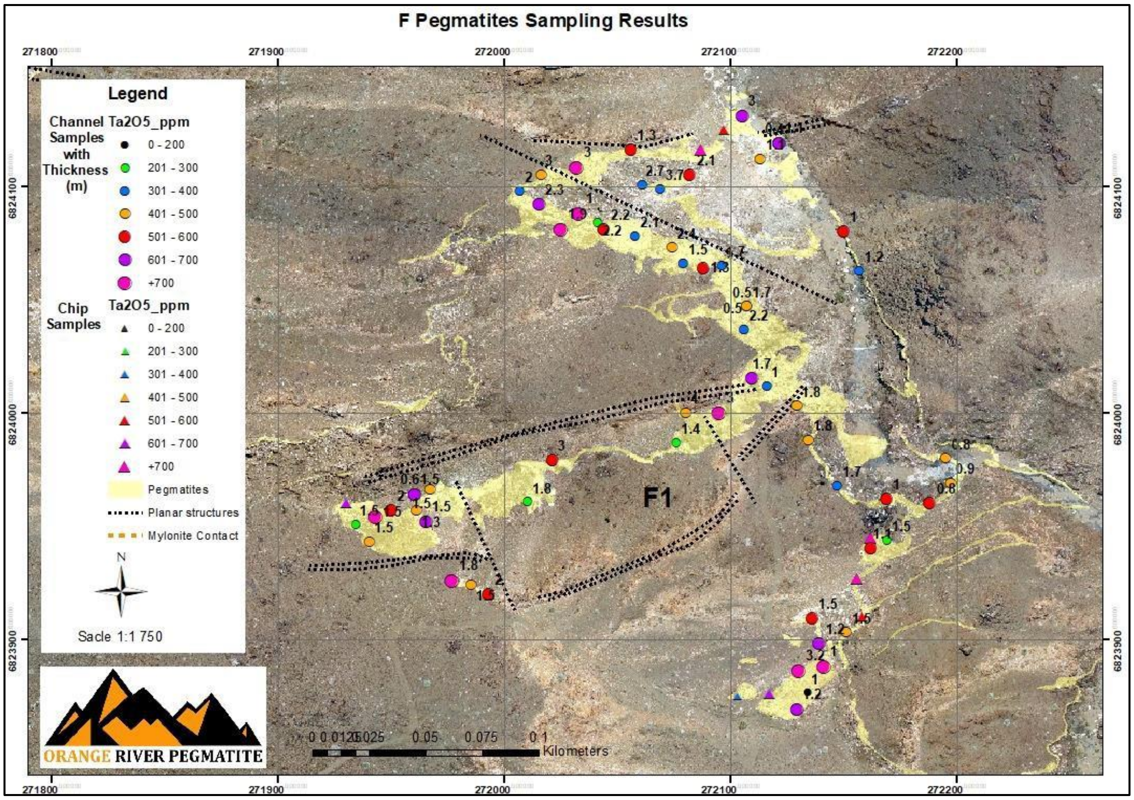
Figure 9.3 shows the D0 outcrop clearly showing purplish-coloured spodumene crystals.

Figure 9.3: An Example of Mineralised D0 Pegmatite Clearly Showing the Spodumene Crystals

Source: Creo Design "Independent Geological Report on the Tantalum and Lithium Mineralization within EPL 5047"

Figure 9.4 shows the F1 Pegmatite outcrop distribution within the identified high priority exploration area. The location of pegmatite outcrops, channel samples, chip samples, field duplicate samples, and several other features are shown in this figure. The pegmatites dip at less than 10° to the east.

Figure 9.4: Outcrop Distribution of the F Pegmatite Showing Channel and Chip Samples



Source: Creo Design "Independent Geological Report on the Tantalum and Lithium Mineralization within EPL 5047".

9.3.2.2 Drilling

ORP's first drilling phase of 23 vertical diamond drill holes comprising 349.85 m of HQ (63.5 mm core) commenced in June 2020 and was completed in August 2020 (Figure 10.1 and Figure 10.2).

Drilling was limited to pegmatites. The holes were drilled at two locations targeting three pegmatites (D1, D2 and F1) with drilling sections spaced 50 m apart with a 50 m strike spacing on drill lines.

Most of the 23 boreholes drilled during Phase 1 intersected the target pegmatite bodies with only one hole at F1 that was drilled as a confirmation hole that did not intersect a pegmatite body and another that stopped short of the D2 body due to excessive water loss.

A total of 112 samples based on lithological logging of the core were taken. The average thickness from the drilling of the F1 pegmatite is 2.1 m, of the D1 pegmatite is 4.27 m, and of the D2 pegmatite is 4.50 m, all markedly thicker than that measured in outcrop.

A marked increase in true thickness of some 10% for the F1 pegmatites and 100% for and 86% for the D1 and D2 pegmatite respectively was observed from the drilling results. The whole pegmatite intersection was used for thickness and grade calculations.

9.3.3 ORP 2021 Campaign

9.3.3.1 Drilling

From mid to late 2021, twenty-nine additional boreholes were drilled at the Swanson deposit with a combined depth of 1,219.07 m (Figure 10.3). Twenty-six of these holes were drilled in the area of the E-pegmatite, between the D-pegmatite to the northwest and the F-pegmatite to the southeast. The other three holes were drilled on the down-dip side of the D-pegmatite, to better delineate their sub-surface extension.

All boreholes drilled during this campaign were vertically oriented, with HQ (63.5 mm) core diameters. Drilling was not conducted on a regular grid, but drill spacing was in the order of 50 m to 70 m. Only three holes were drilled deeper than 60 m (92.52 m, 121.04 m and 134.81 m, respectively). The average depth of the rest of the holes was 33.49 m, and mainly targeted the upper E pegmatites, as well as the F1 Pegmatite.

Additional channel samples were also collected during this time, which also included previously unsampled pegmatites such as E1, D3 and D4.

9.4 Future Exploration

The Mine Geological Department (MGD) will be responsible for all the exploration operations taking place on the ORP portfolio of licences. They will also maintain these licences according to Namibian legislative requirements. Annual budgets will be provided for approval.

Future exploration activities provided by MGD to include:

- Exploring and testing of pegmatites for Ta, Nb and Li mineralisation in order to add Mineral Resources to the current LoM;
- Undertake mapping, sampling and drilling functions and maintain a clean and reliable database;
- Allocate and supervise any drilling contracts that are required to define and test potential Mineral Resources;
- Take responsibility for all the personnel and support requirements that are necessary to successfully implement and conclude these responsibilities;
- Modelling of the data relating to potentially viable mineralised deposits; and,
- Obtain outside, third party assessments and CPR documents.

Three proposed drilling programmes will be implemented over the LoM, to extend the 1st May 2022 Mineral Resource Estimate. For further details on future exploration drilling see Section 10.2.

10.0 DRILLING

10.1 INTRODUCTION

A total of 52 holes have been drilled on the Swanson deposit area by ORP totalling 1,568.9 m of drilling. This has been undertaken in two drilling phases, the first in 2019/2020 and the second in 2021/2022.

10.1.1 ORP 2019/2020 Campaign

ORP's first drilling phase of 23 vertical diamond drill holes comprising 349.85 m of HQ (63.5 mm core) commenced in June 2020 and was completed in August 2020. Drilling was limited to pegmatites. The holes were drilled at two locations targeting three pegmatites (D1, D2 and F1) with drilling sections spaced 50 m apart with a 50 m strike spacing on drill lines. Figure 10.1 and Figure 10.2 illustrates the positions of the drill holes and Table 10.1 contains the drilling information.

Most of the 23 boreholes drilled during Phase 1 intersected the target pegmatite bodies with only one hole at F1 that was drilled as a confirmation hole that did not intersect a pegmatite body and another that stopped short of the D2 body due to excessive water loss.

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A marked increase in true thickness of some 10% for the F1 pegmatites and 100% for and 86% for the D1 and D2 pegmatite respectively was observed from the drilling results. The whole pegmatite intersection was used for thickness and grade calculations.

10.1.2 ORP 2021/2022 Campaign

From mid to late 2021, twenty-nine additional boreholes were drilled at the Swanson deposit with a combined depth of 1,219.07 m (Figure 10.1 and Figure 10.2). Twenty-six of these holes were drilled in the area of the E-pegmatite, between the D-pegmatite to the northwest and the F-pegmatite to the southeast. The other three holes were drilled on the down-dip side of the D-pegmatite, to better delineate their sub-surface extension. Figure 10.1 illustrates the positions of the drill holes and Table 10.2 contains the drilling information.

All boreholes drilled during this campaign were vertically oriented, with HQ (63.5 mm) core diameters. Drilling was not conducted on a regular grid, but drill spacing was in the order of 50 m to 70 m. Only three holes were drilled deeper than 60 m (92.52 m, 121.04 m and 134.81 m, respectively). The average depth of the rest of the holes was 33.49 m, and mainly targeted the upper E pegmatites, as well as the F1 Pegmatite.

Additional channel samples were also collected during this time, which also included previously unsampled pegmatites such as E1, D3 and D4.

Figure 10.1: Drill Collar Positions in Relation to EPL 5047 and ML 223

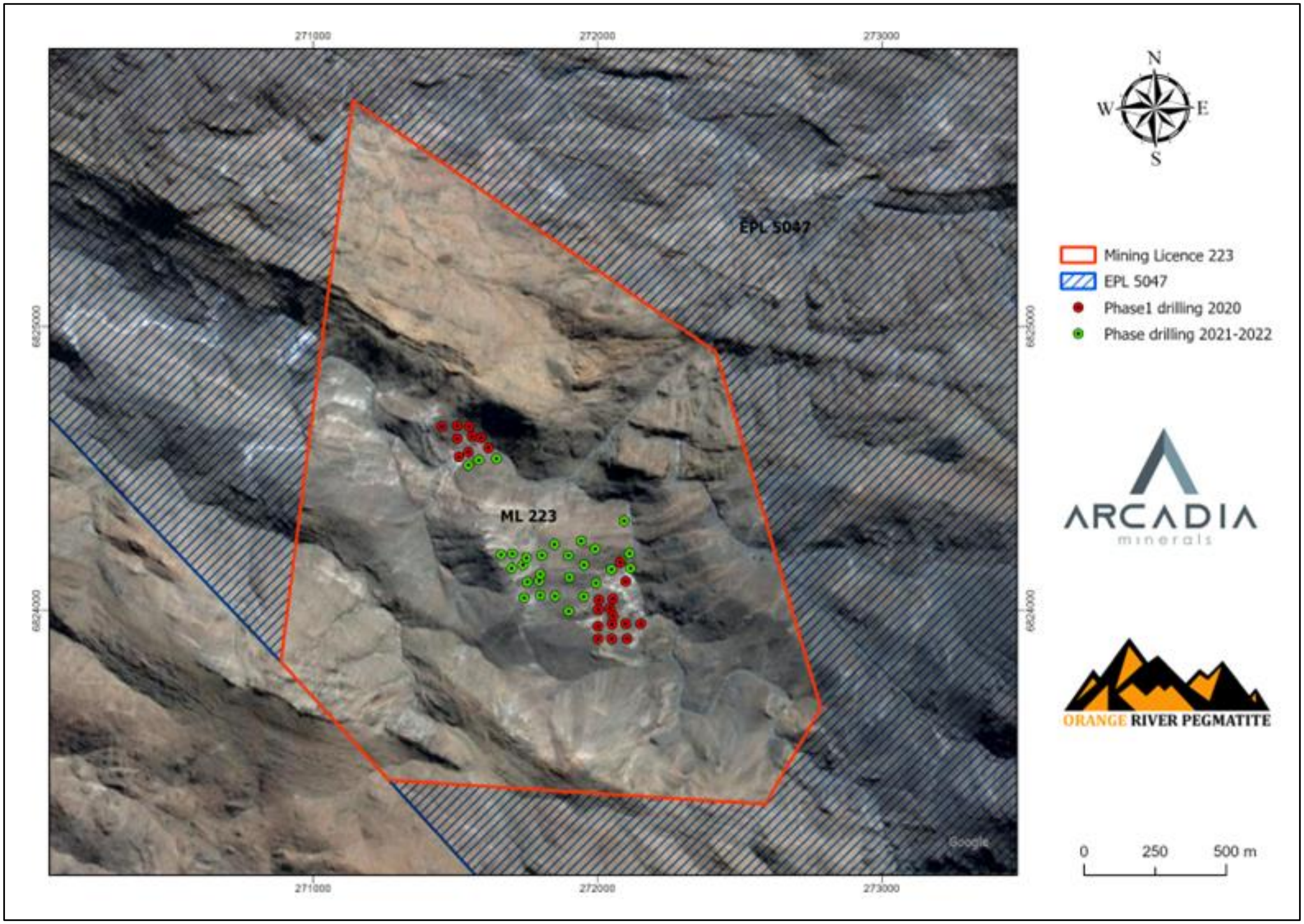


Figure 10.2: Location Map of the ORP Drill Collars (2020-2022)

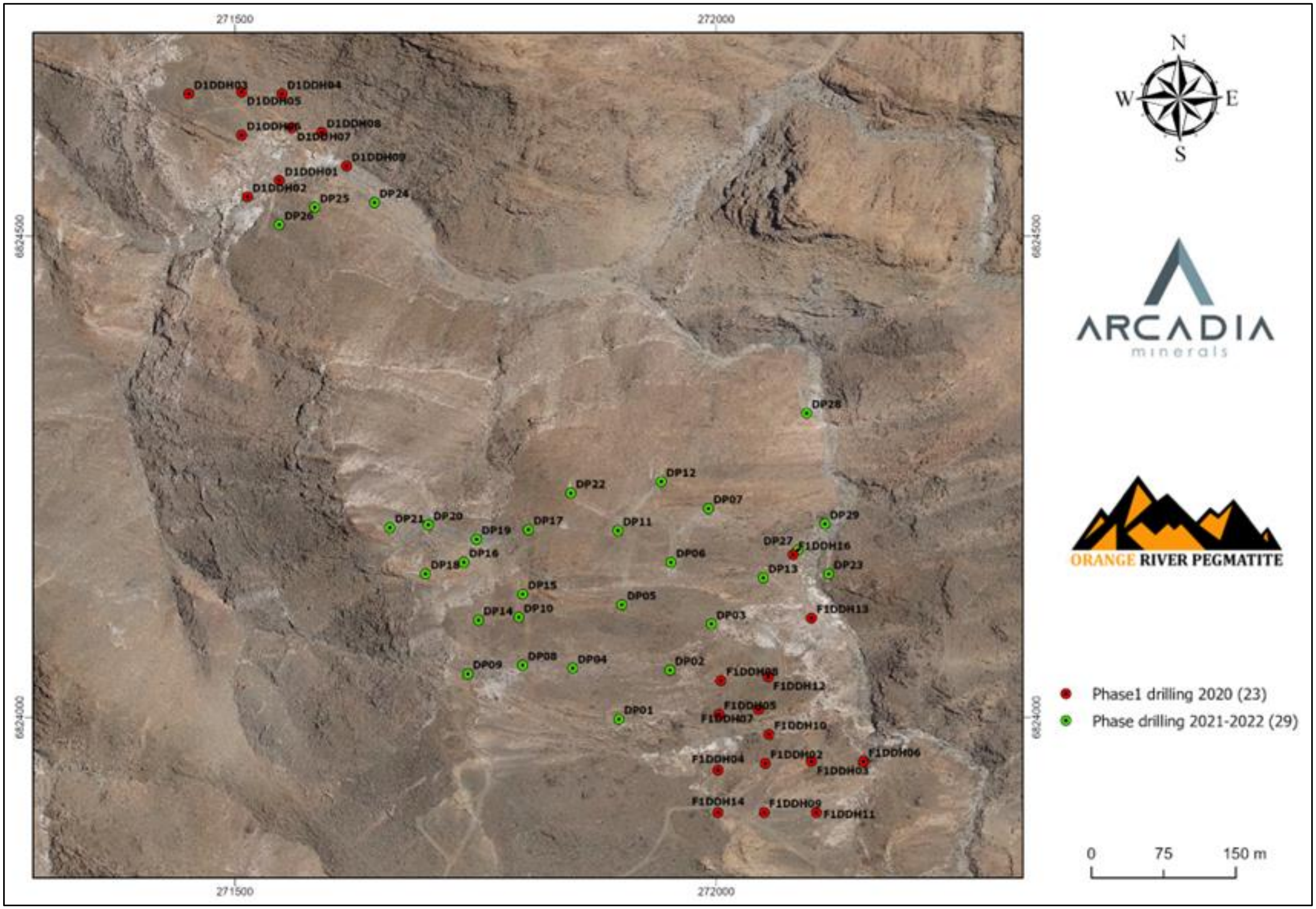


Table 10.1: ORP 2020 Drilling Campaign Data

Hole ID	Easting	Northing	EOH (m)	Elevation (mamsl)	Dip (°)
D1DDH01	271546	6824558	20.87	586.2	-90
D1DDH02	271513	6824541	20.73	585.1	-90
D1DDH03	271452	6824648	33.19	629.8	-90
D1DDH04	271549	6824648	27.68	614.3	-90
D1DDH05	271507	6824650	30.41	619.7	-90
D1DDH06	271507	6824605	21.31	604.8	-90
D1DDH07	271559	6824613	21.51	600.0	-90
D1DDH08	271590	6824608	8.09	599.4	-90
D1DDH09	271616	6824573	29.99	588.4	-90
F1DDH02	272051	6823952	11.67	676.5	-90
F1DDH03	272099	6823954	11.31	669.0	-90
F1DDH04	272002	6823945	7.89	682.2	-90
F1DDH05	272003	6824003	12.2	679.5	-90
F1DDH06	272153	6823954	7.73	655.7	-90
F1DDH07	272044	6824008	12.14	671.7	-90
F1DDH08	272005	6824038	11	676.3	-90
F1DDH09	272050	6823901	12.39	686.6	-90
F1DDH10	272055	6823982	7.33	666.5	-90
F1DDH11	272104	6823901	4.36	671.9	-90
F1DDH12	272054	6824042	14.13	662.9	-90
F1DDH13	272099	6824103	4.97	634.2	-90
F1DDH14	272002	6823901	9.25	693.8	-90
F1DDH16	272080	6824169	9.7	628.5	-90

Table 10.2: ORP 2020 Drilling Campaign Data

Hole ID	Easting	Northing	EOH (m)	Elevation (mamsl)	Dip (°)
DP01	271899	6823998	30.05	713.5	-90.0
DP02	271952	6824049	32.77	693.1	-90.0
DP03	271995	6824097	5.75	668.8	-90.0
DP04	271851	6824051	42.74	731.7	-90.0
DP05	271902	6824117	41.87	717.7	-90.0
DP06	271953	6824161	51.05	694.4	-90
DP07	271992	6824217	57.25	681.7	-90.0
DP08	271799	6824054	20.53	746.3	-90.0
DP09	271742	6824045	18.75	750.3	-90.0
DP10	271795	6824104	25.11	741.4	-90.0
DP11	271898	6824194	92.52	705.8	-90.0
DP12	271943	6824245	56.98	687.8	-90.0
DP13	272049	6824145	13.82	639.8	-90
DP14	271753	6824101	21.23	742.3	-90.0
DP15	271799	6824128	21.87	738.0	-90.0
DP16	271738	6824161	35.07	725.9	-90.0
DP17	271805	6824195	37.67	714.3	-90.0
DP18	271698	6824149	134.81	735.4	-90.0
DP19	271751	6824185	49.04	714.7	-90.0
DP20	271701	6824200	15.98	717.4	-90.0
DP21	271661	6824197	121.04	726.8	-90.0

Hole ID	Easting	Northing	EOH (m)	Elevation (mamsl)	Dip (°)
DP22	271849	6824233	37.67	697.7	-90.0
DP23	272117	6824149	14.79	630.1	-90.0
DP24	271645	6824535	48.25	589.7	-90.0
DP25	271583	6824530	58.52	605.3	-90.0
DP26	271546	6824512	52.83	602.4	-90.0
DP27	272085	6824174	14.84	627.6	-90.0
DP28	272094	6824316	43.67	619.0	-90.0
DP29	272113	6824201	21.07	624.6	-90.0

10.2 Future Exploration

MGD will be responsible for all the exploration operations taking place on the ORP portfolio of licences. Three proposed drilling programmes will be implemented over the LoM, to extend the 1st May 2022 Mineral Resource Estimate. Figure 10.3 illustrates the positions of the proposed exploration holes to be drilled along with the positions of the existing drill holes.

10.2.1 First Programme

The first programme would be to drill out the underground potential of the EF-pegmatite swarms, on a 50 m grid and this would result in the drilling of an estimated 15 diamond boreholes, totalling around 1,200 m. This may convert a large part of the current Inferred Mineral Resource into Indicated Mineral Resources.

10.2.2 Second Programme

The second programme would be to increase the Mineral Resources by drilling the opencast potential of the A, B and C pegmatites within the Swanson Pegmatite Swarm. An estimated 20 holes, to be drilled to a depth of around 50 m each is estimated. A positive outcome could add additional opencast Indicated Mineral Resources.

10.2.3 Third Programme

The third phase of drilling would only take place after geological mapping and grab sampling has identified any mineralised pegmatites out of the more than 150 pegmatites identified on the ORP licences, but to date have not been explored. The best five mineralised pegmatites would be drilled. An estimate of five holes per pegmatite, totalling 1,500 m is expected. This could add additional Inferred Mineral Resources. If the drilling results of any of these five pegmatites is positive in-fill drilling will take place to increase the Mineral Resource category.

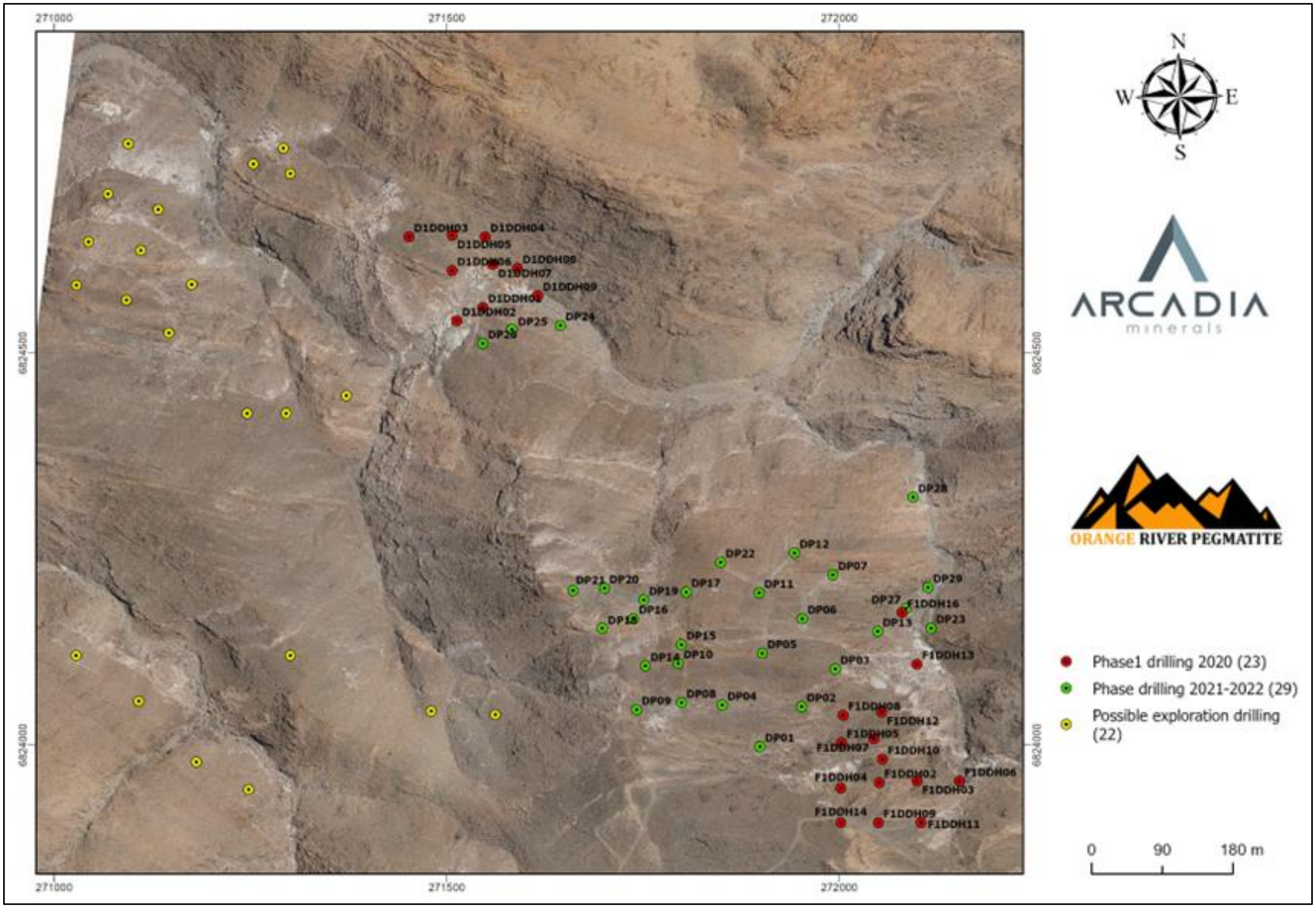
Based on current experience from the latest drilling programme an all-inclusive rate (drilling, water, analyses and drill management) of around US$165/m would be reasonable.

The estimate for the future drilling exploration budget is shown in Table 10.3.

Table 10.3: Future Drilling Exploration Budget Estimate

Phase	Drilling Estimate (m)	Budget (US$)
1. EF-pegmatites (underground potential)	1,200	196,720
2. A, B and C pegmatites (opencast potential)	1,000	163,930
3. New mineralised pegmatites (opencast)	1,500	245,900
Total	**3,700**	**606,550**

Figure 10.3: Proposed Future Exploration Holes



11.0 SAMPLE PREPARATION, ANALYSES AND SECURITY

11.1 INTRODUCTION

For the Swanson deposit area three types of sampling were performed:

- Channel sampling;
- Chip sampling; and,
- Spodumene sampling.

11.2 CHANNEL SAMPLING

The pegmatites have low angle dips therefore, vertical to semi-vertical outcrops were readily available. The preferred cutting sampling method for channel samples was using a diamond blade grinder. The sample positions were first marked on the sidewall, ensuring that the sample included both the top and bottom contacts and the sampling team then cut a 5 cm to 10 cm wide consistent channel in the sidewall from the top to the bottom contacts. Material was then chiselled continuously from top to bottom to complete the sample. Although a continuous channel sample was always the first option, it was, at times, necessary to combine this method with chip samples in places where the nature of the outcrops would require this, i.e., when the pegmatite did not outcrop continuously, and material was broken and fractured.

11.2.1 Pegmatite Sampling Procedures

Each pegmatite was assigned a unique pegmatite group (A to F) and identification number (e.g., pegmatites A1, A2. E1, E2, E3 to F).

Each pegmatite's preferred sample spacing was predetermined, i.e., 50 m, 25 m, 20 m or 15 m along strike, depending on its unique exploration priority rating.

Channel samples were marked by the field geologist on exposed faces with spray paint along the strike. The top to bottom channel was marked out with the field ID written next to it (e.g., E3_19). The marked sample coordinate was recorded in WGS84 UTM 34S with a handheld Garmin global positioning system (GPS). Faces with exposed true thicknesses of the pegmatites were targeted where possible. Where the true thickness of the pegmatite was not well exposed chip sample circles were marked.

The four-person sampling team collected the sample material with a set of electric diamond blade grinders and hammers and chisels, along the spray paint markings. The sampling team collected equal weight batches of material from all portions of the marked face so as not to bias the sample with any preferred internal pegmatite horizon. The sampling team collected between 6 kg and 14 kg of material, depending on the relative grain size and width of the pegmatite face being sampled.

Finer-grained material (such as dominantly sugary albite textured pegmatites) and thinner pegmatite widths would yield smaller sample weights, while coarser material (such as dominantly blocky quartz and feldspar textured pegmatite) and thicker widths would yield larger sample weights.

The sampling team recorded the following information per collected sample locality:

- Marked sample field ID (e.g., E3_19);
- Sample type (e.g., Chip, Channel or Chip and Channel);
- Sampled channel width (e.g., 220 cm, top to bottom, N/A for Chip samples);
- Sample weight (e.g., 9.5 kg); and,
- Comments (e.g., problems encountered).

11.3 Chip Sampling

Chip samples were taken where non-continuous or broken pegmatite outcrops are present. Chip sampling of fresh, in situ, material was selected, ensuring that the individual samples were as continuous as possible, representative and included all the type and texture of material present at the locality.

In areas where flat-lying pegmatites were absent a different approach had to be utilised as a vertical sample from top to bottom of the pegmatite was not possible. In cases where this situation prevailed, a grid of chip samples was taken over the outcropping area. This was combined as much as possible with channel samples on the edges when possible.

11.4 Spodumene Crystal Sampling

Spodumene crystal sampling was primarily undertaken during the reconnaissance programme when the collecting of lithium data was necessary to obtain values on the lithium content of spodumene crystals that are present within the pegmatites. Samples were collected by hand at localities where spodumene crystals were present. This was not done on a prescribed grid or sample interval. Samples were represented by clean spodumene material, without any matrix or contaminant minerals.

11.5 Sample Preparation

ORP maintained strict chain-of-custody procedures during all segments of sample handling and transport. Samples prepared for transport to the laboratory were bagged and labelled in a manner which prevented tampering. Samples also remained in ORP’s control until they were delivered and released to the laboratory. The samples were exported from Namibia to South Africa and export permits for each batch of samples were obtained from the Ministry of Mines and Energy in Namibia and all customs clearance was obtained for both countries.

Sample preparation and analysis was undertaken at the Scientific Services laboratory in Cape Town, South Africa. The sample laboratory list was checked against the samples received and Scientific Services then took custody of the samples after all the samples which were marked on a sample registration list were verified.

At the laboratory the samples were weighed before being crushed in a Boyd Crusher set at 2 mm. A subsample of 100 g of the crushed material was split off in a riffle splitter and this material was then milled in a carbon milling pot to 90% passing 75 µm.

Of the milled material a 0.25 g sample was weighed directly into microwave vessels equipped with a controlled pressure release mechanism. Nitric acid (HNO_3) and hydrofluoric acid (HF) were added before the vessel was sealed and placed in the microwave system. At the end of the microwave process, the vessels were allowed to cool before removing them from the microwave system. Boric acid for HF neutralisation was then added after digestion transfer and made up to volume for inductively coupled plasma-optical emission spectroscopy (ICP-OES) analysis. The instrument was calibrated and the samples measured against the standards. The concentrations determined were reported based on the actual weights measured.

Retained samples including duplicate and reject material and pulps were collected by ORP from the laboratory after acceptance of the quality assurance and quality control (QA/QC) data and were then securely stored in a storage facility.

12.0 DATA VERIFICATION

12.1 DATA MANAGEMENT

The ORP exploration geologist was responsible for the collating, validating, recording and distributing information on site. This responsibility included:

- Checking field data for errors and validity;
- Importing data into Microsoft Excel;
- Checking and importing analytical results from the laboratory;
- Processing data; and,
- Backing up of data.

The database was structured in a format suitable for importing into ArcGIS and three-dimensional (3D) modelling software. The data was then sent to the ORP offices where the data was plotted in ArcGIS to verify the sample locations in relationship to the drone survey results. The laboratory results were also double checked, and QA/QC analyses completed on the results.

12.2 SAMPLE SECURITY

ORP maintained strict chain-of-custody procedures during all segments of sample handling and transport. Samples prepared for transport to the laboratory were bagged and labelled in a manner which prevented tampering. Samples also remained in ORP's control until they were delivered and released to the laboratory. The samples were exported from Namibia to South Africa and export permits for each batch of samples were obtained from the Ministry of Mines and Energy in Namibia and all customs clearance was obtained for both countries.

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Retained samples including duplicate and reject material and pulps were collected by ORP from the laboratory after acceptance of the QA/QC data and were then securely stored in a storage facility.

12.3 QUALITY ASSURANCE AND QUALITY CONTROL

QA/QC samples consisting of blanks and certified reference materials (CRMs) were regularly inserted in the sampling stream at random positions, with the aim of obtaining 10% to 15% of QA/QC sample inclusion into the total pegmatite sample population.

Three field duplicate samples of channel samples F1_3, F1_25 and F1_37 were collected on the F Pegmatite. The field duplicate samples were collected with the aim of testing vertical Ta_2O_5 grade variability within the original channel sample and to test the precision of the channel sampling method at marked sampling sites on the F pegmatite. The field duplicate sample material was collected according to the standard channel sampling procedure employed on site, and only on areas where sample material was previously collected for the original channel sample. The material collected for the field duplicate samples is identical to that of the original sample, however, these have subsequently been separated into an upper, middle and lower portion. The upper portion represents the top third of the exposed pegmatite face, the middle portion the central third and the lower portion the bottom. The upper, middle and lower portions were sampled separately at each original channel sample location. All samples have been collected where true pegmatite thickness is vertically exposed.

The field duplicate samples showed an acceptable reproducibility.

From sampling the upper, middle and lower sections, the tantalite is evenly distributed throughout the pegmatite and no part of the pegmatite has a preference with regards to tantalite mineralisation.

12.3.1 Standards

There were 234 core samples analysed at the Scientific Services laboratory. ORP added a total of 24 AMIS standards, and the laboratory added an additional nine standards to the samples analysed. This number of standards represents 10.6% of the total number of samples analysed.

Table 12.1 shows details of material type, source and accepted certified values and two standard deviations (low and high) above the certified value for the various standards. In all cases, the analysed values for all three elements of interest (tantalum, niobium and lithium) fall within two standard deviations (Table 12.1).

Table 12.1: Standards Analysed with the ORP Samples

Standard	Source	No. Added	Element	Low (-2 SD)	Certified Value	High (+2 SD)
AMIS0339	Mount Cattlin Pegmatite	8	Li %	2.17	2.27	2.37
			Nb ppm	73.5	97.6	121.7
			Ta ppm	266	310	354
AMIS0340	Mount Cattlin Pegmatite	1	Li %	1.273	1.43	1.587
			Nb ppm	2,252	2,510	2,252
			Ta ppm	11,703	13,738	15,773
AMIS0342	Mount Cattlin Pegmatite	4	Li %	0.1445	0.1612	0.1779
			Nb ppm	40	60	80
			Ta ppm	152	169	186

Standard	Source	No. Added	Element	Low (-2 SD)	Certified Value	High (+2 SD)
AMIS0355	Volta Grande Pegmatite	2	Li %	0.6432	0.7268	0.8104
			Nb ppm	41	49	57
			Ta ppm	172	214	256
AMIS0408	Mount Cattlin Pegmatite	9	Li %	1.36	1.53	1.84
			Nb ppm	13,200	15,200	17,200
			Ta ppm	25,800	30,100	34,400
Total		**24**	**-**	**-**	**-**	**-**

12.3.2 Blanks

A total of 17 blanks (AMIS0439 Blank Silica Chips) were added to the two batches of core samples. The blanks were added at the start of each batch as well as at the start of samples from a new pegmatite. This represents 7.2% of the total number of samples. All the blanks reported were below the detection limited for both tantalum and niobium (<10 ppm) and less than 0.0041% Li. The results for the blanks show no indications of systematic cross-contamination.

13.0 MINERAL PROCESSING AND METALLURGICAL TESTING

CoreMet Mineral Processing (CoreMet) has produced a Metallurgical Testwork and Mineral Processing Report dated 29th November 2022. The findings of the report by CoreMet are contained in this section.

13.1 INTRODUCTION

The focus of the DFS is limited to the D, E and F pegmatites since these pegmatites can be extracted by open cast mining method. These pegmatites will be processed by an on-site minerals beneficiation plant.

ORP has commissioned CoreMet to perform mineralogical and metallurgical testwork. The majority of the testwork was executed by LightDeepEarth at their laboratories in Pretoria-West, South Africa. CoreMet also executed part of the testwork at their facility in Gateway Industrial Park, Pretoria, South Africa.

The testwork was performed to develop a DFS process flowsheet to produce commercial grade (>25.0% Ta_2O_5) tantalum concentrate from ore from the D-pegmatite and EF-pegmatites and to quantify the recovery of lithium that will be sold as run of mine (RoM) process tailings. The lithium RoM tailings will be sold separately as by-product when ore containing spodumene is processed through the process plant.

Between 2019 to 2022 various testwork campaigns were conducted on seven different samples from the Swanson deposit to develop and confirm the proposed DFS flowsheet. As part of the testwork, ore variability was also performed to determine whether the flowsheet proposed for the DFS will accommodate the various pegmatites within the DFS mine production schedule.

The CoreMet report on the metallurgical testwork and this section is a consolidation of the mineralogical and metallurgical testwork that was used to develop the proposed DFS flowsheet.

13.2 METALLURGICAL PROCESS

The proposed DFS flowsheet is shown in Figure 13.1 (excluding primary and secondary crushing which is conventional comminution and will be included as part of the mining services). The proposed DFS flowsheet was developed using the following criteria:

1. Based on the mineralogy of the feed material.
2. Based on established process technologies.
3. Achieving a minimum concentrate grade of 25% Ta_2O_5.
4. The mass balance is based on recoveries achieved during the various metallurgical testwork campaigns.
5. The final overall Ta_2O_5 recovery of 64.93% as indicated in Figure 13.1.

6. A simplistic design to limit CAPEX whilst achieving the target recovery of 65% Ta_2O_5 and concentrate grade of at least 25% Ta_2O_5.
7. Focussing on optimum tantalum recovery with the added benefit of acquiring value for the lithium contained in the plant tailings when treating ore with elevated levels of spodumene.

The process description of the proposed DFS flowsheet is presented in Figure 13.1 and can be summarised as follows:

1. Primary crushing with a jaw crusher to <75 mm.
2. Secondary crushing with a cone crusher to <25 mm.
3. Tertiary crushing with a vertical shaft impactor (VSI) to 100% passing 600 µm.
4. Total feed reports to rougher spiral.
5. Rougher spiral tails report to scavenger spiral with its concentrate reporting to the cleaner spiral.
6. Tails from scavenger spiral is dewatered through a dewatering cyclone and screened at 200 µm.
7. Oversize (>200 µm) from dewatering screen reports to discard.
8. Overflow (<200 µm) from dewatering cyclone reports to the thickener.
9. Thickener underflow reports to filter press with filter cake reporting to discard.
10. Rougher spiral concentrate reports to cleaner spiral.
11. Cleaner spiral tails report to rougher spiral feed.
12. Cleaner spiral concentrate reports to product screen and mill.
13. Spiral concentrate is milled down to 100% passing 150 µm before reporting to cleaner circuit (rougher MGS). The milling of the spiral concentrate is to provide the optimal size range to the MGS units as well as optimising the recovery of Ta_2O_5 at the required 25% Ta_2O_5 concentrate grade.
14. Rougher MGS tails reports to the scavenger MGS.
15. Rougher MGS concentrate reports to the cleaner MGS.
16. Scavenger MGS concentrate reports to the rougher MGS feed.
17. Scavenger MGS tails reports to the thickener.
18. Cleaner MGS tails reports to the rougher MGS feed.
19. Cleaner MGS concentrate reports to a product filter, dryer and bagging plant.
20. Value addition for lithium contained in the plant tailings when treating elevated levels of spodumene.

The mass balance for the flowsheet is provided in Figure 13.1.

Figure 13.1: High Level Flowsheet

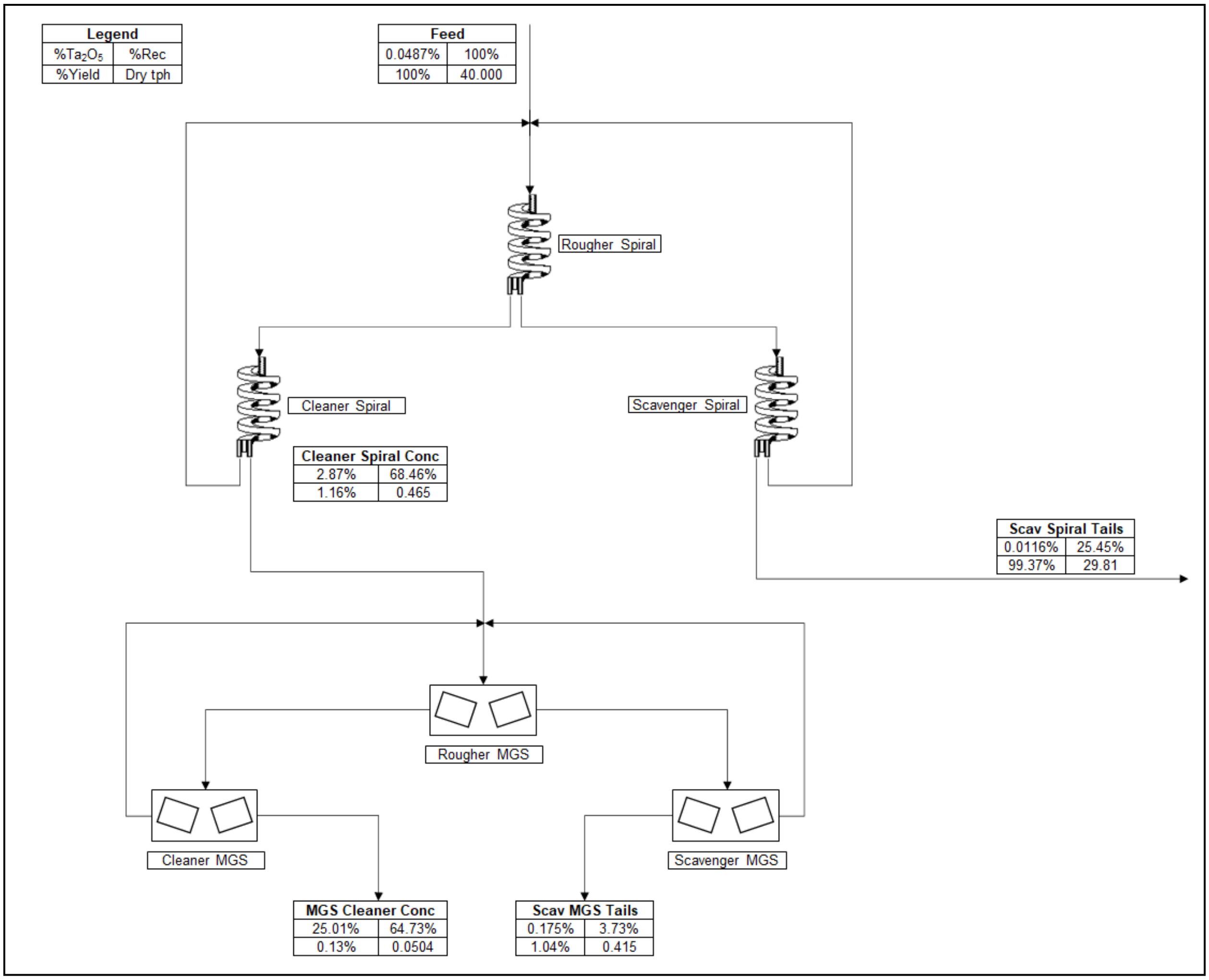


Table 13.1: Mass Balance

Description	Unit	Fresh Feed	Rougher Spiral Feed	Rougher Spiral Conc.	Rougher Spiral Tails	Cleaner Spiral Feed	Cleaner Spiral Conc.	Cleaner Spiral Tails	Scavenger Spiral Conc.	Scavenger Spiral Tails	MGS Rougher Feed	MGS Rougher Conc.	MGS Rougher Tails	MGS Cleaner Conc.	MGS Cleaner Tails	MGS Scavenger Conc.	MGS Scavenger Tails
Solids	t/h	40.000	43.604	2.956	40.647	4.069	0.465	3.604	1.112	39.535	0.740	0.237	0.503	0.050	0.187	0.088	0.415
Ta_2O_5 grade	ppm	487	488	4885	169	3724	28677	505	641	155	21,562	62,530	2,222	250,121	11,911	4,444	1,751
Ta_2O_5 grade	%	0.0487	0.0488	0.488	0.0169	0.372	2.87	0.0662	0.0641	0.0155	2.16	6.25	0.222	25.01	1.2	0.44	0.175
Ta_2O_5 recovery per stage	%	100	-	67.8	32	-	88	12	10	90	-	93	7	85	15	35	65
Overall Ta recovery	%	100.00	109.33	74.13	35.21	77.79	68.46	12.24	3.66	31.54	81.88	76.15	5.73	64.73	11.42	2.01	3.73
Yield per Stage	%	100	-	6.8	93.2	-	11.4	88.6	2.7	97.3	-	32.1	67.9	21.3	78.8	18	82.5
Overall yield	%	100	109.01	7.39	101.62	10.17	1.16	9.01	2.78	98.84	1.85	0.59	1.26	0.13	0.47	0.22	1.04
Upgrade ratio	-	-	-	10	-	-	7.7	-	3.8	-	-	2.9	-	4	-	2	-

13.3 Samples Used for Studies

Metallurgical testwork included the main F pegmatite and variability testwork on the D and E pegmatites. The historical testwork includes the following:

- Two 10 kg samples (X1265 and X1266) that were split out of an initial grab sample from the F1 pegmatite. This sample was used for mineralogical analyses and scoping of the metallurgical test programme;
- A 5.5-t bulk sample was collected from three well-exposed fresh F pegmatite faces A, B and C. This sample underwent full metallurgical testwork to determine expected yields and upgrades;
- A 60-t bulk sample was extracted through blasting and haulage from the F pegmatite area. This sample was used to confirm the proposed DFS flowsheet, improve recoveries and optimise fines (<106 µm) recovery; and,
- 150 kg samples from three different areas namely D (representing an area with lower grade Ta with elevated levels of spodumene. To note is that spodumene is the Li-bearing mineral), E6 (representing an area with high grade Ta) and E7 (representing an area with high grade Ta mixed with high spodumene). These samples were used to evaluate whether the proposed DFS flowsheet will accommodate the various pegmatites within the DFS mine production schedule.

13.3.1 Samples Collection Description

13.3.1.1 Samples 10 kg

The samples that were sent to CoreMet formed part of a bulk sample which originated from the F1 pegmatite. The bulk sample was created as follows:

- Grab samples were collected from the F1 pegmatite (Figure 13.2). These samples were sent for individual analysis;
- After completion of the analysis, the remainders of the pulps of all the samples were combined;
- The newly created bulk sample was mixed by passing it three times through a splitter and then subsequently further mixed with the use of shovels;
- After mixing the sample, weighing 440 kg, it was bagged into a 1 t bulk bag; and,
- From this bulk sample ORP extracted two individual samples for analyses by CoreMet. Both samples were crushed to -1 mm before dispatch. The two samples weighed ~10 kg each.

13.3.1.2 Bulk Sample 5.5 t

The 5.5 t bulk sample was collected from three well-exposed fresh F pegmatite faces A, B and C as indicated in Figure 13.3.
The sample consisted of a combination of in-situ chip and channel and proximal debris sub-samples. The sample was created as follows:

- In-situ material was collected by the chipping method using a hammer and a chisel;
- Numerous channels, across the entire width of the exposed pegmatite faces, was cut with a diamond blade grinder; and,
- Proximal debris material was collected by hand-picking large pegmatite clasts which could be assumed to be derived from the proximal pegmatite face of interest.

From mixing the in-situ and proximal debris material a sample of ~5.45 t was created. The sample consisted of numerous boulder sized clasts ranging in diameter from 50 mm to 400 mm with an average clast size of ~200 mm.

13.3.1.3 Bulk Sample 60 t

A pit was drilled and blasted on the F1 pegmatite from surface to bedrock (estimate 2 m) and 100 t of material was excavated by hand from the pit. Approximately 70 t of this material was loaded into 1 t bags and exported to the town of Aggeneys in the Northern Cape province of South Africa where the material was crushed to 25 mm. From this, 60 t of the material was then re-bagged into 1 t bags and sent to CoreMet.

13.3.1.4 Variability Samples

To perform variability testwork on the satellite pegmatite outcrops (D, E6 and E7), a 150 kg consolidated sample (per pegmatite) was generated by combining various grab samples that were collected over the respective pegmatite strike lengths.

Figure 13.2: F Pegmatite Sampling Locations for the 10 kg Samples

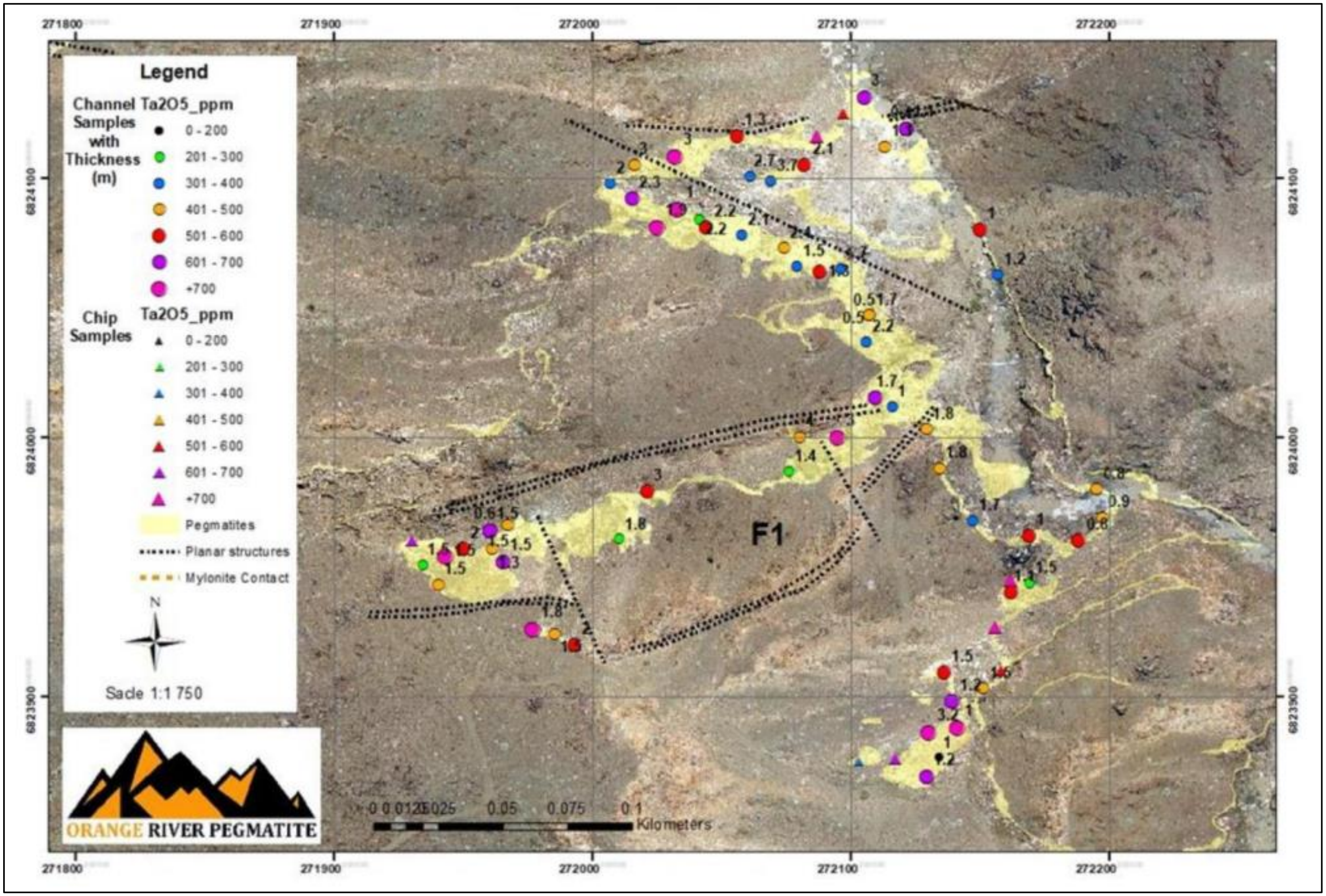
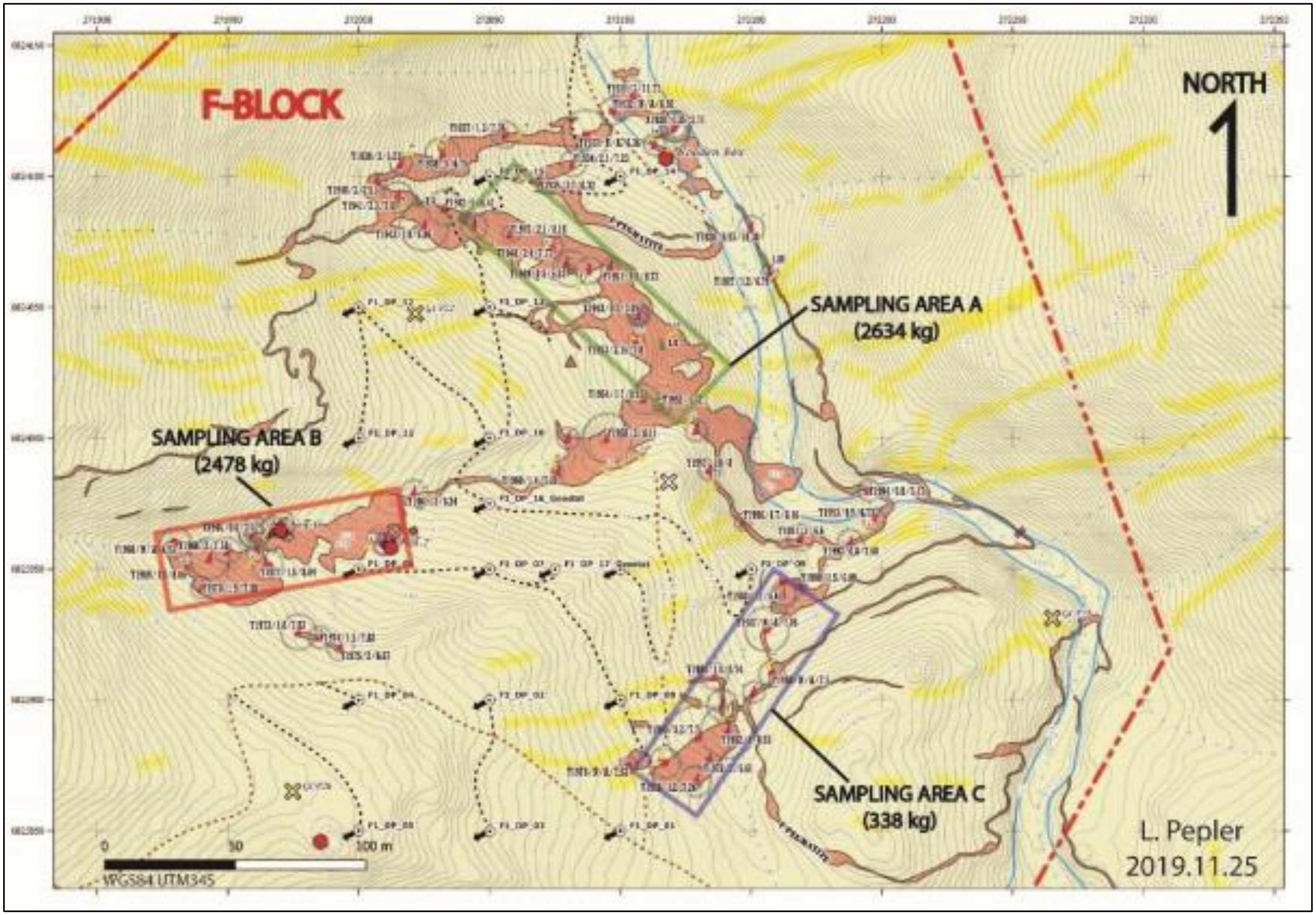


Figure 13.3: Location of F Pegmatite Faces Sampled for the 5.5 t Bulk Sample



13.4 MINERALOGY

13.4.1 Head Sample Concentrations

The head analyses for the seven different types of samples used during the mineralogical and metallurgical testwork are provided in Table 13.2. The following are concluded:

- The F pegmatite samples Ta_2O_5 head grade varied between 357 ppm and 592 ppm;
- The head grade of the E7 (644 ppm Ta_2O_5) and D (438 ppm Ta_2O_5) is in the same range as the F pegmatite;
- The E6 sample has significantly higher Ta_2O_5 content of 901 ppm; and,
- The E7 has significantly higher lithium content (1,889 ppm) compared to the other samples (between 113 ppm and 217 ppm).

Table 13.2: Head Sample Analyses for the Different Types of Samples

Description	Pegmatite	Ta_2O_5 (ppm)	Ni (ppm)	Li (ppm)
X1265	F1	568	46	-
X1266	F1	399	94	-
Bulk sample – 5.5 t	F	357	60	144
Bulk sample – 60 t	F1	592	30	113
E6 sample	E6	901	37	139
E7 sample	E7	644	40	1889
D sample	D	438	53	217

13.4.2 Major Minerals

The major gangue minerals identified in the samples are provided in Table 13.3. The ratio between the minerals slightly changes for the different samples. Important to note is that all the major gangue minerals have densities between 2.57 g/cm^3 and 2.80 g/cm^3.

Table 13.3: Major Gangue Minerals in the Samples

Mineral	Ni (ppm)	Li (ppm)
Albite	$NaAlSi_3O_8$	2.62
Microcline	$K(AlSi_3O_8)$	2.57
Muscovite	$KAl_2(Si_3Al)O_{10}(OH,F)_2$	2.80
Quartz	SiO_2	2.62

13.4.3 Tantalum Minerals

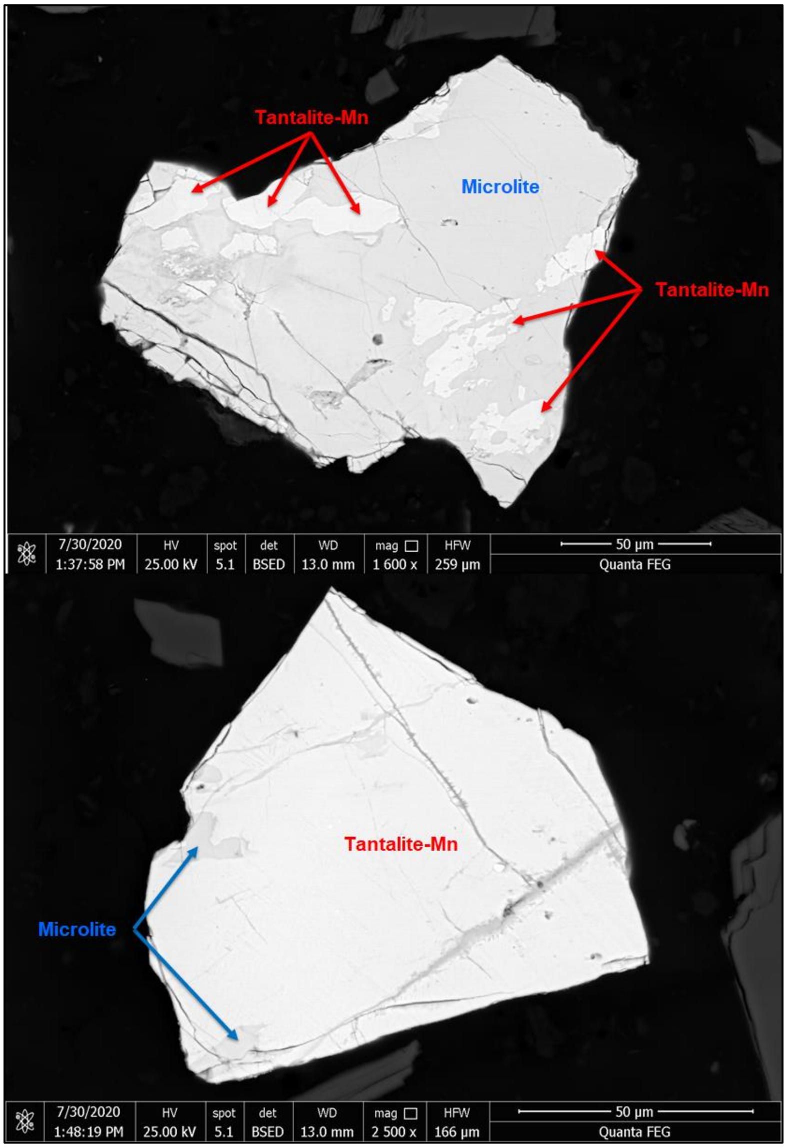
The tantalum bearing minerals for all the different areas (F, D, E7 and E6) after concentration are provided in Table 13.4. The following is important to note:

- Tantalum is mainly contained in tantalite-Mn and microlite;
- Low levels of tantalum are contained in columbite-Fe and tapiolite;
- Tantalite-Mn has significant lower magnetic susceptibility compared to tantalite-Fe - this was an important consideration during the development of the proposed DFS flowsheet (see Figure 13.4);
- Microlite is non-magnetic and cannot be recovered through magnetic separation;
- The ratio of tantalite-Mn to microlite varies significantly between different areas from 3.6 to 0.4. Thus, it is important that the selected processing route should be able to recover both tantalite-Mn and microlite efficiently; and,
- The density of tantalite-Mn is 8.1 g/cm^3 and the density of microlite is 5.3 g/cm^3 compared to the main gangue minerals which have densities between 2.57 g/cm^3 and 2.80 g/cm^3; this means the ore should be amenable to gravity separation.

Table 13.4: Ta_2O_5 Distribution Across the Tantalum Bearing Minerals for F (60 t), D, E7 and E6 Concentrates

Minerals	Density (g/cm^3)	Mass% Ta_2O_5 Distribution Across Tantalum Minerals							
		60 t (+45 µm)	60 t (-45 µm)	D (+45 µm)	D (-45 µm)	E7 (+45 µm)	E7 (-45 µm)	E6 (+45 µm)	E6 (-45 µm)
Columbite-Fe	8.2	0.03	0.01	0.01	0.02	0.00	0.02	0.00	0.02
Tantalite-Mn	8.1	45.30	34.86	67.50	57.33	50.35	46.91	24.54	22.91
Tapiolite	7.8	0.23	0.26	0.28	0.16	0.12	0.21	0.39	0.81
Microlite	5.3	40.34	47.17	18.54	24.32	37.62	30.69	56.87	47.92

Figure 13.4: SEM Micrographs Showing Microlite and Tantalite-Mn Mineral Phases



13.4.4 Liberation

Table 13.5 shows the distribution of tantalum across different mineral classes in different size fractions after samples X1265 and X1266 were milled to 100% passing 300 µm. The data shows that the tantalum minerals are fairly well liberated even at 300 µm, which means it should be possible to recover most of the tantalum at a coarse grind.

Table 13.5: Tantalum Distribution for Samples X1265 and X1266

Parameter	Sample X1265				Sample X1266			
	Calc. Head	-300 +180 µm	-180 +45 µm	-45 +0 µm	Calc. Head	-300 +180 µm	-180 +45 µm	-45 +0 µm
Tantalum content (Ta%)	0.046	0.005	0.013	0.029	0.033	0.006	0.01	0.017
Ta minerals (>50%)	85.5	71.5	88.4	86.6	71.6	86.2	40.1	84.5
Ta minerals (>25%)	4.3	4.0	0.7	6.0	16.9	1.0	31.2	14.4
Other minerals	10.1	24.6	10.8	7.5	11.6	12.8	28.7	1.1
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**

13.5 METALLURGICAL TESTWORK

13.5.1 Crushing

The 5.5 t and 60 t bulk samples were crushed to 100% passing 25 mm. The crushing was completed in two stages consisting of a jaw crusher followed by a cone crusher.

The jaw crusher reduced material to a top size of 75 mm. The jaw crusher discharge was fed to a cone crusher and the cone crusher discharge was screened at 25 mm from where the -25 mm material were bagged. The oversize (+25 mm) was returned to the cone crusher.

From the mineralogical information it was determined that a coarse grind should be sufficient for initial tantalum recovery. A 1 mm top size was selected and tested through three different technologies: VSI, rod mill and high-pressure grinding rolls (HPGRs). The main results are show in Figure 13.5 and Figure 13.6. The main points to note are:

- VSI and rod mill produce similar particle size distribution (PSD), while HPGR tends to generate a slightly wider PSD;
- The HPGR method was excluded due to costs - high CAPEX and OPEX;
- In the rod mill more of the tantalum remained in the coarser fractions, which was determined to be detrimental due to poor liberation; and,
- The VSI provided the best liberation while not generating excessive fines (<45 µm) and was selected on this basis.

Figure 13.5: PSD of the 60 t Sample Crushed to -1 mm using VSI, Rod Mill and HPGR

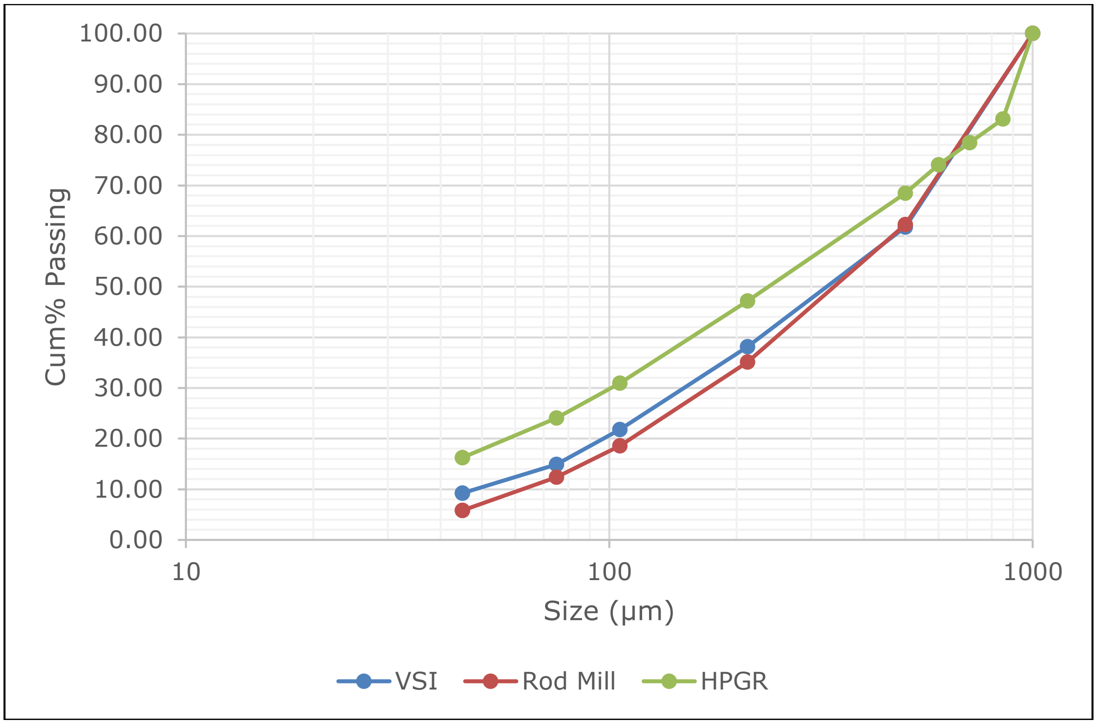
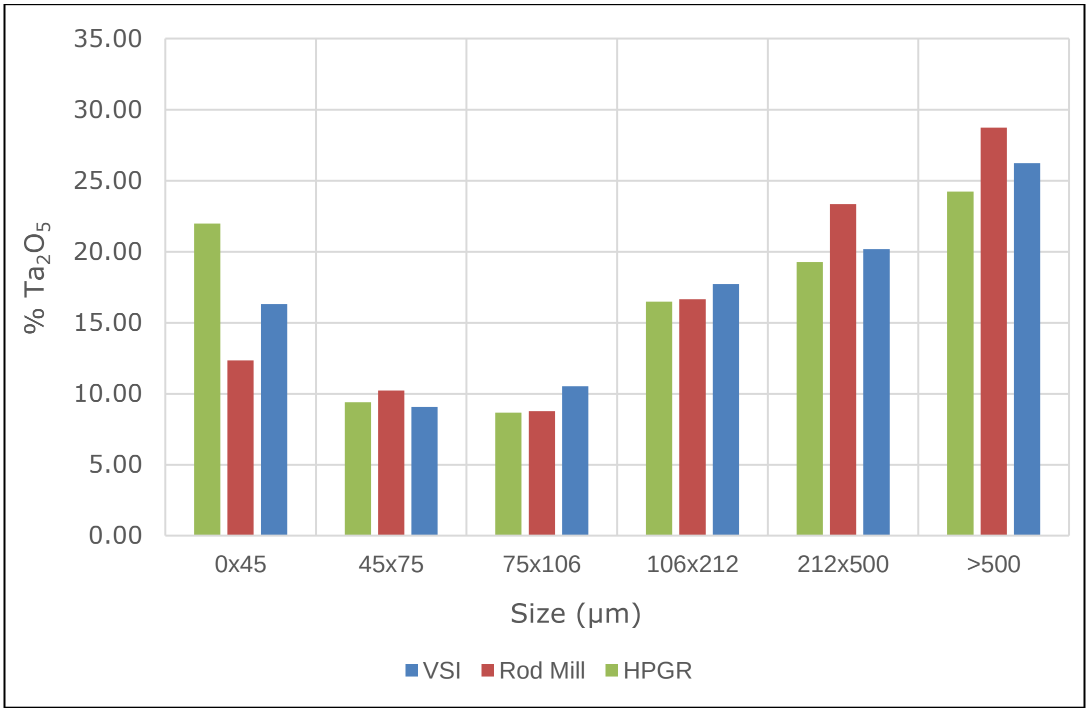


Figure 13.6: Ta_2O_5 Distribution per size Fraction for 60 t Sample Crushed to -1 mm using VSI, Rod Mill and HPGR

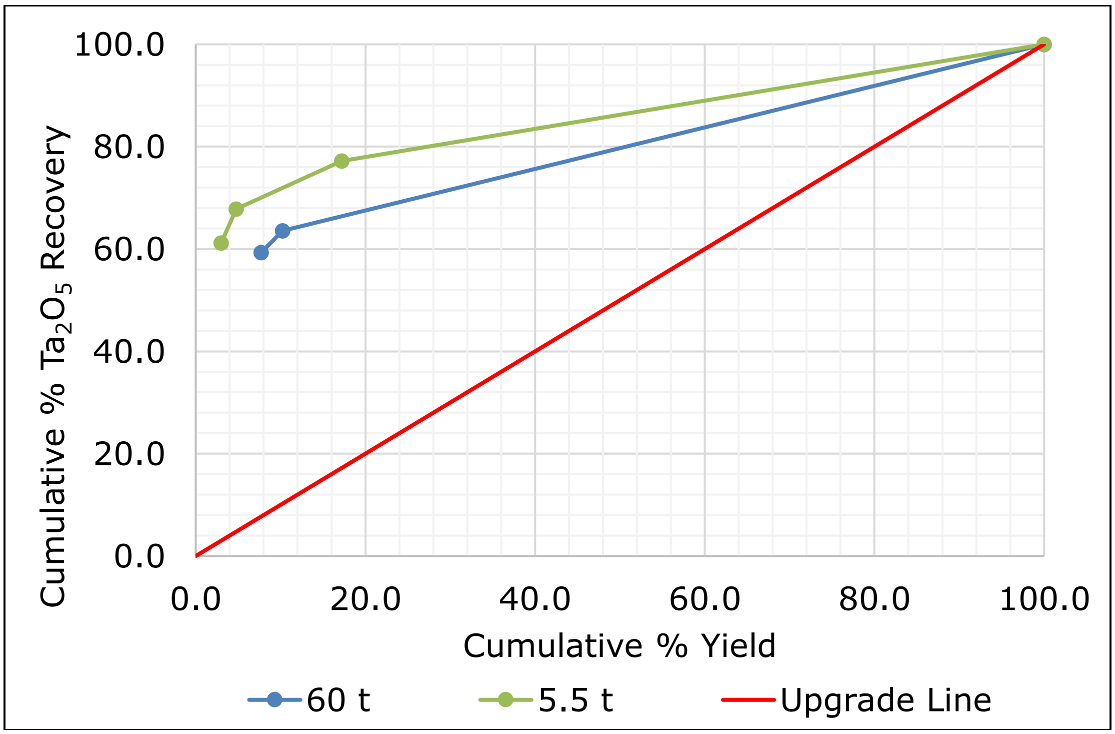


13.5.2 Gravity Separation

Figure 13.7 presents the recovery yield curve for the 5.5 t and 60 t rougher spiral testwork for which an industrial size MG12 spiral (four-stage, twelve-turn spiral) was used. The results indicate:

- The recovery of the 60-t sample was lower, compared to that of the 5.5 t sample (68% versus 64%);
- The lower recovery was due to difference in liberation size which was confirmed through further testwork; and,
- To achieve maximum recovery, crushing to 1,000 µm is required.

Figure 13.7: Recovery Yield Curve for the 5.5 t and 60 t Rougher Spiral Testwork



The Ta_2O_5 distribution was determined in the spiral tails as shown in Figure 13.8. The following are observed:

- Significant tantalum loss (~30%) to <45 µm occurs due to spiral inefficiency in this size fraction. Fine recovery is an important part of the recovery optimisation; and,
- Most of the tantalum losses occurred to the >150 µm fraction due to poor liberation. Liberation testwork (Figure 13.10) indicated that at 300 µm, 50% additional Ta_2O_5 can be recovered. Crushing to a smaller top size does improve Ta_2O_5 recovery as shown in Figure 13.9. This will require further assessment. It is proposed that the VSI should be designed to crush to a top size of 600 µm

and space is left for a possible future milling circuit to grind to <212 µm (as shown in Figure 13.10).

Figure 13.8: Ta_2O_5 Distribution in the Rougher Spiral Tails

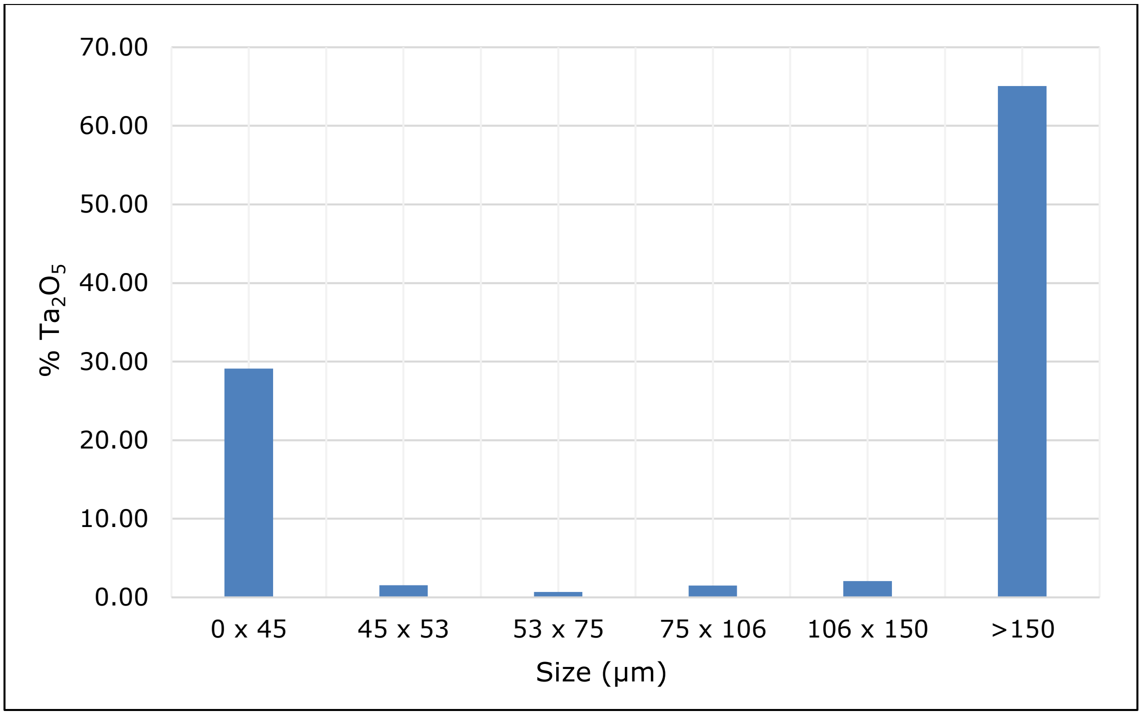


Figure 13.9: Heavy Liquid Test on Deslimed Samples of Different Size Fractions

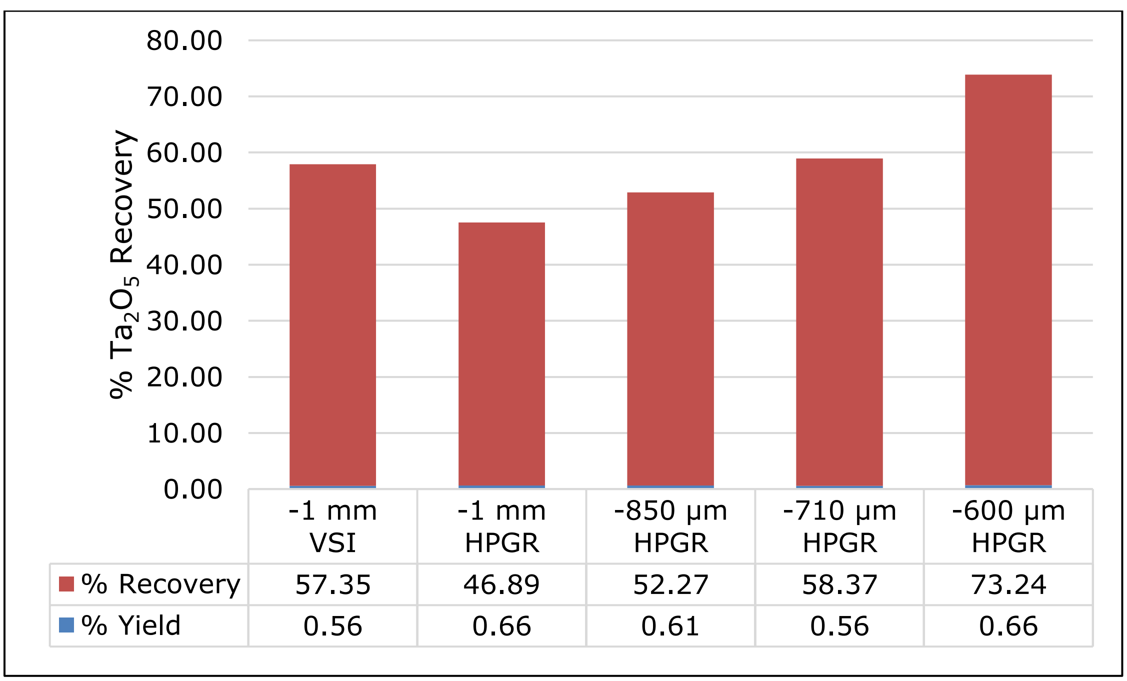
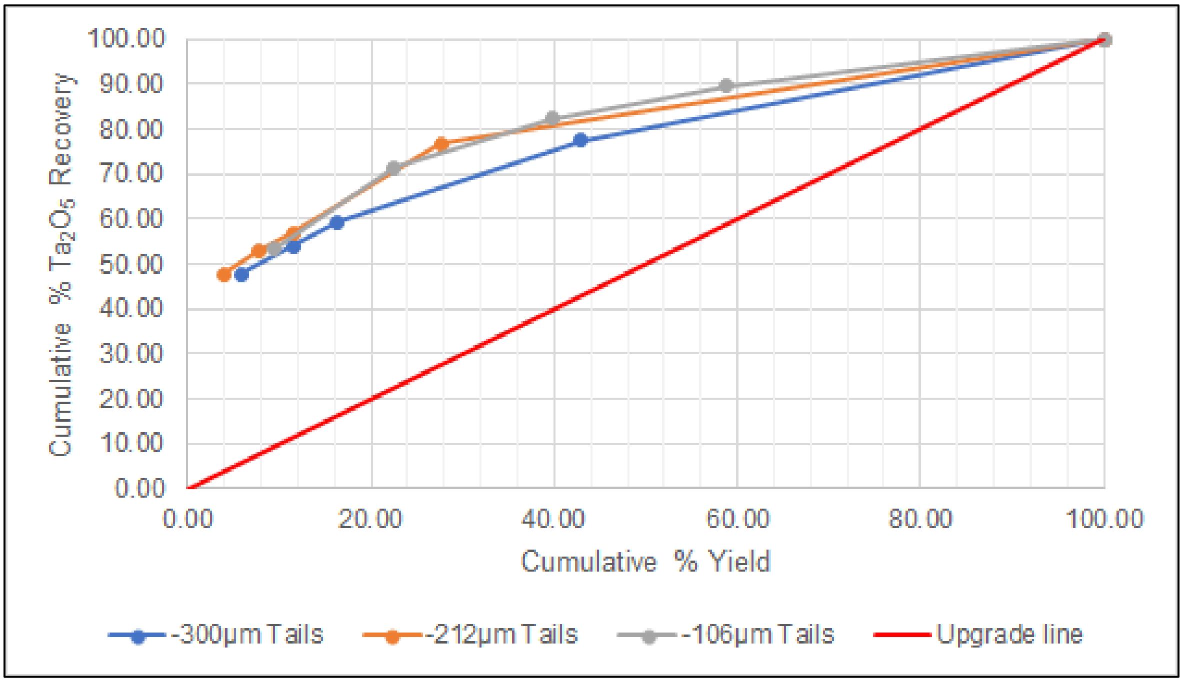


Figure 13.10: Recovery-Yield for the Spiral Tails (>106 µm) Milled to Different Top Sizes and Separated on a Shaking Table



By crushing the feed to 100% passing 600 µm it is possible to achieve similar recoveries of 68% to what was achieved with the 5.5 t samples.

To simulate the proposed DFS flowsheet the 60-t sample underwent a rougher scavenger spiral separation followed by a cleaner spiral test.

The rougher-scavenger test results are shown in Table 13.6 and indicated that it is possible to achieve a recovery of ~64% in a single pass.

The spiral concentrate test (Table 13.7) indicates that it is possible to upgrade the tantalum to 4.1% Ta_2O_5 at a recovery of 88%. This recovery value was used in the mass balance.

Table 13.6: Spiral Rougher-Scavenger Bulk Test (60 t Sample)

Stream Discipline	Fractional				Cumulative		
	Mass (kg)	**Yield (%)**	**Ta_2O_5 (ppm)**	**Ta_2O_5 (% Recovery)**	**Ta_2O_5 (ppm)**	**Cum. Yield (%)**	**Ta_2O_5 (% Cum. Recovery)**
Head	52,780.00	100	592	100.00	592	-	-
Concentrate	3,400.00	6.44	5,456	63.64	5,456	6.44	63.64
Tails	49,380.00	93.56	215	36.36	552	100.00	100.00
Total	**52,780.00**	**100.00**	**552**	**-**	**-**	**-**	**-**

Table 13.7: Spiral Cleaner Bulk Test (60 t Sample)

Stream Discipline	Fractional				Cumulative		
	Mass (kg)	Yield (%)	Ta_2O_5 (ppm)	Ta_2O_5 (% Recovery)	Ta_2O_5 (ppm)	Cum. Yield (%)	Ta_2O_5 (% Cum. Recovery)
Head	3,350.00	100	5,456	100.00	5,456	-	-
Conc-C	390.00	11.75	40,664	88.00	40,664	11.75	88.00
Midd-C	97.00	2.92	2,159	1.16	32,995	14.68	89.16
Tails-C	2,831.00	85.32	690	10.84	5,432	100.00	100.00
Total	**3,318.00**	**100.00**	**5,432**	**-**	**-**	**-**	**-**

13.5.3 Fines Recovery on Spiral Tails

As previously indicated, there are significant tantalum losses within the <45 µm fraction of the spiral tails. The current design excludes fines recovery. However, this part of the testwork investigated the possible upside of fines recovery from the spiral tails.

To improve recovery, the spiral tails was screened at 106 µm. The oversize requires further grinding to improve recovery and the undersize requires specific technology suited to this size range.

This testwork also confirmed that magnetic separation is not viable due to poor recoveries. A centrifugal concentrator (Falcon SB) was used to simulate a Falcon C industrial unit. A rougher and cleaner step was tested on the <106 µm spiral tails (Figure 13.11 and Figure 13.12). The following are observed:

- It is possible to recover up to 80% Ta_2O_5 in 40% of the mass on the rougher (note a single stage Falcon C has maximum mass pull of 40%) at a grade of ~0.1% Ta_2O_5;
- The data indicates that it should be possible to produce a grade of 0.15% Ta_2O_5 on the cleaner with a recovery of 80%. This grade is close to the feed grade to the scavenger MGS, which is where the Falcon concentrate will be fed into the cleaning circuit; and,
- The incorporation of a fines circuit was modelled using the test results. It was determined that the addition of a fines circuit can improve overall recovery between 10% and 13%. However, this will come at large capital requirement due to the added complexity and equipment. Consequently, the proposed DFS flowsheet excludes fines recovery.

Figure 13.11: Falcon Rougher and Cleaner Grade-Recovery Curves on the 60 t <106 µm Spiral Tails

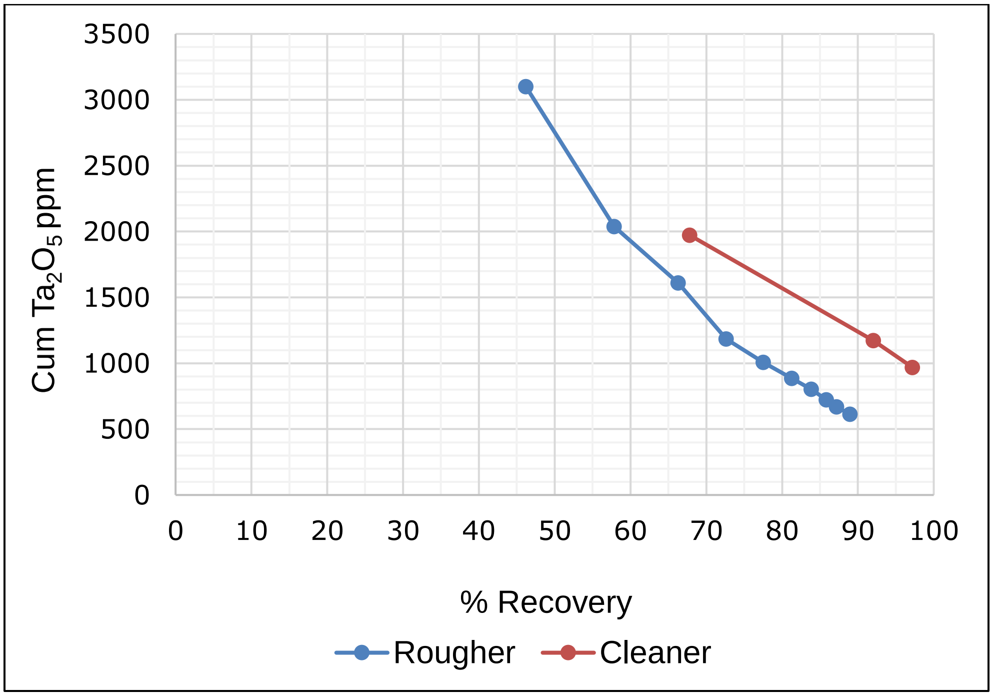
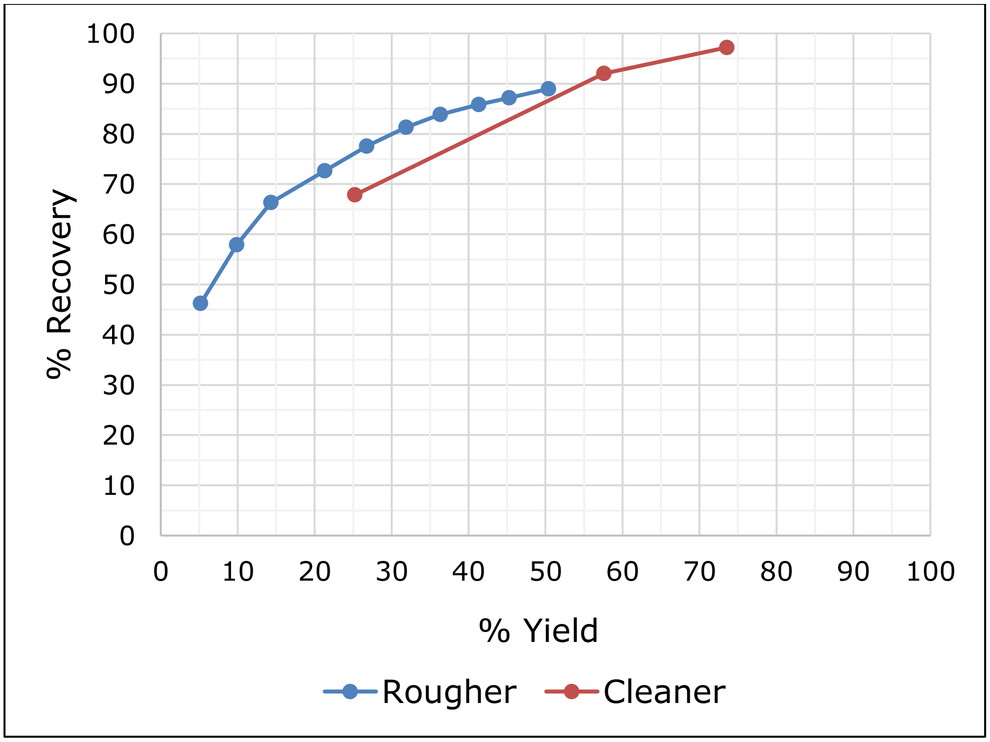


Figure 13.12: Falcon Rougher and Cleaner Recovery-Yield Curves on the 60 t <106 µm Spiral Tails



13.5.4 MGS Cleaner Circuit

13.5.4.1 Concentrate Milling

The concentrates (cut 1 and cut 2) from the cleaner spiral (<1,000 µm) underwent analysis by quantitative evaluation of materials by scanning electron microscopy (QEMSCAN). The cleaner spiral concentrates were milled to <150 µm. The milled product was processed through the MGS to produce a final tantalum concentrate – see Table 13.8, column "MGS Conc".

The following are noted from the concentrate milling work:

- The tantalum in spiral concentrate 1 occurs mostly (~89%) in particles that contains more than 50% Ta minerals by mass with 10% of the tantalum in particles that contain less than 25% Ta minerals by mass;
- The tantalum in spiral concentrate 2 still occurs mostly (~74%) in particles that contains more than 50% Ta minerals by mass. However, 23% of the tantalum occurs in particles that contain less than 25% Ta minerals by mass;
- Finer milling is required to achieve the minimum concentrate grade of 25% Ta_2O_5. From the mineralogical testwork it was clear that milling to <150 µm should be sufficient;
- It should also be noted that a narrower feed PSD increases the MGS separation efficiency; and,
- The spiral concentrate (spiral concentrate 1 and 2) was milled to 100% passing 150 µm. The concentrate was then passed through the MGS. More than 90% of the tantalum were recovered in the concentrate. This MGS concentrate was analysed as shown in Table 13.8.
- The QEMSCAN analysis indicated that the tantalum in the MGS concentrate occurs mostly (~85%) in particles that contains more than 50% Ta minerals by mass. Less than 10% of the tantalum are in particles that contain more than 25% Ta minerals by mass. Thus, indicating that the tantalum was successfully liberated at 150 µm.

Table 13.8: Tantalum Distribution for Spiral Concentrate 1, Spiral Concentrate 2 and MGS Concentrate for the 5.5 t Bulk Sample

Particle Category	Spiral Conc. 1	Spiral Conc. 2	MGS Conc.
Ta (%)	1.41	0.16	3.86
Ta Minerals (>50%)	88.6	73.7	85.2
Ta Minerals (<25%)	1.5	3.5	5.3
Other Minerals	10.0	22.8	9.6
Total	**100.0**	**100.0**	**100.0**

13.5.4.2 MGS Rougher

The final spiral concentrates were milled to 100% passing 150 µm before passing through an MGS. The 5.5 t spiral concentrate was from a single rougher spiral pass and had a feed grade of 1.2% Ta_2O_5. The 60-t spiral concentrate was from a rougher-cleaner spiral combination and had a feed grade of 4.1% Ta_2O_5. The results from the MGS roughing tests are shown in Figure 13.13, Figure 13.14 and Figure 13.15. The following are observed from the testwork:

- The MGS is able to produce a concentrate grade at the commercial grade of 25% Ta_2O_5. It was observed that small changes in operational parameters had a large impact on concentrate grade and recovery. For this reason, a cleaner MGS was added to the DFS flowsheet in order to maintain recovery on the rougher and ensure quality on the cleaner;
- The MGS is able to recover up to 90% of the tantalum in the feed; and,
- The MGS achieves the same recoveries and upgrade ratios (ratio of concentrate grade to feed grade) irrespective of the feed grade.

Figure 13.13: Grade-Recovery Curve for Rougher MGS on the 5.5 t and 60 t Bulk Samples

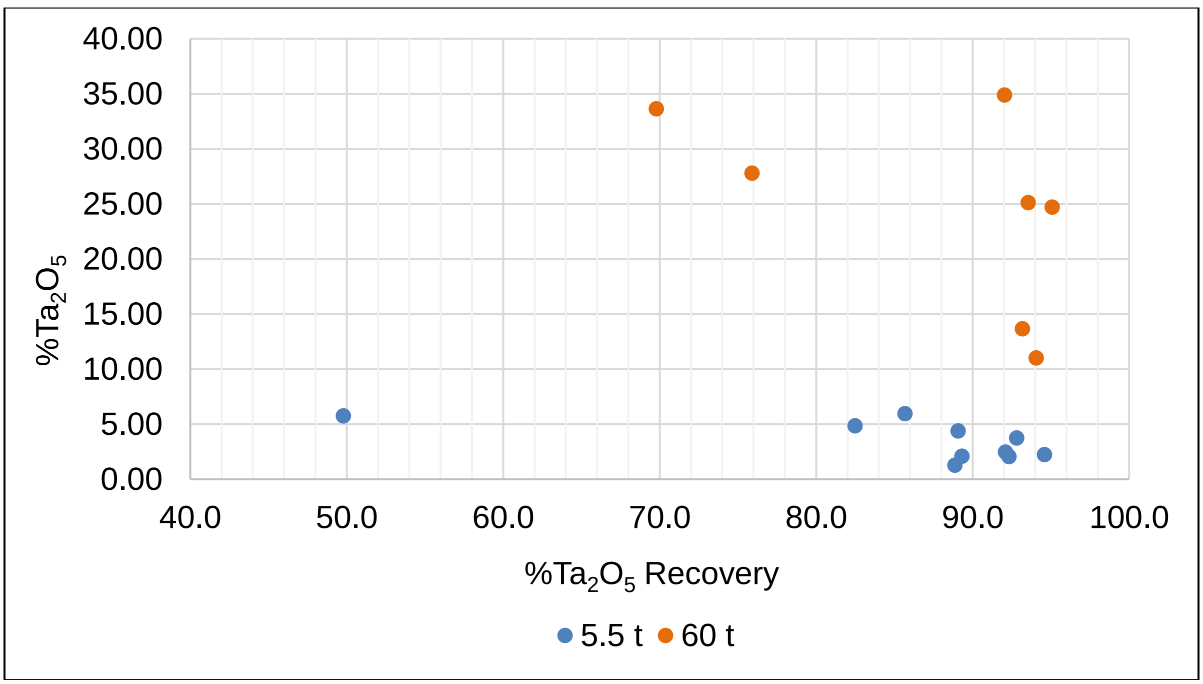


Figure 13.14: Recovery-Yield Curve for Rougher MGS on the 5.5 t and 60 t Bulk Samples

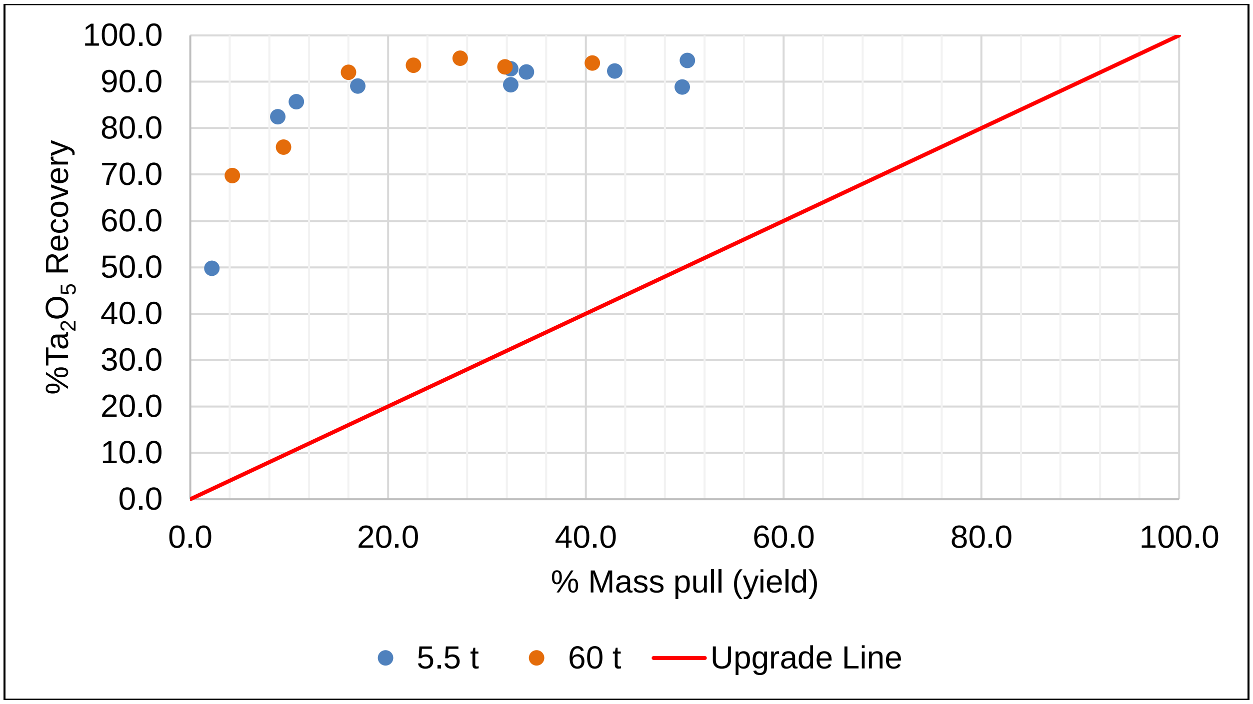
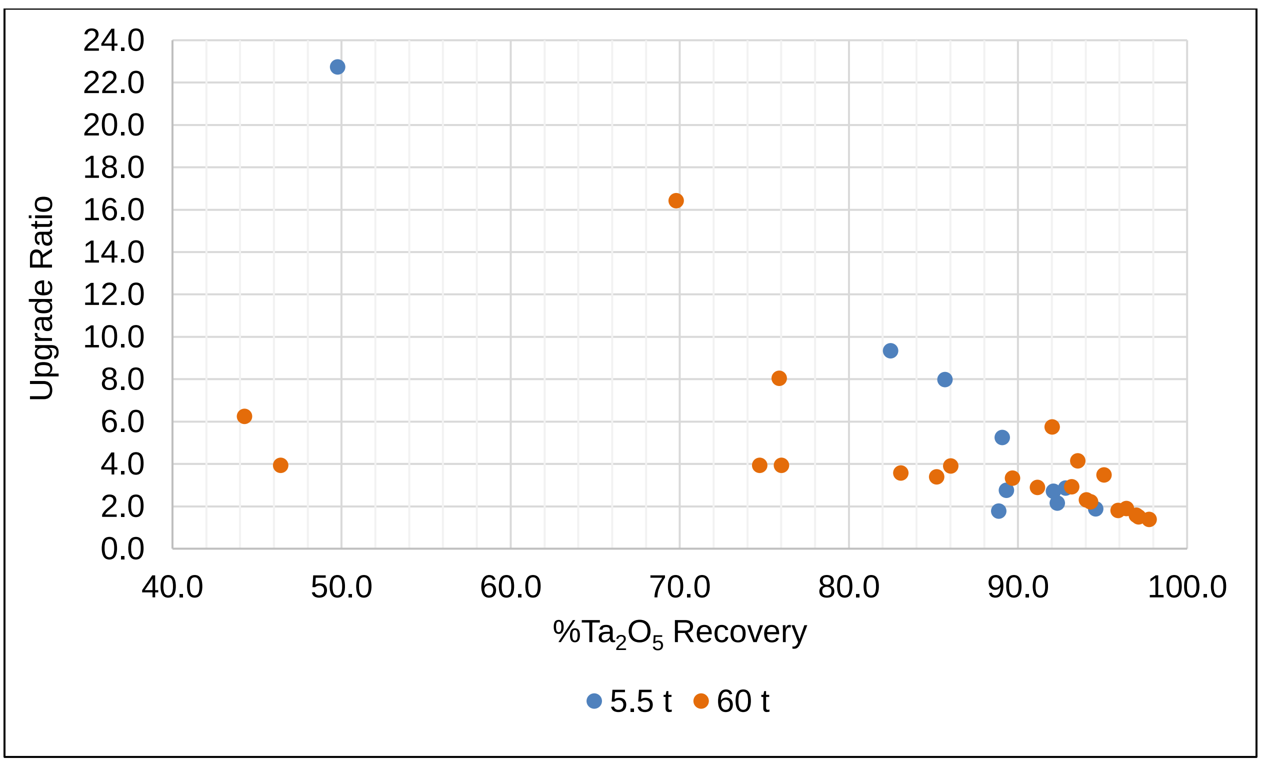


Figure 13.15: Upgrade Ratio-Recovery Curve for Rougher MGS on the 5.5 t and 60 t Bulk Samples



13.5.4.3 MGS Scavenger

The tailings from the MGS rougher test (60 t bulk sample) were sent to a scavenger MGS. The results are shown in Table 13.9. From the results the following are concluded:

- The majority of tantalum losses to the rougher tails were as a result of poor liberation resulting in low recoveries in the scavenger MGS; and,
- A recovery value of 35% Ta_2O_5 was used for the scavenger MGS in the modelling.

Table 13.9: MGS Scavenger Test Results

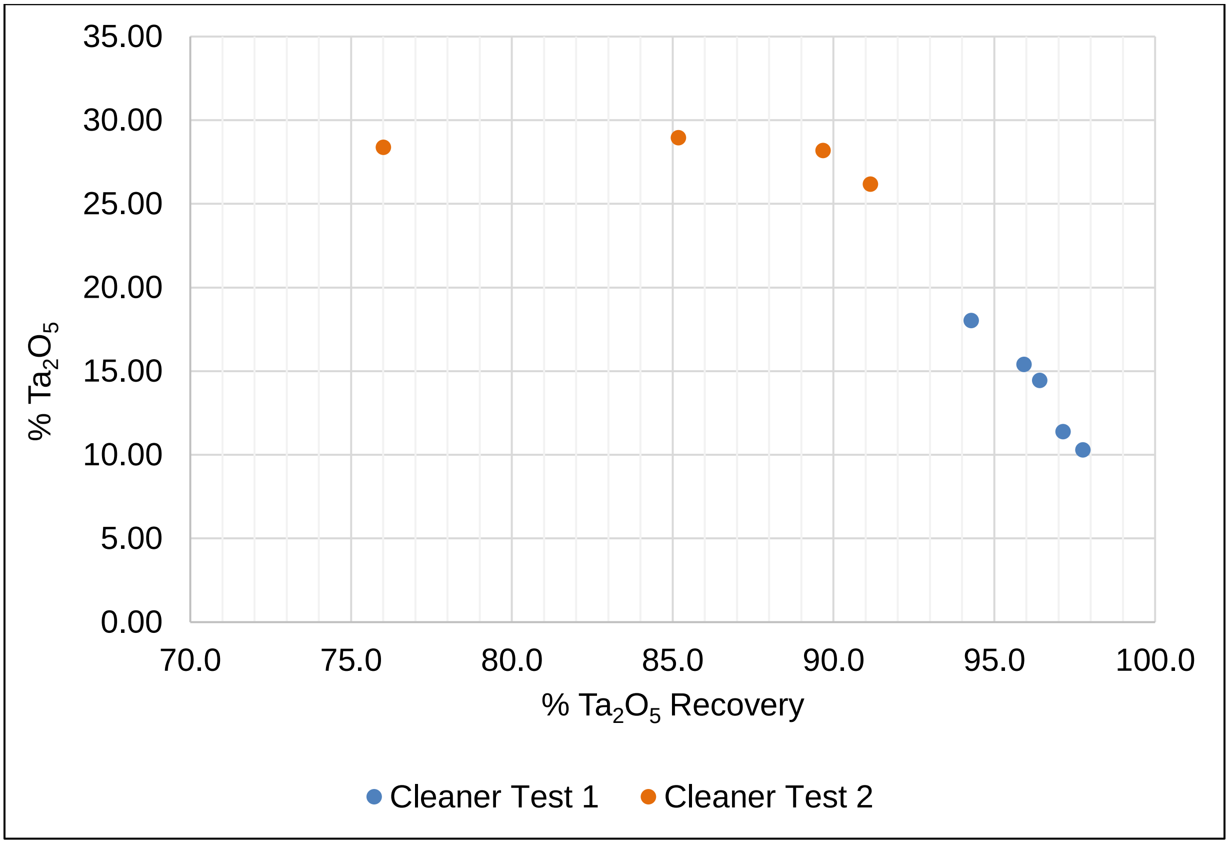
Test Run	RPM	Water Flow Rate (RPM)	Concentrate			Tailings			Head Recalc.
			% Yield to Conc.	Ta_2O_5 (%)	Rec. Ta_2O_5 (%)	% Yield to Tails	Ta_2O_5 (%)	Rec. Ta_2O_5 (%)	Ta_2O_5 (%)
1	168	4	15.47	0.95	25.9	84.53	0.50	74.1	0.57
2	170	4	29.52	0.77	37.1	70.48	0.55	62.9	0.61
3	165	4	7.25	1.10	15.3	92.75	0.48	84.7	0.52
4	168	6	9.33	1.40	22.1	90.67	0.51	77.9	0.59
5	170	6	13.96	1.17	26.5	86.04	0.53	73.5	0.62
6	173	6	19.44	1.09	31.0	80.56	0.59	69.0	0.69

13.5.4.4 MGS Cleaner

The concentrate from the MGS rougher test (60 t bulk sample) was sent to a cleaner MGS. The results are shown in Figure 13.16. From the results the following are concluded:

- The MGS cleaner is able to achieve the required product specification of 25% Ta_2O_5; and,
- The MGS cleaner is able to achieve recoveries in excess of 90%.

Figure 13.16: Grade-Recovery Curve for Cleaner MGS on the 60 t Bulk Sample



13.6 Ore Variability

In order to understand the impact of different ore types (E6, E7 and D) on the proposed DFS flowsheet, 150 kg samples from these three areas were compared to a 150 kg sample from the F pegmatite area (60 t bulk sample). It is not possible to simulate the entire flowsheet on only a 150 kg sample due to the low concentration of the Ta_2O_5 in the feed. However, to understand the expected behaviour, each sample underwent the same sample preparation and processing steps with the focus on recovery. The following testwork was performed on each sample:

- Crush sample to 100% passing 1 mm;
- Perform wet PSD and determine Ta_2O_5 distribution per size fraction;
- Deslime at 45µm;
- Perform a shaking table test on the deslimed sample and determine recovery of Ta_2O_5;
- Collect sufficient concentrate for MGS testwork and mill this sample to 100% passing 150 µm; and,
- Perform an MGS test on the milled sample and determine the recovery of Ta_2O_5 at the same settings.

The results for this testwork are shown in Figure 13.17, Figure 13.18, Figure 13.19 and Figure 13.20. From the results the following are concluded:

- Sample E6 has significantly higher Ta_2O_5 content compared to other samples (Table 13.2);
- Sample E6 crushed significantly finer than the other samples (Figure 13.17), while sample E7 appeared to be more competent;
- E6 had more deportment of Ta_2O_5 to the <45 µm fraction due to the finer PSD (see Figure 13.18). However, in the other size classes the distribution was similar. This indicates that care should be taken to limit over crushing when E6 is processed;
- Sample E7 is the coarsest and also contains more Ta_2O_5 in the >212 µm size fractions (Figure 13.18). However, this coarser distribution does not negatively impact recovery as can be seen in Figure 13.19 and Figure 13.20;
- The primary recovery test (shaking table used to simulate the spiral) indicated that E6 and D fall on the same separation line as the 60 t sample and should produce similar recoveries. The primary shaking table recovery was slightly higher for the E7 sample;
- The MGS testwork indicated that it was possible to recover over 80% on all the different samples;
- The variability test indicates that the DFS flowsheet achieves similar recoveries to the F pegmatite when treating ore from the D and E pegmatites; and,
- Based on the testwork it can be concluded that the overall Ta_2O_5 recovery of 65% is plausible from the D, E and F pegmatites.

Figure 13.17: PSD for Crushed Samples

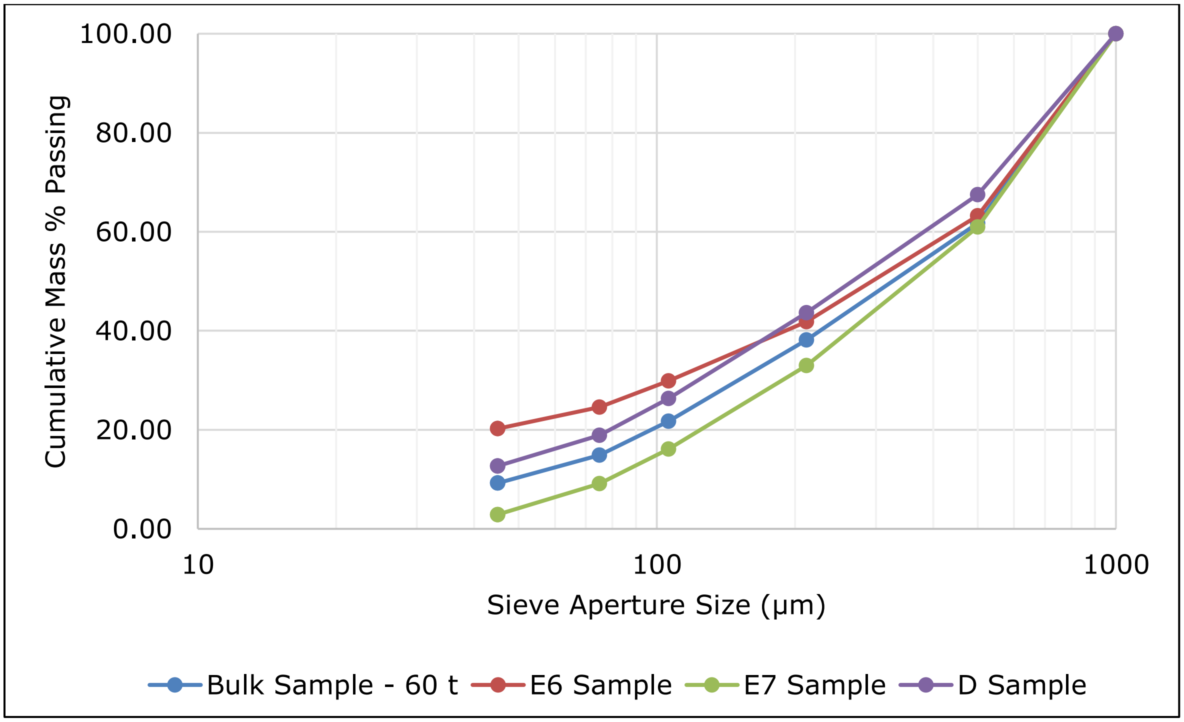


Figure 13.18: Ta_2O_5 Distributions per Size Fraction

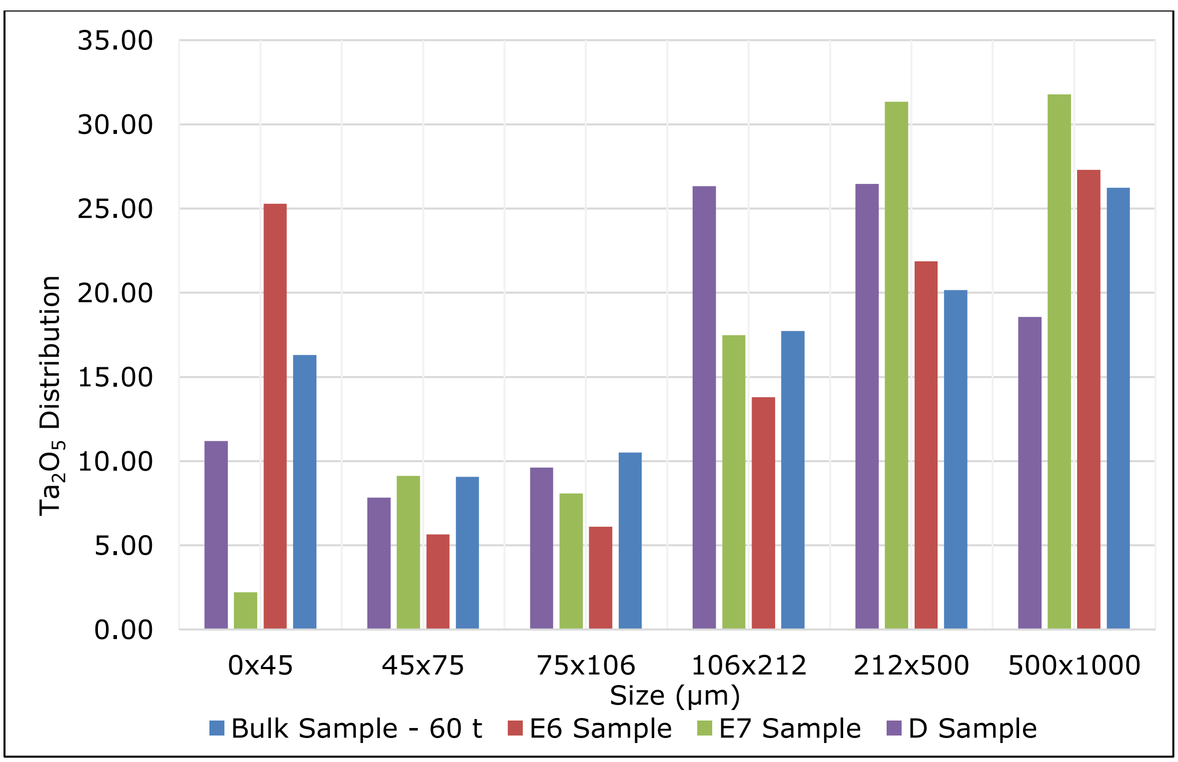


Figure 13.19: Recovery-Yield Curves on the Shaking Table for the -1,000 µm +45 µm Samples

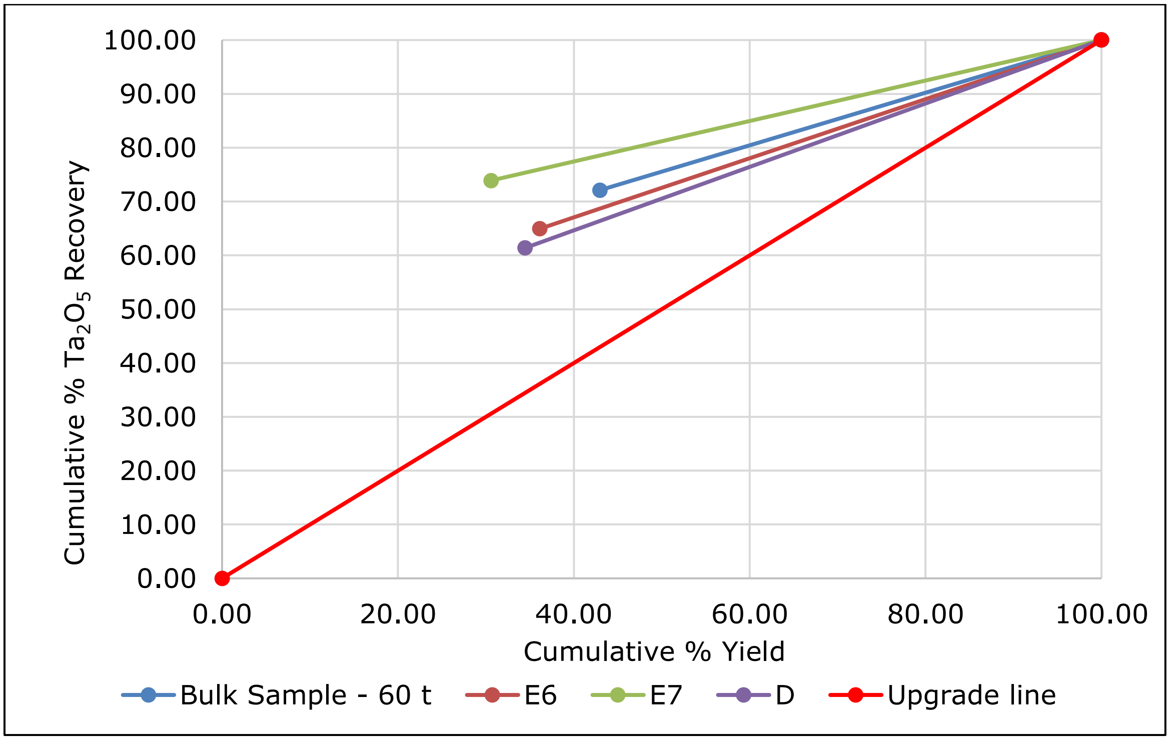
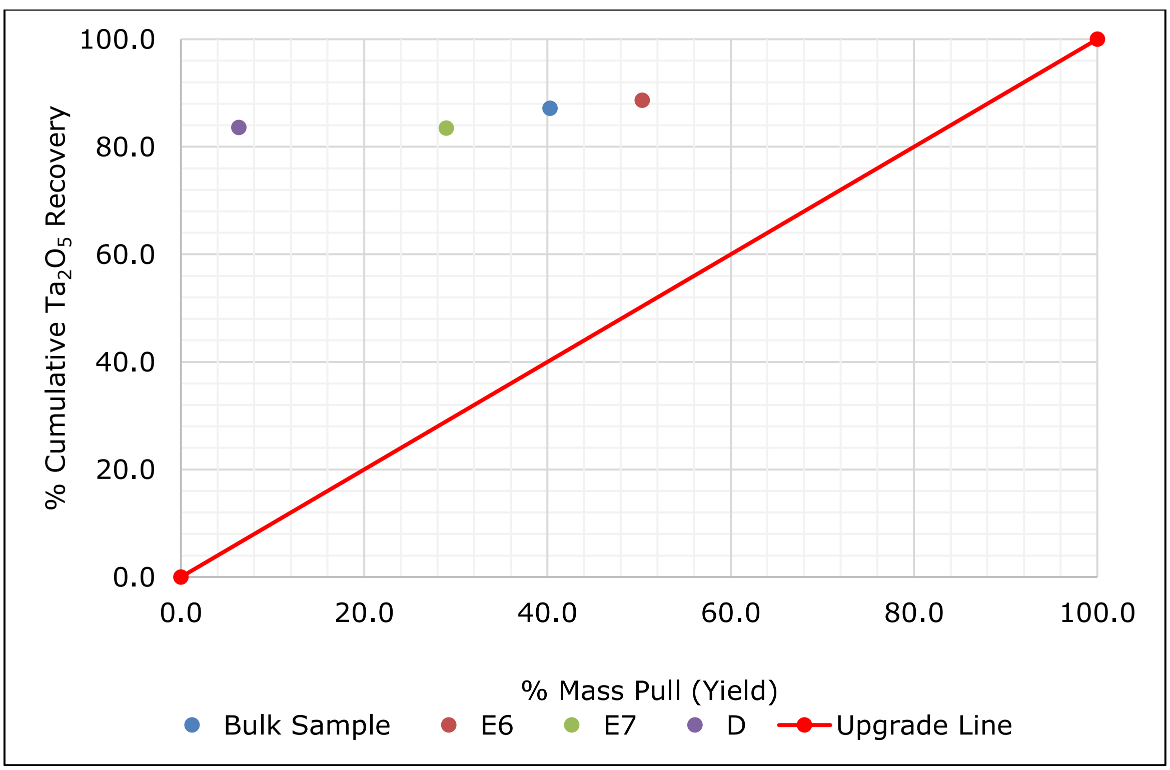


Figure 13.20: Recovery-Yield Curves on the MGS for the -150 µm Samples



13.7 LITHIUM RECOVERY TO TAILS

During the metallurgical testwork programme lithium was not specifically targeted. However, it was traced from the feed to final concentrate for the 60-t bulk sample (F pegmatite). The deportment of the lithium for the 60-t test programme is shown in Table 13.10 and indicates that 99.9% of the Li_2O reports to the tailings streams.

In order to understand the sensitivity of lithium recovery to the tailings with changing parameters it was assessed against a change in feed grade, change in yield to tantalum product and upgrade of lithium in the tantalum product (Figure 13.21).

From Figure 13.21 it is noted that lithium recovery of 99% to the tails is achievable even in the event of the following occurrences:

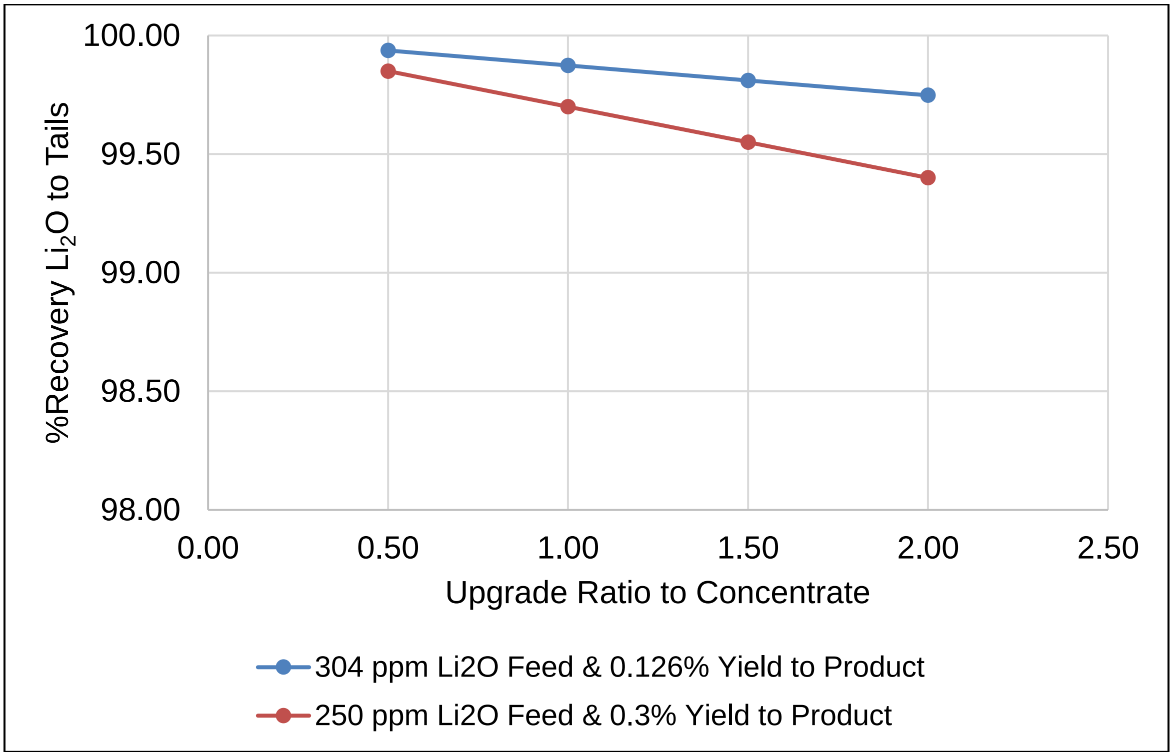
- The yield to tantalum concentrate double; and
- The lithium grade in the tantalum concentrate double.

Based on the testwork it can be concluded that an overall Li_2O recovery of 99% to the process plant tailings is achievable when treating ore from the D, E and F pegmatites.

Table 13.10: Lithium Deportment for 60 t Bulk Sample

Parameter	Value
Feed grade Li_2O (ppm)	304
% Yield to concentrate	0.126
Concentrate grade (ppm)	364
% Recovery Li_2O to concentrate	0.15
% Recovery Li_2O to tails	99.85
% Yield to tails	99.87
Tails grade (ppm)	303

Figure 13.21: Sensitivity of Li_2O Recovery to Tails with Change in Feed Grade, Yield to Tantalum Product and Upgrade to Tantalum Concentrate



13.8 Resource / Reserve

The F1 pegmatite from which the 60-t bulk sample was taken forms part of the EF-pegmatites that is ~58% of the total ore that will be mined over the LoM. The DFS focusses on the opencast mining of the D, E7, E8, E6, and F1 pegmatites.

The D-pegmatite will be mined for the first 3 years and the EF-pegmatites will be mined thereafter.

The variability testwork indicates that the proposed DFS flowsheet will be able to produce a minimum 25% Ta_2O_5 concentrate grade and 65% recovery, when ore from the D-pegmatite and EF-pegmatites, as presented in the DFS mine production schedule, is processed.

Considering the above the DFS mass balance is based on a minimum 25% Ta_2O_5 concentrate grade and 65% recovery.

14.0 MINERAL RESOURCE ESTIMATION

14.1 DATA

14.1.1 Drill Hole Database

A total of 105 diamond drill holes drilled from the surface have been used in the 1st May 2022 Mineral Resource Estimate, as shown in Table 14.1. These holes have been supplemented by geological information gained from surface outcrops, including from channel and chip sampling of these outcrops.

Table 14.1: Boreholes Used in the 1st May 2022 Mineral Resource Estimate

Hole ID	Pegmatite	X	Y	Z	EOH (m)	From (m)	To (m)	Thickness (m)	Ta_2O_5 (ppm)
D1DDH01	D1PEG	271546	6824558	586	20.87	3.63	7.76	4.13	228
D1DDH01	D2PEG	271546	6824558	586	20.87	13.05	16.65	3.60	347
D1DDH01	D2PEG	271546	6824558	586	20.87	16.89	18.05	1.16	717
D1DDH02	D1PEG	271513	6824541	585	20.73	2.21	6.08	3.87	339
D1DDH02	D2PEG	271513	6824541	585	20.73	11.61	12.42	0.81	327
D1DDH02	D2PEG	271513	6824541	585	20.73	12.57	13.16	0.59	648
D1DDH02	D3PEG	271513	6824541	585	20.73	14.17	15.04	0.87	369
D1DDH03	D1PEG	271452	6824648	630	33.19	8.47	15.70	7.23	398
D1DDH03	D2PEG	271452	6824648	630	33.19	25.19	29.37	4.18	325
D1DDH04	D1PEG	271549	6824648	614	27.68	10.75	12.16	1.41	350
D1DDH04	D2PEG	271549	6824648	614	27.68	20.90	27.09	6.19	288
D1DDH05	D1PEG	271507	6824650	620	30.41	4.08	9.33	5.25	458
D1DDH05	D2PEG	271507	6824650	620	30.41	25.52	28.94	3.42	396
D1DDH06	D1PEG	271507	6824605	605	21.31	1.54	9.53	7.99	317
D1DDH06	D2PEG	271507	6824605	605	21.31	13.02	16.03	3.01	244
D1DDH06	D3PEG	271507	6824605	605	21.31	18.18	19.10	0.92	214
D1DDH07	D1PEG	271559	6824613	600	21.51	0.00	8.67	8.67	169
D1DDH07	D2PEG	271559	6824613	600	21.51	16.21	17.50	1.29	253
D1DDH08	D1PEG	271590	6824608	599	8.09	1.50	2.73	1.23	413
D1DDH08	D2PEG	271590	6824608	599	8.09	7.80	8.09	0.29	357
D1DDH09	D1PEG	271616	6824573	588	29.99	5.04	5.77	0.73	279
D1DDH09	D2PEG	271616	6824573	588	29.99	9.58	19.13	9.55	280
F1DDH02	F1PEG	272051	6823952	676	11.67	5.89	8.14	2.25	343
F1DDH03	F1PEG	272099	6823954	669	11.31	9.71	10.78	1.07	507
F1DDH04	F1PEG	272002	6823945	682	7.89	2.70	4.82	2.12	421
F1DDH05	F1PEG	272003	6824003	679	12.20	9.30	11.97	2.67	309
F1DDH06	F1PEG	272153	6823954	656	7.73	3.76	5.18	1.42	399
F1DDH07	F1PEG	272044	6824008	672	12.14	6.24	8.44	2.20	275
F1DDH08	F1PEG	272005	6824038	676	11.00	6.33	9.37	3.04	459
F1DDH09	F1PEG	272050	6823901	687	12.39	10.38	11.89	1.51	665
F1DDH10	F1PEG	272055	6823982	666	7.33	0.23	2.88	2.65	272
F1DDH11	F1PEG	272104	6823901	672	4.36	1.06	2.93	1.87	618
F1DDH12	F1PEG	272054	6824042	663	14.13	3.68	6.24	2.56	363
F1DDH12	PEG	272099	6824103	634	4.97	7.85	8.28	0.43	443
F1DDH13	F1PEG	272002	6823901	694	9.25	0.43	2.59	2.16	361
F1DDH16	F1PEG	272080	6824169	629	9.70	5.33	7.10	1.77	519

Hole ID	Pegmatite	X	Y	Z	EOH (m)	From (m)	To (m)	Thickness (m)	Ta_2O_5 (ppm)
DP01	E7PEG	271899	6823998	713	30.05	2.81	3.39	0.58	652
DP01	F1PEG	271899	6823998	713	30.05	26.37	28.53	2.16	505
DP02	F2PEG	271952	6824049	693	32.77	0.00	0.10	0.10	400
DP02	F2PEG	271952	6824049	693	32.77	1.20	1.79	0.59	488
DP02	F1PEG	271952	6824049	693	32.77	9.52	11.38	1.86	476
DP03	F1PEG	271995	6824097	669	5.75	0.25	2.68	2.43	315
DP04	E7PEG	271851	6824051	732	42.74	16.57	17.79	1.22	884
DP04	F2PEG	271851	6824051	732	42.74	28.33	29.25	0.92	854
DP04	F1PEG	271851	6824051	732	42.74	36.25	37.43	1.18	782
DP05	F2PEG	271902	6824117	718	41.87	27.83	28.38	0.55	355
DP05	F1PEG	271902	6824117	718	41.87	30.21	32.23	2.02	745
DP06	F1PEG	271953	6824161	694	51.05	44.29	46.93	2.64	568
DP07	F1PEG	271992	6824217	682	57.25	52.33	54.03	1.70	649
DP08	PEG	271799	6824054	746	20.53	1.08	1.32	0.24	161
DP08	PEG	271799	6824054	746	20.53	2.42	2.53	0.11	125
DP08	E7PEG	271799	6824054	746	20.53	10.13	10.54	0.41	
DP09	E7PEG	271742	6824045	750	18.75	9.81	11.21	1.40	655
DP10	E7PEG	271795	6824104	741	25.11	16.54	19.01	2.47	619
DP11	E7PEG	271898	6824194	706	92.52	6.64	6.79	0.15	359
DP11	F1PEG	271898	6824194	706	92.52	42.28	44.89	2.61	750
DP11	PEG	271898	6824194	706	92.52	48.00	48.60	0.60	484
DP11	E3PEG	271898	6824194	706	92.52	61.92	62.35	0.43	556
DP11	E2PEG	271898	6824194	706	92.52	69.21	69.54	0.33	454
DP11	E2PEG	271898	6824194	706	92.52	69.86	70.36	0.50	187
DP11	PEG	271898	6824194	706	92.52	75.69	76.16	0.47	382
DP12	F1PEG	271943	6824245	688	56.98	50.23	51.73	1.50	643
DP12	PEG	271943	6824245	688	56.98	51.96	52.07	0.11	380
DP13	F1PEG	272049	6824145	640	13.82	7.92	10.22	2.30	619
DP14	E7PEG	271753	6824101	742	21.23	7.66	9.37	1.71	704
DP14	E8PEG	271753	6824101	742	21.23	15.10	15.95	0.85	376
DP14	F2PEG	271753	6824101	742	21.23	19.78	20.85	1.07	365
DP15	E7PEG	271799	6824128	738	21.87	13.72	17.34	3.62	479
DP16	F1PEG	271738	6824161	726	35.07	20.93	21.78	0.85	441
DP17	E7PEG	271805	6824195	714	37.67	10.80	10.95	0.15	413
DP17	F2PEG	271805	6824195	714	37.67	23.33	25.22	1.89	553
DP17	F1PEG	271805	6824195	714	37.67	30.66	32.44	1.78	731
DP18	E8PEG	271698	6824149	735	134.81	4.48	5.38	0.90	342
DP18	PEG	271698	6824149	735	134.81	6.32	6.51	0.19	131
DP18	F1PEG	271698	6824149	735	134.81	20.51	20.78	0.27	330
DP18	E3PEG	271698	6824149	735	134.81	35.45	36.00	0.55	177
DP18	E2PEG	271698	6824149	735	134.81	80.96	81.11	0.15	206
DP18	PEG	271698	6824149	735	134.81	118.68	118.85	0.17	321
DP18	E1PEG	271698	6824149	735	134.81	131.43	131.98	0.55	266
DP19	F1PEG	271751	6824185	715	49.04	15.32	15.49	0.17	432
DP19	E3PEG	271751	6824185	715	49.04	24.83	24.91	0.08	386
DP20	F1PEG	271701	6824200	717	15.98	2.89	5.97	3.08	614
DP20	E4PEG	271701	6824200	717	15.98	6.73	7.04	0.31	732
DP20	E3PEG	271701	6824200	717	15.98	13.36	13.90	0.54	988
DP21	F1PEG	271661	6824197	727	121.04	5.49	8.49	3.00	454
DP21	E3PEG	271661	6824197	727	121.04	23.04	23.53	0.49	612

Hole ID	Pegmatite	X	Y	Z	EOH (m)	From (m)	To (m)	Thickness (m)	Ta_2O_5 (ppm)
DP21	E2PEG	271661	6824197	727	121.04	62.82	62.95	0.13	189
DP21	E1PEG	271661	6824197	727	121.04	114.21	114.60	0.39	73
DP22	F1PEG	271849	6824233	698	37.67	32.82	35.01	2.19	762
DP23	F1PEG	272117	6824149	630	14.79	8.79	10.21	1.42	674
DP23	PEG	272117	6824149	630	14.79	10.37	10.50	0.13	421
DP24	D0PEG	271645	6824535	590	48.25	27.38	37.00	9.62	354
DP25	D0PEG	271583	6824530	605	58.52	28.00	31.59	3.59	404
DP25	D1PEG	271583	6824530	605	58.52	39.88	43.36	3.48	403
DP25	D1PEG	271583	6824530	605	58.52	44.10	44.24	0.14	474
DP25	D2PEG	271583	6824530	605	58.52	44.61	47.69	3.08	368
DP25	D3PEG	271583	6824530	605	58.52	49.09	49.43	0.34	660
DP26	D0PEG	271546	6824512	602	52.83	16.11	19.81	3.70	193
DP26	D1PEG	271546	6824512	602	52.83	31.91	35.16	3.25	304
DP26	D1PEG	271546	6824512	602	52.83	35.25	35.35	0.10	808
DP26	D1PEG	271546	6824512	602	52.83	35.74	36.52	0.78	684
DP26	D2PEG	271546	6824512	602	52.83	42.09	45.35	3.26	497
DP26	D3PEG	271546	6824512	602	52.83	48.55	49.07	0.52	451
DP27	F1PEG	272085	6824174	628	14.84	7.07	8.43	1.36	578
DP28	F1PEG	272094	6824316	619	43.67	24.56	24.93	0.37	603
DP29	F1PEG	272113	6824201	625	21.07	15.12	16.34	1.22	624

14.1.2 Bulk Density

ORP determined the bulk density of the samples by using the Archimedes principle on 147 chip samples that were collected from all six pegmatites from the targeted pegmatite swarm. The bulk density of each sample was calculated using the formula:

Bulk Density = (weight in air) / (weight in air − weight in water)

This technique measures the volume of a sample by water displacement and density is then calculated as the ratio of mass to volume. It was found that the 147 samples have an average bulk density of 2.60 g/cm^3 (Table 14.2). Table 14.3 shows the mean and variances per pegmatite rock type, also averaging 2.60 g/cm^3.

Table 14.2: Bulk Density Samples from the Pegmatite Groups

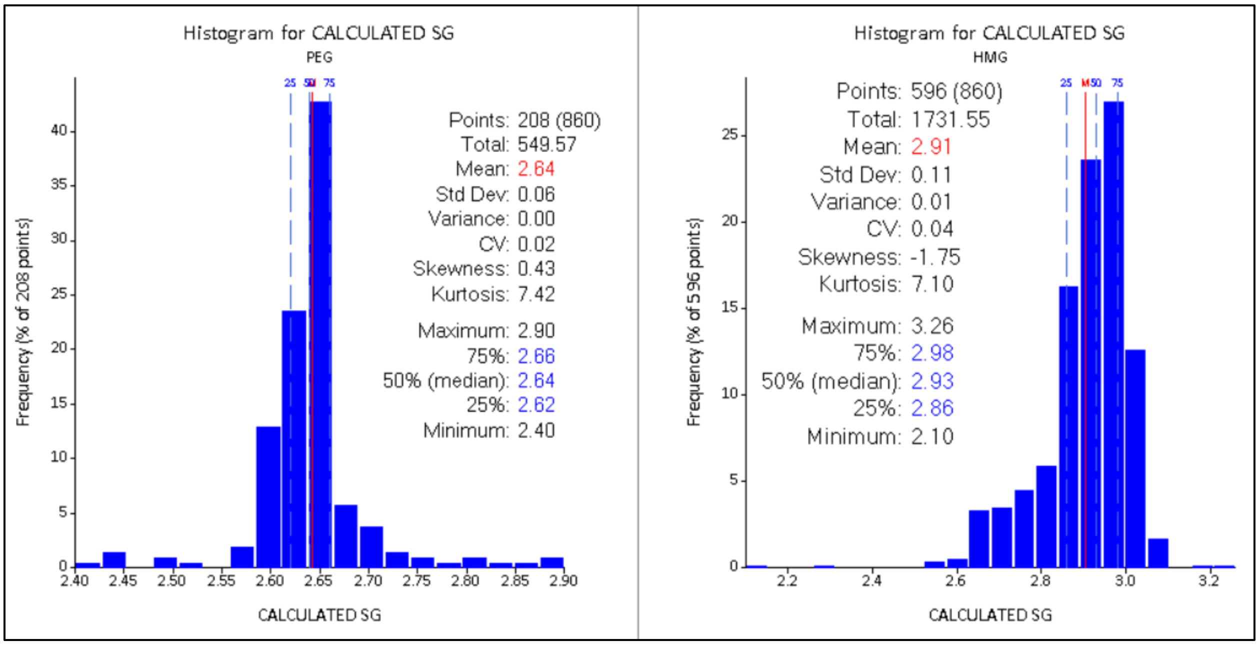
Pegmatite Swarm	No. of Samples	Low (g/cm³)	High (g/cm³)	Mean (g/cm³)
A	23	2.46	2.76	2.60
B	31	2.45	2.70	2.59
C	20	2.49	2.70	2.61
D	27	2.51	2.75	2.58
E	20	2.55	2.65	2.60
F	26	2.44	2.71	2.61
Total	**147**	**2.44**	**2.76**	**2.60**

Table 14.3: Bulk Density Samples per Pegmatite Type

Geological Unit	No. of Samples	Low (g/cm³)	High (g/cm³)	Mean (g/cm³)
Feldspar Pegmatite	35	2.44	2.76	2.60
Quartz Pegmatite	23	2.44	2.73	2.59
Albite Pegmatite	86	2.46	2.68	2.60
Spodumene Pegmatite	3	2.67	2.75	2.71
Total	**147**	**2.44**	**2.76**	**2.60**

A total of 860 pegmatite core samples (average 30 cm in length), 213 from the 2021 campaign and 647 from the 2022 campaign was determined using the density method described above and were used during the Mineral Resource modelling. The 208 pegmatite core samples yielded an average density of 2.64 g/cm^3, while the 596 waste samples yielded an average of 2.91 g/cm^3 (Figure 14.1).

Figure 14.1: Histogram Plots of Density Determinations for Pegmatites (left) and for Waste (right)



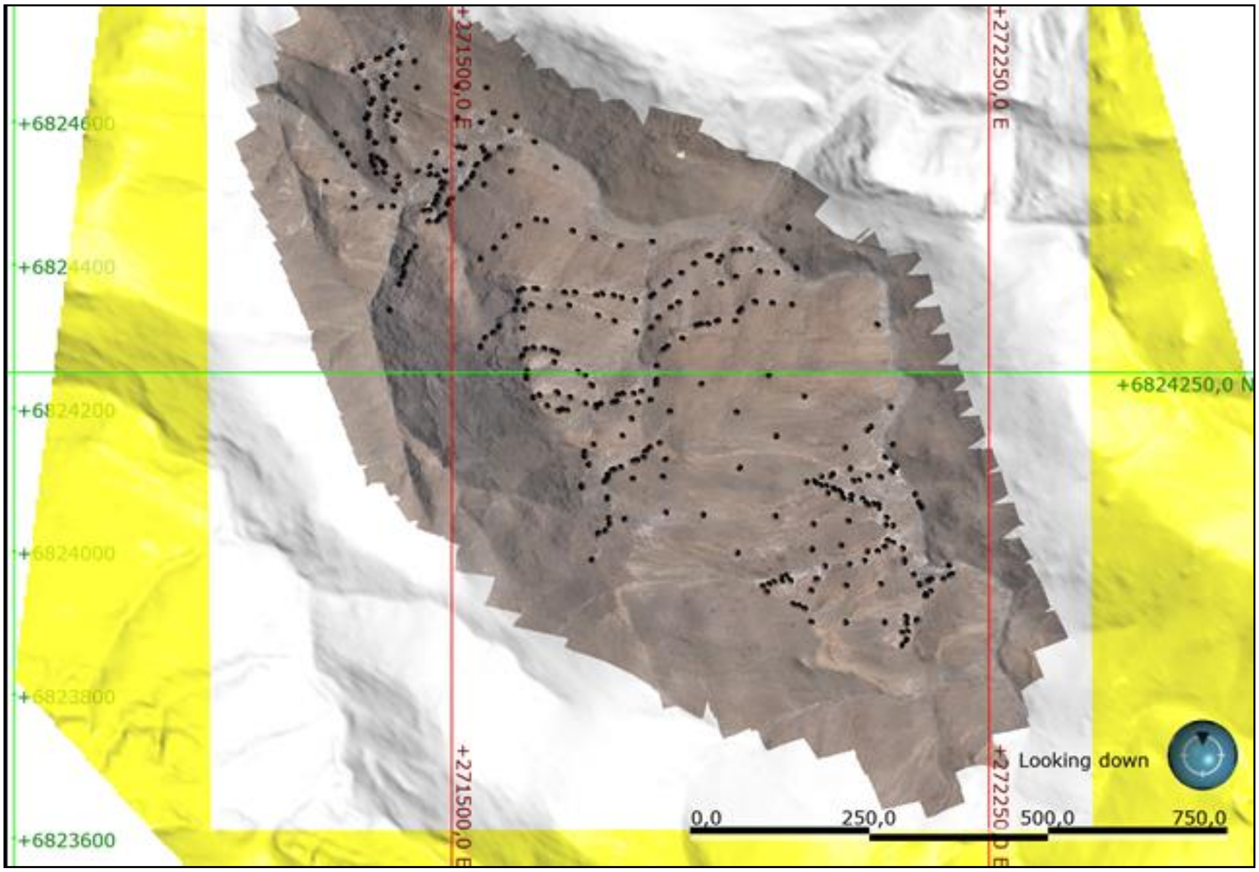
14.1.3 Topography

The topographic surface of the Swanson Property is shown in Figure 14.2. A more detailed topographic surface was used for the latest modelling and 1st May 2022 Mineral Resource Estimate, based on 1 m contour intervals of a drone survey that ORP carried out. Not only is the latest topographic survey more detailed than the previous version, but the elevation thereof is roughly 26 m lower than before, due to a different datum that was used. The samples (boreholes and channels) used for the 1st May 2022 Mineral Resource Estimate are shown in Figure 5.1 and extend from the area of the D-pegmatite in the northwest to the area of the F-pegmatite in the southeast.

The vertical difference ranges from about 600 m elevation in the river at the D-pegmatite, to about 750 m elevation at the E-pegmatite.

A section through the D-pegmatite and EF-Pegmatites is shown in Figure 14.2. Through studying the latest drilling, it was interpreted that E5 pegmatites is in fact an extension of the F1 pegmatite.

Figure 14.2: Project Area Topography Showing Sample Positions Used for Mineral Estimation



Source: ORP Database, Snowden Optiro Leapfrog Analysis.

14.2 GEOLOGICAL MODELLING

The geological interpretation of the Swanson pegmatite deposit during the modelling phase agrees with the general emplacement history and method of formation described in Section 7.0.

Locally, host rocks to the pegmatite intrusions comprise greenschist facies basic amygdaloidal lavas, phyllites and chlorite schists, with interbedded felsic volcano-sedimentary units. Other intrusions, ranging in composition from acidic dykes to diorites are also present in the area, and locally follow the PSZ strike of 120° northeast. A mylonitic shear zone with this same orientation forms the northern boundary of the pegmatites investigated.

The pegmatites formed in tension fractures that developed adjacent to the mylonitic shear zone within the host gabbro rocks. Acidic interbeds, locally referred to as "bars" by previous explorers (Placer, 1981[5]) adjacent to the gabbro, is more competent and thus did not form fractures as easily as the gabbro to accommodate the propagation of pegmatites.

In terms of their geometry, most of the pegmatites at the Swanson deposit have a general northeast-southwest strike, with shallow dip angles of between 10° to 20° to the southeast. One of the pegmatites, however, has a different strike from the rest of the pegmatites investigated. Pegmatite 'F1' strikes approximately 148° and dips on average at 14° to the northeast. Due to the shallow dips of all the pegmatites, this difference in orientation is not easily observed when looking at apparent dips of outcrops, but becomes apparent when true dips are viewed in the 3D model. More borehole intersects are required to confirm the emplacement history of the pegmatites, but the current hypothesis is that the F pegmatite intruded after, and crosscuts the 'E' pegmatites. The F1 pegmatite observed in the south-eastern part of the Swanson Property is most likely the same pegmatite that was previously labelled 'E5' in the central E Area.

In the area pf the D-pegmatite, three main pegmatites were identified and included for modelling, namely D2, D1 and D0 in ascending order. Limited channel samples of a D3 and D4 layer, lower in the sequence, were recently recorded by ORP, but were not considered in the 1st May 2022 Mineral Resource Estimate due to a lack of borehole intersects of these layers. The general arrangement is shown in Figure 14.3.

14.2.1 Database Checks for Modelling

Interval errors and warnings in the geological data were flagged in Leapfrog Geo® modelling software. These errors were then corrected based on the original lithology logs from the drilling of the D-pegmatite and EF-pegmatite deposits. In addition to these checks, the boreholes were also visually inspected by the geologist to ensure that a “clean” database was used for modelling.

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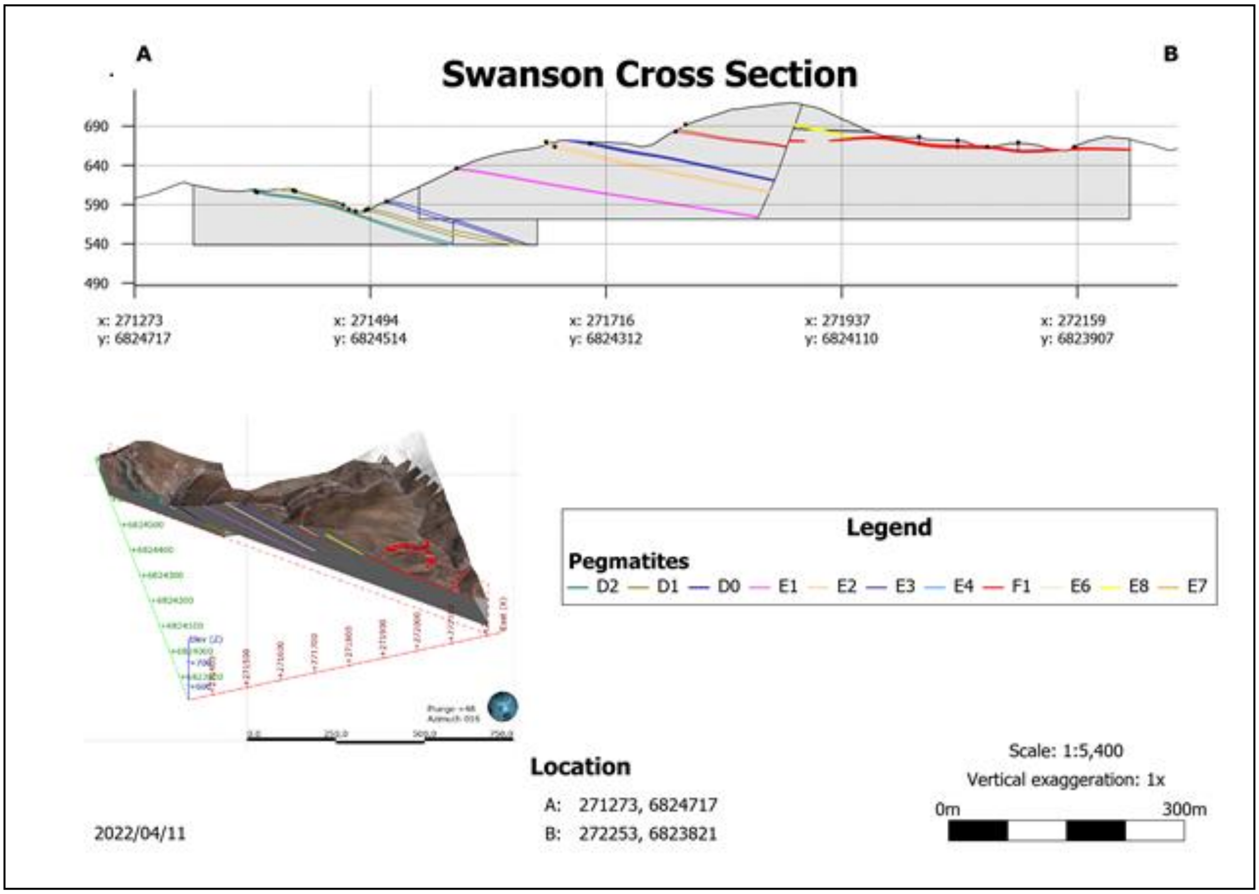
[5] Snowden Optiro Report, August 2022.

Figure 14.3: Section Through the D-pegmatite and EF-pegmatites (Looking West)



Note: Y units are in mamsl

14.2.2 Description of the Model

Two models were created for the 1st May 2022 Mineral Resource Estimate, one for the D-pegmatite, and another for the E and F pegmatites combined (EF-pegmatites). Although the pegmatite intrusions of the Swanson deposit extend beyond these two areas, model boundaries were created around the sampling/mapping locations of the D and E to F pegmatites only. Implicit geological models were created in Leapfrog Geo® (Version 2021.2.4) for areas D and E to F from the data discussed in Section 14.1.1. Implicit modelling, based on a method of global interpolation using radial basis functions, provides a viable alternative to the traditional explicit modelling (wireframing).

Each of the major pegmatites were modelled using the "vein" function in Leapfrog Geo®. Vein contact surfaces in Leapfrog Geo® remove existing lithologies and replace them with the vein lithology within the boundaries defined by hanging-wall and footwall surfaces. Hanging-wall and footwall surfaces were derived from drilling interval contacts, as well as from mapping information.

A surface resolution of 10 m for each vein was inherited from the geological model and a setting for lens surfaces to snap to all input data was applied. Individual planar reference surfaces were defined along the “best fit” between the hanging-wall and footwall surfaces for the construction of each vein.

Individual pegmatites were combined into a vein system in Leapfrog Geo®. This allows for setting up geochronology and cross-cutting relationships between individual veins, as well as reporting of a combined vein system volume, instead of individual volumes only.

Three faults were created during the modelling process, which divided the geological model of the D-pegmatite into four fault blocks. All three faults are subparallel steeply dipping east-northeast striking, and do not intersect one another within the boundaries of the modelled area. Thus, no cross-cutting relationships had to be specified. Two of the modelled faults in the northern part of area of the P-pegmatite are only 16 m apart and likely form part of a steeply dipping fault zone, with little displacement, based on the mapping and drilling information. The third fault lies roughly 100 m to the southwest, and presumably follows the same orientation as the two mentioned above. Another structure, presumably associated with the mylonitic shear zone north of the pegmatites, was used as the northern boundary for the D-pegmatite during this modelling.

A steeply dipping NNE striking fault forms the southern boundary of the geological model for the area of the EF-pegmatite. Small offsets or bends in the pegmatites are observed, but only one main structure was activated as a fault in the model. Similarly, to the fault mentioned above, this fault strikes NNW and dips steeply to the northeast. Notes by the ORP field geologists suggest normal movement along this fault, however, a similar vertical offset of dipping pegmatites could have occurred through sinistral strike-slip kinematics. More information is needed to confirm the true sense of movement, but the apparent downthrow is to the north of this structure.

Down-hole structural logging of orientated boreholes is recommended to better understand the nature and true displacement of the faults and structures mentioned above.

A plan view perspective of the areas of the D-pegmatite (north-western part) and EF-pegmatites (larger, south-eastern part) that were modelled is provided in Figure 14.4. Bright colours indicate pegmatite outcrops.

14.3 Compositing

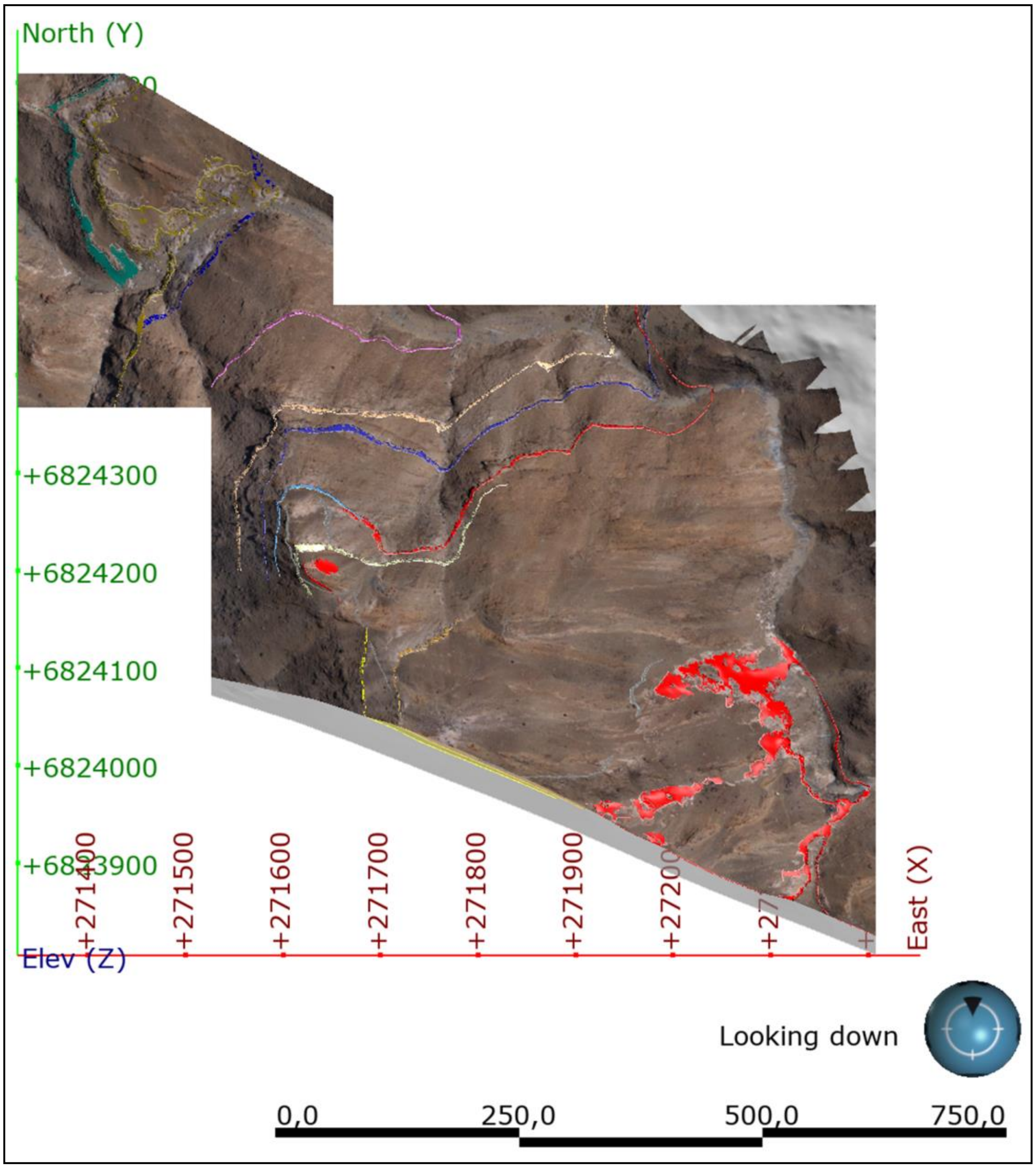
As no zoning of pegmatites was observed (Placer, 1981; Hattingh, 2021[6]), full seam composites were created for all the modelled pegmatite targets. Where more than one sample was taken over the seam thickness, the sample thickness was used to

[6] Snowden Optiro Report, August 2022

weight the final composite. No consistent vertical trend was found in the parameters measured.

As only the pegmatite was sampled, and there is a sharp contact at the top and bottom of the pegmatite unit, the composites were considered to be accurate representations of the mineralisation.

Figure 14.4: Plan View Perspective of the Areas of the D-pegmatite (north-western part) and EF-pegmatites (Larger, South-Eastern Part)



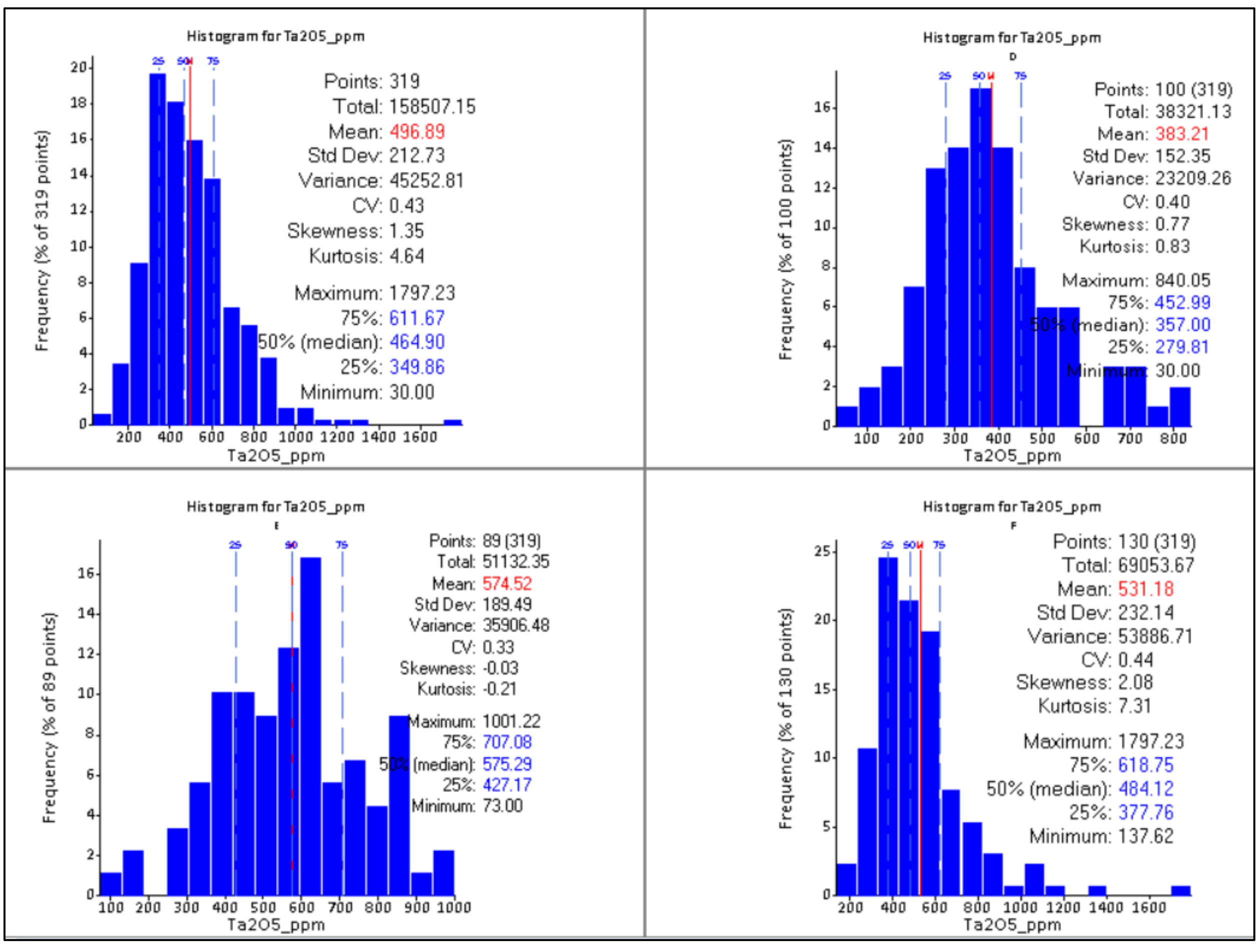
Source: Snowden Optiro Report (August 2022).

14.3.1 Univariate and Bivariate Statistics

Composites were created for the following pegmatite bodies: D0, D1, D2, E1, E2, E3, E4, E5, E6, E7, E, F1 and F2. These were grouped into D, E and F pegmatites for the purposes of this analysis.

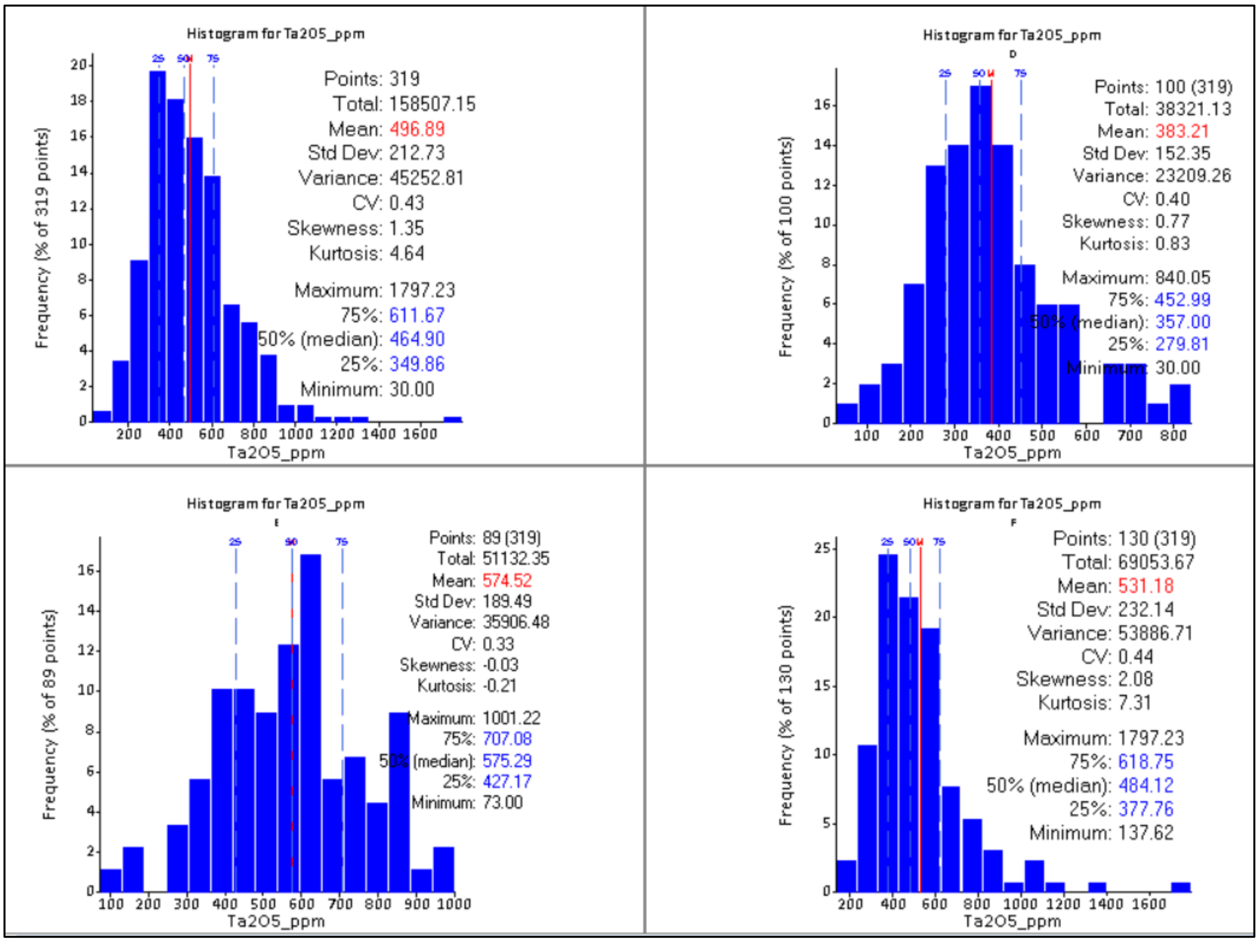
Univariate statistics for thickness in the D, E and F pegmatites are shown in Figure 14.5 The distribution is near-normal, with an overall low positive skewness of 2.67 (zero being symmetrical). This skewness is affected by a number of thicker intersections, particularly in the D-pegmatite. The overall mean thickness is 2.05 m, with average thickness decreasing from D (2.77 m) to E (1.74 m) to F (1.72 m).

Figure 14.5: D, E and F Pegmatites Univariate Statistics for Thickness (m)



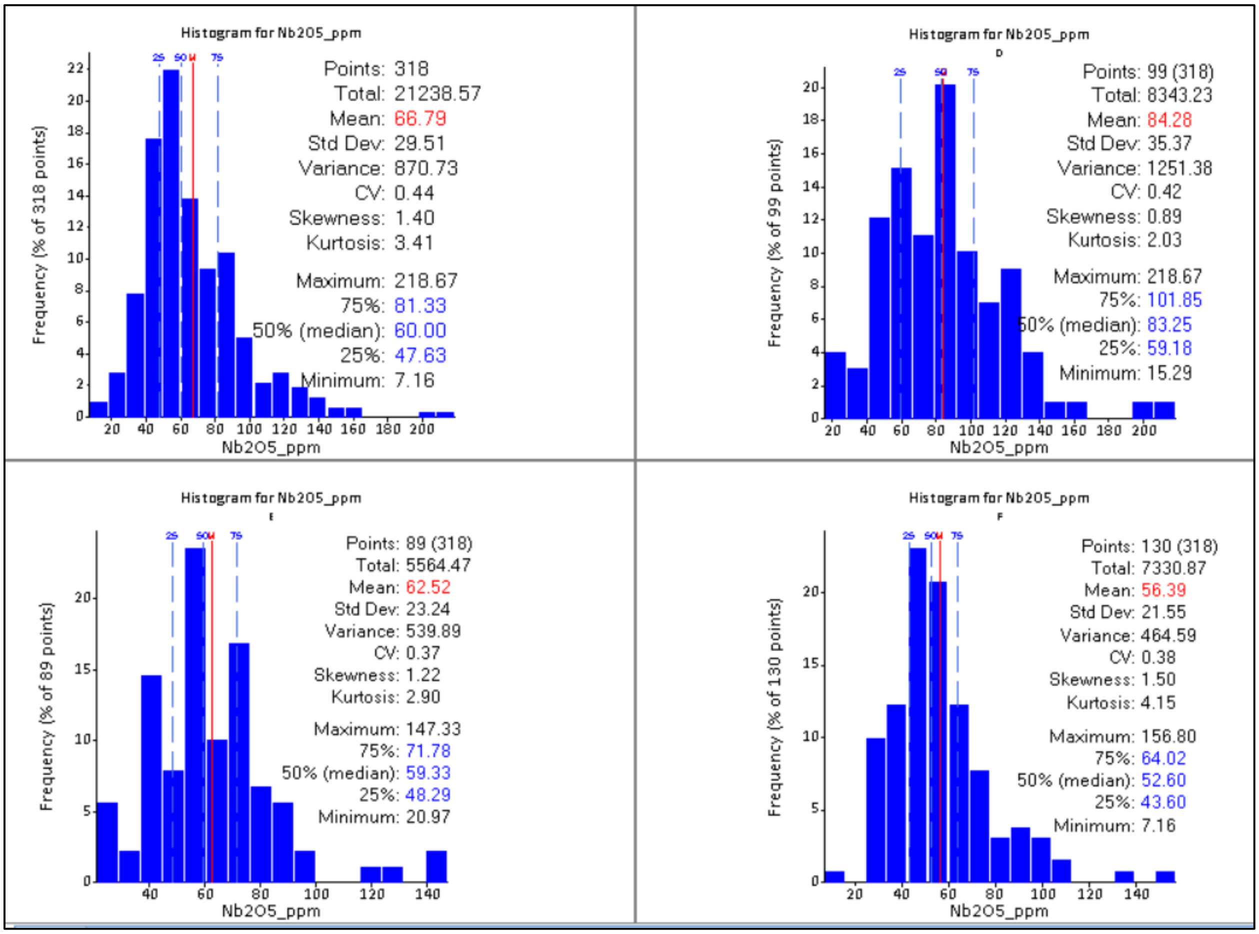
Univariate statistics for Ta_2O_5 ppm in the D, E and F pegmatites are shown in Figure 14.6. The distribution is near-normal, with an overall low positive skewness of 1.35 (zero being symmetrical). This skewness is affected by a number of higher-grade samples, particularly in the F pegmatites. The overall mean value is 497 ppm Ta_2O_5, with average grades increasing materially from D (383 ppm Ta_2O_5) to E (574 ppm Ta_2O_5), and then decreasing slightly to F (531 ppm Ta_2O_5).

Figure 14.6: D, E and F Pegmatites Univariate Statistics for Ta_2O_5 ppm



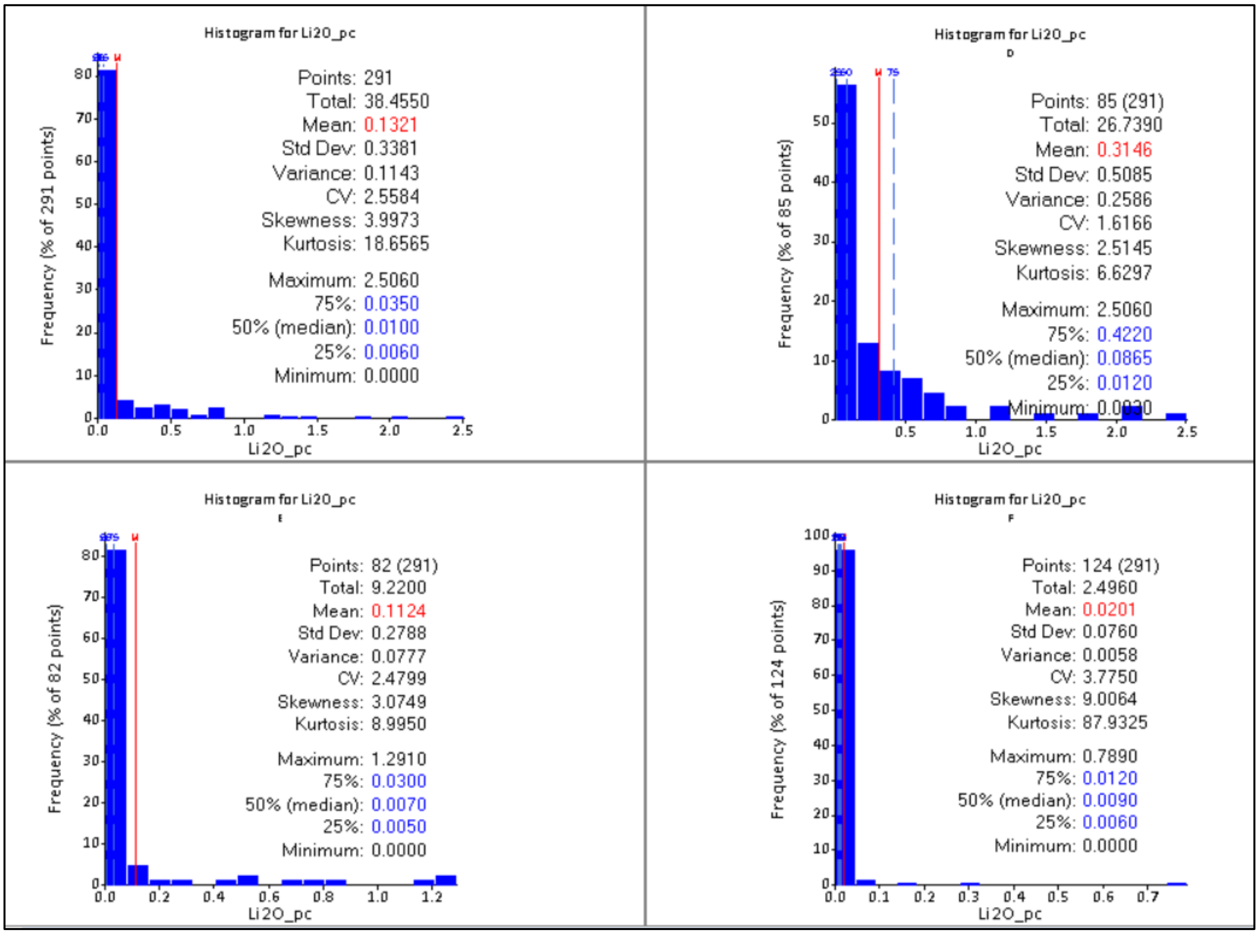
Univariate statistics for Nb_2O_5 ppm in the D, E and F pegmatites are shown in Figure 14.7. The distribution is near-normal, with an overall low positive skewness of 1.40 (zero being symmetrical). This skewness is affected by a number of higher-grade samples, particularly in the D-pegmatite. The overall mean value is 67 ppm Nb_2O_5, with average grades decreasing from D (84 ppm Nb_2O_5) to E (63 ppm Nb_2O_5), and then decreasing slightly to F (56 ppm Nb_2O_5).

Figure 14.7: D, E and F Pegmatites Univariate Statistics for Nb_2O_5 ppm



Univariate statistics for Li_2O % in the D, E and F pegmatites are shown in Figure 14.8. The distribution is strongly positively skewed, with an overall positive skewness of 4.0 (zero being symmetrical). This skewness is affected by a number of higher-grade samples, particularly in the D-pegmatite. The overall mean value is Li_2O 0.13%, with average grades decreasing from D (Li_2O 0.31%) to E (Li_2O 0.11% Li_2O), and to F (Li_2O 0.02%).

Figure 14.8: D Pegmatites Univariate Statistics for Li_2O %



A plot of Ta_2O_5 vs Nb_2O_5 is shown in Figure 14.9. The two variables are positively correlated, with each pegmatite showing distinct distributions.

A plot of Ta_2O_5 vs Li_2O is shown in Figure 14.10. The two variables are positively correlated, with each pegmatite showing distinct distributions.

Figure 14.9: D, E and F Pegmatites Ta_2O_5 ppm vs Nb_2O_5 ppm

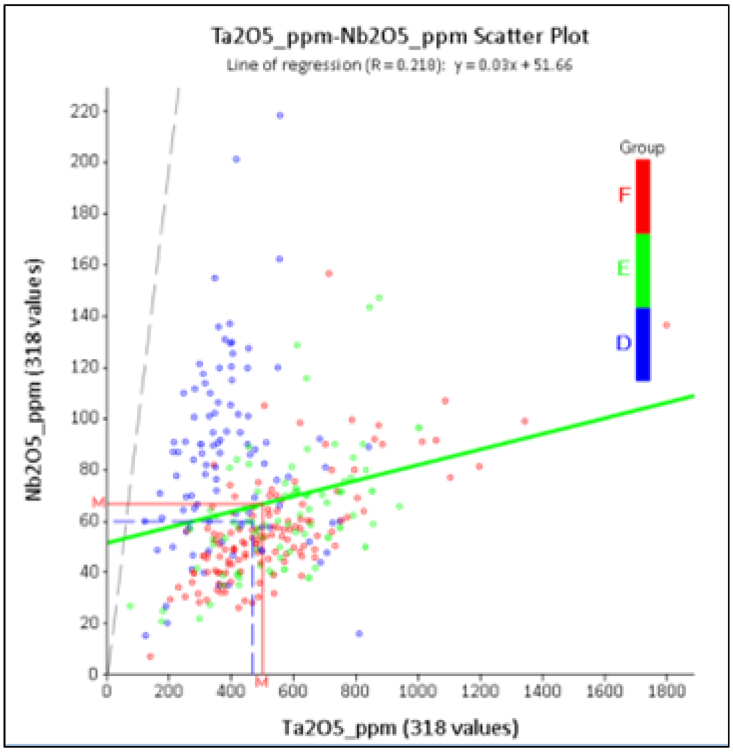
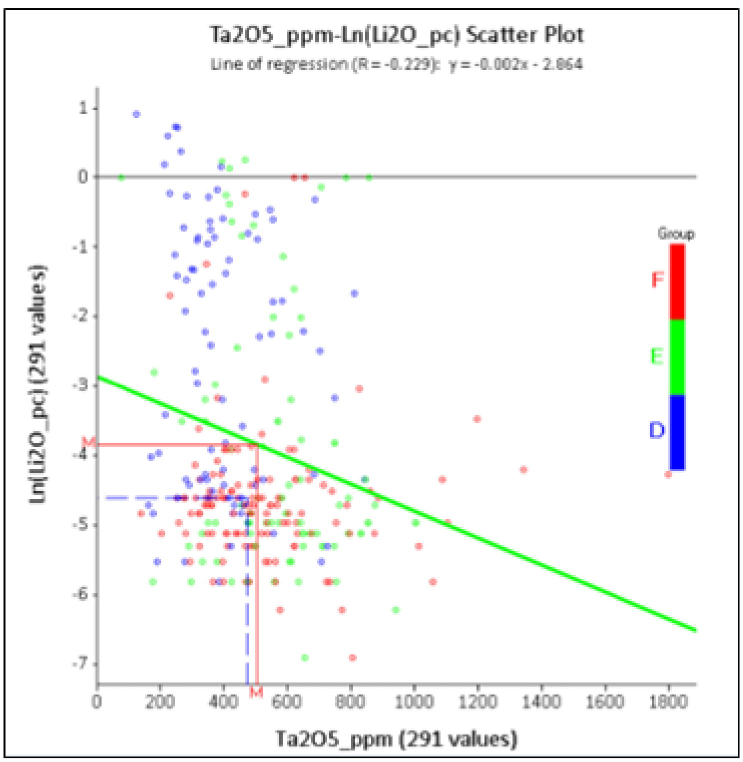
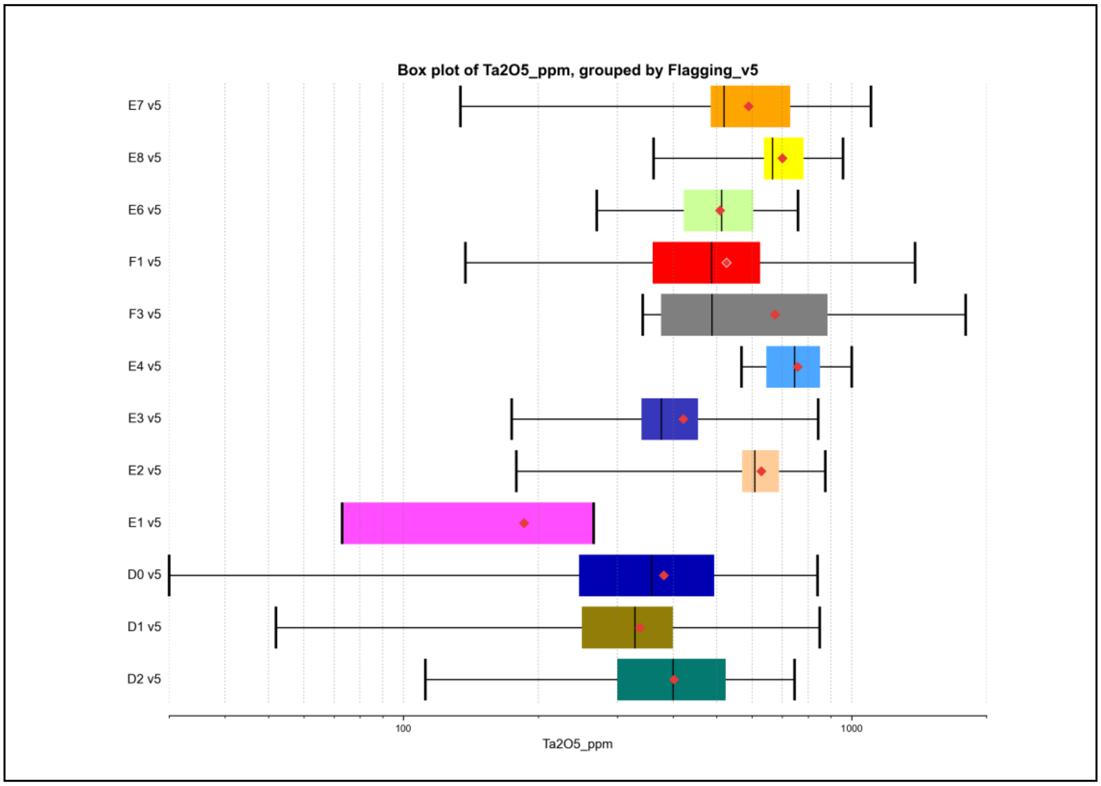


Figure 14.10: D, E and F Pegmatites Ta_2O_5 ppm vs Natural Logs Li_2O ppm



A box-and-whisker plot of Ta_2O_5 ppm per pegmatite is shown in Figure 14.11. Ta_2O_5 average grades are highest in the F pegmatites, with a general increase in average grade from D to E to F pegmatites.

Figure 14.11: Box-and-Whisker Plot of the Ta_2O_5 ppm per Pegmatite



A box-and-whisker plot of Nb_2O_5 ppm per pegmatite is shown in Figure 14.12. Nb_2O_5 average ppm decrease slightly from D to E to F pegmatites.

A box-and-whisker plot of Li_2O % per pegmatite is shown in Figure 14.13. Li_2O average percentages are highest in the D-pegmatite, and also exhibit the highest range.

Figure 14.12: Statistical Box Plot of the Nb_2O_5 ppm per Pegmatite that was Investigated

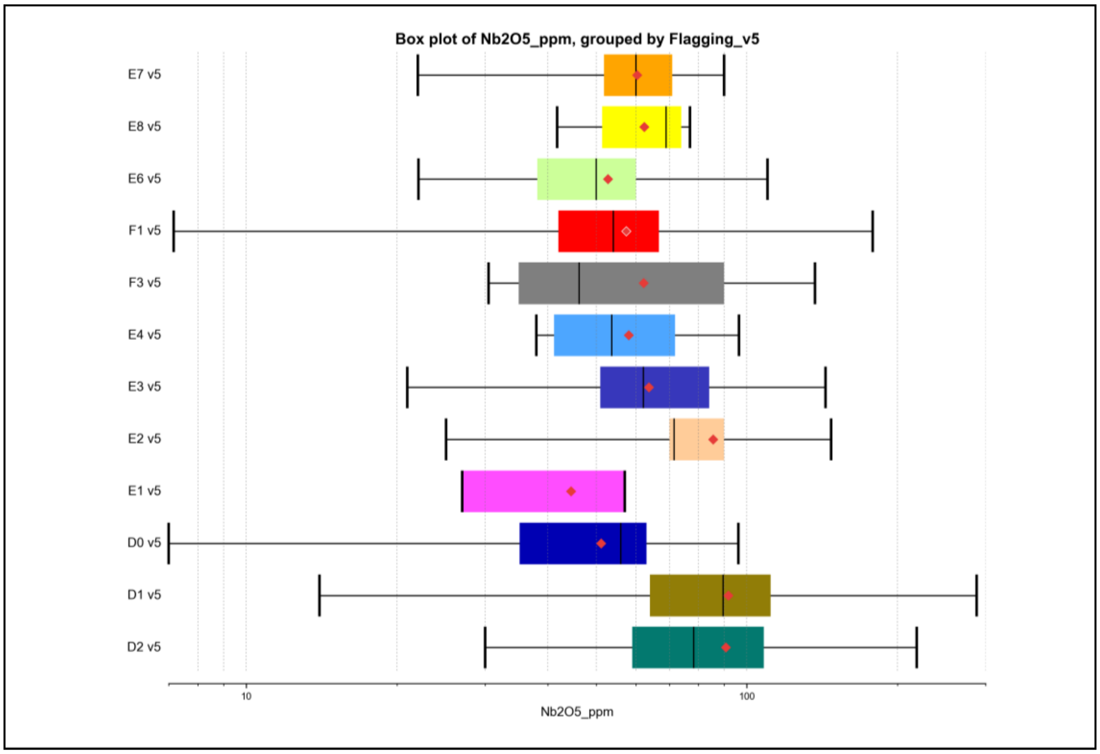
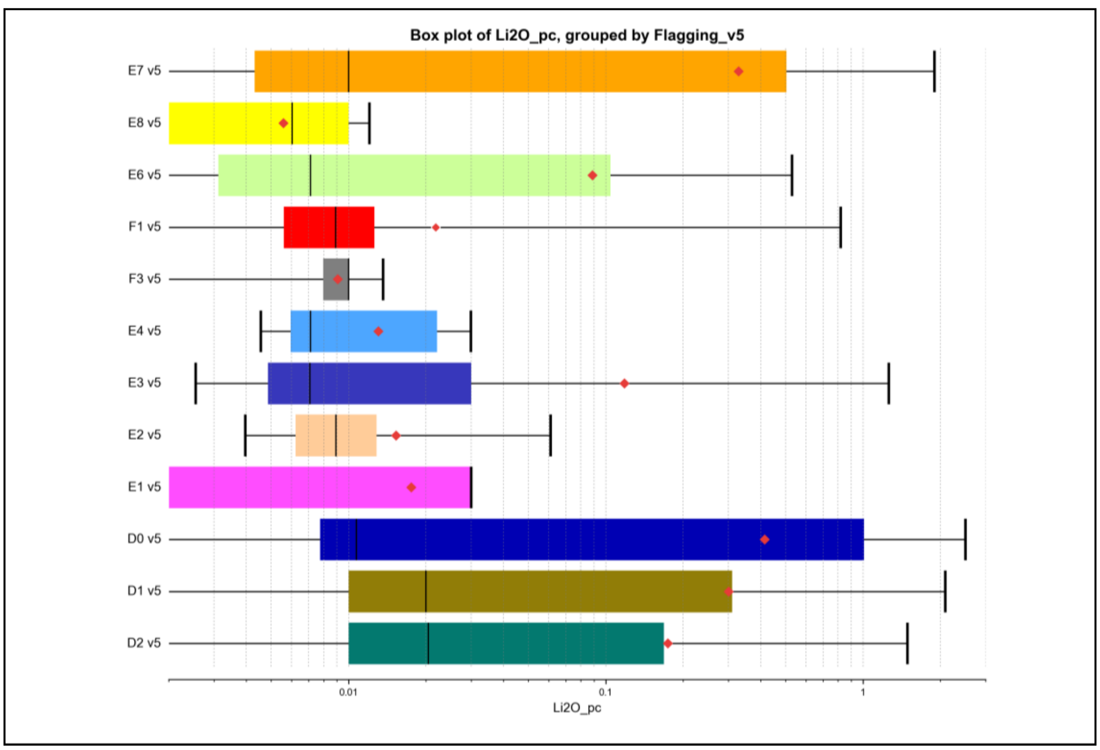


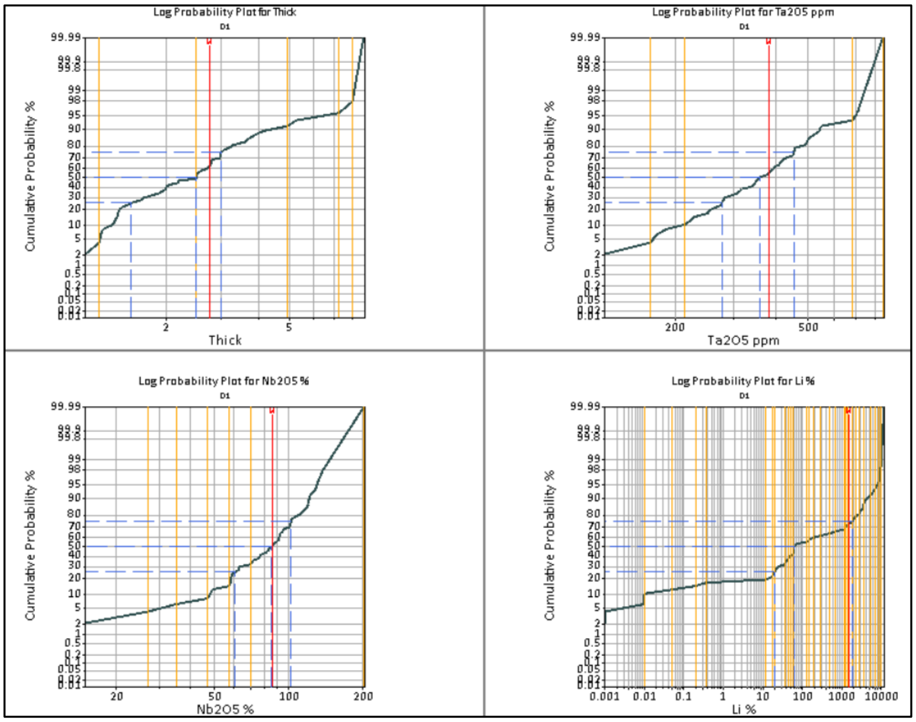
Figure 14.13: Box-and-Whisker Plot of the Li_2O % per Pegmatite



14.3.2 Outliers

An outlier analysis was conducted on the D1 pegmatite, as shown in Figure 14.14. Based on this analysis, it was decided not to apply any top cutting. This is recommended to be looked at during future estimation of Mineral Resources.

Figure 14.14: D1 Top Cut Analysis



14.4 Variography

A full listing of all the variograms generated during the Mineral Resources Estimate is presented in the Snowden Optiro Report (August 2022) in Appendix 2: Variograms.

14.4.1 D1 Pegmatite

A variogram with the following orientation (dip 15.65°, dip azimuth 142.33°, pitch 157.47°) was created for Li_2O % for the D1 pegmatite (Figure 14.15). The modelled variogram shows a nugget to sill ratio of 0.1, with a two-structure spherical model. The sill of the first model is 0.095, with a range of 8.9 m, and the sill of the second structure is 0.166 with a range of 86.15 m.

The variogram parameters for the D1 pegmatite are shown in Table 14.4.

Figure 14.15: D1 Pegmatite Major Axis Variogram for Li_2O %

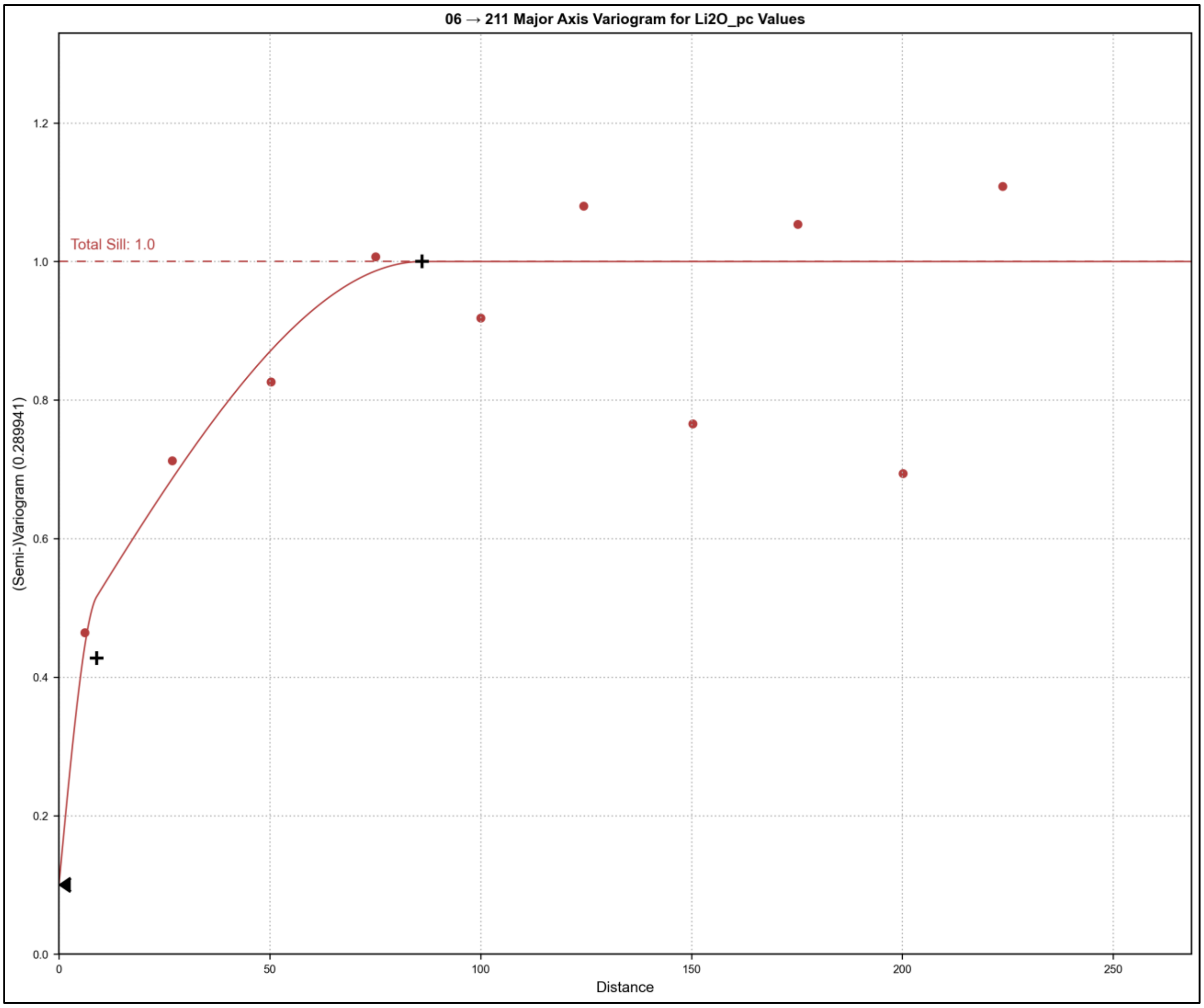


Table 14.4: D1 Pegmatite Variogram Parameters

06 > 211 Major Axis Variography for Li_2O % Values							
No. of points	42	-					
Variance	0.2899	-					
Trend							
Dip (°)	15.65	-					
Dip azimuth (°)	142.33	-					
Pitch (°)	157.4672	-					
Variogram Parameters							
Structure	**Sill**	**Normaliser**	**Model**	**Alpha**	**Major**	**Semi-Major**	**Minor**
Nugget	0.02899	0.1	-	-	-	-	-
Structure 1	0.0949	0.3273	Spherical	-	8.936	9.458	7.217
Structure 2	0.166	0.5727	Spherical	-	86.15	76.53	24
Total Sill	**0.289941**	**1**	**-**	**-**	**-**	**-**	**-**
Experimental Parameters							
Lag	25	-					
Lag tolerance	12.5	-					
Number of lags	9	-					
	In Plane	Off Plane	-				
Angle tolerance	90	90	-				

14.4.2 D2 Pegmatite

A variogram with the following orientation (dip 15.65°, dip azimuth 142.33°, pitch 157.47°) was created for Ta_2O_5 ppm of the D2 pegmatite (Figure 14.16). The modelled variogram shows a nugget to sill ratio of 0.19, with a two-structure spherical model. The sill of the first model is 17270, with a range of 29.17 m, and the sill of the second structure is 510.9 with a range of 79.33 m.

The variogram parameters for the D2 pegmatite are shown in Table 14.5.

Figure 14.16: D2 Pegmatite Major Axis Variogram for Ta_2O_5 ppm

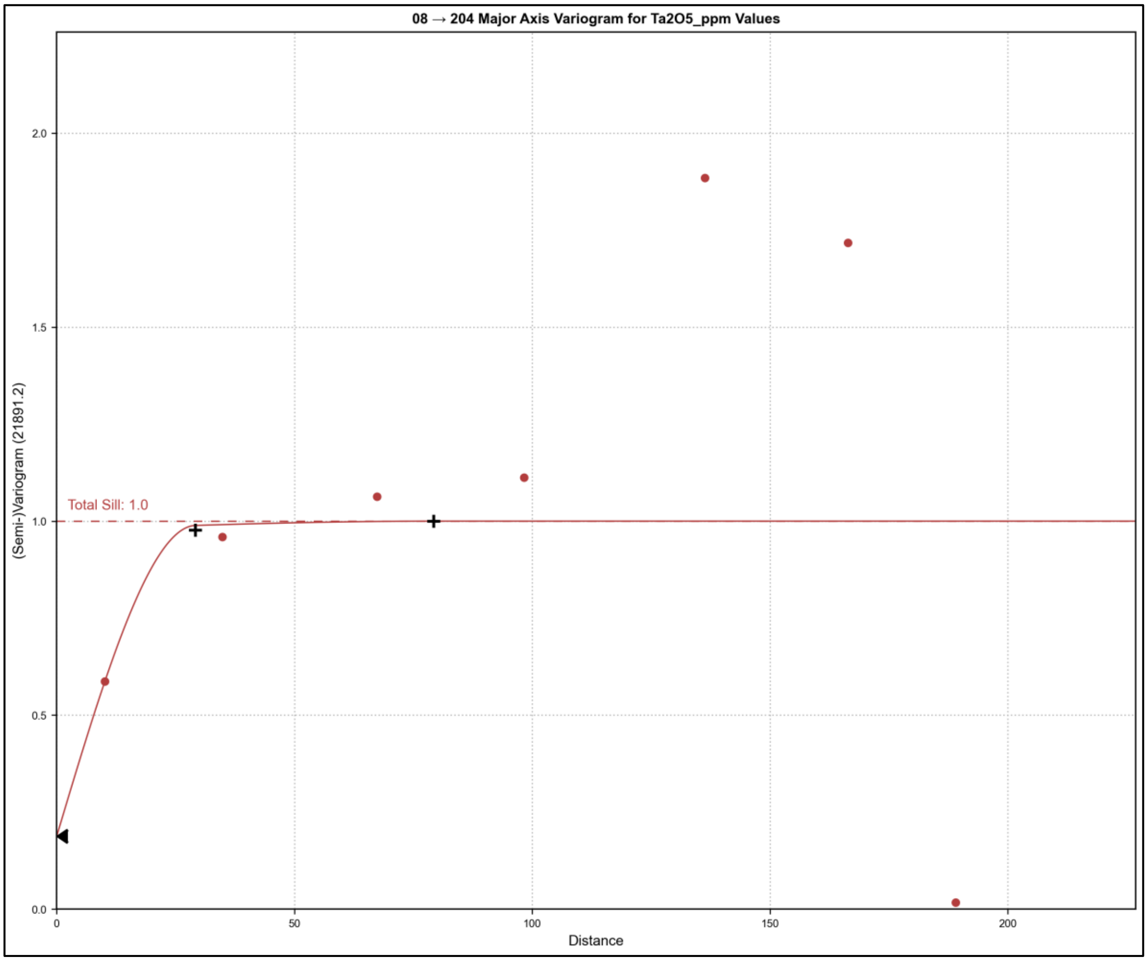


Table 14.5: D2 Pegmatite Variogram Parameters

068> 204 Major Axis Variography for Ta_2O_5 ppm Values							
No. of points	26	-					
Variance	21,890	-					
Trend							
Dip (°)	15.65	-					
Dip azimuth (°)	142.33	-					
Pitch (°)	150.9998	-					
Variogram Parameters							
Structure	**Sill**	**Normaliser**	**Model**	**Alpha**	**Major**	**Semi-Major**	**Minor**
Nugget	4,110	0.18774	-	-	-	-	-
Structure 1	17,270	0.789	Spherical	-	29.17	8.748	20
Structure 2	510.9	0.2334	Spherical	-	79.33	61.02	24
Total Sill	**21,892.93**	**1.00008**	**-**	**-**	**-**	**-**	**-**
Experimental Parameters							
Lag	34	-					
Lag tolerance	17	-					
Number of lags	6	-					
	In Plane	Off Plane	-				
Angle tolerance	45	45	-				

14.4.3 F1 Pegmatite

An omnidirectional normal score transformed variogram was created for Li_2O % of the F1 pegmatite (Figure 14.17). The modelled variogram shows a nugget to sill ratio of 0.3, with a two-structure spherical model. The sill of the first model is 0.32, with a range of 34 m, and the sill of the second structure is 0.39 with a range of 141 m.

The variogram parameters for the F1 pegmatite are shown in Table 14.6.

Figure 14.17: F1 Pegmatite Major Axis Transformed Variogram for Li_2O %

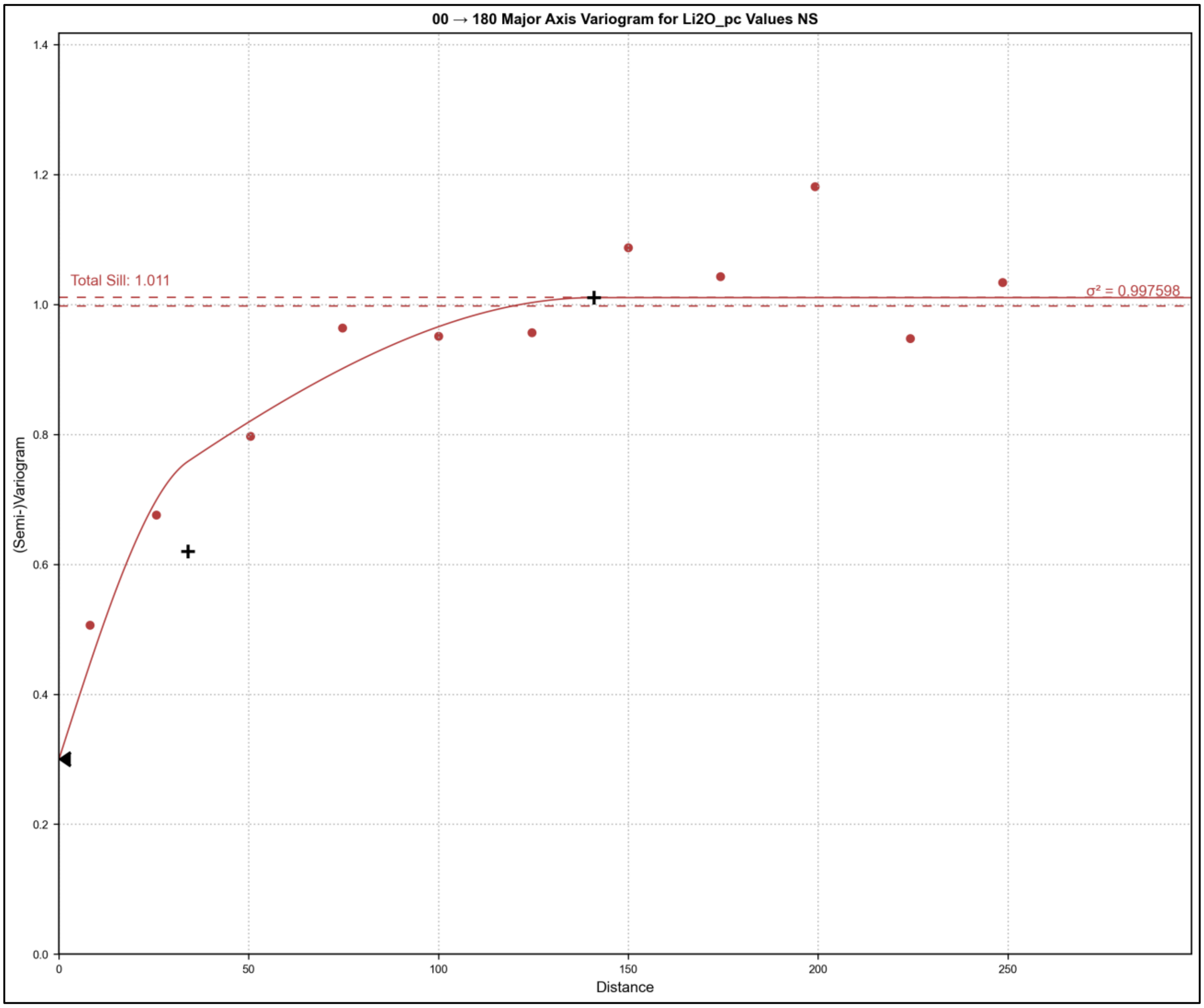


Table 14.6: F1 Pegmatite Variogram Parameters

00> 180 Major Axis Variography for Li_2O % Values NS							
No. of Points	114	-					
Variance	0.9976	-					
Trend							
Dip (°)	0	-					
Dip Azimuth (°)	0	-					
Pitch (°)	90	-					
Variogram Parameters							
Structure	**Sill**	**Normaliser**	**Model**	**Alpha**	**Major**	**Semi-Major**	**Minor**
Nugget	0.3	0.300722	-	-	-	-	-
Structure 1	0.32	0.3208	Spherical	-	34	34	34
Structure 2	0.3906	0.3915	Spherical	-	141	141	141
Total Sill	**1.010589**	**1.013022**	**-**	**-**	**-**	**-**	**-**
Experimental Parameters							
Lag	25	-					
Lag Tolerance	12.5	-					
Number of Lags	10	-					
	In Plane	Off Plane	-				
Angle Tolerance	90	90	-				

14.4.4 Other Pegmatites

For the D0 and the E pegmatites, omnidirectional variograms, were based on the D1 parameters in the September 2021 modelling.

14.5 Block Modelling

14.5.1 Block Model

14.5.1.1 D1 Pegmatite Parameters

The following are the kriging parameters for D1 for Ta_2O_5, Nb_2O_5, and Li_2O:

- Omni-Directional Variogram:
  - Nugget 0.52
  - Sph1 0.34 22
  - Sph2 0.12 50
  - Block Size (parent cell) 10 x 10 x 2
  - Sub-Blocking 2 x 2 x 2
  - Discretisation 2 x 2 x 2
- Octant Search:
  - Minimum 2, maximum 16 samples total;
  - Minimum 2, maximum 8 samples per octant;
  - Search 100 x 100 x 10 first pass (use all samples);
  - Search 200 x 200 x 10 second pass; and,
  - Search 500 x 500 x 100 third pass.

14.5.1.2 D2 Parameters

The following are the kriging parameters for D2 for Ta_2O_5, Nb_2O_5, and Li_2O:

- Omni-Directional Variogram:
  - Nugget 0.60
  - Sph1 0.20 12
  - Sph2 0.20 54
  - Block Size (parent cell) 10 x 10 x 2
  - Sub-Blocking 2 x 2 x 2
  - Discretisation 2 x 2 x 2.
- Octant Search:
  - Minimum 2, maximum 16 samples total;
  - Minimum 2, maximum 8 samples per octant;
  - Search 100 x 100 x 10 first pass (use all samples);
  - Search 200 x 200 x 10 second pass; and,
  - Search 500 x 500 x 100 third pass.

14.5.1.3 F1 Pegmatite Parameters

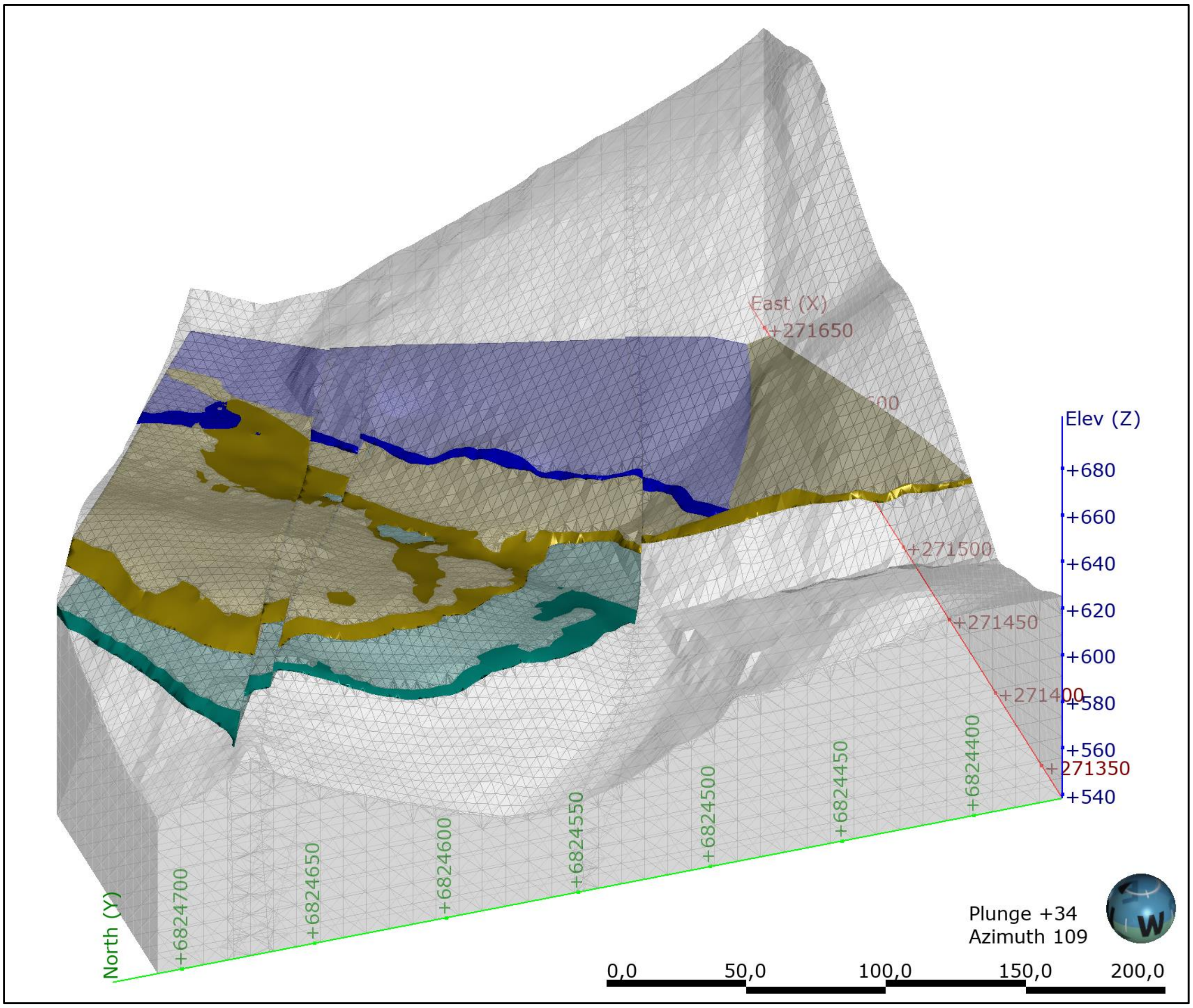
The following are the kriging parameters for F1 for Ta_2O_5, Nb_2O_5, and Li_2O:

- Omni-Directional Variogram:
  - Nugget 0.33
  - Sph1 0.45 10
  - Sph2 0.22 50
  - Block Size (parent cell) 10 x 10 x 2
  - Sub-Blocking 2 x 2 x 2
  - Discretisation 2 x 2 x 2.
- Octant Search:
  - Minimum 2, maximum 16 samples total;
  - Minimum 2, maximum 8 samples per octant;
  - Search 100 x 100 x 10 first pass (use all samples);
  - Search 200 x 200 x 10 second pass; and,
  - Search 500 x 500 x 100 third pass.

14.5.2 Resource Models

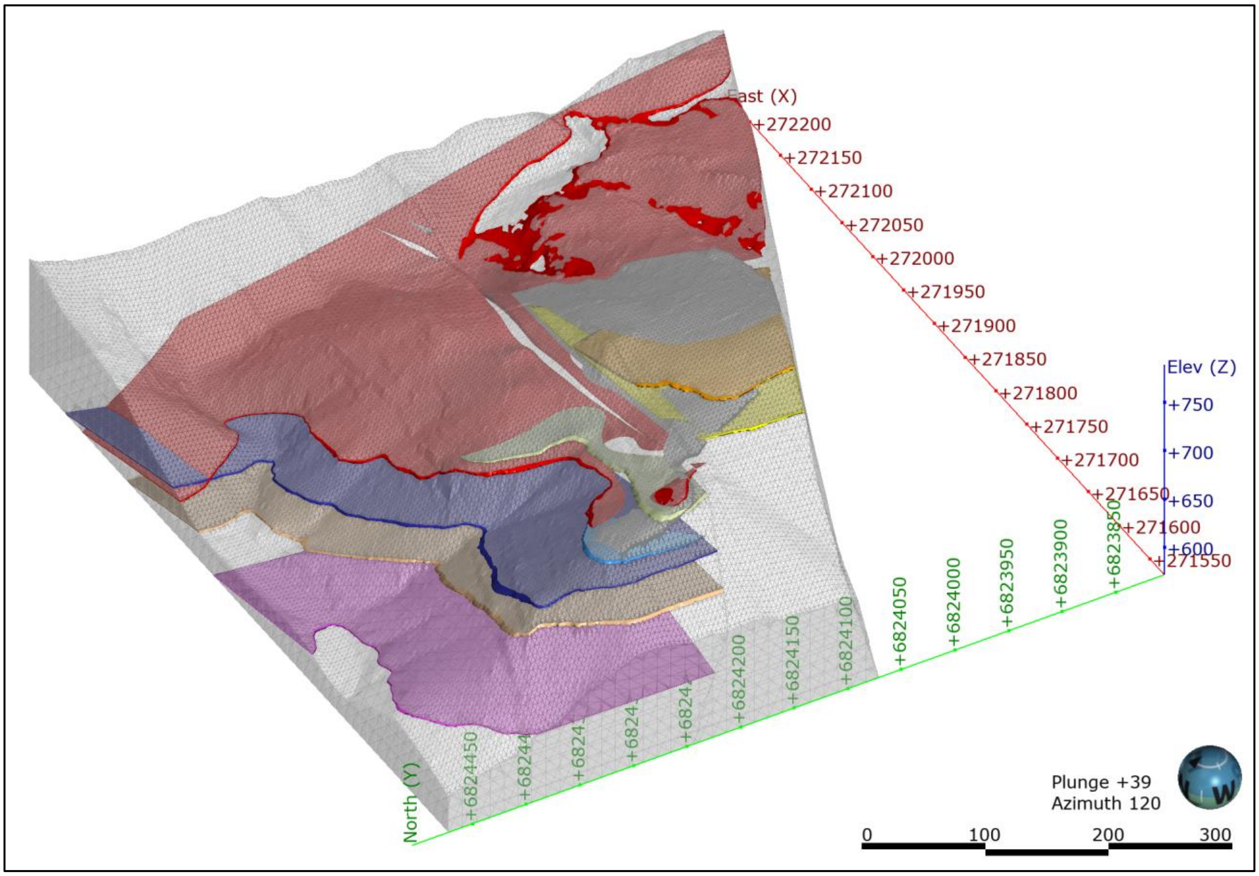
Three-dimensional views of the Mineral Resource models for the D-pegmatite and for the EF-pegmatite are shown in Figure 14.18 and Figure 14.19, respectively.

Figure 14.18: Area of D-pegmatite Three-Dimensional Model



Note: Scale is in metres, Blue = D0, Gold = D1 and Green = D2.

Figure 14.19: Area of EF-pegmatites Three-Dimensional Model (Refer to Figure 14.3 for Colour Legend of Pegmatites)



Note: Scale is in metres.

14.5.3 Density

Density measurements were provided, an unweighted average was calculated for the three rock types indicated: pegmatites, gabbro and associated rocks. Pegmatite samples yielded an average bulk density of 2.64 g/cm^3, which was applied as a global value for pegmatites during the 1st May 2022 Mineral Resource Estimate.

14.5.4 Prior Mining

A tantalite mine with a long productive history is located within the southern central part of EPL 5047 on ML 77, which is surrounded by ORP's larger EPL 5047.

The ML 77 contains a number of well known, economic pegmatites which are being mined for tantalum and is currently owned by the AIM listed KZG. In addition to the mining operation on ML 77, there is abundant evidence of historical mining that took place in the area covered by EPL 5047.

Swanson Enterprises held various claims on the farms Kinderzit 132 and Umeis 110 within the EPL 5047 licence area and mined tantalite, beryl, spodumene and tungsten on these claims in the 1970s to early 1990s. The primary mining was for tantalum that took place on several shallow dipping pegmatites in the north-western strain shadow of the Tantalite Valley Complex (coinciding with the area identified by ORP).

14.6 Mineral Resources Classification

Mineral Resources in the E-F Pegmatite Area were classified primarily on a distance from sample basis. A boundary "shell" was created around sampled borehole traces that were used for the 1st May 2022 Mineral Resource Estimate; this includes boreholes and channel samples. A steeply dipping NNE striking fault forms the southern boundary of this classification system for the EF-pegmatite, whereas the intermittent stream that drains the area forms the eastern and northern boundaries. Mineral Resources within this boundary were classified to have an Indicated confidence level. Based on the average variogram range for Ta_2O_5, a buffer zone of 50 m was created around the boundary shell described above. Pegmatite deposits within the 50 m zone were classified as Inferred. Any deposits beyond the 50 m zone are considered unclassified and were not included in this Mineral Resource report.

The Mineral Resource classification of the E-F pegmatites is shown in Figure 14.20.

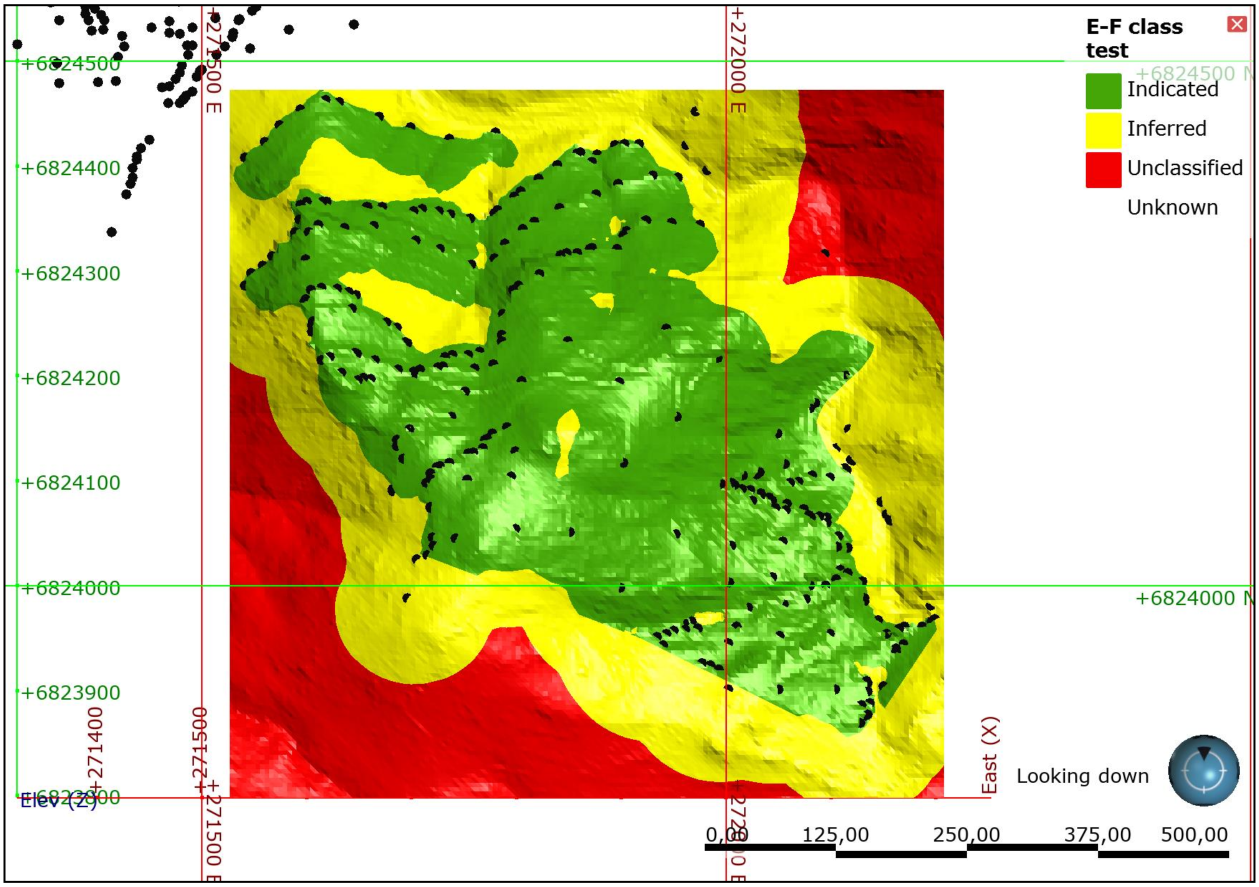
A similar classification method was used for the D-pegmatite, but instead of using a "shell" around the borehole traces, a polygon around the borehole collars was projected vertically downward. The reason for using the shell approach in the EF-pegmatites was to take into consideration shallower holes that did not intersect the lowermost E-pegmatite layers. Applying the same Mineral Resource classification method in the EF-pegmatites as was used in the D-pegmatites would give unrealistically high confidence to these lower pegmatites, with shallow holes drilled above them, but not into them.

Sparse spacing of drill holes specifically in large parts of the D and E-F deposits, resulting in low to unknown statistical grade continuity in these areas is the main reason for not considering the deposit as a Measured Resource at this stage. Nevertheless, the detailed mapping carried out by ORP suggests that geological continuity of the pegmatites is likely.

The Mineral Resource classification of the D-pegmatite is shown in Figure 14.21.

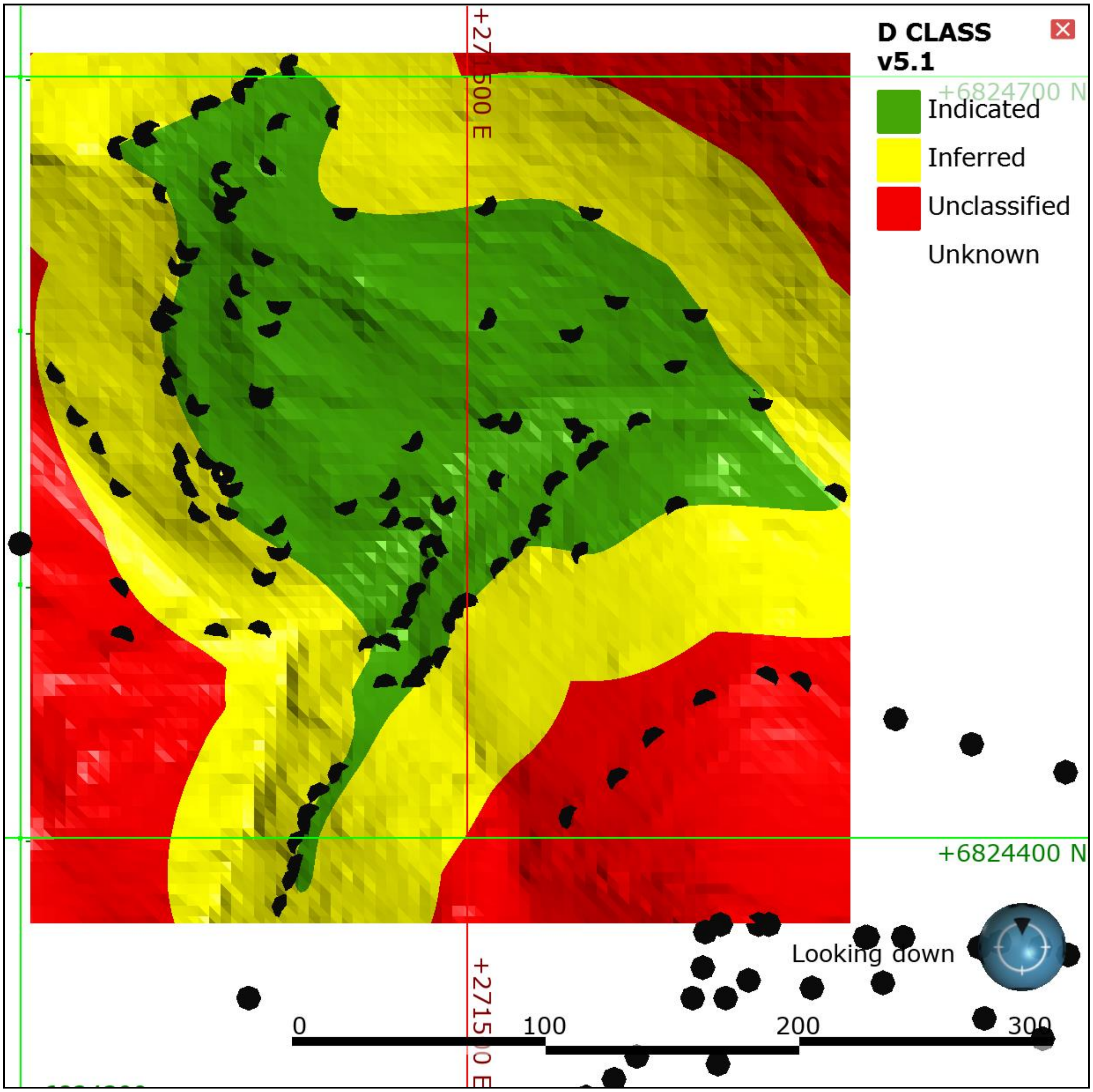
Figure 14.20 and Figure 14.21 show the Indicated and Inferred Mineral Resources for the E-F and D Pegmatite Areas, respectively. The distribution of Ta_2O_5 ppm, Nb_2O_5 ppm and Li_2O % can be seen in the box plots in Section 14.3.1. Roughly 60% of this estimated tonnage lies in the area of the EF-pegmatite. This tonnage could increase if the down-dip continuation of the lower E pegmatites can be proved with future borehole intersects.

Figure 14.20: E and F Pegmatites Resource Classification



Note: The black semi-circles are channel/borehole collar locations.

Figure 14.21: D Pegmatites Resource Classification



Note: The black semi-circles are channel/borehole collar locations.

14.7 MINERAL RESOURCE STATEMENT

Mineral Resources for the Swanson deposit are declared following international best practice and guidelines (JORC Code 2012). Only ore that meets reasonable prospects for eventual economic extraction were considered, assuming inputs derived from metallurgical testwork. Pit optimisation was applied to highlight the portion of the deposit that is economically mineable.

The Mineral Resources for the D Pegmatite Area of the Swanson Deposit are presented in Table 14.7.

Table 14.7: Mineral Resource Statement for the D Pegmatites of the Swanson Deposit as at 1st May 2022 (in accordance with the guidelines of the JORC Code (2012))

Category	Pegmatite	Tonnage (kt)	Grade Ta_2O_5 (ppm)	Ta_2O_5 (t)	Grade Nb_2O_5 (ppm)	Grade Li_2O (%)
Indicated	D0	25	314	8	41	0.18
	D1	323	340	110	96	0.35
	D2	220	408	90	78	0.17
	Total	**568**	**365**	**207**	**87**	**0.27**
Inferred	D0	90	325	29	46	0.29
	D1	250	361	90	93	0.42
	D2	103	408	42	72	0.19
	Total	**444**	**365**	**162**	**79**	**0.34**

Notes:
1. The 1st May 2022 Mineral Resource Estimate has been prepared in accordance with the guidelines of the JORC Code (2012).
1. The Mineral Resources are estimated based on 105 diamond drill holes.
2. Density average value is 2.64 g/cm^3.
3. The block model grades were estimated using Ordinary Kriging.
4. Mineral Resources are not Ore Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the estimated Mineral Resources will be converted into Ore Reserves.
5. The Mineral Resources volume and tonnage have been rounded to reflect the accuracy of the estimate, and numbers may not add up due to rounding.
6. Inferred Mineral Resources are that part of a Mineral Resource for which quantity and grade can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity.
7. The cut-off grade of 236 ppm Ta_2O_5 has been used to estimate the Mineral Resources.

In the D-pegmatite there is a total of 568 kt of Indicated Mineral Resources at an average grade of 365 ppm Ta_2O_5, 87 ppm Nb_2O_5 and 0.27% Li_2O. Inferred Mineral Resources total 444 kt at an average grade of 365 ppm Ta_2O_5, 79 ppm Nb_2O_5 and 0.34% Li_2O (Table 14.7).

The Mineral Resources for the EF-pegmatites are presented in Table 14.8.

Table 14.8: Mineral Resource Statement for the E and F-pegmatites of the Swanson Deposit as at 1st May 2022 (in accordance with the guidelines of the JORC Code (2012))

Category	Pegmatite	Tonnage (kt)	Grade Ta_2O_5 (ppm)	Ta_2O_5 (t)	Grade Nb_2O_5 (ppm)	Grade Li_2O (%)
Indicated	E7	75	626	47	59	0.24
	E8	26	723	19	71	0.00
	E6	40	513	21	54	0.10
	F1	311	563	175	59	0.03
	E4	3	748	2	56	0.01
	E3	53	460	24	76	0.14
	E2	68	660	45	95	0.02
	Total	**577**	**578**	**334**	**65**	**0.07**
Inferred	E7	72	649	47	59	0.17
	E8	61	709	43	67	0.01
	E6	0	529	0	58	0.13
	F1	259	560	145	57	0.02
	E4	6	756	5	57	0.01
	E3	231	456	105	72	0.10
	E2	365	571	208	77	0.02
	Total	**995**	**557**	**554**	**69**	**0.05**

Notes:
1. The 1st May 2022 Mineral Resource Estimate has been prepared in accordance with the guidelines of the JORC Code (2012).
2. The 1st May 2022 Mineral Resources are estimated based on 105 diamond drill holes.
3. Density average value is 2.64 g/cm^3.
4. The block model grades were estimated using the Ordinary Kriging.
5. Mineral Resources are not Ore Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the estimated Mineral Resources will be converted into Ore Reserves.
6. The Mineral Resources volume and tonnage have been rounded to reflect the accuracy of the estimate, and numbers may not add up due to rounding.
7. Inferred Mineral Resources are that part of a Mineral Resource for which quantity and grade can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity.
8. The cut-off grade of 236 ppm Ta_2O_5 has been used to estimate the Mineral Resources.

Indicated Mineral Resources in the EF-pegmatite total 577 kt, at an average grade of 578 ppm Ta_2O_5, 65 ppm Nb_2O_5 and 0.07% Li_2O. Inferred Mineral Resource total 995 kt at an average grade of 557 ppm Ta_2O_5, 69 ppm Nb_2O_5 and 0.05% Li_2O (Table 14.8).

The Summary Mineral Resources for all the Pegmatite Areas of the Swanson Deposit are presented in Table 14.9.

Table 14.9: Summary Mineral Resource Statement for the Swanson Deposit as at 1st May 2022 (in accordance with the guidelines of the JORC Code (2012))

Category	Pegmatite	Tonnage (kt)	Ta_2O_5 (t)	Grade Ta_2O_5 (ppm)	Grade Nb_2O_5 (ppm)	Grade Li_2O (%)
Indicated	Total Area D	568	365	207	87	0.27
	Total Area E-F	577	578	334	65	0.07
	Total	**1,145**	**472**	**541**	**76**	**0.17**
Inferred	Total Area D	444	365	162	79	0.34
	Total Area E-F	995	557	554	69	0.05
	Total	**1,439**	**498**	**716**	**72**	**0.14**
Comparison to September 2021						
Indicated Sept. 2021	Total	664	431	286	76	0.28
Inferred Sept. 2021	Total	544	389	212	75	0.30

Notes:
1. The 1st May 2022 Mineral Resource Estimate has been prepared in accordance with the guidelines of the JORC Code (2012).
2. The 1st May 2022 Mineral Resources are estimated based on 105 diamond drill holes.
3. Density average value is 2.64 g/cm^3.
4. The block model grades were estimated using the Ordinary Kriging.
5. Mineral Resources are not Ore Reserves and do not have demonstrated economic viability. There is no certainty that all or any part of the estimated Mineral Resources will be converted into Ore Reserves.
6. The Mineral Resources volume and tonnage have been rounded to reflect the accuracy of the estimate, and numbers may not add up due to rounding.
7. Inferred Mineral Resources are that part of a Mineral Resource for which quantity and grade can be estimated on the basis of geological evidence and limited sampling and reasonably assumed, but not verified, geological and grade continuity.
8. The cut-off grade of 236 ppm Ta_2O_5 has been used to estimate the Mineral Resources.

The total Indicated Mineral Resources for the Swanson Deposit are 1,145 kt, at an average grade of 541 ppm Ta_2O_5, 76 ppm Nb_2O_5 and 0.17% Li_2O. The total Inferred Mineral Resources are 1,439 kt at an average grade of 716 ppm Ta_2O_5, 72 ppm Nb_2O_5 and 0.14% Li_2O (Table 14.9).

14.8 Comparison to Previous Estimates

In the Acadia listing prospectus filed in June 2021, no Mineral Resources were declared. In the comprehensive supporting document on exploration activities at ORP, Hattingh (March 2021) stated that there was insufficient information to estimate Mineral Resources in accordance with the JORC Code (2012) at the time of reporting and that limited information regarding the spatial extent of the mineralisation was available.

The previous Mineral Resource Estimates are shown in Table 14.10.

Table 14.10: Previous Mineral Resource Estimate for the D and F Pegmatites of the Swanson Deposit as at 2020

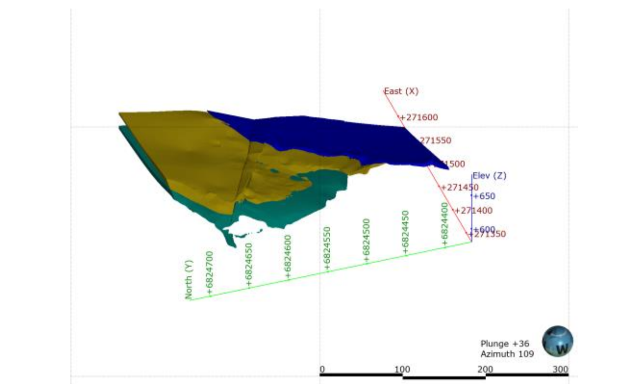
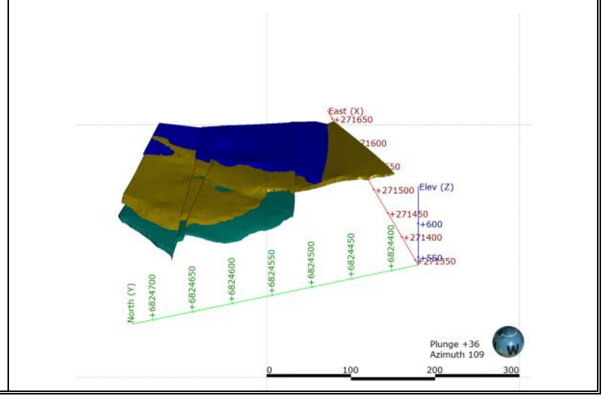
Source	Area	Thickness (m)	Tonnage (kt)	Grade Ta_2O_5 (ppm)	Grade Nb_2O_5 (ppm)	Grade Li_2O (%)	Ta_2O_5 : Nb_2O_5
D Pegmatite ORP 2020	D	2.33	499	395	82	0.67	4.81
F Pegmatite ORP 2020	F	1.59	277	548	55	0.01	9.96

At the end of 2021, before drilling was conducted in the area of the E-pegmatite, Snowden Optiro conducted a Mineral Resource Estimate for the D-pegmatite and F-pegmatite.

Drilling was subsequently carried out in the area of the E-pegmatite, which led to the 1st May 2022 Mineral Resource Estimate. Some reasons for the differences observed between the two latest estimates include:

- Firstly, there is a part in the area of the D-pegmatite where the D0 and D1 pegmatites converge. It isn't 100% clear whether D0 terminates against D1 on the hanging wall side, or whether D1 joins D0 on its footwall side (or if this is in fact a bifurcation). In the 2021 estimate, this specific location was modelled to show that D1 terminates against D0. During the 1st May 2022 Mineral Resource Estimate, it was decided to go with the field geologists' interpretation which indicated that D0 terminates against D1. This change did not have a significant change on the overall Mineral Resource Estimate of the D -pegmatite, but internally assigned a large tonnage that was previously considered to be D0 to D1 (Figure 14.22).
- Ellipsoid dimensions for the third search pass of the Kriging process were increased from 500 x 500 x 10 m to 500 x 500 x 100 m to include all parts of the respective pegmatite that was investigated. This was to ensure that no parts of pegmatite ore were assigned "no value" in the subsequent block model.
- In both areas there were boundary changes implemented in the 1st May 2022 Mineral Resource Estimate, relative to the previous estimate. The main change in boundaries was to include the new boreholes that were drilled (mainly in the area of the E-pegmatite, but also some additional holes in the down-dip sections of the D-pegmatite). The new boreholes also indicated areas of possible faulting that further affected the modelling boundaries. For the 1st May 2022 Mineral Resource Estimate, these faults, as well as the intermittent stream that drains the area were used as boundaries (refer to Section 14.6).
- The largest difference observed when performing a reconciliation between the two latest estimates, is due to the boundary of the F-pegmatite. This was already alluded to in the point about boundary changes above. The latest drilling confirmed that the F Pegmatite extends through the hill that separates the 2021 EF-pegmatites from one another. Therefore, this area was modelled as one target (refer to Section 14.2).

Figure 14.22: Different Interpretations of the Interaction between the D0 and D1 Pegmatites

2021 Interpretation	2022 Interpretation
	

Note: D0 = blue, D1 = gold, D2 = green.

Table 14.11 presents the Indicated and Inferred Mineral Resources for the Swanson Project as at September 2021 at a cut-off of 236 ppm Ta_2O_5, in accordance with the guidelines of the JORC Code (2012).

Table 14.11: Indicated and Inferred Mineral Resources for the Swanson Project as at September 2021 at a Cut-Off 236 ppm Ta_2O_5 (in accordance with the guidelines of the JORC Code (2012))

Category	Pegmatite	Tonnage (kt)	Grade Ta_2O_5 (ppm)	Grade Nb_2O_5 (ppm)	Grade Li_2O (%)
Indicated	D0	4.6	289	77	1.06
	D1	221.1	372	82	0.55
	D2	280.5	439	82	0.20
	F1	157.4	504	57	0.03
	Total	**663.5**	**431**	**76**	**0.28**
Inferred	D0	79.7	354	54	0.87
	D1	188.4	337	85	0.34
	D2	214.0	407	80	0.13
	F1	61.9	527	55	0.01
	Total	**544.0**	**389**	**75**	**0.30**

Notes: Inferred Resources are based on extrapolation of 50 m beyond the last line of sampling and/or boreholes. This is reasonable based on the data density, the variogram range (about 50 m) and the observed continuity of the pegmatite orebodies from outcrop positions. The Inferred Mineral Resource comprises 45% of the total Mineral Resource tonnage.

15.0 ORE RESERVE ESTIMATION

Snowden Optiro was engaged by ORP to undertake an initial mine design and Ore Reserve Estimate for the Swanson Project.

The Ore Reserve Estimate has been converted from Indicated Mineral Resources only. However, as further outlined below the mine schedule does include a limited amount of Inferred Mineral Resources deemed reasonable for inclusion based on the analysis of the mine plan data.

The JORC Code (2012) sate: "An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to an Ore Reserve. It is however reasonably expected that the majority of Inferred Mineral Resources could potentially be upgraded to Indicated Mineral Resources with continued exploration.

Caution should be exercised if Inferred Mineral Resources are used to support technical and economic studies".

A summary of the Ore Reserve Estimate for the Swanson Project is shown in Table 15.1. The Ore Reserve Estimate is inclusive of Ta_2O_5 and Li_2O. No reserve has been declared for Nb_2O_5.

Table 15.1: Swanson Tantalite Project Ore Reserve

D and EF Reserve	Area	Mass (kt)	Ta_2O_5 ppm	Li_2O %	Ta_2O_5 tonnes
Proved	Total D	0	0	0	0
	Total EF				
	Subtotal	**0**	**0**	**0**	**0**
Probable	Total D	409	347.0	0.23%	142
	Total EF	457	549.9	0.07%	251
	Subtotal	**866**	**454.1**	**0.15%**	**393**

Note: 1. While Ore loss is attributable to the pit design taking into consideration geotechnical and other mining design parameters (e.g., benches, ramps etc.), notably on the EF-pegmatites, the grade is not proportionally impacted as grades vary across the resource.

For further reference, a summary of the 1st May 2022 Mineral Resource Estimate used for the Ore Reserve Estimate is shown in Table 15.2 and the relative percentages of the Mineral Resource Estimate used for the conversion is presented in Table 15.3.

Table 15.2: Indicated and Inferred Resources for the Swanson Pegmatites as at 1 May 2022

D, E and F Classification	Area	Mass (kt)	Ta_2O_5 ppm	Nb_2O_5 ppm	Li_2O %	Ta_2O_5 tonnes
Indicated	Total D	568	365	87	0.270	207
	Total EF	577	578	65	0.070	334
	Subtotal	**1,145**	**472**	**76**	**0.169**	**541**
Inferred	Total D	444	365	79	0.340	162
	Total EF	995	557	69	0.050	554
	Subtotal	**1,439**	**498**	**72**	**0.139**	**716**

Source: Snowden Optiro, "20220504 ORP Geology and Mineral Resources 2022 Final".

Table 15.3: Mineral Resources Used in, and Converted to Ore Reserves

D and EF Reserve	Area	Mass (kt)	Ta_2O_5 ppm	Li_2O %	Ta_2O_5 tonnes
Total Indicated Resources declared	Total D Total EF	568 577	365 578	0.25% 0.07%	150 279
Indicated Resources included in Reserve estimation	Total D Total EF	411 555	364 503	0.25% 0.07%	150 279
Percentage of Indicated Mineral Resources (included for reserve estimation) converted to Probable Ore Reserves	Total D Total EF	**99.0%** **82.3%**			**94.6%** **89.9%**
Percentage of total Indicated Mineral Resources converted to Probable Ore Reserves	Total D Total EF	**72.0%** **79.2%**			**68.6%** **75.2%**

16.0 MINE DESIGN

16.1 MINING METHODS

16.1.1 Introduction

In arriving at the Ore Reserve Estimate, the geological and 1st May 2022 Mineral Resource Estimate was analysed and the geological block model inputted into Datamine Studio NPV Scheduler. The optimised pit shells were selected based on economic parameters and were ultimately used for more detailed pit designs. The final technical outputs from the pit designs formed the basis for the Ore Reserve Estimate.

Mining at the Swanson Project would be open pit using drilling and blasting as well as truck and shovel mining.

16.1.2 Production Drilling and Blasting

Drilling and blasting of waste and ore will be undertaken by contractor mining and involve conventional surface methods. Most rock will be blasted except for the topsoil layer that will be removed for future rehabilitation purposes as well as any sufficiently weathered material that could be removed directly.

Drilling and blasting detail are provided in Section 21.3.2.4.

Blasting will utilise a bulk ammonium nitrate explosive with an assumed powder factor of 0.9 kg/BCM.

16.1.3 Loading and Haulage

All blasted waste and ore will be handled by a fleet of 6 trucks and a 75-t excavator. The current planned equipment is summarised in Table 16.1.

Table 16.1: Swanson Mining Fleet

Fleet	Units
Liebherr 974 Excavator	1
Liebherr 954 Excavator	1
Bell B40E 40t ADT Trucks	6
Caterpillar D6 Dozer	1
Caterpillar 14H Grade	1
30t Water Bowser	1
25t Diesel Bowser	1
Pantera DP1100 Drill Rig	1

Source: ORP/ SPH Kundalila.

Production is anticipated to be carried out on a single 10-hour day shift over 22 days a month.

Average equipment utilisation is anticipated to be 76%. All waste will be hauled to a designated overburden dump and will not be replaced in the existing voids at this stage to ensue deeper pegmatite ores for potential future extraction is not sterilised. Ore will be hauled to the processing plant area located to the north of the Swanson Property.

16.1.4 Production Rate

The targeted RoM production based on the expected plant processing capacity is 12,500 tpm or 150,000 tpa. This is based on the designed plant capacity as outlined in Section 17.0.

16.1.5 Haulage of Waste

Waste will be hauled to a dedicated waste dump located on the southern side of the EF-pits. Due to the presence of additional Inferred Mineral Resources within deeper and/or lower pegmatite mineral horizons as well as the potential to access these from underground, no backfilling of the current pits is proposed to limit sterilisation of such resources. The waste dump design is outlined in Section 18.5.8.

Haul roads will be established along the dry water-courses between the D-pit and EF-pits as well as up to the proposed plant location on the northern plateau above the D-pegmatite.

16.1.6 Geotechnical Parameters

Due to the arid nature of the area, overburden rock is largely competent and un-weathered with a weathered zone of <5 m in depth. As such, most mining will require drilling and blasting.

Mining will largely occur into the sides of the hilly terrain and benches will be designed in accordance with the geotechnical design parameters as summarised in Table 16.2.

Table 16.2: Swanson Geotechnical Parameters

Material type	Bench height (m)	Bench width (m)	Bench face angle (°)	Overall face angle (°)
D-pit				
Weathered	5	4.5	70°	53°
Fresh	10	5.5	75°	
EF-pit				
Weathered	5	4.5	70°	50°
Fresh	10	5.5	75°	
Geotechnical berm	11			

Source: Middindi.

16.1.7 Grade Control

From a mine planning perspective, the use of RoM stockpiles will be limited. To ensure plant feed grade is maintained within an appropriate and optimal range, grade control may be required. The use of grade-control drilling and face sampling or the use of small grade control stockpiles could be used to manage the plant feed grades and ore blending.

16.2 Pit Optimisation

In arriving at the Ore Reserve Estimate, the geological and Mineral Resource data was analysed, and the resource block model inputted into Datamine Studio NPV Scheduler. The optimised pit shells were selected based on economic parameters and were ultimately used for more detailed pit designs. The final technical outputs from the pit designs formed the basis for the Ore Reserve Estimate.

16.2.1 Parameters

Prior to the pit optimisation process and pit design process, certain modifying factors were applied to the Mineral Resource block model in determining the ultimate economical and extractable Ore Reserve Estimate. These factors represent the likely impacts on ore recovery from the mine due to inefficiencies or processes employed in mining of the ore.

16.2.1.1 Model Basis

The following block model and cost input files were used in the estimation of the Ore Reserves:

- 20220519 D Sub-blocked Model (COMP Eval)v5.csv.
- 20220519 E-F Sub-blocked Model (COMP Eval)v5.csv.

16.2.1.2 Resource Classification

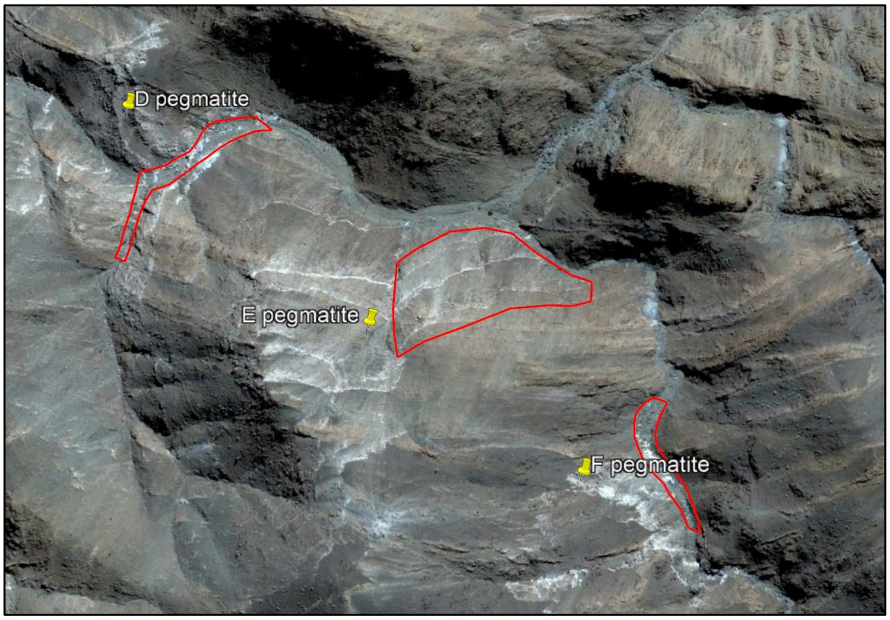
In line with the JORC requirements for reporting of Ore Reserves, in determining the ultimate Ore Reserve, only the Indicated Mineral Resources category was used.

All Mineral Resources classified as "Indicated" were assessed for inclusion in determination of the Ore Reserve.

16.2.1.3 Spatial Constraints

Certain Indicated Mineral Resources were excluded as potential Ore Reserves based on subjective and practical considerations due to their challenging location (such as materially deeper below dry water courses or on outcropping on steep surface terrains. While these Mineral Resources are ultimately extractable, they are currently not included in the , Ore Reserve Estimate. These areas are shown in Figure 16.1.

Figure 16.1: Resource Areas Limited or Excluded from Inclusion in the Ore Reserve Estimate



16.2.1.4 Macro-economic and Processing Assumptions

Based on the metallurgical test-work undertaken and detailed in (Processing Plant report Feasibility study, Obsideo Consulting) The Swanson Project processing plant has been designed to produce a concentrate product with a 25% Ta_2O_5 content and a 65% processing recovery factor. Tantalum concentrate is a well traded product with regularly quoted prices globally. The market for tantalum concentrate is well known and as such the saleability of concentrate from the Swanson Project would not represent a material risk. Furthermore, infrastructure and facilities for the transport and handling of Tantalum concentrate are in place in Namibia and exports would occur through the port of Luderitz.

The sale of Lithium by-product is proposed from the waste stream of the D Pegmatite only due to the higher grades of Li_2O. The market for Lithium from processing by-product is less developed but the terms of an offtake agreement has been agreed with Kazera in Namibia.

The macro-economic and processing recovery factors are summarised in Table 16.3.

Table 16.3: Economic and Processing Assumptions

Assumption	Unit Rate
Ta_2O_5 (25%) concentrate price (US$. CIF)	US$220 per kg
Plant recovery factor	65%
Concentrate grade	25%
Li_2O (30%) waste by-product	US$20/t

16.2.1.5 Dilution and Ore Loss

Given the distinct visible nature and deposition (including thickness and grade) of the pegmatite ore, it not anticipated that material ore loss or dilution would occur. However, inefficiencies in drilling and blasting and potentially the loading process would likely result in some over or under-breaking of waste or ore in the mining process that would result in some dilution or ore loss. As such, a factor of 5% for average dilution and loss was included in the model to account for this risk.

Given the relatively low planned RoM monthly plant feed volumes, while not currently proposed, manual or other magnetic sorting capacity at the plant could be employed to remove or reduce waste should this arise.

16.2.1.6 Cut-off Grade

A cut-off grade of 236 ppm Ta_2O_5 was determined for the 1st May 2022 Mineral Resource Estimate using preliminary mining costs, processing recovery factors, forecast Tantalum concentrate sales price at the time. Using the updated outcomes of the feasibility study and factors as outlined in Table 16.3, as well as applying the ore loss and dilution factors used in the pit optimisation process, an average net overall revenue factor of ~90% could be assumed. From Table 16.4, when applying the calculated cut-off grade of 236 ppm (0.0236%) Ta_2O_5, the average revenue per tonne at this grade remains above the cost of production and thus remains reasonable for the DFS. Furthermore, based on the geological data and sampling undertaken, there are no observed grades of pegmatite ore that were observed below this grade.

Table 16.4: Cut-off Grade Revalidation

Assumption	Unit Rate
In-situ grade	236 ppm
Effective concentrate produced[1]	0.61 kg
Concentrate value	~US$114/t
Revenue factor (incl dilution)	90%
Average OPEX per tonne	~US$80/t
Approximate CAPEX per tonne	US$13.70/t
Total cost per tonne	~US$95/t

Note: [1.] ((236ppm/1000*65%(Rec)) / 25%(Conc grade) = 0.61kg (effective concentrate).

16.2.1.7 Operating Costs

The OPEX as presented in Table 16.5 was provided for use in the pit optimisation. The OPEX were split into ore and waste mining costs for the D-pegmatite and EF-pegmatites, as well as processing and other overhead costs. A summary of the costs used in the pit optimisation process are shown in Table 16.6.

Table 16.5: Operating Cost for Pit Optimisation (US$/t)

Cost element (US$/t)	Source	Unit	D-pegmatite	EF-pegmatites
Average strip ratio	Snowden Optiro	W:W	4	10
Mining cost (per ore tonne)	SHP Kundalila	US$/ore t	3.4	2.4
Mining cost (per waste tonne)	SHP Kundalila	US$/waste	3.4	2.4
Crushing and plant	SPH Kundalila	US $/RoM	17.2	17.2
Contract crushing	SHP Kundalila	US$/RoM t	7.0	7.0
Labour	Obsideo	US$/RoM t	6.6	6.6
Water	Obsideo	US$/RoM t	0.2	0.2
Electricity	Obsideo	US$/RoM t	1.4	1.4
Reagents	Obsideo	US$/RoM t	0.1	0.1
Maintenance	Obsideo	US$/RoM t	2.0	2.0
Mining / plant services		US$/Rom t	2.0	2.0
Laboratory	Lexrox	US$/RoM t	0.3	0.3
Geology	Lexrox	US$/RoM t	0.4	0.4
Survey	Lexrox	US$/RoM t	0.2	0.2
Rehabilitation and monitoring	Impala	US$/RoM t	0.2	0.2
Waste material handling	SPH Kundalila	US$/RoM t	1.0	1.0
General and administration		US$/RoM t	6.4	6.6
Owner's cost (salaries and admin)	ORP	US$/RoM t	2.0	2.0
20 Tonne concentrate transport to Hamburg (CIF)	Kuehne & Nagel	US$/RoM t	1.3	1.3
Site security	Southern Security	US$/RoM t	0.6	0.6
Insurance	Namrisk	US$/RoM t	0.3	0.3
Permitting and other	Ministry Mines	US$/RoM t	0.2	0.2
Royalty	Ministry Mines	US$/RoM t	2.3	2.0
Land use	Warmbad Farms	US$/RoM t	0.11	0.11
Total		**US$/RoM t**	**42.6**	**52.2**

Source: ORP, management

Table 16.6: Operating Cost Summary

Description	Unit	D-pegmatite	EF-pegmatites
Mining direct costs - Ore	US$/RoM t	4.4	3.4
Mining direct costs - waste	US$/waste t	3.4	2.4
Processing direct costs	US$/RoM t	18.2	18.2
Mining overhead costs	US$/rock tonnes	0.3	0.3
Rehab (assume US$2.7m to demolish, close and rehab)	US$/RoM t	0.3	0.3
Sustaining CAPEX (2.5% of total Spiral Plant CAPEX)	US$/RoM t	1.1	1.1

Source: Snowden Optiro Analysis, ORP.

16.2.2 Pit Optimisation Results

Following the application of the key technical, operational, financial and macro-economic assumptions to the model, the outcomes of the economic pit shell analysis for the D-pegmatite and EF-pegmatites are shown in figures Figure 16.2 and Figure 16.3.

Figure 16.2: Economic Pit Analysis – D-pegmatite

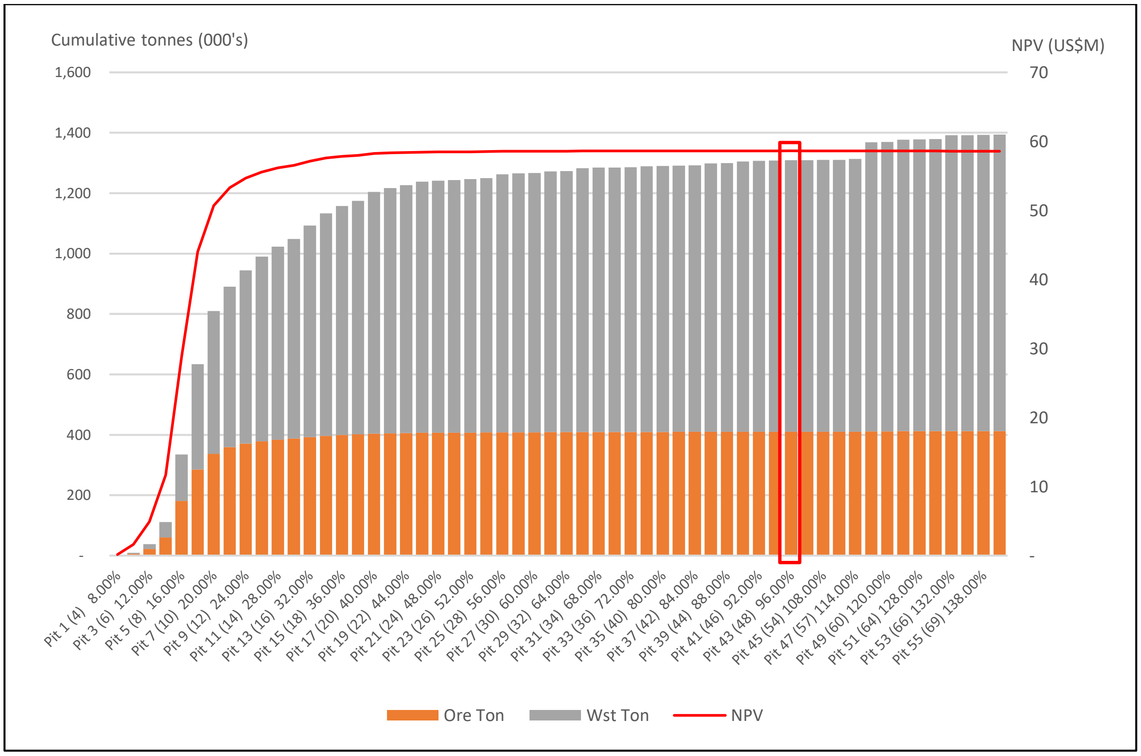
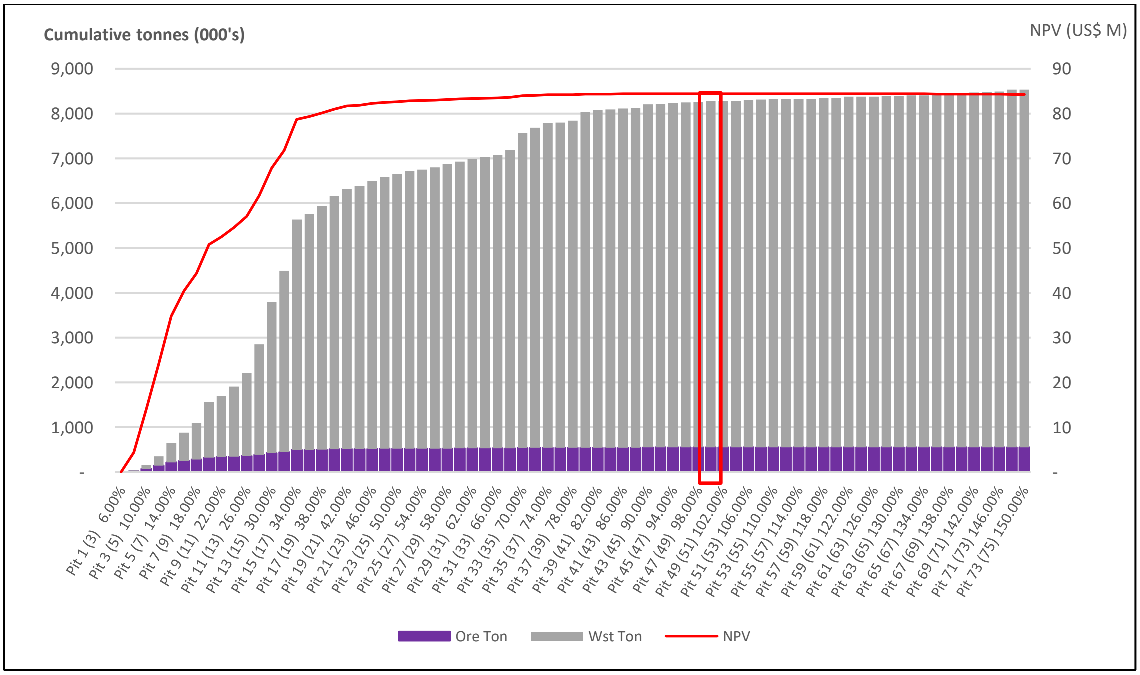


Figure 16.3: Economic Pit Analysis – EF-pegmatites



Based on the pit optimisation results, pit shell 43 (D Pegmatite) applying a revenue factor or 96% and pit shell 48 (EF Pegmatite) applying a revenue factor of 100% were selected as appropriate for the DFS.

A summary of these shells is shown in Table 16.7.

Table 16.7: Selected Pit Shell Summary

	D-pegmatite	EF-pegmatites	Total
Pit shell	43	48	-
Revenue factor	96%	100%	98%
Ore tonnes (Mt)	0.41	0.55	0.96
Waste tonnes (Mt)	0.90	7.72	8.62
Ave strip ratio	2.2	14.2	12.9
Average Ta_2O_5 grade (ppm)	364	503	444
Average Li_2O (%)	0.25	0.07	0.15

A sensitivity analysis of key variables was undertaken and is shown in Table 16.8. Due to the relatively flat economic curve as shown in Figure 16.2 and Figure 16.3 as well as geotechnical constraints, the technical factors are not materially sensitive to shifts in key variables with the exception of geotechnical design criteria. A reduction in the overall slope angle by 5° would result in a 35% increase in Indicated Resource availability in the area of the D-pegmatite.

The results of the pit optimisation used for the estimation of Ore Reserves were reported in the file "281122_Report.xls".

Table 16.8: Selected Pit Shell Summary

Scenario	Indicated (Mt)	Inferred (Mt)	Waste (Mt)	Ta_2O_5 ppm Grade	Li_2O % Grade	Indicated (kt)	Inferred (kt)	Waste (Mt)	Ta_2O_5 ppm Grade	Li_2O % Grade	NPV US$(m)
	D-pegmatite					EF-pegmatites					
Base Case	**410.11**	**62.70**	**0.836**	**364.15**	**0.25%**	**550.30**	**79.37**	**7.64**	**579.80**	**0.07%**	**143**
Price - low (US$190/kg)	409.59	59.18	0.823	364.18	0.25%	548.12	75.53	7.49	579.87	0.07%	118
Price - high (US$250/kg)	410.15	62.70	0.838	364.15	0.25%	550.78	80.61	7.69	579.81	0.07%	168
Concentrate recovery (70%)	410.13	62.70	0.836	364.15	0.25%	550.74	80.60	7.68	579.81	0.07%	157
Concentrate recovery (60%)	410.01	62.70	0.832	364.14	0.25%	549.74	76.69	7.60	579.83	0.07%	129
Pant feed (110 ktpa)	410.11	62.70	0.836	364.15	0.25%	550.30	79.37	7.64	579.80	0.07%	128
Mining costs (+15%)	409.80	60.81	0.827	364.15	0.25%	549.44	76.42	7.58	579.81	0.07%	140
Mining costs (-15%)	410.15	62.70	0.838	364.15	0.25%	550.88	80.66	7.70	579.82	0.07%	147
Processing costs (+15%)	410.10	62.70	0.835	364.15	0.25%	550.20	78.39	7.64	579.81	0.07%	141
Processing costs (-15%)	410.11	62.70	0.836	364.15	0.25%	550.36	79.38	7.65	579.81	0.07%	145
Overall slope angle (+5 deg)	409.15	54.13	0.817	363.65	0.25%	550.17	73.87	7.22	579.79	0.07%	144
Overall slope angle (-5 deg)	555.04	108.26	1.795	364.83	0.27%	550.66	84.65	8.18	579.82	0.07%	149
Dilution (15%)	410.11	62.70	0.836	364.15	0.25%	550.20	78.39	7.64	579.81	0.07%	141

Source Snowden Optiro analysis, (2212_Sensitivity Report.xls).

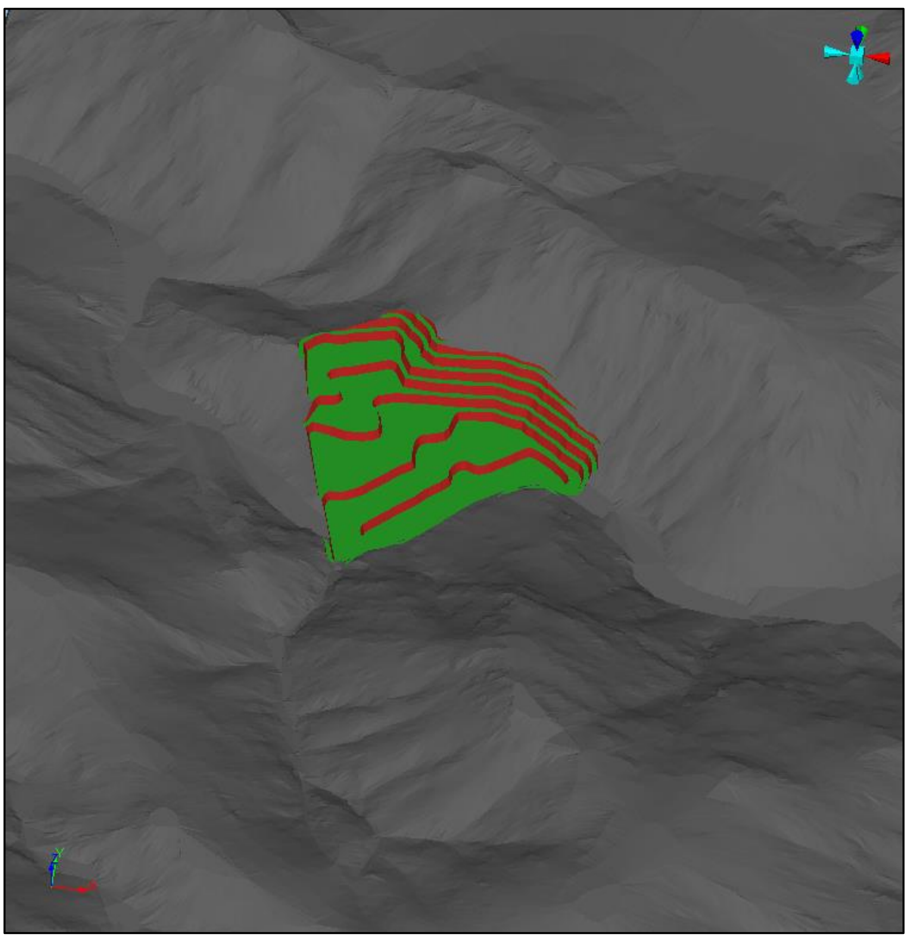
16.3 PIT DESIGN

Pit designs were completed using Datamine Studio OP software. The pit design process was undertaken applying targeted production and processing capacity constraints as well as detailed bench push-back analysis and inclusion of ramps where necessary. The block sizes used in the Mineral Resources block model (10mX x 10mY x 2mZ) were retained as they were representative of a practical mining block size. Furthermore, the pit design was undertaken to ensure that no geotechnical or other bench design issues arise. The resultant pit designs for D and EF are shown in Figure 16.4 and Figure 16.5.

16.3.1 D Pegmatite Pit Design

The final D Pegmatite pit design is shown in Figure 16.4.

Figure 16.4: D Pegmatite Pit Design



Source Snowden Optiro.

The final pit design defined by constraints around the D Pegmatite resulted in a low overall stripping ratio and consistent waste benches. No permanent ramps are required.
Waste will be hauled from the benches along temporary ramps to the waste dump located to the south of the Swanson Property. An overall bench stack of 60 m in total elevation would be required from pit bottom to the highest pit pushback point for mining. The bench inventory for the D-pit is presented in Table 16.9.

Table 16.9: Bench Inventory – D Pegmatite

Bench Elevation (mamsl)		640	630	620	610	600	590	580	Total	Strip Ratio (w:o)	Ta_2O_5 (ppm)[1]	Li_2O (%)[1]
Ore (Indicated)	kt	4,6	35,4	78,3	90,7	90,7	85,5	24,0	409,2		347.0	0.23%
Waste	kt	28,2	125,0	173,1	203,0	214,0	178,0	74,2	995,7	2.43		
Total	kt	32,8	160,3	251,4	293,7	305,0	263,4	98,3	1,404,9			

Note: Diluted grade. Source Snowden Optiro analysis, (2911_ORP Sched.xls).

To note is that while only Indicated Resources were used for the conversion to Ore Reserves, certain Inferred Resources forming part of the pit shell, were therefore excluded but would naturally otherwise be extracted as economic ore. This is reflected in the mining schedule in Section 16.4.

16.3.2 EF-pit Design

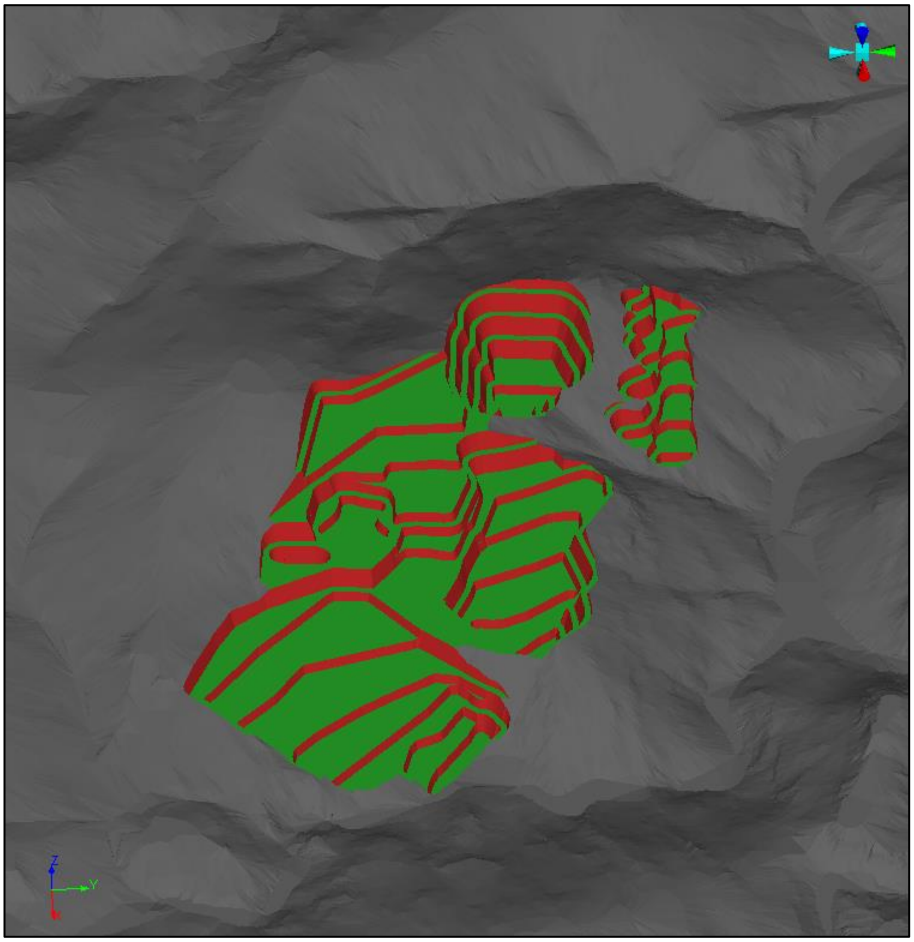
The final pit design defined by constraints around the EF-pegmatites was driven by a higher overall stripping ratio than in the D-pit.

For the purposes of the Ore Reserve Estimate, all Inferred Resources were excluded from the pit optimisation and mine design. However, certain of the "excluded" Inferred Resources do however occur within the pit boundaries and would otherwise be extracted as ore in the ordinary course of mining and would thus result in a lower overall stripping ratio.

No permanent ramps were deemed necessary. Waste would be hauled from the benches along temporary ramps to the waste dump located to the south of Swanson Property. An overall bench stack of 80 m in total overall elevation would be required from the pit bottom (defined by the dry river course) to the highest point of the pit pushback.

The final EF-pit design is shown in Figure 16.5 and the bench inventory in Table 16.10.

Figure 16.5: EF-pit Design



Source Snowden Optiro.

Table 16.10: Bench Inventory – EF-pegmatites

Bench Elevation (mamsl)		750	740	730	720	710	700	690	680	670	660	650	640	630	Total	Strip Ratio	Ta_2O_5 (ppm)[1]	Li_2O (%)[1]
Ore (Indicated)	kt	3.0	17.9	26.2	20.7	15.4	37.7	59.5	67.1	93.7	65.4	27.1	14.2	9.6	457.3		549.9	0.07%
Waste	kt	104.2	333.9	608.6	774.3	942.8	978.8	1,198.1	976.9	722.8	336.9	180.6	86.2	93.1	7,337.0	16.04		
Total	kt	107.2	351.7	634.8	795.1	958.1	1,016.4	1,257.7	1,043.9	816.4	402.2	207.7	100.4	102.6	7,794.4			

Note: [1.] Diluted grade. Source Snowden Optiro analysis, (2911_ORP Sched.xls).

16.4 MINE SCHEDULE

16.4.1 Scheduling Inventory

As noted in Section 15.0 and Section 16.3 certain Inferred Mineral Resources generally occur within the designed pits. From a scheduling perspective, although not classified as an Ore Reserve, it is deemed reasonable to include these in the mine schedule due to their occurrence within the economic pit areas. A summary of the ore sources is provided in Table 16.11.

Table 16.11: Swanson Tantalite Production Schedule (Indicated and Inferred Resources)

Description	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Total
Waste (Mt)	0.4	0.35	2.78	1.5	2.03	1.4	1.01	0.95	0.07	**10.5**
Total Strip Ratio	3.36	2.36	18.53	10.21	14.07	9.46	6.76	6.34	28.64	**9.04**
D Total Ore (Mt)	**0.12**	**0.15**	**0.15**	**0.07**	**-**	**-**	**-**	**-**	**-**	**0.49**
D Ore Indicated (Mt)	0.08	0.12	0.14	0.07	-	-	-	-	-	**0.4**
D Ore Inferred (Mt)	0.04	0.03	0.01	0.01	-	-	-	-	-	**0.09**
EF Total Ore (Mt)	**-**	**-**	**-**	**0.07**	**0.14**	**0.15**	**0.15**	**0.15**	**0**	**0.67**
EF Ore Indicated (Mt)	-	-	-	0.06	0.08	0.09	0.09	0.12	0	**0.44**
EF Ore Inferred (Mt)	-	-	-	0.01	0.06	0.05	0.06	0.03	0	**0.22**
D IND Ta2O5 Grade (ppm)	357	365	369	350	-	-	-	-	-	**362**
D INF Ta2O5 Grade (ppm)	338	379	344	301	-	-	-	-	-	**348**
EF IND Ta2O5 Grade (ppm)	-	-	-	561	606	533	567	611	524	**577**
EF INF Ta2O5 Grade (ppm)	-	-	-	656	637	553	623	576	567	**602**
D Li2O Indicated Metal (%)	0.14%	0.25%	0.32%	0.41%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.28%**
D Li2O Inferred Metal (%)	0.03%	0.04%	0.04%	0.11%	0.00%	0.00%	0.00%	0.00%	0.00%	**0.04%**
EF Li2O Indicated Metal (%)	0.00%	0.00%	0.00%	0.26%	0.06%	0.07%	0.03%	0.01%	0.00%	**0.07%**
EF Li2O Inferred Metal (%)	0.00%	0.00%	0.00%	0.06%	0.10%	0.03%	0.02%	0.01%	0.00%	**0.05%**

Source: Snowden Optiro Analysis, (ORP Mine Schedule (Indicated and Inferred 24-11-22).xlsx).

The proportion of Inferred Resources to Indicated Resources that have been included in the production schedule is shown in Table 16.12.

Table 16.12: Production Schedule Ore Categories

Description	Units	D-pegmatite	EF-pegmatites	Total
Total Ore	Mt	0.492	0.668	1,16
Indicated	Mt	0.405	0.445	0.85
Inferred	Mt	0.088	0.223	0.31
Inferred % of total	%	17.80%	33.00%	26.80%

A total of ~18% of RoM included for mining from the D Pegmatite pit is derived from Inferred Mineral Resources while ~33% of the RoM in the EF-pits is from Inferred Mineral Resources.

The inclusion of the Inferred Mineral Resources is deemed reasonable from a schedule perspective and inclusion for economic extraction as the Inferred Resources occurs over the mine life.

16.4.2 Schedule constraints

The mining schedule was driven by several constraints as outlined in Table 16.13.

Table 16.13: Schedule Constraints

Variable	Constraint	Comment
Monthly RoM Production	12,000 tpm	Plant Design Capacity
Stockpiles	Limited/none	Limit the use of any stockpiles
Pit Priority	D-pit First	D Pegmatite prioritised for strip ratio and a higher Li_2O grades
Ta_2O_5 Grade – D-pegmatite	300-400 ppm	Aim to keep as stable as possible
Ta_2O_5 Grade – EF-pegmatites	500-700 ppm	Aim to keep as stable as possible
Waste[1]	<50 ktpm (D <250 kptm (EF)	Lowest Strip ratio possible but as stable as possible

Notes: 1. Waste was not a primary constraint, but ideally as smooth as possible. Refer to recommendations in Section 27.2. Source ORP management

16.4.3 Schedule Results

The mine schedule is graphically presented in Figure 16.6 provides and present ~8 years of RoM production at 150 ktpa. The monthly RoM production profile within the Indicated and Inferred Mineral Resources are outlined in Figure 16.7.

The monthly Ta_2O_5 and Li_2O profile is presented in Figure 16.8.

Mining is planned to commence with the D-pegmatite due to the low overall strip ratio and relative proximity to the processing plant allowing for a smooth and quick ramp-up in production.

Blending of ore from the two mining areas are not currently considered. This is to ensure that the Li_2O by-product is not diluted, thereby allowing the sale of the fine tailings as a by-product (lithium RoM tailings), when ore containing spodumene is processed through the process plant. This mining strategy would also reduce the ongoing moving of mining equipment between the two areas.

While from a cost optimisation perspective, the smoothing of waste stripping is important, due to the nature of the constraints and pit priorities, smoothing would require some additional early pre-stripping but would also be limited by the availability of ore and equipment fleet to move between the two pits on a monthly or yearly basis without impacting RoM production. Further recommendations are provided in Section 27.2.

Figure 16.6: Monthly Production Profile

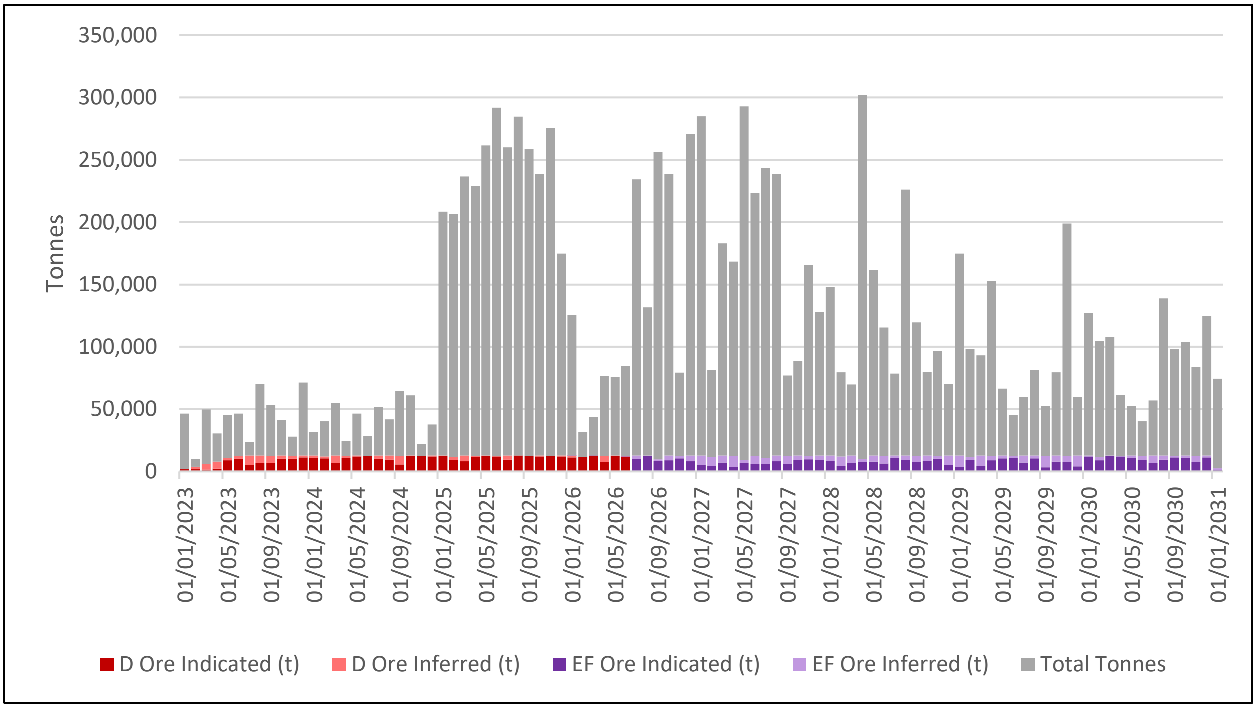


Figure 16.7: Monthly RoM Profile (Indicated and Inferred)

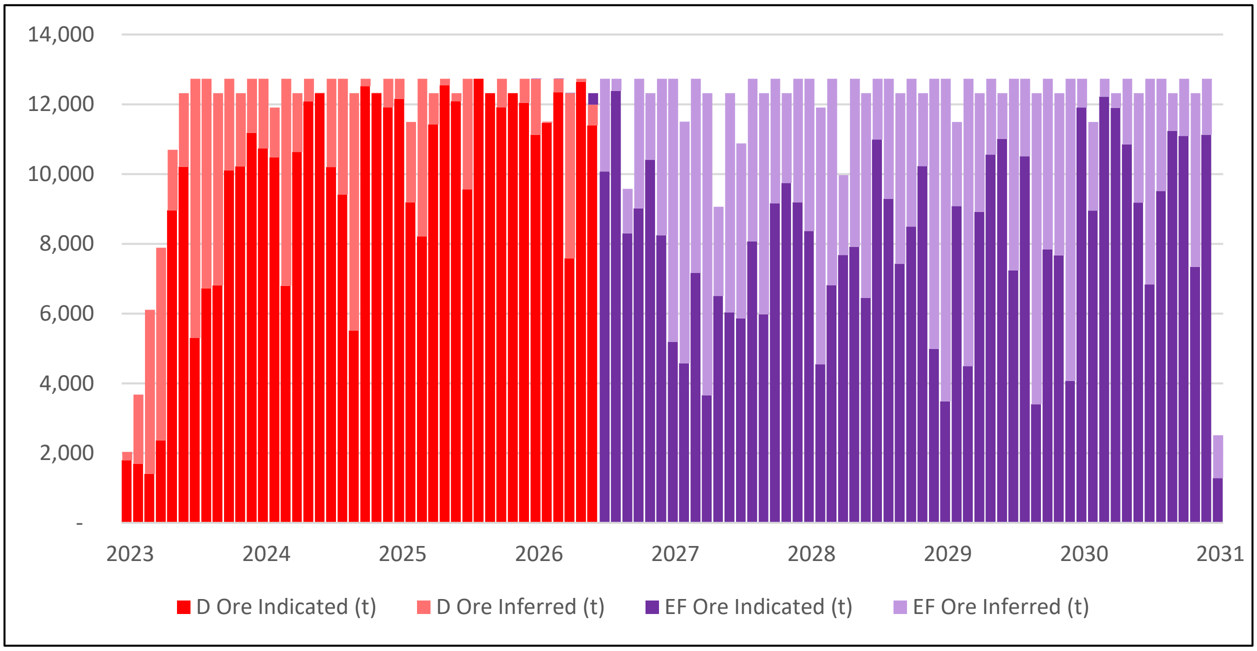
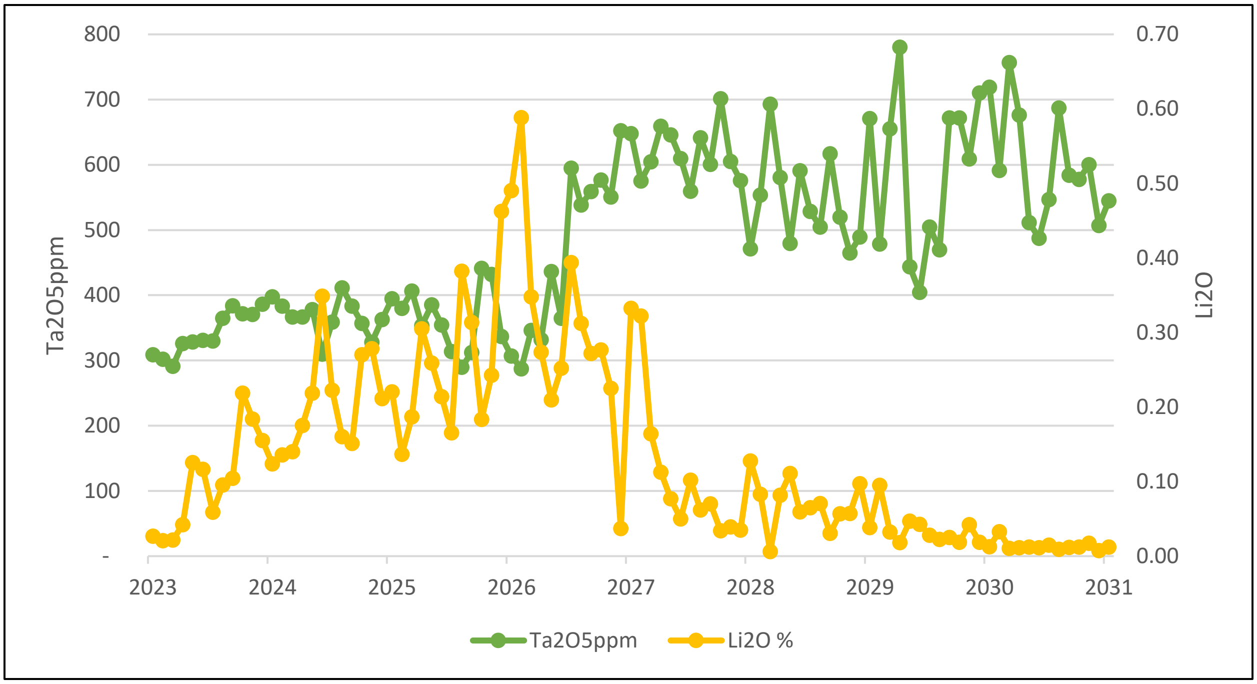


Figure 16.8: Monthly Ta_2O_5 and Li_2O Profile



Note: Years shown are for reference purposes only.

17.0 RECOVERY METHODS

17.1 INTRODUCTION

The engineering design and cost estimation of the Spiral (Concentrator) Plant was performed by ORP engaged Obsideo Consulting (Obsideo).

The Spiral Plant focusses on processing secondary crushed stockpile material with a top size of 25 mm to beneficiate 143 520 tpa RoM at a head grade of 487 ppm Ta_2O_5. This requires tertiary crushing and gravity separation to produce a concentrate with a minimum grade of 25 wt% Ta_2O_5. Tantalite metal is extracted from this concentrate. Tantalite is a metal with extensive applications in the growing electronics market.

The Spiral Plant consists of a tertiary crushing circuit, a rougher circuit, a cleaner circuit, a filtration and drying circuit, and a tailings handling and water recovery circuit. The rougher and cleaner circuits comprise of gravity separation processes to exploit the high density of the Ta_2O_5 minerals.

The DFS consists of the engineering and costing required to provide an estimate at AACE Class 3.

17.2 DESIGN INFORMATION

ORP has completed extensive exploration work which led to a successful Mineral Resource definition. Samples were then collected within the licensed area for detailed mineralogical and metallurgical testwork. The mineralogical and metallurgical testwork led to the development of a process flowsheet to recover a Ta_2O_5 concentrate. The process flowsheet requires a feasibility study to determine the profitability of the beneficiation process. The Spiral Plant was modelled with computer aided design software to quantify the materials and equipment required to realise the design. This model allowed engineering designs of the processing plant to a level on which contractors could provide firm tenders for implementation.

Section 17.2 focusses on the Spiral Plant required to recover a saleable Ta_2O_5 concentrate from the material received after secondary crushing. The battery limits for the Spiral Plant are:

- Top of feed bin to tertiary crushing plant;
- Discharge of oversize from dewatering screen conveyor;
- Discharge of filter cake into filter cake bunker from the tailings filter press;
- Tie-in flange from the raw water line on site;
- MCC main breaker line terminals (400V); and,
- Material in final product bulk bag.

The following aspects are not included in the design of the Spiral Plant:

- Collection, transportation, and disposal/storage of storm water;
- Collection, transportation, treatment, and disposal/storage of biological wastewater (sewerage);
- Supply of plant and administration offices;
- Bulk power supply;
- Raw water supply;
- Access roads;
- Change houses, ablution facilities;
- Sewerage reticulation and treatment;
- Security and access control;
- CCTV Systems;
- Mobile radio systems;
- Raw water dam;
- Telephonic and PABX system;
- Geotechnical survey;
- Soil and Hydrology testwork;
- Front end loaders (FEL) and/or skid loaders;
- Light delivery vehicles (LDVs);
- Cranes and/or telehandlers;
- Pollution Control Dam; and,
- On-site laboratory equipment.

17.2.1 Site Conditions

The Karas Region is the southernmost region of Namibia and the region offers a dry and desert-like climate with an average annual temperature of 28.5°C and a yearly rainfall of approximately 216 mm. The environmental conditions are summarised in Table 17.1.

Table 17.1: Site and Operating Conditions

Site Conditions	Unit of Measurement	Data	Source
Temperature maximum	°C	33	Public Domain
Temperature minimum	°C	8	Public Domain
Temperature average	°C	27	Client Advice
Rainfall maximum	mm/day	30	Public Domain
Rainfall average	mm/annum	216	Client Advice
Humidity annual maximum	%	40	Public Domain

Site Conditions	Unit of Measurement	Data	Source
Humidity annual minimum	%	25	Public Domain
Wind speed annual average	km/hr	15	Public Domain
Wind speed annual maximum	km/hr	32	Public Domain
Plant altitude	m	800 - 900	Client Advice

17.2.2 Ore Characteristics

The geology of the Swanson Property contains units from the Gordonia Sub-Province and is separated from the Richtersveld Sub-Province by the Tantalite Valley Shear (TVS). The mineralisation associated within the pegmatites are aligned with the Pofadder Shear Zone.

Various metallurgical and mineralogical testwork were conducted by CoreMet on behalf of ORP to determine the best suited processing steps required to produce a saleable concentrate from the tantalum ore. Crushing tests provided insight into the requirements for size reduction as well as the properties of the ore. The results from the crushing tests are listed in Table 17.2.

Table 17.2: Ore Characteristics

Ore Characteristics	Value
Solid density	2.66 t/m^3
Crushability (French crushability standard)	53% (very easy)
Abrasiveness (French abrasiveness standard)	1,400 g/t (abrasive)
Dust (minus 0.125 mm fraction after the French crushability test)	30%

The information received from the crushing tests was used to determine the size and type of the processing equipment required to reduce the size of the RoM material prior to the gravity separation section. The mineral composition of the pegmatite ore was determined, and the main minerals are summarised in Table 17.3. This information was used to select the appropriate processing steps to produce the necessary grade of tantalum concentrate.

Table 17.3: Minerals Present in Pegmatite Ore

Mineral	Empirical Formula	Density (t/m^3)	Mass (%)
Albite	$NaAlSi_3O_8$	2.62	57.58
Microline	$K(AlSi_3O_8)$	2.57	1.44
Muscovite	$KAl_2(Si_3Al)O_{10}(OH,F)_2$	2.80	7.62
Quartz	SiO_2	2.62	32.62
Tantalite	$(Fe,Mn)(Ta,Nb)_2O_6$	7.05	0.09

Further analysis was completed on the ore to determine the elemental composition of the RoM. The elemental composition is summarised in Table 17.4. The elemental analysis provides an indication as to the concentration of Ta_2O_5 that is present in the ore.

Table 17.4: Elemental Composition of Pegmatite Ore

Component	Unit of Measurement	60 t Bulk Sample	2020 Reference Samples
SiO_2	%	73.80	75.50
Al_2O_3	%	15.60	14.60
Fe_2O_3	%	0.68	0.34
CaO	%	0.28	0.41
K_2O	%	1.20	0.96
MnO	%	0.15	0.13
P_2O_5	%	0.05	0.13
Nb	ppm	30.00	34.10
Nd	ppm	0.4	-
Ni	ppm	14.00	30.00
Pb	ppm	4.00	-
Pr	ppm	0.15	-
Rb	ppm	765.00	580.00
Sn	ppm	11.00	10.60
Ta	ppm	485.00	296.00
Th	ppm	3.00	-
Ti	ppm	4.20	-
U	ppm	5.80	-

Converting the elemental Ta from Table 17.4 to Ta_2O_5, provides an indication as to the amount of Ta_2O_5 in the pegmatite ore. The corresponding Ta_2O_5 values are:

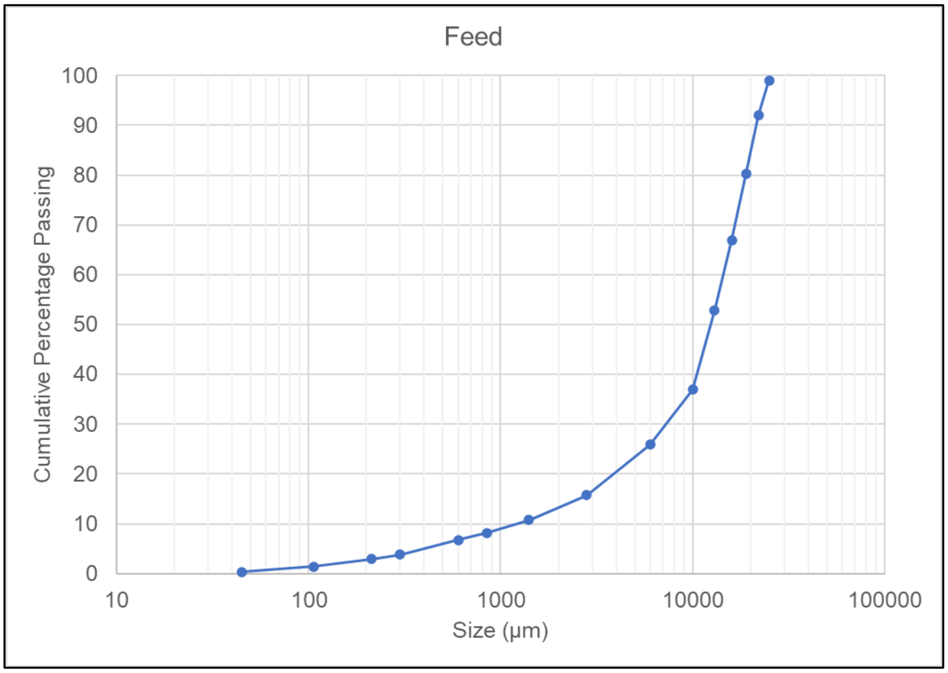
- 592 ppm Ta_2O_5 in the 60-t bulk sample; and,
- 361 ppm Ta_2O_5 in the 2020 reference sample.

The Ta_2O_5 needs to be liberated from the pegmatite ore to make it accessible for upgrading. Studies have shown that 70 wt% to 80 wt% of the Ta_2O_5 is liberated upon size reduction of the ore to 300 µm. Only 20 wt% to 30 wt% of the Ta_2O_5 requires size reduction below 45 µm to become fully liberated and 60 wt% to 65 wt% of Ta_2O_5 is in the size fraction larger than 75 µm (Ilunga, 2022). The environmental impact assessment stipulated an average tantalum grade of 525 ppm with a minimum cut-off grade of 300 ppm (Amutenya, 2022).

17.2.3 Feed Characteristics

The RoM feed is reclaimed from the secondary crusher stockpile with a top size of 25 mm. Figure 17.1 shows the PSD for the material received from the secondary crushing.

Figure 17.1: PSD of Secondary Crushed Material Used as Feed to the Plant



A VSI crusher will be used to crush the material to liberate the tantalum to make it susceptible for gravity separation. A life cycle assessment (LCA) by CoreMet identified the VSI as the preferred technology for tertiary crushing of the material (Ilunga, 2022). The VSI, high pressure grinding rolls, and rod mill produced similar particle size fractions during tertiary crushing, however the OPEX of the VSI mill was more favourable. The tertiary crushing product is the feed to the Spiral Plant with a PSD as stipulated in Table 17.5.

Table 17.5: PSD of Feed Material Obtained from Tertiary Crushing

Size (µm)	Fractional Mass (%)	Cumulative Passing (%)
600	0.0	100.0
300	11.0	89.0
212	34.0	54.9
106	23.6	31.4
75	9.9	21.5
45	8.2	13.3
-45	13.3	0.0

The crushing of the feed material is in a closed circuit with a classification screen to recycle oversize material back to the crusher for further size reduction. The maximum particle size of the feed entering the gravity separation process is dependent on the aperture size of the screen used for the classification of the VSI discharge. This is discussed in the process design criteria.

17.2.4 Plant Feed Requirements

The Spiral Plant is designed to treat 162,000 t/a of RoM at a head grade of 592 ppm Ta_2O_5 (Ilunga, 2022). The product from the Spiral Plant will be a concentrate at a grade of 25% Ta_2O_5. The operating schedule and throughput of the Spiral Plant is summarised in Table 17.6.

Table 17.6: Operating Schedule and Throughput

Description	Unit of Measurement	Value
Availability	%	95
Utilisation	%	65
Planned Running Hours	hr/a	4,050
Plant Throughput	t/hr	40
Overdesign	%	33
Availability	%	95
Utilisation	%	65

The plant was designed for 40 t/h, so on a full 24/7 production schedule with a 95% availability it can handle 27,740 tpm (332,880 tpa). The reason for the over design is twofold:

1. The plant will only operate on a two shift 4-day cycle which means there is 4,742 hours scheduled per year thus the plant can process 189,696 dry t/a. This reduces labour cost, which equates to about a third of the plant OPEX.
2. Due to the low mass pulls to concentrate, the cleaner circuit of the plant is already running at very low flow rates. To drop the throughput (t/h) would results in the inclusion of buffers (tanks) and additional dewatering equipment to have sufficient volume to pump. Furthermore, it will also complicate the circuit since the low flow would mean that all the MGS units will need to be MGS900s (minimum of 6 units) compared to the current design of one MGS902 and two MGS900s. This would mean that the plant CAPEX will increase due to the additional equipment required to handle the low mass flows as well as add to the plant operational complexity.

The equipment used during the metallurgical testing for the development of the process flow, is listed in Table 17.7. Only tested equipment with known experimental results was used for the design of the Spiral Plant. Testwork was not available for the design of the filter presses, thickener and drier.

Table 17.7: Equipment Selection for Process Flow Diagram

Processing Step	Original Equipment Manufacturer	Description
Rougher circuit	Mineral Technologies	MG12
Cleaner circuit	Gravity Mining	MGS

17.2.5 Piping Design Considerations

All piping shall comply with SANS standards unless otherwise specified. The following parameters will also apply:

- Pipe runs shall be as short and as straight as possible using 45° and 90° long radius bends (3D) on slurry;
- Pipes shall be self-draining without dead legs. Where dead legs are unavoidable, drain valves will be installed;
- Pipe deliveries into tanks shall be directed away from the suction outlet to avoid air entrainment and towards the centre of the tank or sump to reduce wear and the formation of vortices;
- Pipe runs shall not interfere with walkways and general maintenance access. Headroom clearance are generally 2,100 mm below all piping and minimum passageway width of 750 mm was applied;
- The minimum clearance between the underside of all pipe bridges and the top of permanent roads must be at least 6.4 m;
- Isolating valves are provided for each take-off from the header, with permanent and safe access made available to these valves;
- Valves and instrumentation are in readily accessible positions for operation and maintenance;
- Compressed air lines are provided with drains at all low points; and,
- Where inline instruments (magflows, control valves, etc.) are installed, a minimum straight run distance of 10 D upstream and 5 D downstream needs is maintained.

The maximum working pressures for the various utilities are:

- Flushing water - 600 kpa;
- Process water - 400 kpa; and,
- Spray water - 400 kpa.

The fittings and flanges used during the plant design will conform to the following requirements:

- Lines 50NB and smaller will be screwed instead of flanged. These pipes are to be site-run, with at least one union every two changes of direction;
- Flanges for steel piping to be mild steel, flat face, drilled off-centre (two holes top) to comply with SANS 1123 T1000/3, SANS 1123 T1600/3, SANS 1123 T2500/3, SANS 1123 T4000/3 as specified and continuously welded to pipes, both inside and outside;
- Screwed wrought steel fittings to comply with BS EN 10241: 2000;

- Gaskets (non-asbestos) to be 3 mm thick;
- HDPE pipes shall generally be a minimum of PN16 PE100 according to SANS 4427: 1996;
- All fittings for HDPE piping are to be provided with weld on stub-ends and backing rings on both sides; and,
- 63 OD and above shall be stub end connections with mild steel hot dip galvanised complying with SANS 31 and 121 backing flat face flanges, with dimensions comply with SANS 1123 table 1000/3 U.O.S, unless otherwise specified.

The pipe supports used in the design, will:

- Generally, take the form of U-bolts and angle/channel-iron brackets welded to the adjacent building steelwork after completion of pipe installation;
- Conform to sound engineering practice for the pipe working requirements; and,
- Conform to standard pipe supports wherever possible.

17.2.6 Pipe Sizing

The material balance was used to determine the flow of material through the pipes. The material in each line was evaluated to determine the solids content and the size of the material present. This was used as input to determine the minimum velocity required to prevent settling in the pipe. The pipeline diameter was selected to prevent settling as well as to reduce excessive wear due to very high velocities.

17.2.7 Equipment Sizing

The philosophy for the mechanical designs is to implement the technology concepts and principles identified as suitable from the metallurgical testwork that was conducted by CoreMet. The general design philosophies and parameters considered are:

- High efficiency and reliability;
- Proven technology;
- Minimal maintenance requirements;
- Maximising plant availability;
- Maximising process recoveries;
- Simplicity;
- Best value for money;
- Standardisation of equipment; and,
- Safety standards according to Mine Health & Safety Act of 1996.

The equipment sizing was completed based on the mass balance for the plant with a maximum particle size of 600 µm. The sizing philosophy for each type of equipment or equipment per area varied and is summarised in Table 17.8.

The equipment must run on a 24-hour continuous basis for four continuous days every week with the remainder of the week being utilised for preventative maintenance. Designs are completed to make equipment accessible and easy to operate.

Table 17.8: Equipment Sizing Philosophy

Equipment / Area Description	Basis of Sizing	Mass Balance Scenario Used
Conveyors	Maximum tonnage from mass balance	Design Flow Rate
VSI crusher	Fresh feed at design throughput rate of 40 t/h. Crushers Supplier calculated recycle load based on required undersize PSD	Design Flow Rate and PSD
Mill discharge screen	Datasheet with process requirements supplied to vendor for sizing.	Design Flow Rate and PSD
Thickener	Flux rate of 0.30 $t/m^2/h$ at PSD. Assumption on similar type of material	Design Flow Rate and PSD
Thickener underflow pumps	Pump Schedule with process requirements supplied to vendor for sizing	Design Flow Rate and PSD
Process water pump	Maximum Water demand	Design Flow Rate and PSD
Slurry pumps	Pump Schedule with process requirements supplied to vendor for sizing	Duty range defined across mass balance scenarios
Submersible pumps	Head loss calculated for required flow and system	Model selected from Vendor Brochure
Spirals	Maximum tonnage from mass balance	Design Flow Rate and PSD
Dewatering cyclones	Datasheet with process requirements supplied to vendor for sizing.	Design Flow Rate and PSD
MGS	Maximum tonnage from mass balance	Design Flow Rate and PSD
Ball mill	Maximum tonnage from mass balance	Design Flow Rate and PSD
Wet screening	Datasheet with process requirements supplied to vendor for sizing	Design Flow Rate and PSD
Filter presses	Datasheet with process requirements supplied to vendor for sizing	Design Flow Rate and PSD
Product dryer	Datasheet with process requirements supplied to vendor for sizing	Design Flow Rate and PSD

17.2.8 Design Process Recovery

The process requirements determined during testing are provided in Table 17.9 and will be used as a design criterion for the Spiral Plant. The experimental work conducted previously by CoreMet was used to compile the recovery information as provided in the Process Design Criteria.

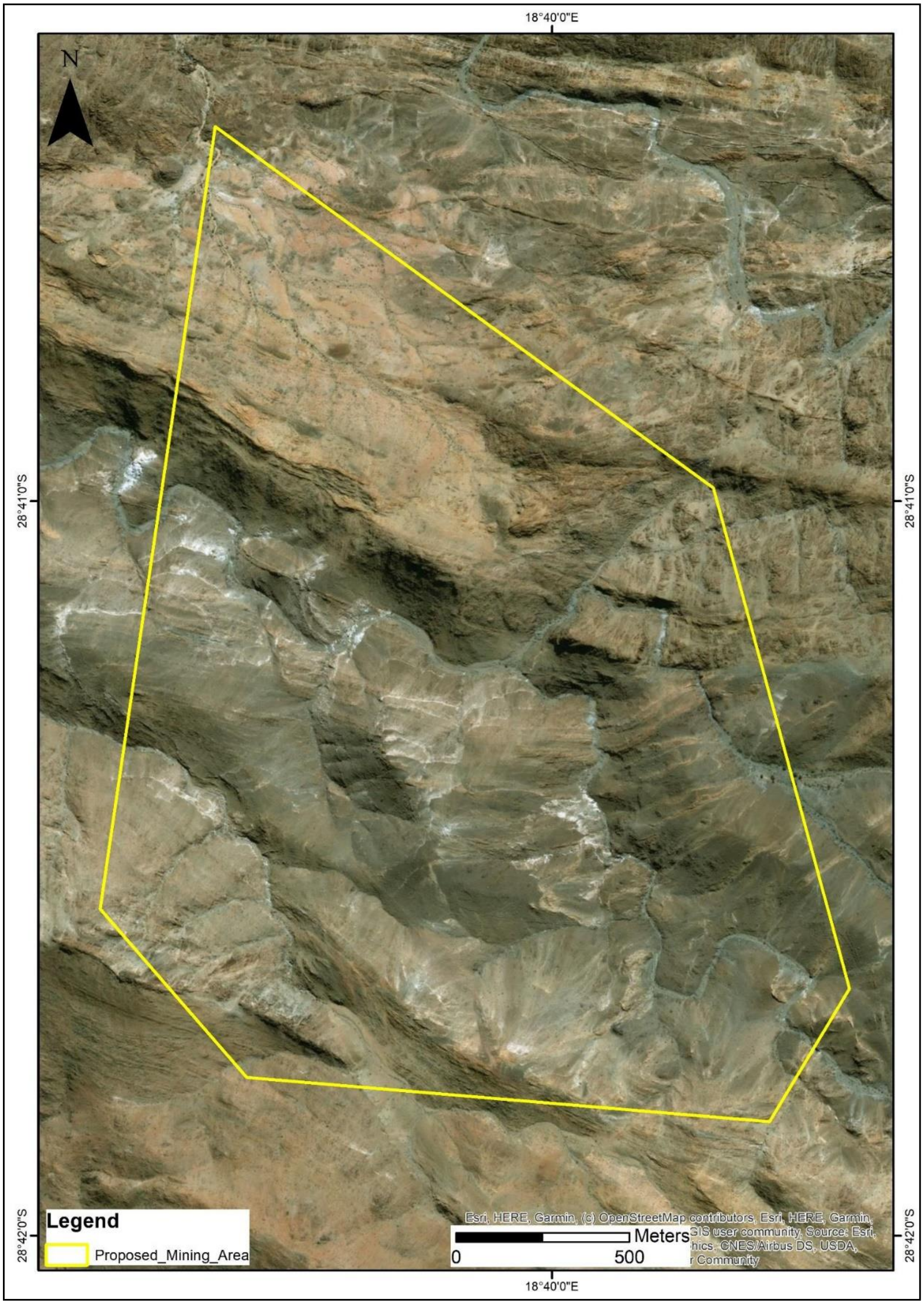
Table 17.9: Process Requirements for Processing Plant

Description	Units	Value
Target plant recovery	Ta%	65
Tertiary crushing circuit p_{100}	µm	600
Overall mass pull	%	0.16
Concentrate drying required	-	Yes
MGS feed dry solids content	wt%	35
MGS concentrate dry solids content	wt%	60
Rougher MGS percentage feed to concentrate	wt%	32
Scavenger MGS percentage feed to concentrate	wt%	18
Cleaner MGS percentage feed to concentrate	wt%	26
Rougher spiral upgrade ratio	-	10.0
Scavenger spiral upgrade ratio	-	3.8
Cleaner spiral upgrade ratio	-	7.7
Rougher MGS upgrade ratio	-	2.9
Scavenger MGS upgrade ratio	-	2.0
Cleaner MGS upgrade ratio	-	3.4
Rougher spiral Ta_2O_5 recovery to concentrate	wt%	67.8
Scavenger spiral Ta_2O_5 recovery to concentrate	wt%	10
Cleaner spiral Ta_2O_5 recovery to concentrate	wt%	88

17.2.9 Location

The mining area is located on the farm Kinderzit 132, which is situated 30 km southwest of Warmbad, Namibia. The centre of the Swanson Project is located at the following coordinates: 18°39'51.046"E and 28°41'19.388"S (Amutenya, 2022). Figure 17.2 indicates a satellite image of the area of ML 223 (Amutenya, 2022).

Figure 17.2: Satellite Image of ML 223



17.2.10 Earth Works

Geotechnical testwork conducted by Prime Resources (2022) indicated that the surface material is primarily comprised of sand (60%). Gravel (23%), silt (14%) and clay (3%) account for the smaller constituents in the material. The material classifies as a G7 material with an optimum moisture content (OMC) of 5 wt%. The material is suitable for embankment construction.

Testwork showed that a low permeability ($<10^{-08}$ m/s) can be achieved at 93% Mod AASHTO density at OMC. The material is beneficial to embankment construction and foundation preparation. The quantity of the material on surface was however very limited and imported material will be required (Prime Resources, 2022).

The geotechnical testwork showed that the material is suitable for in-situ compaction and for embankment construction. The recommendation is however that the top 100 mm of vegetation and topsoil is removed and stockpiled. The remaining in-situ loose material can be compacted in place to a minimum of 93% Mod AASHTO density at OMC. The climate of the Swanson Property makes moisture conditioning of the soil necessary (Prime Resources, 2022).

The overall founding condition for the site is likely to be shallow excavation with topsoil removal. Once this has been done, founding on soft to medium hard rock gneiss/granite will be required. The excavation of any trenches and below surface infrastructure could be difficult (Prime Resources, 2022).

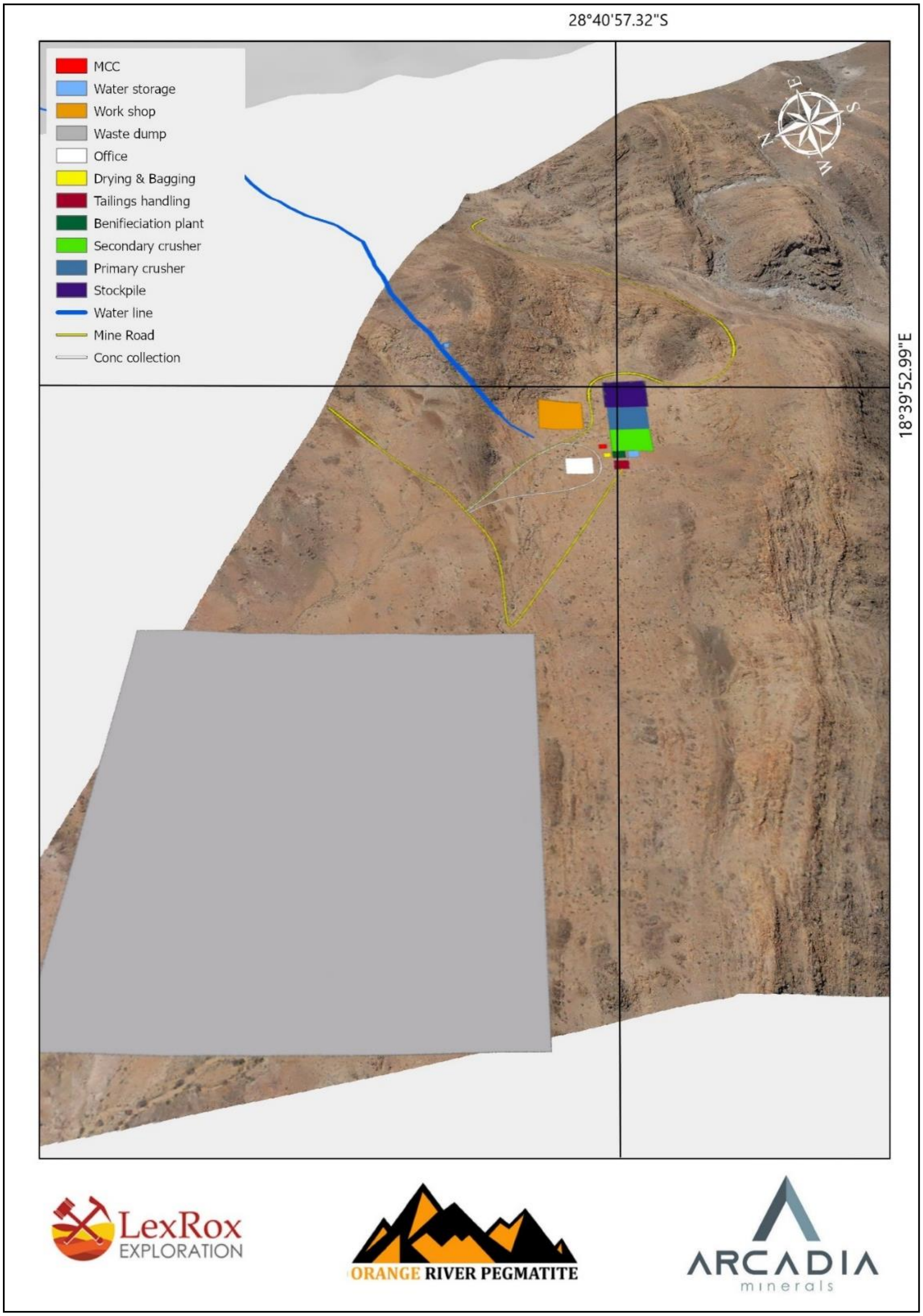
The demarcated site office and laydown areas will be cleared, and topsoil stripped to a depth of 100 mm and stockpiled. Sections in the mining area will be prepared as hard stands for site offices and stores. This will be prepared by ripping 300 mm of in-situ material and re-compacted to at least 93% modified AASHTO maximum density at OMC. A 1% cross fall is required for surface water drainage. The rest of the laydown areas will be graded, and compacted using a smooth roller, then fenced into sections.

Civil construction materials for fills and layer works will be sourced from the mine where possible. The extent of existing borrow pits will need to be verified. The quality and quantity of the available material should also be determined.

17.2.11 Plant Layout

Figure 17.3 shows the proposed plant location on the Swanson Property.

Figure 17.3: Proposed Plant Layout



The layout will take in account certain parameters dictated by the available material properties. Where material properties are not provided from the client, assumed properties are used based on experience from previous projects. The general parameters applied that impacted the layout of the Spiral Plant is outlined in Table 17.10.

The plant layout was completed with the following principles in mind:

- Ensure a clean and safe plant design;
- Minimise the number of transfers;
- Surge capacity shall be provided by a constant density tank;
- Spillage minimisation; and,
- Eliminate/reduce free fall of dusty material.

Table 17.10: General Parameters Impacting Layout

Description	Units	Value
Chutes		
Minimum angle of bottom side to horizontal	Degrees	60
Minimum valley angle to horizontal	Degrees	60
Feed Bin		
Capacity (1.5 times Cat 966 maximum bucket size)	m^3	10
Conveyors		
Maximum slope along the conveyor	Degrees	16
Minimum belt width	mm	750
Troughing idlers angle	Degrees	35 – 45
Max. Conveyor span for manual screw take-up	m	30
Belt type	-	Class 315 3 Ply
Minimum walkway width	mm	500
Pump Boxes		
Minimum operating volume	Seconds	30
Minimum side angles to horizontal	Degrees	60
Minimum valley angle to horizontal	Degrees	60
Tanks		
Tank bottom design	-	Flat Bottom
Minimum freeboard level	-	10% of Tank Diameters

17.2.12 Fire Protection

Fire protection and extinguishing systems shall be an installed system to be designed in conjunction with Obsideo Consulting and a specialist Fire Consultant. For this study, a cost allocation has been allowed for the fire protection system. This includes an overland pipeline from the reservoir at an elevated location with an underground ring main surrounding the plant and six (6) fire hydrants at strategic locations on the plant.

17.2.13 Civil Considerations

Reinforced Concrete designs shall conform to SANS 10100 for general structures and BS 8007 for water retaining structures. Structures are to be designed for a minimum life span of 25 years.

The latest edition of the applicable Namibian and South Africa Standards and National Building Regulations shall establish the minimum requirement for the design, materials, and construction. In the absence of an applicable South Africa Standards a Standard Code of Practice shall govern the quality of the design, material, and Construction, except where otherwise indicated.

Regulations shall be as follows:

- National Building Regulations;
- Mine Health and Safety Act – Act 29 of 1996 and Regulations;
- Explosives Acts and Regulations;
- Occupational Health and Safety Act 83 of 1993;
- South Africa Bureau of Standards for Concrete shall be as follows:
    - SANS 10100 The structural design of concrete;
    - SANS 1200 Civil Engineering Construction;
    - SANS 10109 Floor Finishes for Concrete;
    - SANS 471 Portland cement and Rapid-Hardening Portland Cement;
    - SANS 527 Concrete Building Blocks;
    - SANS 676 Reinforce Concrete Pressure Pipes;
    - SANS 718 Aggregates for Concrete;
    - SANS 878 Ready Mix Concrete;
    - SANS 10161 The designs of foundations for building;
    - SANS 920 Steel Bars for Concrete Reinforcement;
    - SANS 986 Pre-cast Concrete Reinforcement;
    - SANS677 Concrete Non-pressure pipes;
    - SANS 559 Verified Clay Sewer Pipes and Fittings;
    - AWWA D100 Steel tanks, Stand Pipes, Reservoirs and Elevated Tanks – for water storage;
    - COLTO 5100 Segmented concrete block paving;
    - NAMS/SANS 1795:2018 Road Traffic Law Enforcement;
    - NAMS/ISO 80000:2018 Quantities and Units;
    - NAMS/ISO 45001: 2018 Occupational health and safety management systems - Requirements with guidance for use;
    - NAMS/ISO 10006:2019 Quality management systems – Guidelines for quality management in projects;

- NAMS/ISO 10005:2019 Quality management systems – Guidelines for quality plans;
- NAMS/ISO 31000: 2019 Risk management – Guidelines; and,
- EN 197-2:NAMS 197- 2:2022: Standard on Cement specifications.

17.2.14 Civil Exclusions

All future plant extensions have been excluded from this scope of work.

17.2.15 Structural Steel Design Considerations

The design of all structures and their features shall in general conform to the standard of the latest edition of the National Building Regulations (NBR) (SANS 10400-1990) published by the council of SA bureau of Standards.

Regulations shall be as follows:

- SANS 10160: The General Procedures and Loadings to be adapted in the Design of Buildings;
- SANS 10162: The Structural Use of Steel;
- SABS 2853: Design of steel overhead runway beams;
- SANS 32: Internal and / or External Protective Coating for Steel Tube. Hot Dipped Galvanised Coatings Applied in Automatic Plants;
- SANS 121: Hot Dipped Galvanised Coating on Fabricated Ferrous Products;
- SANS 2100-CS: Structural and Steelwork;
- SANS 1431: Grade 350W: All Steel Sections;
- AWS D1.1: Structural Welding Code – Steel;
- API 560: Welded steel Tanks for Oil Storage accordingly; and,
- BS 2654: Steel Tanks.

The minimum thicknesses are as follows:

- Hot – rolled structural sections – 5.0 mm;
- Structural hollow sections - 3.0 mm;
- Cold formed structural sections -2.5 mm; and,
- End plates, gussets, and stiffeners – 6.0 mm.

17.2.16 Electrical Design Considerations

The basis of the electrical design is in accordance with:

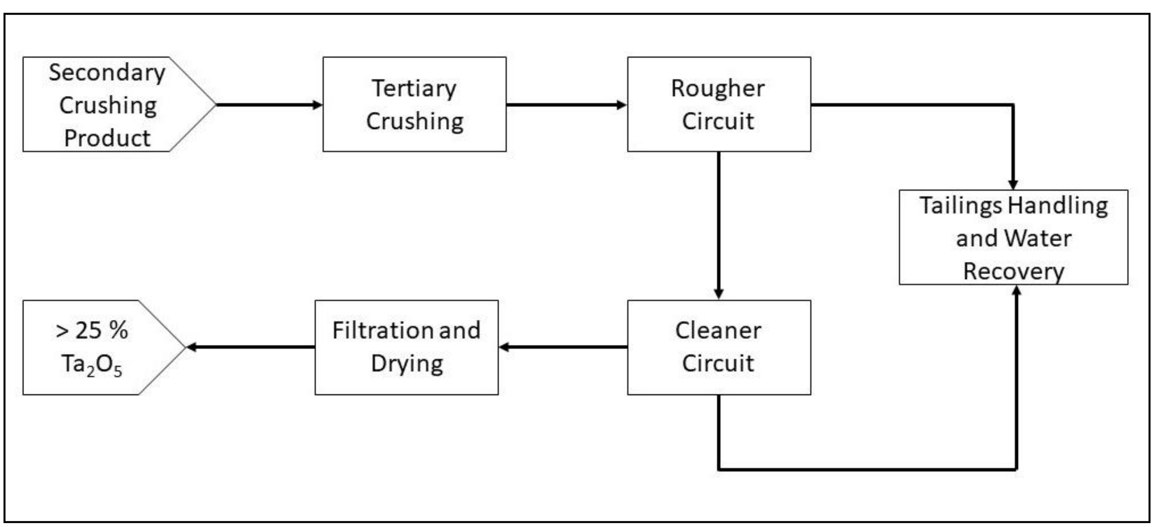
- Occupational Health and Safety Act 85 of 1993 (as amended);

- Mine Health & Safety Act;
- NAMS/ISO 9001:2015 Quality Management Systems- Requirements;
- NAMS/ISO 9000:2015 Quality Management Systems – Fundamentals and Vocabulary;
- NAMS/IEC 62271:2015 High-voltage switchgear and controlgear;
- NAMS/IEC 60364:2015 Electrical installations of buildings;
- NAMS/IEC 60034:2016 Rotating electrical machines;
- NAMS/IEC 60059:2016 IEC standards current ratings;
- NAMS/IEC 60364:2016 Electric installations of buildings;
- NAMS/IEC 60529:2016 Degrees of protection provided by enclosures (IP Code);
- NAMS/IEC 61439:2016 Low-voltage switchgear and controlgear assemblies;
- NAMS/IEC 61508:2016 Functional safety of electrical/electronic/ programmable electronic safety-related systems;
- NAMS/IEC 60076:2016 Power transformers; and,
- NAMS/ISO 5149: 2021 Refrigerating systems and heat pumps —Safety and environmental requirements.

17.3 PROCESS DESCRIPTION

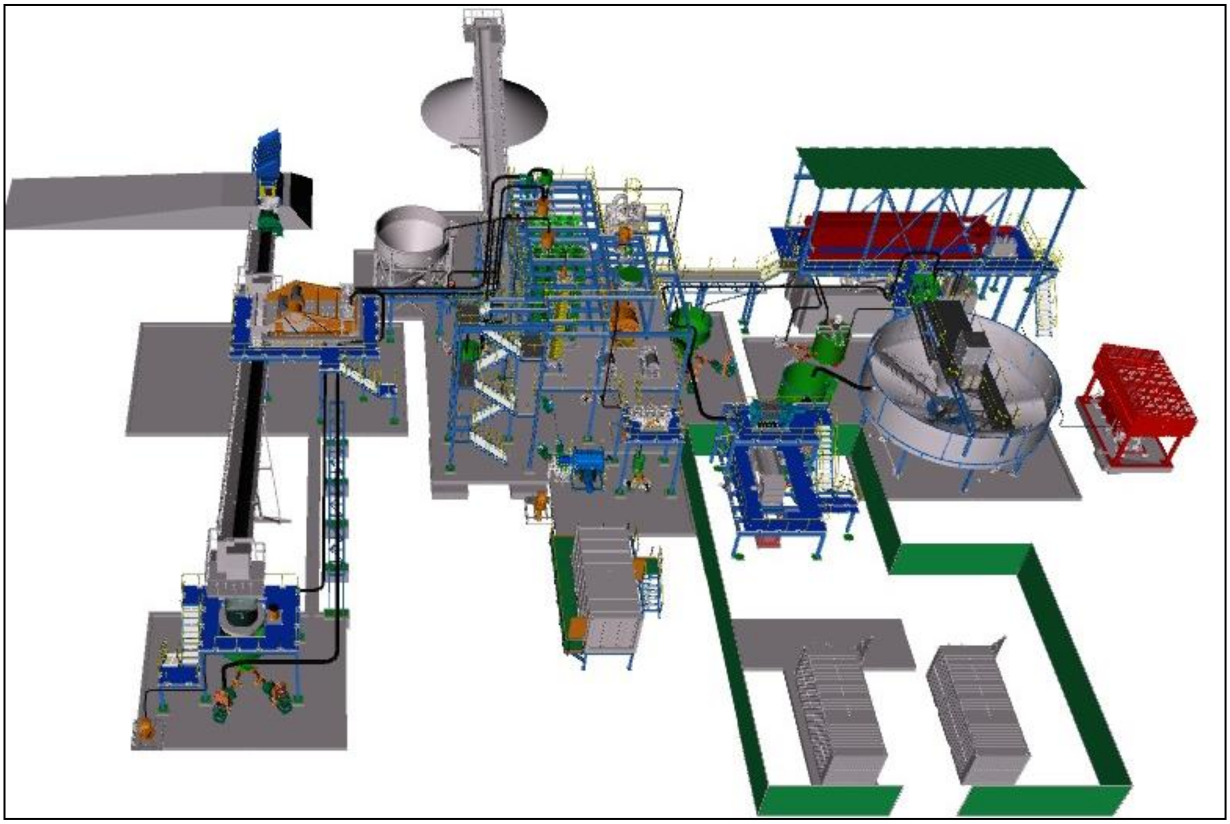
The block flow diagram showing the flow of material in the processing plant is depicted in Figure 17.4.

Figure 17.4: Block Flow Diagram of Spiral Plant



The block flow diagram was used to design the Spiral Plant that can produce a saleable Ta_2O_5 concentrate. An overview of the plant is provided in Figure 17.5.

Figure 17.5: Overview of the Spiral Plant



17.3.1 Work Breakdown Structure (WBS)

The Spiral Plant has been divided into five areas for upgrading and processing of the RoM to final concentrate from the block flow diagram in Figure 17.4. These areas are listed in Table 17.11.

Table 17.11: Work Breakdown Structure

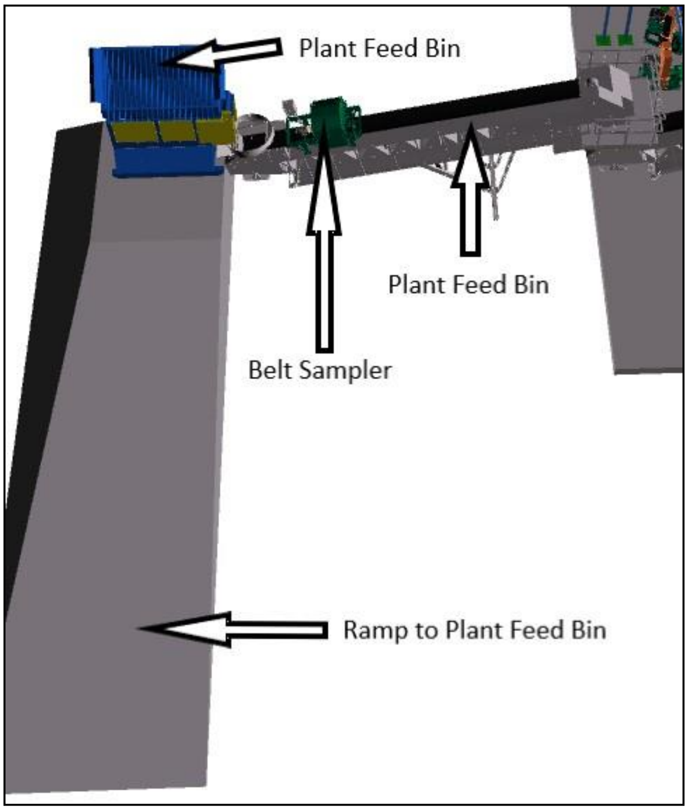
Area Classification	Area Description	Equipment Description
100	Tertiary crushing	Conveyor, VSI, screens, tanks and pumps
200	Rougher circuit	Spirals circuit, conveyor, tanks and pumps
300	Cleaner circuit	Milling, MGS circuit, tanks and pumps
400	Filtration and drying	Product filter press, product drier and bagging
500	Tailings handling and water recovery	Thickener, filter press, tanks and pumps

The feasibility study report will be structured to discuss each of the areas listed in the WBS.

17.3.2 Tertiary Crushing (VSI Circuit)

The material from the secondary crushing stockpile, with a top size of 25 mm, will be fed into the tertiary crushing circuit. The feed bin for the secondary stockpile material to the tertiary crushing plant is the battery limit for the design. The feed bin and feed conveyor are shown in Figure 17.6.

Figure 17.6: Plant Feed Bin and Feed Conveyor



The final product size received from the tertiary crushing is determined by the wet classification screen shown in Figure 17.7 that separates the discharge from the VSI into an undersized product for gravity separation and an oversize product that requires further size reduction in the VSI mill shown in Figure 17.8. The oversize from the classification screen is combined with the fresh feed from the feed bin and reintroduced into the VSI for size reduction. The feed to the plant needs to be reduced below 600 μm before gravity separation is applied to achieve the target tantalum recovery of 65 wt%. The recycle stream from the classification screen oversize is approximately 4 times more than the fresh feed to the plant. Table 17.12 shows how this recirculation of material affects the particle size distribution of the material that is introduced into the VSI.

Figure 17.7: Wet Classification Screen

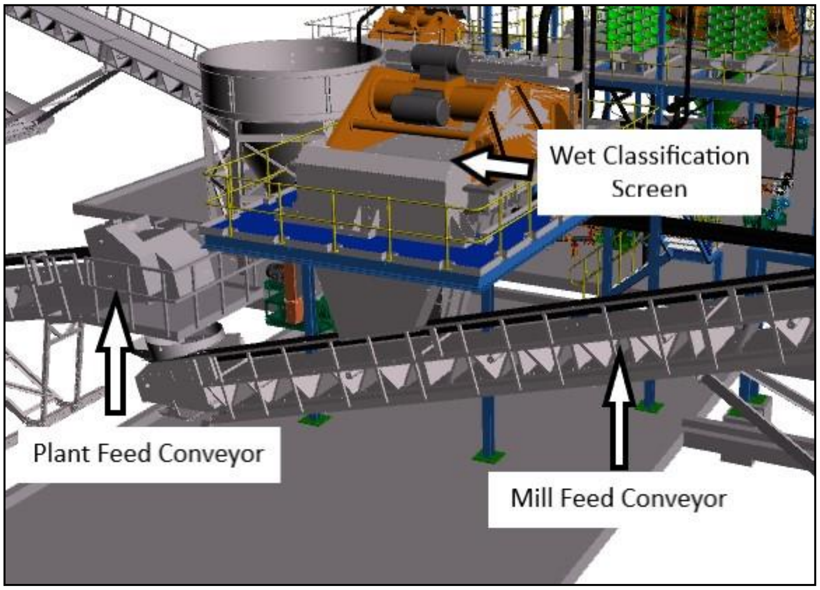


Figure 17.8: VSI Mill with Discharge Tank

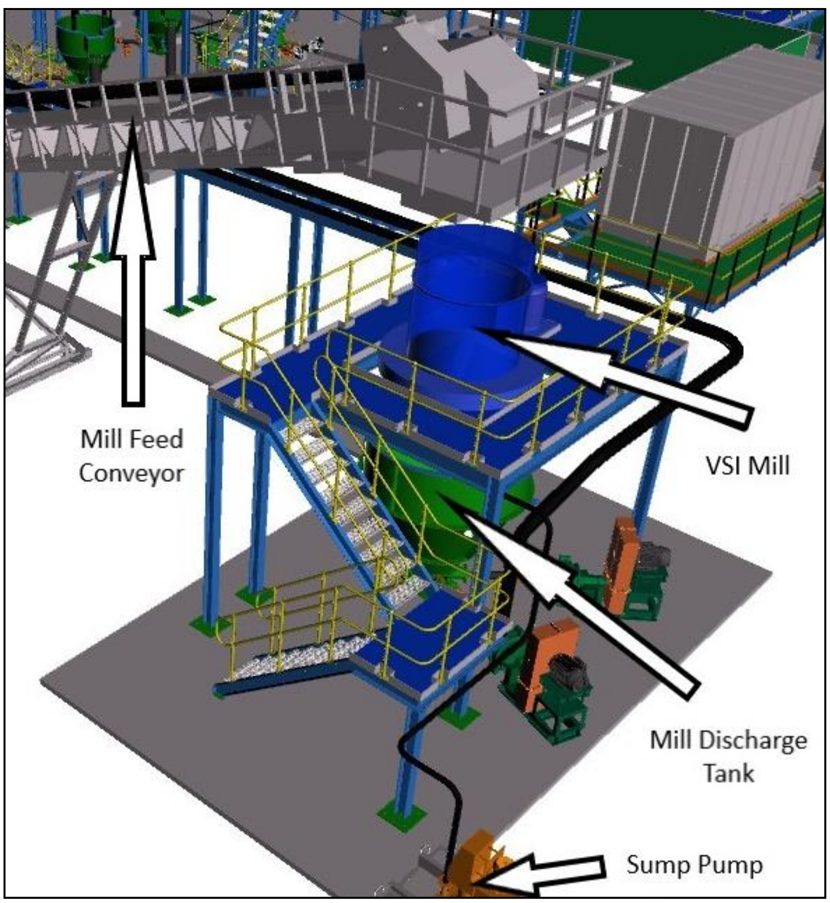


Table 17.12: Particle Size Distribution of VSI Feed Material

Size (µm)	Secondary Stockpile PSD			VSI Feed (including recycle) PSD		
	Fractional Mass %	Cumulative % Retained	Cumulative % Passing	Fractional Mass %	Cumulative % Retained	Cumulative % Passing
25,000	0.97	0.97	99.03	-	-	-
22,000	7.00	7.98	92.02	-	-	-
19,000	11.77	19.75	80.25	-	-	-
16,000	13.33	33.07	66.93	-	-	-
13,000	14.01	47.08	52.92	-	-	-
10,000	15.95	63.04	36.96	31.1	31.1	68.9
8,000	-	-	-	5.1	36.2	63.8
6,700	-	-	-	4.5	40.7	59.3
6,000	11.09	74.12	25.88			
5,000	-	-	-	8.2	48.9	51.1
4,000	-	-	-	1.7	50.6	49.4
3,000	-	-	-	2.5	53.2	46.8
2,800	10.12	84.24	15.76	-	-	-
2,000	-	-	-	7.2	60.3	39.7
1,400	4.96	89.20	10.80	-	-	-
1,000	-	-	-	10.1	70.4	29.6
850	2.63	91.83	8.17	3.2	73.6	26.4
600	1.36	93.19	6.81	-	-	-
500	-	-	-	7.6	81.2	18.8
300	3.02	96.21	3.79	-	-	-
212	0.88	97.08	2.92	9.9	91.1	8.9
106	1.46	98.54	1.46	4.1	95.2	4.8
75	-	-	-	1.6	96.8	3.2
45	1.07	99.61	0.39	1.3	98.1	1.9
-45	0.39	100.00	0.00	1.9	100	0.0

A 600 µm aperture size on the classification screen provides the final PSD for gravity separation as shown in Table 17.13.

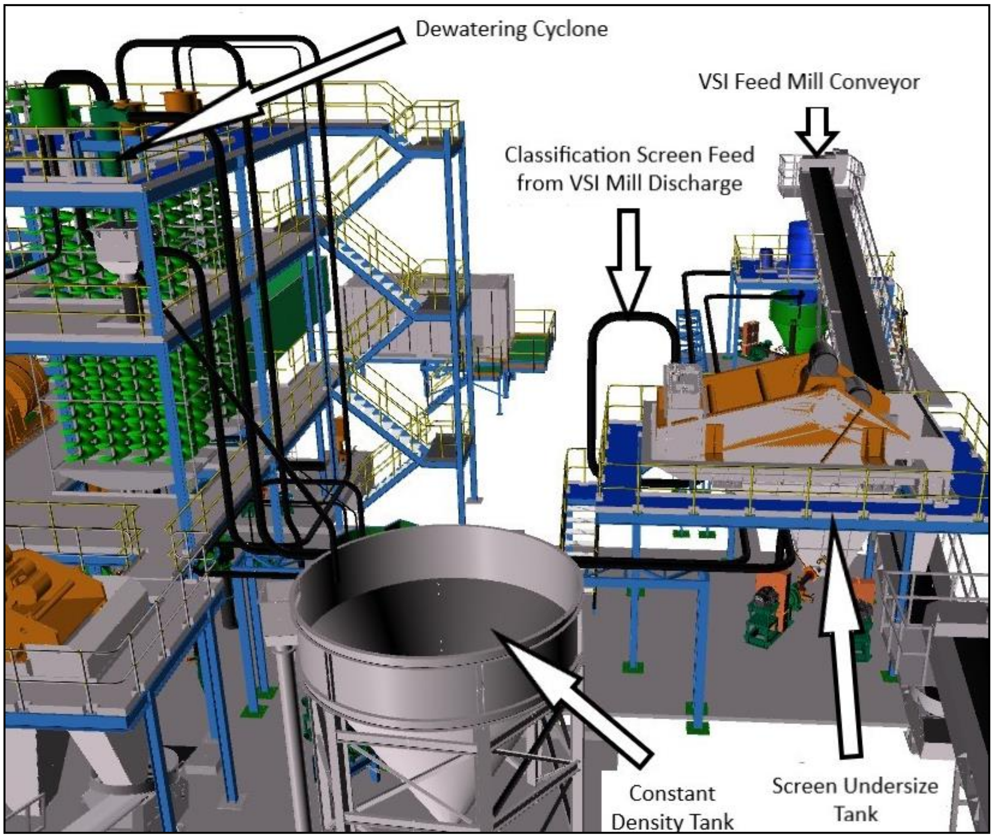
Table 17.13: PSD of Feed from VSI to Spiral Plant with Variation in Screen Aperture Sizing

Size (µm)	Fractional Mass (%)	Cumulative Passing (%)
1,000	0	100.0
600	0.0	100.0
300	11.0	89.0
212	34.0	54.9
106	23.6	31.4
75	9.9	21.5
45	8.2	13.3
0	13.3	0.0

The wet classification process requires a significant volume of spray water and produces a diluted undersize product that needs to be dewatered before gravity separation. This is achieved with a dewatering cyclone that discharges a concentrated underflow into a constant density tank. Figure 17.9 shows the undersize from the classification screen with the dewatering cyclone and constant density tank.

The constant density tank is sized for 30 minutes buffer capacity to the gravity separation process. Figure 17.9 also shows the location of the constant density tank in the Spiral Plant in relation to other major equipment in the plant.

Figure 17.9: Constant Density Tank with Dewatering Cyclone



The tertiary crushing area comprises of the following equipment:

- Two (2) Conveyor;
- One (1) Feed Bin;
- One (1) VSI Mill;
- One (1) Screen;
- Accompanying chutes;
- Three (3) Tanks;
- Three (3) Slurry Pumps; and,
- One (1) Sump Pump.

The design criteria for the major equipment in the tertiary crushing area is summarised in Table 17.14.

Table 17.14: Design Criteria Used for Sizing of Equipment in Tertiary Crushing Area

Description	Units	Value
VSI Mill		
Maximum feed size	mm	25
Maximum moisture content in feed	wt%	20
Wet Classification Screen		
Aperture size of screen	µm	600
Maximum solids content in feed to screen	wt%	55
Maximum amount of spray water	m^3/hr	80
Moisture content of oversize material	wt%	18
Number of screen decks	-	1
Dewatering Cyclone		
Maximum solids content in feed	vol%	15
Minimum solids content in underflow	vol%	25
Solids split to overflow	wt%	1.9
Number of cyclones online	-	1

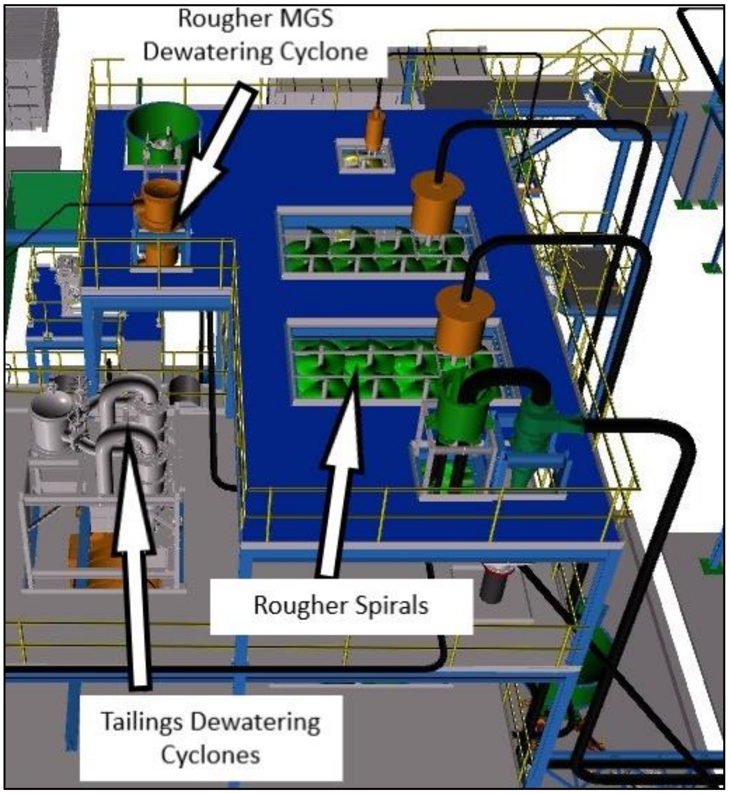
The control in this area is driven by the VSI Mill operation. The current drawn on the VSI Mill will be controlled by changing the feed to the VSI Mill. This will control the amount of fresh feed that can be introduced into the mill. The feed bin is equipped with a belt feeder with a VSD to control the fresh feed to plant. The feed bin discharges onto a conveyor equipped with a belt sampler and weightometer to obtain an accurate sample of the material entering the plant as well as an indication as to the amount of fresh feed that is being processed. The constant density tank provides a slurry with a higher density than required for the gravity separation as well as a buffer capacity for the operation of the plant.

The conveyors in the tertiary crushing area are modular equipment that require a reinforced concrete pad footing to support the conveyor steel work. The structures for the VSI Mill, Screen and Constant Density Tank are permanent structures that are provided with the necessary access staircases, platforms, and foundations. These areas are equipped with bunded areas to contain spillage that might occur.

17.3.3 Rougher Circuit

The constant density tank contains a slurry with a higher solids content than required for the spiral concentrators. The slurry is transferred to the rougher spiral feed tank and mixed with recycle process water streams. Dilution water is added to obtain and control the optimum feed conditions to the spiral concentrators. The slurry is pumped to the rougher spirals as indicated in Figure 17.10. The rougher spirals produce a concentrate stream and a tails stream.

Figure 17.10: Rougher Spirals Feed Tank



The tails from the rougher spirals is introduced into scavenger spirals to recover additional concentrate. The tails from the scavenger spirals are considered as the final tails and needs to be stockpiled. This requires dewatering of the scavenger spiral tails with a dewatering cyclone and a dewatering screen. The oversize fraction of the screen discharges onto the tails stacking conveyor shown in Figure 17.11 while the undersize of the screen is pumped to the tailings handling section. Figure 17.12 shows the rougher spirals, scavenger spirals, cleaner spiral and tailings dewatering screen.

Figure 17.11: Tailings Dewatering Screen with Stacking Conveyor

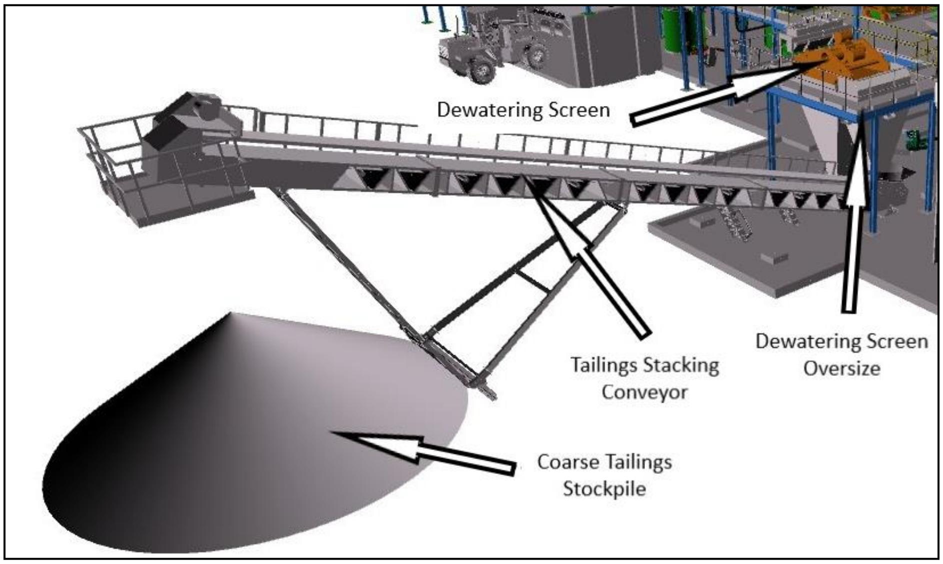
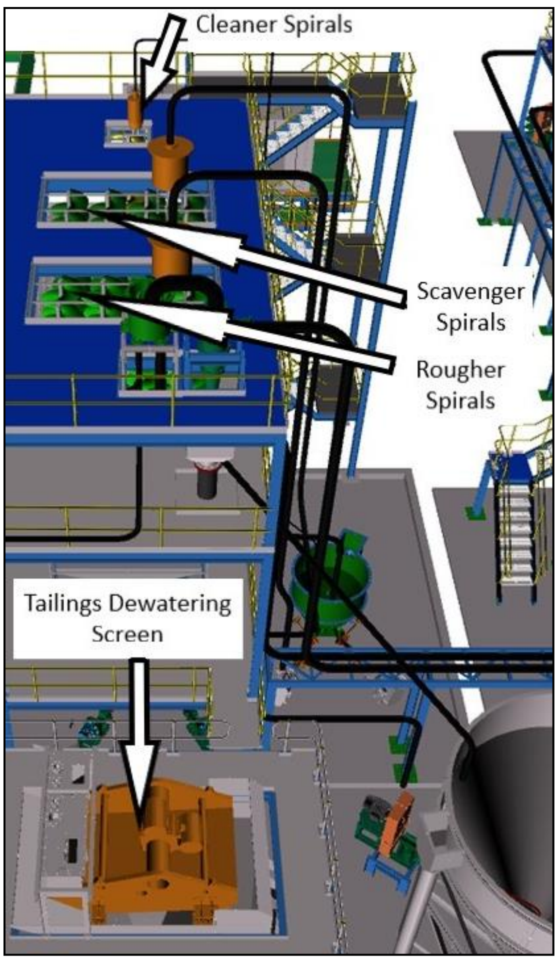


Figure 17.12: Spirals and Dewatering Screen Layout



The concentrate streams from the rougher and scavenger spirals are collected in a tank and then pumped to cleaner spirals for further upgrading. The tails from the cleaner spirals are returned to the rougher spiral feed tank while the concentrate gravitates to the cleaner circuit. The Rougher Circuit contains the following equipment:

- One (1) Conveyor;
- One (1) Dewatering Screen with Cyclones;
- One (1) MG12 Rougher Spirals Bank (eight triple-start candles = 24 starts) and distributor;
- One (1) MG12 Scavenger Spirals Bank (eight triple-start candles = 24 starts) and distributor;
- One (1) MG12 Cleaner Spiral (one triple-start candle = 3 starts);
- Four (4) slurry tanks;
- Four (4) centrifugal slurry pumps; and,
- One (1) Sump Pump.

Table 17.15 summarises the main design considerations that were used during the sizing selection of the equipment in the rougher circuit.

Table 17.15: Design Criteria Used for Sizing of Equipment in Rougher Circuit

Description	Units	Value
Spirals		
Maximum spirals feed solids content	wt%	35
Solids loading per start	t/hr	1.8
Product split	-	Concentrate and tails
Spirals model	-	Minerals technologies MG12
Starts per candle	-	3
Dewatering Screen Information		
Aperture size of screen	μm	400
Maximum solids content in feed to screen	wt%	30
Maximum amount of spray water	m^3/hr	0
Moisture content of oversize material	wt%	20
Number of screen decks	-	1
Dewatering Cyclone		
Maximum solids content in feed	vol%	15
Minimum solids content in underflow	wt%	60
Solids split to overflow	wt%	1.8
Number of cyclones online	-	2

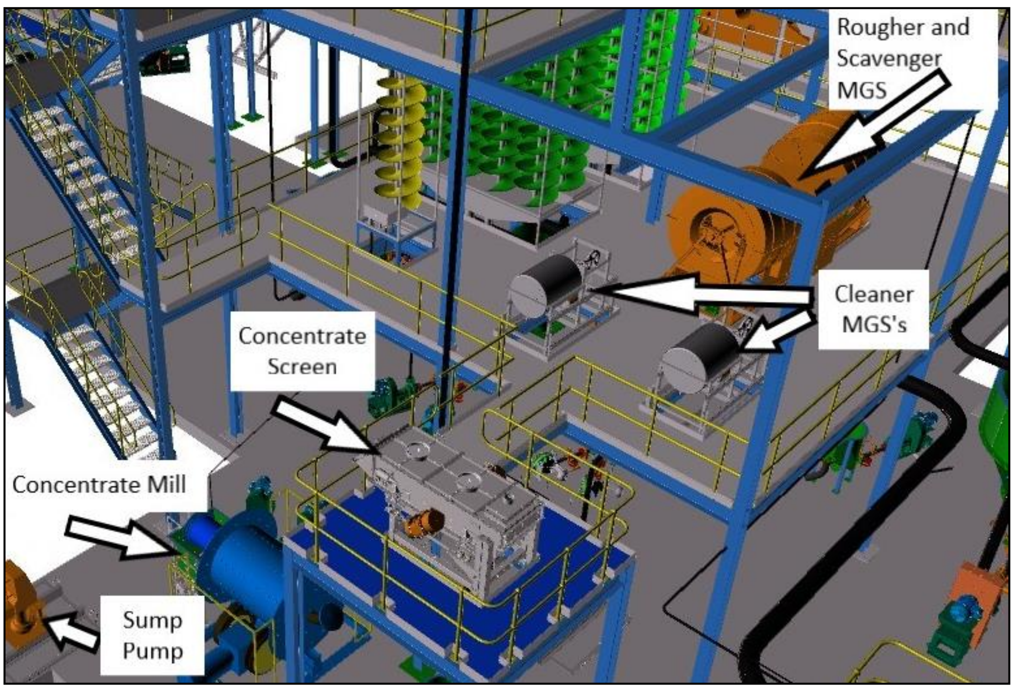
The height of the spirals dictates the overall height of the plant structure. All the tanks and pumps are kept on the ground level to utilise gravity for transport of the concentrate and tailings from the spirals to the individual tanks.

Density control in this area is achieved by adjusting the rate at which slurry is extracted from the constant density tank. The level of the tanks is controlled by the addition of water with automated valves. The product obtained from the rougher circuit is not at the correct grade to market as a saleable product.

17.3.4 Cleaner Circuit

The cleaner circuit increases the grade of the concentrate received from the rougher circuit to produce a saleable product. To further increase the liberation of the tantalum in the concentrate from the rougher circuit, milling is implemented. This maximises the recovery of the tantalum at the required product grade. The concentrate milling is a closed circuit with a classification screen as shown in Figure 17.13. The oversize from the classification screen is introduced into a ball mill for size reduction and the undersize is pumped to the Rougher MGS.

Figure 17.13: Cleaner Circuit Equipment



The cleaner gravity circuit contains the following equipment:

- One Rougher-Scavenger MGS (one C902 MGS);
- Two (2) Cleaner MGSs (two C900 MGSs);
- One (1) Ball Mill;
- One (1) Concentrate Classification Screen;
- Five (5) Tanks;
- Five (5) Pumps;

- One (1) Dewatering Cyclone Cluster;
- One (1) Sump Pump and,
- One (1) Deep Cone Settler.

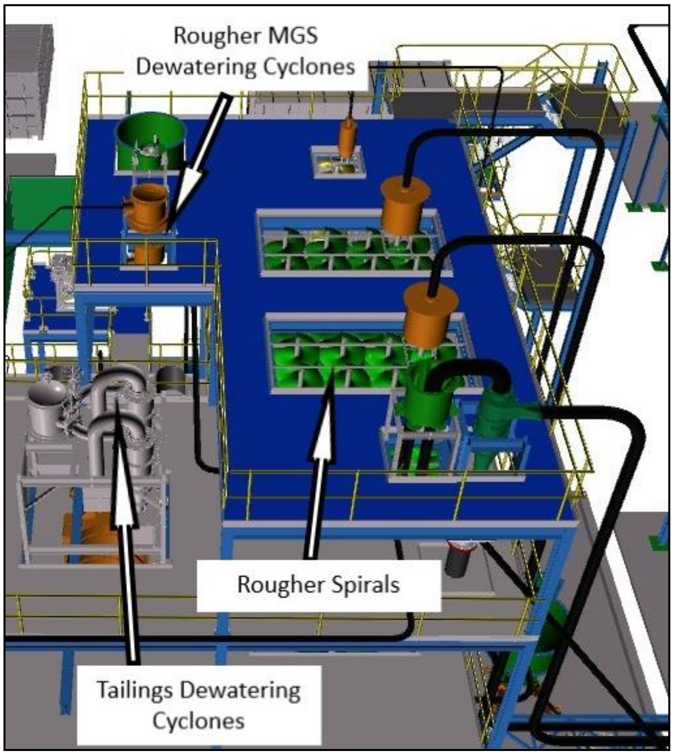
The design criteria for the major equipment in the cleaner circuit area is summarised in Table 17.16.

Table 17.16: Design Criteria Used for Sizing of Equipment in the Cleaner Circuit

Description	Units	Value
Multi Gravity Separator		
Maximum mgs feed solids content	wt%	35
Maximum solids content in concentrate from mgs	wt%	60
Mgs wash water flow rate	m^3/hr/t feed solids	1.25
Ball Mill		
Level in mill	vol%	30
Maximum solids content in mill	wt%	70
Maximum recycle load	t/hr	3
Maximum feed size	mm	6
Maximum solids feed rate	t/hr	2.1
Discharge arrangement	-	Overflow type
Concentrate Classification Screen		
Aperture size of screen	µm	150
Maximum solids content in feed to screen	wt%	50
Maximum amount of spray water	m^3/hr/t feed solids	0.8
Moisture content of oversize material	wt%	20
Number of screen decks	-	1
Deep Cone Settler		
Minimum underflow solids content	wt%	35
Particle size used for calculation of up-flow velocity	µm	45
Rougher MGS Dewatering Cyclone		
Maximum solids content in feed	vol%	15
Maximum solids content in underflow	wt%	35
Solids split to underflow	wt%	99.78
Cut point of cyclone	µm	Small as possible

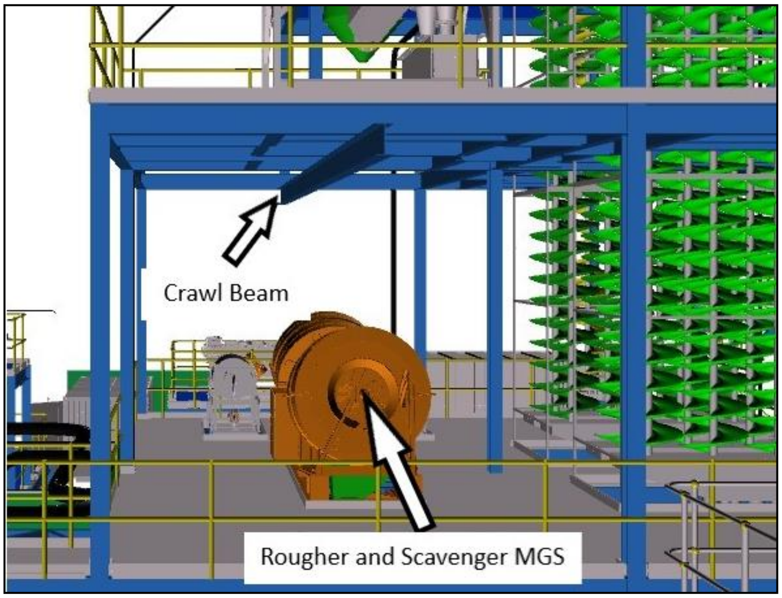
The cleaner spiral concentrate gravitates into the feed tank of the concentrate screen. The oversize from the classification screen gravitates into the ball mill, which discharges back into the tank feeding the concentrate screen. The diluted undersize from the concentrate classification screen is pumped to a dewatering cyclone cluster to increase its solids content prior to it being introduced into the rougher MGS. These cyclones are located on the top floor of the structure to enable the use gravity to feed the underflow into the rougher MGS and is shown in Figure 17.14.

Figure 17.14: Rougher MGS Dewatering Cyclone Cluster



Pressure control is implemented on the inlet to the dewatering cyclone cluster. The tanks in the cleaner circuit are on the ground level and the MGS units are on the first floor to make use of gravity for transporting the tails and the concentrate. The feed to the scavenger MGS warrants the use of a peristaltic pump, which makes dewatering with a cyclone impractical. Therefore, a deep cone settler is used to increase the solids content to the required 35 wt% for operation of the scavenger MGS. The tails from the Scavenger MGS is routed to the tailings handling circuit, whereas the concentrate is recycled back to the rougher MGS. The concentrate stream from the rougher MGS is pumped to the cleaner MGS to produce a final concentrate containing at least 25 wt% Ta_2O_5. The cleaner MGSs are smaller units and will receive an equal distribution of material. The cleaner MGS units have been sized to be able to accommodate all the feed into one unit, if one unit requires maintenance to be completed. Crawl beams are positioned above the MGS units to allow for removal of the drums during routine maintenance and is indicated in Figure 17.15.

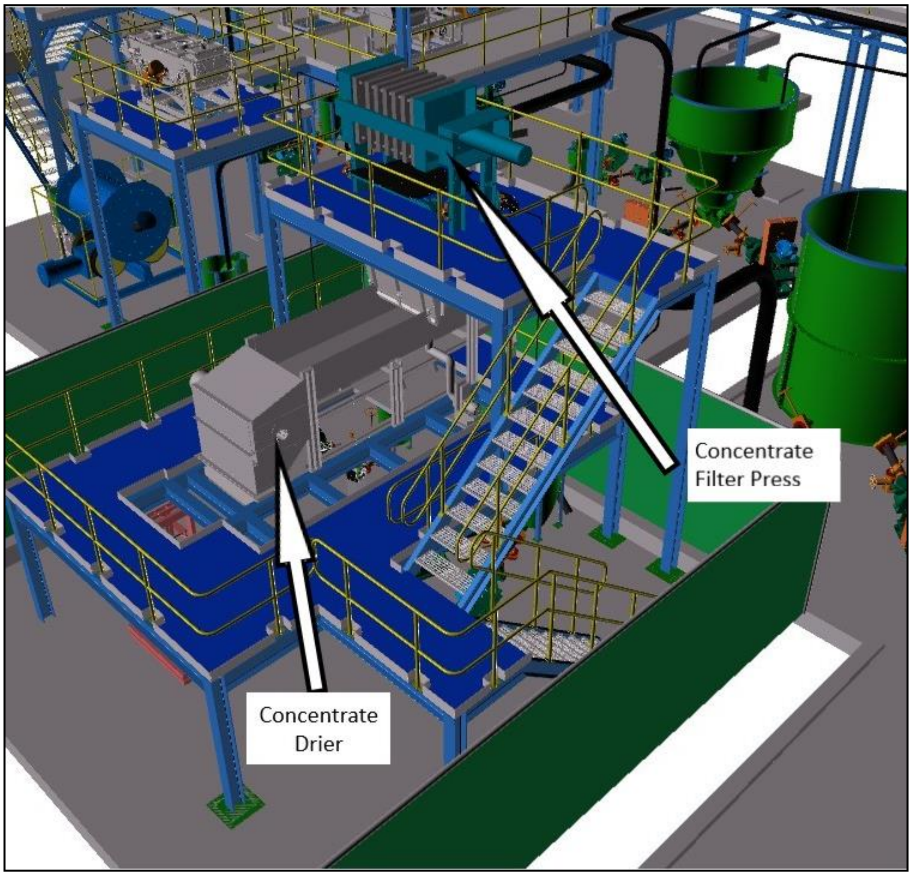
Figure 17.15: Crawl Beam for MGS Maintenance



17.3.5 Filtration and Drying

The final concentrate from the cleaner MGS requires a significant reduction in water content before bagging of the material can be completed. This is accomplished with a filter press and a final product drier. The concentrate filter press and drier are shown in Figure 17.16.

Figure 17.16: Concentrate Filter Press and Drier



The product filter press reduces the moisture content sufficiently for final drying in a drier before bagging. This area is separated from the Spiral plant and fenced-off for security of the final concentrate. The drier discharges the final concentrate into a bulk bag on a platform scale as shown in Figure 17.16. The bulk bag can be transported with a forklift or other suitable equipment.

The product handling area contains the following equipment:

- One (1) Filter Feed Tank with agitator;
- One (1) Product Filter Press;
- One (1) Product Filtrate Tank;
- One (1) Final Product Drier; and,
- One (1) Bagging facility with platform scale.

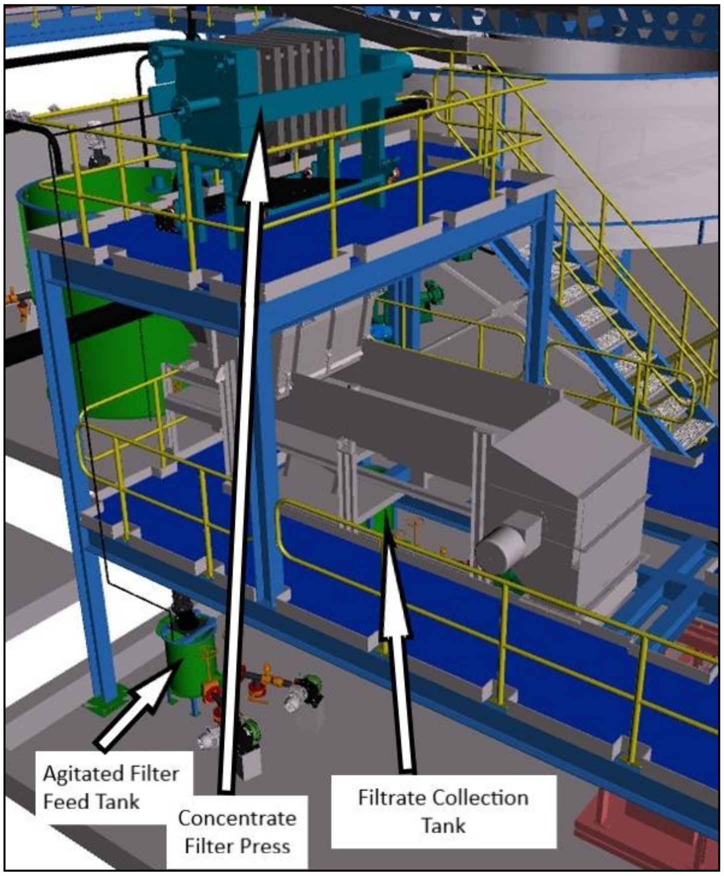
The design criteria for the major equipment in the filtration and drying area is summarised in Table 17.17.

Table 17.17: Design Criteria Used for Sizing of Equipment in Filtration and Drying Circuit

Description	Units	Value
Filter Press		
Maximum solids content	wt%	60
Maximum particle size in feed	μm	150
Maximum water content in filter cake from the filter press	wt%	25
Discharge arrangement	-	Chute
Drier		
Maximum feed moisture	wt%	25
Maximum particle size in feed	μm	150
Maximum product temperature	°C	130
Discharge arrangement	-	Conveyor
Feed cake breaker required	-	Yes
Maximum product moisture content	wt%	5
Bagging		
Bag size to be used	m^3	1
Maximum weight of bulk bag	kg	1,000
Method of loading of bag	-	Forklift

The filter press is a batch operation and requires a volume of material before processing can commence. The product filter press feed tank is therefore sized to accommodate material for at least three cycles of the filter press and contains an agitator to ensure a homogenous feed to the filter press. Figure 17.17 shows the filter press feed tank equipped with the agitator. The fencing in the final product area was hidden to be able to show the feed tank of the filter concentrate filter press in Figure 17.17.

Figure 17.17: Concentrate Filter Press with Agitated Feed Tank

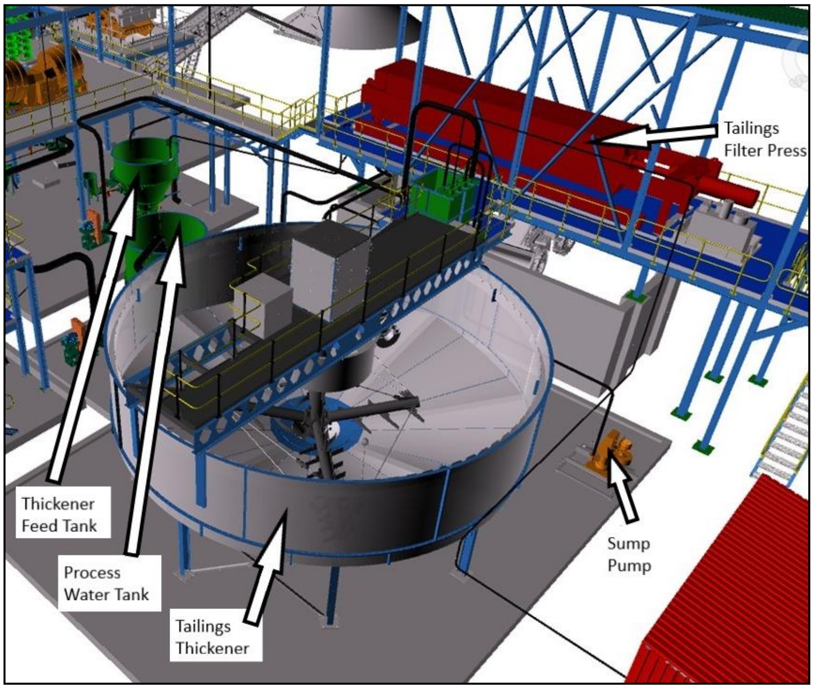


The filter cake from the filter press discharges into the feed hopper of the drier and is broken by rotating pins in the hopper. The feed to the drier is controlled with a gate above the belt. The drier uses infrared lights to dry the material. The infrared lights minimise the moisture content of the material being bagged, without generating fines during the drying process. The drier is equipped with a section that allows for cooling of the material prior to bagging. The filtrate from the product filter press is combined with the overflow from the rougher MGS dewatering cyclones and used in the cleaner circuit to minimise the losses of tantalum.

17.3.6 Tailings Handling and Water Recovery

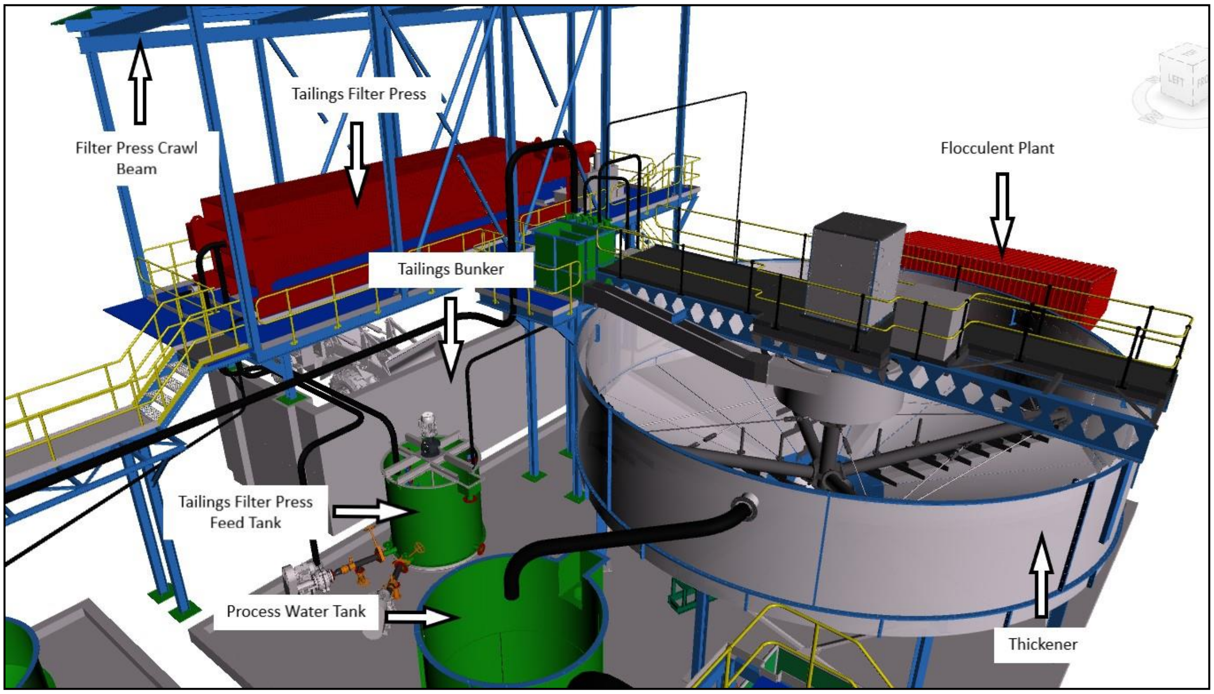
The dewatering cyclones which are used above the dewatering screen are combined with the tails from the scavenger MGS for thickening and dewatering to recover process water for reuse. These streams are combined into a thickener feed tank which also receives the filtrate from the tailings dewatering filter press. This allows a constant feed rate to the thickener and better control on the flocculent dosing for the thickener. The position of the thickener feed tank and thickener is shown in Figure 17.18.

Figure 17.18: Thickener Feed Tank and Thickener Position



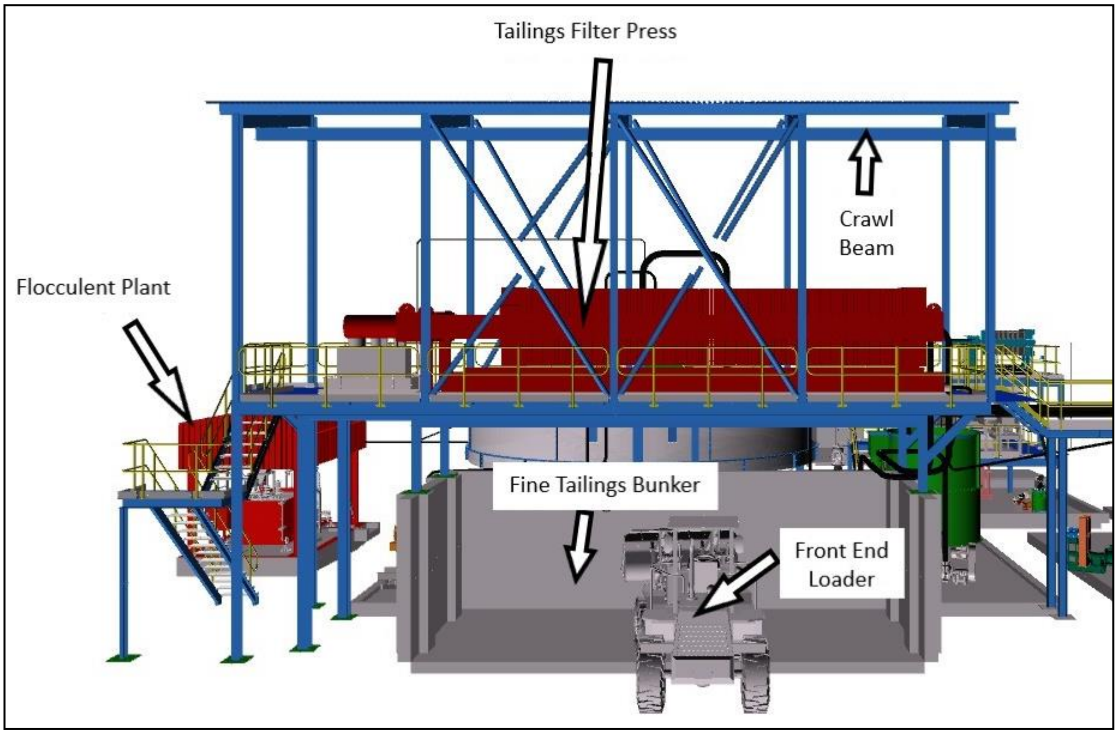
The thickener underflow is extracted from the thickener and discharges into a tailings filter feed tank. The intermediate tank allows for continual discharge of the thickener underflow to maintain the optimum sludge bed in the thickener and provides sufficient volume of feed required for the batch operation of the tailings filter press. Figure 17.19 shows the position of the tailings filter press feed tank in relation to the tailings filter press. This tank is also equipped with an agitator to ensure a homogeneous feed to the tailings filter press. Flocculent dosing is required to reduce the size of the thickener. This aids in the settling and consolidation of the material for dewatering in the filter press. The position of the flocculent plant is also indicated in Figure 17.19.

Figure 17.19: Tailings Filter Press with Feed Tank and Bunker



The filter cake from the tailings filter press is discharged into a bunker underneath the filter press. A front-end loader (FEL) can be used to remove the filter cake when enough is available for transportation. The filter press structure is equipped with a crawl beam to allow for maintenance of the filter press (removing and replacing of filter plates) as well as a roof structure. The filter press contains several plastic filter plates that requires protection from the elements. Figure 17.20 shows the layout of the tailings filter press.

Figure 17.20: Tailings Filter Press with Bunker



The tailings from the filter press can be stockpiled with the oversize tailings from the tailings dewatering screen. The composition of these to tailings products must be evaluated to determine the feasibility of co-disposal of these streams.

The tailings handling area contains the following equipment:

- One (1) Tailings Thickener;
- One (1) Tailings Filter Press Feed Tank with agitator;
- One (1) Tailings Filter Press;
- One (1) Filter Press Feed Pump;
- One (1) Process Water Tank;
- One (1) Process Water Pump; and,
- One (1) Flocculent Plant supplied by the vendor.

The design criteria for the major equipment in the tailings handling area is summarised in Table 17.18.

Table 17.18: Design Criteria Used for Sizing of Equipment in Tailings Handling Water Recovery Area

Description	Units	Value
Thickener		
Thickener type	-	High Rate
Minimum thickener underflow solids content	wt%	50
Thickener loading	$t/m^2/hr$	0.21
Up-flow velocity	m/hr	0.83
Flocculent dosing required	-	Yes
Flocculent used	-	TBD
Filter Press		
Minimum solids content in the feed to filter press	wt%	50
Maximum particle size in feed	µm	150
Maximum water content in filter cake from the filter press	wt%	25
Discharge arrangement	-	Bunker
Type of filter press	-	
Bagging		
Bag size to be used	m^3	1
Maximum weight of bulk bag	kg	1,000
Method of loading of bag	-	Forklift

17.4 Key Decisions

17.4.1 Desliming

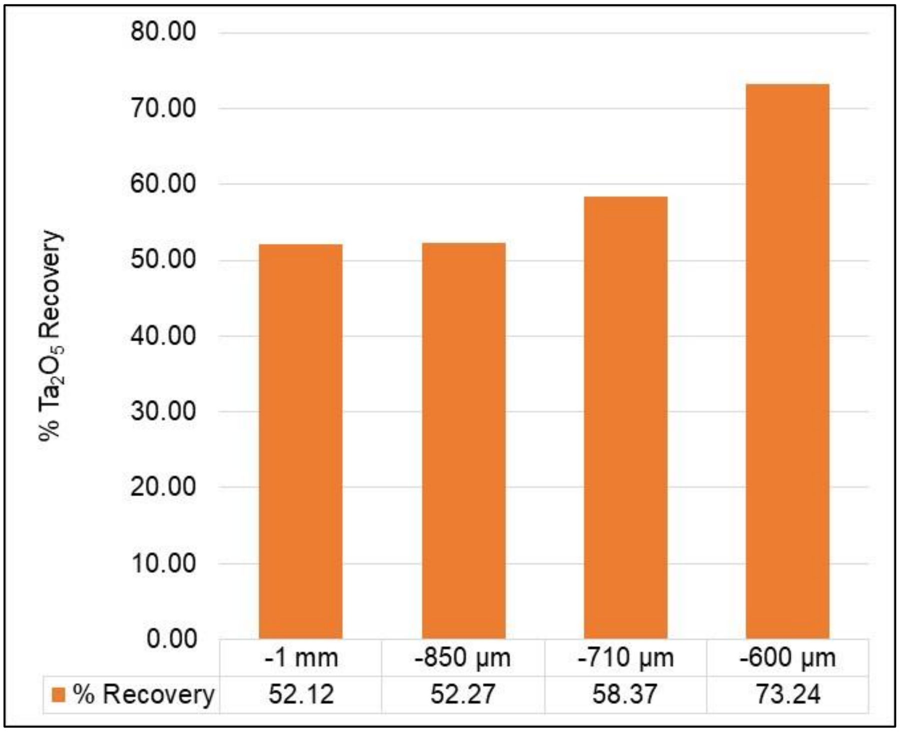
Mineralogical testwork showed that approximately 9 wt% of the feed material was smaller than 45 µm. This fraction contained on average 975 ppm Ta_2O_5. The efficiency of the gravity separation achievable with the MG12 spirals was determined with a feed containing this fine material. The testwork showed that no desliming step is required prior to the rougher circuit. The slimes did not negatively impact the spiral separation.

17.4.2 VSI Mill Sizing

The testwork conducted by CoreMet (Ilunga, 2022) evaluated the extent of the liberation required for effective recovery of the tantalum from the feed, Heavy Liquid Separation (HLS) tests were conducted at a density of 2,960 kg/m^3 on various size fractions as shown in Figure 17.21. The VSI Mill was sized to be able to produce a final particle size of 100% passing 600 µm to maximise Ta_2O_5 recovery.

m.PLAN INTERNATIONAL

Figure 17.21: Recovery of Ta_2O_5 with Liberation



17.5 Mass Balance Development

The mass balance was developed for the 40 t/h feed rate at a PSD as received from the undersize of the screen in the tertiary crushing section.

The mass balances for the different particle sizes are summarised in Table 17.19.

Table 17.19: Summary of Tantalum Mass Balance for Spiral Plant

Description	Ta Mass Flow Rate (kg/hr)
Plant feed (<25 mm)	19.48
VSI undersize	19.48
Rougher Circuit	
Feed	19.11
Spirals circuit concentrate	13.12
Spirals circuit recovery	68.6 wt%
Cleaner Circuit	
Feed	13.12
MGS Circuit concentrate	12.69
MGS Circuit recovery	96.7 wt/%
Plant Summary	
Overall plant feed	19.48
Overall plant production	12.69
Overall recovery	65 wt%
Water requirement (m^3/hr)	9.8

Water is recirculated in the process with the only losses from the moisture in the product filter cake material, tails filter cake material and the tailings dewatering screen oversize material. The water consumption amounts to a value of 0.25 m^3 of water required per tonne of material processed.

17.6 HAZOP III Study

A hazard and operability (HAZOP) study was performed as part of the DFS for the Spiral Plant as described in Section 23.1.

17.7 Procurement Operating Plan

The contracting strategy for the execution is based on an engineering, procurement, construction and management (EPCM) model whereby an EPCM contractor is appointed on behalf of the client for all engineering, procurement, and construction management with associated professional services. The procurement packages were developed in accordance with the WBS and enquiries were sent to the market. The technical and commercial proposals were received for the following packages:

- 001 MGS;
- 002 FALCONS;
- 003 SCREENS;
- 004 SPIRALS;
- 005 PUMPS;
- 006 FILTER PRESSES;
- 007 CYCLONES;
- 008 AGITATOR;
- 009 SLURRY PUMPS;
- 010 THICKENER;
- 011 CONVEYORS;
- 012 BALL MILL;
- 013 VSI MILL;
- 014 DRYER;
- 015 BAGGING;
- 016 VALVES;
- 017 ELECTRICAL MCC SUPPLY;
- 018 INSTRUMENTATION SUPPLY; and,
- 019 CSMPPEI.

Several of the packages listed above are sole source supplies based on the results that were obtained by these specific equipment suppliers during the metallurgical test campaign. It is recommended that the execution of the proposed Swanson Mine be implemented on the same procurement plan. The Falcon Concentrator units were included in the list of packages to be able to quantify the CAPEX required for the proposed value engineering (Section 17.10).

17.8 Implementation Schedule

To indicate the time required for execution of the proposed Swanson Mine, a preliminary implementation schedule is provided in the Table 17.20.

Table 17.20: Preliminary Implementation Schedule

Cost Categories	Start Date	Finish Date
Commencement date	Month 1	Month 1
Project setup	Month 2	Month 2
Detail design	Month 2	Month 7
Procurement	Month 2	Month 11
Construction	Month 4	Month 12
Commissioning	Month 11	Month 13

17.9 Value Engineering

The following value engineering opportunities have been identified to reduce CAPEX and OPEX and improve the recovery:

- valuation of instrumentation requirements;
- fines beneficiation;
- finer grinding of coarse tails; and,
- tailings handling and water recovery.

17.9.1 Valuation of Instrumentation Requirements

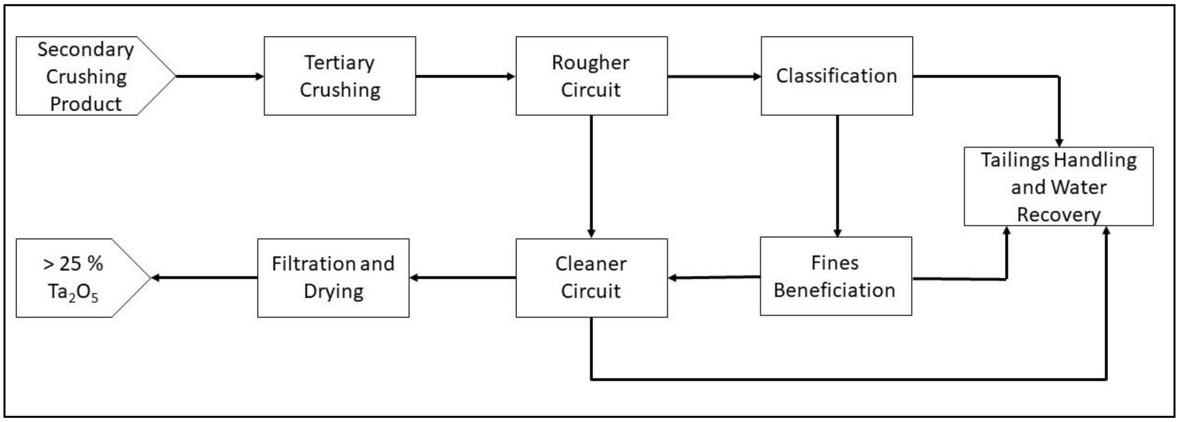
The level of instrumentation on the current plant design correspondents with other previously implemented projects. There is scope to re-evaluate the instrumentation that is proposed in the DFS.

17.9.2 Fines Beneficiation

The tailings from the spiral circuit is dewatered and the undersize from the dewatering is introduced into the thickener for water recovery. The undersize material can be upgraded by the introduction of a fines beneficiation circuit to recover additional tantalum from the spiral circuit tails.

Figure 17.22 illustrates an extract of a block flow diagram indicating the addition of a fine gravity circuit.

Figure 17.22: Extract of a Block Flow Diagram Indicating the Addition of a Fine Gravity Circuit



Falcon Concentrators have shown great promise in increasing the tantalum recovery.

The benefit of the fine gravity circuit on the production of the plant, was evaluated by removing the concentrate stream being returned from the fine gravity circuit to the cleaner gravity circuit and the information is provided in Table 17.21.

Table 17.21: Impact of Fine Gravity Circuit on Recovery

Description	Current Design	Fines Beneficiation
	Tantalum Mass Flow Rate (kg/hr)	Tantalum Mass Flow Rate (kg/hr)
Overall plant feed	23.68	23.68
Overall plant production	15.45	18.58
Overall recovery	65 wt%	78 wt%

The addition of a fines beneficiation step must be evaluated to understand the cost impact of increased recovery. An initial proposed flowsheet that includes Falcon C separators and additional MGS units was costed and would require an additional CAPEX investment of approximately US$2.2 million. Other methods of fines beneficiation (up current classifier, etc) must also be evaluated to determine the most profitable solution to increase the recovery.

17.9.3 Fine Grinding of the Coarse Tails

The Ta_2O_5 lost in the fraction larger than 45 µm is due to poor liberation. Testwork indicated that milling the coarse oversize to below 212 µm will recover more than 50% of the Ta_2O_5 lost to his fraction. This however will provide the most benefit in conjunction with the above-mentioned fines beneficiation since milling of the coarse tails will result in a significant increase in the Ta_2O_5 in the fraction smaller than 45 µm.

This additional recovery will need to be evaluated against the additional CAPEX and OPEX cost.

17.9.4 Tails Handling and Water Recovery

Testwork for the settling and filterability of the tailings from the process was not available. Obtaining test results for the material characteristics in this section can have a significant impact in the sizing and costing of this section. The use of flocculent dosing to aid in the settling of the material can be optimised to ensure optimal water recovery.

17.10 RISKS AND MITIGATION ACTIONS

The feed grade is the biggest risk to the plant. A variation in the feed grade will require more frequent sampling and more operator intervention to ensure that the correct grade of concentrate is produced. The Spiral Plant is equipped to handle a range of feed grades to ensure recovery is maintained at fluctuating feed grades.

To mitigate the influence of the feed grade entering the plant, grade control is required from pit to mouth. The current mine plan includes stockpiling material before the primary crushing section. This would allow the selective stockpiling of different RoM grades as well as blending during the reclaiming process. A grade controller will be required to schedule the stockpiling and the subsequent reclaiming and feeding of the primary crushing to ensure stable grade control into the Spiral Plant.

18.0 PROJECT INFRASTRUCTURE

18.1 ACCESS AND HAUL ROAD FEASIBILITY STUDY

The 21.7 km access road will connect the secondary road D206 to the Swanson processing plant and allow operational traffic to and from the plant as well as the transporting of concentrated ore to the ports for export. The access road will also service the electricity and bulk water supply to the processing plant. The access road will be an 8.6 m wide gravel-wearing course surface road with a design speed of 70 km/h.

The 1.8 km haul road is designed for rigid dump trucks to transport mined pegmatite from the mining area to the processing plant. The haul road will be a 15 m wide gravel-wearing course surface road designed for a 10 m wide by 14 m long rigid dump truck.

18.1.1 Access Road

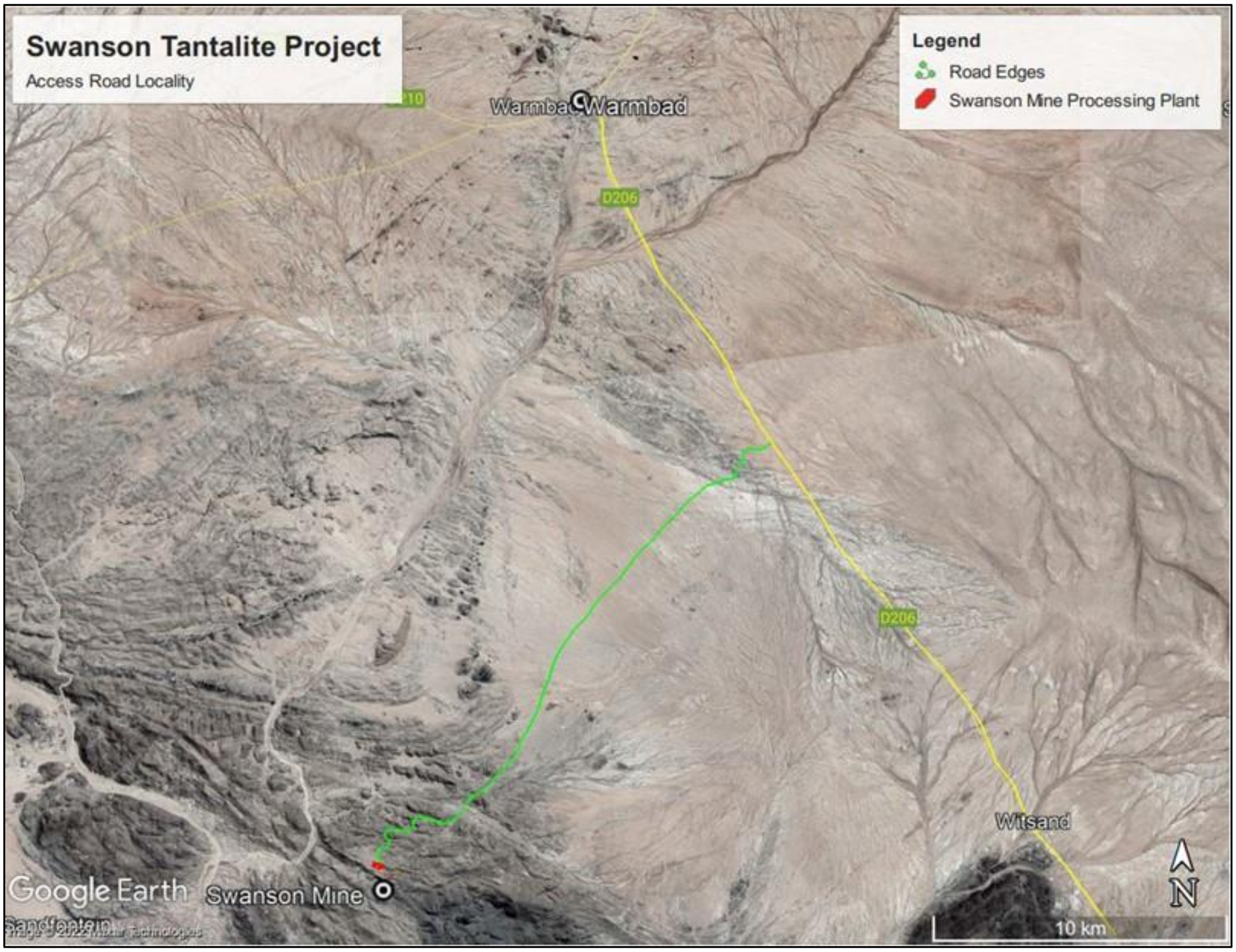
18.1.1.1 Purpose

The access road will connect the Swanson processing plant to Secondary Road D206. It will carry light vehicle traffic for staff and operations managers, as well as heavy vehicles to deliver plant and construction equipment. It will also be used as a route to transport concentrated ore to Lüderitz. The road will also act as the electricity and bulk water supply route.

18.1.1.2 Route Locality

The optimal route was determined by optimizing the route’s alignment while adhering to the design standard. The resulting route locality is depicted in Figure 18.1.

Figure 18.1: Swanson Access Road Locality



18.1.1.3 Geometric Design

Design Standard

The design is governed by the Namibian Roads Authority Geometrics Manual as published in October 2014.

The design standard for a design speed of 70 km/h was used to design the preliminary road to verify the access road feasibility.

18.1.1.4 Horizontal Design

The preliminary access road is 21.7 km long and the road width is 8.6 m wide with 2 x 3.4 m lanes and 900 mm wide shoulders.

18.1.1.5 Vertical Design

The preliminary vertical design has a maximum gradient of 7% and the minimum K-values of 30 for crest curves and 25 for sag curves was applied. The design follows the natural ground level, and the cut and fill was balanced.

18.1.2 Hydrology and Stormwater Management

18.1.2.1 Hydrology

The hydrology for the road will be determined as per the requirements of the latest edition (1st edition published October 2014) of the Namibian Roads Authority Drainage Manual. The design flood frequency will be based on the Rational Method for the particular catchment and watercourse.

18.1.2.2 Hydraulic Structures

The general stormwater management components for the access road will be as follows:

- Open side drains are to be provided along the entire length of the route, where possible;
- Cut-off walls are to be provided at minor drainage path locations; and,
- Causeway concrete slabs are to be provided at major river crossings, if necessary.

18.1.3 Pavement Structure

The pavement structure proposed consists of a 200 mm gravel wearing course and 2 x 150 mm G7 gravel layers with a minimum California Bearing Ratio (CBR) of 15%.

18.1.4 Construction and Materials

18.1.4.1 Construction Method

The construction methods will follow standard practices. There will be extensive fills and cuttings. The cuttings will need to be blasted where hard rock is encountered.

18.1.4.2 Material Sources

The material from the cuts will be used in the fills, and where found suitable, for the gravel layers. Borrow pits will be opened for any material shortfall. Table 18.1 provides the volumes of cut and fill, and the gravel layers.

Table 18.1: Access Road Gross Material Quantities

Access Road Bulk Earthworks and Layers	Volumes (m^3)
Total cut and borrow for fill	66,385
Total cut and borrow for road layers	60,066
Total cut to spoil	17,553
200 mm G5 gravel wearing course from cut	11,701
200 mm G5 gravel wearing course from borrow pits	27,303
300 mm G7 subbase from cut	48,365
300 mm G7 subbase from borrow pits	12,091

18.2 HAUL ROAD

18.2.1 Purpose

The haul road will be used to transport the mined pegmatite from the valley bottom to the Swanson processing plant.

18.2.2 Route Locality

The optimal route was scoped on-site, and a digital terrain model of the area was used to place the road and optimize the design. The resulting road layout is depicted in Figure 18.2.

18.2.3 Geometric Design

18.2.3.1 Design Standard

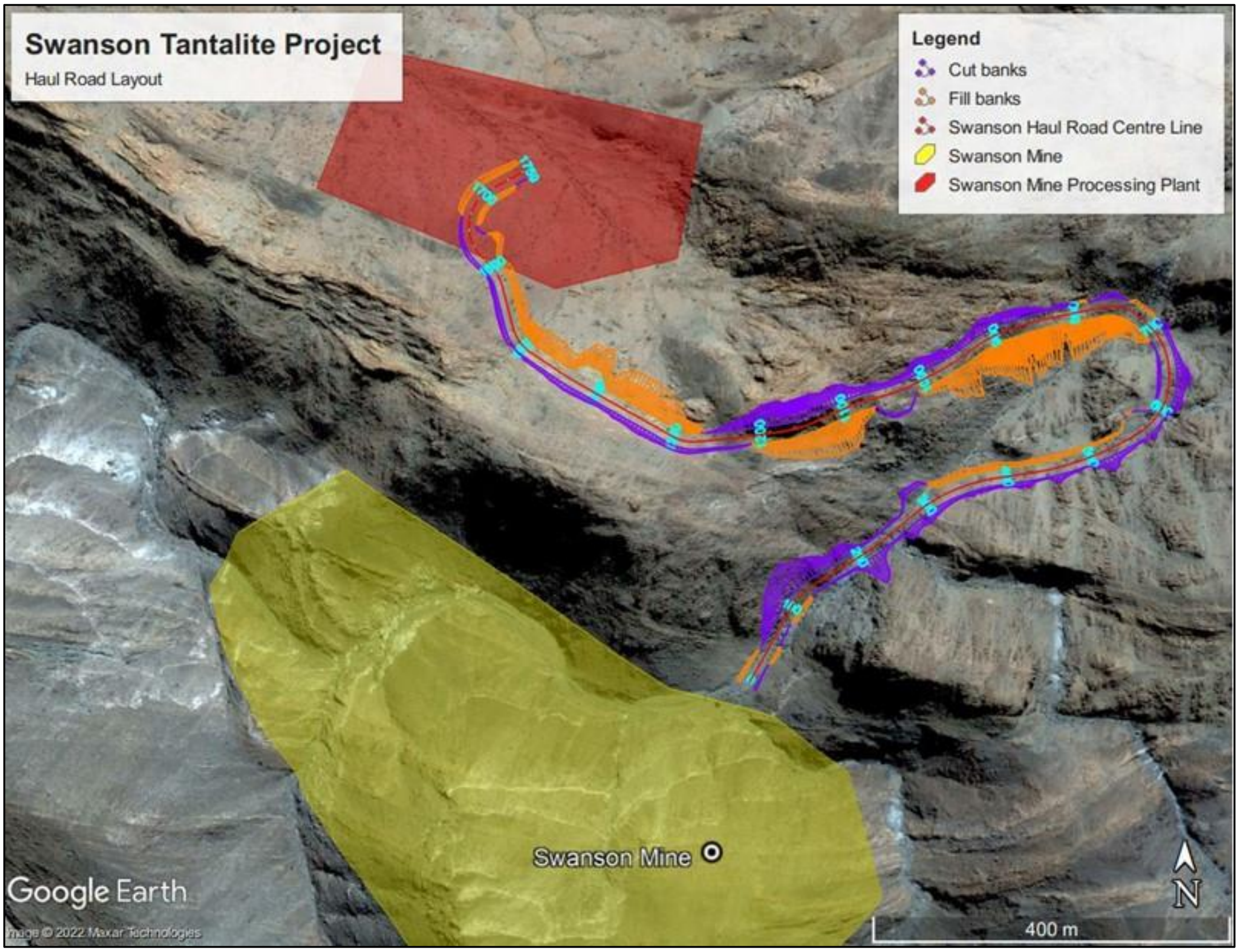
The design is governed by the anticipated rigid dump truck with a width of 10 m and a length of 14 m.

A design speed of 40 km/h was used to design the preliminary haul road and to verify the haul road feasibility.

18.2.3.2 Horizontal Design

The preliminary haul road is 1.8 km long and the road width is 15.0 m wide with 2 x 7.5 m lanes and 2.0 m high safety berms on the fill sides. The minimum radius is 50 m. The design includes five passing bays, 15 m wide and 20 m long with 15 m tapers, to allow empty trucks to turn out of the way of loaded trucks, travelling up the haul road to the processing plant.

Figure 18.2: Swanson Haul Road Layout



18.2.3.3 Vertical Design

The preliminary vertical design has a maximum gradient of 9.7% and the minimum K-values of 6 for crest curves and 8 for sag curves was applied. The design was optimized to have a gradient of less than 10%.

18.2.4 Hydrology and Stormwater Management

18.2.4.1 Hydrology

The hydrology for the road will be determined as per the requirements of the latest edition (1st edition published October 2014) of the Namibian Roads Authority Drainage Manual. The design flood frequency will be based on the Rational Method for the particular catchment and watercourse.

18.2.4.2 Hydraulic Structures

The general stormwater management components for the access road will be open side drains, provided along the entire length of the route where possible, to cater for stormwater run-off.

18.2.5 Pavement Structure

The pavement structure consists of a 500 mm gravel wearing course and 750 mm G5 and 1,500 mm G7 gravel layers with a minimum CBR of 18%.

18.2.6 Construction and Materials

18.2.6.1 Construction Method

The construction methods will follow standard practices. There will be extensive fills and cuttings. The cuttings will need to be blasted where hard rock is encountered.

18.2.6.2 Material Sources

The material from the cuts will be used in the fills, and where found suitable, for the gravel layers. Borrow pits will be opened for any material shortfall. Table 18.2 provides the volumes for cut and fill, and the gravel layers.

Table 18.2: Haul Road Gross Material Quantities

Haul Road Bulk Earthworks and Layers	Volumes (m^3)
Total cut and borrow for fill	83,083
Total cut and borrow for road layers	25,455
Total cut to spoil	29,156
500 mm G5 gravel wearing course from cut	4,616
500 mm G5 gravel wearing course from borrow pits	10,770
750 mm G5 gravel base from cut	15,035
750 mm G5 gravel base from borrow pits	10,023
300 mm G7 subbase reworked in-situ	52,230
300 mm G7 subbase from cut	5,803

18.3 Power

On 22nd September 2022 Mr. Simeon Kulo, Distribution and Rural Electrification for NamPower (Namibian national electric power utility company), confirmed that:

- NamPower had assessed the power requirements for the Swanson Mine and that the nearby Warmbad Substation would have sufficient capacity in terms of transmission; and,
- The mine could be fed up to 2.7 MVA from the Warmbad Substation.

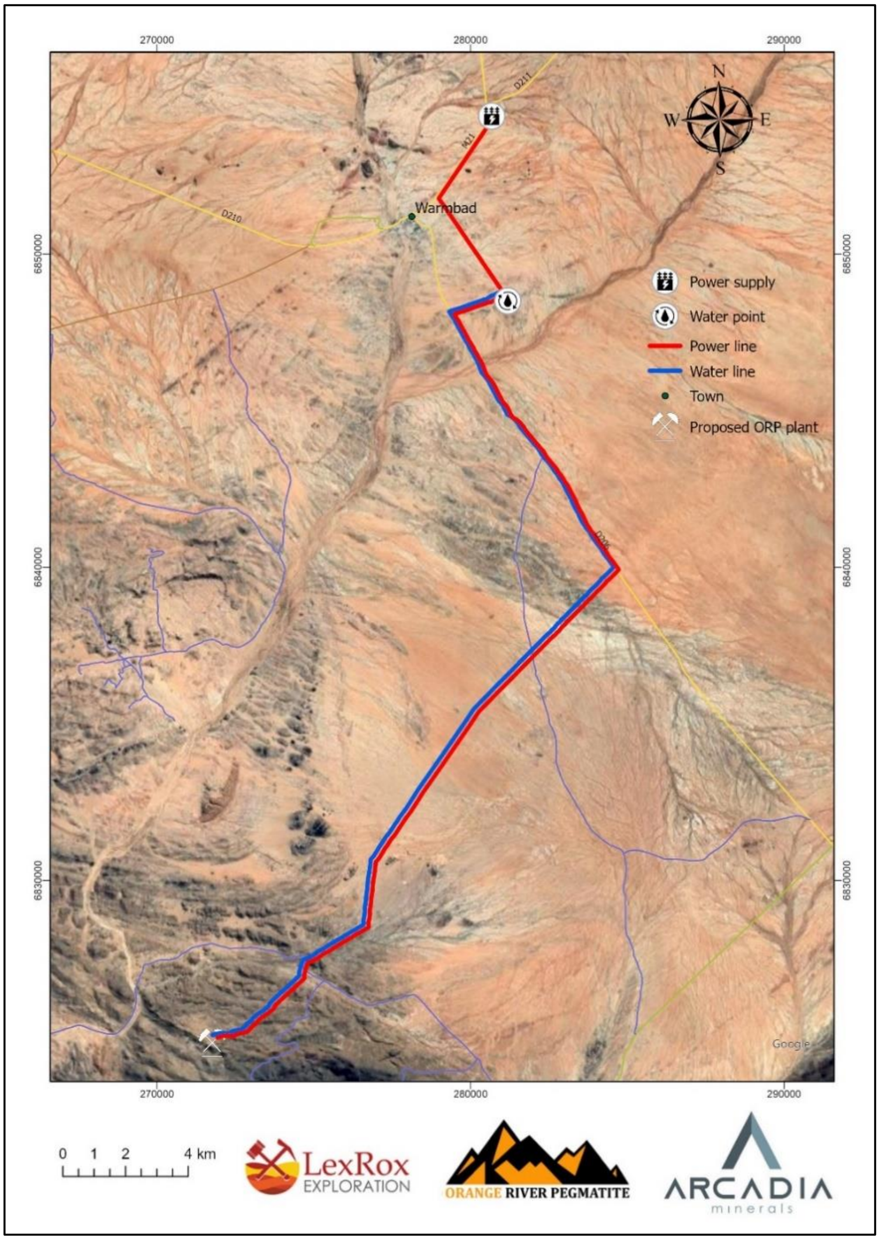
Walters Electrical Services cc was appointed by ORP to assess the feasibility of setting up and installing a 33 kV overhead power line for the proposed Swanson Mine. The approximately 41 km power line will connect power and supply electricity to the Swanson Mine including the processing plant, mining operation, and other associated infrastructure and services from the main Warmbad Substation.

18.3.1 Power Line Route

The proposed 33 kV overhead powerline route from Warmbad to the Swanson Mine is presented in Figure 18.3.

Walters Electrical Services cc will be constructing the new 33 kV overhead line from Warmbad to the proposed Swanson Mine. The company will conduct a survey and set out the route of the new line. ORP will be responsible for obtaining the EIA certificate and landowners' agreements. The servitude for the line route will be registered through a land surveyor which will be appointed by ORP.

Figure 18.3: Map Showing the Power Line from Warmbad to the Swanson Mine



18.3.2 Specifications

The overhead line will be constructed with 11 m to 13 m timber poles and a Rabbit aluminum conductor will be used for the stringing. A 33 kv to .420 kV ground mounted transformer be installed in a small, fenced substation yard. 33 kV drop out fuses will be installed 1 pole before the transformer with a set of isolating links in the middle of the line. A complete construction up to Nampower standards will be completed for the T – Off point which included links, a complete N 38 recloser with bypass and aux transformer structure and a 33 kV metering point complete with meter board.

A South African Bureau of Standards (SABS) approved 33 kV to .42 kV ground mounted transformer will be installed, including medium voltage (MV) and low voltage (LV) earthing and MV arrestors. The quote does not include LV cables and distribution.

18.4 Water

ORP originally makes provision for water to be sourced by either a pipeline from Warmbad or otherwise extracting water from local underground aquifers. However, following a trade-off study ORP elected to source water from Warmbad. Preliminary plans indicate that the water pipeline will be less than 40 km long with a diameter of 160 mm.

18.5 Spiral Plant Tailings and Waste Rock

ORP engaged Prime Resources to perform the feasibility design and cost estimation of the tailings storage facility (TSF) of the Spiral Plant and the waste rock dump (WRD) of the open cast mining operation for the Swanson DFS.

The mining operation involves the development of two opencast pits i.e., the D-pegmatite pit (the D-pit) and the E and F-pegmatite pit (EF-pit). The waste rock from both pits is disposed to a single WRD site.

RoM is hauled to the Spiral Plant where it is crushed and ground to 1 mm. The processes for tantalum mineral recovery and beneficiation includes magnetic separators and centrifugal concentrators. The Spiral Plant produce two tailings streams, a fine tailings (-45 µm dewatering oversize) and a coarse tailings (+45 µm filter cake).

The TSF includes separate disposal of fine and coarse tailings produced from the Spiral Plant to allow for the sale of the fine tailings as lithium RoM tailings as a by-product. However, the separate tailings are disposed to a single TSF site.

18.5.1 Scope of Work

The scope of works associated with the TSF and WRD are as follows:

- Development of design criteria.
- Selection of preferred locations.
- Review of geochemical characterisation of the tailings material.
- Characterisation of the near surface geotechnical conditions associated with the TSF.
- Design of geotechnical and drainage aspects of the TSF and WRD.
- Stability considerations.

- Produce relevant feasibility level design drawings.
- Produce a schedule of quantities, feasibility level CAPEX estimate.

18.5.2 Design Criteria

The design criteria for the Swanson DFS agreed with ORP for the TDF and WRD is presented in Table 18.3.

Table 18.3: Design Criteria

General	Units	Qty	Source
LoM	months	97	Snowden Optiro
Total RoM feed	tonnes	1,160,159	Snowden Optiro
Total waste rock	Mt	7.58	Snowden Optiro
Tailings/ Plant Waste	**Units**	**Qty**	
Fine tailings	t	696,096	Calculation
Coarse tailings	t	464,064	Calculation
Tailings (fine and coarse) placement dry density	t/m^3	1.6	Prime Resources
Fine tailings volume/ storage requirement	m^3	435,060	Calculation
Coarse tailings volume/ storage requirement	m^3	290,040	Calculation
Tailings moisture content	% (w/w)	15 to 20	CoreMet
Waste Rock	**Units**	**Qty**	
Waste rock bulk density	t/m^3	1.62	Prime Resources
Total waste rock tonnage	t	10,496,643	Snowden Optiro
Total waste rock volume	m^3	6,492,368	Calculation

18.5.3 Available Information

The following relevant information was made available during the Swanson DFS:

- ORP Tantalite Project Preliminary Economic Assessment (LexRox Exploration and Mining, 2020).
- Environmental impact assessment (Impala Environmental, 2020).
- Mining schedule (Snowden Optiro, 2022).
- Grading analysis on the tailings material (CoreMet, 2022).
- Characterisation and Classification of Mineral Processing Tailings (Envirosim, 2022).

Additional information such as contour data, infrastructure positions and layout, pit designs and others have been received though correspondence from various project consultants during the course of the DFS.

18.5.4 Site Characteristics

18.5.4.1 Topography and Vegetation

The Swanson Property is characterised by steep undulating gravel and boulder covered hills and deep valleys with isolated plains. The vegetation is sparse with limited shrub-like flora.

18.5.4.2 Climate

The site of the proposed Swanson Mine is within a very arid region, with average temperatures ranging from 31 to 33 degrees Celsius daytime temperatures in summer, and from 10 to 16 degrees Celsius night-time temperatures in winter. The mean annual precipitation is low, generally less than 150 mm per annum. The majority of the rainfall is experienced in February and March (Impala Environmental, 2020).

18.5.4.3 Seismicity

Namibia is located in a low seismic hazard zone. This is widely documented and indicated on various published maps, such as that produced by the Global Earthquake Model (GEM), Global Seismic Hazard Map and the Global Seismic Hazard Assessment Program Map (GSHAP).

The seismic activity over the last century, and the seismic hazard zones of Namibia are shown in Figure 18.4 and Figure 18.5. These maps were produced by the Geological Survey of Namibia and were produced by Geo-logic Solutions. From the various sources of data, the estimated peak ground acceleration (PGA) with a 10% probability of exceedance in 50 years (475-year return period) is approximately 0.2 to 0.4 m/s^2 or 0.02 to 0.04 g, indicative of a low seismic hazard zone.

Figure 18.4: Namibia Seismic Activity (Geo-logic Solutions, 2021)

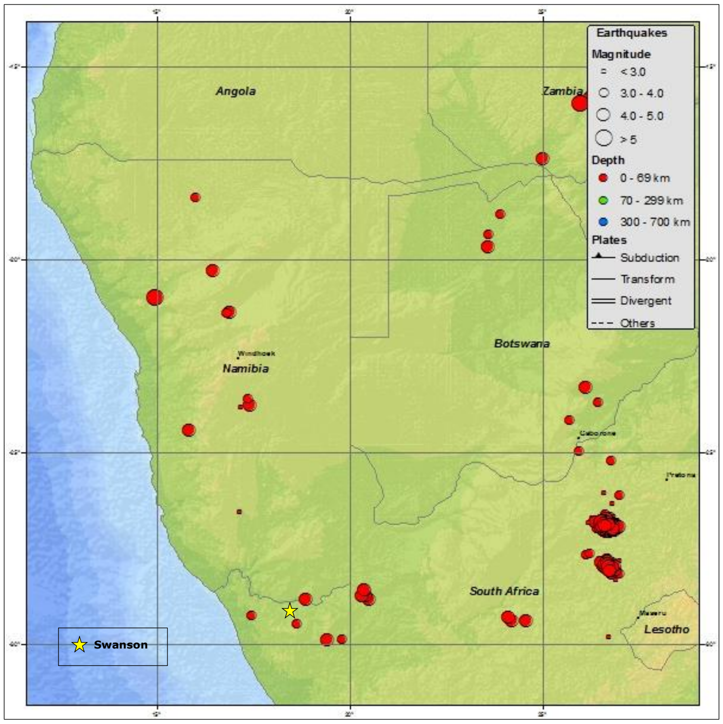
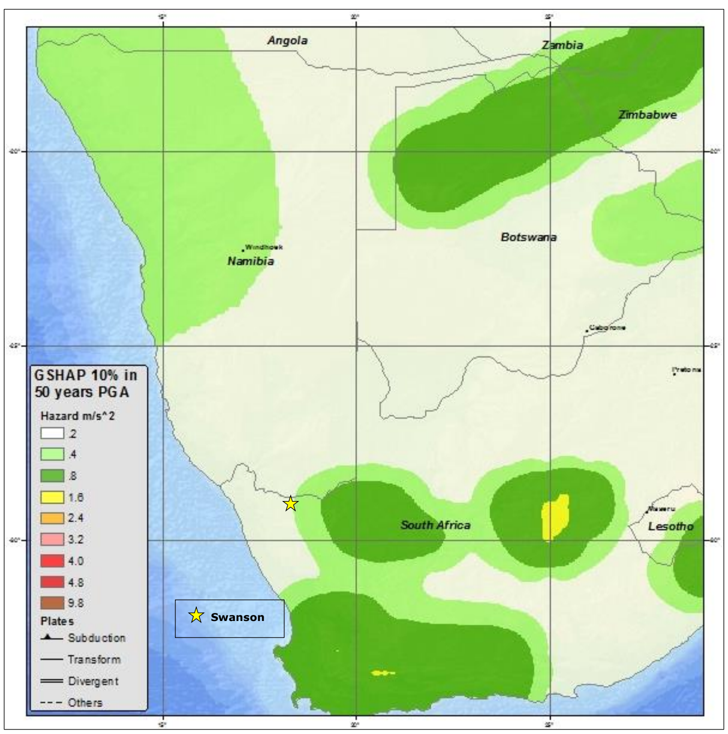


Figure 18.5: Namibia Seismic Hazard Map (Geo-logic Solutions, 2021)



18.5.5 Site Selection

18.5.5.1 Waste Rock Dump

The appropriate positioning of the WRD was subject to available area with adequate capacity to build a stable landform of waste rock, and to limit the haul distance from the mining pits.

The topography in the vicinity of the D-pit and EF-pit is characterised by steep hills and deep valleys. A single suitable site for the WRD was identified to the south of the EF-pit. This area consists of a large valley to the east and a small valley to west that is separated by a topographic saddle. This site is immediately adjacent to the EF-pit which minimises the haulage distance from this pit. The average haulage distance from the D-pit is approximately 1,500 m, with an average elevation difference of approximately +110 m. The valleys are generally dry and only briefly contain water following a rainfall event.

In addition to surface deposition of waste rock, the D-pit provides an opportunity for backfill and additional capacity. The D-pit is mined first for a period of 42 months, after which the pit void can be backfilled to elevation 590.1 meters above mean sea level (mamsl), providing additional capacity of approximately 225,000 m^3.

18.5.5.2 Spiral Plant Tailings

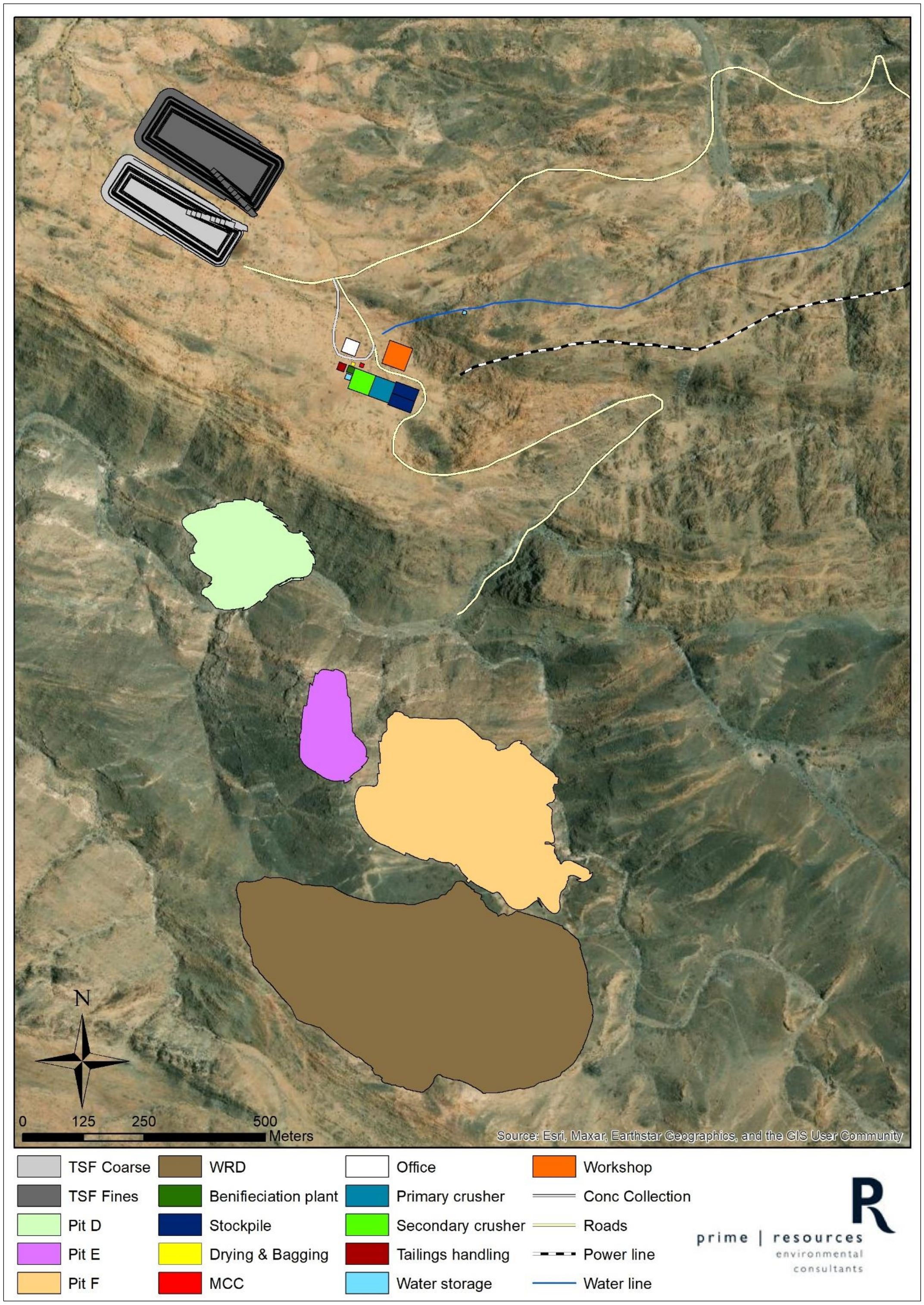
The Spiral Plant, and other surface infrastructure such as the Primary/Secondary crushing, workshops, and offices, are located on the adjacent plateau above the D-pit.

Ore is trucked from the D-pit and EF-pit to the Primary/Secondary crushing plant from where the crushed ore is fed to the Spiral Plant. The Spiral Plant tailings are trucked to the TSF for disposal. The fine and coarse tailings are stored separately, on a single TSF site, to allows for the sale of the fine fraction as lithium RoM tailings as a by-product.

The TSF have been positioned in close proximity to the Spiral Plant to minimise haulage distances. The available area is sufficient for the separate storage of the fine and coarse tailings.

Figure 18.6 illustrates the position of the TSF, WRD and other surface infrastructure relative to the open pits.

Figure 18.6: Surface Layout

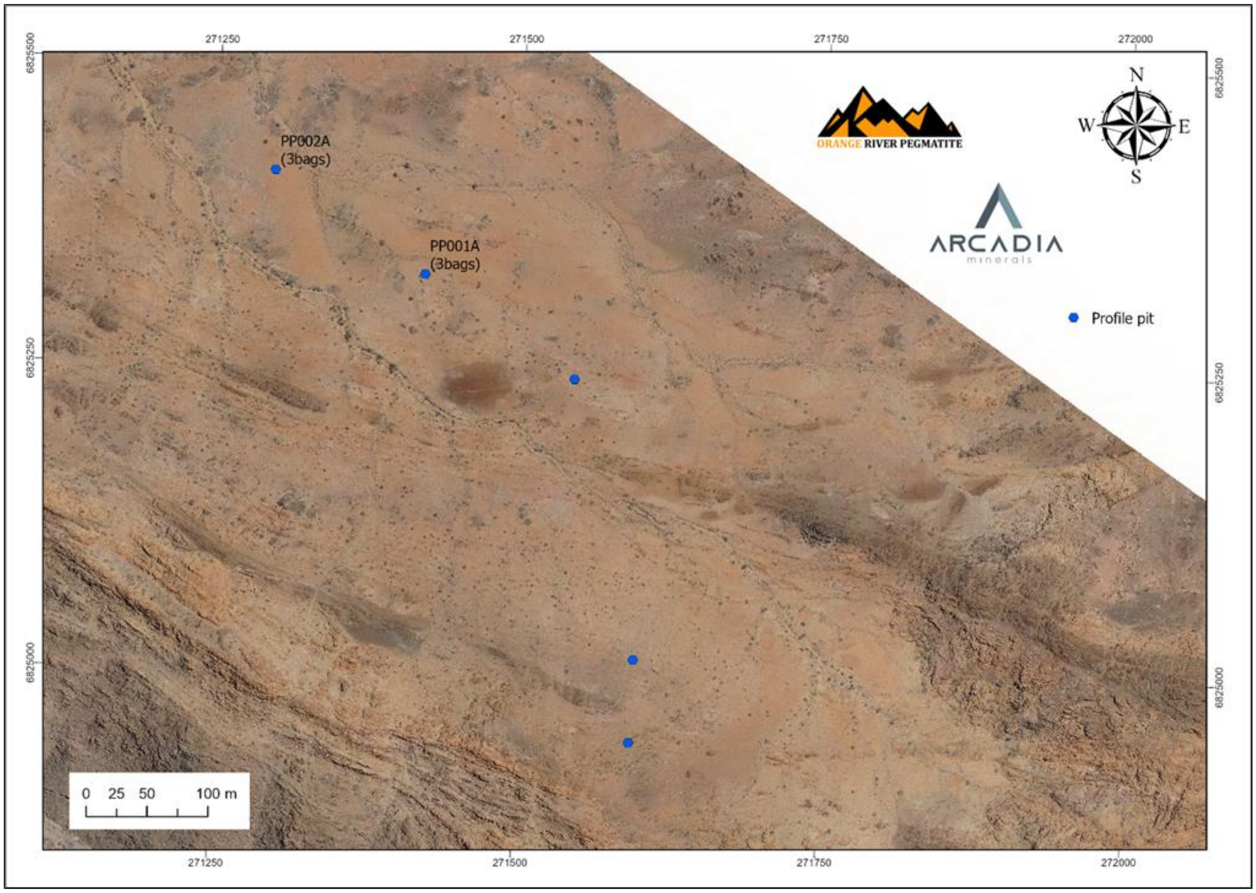


18.5.6 Geotechnical Investigation

18.5.6.1 Fieldwork

A surface geotechnical assessment was undertaken in March 2022, over the footprint of the proposed TSF. The assessment included five trial pits excavated by hand to various depths ranging from 200 mm to 600 mm. There pits were excavated to refusal on coarse grained gneiss rock. The positions of the test pits where samples were collected are shown as PP001A and PP002A, in Figure 18.7.

Figure 18.7: Geotechnical Test Pit Locations



18.5.6.2 Laboratory Testing

A composite representative sample was taken of the material excavated from each pit. The samples were sent to NTS Laboratory in Windhoek for selected testwork.

The samples from each pit were initially tested for grading and indicators to classify the materials. The grading curves and consistency limits of the two materials were found to be very similar and classified as slightly plastic, poorly graded sand-clay to sand-silt mixtures.

Due to the similarity of the materials form the test pits, a combined bulk sample was prepared for the remainder of the tests which was focused on the determination of the mechanical properties of the surface material.

The maximum dry density of the American Association of State Highway and Transportation Officials standard (Mod AASHTO), of the material was determined as 2,213 kg/m^3 at an optimum moisture content (OMC) of 5.8%. The California Bearing Ratio (CBR) ranged from 17% at a density of 93% Mod AASHTO, to 30% at a density of 95% Mod AASHTO.

The permeability of the material was tested at two densities with the following results:

- Permeability at 95% Mod AASHTO density at OMC: 1.17 x 10^{-08} m/s.
- Permeability at 93% Mod AASHTO density at OMC: 7.43 x 10^{-08} m/s.

The shear strength of the material was determined with the unconsolidated-undrained Triaxial (UU Triaxial) Compression Test, which is a quick test and strength is measured in terms of total stress. The test result indicated a friction angle of 34 degrees with an apparent cohesion of 106 kPa.

18.5.6.3 Discussion

The geotechnical fieldwork included the manual excavation of two trial holes over the proposed TSF footprints, which quickly met refusal in outcropping gneiss at shallow depths of 200 mm and 600 mm, respectively. The material seems to be excavated with relative ease. However, the extent of the exaction was very limited in depth.

The surface material primarily consists of sand (60%) with 23% gravel, 14% silt and 3% clay. A high density was achieved with the Mod AASHTO compaction effort with a low moisture content of 5%. The material classifies as a G7 material which would be suitable for embankment construction if available in sufficient quantities.

Low permeability (<10^{-08} m/s) can be achieved at 93% Mod AASHTO density at OMC. The material strength is suitable for a granular fill material and is beneficial to embankment construction and foundation preparation. The quantity of the material on surface was however very limited and an additional borrow material source (such as mine waste rock) will be required.

From the field work and laboratory testing, the material is considered suitable for in-situ compaction (between outcropping rock if required) and for embankment construction.

It is recommended that the top 100 mm of vegetation and topsoil be removed and stockpiled for future rehabilitation.

The 200 to 300 mm below surface could be excavated in places and used for use in berm and embankment construction but the weathered material is expected to be patchy and only limited pockets of weathered material between outcropping rocks. The remaining in-situ loose material can be compacted in place to a minimum of 93% Mod AASHTO density at OMC (5% by mass) in any loose patches.

Given the dry climate of the Swanson Property, moisture conditioning of the soil may be required for compaction, albeit by a limited amount.

General comment on the overall founding condition for the co-disposal facility and any other surface equipment on the site, it is likely to comprise of shallow excavation with topsoil removal and then founding on soft to medium hard rock gneiss and/or granite. Excavation of any trenches and below surface infrastructure could be difficult with outcropping rock, design should take this into consideration.

The geotechnical investigation did not include the selected area for the WRD.

18.5.7 Material Properties

18.5.7.1 Physical Characteristics

Tailings

The final tailings consist of a coarse fraction (dewatering oversize) and a fine fraction (filter cake). The particle size distribution of the tailings fractions has been determined by CoreMet as summarised in Table 18.4.

Table 18.4: Geotechnical Properties of the Tailings

Property	Coarse Tailings	Fine Tailings
Specific gravity	2.7	2.7
D_{10} (mm)	0.095	0.040
D_{30} (mm)	0.29	0.11
D_{60} (mm)	0.56	0.24
% fines (<0.075 mm)	7.6	19.9
Cu (coefficient of uniformity)	5.9	6.0
Cc (coefficient of curvature)	1.58	1.17

Both the fine and coarse tailings are well graded, with a small percentage of fines and are considered coarse in general tailings terms. The fine and coarse tailings are compared to silica sand (CoreMet) both with an expected compacted bulk density of 1.6 t/m^3.

It is recommended that tailings samples be made available for future physical characterisation tests to be undertaken on the tailings including consistency limits, moisture-density (compaction), hydraulic conductivity, consolidation, and shear strength. These parameters may then be used in determining the attainable dry density of the tailings with compaction, to confirm the required capacity. The mechanical properties of the tailings will be required to determine slope stability analyses.

Waste Rock

The mining process involves blasting of the host country rock. The blasted overburden or waste rock consist of competent pegmatite rock fragments with an estimated maximum particle size of 400 mm. No physical particle size test work was undertaken on waste rock material, and the typical pegmatite rock properties as presented in Table 18.5 were obtained from literature.

Table 18.5: Typical Pegmatite Rock Properties

Property	Detail
In-situ bulk density	2.7 t/m^3
Bulking factor	67%
Loose bulk density	1.62 t/m^3
Friction angle	37 deg

Geochemical Characteristics

The geochemical characterisation and classification of the tailings was undertaken by EnviroSim in April 2022. The purpose of the geochemical characterisation and classification is to assess the potential for pollutant release from the tailings material, and to determine the appropriate management and mitigation measures, and barrier requirements for the tailings impoundment.

The characterisation and classification was undertaken in accordance with regulations under the South African National Environmental Management Waste Act (58 of 2008), which provides the required methodology for assessment of the waste material and selection of an appropriate barrier.

A summary of the key geochemical characteristics as reproduced from the Envirosim report is as follows:

- The natural pH is between 7.8 and 9.
- Contains minimal oxidisable sulphides.
- The total and leachable concentrations of inorganic determinants measured were all below their respective threshold values, apart from Boron which exceed the thermal conductivity dissipation tests threshold value (TCT0) for one of the samples.
- As a result of the Boron concentration, the preliminary classification for the specific sample is a Type 3 (low risk waste), whereas the other sample classify as a Type 4 (inert waste).
- The Boron concentration for one sample was low, and below detection for the other.

- Taking the average Boron concentration into account and based on the analytical results and the trace levels of metals and ions detected in both samples, it is recommended that the tailings expected from the Swanson Project would typically in South Africa be classifiable as Type 4 waste.
- The Class D recommended basal barrier (as per the South African regulations) is a prepared in-situ layer, scarified and compacted to specification.

To date, there has been no geochemical characterisation done on the waste rock material. It is currently assumed that the non-mineralized granitic gneiss waste rock has no polluting potential over the long term. It is however recommended that the impacts of blasting and associated release of nitrates be assessed in terms of the geochemical profile of the deposited waste rock.

18.5.8 Waste Rock Dump Design

18.5.8.1 Operational Plan

The waste rock is hauled from the various pits to the WRD, which is positioned to the south of the EF-pit.

The D-pit is mined first, with the waste rock hauled to WRD. The mining of the EF-pit is followed, with the waste rock either placed on the WRD or used for backfill of the D-pit to elevation 590.1 mamsl. Once the D-pit has been backfilled, the remainder of the waste rock are hauled and placed on the WRD. No further backfill of pits is expected.

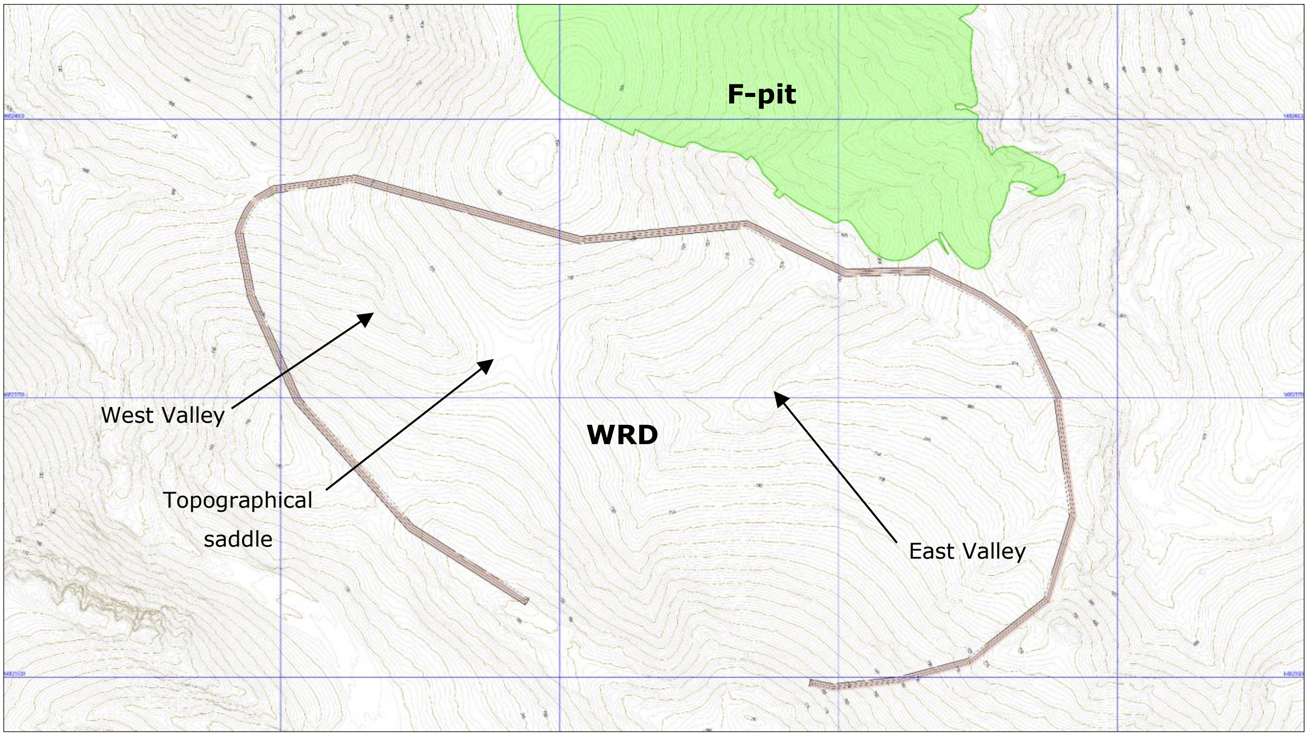
18.5.8.2 Layout and Development

The WRD is developed by placing the waste rock in 10 m lifts with 10 m wide benches and intermediate slide slopes of vertical to horizontal ratio of 1 to 1.5. The final elevation of the WRD is 765 m, with a maximum height of 96 m and footprint of approximately 24 ha.

The storage capacity of the WRD is 6,460,000 m^3 or approximately 10.34 million tonnes. The backfill of the D-pit to the selected elevation requires 224,770 m^3 or approximately 360,000 tonnes.

The development of the WRD is from the lowest point of the valley on the eastern boundary, advancing in an upstream (westerly) direction. The WRD is developed from the western boundary, in an easterly direction toward the topographical saddle. The final WRD landform will fill the valleys and encapsulate the saddle. Figure 18.8 shows the extent of the WRD relative to the F-pit in green. Also shown are the east and west valleys and the topographical saddle.

Figure 18.8: WRD Site Topographical Features



The stage capacity curves as indicate in Figure 18.9 and Figure 18.10 presents the relationship between the elevation, the storage volume and tonnage over the LoM.

Figure 18.9: WRD Elevation vs Volume/ Tonnage

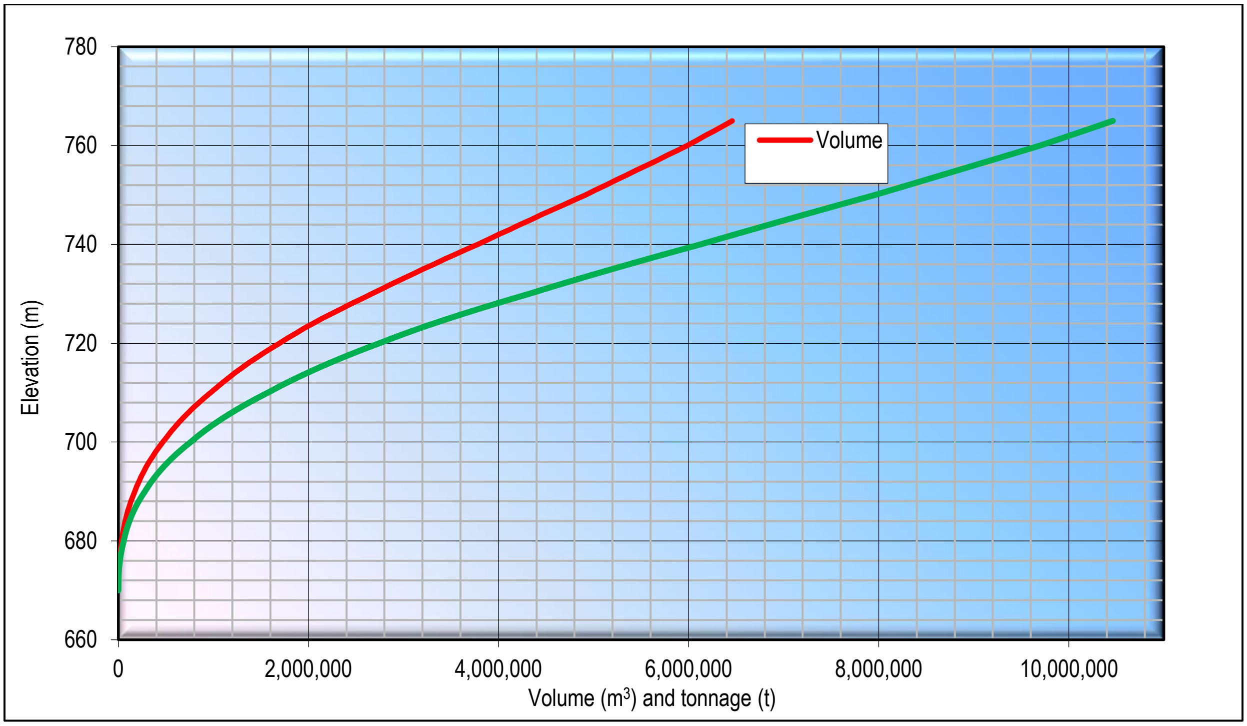
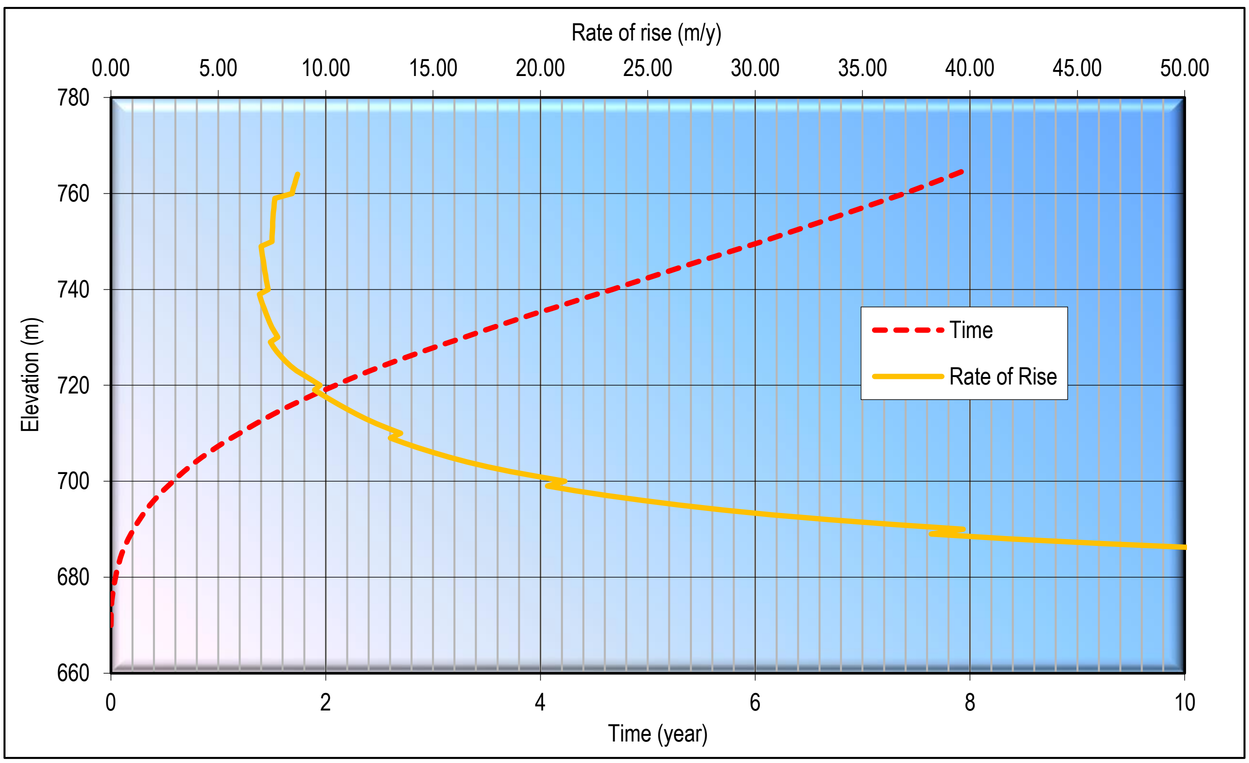


Figure 18.10: WRD Elevation vs Time/ Rate of Rise



18.5.8.3 Containment

The WRD includes a toe embankment wall that defines the extent of the WRD and behind which the material will initially be deposited. The initial waste rock hauled from the pit are used to construct the toe wall to a nominal height of 1.5 m, with a 2 m wide crest and 1V:1.5H side slopes.

18.5.8.4 Surface Water Management

The WRD is positioned across a saddle with valleys on either side, to the east and west. It is anticipated that any precipitation and resultant surface runoff form the valley catchments report to the valley and eventually the valley outlets on the eastern and western boundaries, respectively. The surface water management strategy includes the attenuation and controlled release of runoff, rather than the containment thereof.

Attenuation berms are planned across the valleys at 10 m vertical elevation intervals. The berms will be constructed from waste rock material to a nominal height of 1.5 m, with a 2 m wide crest, 1V:1.5H side slopes and a 3 m wide spillway. These berms will attenuate the runoff collected in the valley catchments.

The toe wall within the valleys at the eastern and western boundaries functions as an attenuation berm. In addition, a rock mattress will be positioned downstream of the toe wall to dissipate the runoff prior to releasing it to the downstream environment. The rock mattress will also be constructed from waste rock and will be placed over an area that is 10 m long and 5 m wide, with a nominal thickness of 500 mm.

18.5.8.5 Stream Diversion

The D-pit intersects an ephemeral river course, that flows in a general east to west direction. During the operation of the D-pit and following the backfill of the pit, occasional runoff from the upstream catchment that is conveyed in the river course will require diversion and further conveyance to the river course downstream of the D-pit.

The backfill of the D-pit is limited to elevation 590 mamsl. The bench above the backfill level is available for the engineering of a diversion structure, likely a combination of a channel and berm. The bench extends from the point where the river course intersects with the D-pit on the eastern perimeter, along the southern perimeter of the pit and exits on the western perimeter.

The development of the D-pit is such that preparatory works for the diversion measure is undertaken during the dry season.

m.PLAN INTERNATIONAL

18.5.8.6 Rehabilitation

The rehabilitation activities currently planned for the WRD include the flattening and reshaping of the side slope profile. The benches and safety berms will be used in cut and fill works to create a 1V:2.5H profile. These activities can be undertaken during operations, but with the condition that deposition activities do not take place above the rehabilitation activities. It is not expected for topsoil to be available to cover final sides slope rock profile of the WRD.

18.5.9 Spiral Plant Tailings Design

18.5.9.1 Operational Plan

The fine and coarse tailings form the Spiral Plant requires separate storage as the fine fraction may be sold to a third party for the processing of the residual Lithium content.

The TSF is positioned to the north-west of the Spiral Plant. The coarse tailings are collected from the dewatering screen oversize stockpile at the Spiral Plant and hauled by truck to the southern section of the TSF, and the fine tailings is collected and hauled by truck to the northern section of the TSF. Both tailings streams are dumped, levelled, and compacted within their respective areas.

18.5.9.2 Layout and Development

The fine and coarse tailings are placed on separate, however adjacent areas of the TSF and are rectangular in shape with a north-west to south-east orientation. The TSF is advanced in a south-easterly direction, with deposition starting at the lowest end, on the north-western flank.

The tailings material is placed by articulated dump truck (ADT) and spread by suitable machine such as a small dozer or TLB. The TSF will be developed as an upstream dry stack facility, with 5 m vertical lifts, an intermediate side slope of 1V:1.5H (≈33.7°), and to a final elevation of 663 mamsl. This will require a total of four lifts for a total final height of 20 m.

The design parameters for each of the TSF are summarised in Table 18.6.

Table 18.6: TSF Design Parameters

General	Fines Tailings Facility	Coarse Tailings Facility
Crest elevation (mamsl)	663	663
Max downstream height (m)	20	20
Required volume capacity (m^3)	435,060	290,040
Volume capacity, without ramp (m^3)	439,908	299,836
Volume capacity, with ramp (m^3)	437,726	297,646
Final crest area (m^2)	13,763	7,456
Final toe area (to outer toe of toe wall) (m^2)	43,681	34,380

The stage-capacity parameters of the TSF has been determined and reflects the relationship between the elevation, the storage volume and tonnage. The stage capacity curves for the Fines Tailings Facility is presented in Figure 18.11 and Figure 18.12 and for the Coarse Tailings Facility in Figure 18.13 and Figure 18.14.

Figure 18.11: Fines TSF: Elevation vs Volume/ Tonnage

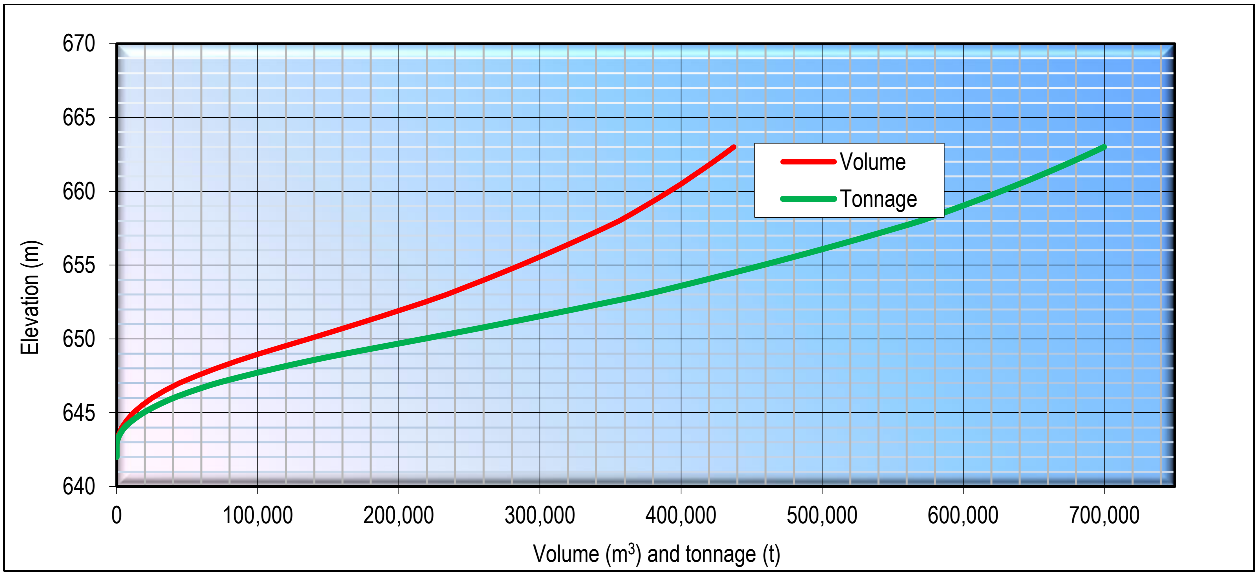


Figure 18.12: Fines TSF: Elevation vs Time/ Rate of Rise

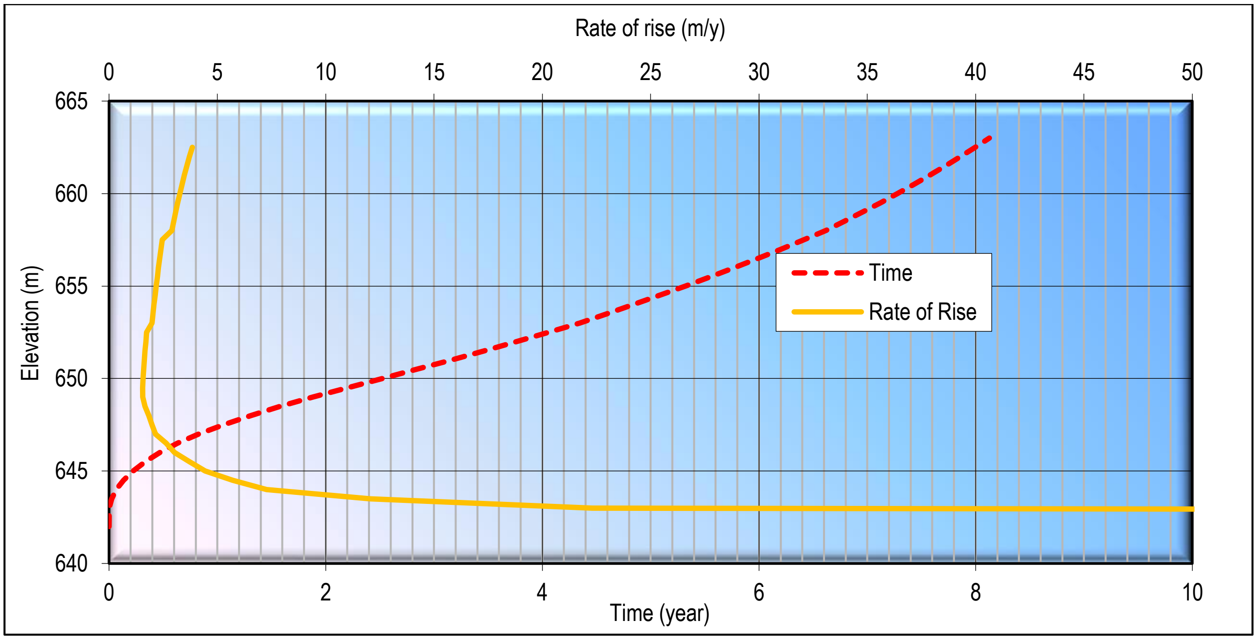


Figure 18.13: Coarse TSF: Elevation vs Volume/ Tonnage

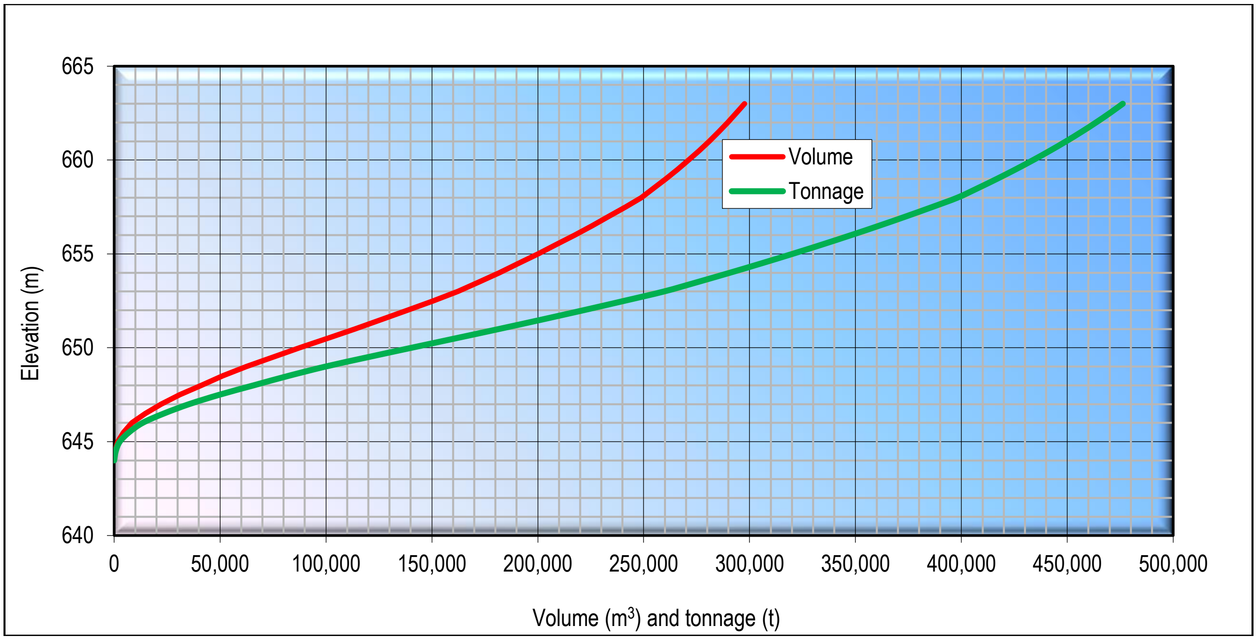
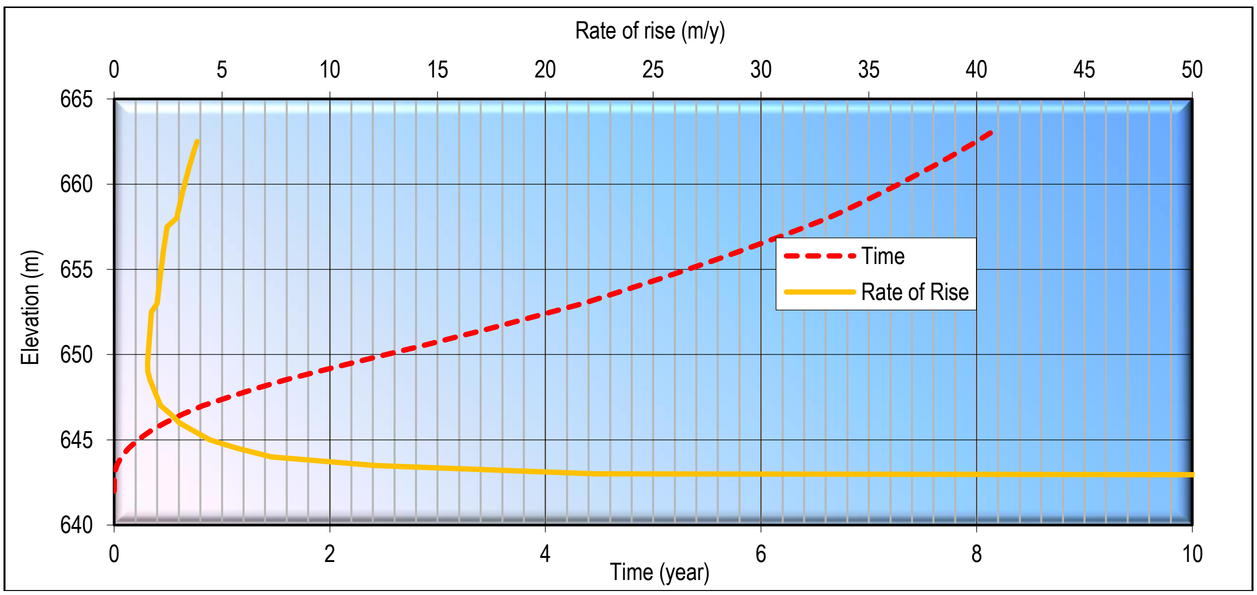


Figure 18.14: Coarse TSF: Elevation vs Time/ Rate of Rise



Access onto the TSF is via single ramp onto a platform, from where two ramps lead to the respective facilities. An access road is included around the perimeter of each facility, and between the facilities. These access roads provide access to perimeter of the TSF during the construction and operational phases for monitoring and maintenance.

18.5.9.3 Containment

A nominal toe wall needs to be constructed for each facility to confine the tailings around its perimeter. Locally sourced borrow material, either from the basin or from a borrow area, are used for the construction of these embankments. The embankment will be 500 mm high, with 500 mm crest width and 1V:1.5H side slope. The material for the toe wall should be placed in 300 mm layers and compacted to 93% Mod AASHTO at optimum moisture content.

18.5.9.4 Drainage

The tailings material is expected to be deposited at a moisture content ranging between 15% and 20%. Under normal conditions, no free water is expected to be released from the deposited material. In the event of upset conditions i.e., higher moisture content and leaching of water from the tailings, and runoff during rainfall events, this water is captured by a perimeter collector trench and berm planned for around the outside perimeter of the toe wall.

The containment berm on the north-western flank of each facility consists of a coarser material, to allow for free movement of any drainage and seepage in a downstream direction. The coarse material for the toe wall is placed in 300 mm layers, and only nominally compacted.

The collector drain for each facility leads to a low point on the north-west flank, from where it can be directed into a drainage outlet trench and allowed into the downstream environment, as the tailings has been shown to have a low potential for the release of pollutants. An energy dissipator consisting of rough grouted stone pitching is positioned at the end of the drainage outlet trench.

The trenches consist of elementary non-symmetrical V-channels, excavated with a grader. The channels are limited to a depth of 300 mm due to the shallow coarse grained gneiss rock encountered during the geotechnical investigation. The perimeter embankment will be 500 mm high, with 500 mm crest width and 1V:1.5H side slope. The material for the perimeter walls will be placed in 300 mm layers and compacted to 93% Mod AASHTO at optimum moisture content.

18.5.9.5 Stormwater Management

A stormwater diversion trench is positioned on the upstream side of the TSF and extends around the external perimeter to positions downstream of the facilities. These trenches are included to divert any surface runoff away from the TSF. Similar to the drainage collector drain channels, the stormwater diversion trench is limited to a depth of 300 mm and consist of a grader-excavated non-symmetrical V-channel. The stormwater diversion trenches will also terminate in an energy dissipator consisting of rough grouted stone pitching.

A berm is positioned adjacent to the trench and is 500 mm high, with a 500 mm crest width and 1V:1.5H side slope. The material for the stormwater diversion berm is placed in 300 mm layers and compacted to 93% Mod AASHTO at optimum moisture content.

18.5.9.6 Rehabilitation and Closure

The rehabilitation and closure of the TSF are based on the following assumptions:

- The fine tailings are planned to be sold as lithium RoM tailings and as such will be removed from site during the LoM.
- The coarse tailings will remain on site indefinitely.
- The potential for contamination of the upper soil profile, any surface water and groundwater resources are low due to the geochemical characteristics of the tailings.

The following describes the proposed rehabilitation activities for the TSF:

- Flattening of the coarse tailings facility side slopes to an overall slope of 1V:3H.
- Flattening of the external perimeter embankments of the coarse tailings facility, such that the perimeter stormwater diversions remains, including the energy dissipators.
- Flattening of the remaining perimeter embankments of the fine tailings facility.
- Flattening of the road layerworks.

19.0 MARKET ASSESSMENT

The Market Assessment of the Swanson DFS Report (Section 19.0), unless indicated differently, is based on a presentation report on the tantalite market by Argus Media Group (Argus), dated March 2022. The Argus Tantalite Market Report was independently prepared for ORP by Argus to present independent market and forecasting analysis of the global tantalite market.

Salient points of the Argus Tantalite Market Report are presented in the following sections:

19.1 INTRODUCTION

The mineral group tantalite [(Fe, Mn)Ta_2O_6] is the primary source of the chemical element tantalum (Ta).

Tantalum is a rare, hard, blue gray, lustrous transition metal that is highly corrosion resistant. It is part of the refractory metals group, which are widely used as minor components in alloys. Its chemical inertness makes it a valuable substance for laboratory equipment, and as a substitute for platinum. Its high electrical capacitance and resistant to chemical attack make it ideal for numerous applications in aerospace and electronics (Global Advanced Metals).

Tantalum is considered a technology critical element by the European Commission.

19.2 MARKET SPECIFICATIONS

Tantalite on the international market generally contains a minimum of 30% Ta_2O_5. However, tantalum above 20% Ta_2O_5 is also of interest.

International tantalum prices are normally referenced to contain a minimum of 25% Ta_2O_5 and includes cost, insurance, and freight (CIF) delivered to main port Europe.

Since tantalum is priced based on the Ta_2O_5 content, the selling price of material containing more than 25% Ta_2O_5 is based on their Ta_2O_5 content applying the basis 25% Ta_2O_5 CIF main port prices. However, the price of material containing less than 25% Ta_2O_5 trades at a discounted to the tantalite basis.

Other tantalum prices (pentoxide and metal) have been assessed by Argus as presented in Figure 19.5.

Tantalum often contains sufficient amounts of naturally occurring thorium and uranium to be classified as radioactive for handling and transport.

19.3 TANTALUM AND CONFLICT MINERALS

Historically, much of the world's easily extractable tantalum ore has been located in the Democratic Republic of Congo (DRC). This area has been in conflict for many years. As such, tantalum, and other minerals in the area, has sometimes financed armed conflict or are mined using forced labour.

Initiatives to prevent the trade in conflict minerals sought to stop funding to militias. The USA Dodd-Franc act requires companies to determine the origins of tantalum and if sourced from the DRC or adjoining countries, to assess the source and origin.

On 1st January 2021 a new law came into force across the European Union aiming to stem the trade in conflict minerals including tantalum.

19.4 SUPPLY AND DEMAND DYNAMICS

19.4.1 Global Outlook

The International Monetary Fund (IMF) reported in April 2022 that the war in Ukraine has triggered a costly humanitarian crisis. Also, economic damage from the conflict will contribute in 2022 to a significant slowdown in global growth and add to inflation.

The IMF projected in April 2022 that growth will globally decrease from 6.1% estimated in 2021 to 3.6% in 2022 and 2023. After 2023 the IMF forecasts that global growth will decrease to about 3.3% over the medium term.

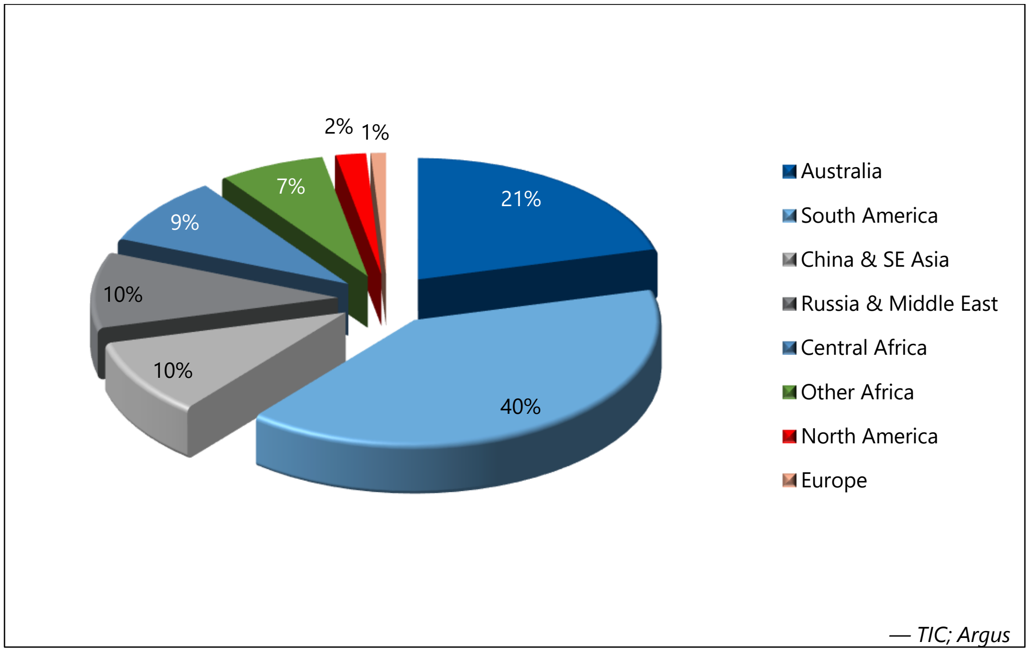
War-induced commodity price increases and broadening price pressures have led to 2022 inflation projections of 5.7% in advanced economies and 8.7% in emerging market and developing economies.

19.4.2 Tantalum Supply

Total tantalum Ore Reserves estimated in 2020 were between 300 kt and 350 kt which is sufficient for up to 140 years at current production levels.

Figure 19.1 presents the estimated 2020 global tantalum Ore Reserves per region.

Figure 19.1: Estimate 2020 Tantalum Reserves



According to the Tantalum-Niobium International Study Center, South America holds the majority of tantalum Ore Reserves at 40% of the global total. Australia, at 20% of the global Ore Reserves, is the single country with the largest tantalum Ore Reserves.

China (and Southeast Asia), Russia (and the Middle East) and Central Africa are all estimated to have around 10%, while the remainder of Africa has 7%.

North America and Europe does not contain significant tantalum Ore Reserves.

Existing world tantalum Mineral Resources (the majority of which are in Australia, Brazil, and Canada) are considered adequate to supply projected future needs. Future supplies will come from Ore Reserves and other currently undiscovered Mineral Resources, and material form recycling and waste disposal or low-grade sites.

19.4.3 Tantalum Mine Production

According to the United States Geological Survey, global mine tantalum production has increased at 8.5% per year from 916 t in 2011 to 2,080 t in 2021 - most of this growth came from the DRC which tripled output over this period. Other significant producing countries include Brazil (23% of global output), Rwanda (13%) and Nigeria (12%). Australia is a growing producer of tantalum a by-product of lithium mining.

On an annualised basis, production of tantalum raw materials peaked at 1,239 t in 2014, before dropping to 389 t in 2020 and then reaching an estimated 675 t in 2021.

In 2021, over 60% of mine production was from primary tantalum concentrates, with by-product material from tin slags (30%) and other concentrates the remainder.

The DRC, the world's biggest tantalum producer, has increased its tantalum mining activities in recent years. In total, output of 700 t of the metal in 2021, producing one third of the world's mined tantalum supply for the year.

Brazil is the second largest tantalum producing country, and one of only two on the list outside of Africa. Overall, Brazil is home to 40,000 t of tantalum Ore Reserves. In light of issues facing tantalum from Rwandan and Congolese, Brazil could become the major source of tantalum in the coming years.

Nigeria was the fourth largest tantalum mining country in 2021. It is believed to have large tantalum Ore Reserves, although the exact figure remains unknown.

Australia did not make the 2021 top tantalum mining list. However, it hosts the world's largest tantalum Ore Reserves (94,000 t of which 39,000 t is JORC compliant).

19.4.4 Secondary Tantalum Production

The ratio between receipts of primary and secondary materials has averaged 75:25 over the last decade. Secondary material supply peaked at 30% in 2013.

Approximately 22% of the 2021 global tantalum production came from secondary tantalum production (tantalum recycling). This is down from a high of 30% in 2013.

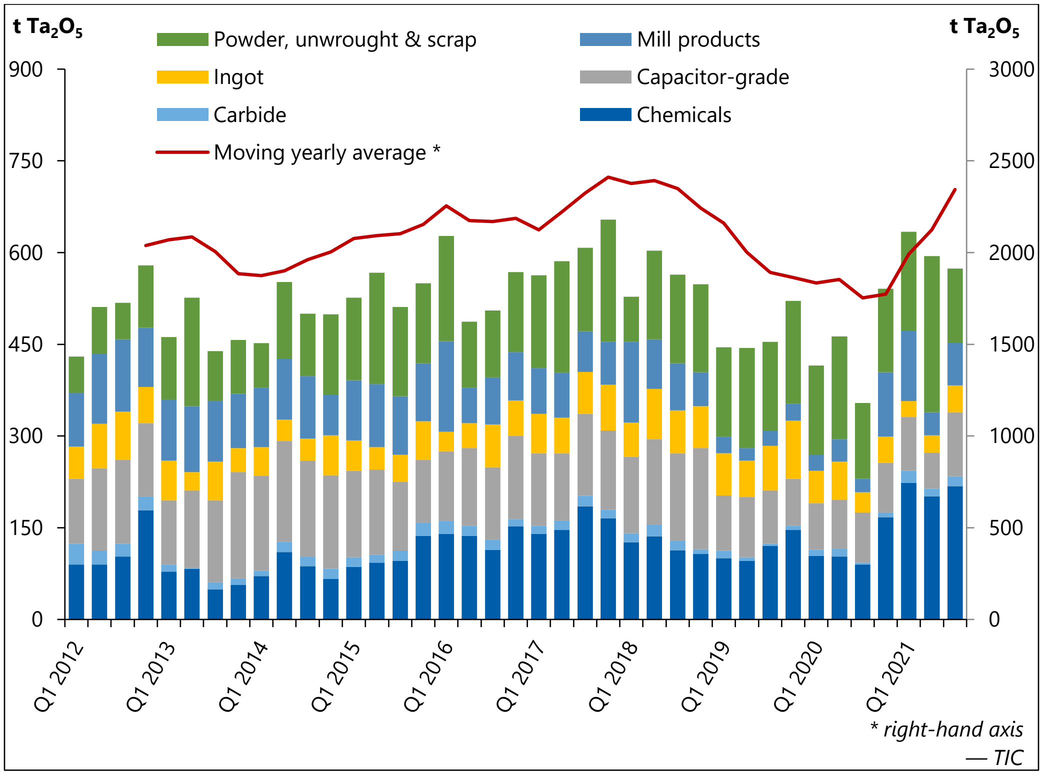
Tantalum is recovered from slags resulting from the smelting of tin. It is also recovered from powder sweepings and wire scrap from capacitor manufacturing, and from end-of-life capacitors and spent sputtering targets.

19.4.5 Global Product Demand

Tantalum demand increased steadily from 1,885 t in 2013 to 2,410 t in 2017, equating to a 6.4% compound annual growth rate (CAGR). Demand then declined year on year to 1,775 t in 2020, a 25% drop from the 2017 peak. Demand for tantalum recovered strongly back to 2017 levels in 2021.

The tantalum product demand between 2012 and 2021 is presented in Figure 19.2.

Figure 19.2: Tantalum 2012 to 2021 Tantalum Product Demand



China is a key tantalite importer and consumer. It purchases around 25% of the world's total consumption.

China has various tantalum pentoxide producers in Jiangxi, Guangdong, Guangxi, and Ningxia provinces. Concentrates from Africa and Brazil have to be shipped at around 85% to 90% tantalum concentrate due to low tantalite ore availability in China.

19.4.6 Tantalum Demand by Application

Demand for tantalum ores and concentrates was estimated at 2,500 t in 2021.

Competition for tantalum metal by industry can be intense because of its narrow supply chain. Of the 2021 tantalum consumption, about 70% of demand came from electronics. In particular, the capacitor sector which in 2020 representing almost 45% of consumption.

Applications for tantalum in high temperature alloys (superalloys) represent a further 25% of demand. These alloys are principally used in turbine blades in civilian and military jet aircraft, as well as industrial turbines (e.g., for power generation).

Other uses include semiconductors, chemical processing equipment, medical equipment, and other various applications.

19.4.7 Demand Forecast

The tantalum outlook continues to remain robust, regardless of its international supply chain scrutiny. Its characteristics will continue to make it a growth market over the next five years. Its application in electronics, aircraft, medical, and especially thermal batteries in electric vehicles assure its continued global consumption.

Vehicle electrification will displace a significant proportion of the automotive components of the internal combustion engine (ICE) in the next 10 years to 20 years.

The global tantalum capacitors market is slated to expand at a CAGR of around 6% over the forecast period (2021 to 2031).

The consumer electronics market often appears to reach its saturation levels with proliferation rates at maximum. However, there are always innovative products that act as critical growth drivers in this sector. One of the biggest markets for consumer electronics is in the USA, with annual consumer spending of over US$400 billion.

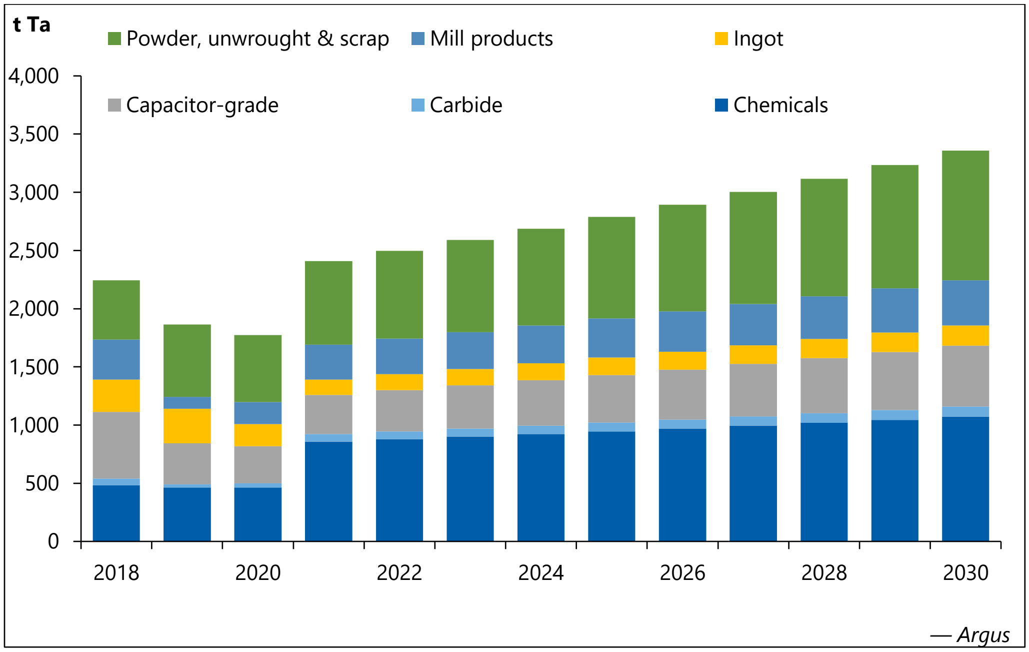
Revenue in the consumer electronics segment is expected to grow between 2022 and 2025 at 7.20% CAGR.

According to Fortune Business Insights, the global consumer electronics industry is expected to reach US$989.37 billion by 2027. The growth is attributable to the growing demand for user friendly electronic products and the rising residential sector that propels the demand for consumer electronics globally. The research mentions that the market is projected to exhibit a CAGR of 5.3% between 2020 and 2027.

In the next 20 years, Airbus forecasts a need for over 39,000 new passenger and freighter aircraft. Having lost nearly two years of growth over the COVID period, passenger traffic has demonstrated its resilience and is set to reconnect to an annual growth of 3.9% per year.

The tantalum demand forecast between 2018 and 2030 for the major products are presented in Figure 19.3.

Figure 19.3: Tantalum Demand Forecast 2018 to 2030



19.4.8 Tantalum Supply Forecast

Production has held steady in central Africa, the world's largest producing region. This year's United Nations report on the trade in conflict tantalum recorded continuing concerning practices, including substantial apparent tantalum smuggling from the DRC and relabelling as Rwandese ore. This could potentially create pressure on supply from the region until compliance and traceability improve.

Even before COVID, the lithium industry was in the doldrums as battery makers worked through the glut of 2018 lithium production. Since Australian lithium mines are also a source of tantalum, tantalum output in Australia decreased. However, the lithium industry is enjoying a resurgence.

Lithium expansion could bring large increases in tantalum production. Within the next few years, it is projected that lithium driven tantalum supply will expand considerably in Brazil and Mozambique.

Co-production of tantalum occurs with relatively minimal incremental environmental impact and predictable economics.

Lithium's growth will cause stability to the tantalum industry. Vehicle electrification, and thus lithium, is likely to remain. Consequently, tantalum supply will increasingly be stable and predictable, ending the profound volatility of the past. Predictable supply from a stable jurisdiction is going to fuel further tantalum demand growth as the perceived supply, reputation, and price risks diminishes over time.

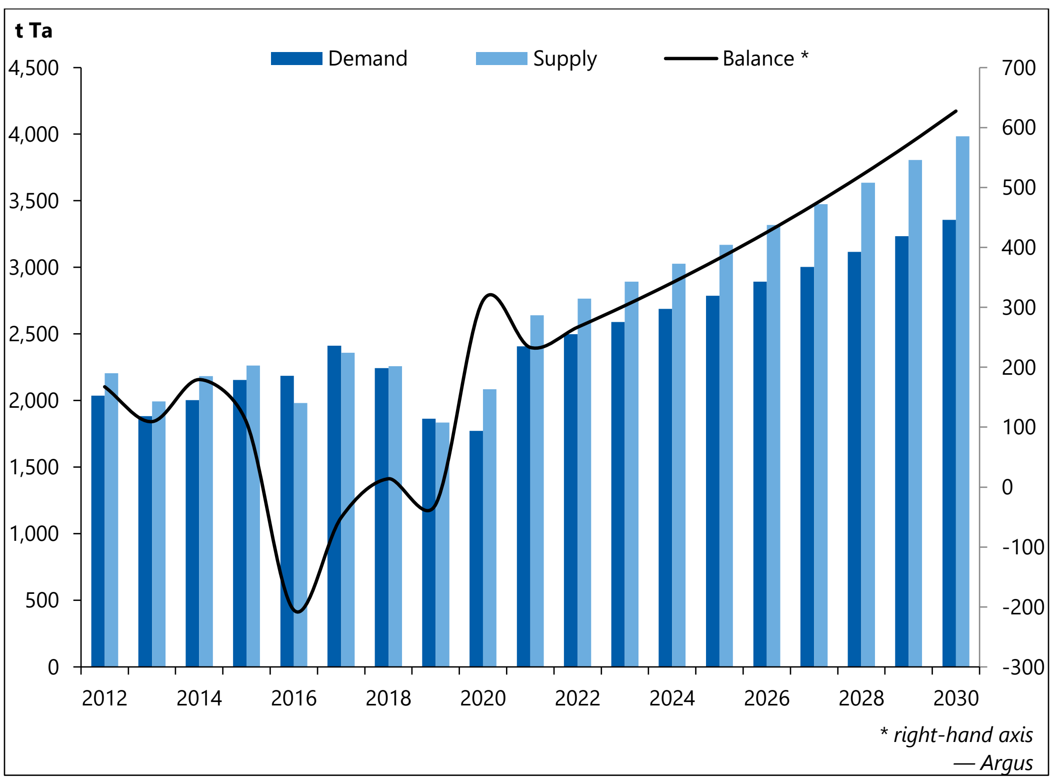
Thanks to lithium battery demand, tantalum supply is poised to grow strongly over the coming years, just as demand also looks set to climb on a sustained basis. Argus predicts that on balance supply is likely to outgrow demand, although the impact of a stable and secure supply on future demand should not be overlooked and could potentially spur faster growth in demand.

Historically, tantalum supply has been skewed towards one region. Until the mid 2010s, Western Australia was the largest source. It was a stable industrial scale source that became relatively expensive. This was entirely replaced by supply from Central Africa - an artisanal scale source that is more economical, but supply is less stable. Tantalum as a coproduct of lithium mining reintroduces industrial scale stability, does so economically, and should result in a balanced global supply without over reliance on any one region.

Each year approximately 30% of all tantalum sold to end users comes from high purity recycled tantalum material. Tantalum recycling is established, and the material is actively traded and much sought after by processors.

Tantalum supply, demand and balance forecast for 2018 to 2030 is presented in Figure 19.4.

Figure 19.4: Tantalum 2018 to 2030 Supply, Demand and Balance Forecast



19.5 Tantalum Prices

During 2020 raw material prices slipped to their lowest levels in a decade. The trend reversed in 2021, with spot prices climbing 50% by mid year. Prices have since slightly decreased. However, for now, appear steady above those of late 2020.

19.5.1 Historical Prices

The price of tantalum increased steeply by over 200% from 2009 (US$86/kg) to 2011 (US$272.5/kg) due to the closure of Wodgina mine in Australia and coming into force of the Dodd Frank act in January 2011 which constrained supply.

Prices fell back almost to 2009 levels by the end of 2016 as supply levels outstripped demand.

Increasing demand put pressure on the supply of tantalum and prices reacted accordingly increasing to a peak of US$232.50/kg in July 2018.

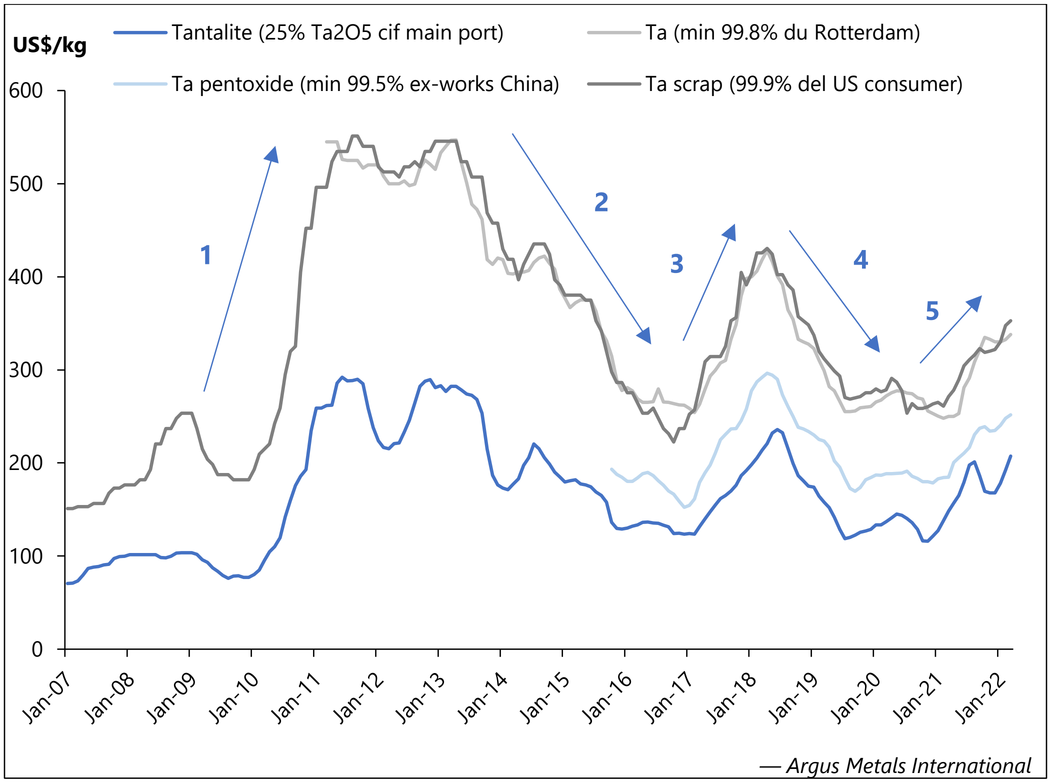
Weakening demand in 2019 and the COVID outbreak in 2020 pushed tantalite prices down to US$115/kg towards the end of 2020.

The ‘V’ shaped recovery in global activity in 2021 helped to boost tantalum demand and tantalite prices recovered to just over US$210/kg in June 2021.

After a small dip in prices toward the end of 2021, prices have rallied on the current geopolitical situation to average US$202.50/kg in March 2022.

As graphically presented in Figure 19.5, tantalite prices show a reasonable correlation with copper prices, which can be used for forecasting or forward price hedging.

Figure 19.5: Tantalum Prices between 2007 and 2021



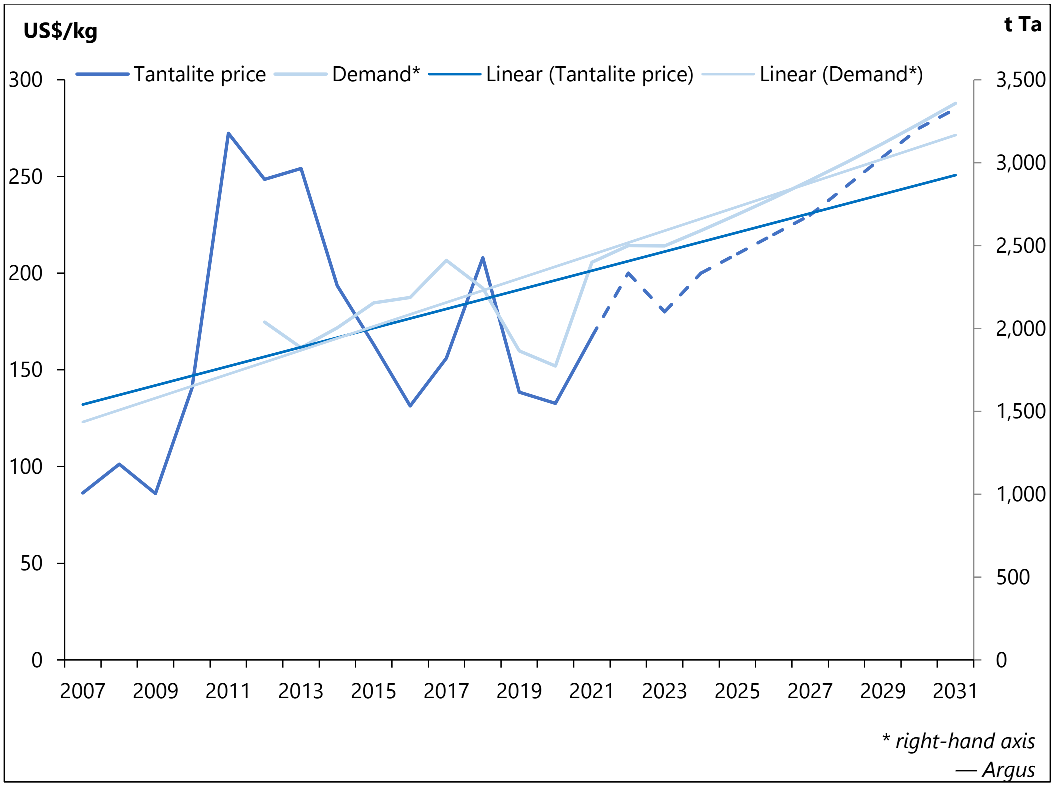
19.5.2 Forecast to 2031

The forecasted tantalite prices (CIF delivered to main port Europe) to 2031 for tantalite containing 25% Ta_2O_5 is presented in Table 19.1 and Figure 19.6.

Table 19.1: Tantalite Price Forecast to 2031 (US$/kg)

Year	Tantalite Price (US$/kg)
2020	132.71
2021	167.15
2022	200.00
2023	180.00
2024	200.00
2025	210.00
2026	220.00
2027	230.00
2028	245.00
2029	260.00
2030	275.00
2031	285.00

Figure 19.6: Tantalum Prices between 2007 and 2021



20.0 ENVIRONMENTAL STUDIES, PERMITTING AND SOCIAL IMPACTS

20.1 Background

The Namibian *Environmental Management Act* (2007) and it's Environmental Regulations procedure (GN 30 of 2012) stipulates that no mineral exploration and mining activities may be undertaken without an ECC. As such, an ECC must be applied for in accordance with regulation 6 of the 2012 environmental regulations.

In terms of section 3 of the annexure contained in the Environmental Regulations of 2012, the following mining related activities require an ECC:

- The construction of facilities for any process or activities which requires a licence, right or other form of authorisation, and the renewal of a licence, right or other form of authorisation, in terms of the Minerals (Prospecting and Mining Act), 1992;
- Other forms of mining or extraction of any natural resources whether regulated by law or not; and,
- Resource extraction, manipulation, conservation and related activities.

It is imperative that the environmental proponent must conduct a public consultation process in accordance with regulation 21 of the 2012 environmental procedure. Also, the proponent must perform an Environmental Impact Assessment (EIA) over the area covered by the Mining Licence. For this, a full environmental impact assessment study with specialist studies incorporated and an Environmental Management Plan Report (EMPR), needs to be submitted for the proposed mining activities.

20.2 Status of Licences

ORP submitted an application for a ML 223 on 22nd May 2020. ML 223 was granted by the Minister for the Department of Mines and Energy of Namibia on 3rd June 2022.

The ML 223 authorise ORP to commence with the necessary development work towards mining operations for base and rare metals, industrial minerals and precious metals for a period of 15 years (from 19th May 2022, to 18th May 2037). The size of the ML 223 is 312.9 ha.

The ML 223 is located 30 km southwest of the town of Warmbad in the Karasburg District of Southern Namibia, on the farm Kinderzit 132 and Umeiss 110. The coordinates for the centre of the mining area are 18°39'51.046"E and 28°41'19.388"S. The mining area is located within the boundaries of EPL 5047, owned by ORP.

In terms of the Minerals (Prospecting and Mining Act) of 1992, a Mining Licence is renewable by application 12 months before the expiry date. The application needs to indicate that the mineral to which the Mining Licence relates exists in the mining area in sufficient quantity that it can be mined and sold.

The Minister may not refuse renewal of a Mining Licence if the holder satisfied the following:

- Complied with the terms of the Mining Licence and the proposed programme of mining operations; and,
- Has expended the capital required for the purposes of which the Mining Licence was granted.

ORP received notice that an ECC was granted under reference ECC 02187 to undertake the proposed development of the Swanson Mine, and to commence with activities specified in ORP's Environmental Assessment Report and EMPR filed with the Ministry of Environment, Forestry and Tourism.

The National Heritage Council of Namibia has Consent to mining operation over ML 223, valid from 14th October 2021, to 13th October 2022. To note is that Heritage Consent is issued only on an annual basis. Considering that the current mining environment has not been altered since the approval from the Heritage Council was sought, ORP is eligible for another one-year extension without the need of undertaking an archaeological field survey.

Impala Environmental Consulting cc (Impala Environmental) is working with the Heritage Consultant on the renewal of the Heritage Consent.

Once mining operations commence, an archaeological field survey has to be undertaken annually by a qualified archaeologist.

20.3 Environmental Impact Assessment

Impala Environmental was appointed by ORP to perform an EIA of the proposed Swanson Mine. The EIA included preparation of an Environmental Scoping Report and EMPR for the development of the proposed Swanson Mine.

Issues and concerns identified in the EIA formed a set of environmental specifications that will be implemented by ORP in operating the Swanson Mine. These environmental specifications form the basis for an agreement between ORP and the Ministry of Environment and Tourism. By virtue of that agreement, the specifications will become binding on ORP.

The findings of the Environmental Scoping Report and EMPR is presented in a document entitled: "Environmental Impact Assessment for the Proposed Development of a Tantalite Mine on ML 223, Southern Namibia", September 2021, by Impala Environmental (the Environmental Scoping Report). The public participation process and Impala Assessment Report was overseen by Mr. Ndaluka Amutenya as the environmental assessment practitioner.

Following granting of ML 223, ORP received confirmation from Nampower, that the mine can be fed up to 2.7 MVA from the substation located in the town of Warmbad. The EIA for the new ~40 km 33 kV or 66 kV line from the Warmbad substation to the Mine is included in the Environmental Scoping Report and Management Plan entitled "Environmental Impact Assessment for the proposed construction of a powerline, pipeline and road in support of tantalite mining on ML 223".

The water pipeline, new access road, and power line will run parallel to each other from Warmbad to the proposed Swanson Mine.

The Environmental Scoping Report for infrastructure development makes provision for water to be sourced from two localities namely, a pipeline from Warmbad or otherwise extracting water from local underground aquifers. ORP elected to source water from Warmbad. In the EIA report, it was proposed that the water pipeline will be less than 40 km long with a diameter of 160 mm.

The Environmental Scoping Report states that mining will occur by both open cast (drilling and blasting followed by loading and haulage) and underground mining extraction over the operational lifespan. The Environmental Scoping Report includes standard methods for the disposal of sewage, hazardous, industrial and domestic waste that is normally applied by mining operations in southern Africa. Environmental rehabilitation is planned both during and at the conclusion of the mining operation.

A good, unsealed (gravel), access road exists to the operational offices. The Environmental Scoping Report makes provision for new unsealed roads to support the mining and recovery plant areas. The provision of unsealed roads is standard practice in Namibia.

The Environmental Scoping Report proposes standard practices for the provision of buildings, fuel distribution, storage and supply and fire fighting that is normally applied by mining operations in southern Africa.

Section 9(a) of the 2102 Environmental Regulations requires disclosure of all specialist studies to be undertaken as part of the assessment process, including any specialist to be included. The specialist studies undertaken and the specialists performing the studies are as follows:

- Archaeological survey was performed by Dr. John Kinahan;
- Water specialist study was undertaken by Dr.Josephine Hamukoto;
- Fauna study was carried out by Dr. John Irish from Biodata Consultancy cc;
- Dr Onjefu Sylvanus Ameh carried out an air quality study over Swanson Property;
- Flora specialist study was performed by Coleen Mannheimer; and,
- Noise specialist study was undertaken by Dr Onjefu Sylvanus Ameh.

The Environmental Scoping Report includes for storage of mine overburden, mine waste, and tailings from the process plant. However, it excludes provision for fine slurry (slime) tailings from the process plant since no slimes will be created in the process - all process tailings will be dry stacked. Following granting of ML 223, ORP revised the initial plan proposed in the Environmental Scoping Report that all waste will only be stockpiled temporarily (for the first three years) after which material will be mixed (fines, plus coarse mine waste) and returned to the mined-out areas for rehabilitation. The revised plan for stockpiling will be disclosed and included in the bi-annual environmental reports once mining operations commence.

The Environmental Scoping Report does not make provision for acid mine drainage since sulphides are not associated with any of the deposits and thus no acid mine leaching will therefore be present.

Although no archaeological sites have been identified to date, appropriate measures will be undertaken upon discovering of archaeological sites. All archaeological remains are protected under the National Heritage Act of 2004 and will not be destroyed, disturbed or removed. The Act also requires that any archaeological findings should be reported to the Heritage Council in Windhoek. An appropriate Chance Find Procedure is included in Appendix 1 of the archaeological report.

The Environmental Management Principles and proposed mitigation measures, outlined in the EMPR, is standard for mining operations within Namibian. These do not impose any stricter requirements on ORP for the development of the proposed Swanson Mine. Similarly, proposed monitoring, auditing and reporting to ensure compliance with the EMPR and recommended closure and rehabilitation activities post mining, conforms to standard mining practices.

The Environmental Scoping Report concludes as follows:

- Due to the potential employment of 96 people, their families will benefit from the proposed Swanson Mine. The proposed Swanson Mine has great potential to improve livelihoods and contribute to sustainable development within the surrounding Warmbad; and,
- Potential negative impacts associated with the proposed Swanson Mine are expected to be low to medium in significance:
    - Provided that the mitigation measures are implemented, there are no environmental reasons why the proposed Swanson Project should not be approved; and,
    - Botanical work done to date did not raise any concerns, but will be monitored on an on-going basis.

The report on the archaeological survey (Kinahan, September 2021) presents that no sites of heritage significance were found, and proposed that the ORP be given consent to proceed with exploration and mining activities.

The report on fauna study (Irish, September 2021) presents the following concerns:

- The leopard, mountain zebra, brown hyena and klipspringer are the only large wildlife species of concern in the area. Threats they face from the development include:
  - Habitat loss within the area of the Mining Licence (MLA). The loss may be offset by ensuring no further habitat loss or disturbance of wildlife outside the MLA; and,
  - Enforcing speed limits to minimise road kills of mainly the brown hyaena at night.
- The Karoo girdled lizard is the only reptile of concern in the area. The threats it faces from the development include:
  - Habitat loss – as above - enforcing undisturbed no-go of the surrounding areas;
  - Enforcing speed limits to minimise road kills of the slow-moving lizards; and,
  - Minimizing illegal collection through employee education and security control (equipment movement) out of the mining area to prevent live animal movement.
- The Verreaux's eagle, rock kestrel, spotted eagle-owl and barn owl are the only birds of prey of concern in the area. The threats they face from the development include:
  - Habitat loss – as above - enforcing undisturbed no-go of the surrounding areas; and,
  - Enforcing speeds limits to minimise road kills of especially owls at night.
- A natural spring of high importance to wildlife exists in the area which might be negatively impacted by direct water extraction or lowering of the water table. It is proposed to:
  - Ensure the continued availability of the water resource by enforcing undisturbed no-go of the surrounding areas. No new development within 1 km from the spring not to disturb wildlife using the water resource;
  - No water abstraction from the spring should be allowed at all; and,
  - Regular monitoring of the water table level of the spring. Any lowering should necessitate appropriate action to maintain the ecological integrity of the spring.

The report on the water specialist study (Hamutoko, no date) suggests little or no impact on groundwater resources from the proposed Swanson Mine. Water samples from a borehole approximately 11 km from the proposed Swanson Mine indicated that due to high fluoride content its water is unsuitable for human consumption. The water planned to be sourced from Warmbad is potable water and as such water for human consumption will not be sourced from groundwater.

The report on the flora specialist study (Mannheimer, August 2021), states that only one plant species of high conservation concern would be substantially affected by the proposed Swanson Mine. It proposes that if mitigation measures are followed, then the impact of the proposed Swanson Mine on vegetation is likely to be minor. However, it states that the assessment did not include any linear infrastructure, such as potential roads, pipelines or power lines, or any areas for staff housing and note that:

- The access road from the D206 crosses a zone of high concern. Development of this zone should trigger a floral assessment; and,
- The same applies to pipelines and power lines. There are areas along the access road that would need similar assessment should they be targeted for development.

The report on air quality and noise study (Ameh, no date) states that noise pollution and dust deposition are major components of mining activities. However, environmental deterioration of air quality and noise pollution can be addressed through implementation of the recommended Environmental Management and Monitoring Plans.

20.4 Social Licence to Operate

The Environmental Scoping Report includes the findings of assessing social impacts and assessing the significance of the identified impacts to develop the Swanson Mine.

The Public Participation Process section of the Environmental Scoping Report presents that no negative concerns were received.

The Environmental Scoping Report proposes that 96 families will benefit from the Mine. The Mine has the potential to improve the livelihoods and contribute to sustainable development within the surrounding communities.

The Environmental Scoping Report allows for community meetings by ORP to effectively communicate with the local community and thus to avoid unexpected social impacts. ORP would provide a fund, that would contribute 1% of the after-tax profit of the Swanson Mine to fund local community projects.

ORP committed their socio-economic development plan to the Ministry of Mines and Energy, in a document dated 20th June 2022. In this, ORP prioritised various types of initiatives and programmes to meet its long-term socioeconomic development obligations. ORP's socio-economic development plan conforms to standard mining practices in Namibia, does not propose more onerous commitments for the development of the Swanson Mine and conforms to the guideline of Namibia's 5th National Development Plan.

21.0 CAPITAL AND OPERATING COSTS

21.1 PROJECT REQUIREMENTS

21.1.1 Introduction

The purpose of the CAPEX and OPEX cost estimates are to determine costs that has been estimated in accordance AACE Class 3 - Recommended Practice 47R-11, for use in the Economic Analysis.

The various AACE class estimates are outlined in Table 21.1. The Class 3 is presented in bold.

Table 21.1: AACE Class Guidelines

Primary Characteristic			Secondary Characteristic	
CLASS	**DEFINITION** Completion definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical of estimating method	**ACCURACY** Low and high ranges at a 50% confidence
5	0% to 2%	Concept Screening	Capacity factored, parametric models, judgment or analogy	L: -20% to -50% H: +30% to +100%
4	1% to 15%	Study or Feasibility	Equipment factored or parametric models	L: -15% to -30% H: +20% to +50%
3	**10% to 40%**	**Budget, control, or authorization**	**Semi-detailed unit costs with assembly level line items**	**L: -10% to -20% H: +10% to +30%**
2	30% to 70%	Control or bid/tender	Detailed unit cost with forced detailed take-off	L: -5% to -15% H: +5% to +20%
1	50% to 100%	Check estimate or bid/tender	Detailed unit cost with detailed take-off	L: -3% to -10% H: +3% to +15%

DFS costs are based on contractors performing the mining and the operation and maintenance of the Primary/Secondary Crushing and Spiral (Concentrator) Plant.

21.1.2 Responsibilities

The DFS costs were estimated by the various specialist consultants as outlined in Table 21.2.

Table 21.2: CAPEX and OPEX Responsibility Matrix

Discipline	Responsibility
Geology and grade control	LexRox Exploration
Contractor mining	SPK Kundalila
Contract crushing and surface material handling	SPH Kundalila
Access and haulage roads and road maintenance	SPH Kundalila
Spiral Plant	Obsideo Consulting
Spiral Plant tailings	Prime Resources
Water pipeline and maintenance	Spes Bona Engineering
Electrical power line	Walters Electrical Services

Discipline	Responsibility
Reagents	Obsideo
Laboratory	LexRox Exploration
Geology	LexRox Exploration
Survey	LexRox Exploration
Environmental monitoring	Impala Consulting
Owner's cost (salaries, wages, admin, vehicles)	ORP
Concentrate transport and CIF shipping to Hamburg	Kuehne and Nagel
Site security	Southern Security
IT hardware, software, communication, and CCTV	LexRox Exploration
Accounting	Fellowship
Office, furniture, and Owner's vehicles	ORP
Insurance and policies	Namrisk

21.1.3 Escalation

All cost, commodity princes and exchange rates are as the DFS Base Date of 31st March 2023. The cost estimates applied a 4.0% escalation to allow for price increases from estimation completion in Q3 2022 to the DFS Base Date.

21.1.4 Exclusions

The following were not included in the DFS cost estimates:

- Financing costs;
- Taxes and duties (these have been calculated separately as part of the DCF);
- Sunk costs;
- Currency fluctuations; and,
- Ongoing exploration costs.

21.1.5 Exchange Rates

The DFS costs are presented in United State dollar (US$). The estimate was performed in NAD which is pegged to the South African Rand (ZAR) at a rate of 1:1. An exchange rate of NAD18.30/US$ was used to convert the NAD estimate to US$.

21.2 Capital Cost

21.2.1 Scope of the Estimate

The CAPEX estimate consists of direct and indirect costs, including Owner's costs and contingency costs, to be expended as follows:

1. Initial CAPEX which extends from the finance investment decision (FID) until the start of the commercial production. FID is the milestone decision to proceed with the capital project planning process to proceed with the major financial commitments; and,

2. Sustaining CAPEX that includes all costs expended during the period starting at commercial production and extending until the end of the LoM.

The initial and sustaining CAPEX includes labour, permanent material and equipment, and subcontractors' costs required for the mine pre-production development, erection commissioning and ramp-up of the Spiral Plant another associated processing and mining facilities, the TSF, as well as the required infrastructures, services and utilities normally associated with open cast mining and processing in Southern Africa, and to support normal operation.

The CAPEX prepared for the DFS qualifies as a Class 3 estimate as per the AACE Recommended Practice 47R-11. The accuracy of the overall CAPEX estimate is assessed at between +15% and -15%. The overall contingency provision for CAPEX and OPEX are 10.0% and 7.5%, respectively.

21.2.2 Basis of Estimate

The CAPEX estimate has been derived from information collated from the following technical design documents:

- LoM pit production schedule, including stockpiling operations and cost estimates;
- LoM Primary/Secondary Crushing and Spiral Plants design and cost estimates;
- Access and mine haul roads designs and layouts;
- Metallurgical testwork and process plant design criteria;
- General arrangement and layout drawings;
- Process flow diagrams;
- Process plant equipment data sheets and lists;
- Process plant piping and instrumentation diagrams;
- Electrical single-line diagrams and motor lists;
- Various discipline material take-offs (MTOs);
- Quotations from vendors;
- Quotations from vendors on main construction contracts;
- Construction and ramp-up schedules; and,
- Historical databases.

The following assumptions were made in the preparation of the DFS CAPEX estimate:

- The longest construction is that of the Spiral Plant that is estimated to be completed within 12 months;
- LoM is 8 years (97 months in total);

- Smooth transition between the various implementation phases;
- Topography, geotechnical and material assumptions include:
  - the chosen site is suitable for the foundations; there are no specific problems due to excess precipitation or groundwater. Rock excavation will be required during excavation. A geotechnical survey was conducted, and site conditions were confirmed;
  - there is no requirement for piling;
  - the earthworks bill of quantities (BOQs) is optimised in terms of cut and fill as a function of the topography. Further topography surveys will be performed during the early stages of the detailed engineering phase;
  - a source of aggregate, adequate for fill/backfill as well as for concrete mix, in sufficient quantity, will be within 2.5 km by road from the centre point of the process area;
  - waste rock from the mine pit will be adequate for all fill requirements;
  - excavated material, and mining waste for construction, will be non-acid generating;
  - the structural design will not be modified as a result of further topography studies; and,
  - the structural design will not be modified as a result of further geotechnical studies.
- Construction assumptions include for the following:
  - the construction work will be executed as a single EPCM contract;
  - the construction schedule will run for 12 months during which time the access roads will be upgraded and the mains power supply will be constructed - the current access road will be sufficient for deliver of goods required to maintain the construction schedule and construction will require the use of temporary fuel-powered generators;
  - there will be proper communication and cooperation by all construction contractors;
  - there will be no shortage of skilled trades workers throughout the construction phase, including the early works phase;
  - the Construction Contractors' facilities will be located within a maximum of 30 min walking distance from the working point;
  - the construction site will be accessible 24 h daily and 7 d weekly with adequate safety supervision;
  - the inspection of equipment and material upon reception at site will reveal no deficiency; hence, there is no provision for rework or repair; and
  - there will be no rework to field erected and installed equipment and material resulting from a quality assurance/quality control (QA/QC) inspection.
- Design and measurement assumptions includes for:
  - each open pit consists of only one ramp;

  - two FELs will be sufficient for loading of the Primary/Secondary and Spiral Plants and loading of the Spiral tailings;
  - transfer of mining waste and the spiral tailings to the storage facility will by haul trucks;
  - piping was measured from P&IDs and drawings; and,
  - instruments were measured from P&IDs.
- Transportation of procurement equipment, machines and construction material will be by commercial road vehicles from single collection depots located in either Johannesburg or Walvisbay.

The following are excluded from this CAPEX estimate:

- Taxes, duties and royalties (these have been calculated separately as part of the DCF);
- Risk provision, including costs pertaining to mitigation plans;
- Escalation beyond the DFS Base Date of 31st March 2023;
- Work stoppage resulting from labour dispute;
- Scope changes; and,
- Delays resulting from the following:
  - permitting and licencing;
  - financing; and
  - FID approval.
- The overall contingency provision for CAPEX and OPEX are 10.0% and 7.5%, respectively.

21.2.3 CAPEX Summary

The total CAPEX for the Swanson Project was estimated to total **US$9,870,850**. This cost excludes overall 10.0% contingency which were included separately in the DCF model.

The CAPEX by work breakdown structure (WBS) is summarised in Table 21.3.

Table 21.3: Total CAPEX

Description	Cost (US$)
Geology and grade control	58,520
Access road	559,050
Haulage road	315,000
Mine establishment (equipment and workshop)	947,590
Primary/secondary crushing establishment	85,250
Spiral Plant	6,362,280
Spiral Plant Tailings	298,970

Description	Cost (US$)
Water pipeline	514,320
Power supply	524,860
IT hardware, software, communication, and CCTV	13,180
Office and furniture	123,630
Owner's vehicles	68,200
Total	**9,870,850**

21.2.4 Geology and Grade Control

The CAPEX for geology and grade control were estimated by LexRox Exploration Services and consist of the items presented in Table 21.4.

Table 21.4: Total CAPEX

Description	Cost (US$)
Laboratory	
Microscope	280
Heavy liquid equipment and laboratory equipment	1,140
Laboratory crusher	1,990
Pellet maker	280
Handheld XRF with stand and standards	23,300
Subtotal Laboratory	**26,990**
Geological Items	
General Items (sample bags etc.)	1,700
GPS & survey equipment (include drone)	8,520
Compasses and digital camera	850
Field equipment for field camp	1,140
Sub Geological Items	**12,210**
Transport	
4 * 4 vehicle	17,050
4 * 4 trailer	2,270
Subtotal Transport	**19,320**
Total Geology and Grade Control	**58,520**

21.2.5 Contractor Mining and Crushing

The CAPEX for the access and haul roads, contract mining, surface materials handling and Primary and Secondary Crushing and Screening Plant (Primary/Secondary Crushing Plant were estimated by SPK Kundalila (SPH).

21.2.5.1 Access and Haul Roads

The initial CAPEX cost to establish the main access road connecting the C10 secondary gravel road with the Swanson Mine and the various haul roads were based on preliminary engineering designs and estimates. These formed the bases to estimate material take offs. NAD rates from current execution work were applied to the various take offs to determine NAD CAPEX. The US$ CAPEX equivalent were determined by applying the DFS exchange rate of NAD18.30/US$.

The total CAPEX for the access road and haul roads equates to US$565,350 and US$318,560, respectively. Table 21.5 present a cost breakdown of the various items comprising the total road CAPEX.

Table 21.5: Road Cost Breakdown

Description	Amount (US$)
Access Road	
Site establishment	48,310
Accommodation of traffic	1,720
Clearing and grubbing	32,960
Drains	52,000
Prefabricated culverts	34,420
Borrow materials	13,470
Breaking material borrow pits	155,620
Mass earthworks	218,630
Pitching stonework	1,920
Subtotal Access Road	**559,050**
Haul Roads	
Site establishment	22,730
Clearing and grubbing	2,270
Drains	5,110
Borrow materials	3,350
Mass earthworks	278,730
Road signs	2,810
Subtotal Haul Roads	**315,000**
Total Roads	**874,050**

21.2.5.2 Mining and Crushing

Mining and primary crushing and screening will be by contractor operator with a core Owner’s Team to manage contractor operations. As such, CAPEX for mining is limited to US$947,590 as outlined in Table 21.6.

Table 21.6: Road Cost Breakdown

Description	Cost (US$)
Workshops	317,770
Equipment Wash-bay	45,400
Site Offices	72,630
Small tools	63,550
Office furniture and supplies	18,160
Internet infrastructure	27,240
Transport of fixed infrastructure items	99,870
Transport of Earthmoving Equipment	263,290
Other	39,680
Total Mining Cost	**947,590**

The CAPEX for the Primary/Secondary Crushing Plant equates to US$85,250. This plant consists of semi-mobile solutions comprising standard, heavy-duty crushers, and screens. These semi-mobile units are supplied complete and ready to run. The crushers and screens are mounted on skid-frames that do not require concrete foundations and are designed for rapid installation and integration.

The CAPEX for the Primary/Secondary Crushing Plant includes only site establishment since the CAPEX for the semi-mobile units will be amortised over the LoM for which the contractor will invoice ORP per tonne ore crushed.

21.2.6 Spiral Plant

21.2.6.1 Summary

The CAPEX for the Spiral Plant was estimated by Obsideo Consulting. The cost estimate was completed as detailed in a Basis of Estimate, appended to the Obsideo report entitled: "Orange River Pegmatite Feasibility Study, Processing Plant Feasibility Study Report", Ref No. 6080-0000-GREP-001.01, signed 25th October 2022, Revision 0B. The purpose of the Basis of Estimate is to document and record in detail the basis and methodology that was used to compile the CAPEX estimate.

The Basis of Estimate of the Spiral Plant is presented in Appendix E and the calculation of the escalation applied in estimating the costs for the Spiral Plant is described in Appendix I.

The WBS consists of the following areas:

- Level 1: ORP Tantalum Project Feasibility Study (000); and,
- Level 2: consisting of the following sub-areas:
  - VSI Circuit (100);
  - Rougher Circuit (200);
  - Cleaner Circuit (300);
  - Filtration and Drying (400);
  - Tails Handling and Water Recovery (500);
  - Electrical & Instrumentation (600); and,
  - Civil & Structural (700).

The cost breakdown structure was compiled according to the various disciplines and cost drivers.

21.2.6.2 CAPEX Estimate

All cost, commodity princes and exchange rates are as the DFS Base Date of 31st March 2023. The cost estimates applied a 4.0% escalation to allow for price increases from estimation completion in Q3 2022 to the DFS Base Date.

The CAPEX estimate has been prepared using MS Excel and is presented as such. Summary tables have been used to compile cost allocations that can be used for reporting. Various reports and summaries have been generated to show the required level of details per Cost Breakdown Structure.

The Basis of Estimate present in detail the methodology to estimate the following components of the CAPEX estimate:

- Mechanical, electrical and instrumentation equipment;
- Civil, structural, mechanical, earthworks, platework, piping, electrical and instrumentation;
- Fixed preliminary and general;
- Timed related preliminary and general;
- Civil and infrastructure BoQs;
- Structural steel BoQs;
- Mechanical installation;
- Structural platework BoQs;
- Piping costing methodology;
- Electrical, cabling and instrumentation costing methodology;
- First fills, strategic and commissioning spares;
- Logistics management;
- Engineering, procurement, construction and management;
- Owner's costs;
- Escalation; and,
- Contingency.

M.Plan reviewed the Basis of Estimate and the above discipline estimation methodology and believe this conforms with standard and best international practices for AACE Class 3 cost estimation.

To complete the CAPEX, the major cost elements were identified and quantified. Request for quotations were issued to the market and cost was the main driver for the procurement philosophy considering the location and accessibility of the site. The cost estimate assumed no (significant) interruption of the implementation schedule after funding approval has been given. It is also assumed that all environmental and permitting requirements will have been satisfied prior to FID to allow for the continuous execution of the proposed Swanson Mine.

The CAPEX for the Spiral Plant per WBS are presented in Table 21.7.

Table 21.7: Spiral Plant

Description	Cost (US$)
Mechanical	2,120,190
Electricity and instrumentation	432,250
Civil, structural mechanical, platework, piping, electrical instrumentation	2,279,410
Logistics	381,150
First fill and spares	106,010
EPCM	625,560
Owner's cost	260,650
Escalation	157,060
Total Spiral Plant	**6,362,280**

The calculation of the total CAPEX for the Spiral Plant is outlined in Appendix F of the Obsideo Processing Plant Feasibility Study Report (Ref No. 6080-0000-GREP-001.01).

The following Source Documentation formed the basis of the estimate of the Spiral Plant CAPEX:

- Process flow diagrams;
- Piping and instrumentation diagrams;
- Block plans;
- General arrangement drawings;
- Mechanical equipment list;
- Electrical and instrumentation equipment lists;
- Piping and cable schedules;
- Bills of materials;
- Vendor (turnkey) packages;
- Evaluated tender documents;
- Client and consultants' reports; and,
- Project implementation plan and schedule.

21.2.7 Spiral Plant Tailings

The CAPEX of the Spiral Plant tailings is associated with the construction of the fine and coarse TSF and is determined from the required works which includes the following:

- Site establishment with all the required manpower and equipment to support the Works.
- Clearing and grubbing of the TSF basin, embankment, and channel footprint areas.

- Removal of any topsoil over the TSF basin, embankment, and channel footprint areas. This may be limited as there are abundant gravel on surface, including outcropping of coarse-grained hard rock gneiss.
- Stockpiling of topsoil that has been stripped of the TSF basin, embankment, and channel footprint areas, in a designated area, in close proximity to the TSF.
- Scarification, moisture conditioning and compaction of areas such as the TSF basin and perimeter road subgrade where loose materials are encountered.
- Excavation of seepage collection and stormwater diversion trenches with a grader to form non-symmetrical V-channels.
- Development of borrow operations within the TSF basin, as instructed by the Employer.
- Excavation of borrow material over the basin of the TSF to be stockpiled and used for embankment construction.
- Construction of perimeter containment and stormwater diversion embankment walls and fills with selected and approved material from the borrow material stockpiles.
- Placement and compaction of selected and approved material for the TSF perimeter access road layer works.
- Civil works: placement of grouted stone pitching at the outlet of the stormwater diversion channels and seepage collection channel.
- Servicing and maintenance of all equipment used in the execution of the Works.
- Provision of labour, supervision, and management for the execution of the Works.
- Site dis-establishment including removal of all buildings, and waste from site.

The CAPEX estimate for the TSF makes allowance for the construction of the perimeter and division embankments, which includes dozing, levelling, shaping of the waste rock in layers. The haulage and placement of the calcareous waste rock is undertaken by mining fleet and is included under the mining cost.

The CAPEX estimation of the TSF have been determined with an accuracy of between +15% and -15% and are presented in US dollars (US$) as of February 2023, with a zero-discount rate.

The costs have been based on a schedule of quantities for the works and construction rates provided by SPH Kundalila. The CAPEX estimate associated with the construction of the TSF are summarised in Table 21.8.

Table 21.8 TSF CAPEX Estimate

Description	Cost (US$)
Site clearance, clearing and grubbing, removal of topsoil	52,100
Base preparation, scarification, and compaction	30,770
Excavations of channels and borrow from the basin	42,240
Construction of embankment walls and fills	77,040
Access road works	9,650
Civil works	3,460
Water supply*	15,510
Sub-total	**230,770**
P&G (~US$11,000 per month for 6 months)	68,200
Total CAPEX	**298,970**

*Water is assumed to be supplied to a central facility at a cost of R130/kl. These works require an estimated 2100 kl (SPH, 2023).

Earthworks of the TSF site will be performed by the mining contractor. P&G allowance of ~US$11,000 per month for initial 6-month period based on 30% of total TSF CAPEX.

Excluded from the CAPEX estimate are the following:

- Any electrical, mechanical and instrumentation equipment is unlikely to be required nor costed.
- Any works associated with the haul road between the Spiral Plant and the TSF.
- WRD preparation since topsoil removal and preparation has been included for in mining CAPEX contingency.
- Overall contingency of 10.0% has been allocated in the DCF model.

21.2.8 Bulk Water and Power Supply Infrastructure

The CAPEX for the bulk water pipeline and power supply infrastructure were estimated respectively by Spes Bona Engineering and Walters Electrical Services. The CAPEX breakdown for these supply infrastructures are outlined in Table 21.9 and Table 21.10, respectively.

Table 21.9: Water Pipeline

Description	Cost (US$)
Pumps	11,370
Pipeline	426,230
Reservoirs	31,260
Power supply	2,840
Installation	42,620
Total water pipeline cost	**514,320**

Table 21.10: Power Supply

Description	Cost (US$)
Material and construction	397,810
Do pole hole and stay drilling	51,320
Metering Unit and DB board and cable and install	7,960
Pole mounted transformer	22,110
Transformer equipment	23,440
Site establishment	22,220
Total power supply	**524,860**

21.2.9 IT, Office, and Owner's Vehicles

The CAPEX for Information Technology (IT) hardware and software, office prefabricated buildings, office furniture and Owner's vehicles were estimated by LexRox Exploration Services and consist of the items and costs as presented in Table 21.11.

Table 21.11: IT, Offices, Furniture and Owner's Vehicles

Description	Cost (US$)
IT Hardware	
Server & power supply & fire wall & network	3,120
CCTV system	1,020
Laptops (6)	3,140
Printers and plotters	690
Sub Total IT Hardware	**7,970**
Software	
Windows and anti-virus	1,120
Accounting	590
Setup and installation cost	3,500
Subtotal IT	**5,210**
Total IT	**13,180**
Offices	
12 x prefabricated offices	46,880
3 x prefabricated ablution facilities	37,360
1 x prefabricated boardroom	9,050
1 x prefabricated laboratory	9,050
Transport	5,140
Office furniture	16,150
Subtotal offices and furniture	**123,630**
Owner's vehicles	
1 x Double cab	39,780
1 x Single cab	28,420
Subtotal owner's vehicles	**68,200**
Total IT, offices and furniture and owner's vehicles	**205,010**

21.3 Operating Cost

The OPEX is based on the following:

- contractors performing the mining and the operation and maintenance of the Primary/Secondary Crushing and Spiral (Concentrator) Plant;
- excludes taxes, duties and royalties (these have been calculated separately as part of the DCF);
- Base Date of 31st March 2023. The cost estimates applied a 4.0% escalation to allow for price increases from estimation completion in Q3 2022 to the DFS Base Date;
- Fuel cost of US$1.33/l;
- Electricity cost of US$0.072 /kWhr; and,
- Water cost of US$0.842/ kL.

The OPEX prepared for the DFS qualifies as a Class 3 estimate as per the AACE Recommended Practice 47R-11. The accuracy of the overall OPEX estimate is assessed at between +15% and -15%. The overall contingency provision is 7.5%.

21.3.1 OPEX Summary

The Swanson DFS OPEX consist of a fixed monthly and a variable component. The variable component is charged on a per tonne basis. The OPEX (fixed monthly and variable per tonne material) per WBS are presented in Table 21.12. These costs exclude the 7.5% contingency which were included separately in the DCF model.

The average monthly OPEX equates to US$707.38/t RoM for a RoM feed rate of 12,500 tpm.

Table 21.12: Summary of Fixed and Variable OPEX

Description	Fixed Monthly (US$)	Variable (US$/t material)
Geology and Grade control	10,910	-
Haulage road and road maintenance	1,700	-
Mining contract cost	87,200	-
Mining contract cost ore D pegmatite	-	2.08
Mining contract cost waste D pegmatite	-	2.08
Mining contract cost ore EF pegmatite	-	2.09
Mining contract cost waste EF pegmatite	-	1.96
Crushing cost	62,140	1.42
Mining equipment to be used in plant	-	0.88
Spiral plant CAPEX and OPEX	76,840	4.23
Spital plant tailings	2,984	-
Plant waste transport	-	1.02
Environmental monitoring	1,700	-
Water pipeline and maintenance	1,700	-

Description	Fixed Monthly (US$)	Variable (US$/t material)
Ore transport to port and shipping Hamburg	-	668.97
Site security	9,390	-
IT hardware, software, communication and CCTV	930	-
Accounting and land use	3,410	-
Insurance and policies	5,650	-
Owner's team salaries and wages	18,750	-
Total	**283,304**	**684.72**

The DFS OPEX breakdown in fixed and variable costs are presented in Table 21.13 and Table 21.14, respectively.

Table 21.13: Fixed OPEX Breakdown

Description	Quantity	Unit cost (US$)	Cost (US$)
Geology labour			
Site geologist	1	3,410	3,410
Geological assistant	1	852	850
Laboratory technician	1	1,989	1,990
Laboratory assayer	2	597	1,190
Samples	3	483	1,450
General labour	3	483	1,450
Sub Total Geology Labour	**11**	**-**	**10,340**
Geological consumables (bags, standards)	n/a	n/a	**570**
Sub Total Geology			**10,910**
Road maintenance	n/a	n/a	**1,700**
Mining			
Project manager	1	6,820	6,820
Project foreman	3	4,262	12,790
Safety officer	1	2,842	2,840
Engineering foreman	1	5,399	5,400
Administrator	1	2,557	2,560
Clerks	2	1,421	2,840
Cleaners	5	852	4,260
Office supply	1	2,274	2,270
IT	1	2,842	2,840
Small tools	1	4,264	4,260
Housing	7	1,024	7,170
Light vehicles	7	1,705	11,930
Diesel bowser	1	8,525	8,520
Light plants	3	1,591	4,770
Management fee	-	10.0%	7,930
Sub Total Mining			**87,200**
Crushing Plant OPEX Cost			
Labour, equipment depreciation, profit, vehicles			62,140
Sub Total Crushing			**62,140**

Description	Quantity	Unit cost (US$)	Cost (US$)
Spiral Plant			
Labour			76,840
Sub Total Process Plant			**76,840**
Spiral Plant Tailings			
Dry tailings production (tpm)			12,085
Tailings management US$ per dry tonne tailings placed			0.247
Sub Total Spiral Plant Tailings			**2,984**
Environmental Monitoring			
Environmental audit			1,420
Transport			170
Site visit rate			110
Sub Total Environmental Monitoring			**1,700**
Water Management			
Monthly labour cost			680
Transport			450
Consumables			570
Sub Total Water			**1,700**
Security Services			
Guards supervisor	3	386	1,160
Guards	9	296	2,660
Guards - CCTV	3	375	1,130
Guards - Access control	3	296	890
Security vehicle	1	2,066	2,070
Housing	1	1,478	1,480
Sub Total Security Services			**9,390**
Site Security			
IT support and maintenance			420
Printer ink toners and paper			60
Annual (Software update (~US$5,246)			90
Monthly internet and telephone cost			360
Sub Total Site Security			**930**
Accounting Services			
Site accountant			850
Auditing and monthly accounts management			1,140
Sub Total Accounting Service			**1,990**
Land Use Agreements			
Mine land agreement			990
Water pipeline servitude			430
Sub Total Land Use			**1,420**
Insurance and Policies			
Insurance (plant equipment, namrisk)			4,510
Rehabilitation policy			1,140
Sub Total Insurance Policies			**5,650**
Owner's Team			

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Description	Quantity	Unit cost (US$)	Cost (US$)
Project manager			7,960
Administration manager			2,270
Security officer (on site)			1,700
Secretary			850
Office and General administration			1,420
Travel and accommodation			3,410
Fuel			1,140
Sub Total Owner's Team			**18,750**
Total Fixed Monthly OPEX			**283,304**

Table 21.14: Variable OPEX Breakdown

Description	UNIT	Cost (US$)
D Ore		
drill and blast	US$/t	1.08
mine and haul	US$/t	1.00
Sub Total D Ore Mining	**US$/t**	**2.08**
D Waste		
drill and blast	US$/t	1.08
mine and haul	US$/t	1.00
Sub Total D Waste Mining	**US$/t**	**2.08**
EF Ore		
drill and blast	US$/t	1.08
mine and haul	US$/t	1.01
Sub Total EF Ore Mining	**US$/t**	**2.09**
EF Waste		
drill and blast	US$/t	1.07
mine and haul	US$/t	0.89
Sub Total EF Waste Mining	**US$/t**	**1.96**
Crushing Plant		
crushing cost	US$/t	1.42
Sub Total Crushing Plant	**US$/t**	**1.42**
Mining Equipment at Crushing Plant		
2 Loaders	US$/t	0.88
Sub Total Mining Equipment at Crushing Plant	**US$/t**	**0.88**
Spiral Plant		
Labour	US$/t	1.23
Water	US$/t	0.20
Electricity	US$/t	1.42
Maintenance	US$/t	1.29
Reagents	US$/t	0.09
Sub Total Spiral Plant	**US$/t**	**4.23**
Spiral Plant Transport		
load and transport within 1 km	US$/t	1.02
Sub Total Load, Haul and Tailings Management	**US$/t**	**1.02**
Concentrate Transport and Shipping		
Ocean freight	US$	183
Shipping line local fees	US$	87

Description	UNIT	Cost (US$)
Namport charges	US$	181
Transport container site to port	US$	5,740
Security container	US$	3,410
Handling and documentation	US$	129
Agent fee	US$	85
EVGM fee loading	US$	15
IT fee	US$	2
QSHE fee	US$	3
Customs inspection	US$	15
Insurance from site to Port Hamburg	US$	6,607
Discharge Hamburg	US$	17
ISPS	US$	2
Container Inspection Fee	US$	2
Facility Fee @ 1.5%	US$	247
Sub Total Transport and Shipping	**US$**	**16,724**
Weight per container	t	25
Transport and Shipping per ton tantalum conc.	**US$/t**	**668.97**

21.3.2 Mining

21.3.2.1 Mine Design Parameters

Mining and crushing costs were developed by SPH based on the open pit designs and ore and waste production schedules developed by Snowden Optiro as outlined in Section 15.0 and Section 16.0.

Snowden Optiro optimised ore and waste production schedules to maximise NPV. The optimisation includes mine sequencing and mining rate, stockpile usage and rehandling, as well as fleet usage. The production schedules were then further detailed to accurately track material movements, stockpile and mill blending schedules, block mining, waste movements and equipment usage and movements.

A total pit waste rock of approximately 10.5 million tonnes is produced over the LoM.

As informed by ORP, the waste rock classifications will be similar in nature and would allow for tipping of waste and overburden on a single stockpile. As such, SPH did not make allowance to split the pit waste into potentially acid generating (PAG) or Type-2 Rock, non-potentially acid generating (NPAG) or Type-1 Rock or overburden.

An indicative overburden waste stockpile was designed for the haulage distance and required tipping area for the required waste volumes generated over the LoM.

The LoM mine waste surface storage requirement is outlined in Table 21.15.

Table 21.15: Surface Storage Capacities

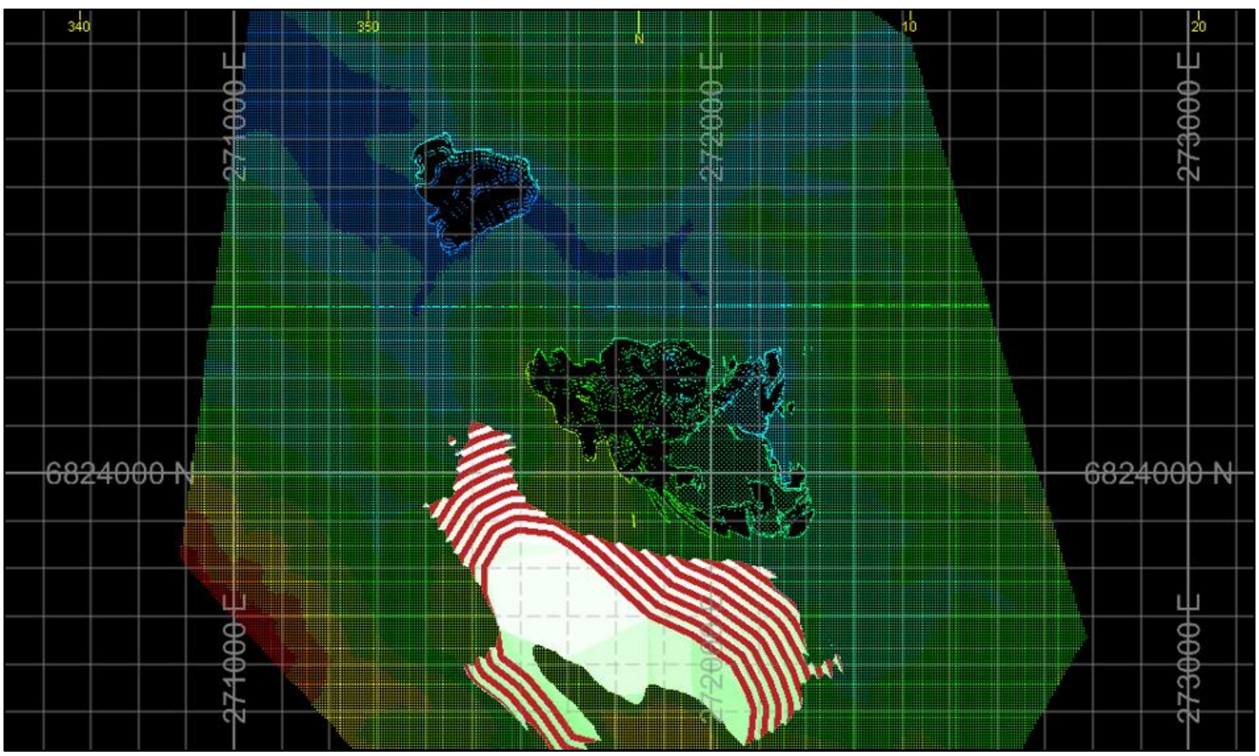
Waste Dump	Capacity (t)	Capacity (m^3)	Surface Area (ha)	Percentage Filled (%)
D and EF waste dump	11,577,053	4,134,662	140.14	90.7
Total	**11,577,053**	**4,134,662**	**140.14**	**-**

The following factors was used to calculate the waste dump capacity:

- Individual Bench Slope: 32°
- Berm Widths: 10 m
- Waste Material Swell: 21%
- Waste Material Density: 2.8

The waste rock storage layout is presented in Figure 21.1.

Figure 21.1: Overburden and Waste Rock Storage Layout



The RoM tonnage from the various deposits will fluctuate monthly. As such, a Crusher Stockpile will be created to ensure smooth feeding of the Primary/Secondary Crushing Plant and subsequent Spiral Plant. This will also assist with grade control.

Ore will be placed in a three-fingers shaped stockpile, prior to feeding of the Primary/Secondary Crushing Plant. The fingers-shaped stockpile is also referred to as grade bins. All the RoM placed at the Crusher Stockpile is included in the mine production schedule and will be milled over the LoM.

The RoM Stockpile is accessible from the access road to the South as well as along the crusher feed ramp. The stockpiled material will be loaded and feed to the Primary/Secondary Crushing Plant by a front-end wheel loader (FEL).

The mine haul trucks will transport the RoM within 500 m from the crusher via the access haul roads ramp. This route has a cycle time of 12.1 minutes from the D-pit and 12.1 minutes for the EF-pit. The indicated cycle times includes loading and dumping.

21.3.2.2 Surface Mine Haul Roads and Access

This section refers only to the haul and access roads accessible by haul trucks and heavy mining equipment.

Road designs were done to be double-lane road based on the dimensions of the selected primary hauler, i.e., the Bell B40 with an operating width of 3.36 m. The road width included for double lane road with berm and the area required for the Bell B40 to safely complete a three-point turn.

Haul roads for the Bell B40 are designed with berms on both sides of the road and include a drainage ditch on one side. All surface roads are double lanes. The total width of the surface roads is 14.61 m as indicated in Figure 21.2.

Figure 21.2: Double Lane Surface Haul Road Profile

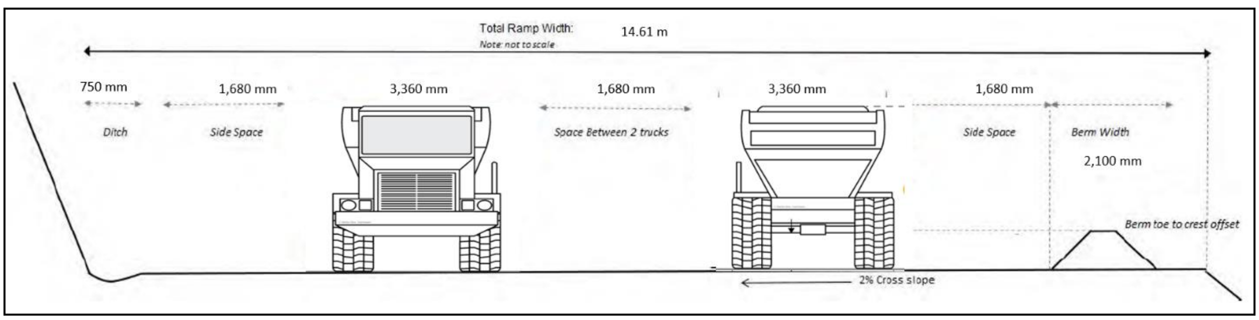
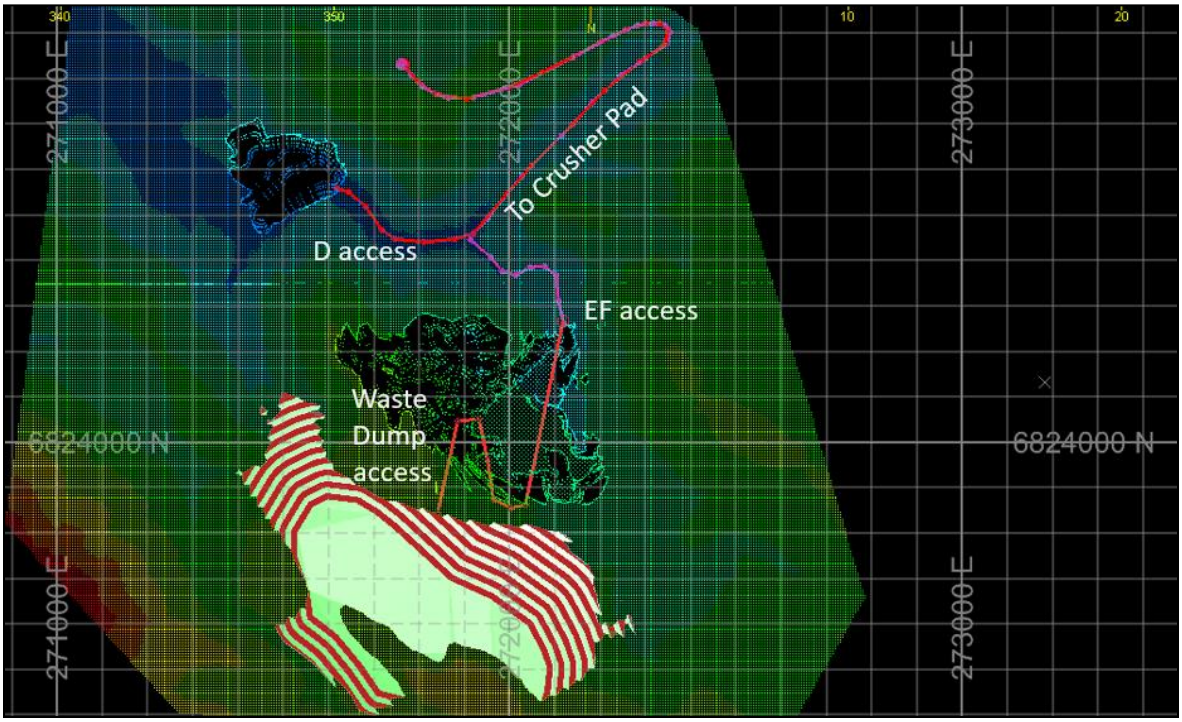


Figure 21.3 depicts all the haulage roads connecting the open pits with the waste stockpile and to the Crusher Stockpile.

Figure 21.3 presents the site mine road layout.

Figure 21.3: Site Mine Road Layout



21.3.2.3 Mine Operations Approach

Mining will be performed using conventional open pit techniques with hydraulic backhoe excavators, wheel loaders and mining trucks in a bulk mining approach with 10 m benches.

Open pit contractor mining is planned that will include drilling and blasting, loading, haulage and dumping, Primary/Secondary crushing and other contractor mining activities that are normally associated with open cast contractor mining in Southern Africa. Explosive supply and blasting will be outsourced to third party experienced contractors.

21.3.2.4 Drilling and Blasting

Drilling and blasting specifications are established to enable single pass drilling and blasting of 10 m benches.

For this bench height, a blast hole size of 127 mm is proposed consisting of a 3.2 m x 3.3 m pattern and 0.5 m of sub-drill. These drill parameters combined with a high energy bulk emulsion with a density of 1.12 kg/m^3 result in a powder factor of 0.95 kg/t.

Blast holes are initiated with pyrotech detonators and primed with 400 g boosters. The bulk emulsion product is a gas sensitised pumped emulsion blend specifically designed for use in wet blasting applications.

Several rock types are present in the pit with the average rock hardness estimated at approximately 152 MPa. The average drill productivity for the production rigs, using down-the-hole drill string, is estimated at 33 m/hr instantaneous with an overall penetration rate of 24.2 m/hr. The overall drilling factor represents time lost in the cycle when the rig is not drilling such as move time between holes, moves between patterns, drill bit changes, etc.

Table 21.16 summarise the drilling and blasting parameters per rock type.

Table 21.16: Drilling and Blasting Parameters

Design Description	Rock Types	
	Pegmatite	Mafic Gneiss
Explosives type	Emulsion blend	emulsion blend
Rock dens. (g/cm^3)	2.62	3.00
Average joint spacing factor	20.00	10.00
Joint orientation factor	40.00	20.00
Rock blastability factor	90.23	59.56
Rock UCS (MPa)	225.00	125.00
Bench height (m)	10.00	10.00
Sub drill (m)	0.50	0.50
Stemming length (m)	2.54	2.04
OR scaled depth of burial	-	-
Air deck length (m)	1.00	-
Hole diameter (mm)	127.00	102.00
Coupling (%)	100.00	100.00
Effective charge diameter (mm)	127.00	102.00
Spacing to burden ratio	1.03	1.25
Burden (m)	3.18	3.37
Spacing (m)	3.27	4.21
Presplit stand-off	-	-
Number of burdens across blast	10.00	10.00
Powder factor (kg/m)	0.95	0.56
Scaled burden (m/kg/m)	0.84	1.10
Toe (1/3 BH) energy factor)	1.49	0.72
Energy factor	0.89	0.52
Average in-hole density	1.12	1.15
RWS	93.00	93.00
VOD (m/s)	4,000.00	4,000.00
Rock sonic velocity (m/s)	5,500.00	5,000.00
Rock		
Rock blastability index (0 to 100)	90.23	59.56
Rock density (g/cm^3)	2.62	3.00
Rock UCS (MPa)	225.00	125.00
Explosive		
Explosive type	emulsion blend	emulsion blend
Charge mass/metre (kg/m)	14.22	9.42
Explosive mass per hole (kg)	99.00	79.70
Effective charge diam (mm)	127.00	102.00
Average in-hole density (g/cm^3)	1.12	1.15

Design Description	Rock Types	
	Pegmatite	Mafic Gneiss
Blast Geometry		
Stemming length (m)	2.54	2.04
Column length (m)	6.96	8.46
Air deck length (m)	1.00	-
Hole depth (m)	10.50	10.50
Bench height (m)	10.00	10.00
Sub-drill (m)	0.50	0.50
Hole diameter (mm)	127.00	102.00
Pattern		
Burden (m)	3.18	3.37
Spacing (m)	3.27	4.21
Scaled burden	0.84	1.10
Energy		
Powder factor (kg/m^3)	0.95	0.56
Energy factor	0.89	0.52
Toe (1/3 bench height) energy factor	1.49	0.72
RWS	93.00	93.00
ASV	3.53	3.53
RBS	130.20	133.69
Borehole pressure (MPa)	13,730.48	17,818.82
Fragmentation		
Expected mean fragment size (cm)	19.58	19.12
Uniformity index	0.90	1.07
Characteristic size	29.50	26.95

The blast hole rig selected for production drilling will have a hole size range of 105 mm to 141 mm with a single pass drill depth of 4.8 m. This rig will have a top hammer drilling configuration. It is expected that the top hammer drilling mode will be most efficient. Due to the high cost of an Autonomous Drill System (ADS) it was not considered. Evaluation of an ADS will again be assessed prior to commencement of operations.

Blasting activities will be outsourced to an explosive's provider for supply and delivery of explosives in the hole through a service contract. The mining contractor will be responsible for designing blast patterns and relaying hole information to the drilling teams.

21.3.2.5 Grade Control

The ore control programme will consist of establishing dig limits for ore and waste to guide loading.

For optimal ore-waste boundaries identification, blasthole sampling will target 100% of all ore material and capture 100% of the total waste in the pit. Reverse circulation is not deemed required as the orientation of the ore domains make blasthole sampling suitable.

The ore control boundaries will be established by the mine's geology department based on grade control information obtained from the blast hole sampling with post-blast boundaries adjusted for blast movement measurements.

The samples collected will be sent to an onsite laboratory for sample preparation and assaying for the RoM. Samples will be collected on the bench and tagged by grade control samplers.

21.3.2.6 Pre-Split

No presplit blasting has been allowed for during the DFS. A future planned study into the rock mechanics along with the rockfall and slope stability will guide the operational requirement for pre-split blasting.

21.3.2.7 Loading

Most of the loading in the pit will be performed by one 4.8 m^3 backhoe excavator. The excavator will be matched with a fleet of 38 t payload capacity mine trucks. The hydraulic excavator will be complemented by one production FEL with a 5 m^3 bucket at the Crusher Stockpile pad and Spital Plant feed bin.

A single 50-t excavator will take care of any soft waste stripping and clean-up tonnages, along with any narrow-thickness ore zones associated with uneven ore and waste contact zones.

The loading productivity assumptions for both types of loading tools for ore and waste are presented in Table 21.17.

Table 21.17: Loading Specifications

Description		**Ore**		**Waste**	
Loading Unit Liebherr		**974**	**954**	**974**	**954**
Haulage Unit Bell		**B40E**	**B40E**	**B40E**	**B40E**
Rated truck load	t	38.00	38.00	38.00	38.00
Heaped tray volume	m^3	14.62	14.62	12.67	12.67
Bucket capacity	m^3	4.30	2.50	4.30	2.50
Bucket fill factor	%	93%	90%	93%	90%
In-situ density	t/bcm	2.60	2.60	3.00	3.00
Moisture	%	3%	3%	3%	3%
Swell	%	21%	21%	21%	21%
Wet loose density	t/lcm	2.58	2.58	2.98	2.98
Actual load per bucket	t	11.11	6.46	12.82	7.45
Passes (decimal)	#	3.42	5.88	2.96	5.10
Passes (whole)	#	3.50	5.90	3.00	5.10
Actual truck wet load	t	38.88	38.11	38.46	38.01
Actual truck dry load	t	37.72	36.97	37.30	36.87
Actual heaped volume	m^3	14.51	14.22	12.43	12.29
Payload capacity	%	97.1%	99.1%	98.2%	99.3%
Heaped capacity	%	99.26%	97.28%	98.16%	97.02%

Description		Ore		Waste	
Loading Unit Liebherr		974	954	974	954
Haulage Unit Bell		B40E	B40E	B40E	B40E
Cycle Time					
Load time	min	2.66	5.43	2.66	5.43
Trucks loaded	/hr	22.58	11.05	22.58	11.05
Production/Productivity					
Production dry	t/hr	851.46	408.56	842.10	407.50
Effective hours	hrs/a	1,973.08	4,111.98	1,995.00	4,122.73
Dry capacity	kt/a	5,388.98	2,585.83	5,329.76	2,579.09
Number of units	#	0.37	1.59	0.37	1.60
Tonnes	t/a	1,680,000	840,000	1,680,000	84,000

The one 4.8 m^3 excavator is expected to achieve a productivity of 851 t/hr based on a 5-pass match with the mine trucks and an average load time of 2.39 minutes.

The 50-t excavator's productivity in waste will be at 408 t/hr due to a lower density of this material and the size of the equipment, for an average load time of 5.43 minutes.

21.3.2.8 Haulage

Haulage will be performed with a 38-t class mining trucks. The truck fleet productivity was estimated in Talpac software. Several haulage profiles were digitised in Deswik with haul routes exported to Talpac to simulate cycle times.

Cycle times have been estimated for each period and the appropriate waste tipping site as determined from the waste dumps tipping strategy.

The assumptions and input factors for the Talpac simulations are presented in Table 21.18, Table 21.19, and Table 21.20.

Two speed limits were applied in the simulation. For all downhill ramps, with an incline greater than 5%, the speed is limited to 30 km/hr. Otherwise, the maximum truck speed of 40 km/hr were used in the simulations.

Table 21.18: Site Speed Limits

Parameter	Speed (km/hr)
Site maximum	40
Down hill	12

Table 21.19: Site Rolling Resistance Assumptions

Parameter	Rolling Resistance (%)
Pit ramp	3
Dump	3.5
Pit floor	3.5
Haul road	2.5

Table 21.20: Fixed Cycle Time Components

Parameter	Time (Minutes)
Queue time	1.22
Spot time	0.6
Loading time	0.57
Total loading	2.39
Queue time	0
Spot time	0.3
Dumping time	0.3
Total dump	0.5
Total fixed	3.49

A multiple waste dumps tipping strategy was used to help level the truck requirements. During the critical phases, levelling was achieved by sending waste rock to the closest dump face.

Figure 21.4 and Figure 21.5 presents the trucks cycle times per pit, while Figure 21.6 summarises the haulage hours per source.

Figure 21.4: Truck Cycle Times D-pit

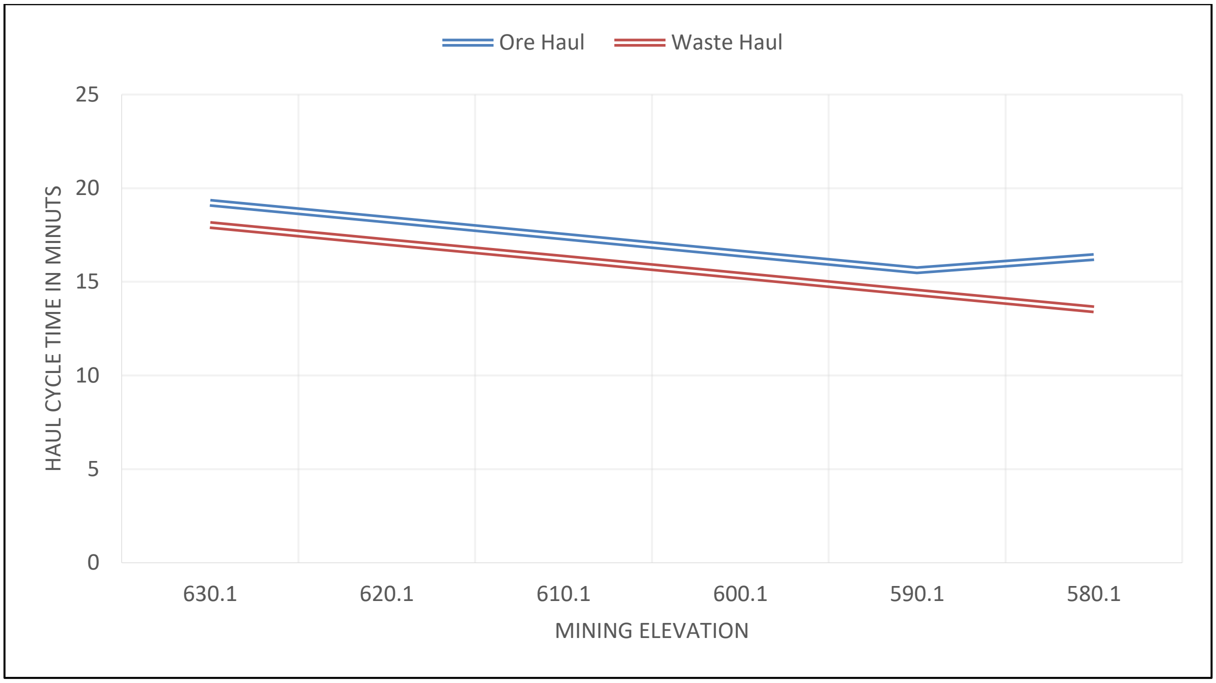


Figure 21.5: Truck Cycle Times EF-pit

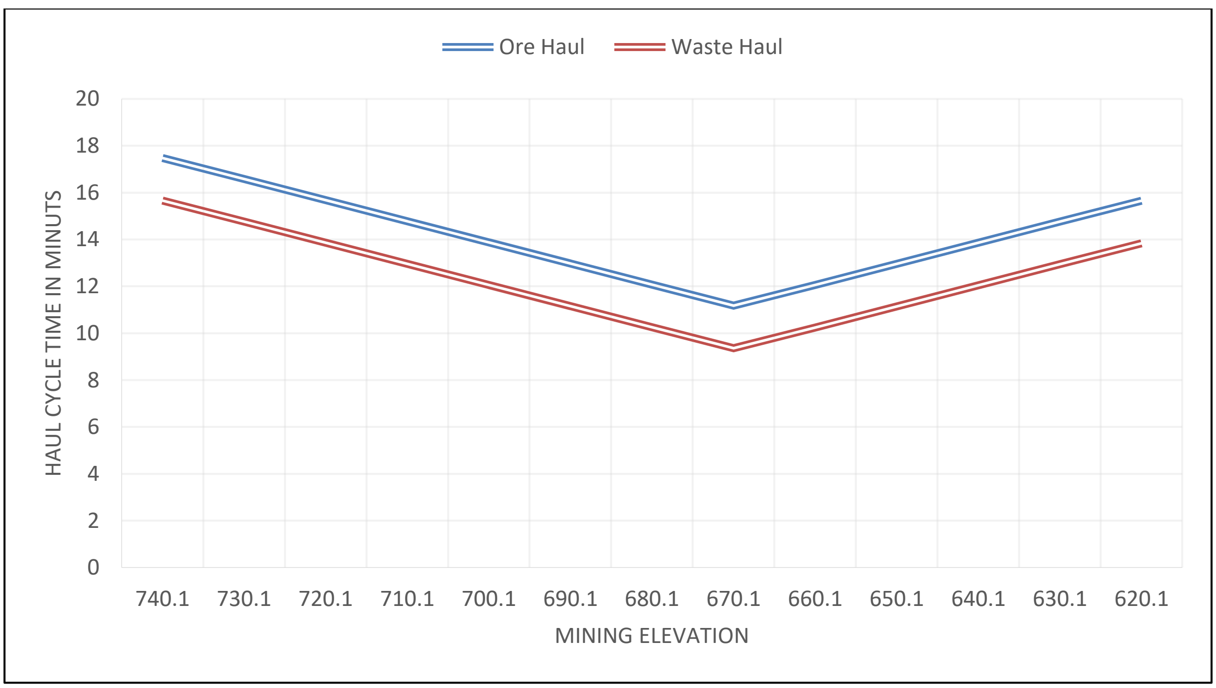
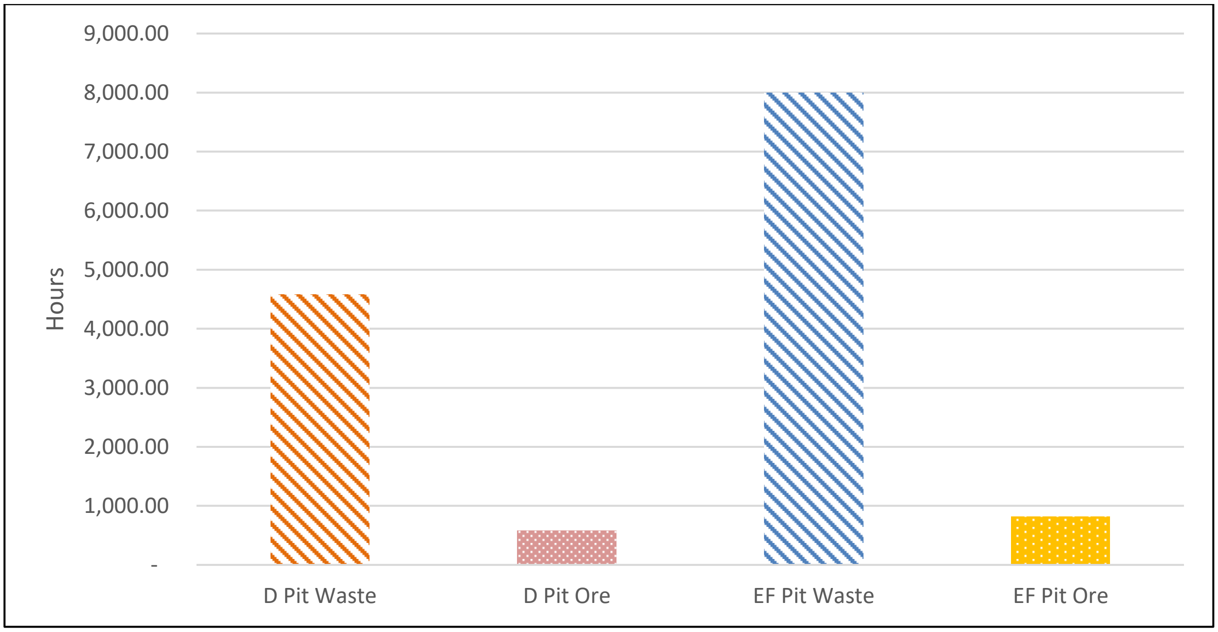


Figure 21.6: Haulage Hours by Source



Due to the ore body and topography characteristics of the Swanson deposits, cycle times decrease as the pit deepens. This is since the crease of the pit ramp exits closer to the material placement location as the pit is developed. Cycle time is also dependant on the dumping schedule and the distance each dump is from the pit.

The dump schedule was planned such that cycle times tends to plateau at a maximum to allow for a consistent fleet over the majority of the LoM. The large variation in cycle time between years within the same phase represents material being diverted to a different destination with a new corresponding cycle time.

The EF-pit sees a large reduction in cycle times for waste material due to the waste dump's proximity which reduces the haulage distance and time.

The total haul hours required by period coupled to the truck mechanical availability were used to determine the number of trucks required throughout the LoM.

The truck fleet reaches a maximum of six units from the start of the operations and is maintained up the point where Phase 1 and Phase 2 is completed. Phase 3 mining will require a total of four trucks up to the end of the LoM. Figure 21.7 summarises the truck requirements.

Figure 21.7: Truck Requirements

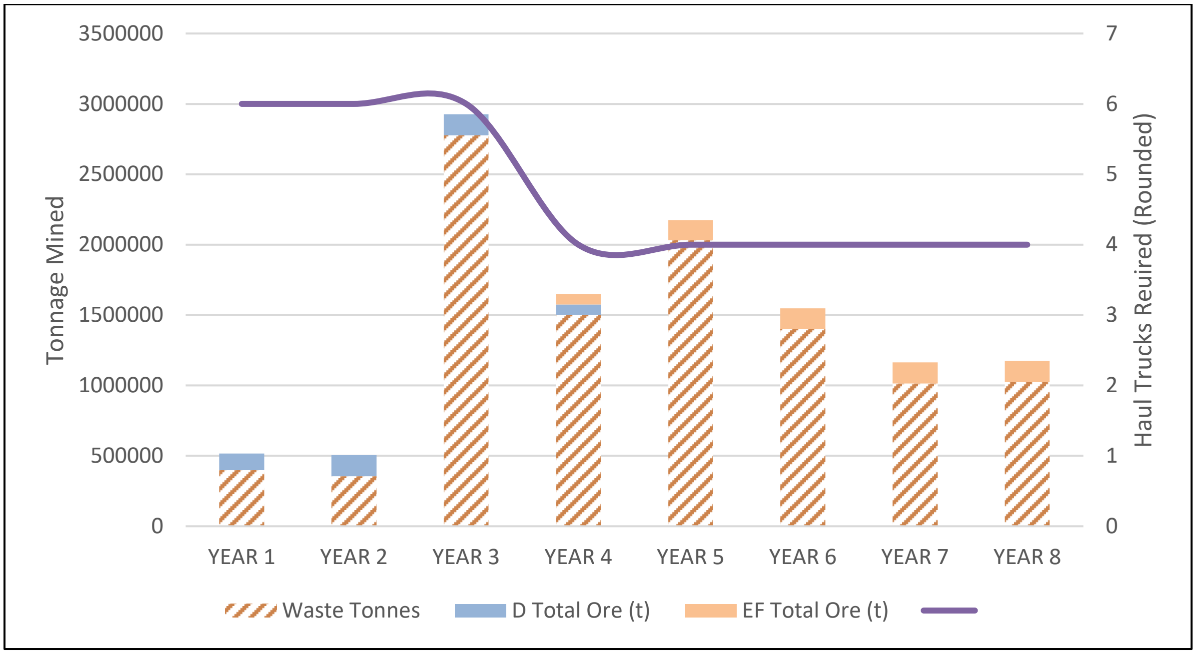
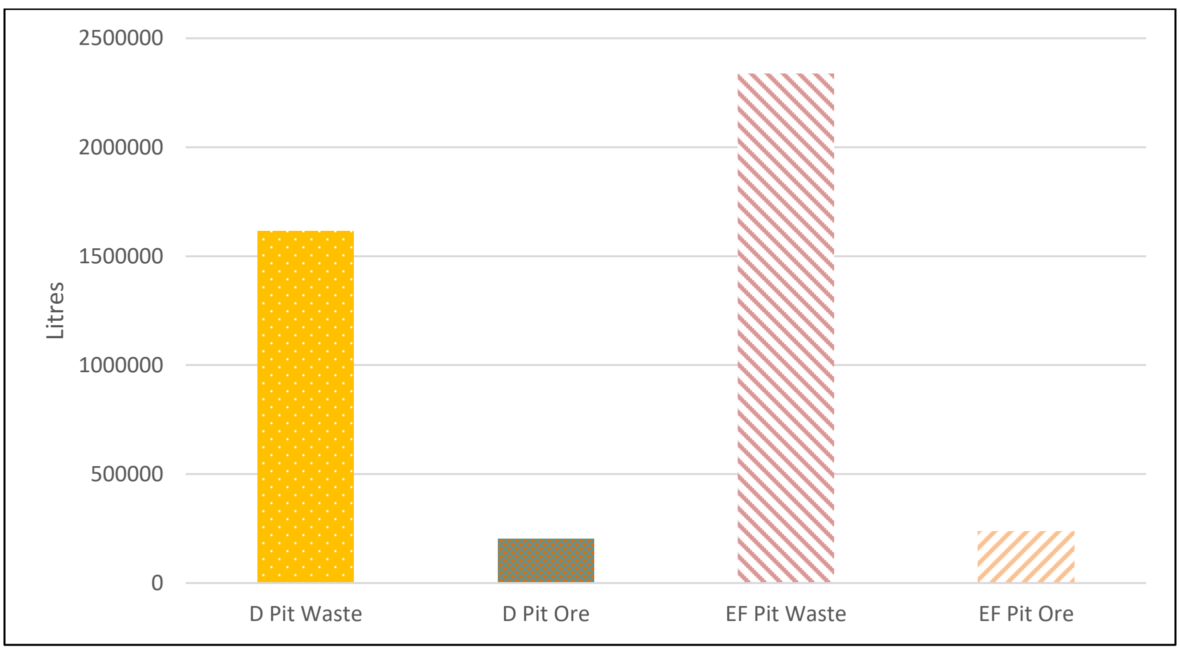


Figure 21.8 depicts the fuel usage by year. Over the LoM a total of 4,39 million litres of fuel will be consumed by the mining fleet.

Figure 21.8: Estimated Fuel Requirements



21.3.2.9 Road and Dump Maintenance

Pit operating floors, waste and ore storage areas will be maintained by a fleet of one 185HP grader and 449HP water bowser. These equipment items will be purchased and dedicated to mine roads and the loading areas.

21.3.2.10 Support Equipment

All construction related work, such as berm construction, bench scaling etc. will be completed by one 50 t excavator. One pit bus will transport workers to their assigned workplace and a total of 7 pick-ups will be purchased for all the opencast departments. Several other equipment purchases are included to support the mining activities.

21.3.2.11 Mine Maintenance

The mining contractor has not included an Original Equipment Manufacturer (OEM) contract or Maintenance and Repair Contract for its mobile equipment fleet. This is since the internal maintenance department and personnel requirement has been structured to fully manage this function, performing maintenance planning and training of employees. However, reliance on dealer and manufacturer support will be key for the initial years, and major component rebuilds will be supported by the OEM's dealer throughout the LoM.

Tyre monitoring, rotation and replacement will be carried out in-house. Consequently, a tyre handler truck has been included as part of the maintenance equipment.

Some other equipment will also be purchased to facilitate the maintenance activities and support the operation, such as one fuel and lube truck, a dedicated lube truck, a forklift and some small equipment like tower lights, welding machines or portable air compressors.

21.3.2.12 Roster Schedules

A 5-day on 2-day off rotating schedule has been planned on a single 10-hour shift.

One crew is required to operate on a continuous basis of 10 hours per day, 261 days per year. Given the planned equipment capacity compared to the planned mining volumes a weekday dayshift only operation will be adequate.

In the event of any production hours being lost due to unforeseen breakdowns or weather events and stoppages, lost hours can be regained by working an additional Saturday or night shifts to make up any shortfall in planned volumes.

21.3.2.13 Mine Equipment Requirements

The main factors which influenced the selection of the major mine equipment included the annual production requirements and optimisation of the fleet size given the ore and waste rock types to be mined.

An analysis was performed to determine the optimal fleet size, equipment type and preferred suppliers. The requirements of major mining units are presented in Figure 21.9.

Figure 21.9: Equipment Requirements

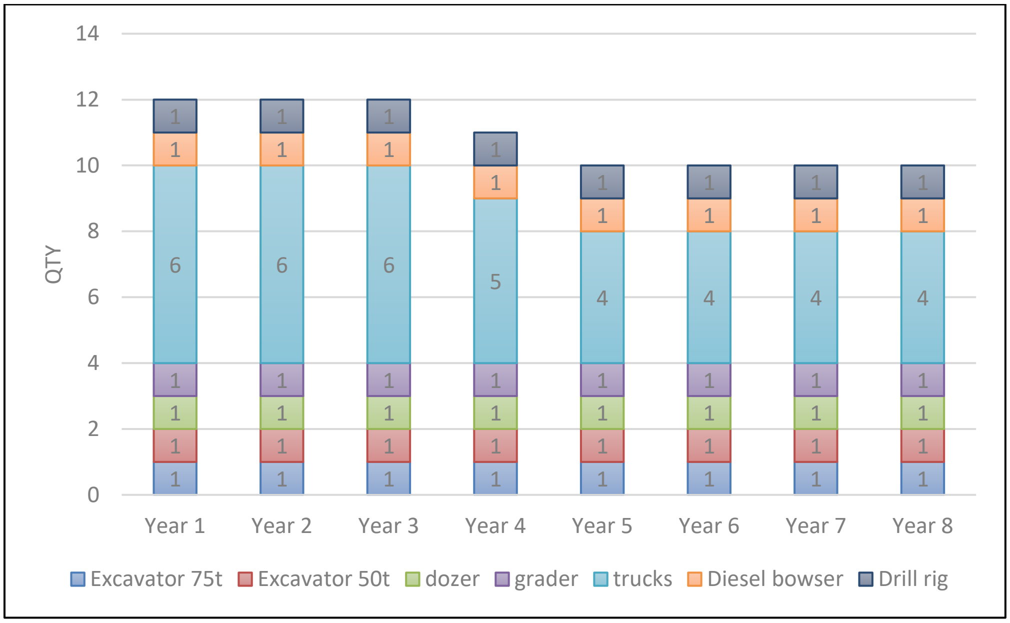


Table 21.21 presents the mine workforce requirements over the LoM. The mine workforce peaks at 40 members of staff in year 1 to 3, then decreases to 39 from year 4 to year 5 with a reduction occurring when the tonnage decreases starting the up to end of LoM.

Table 21.21: Workforce Requirements over the LoM

Department	Maximum	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8
Opencast operations	23	23	23	23	22	20	20	20	20
Milling	8	8	8	8	8	8	8	8	8
Repair and maintenance	9	9	9	9	9	9	9	9	9
Total mining workforce	**40**	**40**	**40**	**40**	**39**	**37**	**37**	**37**	**37**

21.3.2.14 Contractors Pricing Methodology

The final OPEX reflect the equipment selected, which was optimal in terms of costs, size, flexibility, operability, and suitability to handle the expected operating and production profiles developed during the DFS.

The DFS OPEX were based on mine scheduling of the Swanson pits and their associated infrastructure with their planned waste storage facility locations. To accurately project the future OPEX, the monthly haul distance for the production faces to the materials respective tipping points was calculated to estimate the mining fleet’s operating hours.

The average operating unit costs per mining function were calculated by applying rates to each year’s materials BoQ for the full LoM and then determining what the average unit rates over the entire LoM would be by taking all the mining-related costs into consideration.

Given the rock type, the contractor priced equipment capable and suited to this type of open pit operation. However, due to varying stripping ratio over the LoM, the equipment requirement is not consistent. Consequently, mining equipment is not fully utilised during all months over the LoM and as such, the contractor has excess capacity during certain periods of the LoM. This made equipment planning challenging and it was concluded that a more appropriate costing approach is to apply a monthly fixed cost based.

Since the RoM monthly ore profile was consistent costing of the Primary/Secondary crushing was costed on a variable, per tonne ore crushed, rate basis.

21.3.3 Primary/Secondary Crushing

Initial size reduction, applying primary and secondary crushing and screening, of the RoM will be performed by the mining contractor. The Primary/Secondary Crushing Plant will produce -150 mm ore that can be fed to the Spiral Plant for tertiary crushing and spiral concentration.

Primary/Secondary Crushing Plant will occur on a dry basis using semi-mobile solutions comprising standard, heavy-duty crushers, and screens. These semi-mobile units are supplied complete and ready to run. The crushers and screens are mounted on skid-frames that do not require concrete foundations and are designed for rapid installation and integration.

21.3.3.1 Process Flow

RoM will be delivered to the primary jaw crusher grade bins by 38-t haul trucks. Dual side dumping is included in the design to minimise waiting time. The grade bin has a design capacity of approximately 580 t.

The RoM is loaded from the grade bins by a FEL. The primary crushing is performed by a jaw crusher. The jaw crusher product is removed by variable speed apron feeder from where the crushed material is transferred to the primary crusher conveyor that feeds a double deck screen. The +25mm material is further crushed by a cone crusher and the -25mm is stockpiled as feed to the Spiral Plant.

The major equipment following primary jaw crushing is as follows:

- Pilot Modular Metso GP100 Skid Mounted Cone Crusher;
- Pilot Modular DD4815 Double Deck Dry Screen (Frame and Chutes);
- Pilot Modular MPM910 Permanent Magnet;
- Self-Cleaning Magnet c/w C-Frame; and,
- Pilot Modular Conveyors (2 x MC750-21m and 1 x MC750-11m); and,

21.3.3.2 Human Resources

The Primary/Secondary Crushing Plant will be staffed with its own dedicated workforce and supporting equipment. These will operate and managed independently from the open cast mining operations.

The LoM workforce and supporting equipment requirements for the Primary/Secondary Crushing Plant are presented in Table 21.22 and Table 21.23, respectively.

Table 21.22: Workforce Requirements over the LoM for the Process Plant

Department	Maximum	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8
Milling operations	4	4	4	4	4	4	4	4	4
Repair and maintenance	4	4	4	4	4	4	4	4	4
Total milling workforce	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**

Table 21.23: Supporting Equipment Requirements over the LoM

Type	Maximum	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8
Front end loader 4.4 m^3	2	2	2	2	2	2	2	2	2
Backup genset	1	1	1	1	1	1	1	1	1
Rock breaker	1	1	1	1	1	1	1	1	1
Light vehicles	2	2	2	2	2	2	2	2	2
Forklift / telehandler	1	1	1	1	1	1	1	1	1
Total	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**	**7**

21.3.4 Spiral Plant OPEX

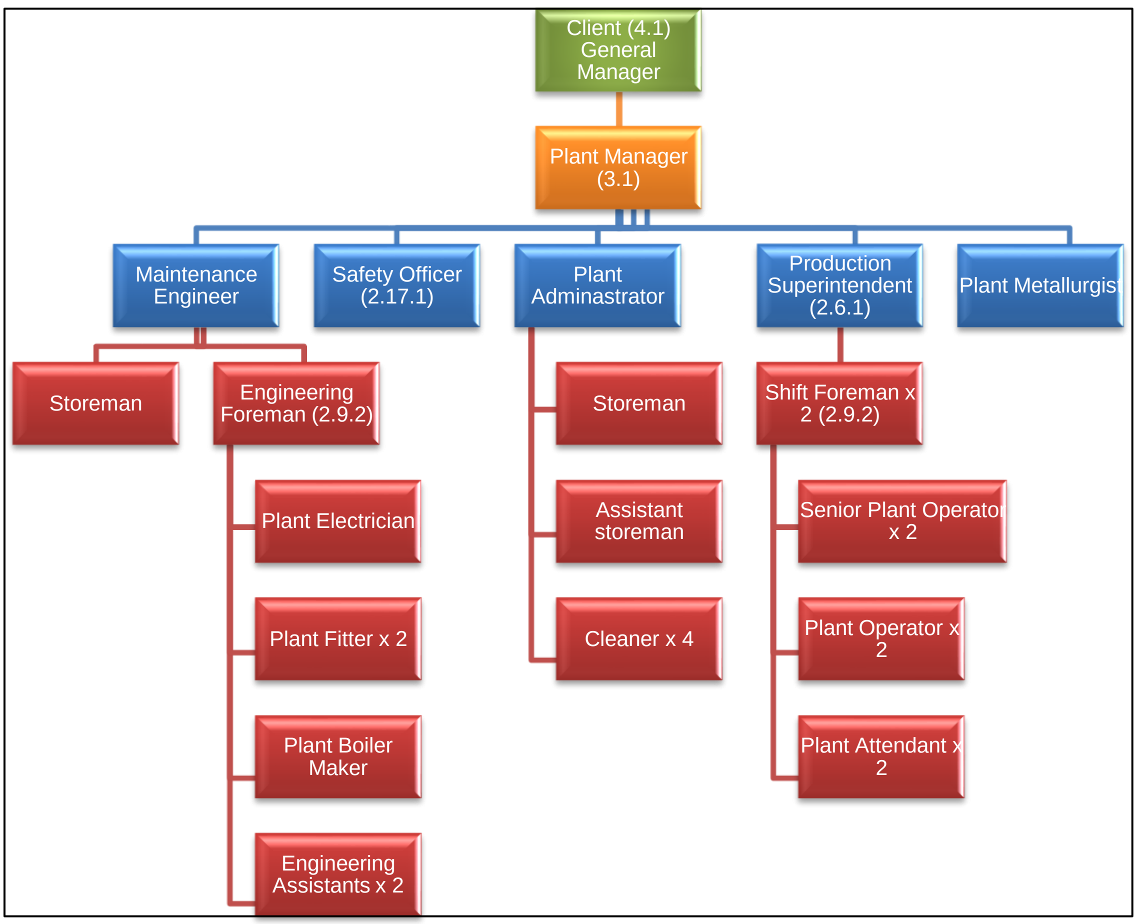
The monthly OPEX was determined for approximately 299 hours of production per month to achieve the necessary 3,588 annual planned running hours of the plant as summarised in Table 21.24.

Table 21.24: Operating Schedule and Throughput

Description	Units	Value
Availability	%	95
Utilisation	%	40
Planned running hours	h/a	3,588
Plant throughput	t/h	40
Plant throughput	t/a	143,520
Plant production	kg/hr	49.3
Plant production	t/a	177
Water consumption	m^3/hr	9.8
Power consumption	kW	834

The organogram for the Spiral Plant personnel is shown in Figure 21.10.

Figure 21.10: Organogram



The monthly OPEX for the Spiral Plant (Table 21.25) is based on contractor operations and maintenance for which a 20% margin was included for labour, maintenance, and reagents.

Table 21.25: Fixed and Variable Labour Costs for the Spiral Plant

Cost Categories	Fixed monthly (US$)	Variable Monthly Costs			
		Price (US$)	Unit	Usage/month	Cost (US$)
Labour	61,911			14,770	14,770
Head office support services	11,969				
Water		0.801	US$/kL	2,930	2,346
Electricity		0.069	US$/kWhr	249,366	17,097
Maintenance				15,559	15,559
Reagent (flocculent)				1,044	1,044
Subtotal	**73,880**				**50,816**

The fixed portion of the OPEX accounts for monthly salaries that are independent on production volumes. The variable portion of the OPEX includes the costs associated with producing the concentrate. This includes production bonusses and overtime to personnel.

Support provided by the head office, includes the following:

- Procurement support (two (2) procurement officers);
- Administrative support (two (2) clerks and an ad hoc accountant);
- Technical support (ad hoc Lead Process Engineering);
- Office overheads; and,
- Travelling and disbursements to the Swanson Mine.

The proposed monthly labour costs per designation, including production costs and head office support costs are summarised in Table 21.26.

Table 21.26: Monthly Compensation per Designation

Discipline	Designation	Fixed Monthly Salary (US$)	Monthly Production Costs (US$)	Total Monthly Costs (US$)
Production Labour Costs				
Management	Plant manager	9,590	1,918	11,508
	Resident engineer (2.13.1)	7,512	1,502	9,015
	Safety officer (2.17.1)	1,598	320	1,918
	Plant administrator	639	128	767
	Production superintendent (2.6.1)	3,676	735	4,411
	Plant metallurgist	5,434	1,087	6,521
Maintenance	Engineering foreman (2.9.2)	2,424	1,007	3,431
	Plant electrician	831	345	1,176
	Plant fitter	1,662	690	2,353
	Plant boilermaker	831	345	1,176
	Engineering assistant	1,717	713	2,430
Admin	Storeman	242	101	343
	Cleaner	970	403	1,372

Discipline	Designation	Fixed Monthly Salary (US$)	Monthly Production Costs (US$)	Total Monthly Costs (US$)
Production	Shift foreman	4,603	959	5,562
	Senior plant operator	5,370	1,119	6,489
	Plant operator	2,302	480	2,781
	Plant attendant	1,115	232	1,347
Laboratory	Technician	1,074	224	1,298
Fixed monthly salary (excl. Product. Costs)		**51,593**		
Monthly production labour costs				**63,901**
Head Office Support				
Head office support	Lead process engineer (60%)	3,261	-	3,261
	Accountant (40%)	601	-	601
	Procurement officer x 2	2,238	-	2,238
	Clerks x 2	1,279	-	1,279
	Office overheads			738
	Travelling and disbursements			1,858
Total head office costs				**9,974**

Settling test were not conducted on the tailings and a conservative flocculant dosing of 50 g/t of solids was used from experience. The OPEX for the flocculant is based on approximately 24 t of solids entering the thickener.

The monthly maintenance cost is the sum of the mechanical and electrical spares required over a 5-year period. The mechanical spares were determined as 30% of the total mechanical equipment cost, whereas the electrical spares were estimated at 20% of the mechanical spares.

Table 21.27 summarises the Concentrator plant OPEX which is approximately US$ 131.15 thousand per month (fixed plus variable). This equates to about US$10.50 per tonne RoM or US$ 8.91 per kg of final concentrate produced.

Table 21.27: Total Spiral Plant Fixed and Variable Costs

Description	Fixed		Variable		Total
	Monthly (US$)	US$ /t	Monthly (US$)	US$ /t	US$ /t
Cost per t RoM	73,880	5.91	50,816	4.07	**9.98**
Cost per t concentrate		5,017		3,450.69	**8,468**

21.3.5 Spiral Plant Tailings

The variable OPEX to dispose of the process plant tailings of US$1.27 per tonne tailings includes loading and transportation (US$1.03/t tailings) and tailings management costs (US$0.25/t tailings).

The loading and transpiration cost was estimated by SPH based on the tailings disposal schedule and the dry-stack tailings design performed by Prime Resources.

SPH assumed that the tailings will be loaded by the FELs and made allowance for a single 38-t mining truck for haulage and placing of the dry stackable tailings to the designated tailing disposal facility.

The tailings management OPEX was estimated by Prime Resources based on the following:

- Tailings management, included for dozing, levelling, and shaping of the deposited material. Allowance has been made for a single vehicle (TLB or small dozer) operating at selected hours per day.
- Routine inspection, cleaning, and maintenance of drains, channels, and roads.

The annual OPEX of the TSF is US$36,210, which is the equivalent to approximately US$0.25 per dry tonne (~146,500 t) of tailings placed.

21.3.6 Ore Transportation

The transportation cost of the tantalum concentrate from the Swanson Property (close to the town of Warmbad) to the port of Walvisbay and cost, insurance and freight (CIF) shipping to Hamburg, Germany was estimated by Kuehne and Nagel.

The total transportation and shipping cost equates to US$ 16,724 per 25 t container thus equating to a variable OPEX of US$668.97/t tantalum concentrate. The cost breakdown for the various transportation and shipping items are presented in Table 21.28.

No transportation cost was estimated for the lithium RoM tailings that will be sold ex-works at the Swanson Mine.

Table 21.28: Concentrate Transport and Shipping

Item	Cost (US$)
Ocean freight	183
Shipping line local fees	87
Namport charges	181
Transport container site to port	5,740
Security container	3,410
Handling and documentation	129
Agent fee	85
Evgm fee loading	15
IT fee	2
Quality, safety, health and environment fee	3
Customs inspection	15
Insurance from site to Port Hamburg	6,607
Discharge Hamburg	17
International ship and port security	2
Container inspection fee	2
Facility fee @ 1.5%	247
Subtotal transport and shipping	**16,724**

22.0 ECONOMIC ANALYSIS

22.1 INTRODUCTION

The economics potential of the proposed Swanson Mine was assessed by performing of an Economic Analysis in the form of a discounted cash flow (DCF) model. The DCF model was estimated in real (constant US$) terms, thus excluding the effect of inflation.

Annual cash flow projections were estimated over the LoM based on CAPEX, production costs, transportation and refining charges, OPEX and sales revenue. Pre-tax and post-tax estimates were developed. The post-tax estimates are likely to approximate the true investment value. It must be noted that tax estimates involve many complex variables that can only be accurately calculated during operations. Consequently, the after-tax results are only approximations.

Sensitivity analyses were performed for changes in sales revenue (metal prices and head grade), OPEX, CAPEX and discount rate to determine their relative importance as value drivers.

Revenue is derived from the sale of tantalum concentrate, containing ≥25.0% Ta_2O_5, and separate sales of lithium RoM tailings as by-product. The tantalum concentrate is expected to attract a credit for contained niobium oxide content.

The proposed Swanson Mine is assessed by Arcadia to determine its exploitation potential at DFS level (AACE Class 3).

The proposed Swanson Mine will produce a concentrate grade at the commercial grade of 25% Ta_2O_5. During operation, lithium RoM tailings will be produced, when ore containing spodumene is processed through the process plant. This will be sold as a by-product to neighbouring Hebei. Niobium oxide contained within the tantalum concentrate is credited to the sales price of the tantalum concentrate.

The Economic Analysis relies on Mineral Resources, Ore Reserves, mine production schedule, recoveries, OPEX, CAPEX, commodity prices, etc. determined during the DFS by various specialist consultants coordinated by ORP, or inputs provided by ORP.

The Economic Analysis was performed at 100% attributable to ORP, in which Arcadia has an 80% interest.

Section 22.0 outlines the approach taken to perform the Economic Analysis of the Swanson Mine. Section 22.0 presents all the relevant information to ensure the Economic Analysis adheres to the guiding principles (Competence, Materiality, Reasonableness, Transparency, Independence and Objectivity) described by the International Mineral Valuation Standards Template (IMVAL Template).

The Economic Analysis is not purported to be a mineral asset valuation. However, in adhering to the IMVAL guiding principles, it is ensured that the Economic Analysis adhere to current international best practices in determining the economic potential of the proposed Swanson Mine.

22.2 Scope of Work

The scope of work was to perform an Economic Analysis in the form of a DCF model. The Economic Analysis evaluate if the proposed Swanson Mine presents economic potential thereby meeting the JORC (2012) standards that a Mineral Resource have "reasonable prospects for economic extraction". The Economic Analysis will be an important part of documentation during final investment decision (FID) to guide decision-making whether to proceed with the development of the proposed Swanson Mine.

The DCF presents the mine development and LoM production, waste and plant processing schedules, as well as concentrate and by-product production, CAPEX and OPEX cost estimates, all determined during the DFS or supplied by ORP. The DCF included royalty payments, pre-tax income, tax calculations, projected cash flows, and a range of NPVs at the appropriate level.

The DCF determine an appropriate economic basis of value. Due to the various subjective inputs involved in generating a DCF, it is standard for the outcome to be regarded as an opinion, and not as a fact. For this reason, the resultant of the Economic Analysis is most appropriately stated as a lower and upper range.

The Economic Analysis is subjected to sensitivity analyses to determine their relative importance as value drivers. The resulting value range derived from the sensitivity analyses is used to guide the concluding range of economic value for the Swanson Mine.

M.Plan's concluding opinion of the Economic Analysis is based on the methodology, assumptions and exclusions presented in the following sections.

22.3 Statement of Independence

M.Plan is an independent advisory company. Its consultants have extensive experience in preparing CPs, Technical Advisors and Valuation Reports for mining and exploration companies. M.Plan's advisers performing the Economic Analysis has significant experience in the analysis and evaluation of mining and exploration properties worldwide and are members in good standing of appropriate professional institutions.

Neither M.Plan, nor its staff, associates or subcontractors, have, or have had, interest in ORP, Arcadia, or the properties comprising the proposed Swanson Mine, capable of affecting their ability to give an unbiased opinion. M.Plan has not received, and will not receive, any pecuniary or other benefits in connection with this assignment, other than normal consulting fees.

M.Plan was remunerated an agreed fee amount for the preparation of their scope of services, with no part of the fee contingent on the conclusions reached or the content of their services or the Economic Analysis.

The Specialist responsible for preparing the Economic Analysis, Mr. Derick, R. de Wit, is considered competent, as outlined in the JORC-code (2012), by way of his relevant and appropriate education, experience, and Professional association (ethics). Mr. de Wit is a Professional Engineering Technologist (Chem. Eng.), registered with the Engineering Council of South Africa, has more than five years' relevant experience in the analysis and evaluation of the type of exploration and mining properties discussed in the DFS Report and is a Fellow of both the Australasian and Southern African Institutes of Mining and Metallurgy.

M.Plan are not qualified to provide extensive commentary on the legal issues associated with the proposed Swanson Mine. No warranty or guarantee, be it express or implied, is made with respect to the completeness or accuracy of any of the legal aspects of the proposed Swanson Mine.

22.4 Personal Inspection

The Specialist responsible for preparing the Economic Analysis has worked closely with the CPs responsible for the Mineral Resource and Ore Reserve Estimates and the other CPs whose work are material to the Economic Analysis. The Specialist has performed a review of the work by the Specialists capable of impacting the outcome of the Economic Analysis.

Considering the above, the Specialist is satisfied that there is sufficient current information available to allow an informed Economic Analysis to be made without an inspection to the properties comprising the proposed Swanson Mine.

22.5 Economic Analysis Approach

The methods used to determine the economic potential of a mineral property differ depending on the developmental stage i.e., exploration, development and production properties.

The following three approaches are internationally accepted to evaluate mineral properties:

1. Cash Flow: used for development and production assets and relies on the "value in use" principle and requires determination of the present value of future cash flows over the useful life of the mineral asset.
2. Market: used for exploration and development assets which is based on the relative comparisons of comparable properties for which a transaction is

available in the public domain. The market approach relies on the principle of "willing buyer, willing seller" and requires that the amount obtainable from the sale of the mineral asset is determined as if in an "arm's length" transaction.

3. Cost: used for early-stage exploration assets which relies on the historical and future exploration expenditure.

The selection of an appropriate evaluation approach is dependent on the availability of information and purpose of the engagement. Since the purpose of the Economic Analysis is to evaluate if Mineral Resources and Ore Reserves can be estimated and FID to proceed with the development of the Swanson Mine. Thus, determining of the present value of the future cash flows (i.e., the Cash Flow Approach) is the suited approach to assess the economic potential of the proposed Swanson Mine.

The Cash Flow Approach focuses on the value of a mineral asset's future income streams. The future forecasts are usually based on either historic results or the results of a mine feasibility assessment study and the value is based on the value, in present day terms, of an anticipated series of future income streams. The cash flow assumptions are based upon realistic estimates, at the time of the economic evaluation, of the costs of ongoing capital spending, production, sales revenues and expenditures.

A discount rate is then applied to the cash flows, which is dependent on the nature of the project and operating company's cost of capital and risk profile, to yield a NPV on the post-tax un-escalated DCF. The Cash Flow Approach considers the unique technical and financial characteristics of each project.

In M.Plan's experience, the difference between the results of the escalated and un-escalated DCF models is zero, where the correct real (excluding inflation) and nominal (including inflation) discount rates have been applied, and the correct cost inflation rates used to compile the nominal cash flow model. For this reason, the un-escalated (real) model, discounted at a real (no inflation) discount rate is considered accurate and the preparation of an escalated model to demonstrate the un-escalated model's accuracy is unwarranted.

22.6 Economic Analysis Date

The Economic Analysis was performed at an Effective Date of 30th November 2022.

The parameters, plans, assumptions and current economic, regulatory, financial and market conditions, may change over time. The Concluding Option of Value Range is based on certain forward-looking statements regarding operations, economic performance, commodity prices, exchange rates, and financial conditions, etc. Although M.Plan believes that the expectations reflected in such forward-looking statements are reasonable, no assurance can be provided that such expectations will prove to be correct.

Subsequent developments and changes to the forward-looking statements may affect the Concluding Opinion of Value Range. As such, the Concluding Opinion of Value Range is related and applicable only as at the Effective Date.

22.7 Economic Analysis Assumptions

The Concluding Opinion of Value Range is based on the DFS on the proposed Swanson Mine and the material inputs outlined in Table 22.1 and the following assumptions:

- Information provided by the Client and its contractors as presented in the DFS can be relied upon as input to develop the DCF model;
- Regulatory approvals will be timeously obtained and kept valid;
- ORP would continue as going concerns and has or will secure the necessary funds to develop the Swanson Mine as intended in the DFS;
- Lithium sales revenue is limited to RoM tailings, when ore containing spodumene is processed through the process plant;
- Project execution (detail engineering, design and construction) is based on the following:
  - FID is expected on 1st July 2023;
  - detail engineering, design, construction and commissioning will require 18 months, followed by ramp-up to full production;
  - linear ramp-up will occur from ~16% in month 1 to ~100% in month 6;
  - processing of ore (including ramp-up) is scheduled to occur for 97 months (8 years and 1 month) between 1st January 2025, to 31st December 2033; and,
  - ore will be available at commencement of commissioning and ramp up and the production and stockpile schedule will ensure the process plant is continuously fed throughout the LoM at the design capacity.
- ORP would be able to secure markets and product offtake (>25.0% Ta_2O_5) tantalum concentrate, niobium credits, and lithium RoM tailings;
- Marketing cost assumptions used for the Economic Analysis are based on:
  - independent Tantalite Market Report by Argus Media Group as summarised in Section 19.0; and,
  - ORP's views based on discussions with concentrate trading companies.
- It is reasonably expected that the majority of Inferred Mineral Resources within the mine production schedule and DCF model can be upgraded to Indicated Mineral Resources to thereby realise their economic value as forecasted within the DCF model.

  However, the reader should exercise caution since the Swanson mine production schedule and DCF model includes for Inferred Mineral Resources which has a lower level of confidence than that applying to an Indicated Mineral Resource and thus is of higher risk.

- Income is received and expenses are paid after 30 days;
- The methodology to calculated tax payments for royalty, property and company income taxes were furnished by ORP and used as such in the DCF model;
- The NPV is based on a real discount rate of 10.0% which the Specialist responsible for the Economic Analysis believe is appropriate for the risks and development stage of the proposed Swanson Mine;
- Reliance can be placed on the forecasted; head grades, mining and milling production rates, recoveries, price forecasts, costs and other material assumptions as outlined in Table 22.1;
- accounting depreciation is equal to tax wear and tear; and
- accrued tax loss available to be applied to future profits.

Table 22.1: DCF Model Material Inputs

Description	Unit	Value	Notes
General			
Project commencement	dd/mm/yyyy	01-Jan-23	Construction commences
Base Date	dd/mm/yyyy	31 March 2023	Escalation, currency, and commodity prices
Resource Information			
Production commence	month	13	Production start after
Invoice	month	1	Months after production
Cash receipt delay	month	1	Months after invoice receipt
Metal Recovery			
Tantalum recovery	%	65%	Saleable %
Niobium recovery	%	65%	Saleable %
Lithium recovery	%	98%	Saleable % (D ore only)
Tantalum material multiplier	multiplier	4	Material calc for transport
Average monthly production	tpa	12,500	To calculate variable OPEX
Financial Inputs			
Company tax rate	%	32.00%	Namibian Chamber of Mines
Royalties (base metals)	%	3.00%	Namibian Chamber of Mines
Export tax on concentrate	%	0.25%	Namibian Chamber of Mines
Social contribution	%	1.00%	ORP
Depreciation capital	%	33.33%	Namibian Chamber of Mines
Depreciation mining plant	%	100.00%	Namibian Chamber of Mines
Exchange rate	US$/NAD	18.30	Client
Opening bank balance	US$	0	Cash available at inception
Opening taxable loss	US$	(1,641,739)	Loss accumulated in company
Sales Price			
Tantalum	US$/kg Ta_2O_5	210	
Niobium	US$/kg Nb_2O_5	50	
Lithium	US$/t	60	

Description	Unit	Value	Notes
Sensitivity Analysis			
Financial			
Taxation	months	4	Paid months after year end
Interest on shareholders loans	%	0.0%	
XIRR date	date	1st January 2023	
Contingencies			
CAPEX	%	10.0%	
OPEX	%	7.5%	
NPV			
Discount rate financial risk	% p.a.	2.5%	
Discount rate project risk	% p.a.	5.5%	
Discount rate - total risk	% p.a.	8.0%	
NPV Sensitivity			
Variable OPEX	%	0.0%	
Fixed OPEX	%	0.0%	
Yield recovery	%	0.0%	
CAPEX	%	0.0%	
Selling price / kg	%	0.0%	

22.8 Economic Analysis Exclusions

The Concluding Opinion of Value Range is based on the following exclusions:

- Mining will be by contractor mining. The mining contractor rates includes for amortisation of mining equipment and the required associated infrastructure.
- Cost provisions does not include for any licensing fees or intellectual property costs;
- The DCF model is generated in constant US$ and thus excludes for price escalation and inflation;
- All CAPEX and sales exclude value added tax (VAT);
- Provisional tax payments have been excluded from the DCF model; and,
- Hebei construction funding as discussed in Section 25.2.

22.9 Cautionary Statement

The Economic Analysis is based JORC (2012) compliant Mineral Resources and Ore Reserves, from which a mine production schedule was developed. The mine production schedule does include Mineral Resources in the Inferred classification.

The JORC Code (2012) sate: "An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade (or quality) are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify geological and grade (or quality) continuity. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to an Ore Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Caution should be exercised if Inferred Mineral Resources are used to support technical and economic studies".

22.10 Economic Analysis Summary

M.Plan constructed a constant DCF model, applying the "value in use" principle, using cash flow projections and future production, recoveries, sales and expenses over the LoM, as determined during the DFS.

The LoM cash flow forecast for the proposed Swanson Mine is shown in Table 22.2.

Table 22.2: Swanson Life of Mine Cash Flow Forecast

DESCRIPTION	UNITS	TOTAL	Jan'23	Feb3	Sep'23	Oct'23	Nov'23	Dec'23	Jan'24	Feb'24	Mar'24	Apr'24	May'24	May'25	Jun'25	Jul'25	Nov'31	Dec'31	Jan'32	Jan'33
All waste	**kt**	**10,497**							**44.3**	**6.3**	**43.5**	**22.5**	**34.8**	**33.8**	**16.2**	**39.1**	**71.7**	**111.9**	**71.9**	
All ore	**kt**	**1,160**							**2.0**	**3.7**	**6.1**	**7.9**	**10.7**	**12.7**	**12.3**	**12.7**	**12.3**	**12.7**	**2.5**	
Ta_2O_5 Plant Feed	**t**	**569**							**0.6**	**1.1**	**1.8**	**2.6**	**3.5**	**4.8**	**3.8**	**4.6**	**7.4**	**6.5**	**1.4**	
Nb_2O_5 Plant Feed	**kg**	**88,058**							**172**	**298**	**483**	**670**	**1,012**	**1,196**	**1,191**	**1,213**	**750**	**750**	**145**	
Li_2O Plant Feed	**t**	**492,438**							**2,037**	**3,680**	**6,111**	**7,884**	**10,692**	**12,729**	**12,319**	**12,730**	**0**	**0**	**0**	
Li_2O Spiral Tailings sales	**t**	**346,780**												**12,729**	**12,319**	**12,730**				
Ta_2O_5 Revenue	**US$m**	**77.707**							**0.09**	**0.15**	**0.24**	**0.35**	**0.48**	**0.66**	**0.52**	**0.62**	**1.01**	**0.88**	**0.19**	**0.00**
Nb_2O_5 Revenue	**US$m**	**2.862**							**0.01**	**0.01**	**0.02**	**0.02**	**0.03**	**0.04**	**0.04**	**0.04**	**0.02**	**0.02**	**0.00**	**0.00**
Li_2O Revenue	**US$m**	**20.391**							**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.748**	**0.724**	**0.749**	**0.000**	**0.000**	**0.000**	**0.000**
Variable OPEX																				
Mining ore + waste	US$m	**-23.431**							-0.096	-0.021	-0.103	-0.063	-0.094	-0.097	-0.059	-0.108	-0.166	-0.246	-0.146	
Crushing	US$m	**-1.645**							-0.003	-0.005	-0.009	-0.011	-0.015	-0.018	-0.017	-0.018	-0.017	-0.018	-0.004	
Mining equipment used at plant	US$m	**-1.027**							-0.002	-0.003	-0.005	-0.007	-0.009	-0.011	-0.011	-0.011	-0.011	-0.011	-0.002	
Plant waste transport	US$m	**-1.179**							-0.002	-0.004	-0.006	-0.008	-0.011	-0.013	-0.013	-0.013	-0.013	-0.013	-0.003	
Plant operations	US$m	**-4.905**							-0.009	-0.016	-0.026	-0.033	-0.045	-0.054	-0.052	-0.054	-0.052	-0.054	-0.011	
Tantalum concentrate shipment	US$m	**-0.990**							-0.001	-0.002	-0.003	-0.004	-0.006	-0.008	-0.007	-0.008	-0.013	-0.011	-0.002	
Total Variable OPEX	**US$m**	**-33.176**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**-0.113**	**-0.050**	**-0.152**	**-0.127**	**-0.181**	**-0.201**	**-0.159**	**-0.212**	**-0.272**	**-0.353**	**-0.167**	**0.000**
Fixed OPEX																				
Mining contract	US$m	**-8.460**							-0.087	-0.087	-0.087	-0.087	-0.087	-0.087	-0.087	-0.087	-0.087	-0.087	-0.087	
Crushing	US$m	**-6.028**							-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	-0.062	
Site security	US$m	**-1.003**		0.000	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	-0.009	
IT and communication	US$m	**-0.093**		0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	
Accounting and land use	US$m	**-0.392**	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	
Insurance	US$m	**-0.611**		0.000	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	
Maintenance - road	US$m	**-0.162**		0.000							-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	
Maintenance - water pipe	US$m	**-0.162**		0.000							-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	
Salaries and wages and other cost	US$m	**-1.819**		0.000					-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	-0.019	
Plant operation	US$m	**-7.453**		0.000					-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	-0.077	
Geology and grade control	US$m	**-1.058**		0.000					-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	-0.011	
Environmental monitoring	US$m	**-0.177**		0.000										-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
Tailings and waste	US$m	**-0.289**		0.000					-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	-0.003	
Total Fixed OPEX	**US$m**	**-27.709**	**-0.003**	**-0.003**	**-0.019**	**-0.019**	**-0.019**	**-0.019**	**-0.278**	**-0.278**	**-0.282**	**-0.282**	**-0.282**	**-0.283**	**-0.283**	**-0.283**	**-0.283**	**-0.283**	**-0.283**	**-0.002**
OPEX Contingency	US$m	**-4.566**	0.000	0.000	-0.001	-0.001	-0.001	-0.001	-0.029	-0.025	-0.033	-0.031	-0.035	-0.036	-0.033	-0.037	-0.042	-0.048	-0.034	0.000
Total OPEX	**US$m**	**-65.451**	**-0.004**	**-0.004**	**-0.021**	**-0.021**	**-0.021**	**-0.021**	**-0.420**	**-0.353**	**-0.466**	**-0.439**	**-0.497**	**-0.521**	**-0.475**	**-0.532**	**-0.597**	**-0.684**	**-0.484**	**-0.002**
Depreciation charge	**US$m**	**-10.858**	-0.013	-0.142	-0.509	-0.629	-0.752	-0.892	-0.879	-0.750	-0.737	-0.724	-0.724	-0.006	-0.006	-0.006	0.000	0.000	0.000	0.000
EBIT	**US$m**	**24.651**	**-0.016**	**-0.146**	**-0.529**	**-0.649**	**-0.773**	**-0.913**	**-1.300**	**-1.103**	**-1.112**	**-1.002**	**-0.963**	**0.149**	**0.172**	**0.907**	**0.413**	**0.345**	**0.549**	**-0.002**
Capital Expenditure																				
Geology and Grade control	US$m	**-0.059**				-0.020	-0.020	-0.018												
Access Road	US$m	**-0.559**	-0.140	-0.140																
Haulage Road and Road Maintenance	US$m	**-0.315**		0.000	-0.063	-0.063	-0.063	-0.063												
Mine Establishment	US$m	**-0.948**		0.000	-0.237	-0.237	-0.237	-0.237												
Crushing Cost	US$m	**-0.085**		0.000	-0.021	-0.021	-0.021	-0.021												
Plant CAPEX and OPEX per Ore Ton	US$m	**-6.362**		-1.272	-0.700	-0.700	-0.700	-0.891												
Water Pipeline and Maintenance	US$m	**-0.514**		0.000	-0.103	-0.103	-0.103	-0.103												
Tailings and waste	US$m	**-0.299**		0.000	-0.060	-0.060	-0.060	-0.060												
Power Line	US$m	**-0.525**		0.000	-0.105	-0.105	-0.105	-0.105												
IT, Comms, CCTV, office, vehicles, etc.	US$m	**-0.205**		0.000		0.000	-0.103	-0.103												
Total direct CAPEX	**US$m**	**-9.871**	**-0.140**	**-1.412**	**-1.289**	**-1.309**	**-1.412**	**-1.600**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
CAPEX Contingency	US$m	**-0.987**	-0.014	-0.141	-0.129	-0.131	-0.141	-0.160												
Total CAPEX	**US$m**	**-10.858**	**-0.154**	**-1.553**	**-1.418**	**-1.440**	**-1.553**	**-1.760**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Tax and Royalties																				
royalties - industrial mineral 3.0%	US$m	**-3.029**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.003	-0.005	-0.008	-0.011	-0.020	-0.043	-0.039	-0.031	-0.031	-0.027	0.000
export tax - concentrate 0.25%	US$m	**-0.201**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	-0.001	-0.002	-0.002	-0.001	-0.003	-0.003	-0.002	0.000
social contribution 1.0%	US$m	**0.000**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Corporate tax payable	US$m	**0.000**	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total tax and royalties payable	**US$m**	**-3.230**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**-0.003**	**-0.005**	**-0.008**	**-0.012**	**-0.021**	**-0.045**	**-0.040**	**-0.033**	**-0.034**	**-0.029**	**0.000**
Net profit	**US$m**	**10.562**	**-0.170**	**-1.699**	**-1.947**	**-2.090**	**-2.325**	**-2.673**	**-1.300**	**-1.106**	**-1.117**	**-1.011**	**-0.975**	**0.127**	**0.127**	**0.867**	**0.379**	**0.311**	**0.520**	**-0.002**
Discounted Cashflow																				
Project undiscounted cashflow (FCF)	**US$m**	**21.420**	**-0.157**	**-1.557**	**-1.438**	**-1.461**	**-1.574**	**-1.780**	**-0.420**	**-0.356**	**-0.380**	**-0.286**	**-0.251**	**0.134**	**0.134**	**0.873**	**0.379**	**0.311**	**0.520**	**-0.002**
Project NPV (discounted cashflow)	US$m	**10.254**	-0.157	-1.547	-1.364	-1.376	-1.472	-1.655	-0.388	-0.327	-0.346	-0.259	-0.226	0.111	0.110	0.715	0.188	0.153	0.254	-0.001

22.11 SENSITIVITY ANALYSES

Sensitivity analyses were performed for variations in the key economic parameters of sales revenue (metal prices and head grade), OPEX and CAPEX and discount rate. This was done to determine the key economic parameter's relative importance as value driver.

The results of the sensitivity analyses based on changes in NPV (8% real, after tax) and internal rate of return (IRR), after tax, to the key economic parameters are presented in the form of a spider diagram in Figure 22.1 and Figure 22.2, respectively.

Figure 22.1: NPV Sensitivity to Key Economic Parameters

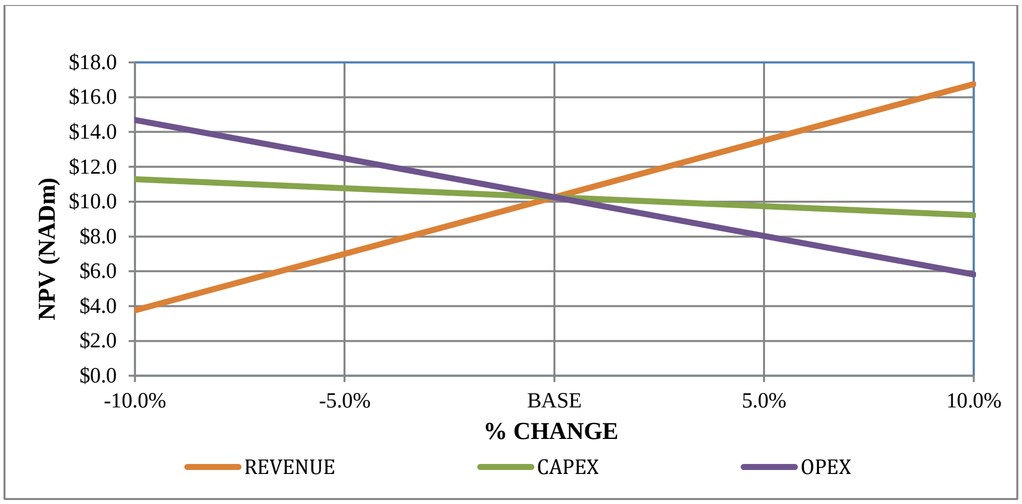


Figure 22.2: IRR Sensitivities to Key Economic Parameters

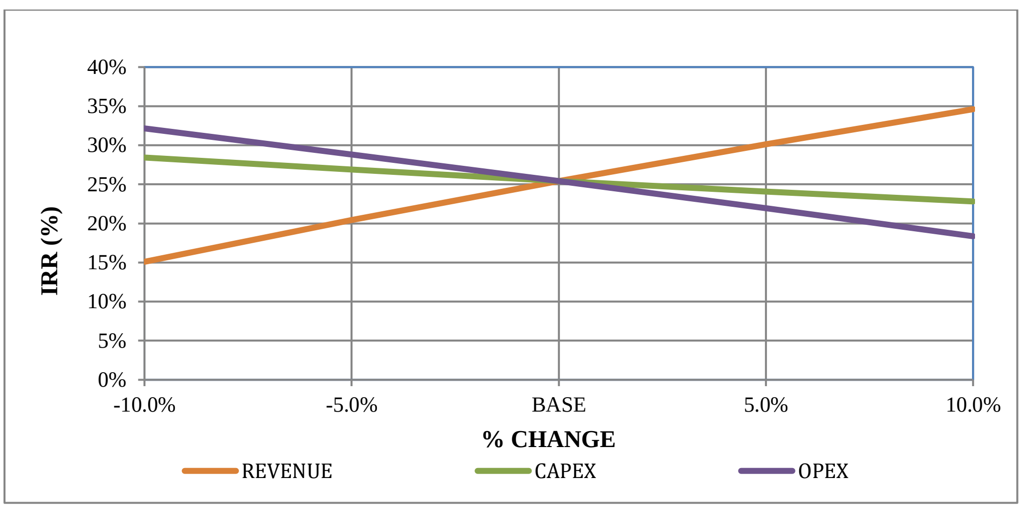


Figure 22.1 and Figure 22.2 indicates that the proposed Swanson Mine's NPV and IRR are both most sensitive to revenue and least sensitive to CAPEX with the sensitivity for OPEX between revenue and CAPEX. However, OPEX does closer aligned with CAPEX than with revenue.

23.0 RISK IDENTIFICATION

The overall risks rating to develop the Swanson Project and operate the proposed Swanson Mine is acceptable for a DFS and is classified as moderate to low due to:

- The well-defined geology;
- The mining method is by low risk open cast;
- The design of the Spiral Plant is "modular" and based on a simplistic process flow - all technologies proposed for the DFS flowsheet are well established within tantalum recovery;
- The execution schedule is short (13 months);
- Low total CAPEX requirement (~US$11 million including 10% contingency);
- The Swanson Project is located in a country with a low-risk rating and established mining industry;
- The Swanson Project produce a commodity that has extensive applications in the growing electronics market, where reliable supply from an area not associated with the finance of armed conflict or using forced labour is required and may thus incur a price premium;
- Although, the geotechnical foundation profile of the area selected for the WRD is unknown, it is likely to comprise shallow rock with a thin soil cover as with the rest of the Swanson Property;
- The area selected to locate the WRD has been assumed in the DFS to be stable under static conditions and pseudo-static conditions, given the low seismicity of the area. The intermediate side slope and benching configuration, and conservative overall slope profile contributes to the stability of the WRD. The overall slope that has been selected for the final WRD profile is less than the angle of repose; and,
- Based on the planned compaction of the material, side slope profile and low-seismic hazard zone, the TSF site is considered to be stable under static conditions and pseudo-static conditions.

To note is that the hydrology of the Swanson Property and selected catchments has not been properly assessed during the DFS. The WRD is part of large catchment and requires hydraulic control measures, particularly during the initial period where little waste rock will be deposited. Design stormwater and depth duration frequency estimates are required to determine the design peak intensity for sizing of storm water attenuation and diversion measures, including the diversion of the ephemeral river course intersecting the D-pit.

The risks and opportunities associated with the design and operation of the Swanson TSF were evaluated. Very few were identified and are summarised as follows:

- The tailings geochemical characterisation and classification has been undertaken on a representative tailings sample, by means of a static leach test as per the relevant legislation. The pollutant release over the long term from the tailings material (fine and coarse) may vary. Additional kinetic testing on both the fine and coarse tailings should be undertaken to confirm the current assumptions on the tailings geochemical character.

- The physical properties of the fine and coarse tailings are yet to be determined. This includes achievable dry densities which determines the required volumetric capacity footprint of the facility. The current spatial design parameters are based on assumed values and should be confirmed. Should the confirmed parameters differ significantly from the assumed, then the design could be adjusted to accommodate the tailings as per the design criteria. Available space next to the Spiral Plant does not seem to be a constraint.
- The tailings facility is designed to accommodate filtered tailings with a moisture content of below 20%, which is assumed to be represent an unsaturated material. No provision has been made to temporarily store tailings slurry (saturated material) produced in the event of upset conditions in the Spiral Plant.

23.1 HAZOP III Study

A hazard and operability (HAZOP) study was performed as part of the DFS for the Spiral Plant. The HAZOP focused on the equipment that is used in the Spiral Plant. The following equipment was evaluated during the HAZOP:

- Feed Bins;
- Conveyors;
- Belt Feeders;
- Dry Screening Screens;
- Centrifugal Slurry Pumps;
- Chutes;
- Wet Screening Screens;
- MGS Units;
- VSI Mill;
- Ball Mill;
- Slurry Tanks;
- Cyclones;
- Filter Feed Tanks (with agitator);
- Filter Presses;
- Dryer;
- Spillage Pumps;

- Thickener;
- Process Water Tank;
- Process Water Pumps;
- Spirals; and,
- Trackless Mobile Machinery.

The list of deviations provided in Table 23.1 were evaluated for each of the equipment items identified above. If the deviation was not likely to occur or to create a problem or hazard, it was given no further consideration. If a deviation could occur and create a problem or hazard, then the deviation was referred to in the Study Record proforma and analysed with respect to the following:

- Causes (e.g., failures);
- Consequences (e.g., problems or hazards);
- Safeguards already provided or existing; and,
- Recommendations to either prevent the deviation or protect against its consequences.

Table 23.1: List of Deviations

Deviation	Deviation	Deviation
High flow	High level	Impurities
Low flow	Low level	Loss containment
No flow	High composition	Radiation
Reverse flow	Low composition	Generation
High pressure	High Ph	Start/stop
Low pressure/vacuum	Low Ph	Emergency/test
High temperature	Fast reaction, mix	Inoperability
Low temperature	Slow reaction, mix	Human interaction
Poor integrity	Malfunction	Fire/explosion

Each of the deviations is assessed with regards to the severity and probability according to the following scoring matrices shown in Table 23.2 and Table 23.3, respectively.

Table 23.2: Severity Scoring Matrix

Weighting	6	5	4	3	2	1
Effect	**Catastrophe** Multiple fatalities	**Major** Fatality or disability	**Severe** Injury	**Serious** Medical treatment	**Minor** First aid	**None** No injury

Table 23.3: Probability Scoring Matrix

Weighting	6	5	4	3	2	1
Effect	**Regular** Many times a day	**Probable** Daily	**Can Happen** Once per week	**Low Likelihood** Once per month	**Rare** Once a year	**Highly Unlikely** Never to happen

The risk rating for each of the deviations is calculated as the product of the Severity and the Probability of the deviation. The risk rating is then plotted on the risk rating matrix to determine if any further actions are required to mitigate the risk. The risk rating matrix is provided in Table 23.4 and the calculation thereof is completed by the following equation:

$$Risk\ Rating = Severity\ x\ Probability$$

Table 23.4: Risk Rating Matrix

	Severity						
Probability	**Weighting**	**1**	**2**	**3**	**4**	**5**	**6**
	6	6	12	18	24	30	36
	5	5	10	15	20	25	30
	4	4	8	12	16	20	24
	3	3	6	9	12	15	18
	2	2	4	6	8	10	12
	1	1	2	3	4	5	6

Any deviation with a risk rating between 10 and 36 will require additional mitigation actions to reduce the risk to an acceptable level. Any deviation with a risk rating between 1 and 9 is considered as acceptable and no further actions are required to mitigate the risk. The following team members participated in the HAZOP sessions as listed in Table 23.5.

Table 23.5: HAZOP Participants

Name and Surname	Company	Designation
Anro Barnard	Obsideo Consulting	Process Engineer
Zoe Ilunga	CoreMet Mineral Processing	Metallurgical Engineer
Albert Venter	CoreMet Mineral Processing	Technical Director

The deviations shown in Table 23.6 were identified as items that need to be addressed during the detail design to reduce the Risk Rating to an acceptable level.

Table 23.6: Deviations Requiring Additional Consideration in the Detail Design

Equipment	Deviation Description	Initial Risk Rating	Comment
Feed bin	Excess material in bin than design	12	Production planning. Safe distance from bin (Address in detail design).
	Excessive dust release	12	Ensure adequate dust control during detail design (covers, etc).*
Conveyors	Foreign material	12	Evaluate the possibility of foreign material from stockpile.
	Loss of containment	12	Ensure adequate protection during detail design (covers, etc).*
	Inoperability	10	Control philosophy to be addressed in detail design.*
Belt feeders	Foreign material	12	Evaluate the possibility of foreign material from stockpile.
Wet screening	More material than design Excess spray water	12	Ensure adherence to standard operating procedures. Training of operators are essential.
Mgs	Equipment failure. Emergency	10	Ensure risk is addressed in detail design with necessary interlocks and control philosophy.
Filter presses	Equipment failure. Emergency	10	Ensure risk is addressed in detail design with necessary interlocks and control philosophy.
Drier	Equipment failure. Emergency	10	Ensure risk is addressed in detail design with necessary interlocks and control philosophy.
Constant density tank	Start/stop/emergency/test	12	Ensure adequate operator training. Aspect included in standard operating procedures.

* Impact of cost associated with these changes are covered in the contingency of the Project.

24.0 ADJACENT PROPERTIES

Kazera Global PLC (AIM listed) currently holds a 75% share in African Tantalum (Proprietary) Limited (Aftan), which in turn has two wholly owned subsidiaries, Namibia Tantalite Investments (plant and operating assets) and Tameka (owner of the Mining Licence). Through the EPL 5047 licence, ORP has exploration rights for all the areas within the EPL boundaries and all areas surrounding Kazera's Mining Licence. The mine primarily produces tantalite, although Kazera has indicated that they are assessing the lithium potential of the ore as well. For this reason, the company instituted an exploration programme during 2017. The location of the Kazera lease area is shown in Figure 24.1.

Johnson (2017) commented on a geological mapping programme on ML77 and noted that the licence largely comprised a large 7.1 km by 3.3 km black to dark green-brown gabbro intrusion formed in the right-lateral PSZ and forming an ovoid dome shaped mountain contained within paragneisses of the Namaqua Complex. The complex itself was comprised mainly of mica schists and quartzites.

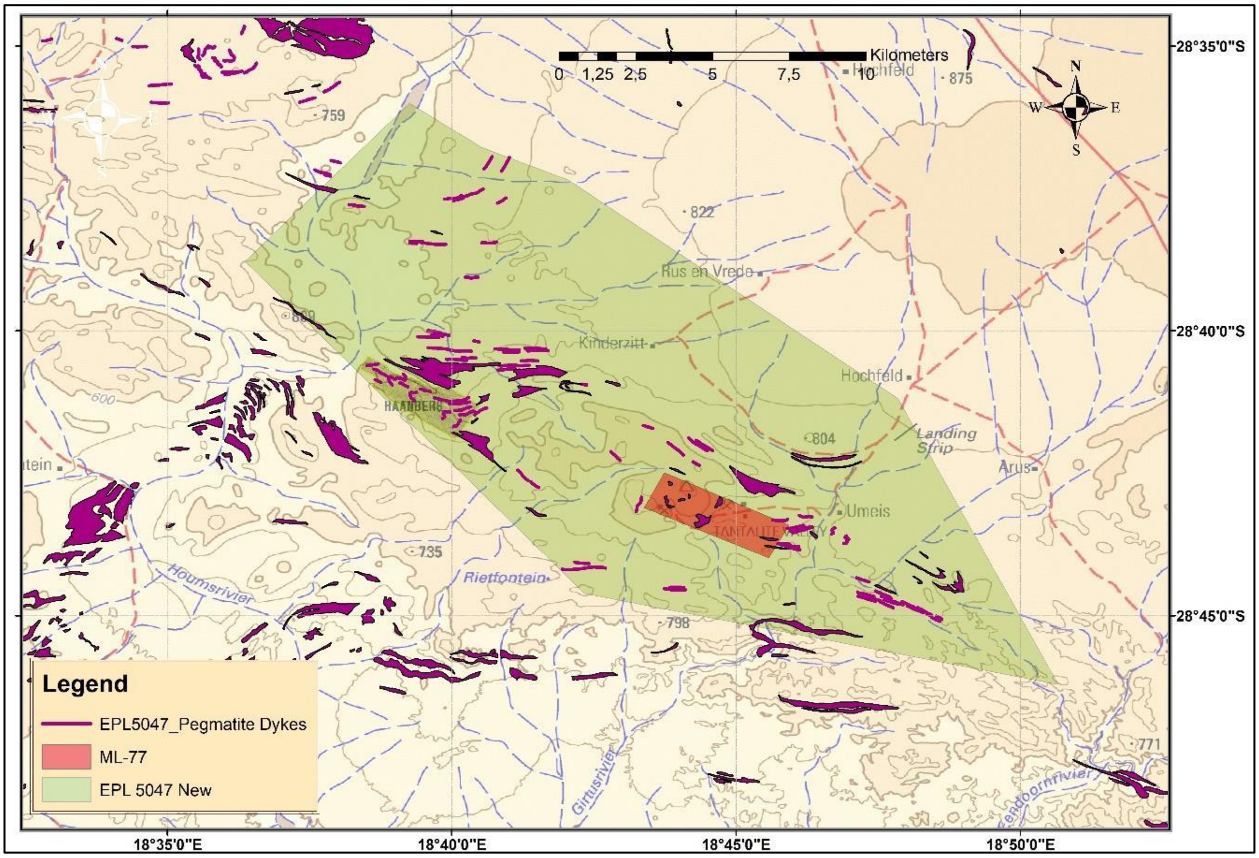
Johnson noted two generations of pegmatites which intruded into the gneisses and schists: older unzoned and un-mineralised schistose pegmatites intruded prior to regional metamorphism and deformation. Quartz, feldspar and muscovite are the main constituents of these pegmatites; and younger coarser-grained, garnet-bearing pegmatites containing tantalite, lepidolite, spodumene and beryl as well as traces of copper and nickel, which pinch and swell and average 10 m thick.

Following the completion of this programme, Kazera announced a JORC compliant Mineral Resource Estimate of 594,300 t at a grade of 247 ppm Ta_2O_5 (Kazera Purple Haze Mineral Resource Statement 2019; Kazera Homestead-Mineral-Resource-Statement 2019; White City Mineral Resource 66 Statement 2019). The Inferred Resource is 501,100 t at a grade of 206 ppm Ta_2O_5, and the Indicated Resource is 93,200 t at a grade of 471 ppm Ta_2O_5.

Although the mineralised pegmatites explored within the EPL 5047 licence are currently the flagship operation of ORP, the company has extensive areas available for further exploration. The current understanding of mineralisation seems to indicate there is a potential relationship between the mafic-ultramafic complex present on the EPL 5047 licence and ML 77 (Tantalite Valley Complex) and elevated tantalum in the associated younger pegmatites.

ORP owns the rights on the EPL 6940 and EPL 7295 licences, both located to the east and southeast of the EPL 5047 licence. Both these licences have indicative potential for mineralised pegmatites as indicated on EPL 6940 and also the Kum Kum Mafic Complex that is located on EPL 7295. The total amount of pegmatites mapped by the Namibian Council of Geoscience over the three ORP EPL's amount to more than 200 pegmatites. All indications are that the same mineralisation model present could be applicable to these areas.

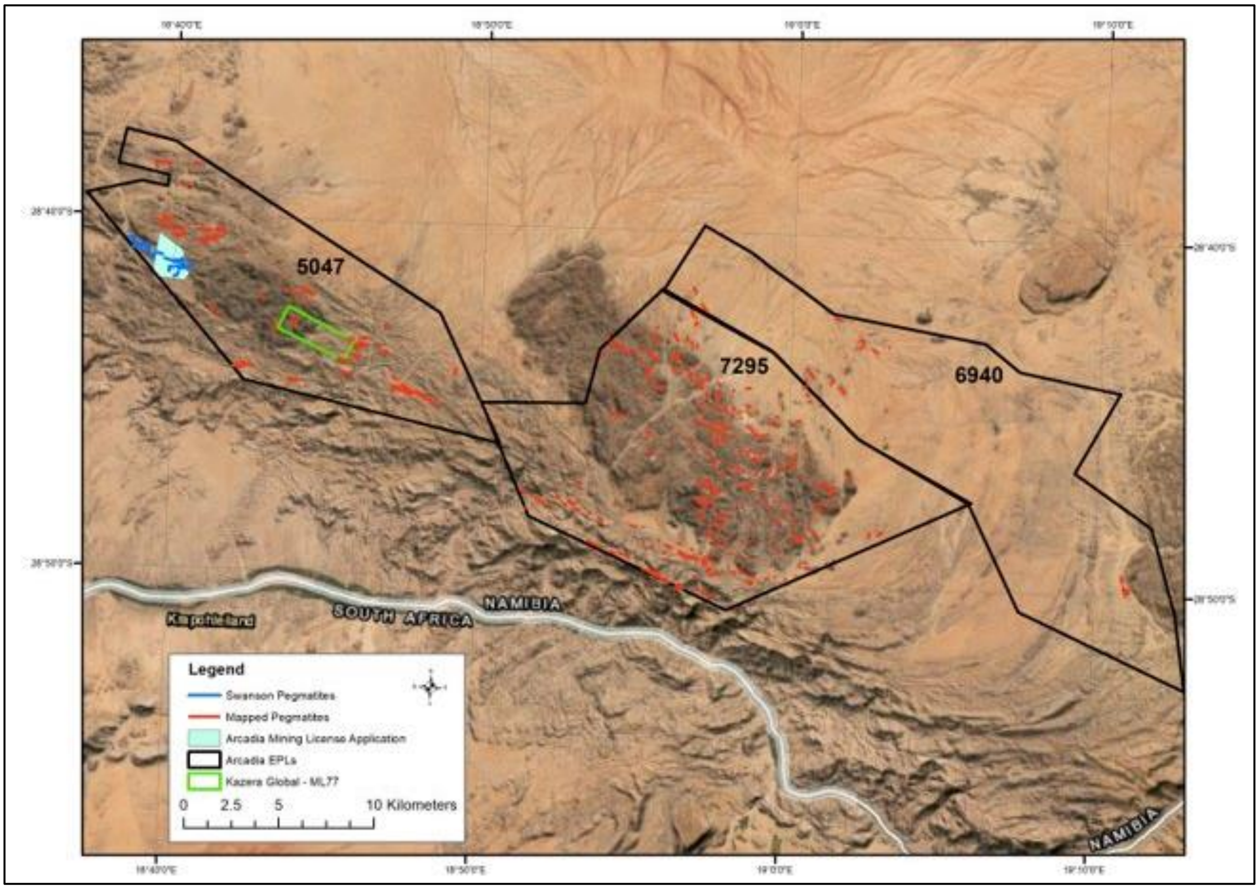
Figure 24.1: Locality of ML 77 with Tantalite Mining



The location of the known pegmatites over the licences EPL 5047, 7295 and 6940 are shown in Figure 24.2.

Previous exploration drilling, on licences ML 77 and EPL 5047 also intersected sulphide nickel mineralisation in one of the boreholes. Additional boreholes were then targeted specifically at the nickel mineralisation and this drilling confirmed a relatively thick zone with primary nickel, and secondary copper sulphide mineralisation. This, however, falls outside the scope of the DFS Report and has since been developed by ORP as a separate and stand-alone project.

Figure 24.2: Location of Mapped Pegmatites over Licences EPL 5047, EPL 7295 and EPL 6940



25.0 OTHER RELEVANT DATA AND INFORMATION

25.1 OFFTAKE

On 23rd March 2023 a LoI was concluded between ORP and Hebei Xinjian Construction CC (Hebei) to purchase the lithium containing Spiral Plant tailings (waste).

The Swanson Project neighbours the active tantalite mining operation (African Tantalum (Pty) Ltd) owned by AIM listed, KZG. During December 2022, KZG announced that it had signed a definitive agreement to sell its 100% interest in African Tantalum to Hebei.

The LoI outlines purchasing within 24 months from the date of name-plate production of the Swanson Mine, 3500,000 tonnes of Spiral Plant tailings containing an average metal content of 0.3% Li_2O not containing less than a minimum metal content of 0.2% Li_2O. The purchase price is given at US$60 per ton (ex-works Swanson Mine) which will be adjusted pro-rated to the current spodumene minimum 5% Li_2O spot price.

Considering the LoI, the DCF (Section 22.0) includes revenue from lithium RoM Spital Plant tailings when the grade is >0.2% Li_2O and a blend of 0.3% Li_2O is achieved by stockpiling and blending. When the lithium RoM grade <0.2% Li_2O no revenue is recognised in the DCF model for lithium RoM tailings.

As stated in Section 16.4.1 the mine production schedule does include Mineral Resources in the Inferred classification. As such, the revenue from the lithium RoM tailings includes Inferred Mineral Resources that fall within the pit shells of the Ore Reserve Estimate.

The JORC Code (2012) sate: "An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to an Ore Reserve. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.

Caution should be exercised if Inferred Mineral Resources are used to support technical and economic studies".

25.2 CONSTRUCTION FUNDING

A summary of the salient points of the 29th May 2023 Arcadia ASX Announcement regarding the construction funding to construct the MGS Plant secured from Hebei are as follows:

- Hebei is to construct the MGS Plant, infrastructure, roads and do mine development and commissioning of the MGS Plant according to detailed engineering specifications to consistently produce a minimum 25% Ta_2O_5 concentrate from a minimum feed of 12,500mt per month;

- Hebei is to receive a 38% interested in the owner of the Swanson Mine, Orange River Pegmatite (Pty) Ltd;
- MGS Plant designed to receive c. 20,000t feed per month;
- Name Plate Production expected by Q2 of 2024;
- ORP shall be entitled to transfer EPL 5047 and EPL 7295 to a new private company in which the previous shareholders of ORP will hold shares in the same proportion as previously held;
- Hebei, at its own costs and without recourse to ORP or Arcadia must proceed to construct and commission the processing plant, subject to:
    - detailed engineering and design specifications;
    - Hebei shall provide suitably skilled and experienced staff, employees and sub-contractors at its own cost until the Transaction become effective;
    - Hebei shall use its own facilities, equipment and tools for the construction and commissioning at its own cost and without any further recourse to ORP and Arcadia, and
    - strict compliance with the laws of Namibia, including Mining, Environmental, Health and Safety regulations.
- The minimum specifications relate to the final description of the location, design, components and functionality of the processing plant, infrastructure (power, water and roads), mine site infrastructure, all of which has been prepared by Arcadia in pursuance of the DFS;
- Hebei is to construct and commission the MGS Plant not later than 12 months following signature on the basis that time is of the essence in relation to the required completion of the MGS Plant; and,
- Construction of the MGS Plant is to commence following the fulfilment of conditions pertaining to approval by the shareholders of ORP and the passing of the required resolutions by the directors of ORP and Hebei, which Arcadia expects to be completed before the end of May 2023.

Further information on the Hebei construction funding can be obtained from Arcadia's website (https://www.arcadiaminerals.global/).

25.3 OTHER (BENCHMARKING)

In 2017, the United States Geological Survey (USGS) issued a paper on niobium and tantalum as Chapter M of Critical Mineral Resources of the United States - Economic and Environmental Geology and Prospects for Future Supply. The USGS noted that niobium and tantalum are transition metals that are almost always found together in nature because they have very similar physical and chemical properties. Their properties of hardness, conductivity, and resistance to corrosion largely determine their primary uses today. The leading use of niobium (about 75%) is in the production of high-strength steel alloys used in pipelines, transportation infrastructure, and structural applications. Electronic capacitors are the leading use of tantalum for high-end applications, including cell phones, computer hard drives, and such implantable medical devices as pacemakers.

The USGS (2017) noted that Brazil and Canada were the leading producers of niobium mineral concentrates, but Brazil was by far the leading producer, accounting for approximately 90% of production, which came mostly from weathered material derived from carbonatites. Australia and Brazil have been the leading producers of tantalum mineral concentrates, although recently Ethiopia and Mozambique have also been significant suppliers of tantalum. Artisanal mining of columbite-tantalite (also called coltan) is practiced in many countries.

USGS (2017) estimates that the global Ore Reserves and Mineral Resources of both niobium and tantalum are large, but they are unevenly distributed geographically. According to the USGS, primary niobium and tantalum mineral deposits are found in three main types of igneous intrusive rocks:

- Carbonatites and associated alkaline rocks (niobium dominant);
- Alkaline to peralkaline granites and syenites (niobium dominant); and,
- Rare-metal granites and pegmatites of the LCT family (tantalum dominant) (Černý and Ercit, 2005[7]).

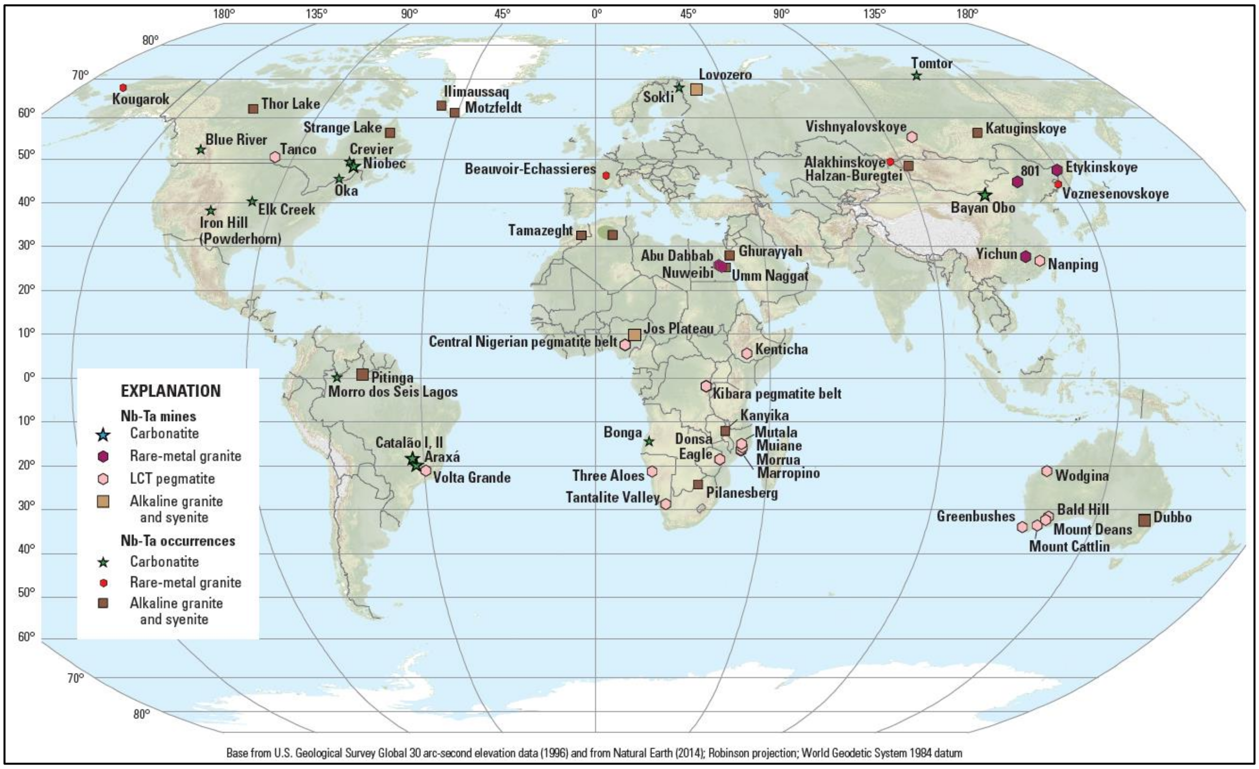
Selected global niobium-tantalum deposits are shown in Figure 25.1, by deposit type.

According to the USGS (2017), all economically important tantalum mineralisation is related to rare-metal granites (also called rare-element granites) and LCT-type pegmatites.

LCT-type pegmatites are generally small (metres rather than kilometres in length and width) granitic intrusions characterised by extremely coarse, but with variable grain sizes and enrichments in lithium, rubidium, caesium, beryllium, tantalum and niobium (Ta>Nb) (Černý and Ercit, 2005[6]).

[7] Snowden Optiro Report, August 2022.

Figure 25.1: Selected Niobium and Tantalum Mines, Deposits, and Occurrences, by Deposit Type



Source: USGS 2017.

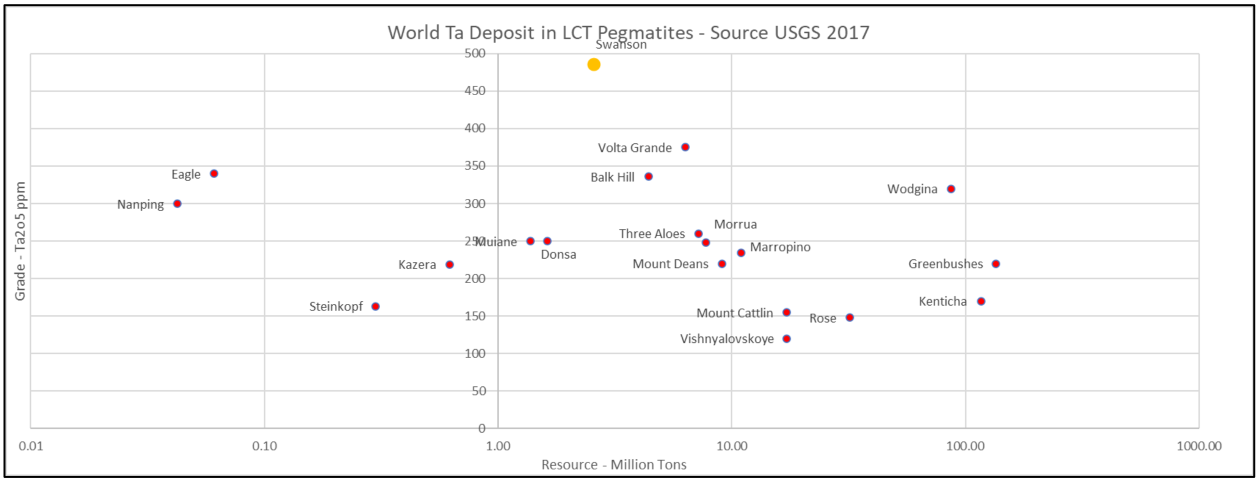
LCT-type pegmatites are the products of highly fractionated and volatile-rich granitic magmas generally derived from rare-metal granites. They commonly occur in aureoles surrounding the roof of their parental granite intrusion, and the mineralised and most fractionated pegmatites are found the farthest away.

The LCT database was used for benchmarking of tantalum grades and tonnages. Niobium was not always captured in the USGS database, and was either missing or shown as not available, so niobium was left out of the benchmarking.

The ORP Project was benchmarked against the following 18 directly comparable deposits: Nanping, Eagle, Steinkopf, Kazera, Muiane, Donsa, Balk Hill, Volta Grande, Three Aloes, Mount Deans, Morrua, Marropino, Mount Cattlin, Vishnyalovskoye, Rose, Wodgina, Greenbushes and Kenticha (Figure 25.2).

The benchmarked study is shown in Figure 25.2. The weighted average grade of these 18 deposits is 234 ppm Ta_2O_5, indicating that grades of the Swanson Project are materially above their global peer group and of the highest grades in the world.

Figure 25.2: Benchmarking of LCT Pegmatites



Source: USGS Niobium and Tantalum: Critical Mineral Resources of the United States; Snowden Optiro analysis.

A detail web search of the 18 deposits resulted in public domain information being obtained for 11 of the deposits. Table 25.1 shows the public domain tonnes and grades for these deposits. As presented in Table 25.1 the Swanson Project is the highest grade of the 11 deposits researched.

Table 25.1: Benchmarked Deposits

Company	Deposit	Country	Resource Category	Resource (Mt)	Grade Ta_2O_5 (ppm)
Arcadia Minerals Limited	Swanson	Namibia	Indicated and Inferred	1.439	486
Alliance Mineral Assets	Bald Hill	Australia	Measured and Indicated	4.40	336
Global Advanced Metals	Wodgina	Australia	Measured and Indicated	86.50	320
Advanced Metallurgical Group	Volta Grande	Brazil	Measured and Indicated	14.7	318
Noventa	Morrua	Mozambique	Measured and Indicated	7.77	248
Global Advanced Metals	Greenbushes	Australia	Measured and Indicated	135.10	220
Aruma Resources Limited	Mount Deans	Australia	Measured and Indicated	9.10	22
Kazera Resources	Kazera	Namibia	Measured and Indicated	0.62	219
Noventa	Marropino	Mozambique	Measured and Indicated	21.70	190
Ethiopian Mineral Petroleum and Biofuel	Kenticha	Ethiopia	Reserve	116.40	170
Galaxy Resources	Mount Cattlin	Australia	Measured and Indicated	17.16	155
Critical Metals	Rose	Canada	Reserve	31.90	148

26.0 INTERPRETATIONS AND CONCLUSIONS

M.Plan was engaged by ASX listed Arcadia to compile the results of a DFS, prepared by independent expert advisors (Table 1.1 and

Table 2.1), on the Swanson Project, into this CPR, termed "the DFS Report".

Arcadia's interest in the Swanson Project is through their subsidiary, ORP, in which Arcadia holds an 80% interest.

ORP is a Namibian registered company and sole owner of EPL 5047 located in the Karas Region of the southern part of Namibia.

On 19th May 2022, ORP was granted ML 223 on a portion of EPL 5047, in respect of base and rare metals, industrial minerals and precious metals.

The focus of the DFS has been limited to the D, E and F pegmatites since these pegmatites can be extracted by open cast mining method.

The DFS Report presents the results of the DFS and includes a JORC Code (2012) Mineral Resource and Ore Reserve Estimate on the D, E and F pegmatites. Engineering design and cost estimations were done to AACE Class 3 with an accuracy of between +15% and -15%.

The CPs responsible for the Mineral Resource and Ore Reserve Estimates performed a visit to the Swanson Property as required by JORC-Code (Table 2.2).

26.1 GEOLOGY AND MINERAL RESOURCE ESTIMATE

The interpretations and conclusions of the geology and 1st May 2022 Mineral Resource Estimate of the Swanson Property are as follows:

- More than 200 pegmatites have been identified on three EPL licences held by ORP. A total of 15 Ta_2O_5 mineralised pegmatites, called the Swanson swarm have been explored to date. The 1st May 2022 Mineral Resource Estimate quantified the outcropping and shallow deposits on three groups of the pegmatites, consisting of 10 pegmatites, namely the D, E and F pegmatites;
- These pegmatites are of uniform thickness (generally about 1.5 m to 2.5 m thick), are tabular, non-zoned, gently dipping, and contain tantalum, niobium and lithium mineralisation, together with quartz, sugary albite, spodumene and minor constituents including beryl, lepidolite, muscovite, apatite, fluorite, biotite and microlite. They intruded into competent gabbros and are bound on the northern side by a northwest trending mylonitic zone;
- The mineralogy gives the pegmatites a whitish appearance, which contrasts strongly with the dark gabbroic host rock;

- The 1st May 2022 Mineral Resource Estimate incorporated all the geological knowledge and exploration information up to 30th April 2022. Geological continuity of the pegmatites has been established through outcrop mapping and sampling (chip and channel) of surface exposures, and the extension of these pegmatites under shallow cover has been established by diamond drilling;
- The thickness of the pegmatites has been established through modelling of the hanging wall and footwall contacts. Ta_2O_5 ppm, Nb_2O_5 ppm and Li_2O % grades have been estimated using Ordinary Kriging, with geostatistical continuity of the Ta_2O_5 grades being established through variography analysis;
- The geological and grade continuity of the pegmatites was sufficient to classify the reasonably well-explored area of the Swanson deposit as Indicated Mineral Resources, with Inferred Mineral Resources being extrapolated 50 m beyond the last line of sampling;
- For the D-pegmatites the 1st May 2022 Mineral Resource Estimate identified a total of 568 kt of Indicated Mineral Resources at an average grade of 365 ppm Ta_2O_5, 87 ppm Nb_2O_5 and 0.27% Li_2O, and a total of 444 kt of Inferred Mineral Resources at an average grade of 365 ppm Ta_2O_5, 79 ppm Nb_2O_5 and 0.34% Li_2O; and,
- For the E and F pegmatites the 1st May 2022 Mineral Resource Estimate identified a total of 577 kt of Indicated Mineral Resources at an average grade of 578 ppm Ta_2O_5, 65 ppm Nb_2O_5 and 0.07% Li_2O, and a total of 995 kt of Inferred Mineral Resources at an average grade of 557 ppm Ta_2O_5, 69 ppm Nb_2O_5 and 0.05% Li_2O.

26.2 MINING AND ORE RESERVE ESTIMATE

The interpretations and conclusions of the mining and the Ore Reserve Estimate of the Swanson Property are as follows:

- At the proposed RoM production rate of 12,000 tpm, the LoM is ~8 years;
- The overall conversion of total Inferred Mineral Resources to Probable Ore Reserves is between 72% and 79% for the D and EF-pits respectively;
- Further upgrading of the Inferred Mineral Resources to Indicated Mineral Resources would largely increase the Mineral Resources and Ore Reserves and extend the LoM;
- The mining schedule was developed based on the requirements to concentrate on the D-pegmatite initially and transition to the EF-pegmatites. However, with the low stripping of waste required for the D-pegmatite initially, the mining equipment may not be optimally employed over this period resulting in underutilisation of any fixed costs. Further due to the high pre-stripping of overburden required to access EF ore to ensure plant feed is maintained at 12500tpm, the total production volume results in a significant spike around 2026, requiring a potential change in equipment and fleet required. Going

forward, this would need to be considered from a cost and operational optimisation perspective to ensure that equipment is available and best utilised for total volumes; and,

- The Ore Reserve Estimate reports for the D-pegmatite 409 kt of Ore in the Probable category containing 347 ppm Ta_2O_5, 0.23% Li_2O and 142 tonnes Ta_2O_5 and for the E and F pegmatites 457 kt Ore in the Probable category containing 550 ppm Ta_2O_5, 0.07% Li_2O and 251 tonnes Ta_2O_5. No Proved Ore reserves were declared.

26.3 MINERAL PROCESSING AND METALLURGICAL TESTING

The interpretations and conclusions of the mineral processing and metallurgical testing are as follows:

- The proposed DFS flowsheet consists of comminution to -600 µm, followed by primary recovery spirals. The concentrate from the spirals is milled to 150 µm to produce a final product grade of ≥25% Ta_2O_5 in an MGS circuit;
- All technologies proposed for the DFS flowsheet are well established within tantalum recovery;
- The addition of a fines circuit to recover Ta_2O_5 lost to the spiral tails can add an additional 10% to 13% recovery. However, will require additional CAPEX and as such has been excluded from the DFS process flow to first perform a trade-off to assess the increase in cost versus revenue improvement;
- MGS testwork indicated that it was possible to recover at least 80% on all the different samples;
- Variability test indicates that the DFS flowsheet achieves similar recoveries to the F pegmatite when treating ore from the D and E pegmatites;
- Based on the testwork, it can be concluded that the overall Ta_2O_5 recovery of 65% is plausible regardless if the ore originates from the D, E or F pegmatites;
- Based on the testwork, it can be concluded that an overall Li_2O recovery of 99% to the process plant tailings is achievable when treating ore from the D, E and F pegmatites;
- The proposed DFS flowsheet can produce a concentrate grade of 25% Ta_2O_5 at a Ta_2O_5 recovery of at least 65%; and,
- Optimisation of crushing and grinding need to be further investigated to improve overall recovery. The plant design should allow for changes in grind size as well as leave space available for possible future milling.

26.4 RECOVERY METHODS

The interpretations and conclusions of the Spiral Plant are as follows:

- The plant location is well positioned on a flat area to the north of the pegmatite swarm - above the D-pit to save on haul distance;

- Metallurgical and mineralogical testwork led to the development of a process flowsheet to recover tantalum concentrate from the pegmatite ore;
- The Spiral Plant was designed with technology that was used during metallurgical testing;
- The Spiral Plant was sized to processes 40 t/h of material with a top size of 600 µm and an operating time of 3,588 h/a. This amounts to the processing of 143,520 t of material per annum;
- From the 143,520 t of feed material, 176716 kg of concentrate is produced at a minimum Ta_2O_5 concentration of 25 wt%;
- The amount of Ta_2O_5 being introduced into the plant through the RoM, is approximately 70 t/a, 46 t of Ta_2O_5, the tantalum reports to the final concentrate, which translates to a recovery of approximately 65.1 wt% at a maximum particle size of 600 µm;
- It is possible to increase the recovery with the introduction of a fines beneficiation circuit to approximately 78 wt%. This is technically feasible; however, it requires an additional CAPEX investment of approximately US$ 2.2 million that needs to be justified by the profitability at the increased recovery rates;
- The CAPEX estimate for the Spiral Plant was completed in accordance with a BoE methodology which conforms to AACE Class 3; and,
- Construction has been estimated to require approximately 11.5 months. The detail design phase requires approximately 5 months and procurement approximately 9 months. To optimise the implementation time, the detail design and procurement phases will be executed simultaneously to complete construction and commissioning within the estimated timeframe.

26.5 Project Infrastructure

The interpretations and conclusions of the infrastructure required are as follows:

- The DFS includes for the standard bulk infrastructure supply and other services normally associated with open cast mining in Southern Africa;
- ORP received confirmation from Nampower, that the mine can be fed up to 2.7MVA from the substation located at the town of Warmbad. The DFS includes for ~40 km 33 kV line from the Warmbad substation;
- A good, unsealed (gravel), access road exists to the operational offices. The Environmental Scoping Report makes provision for new unsealed roads to support the mining and recovery plant areas;
- The main access road will connect the C10 secondary gravel road with the Swanson Property; and,
- ORP elected to source water via a pipeline from Warmbad instead of extracting water from local underground aquifers.

26.6 Waste Rock Dump

The interpretations and conclusions of the mining WRD are as follows:

- The WRD is positioned to the south of the E and F-pits to save on haul distances from the three open pits;
- The waste rock from the mining of the D-pit and EF-pit is hauled and placed by the mining fleet;
- The majority of the waste rock are deposited on the WRD, with a portion of the waste rock being used to backfill the D-pit, after it has been mined and to construct the toe wall, attenuation berms and energy dissipaters of the WRD;
- The WRD are developed in 10 m raises to a final elevation of 765 m, with a maximum height of 96 m; and,
- A stream diversion is required as the D-pit is positioned within an ephemeral river course.

26.7 Spiral Plant Tailings

The interpretations and conclusions of the Spiral Plant Tailings facility are as follows:

- The beneficiation of the pegmatite ore produces fine and coarse tailings. The tailings are produced as an unsaturated filtered material, with a moisture content ranging between 15% and 20%, and are delivered to the TSF by truck;
- A suitable site for the disposal of the tailings has been identified to the north-west of the Spiral Plant, within a short haul distance from the plant;
- The TSF are designed to accommodate both tailings stream over the LoM with further space allowance to the west for future expansion, if required;
- The TSF are designed to allow for the dry stacking of the tailings to a final height of 20 m, with intermediate benches at 5 m vertical increments;
- The tailings are contained by perimeter embankments, with perimeter drainage measures to control any runoff and seepage from rain events. Stormwater management measures are also included; and,
- The rehabilitation of the coarse tailings facility includes the flattening of the side slopes to 1V:3H and the flattening of the perimeter infrastructure but keeping the stormwater diversion measures functional.

26.8 Marketing Assessment

The following are concluded from the Argus Tantalite Market Report:

- The tantalum outlook continues to remain robust, regardless of its international supply chain scrutiny. Its application in electronics, aircraft, medical, and especially thermal batteries assure its continued global consumption;

- Tantalum production has held steady in central Africa, the world's largest producing region, although continuing concerning practices remains. This could potentially create pressure on supply from the region until compliance and traceability improve. Lithium expansion could bring large increases in tantalum production which will cause stability to the tantalum industry;
- Tantalum supply is poised to grow strongly due to lithium battery demand over the coming years. Argus predicts that on balance, supply is likely to outgrow demand, although the impact of a stable and secure supply should not be overlooked and could potentially spur faster demand growth; and,
- After a small dip in tantalum prices toward the end of 2021, it has rallied on the current geopolitical situation to average US$202.50/kg (25% Ta_2O_5 inclusive of CIF delivered to main port Europe) in March 2022.

26.9 Environmental Studies, Permitting and Community Impacts

The interpretations and conclusions of the environmental studies, permitting and community impacts are as follows:

- ORP was granted ML 223 on June 3, 2022. ML 223 authorise ORP to commence development work towards mining operations for base and rare metals, industrial minerals and precious metals for 15 years (19th May 2022 to 18th May 2037);
- ORP was granted an ECC 02187 to undertake the proposed development of the Swanson Mine, and to commence with activities specified in their Environmental Assessment Report and the filed EMPR;
- The National Heritage Council of Namibia has Consent to mining operation over ML 223, valid for a year from 14th October 2021 to 13th October 2022. ORP is not aware of any reason why renewal for another year will not be granted;
- The Environmental Management Principles and proposed mitigation measures, outlined in the EMPR, is standard for mining operations within Namibian. These do not impose any stricter requirements on ORP for the development of the proposed Swanson Mine. Similarly, proposed monitoring, auditing and reporting to ensure compliance with the EMPR and recommended closure and rehabilitation activities post mining, conforms to standard mining practices;
- The Environmental Scoping Report concludes that the proposed Swanson Mine has great potential to improve livelihoods and contribute to sustainable development within the area surrounding the town of Warmbad; and potential negative impacts associated with the proposed Swanson Mine are expected to be low to medium in significance;
- The report on the archaeological survey presents that no sites of heritage significance were found, and proposed that the ORP be given consent to proceed with exploration and mining activities;

- The report on the water specialist study suggests little or no impact on groundwater resources from the proposed mining activities;
- The report on the flora specialist study, state that only one plant species of high conservation concern would be substantially affected by the proposed Swanson Mine. It proposes that if mitigation measures are followed, then the impact of the proposed Swanson Mine on vegetation is likely to be minor; and,
- The report on air quality and noise study state environmental deterioration of air quality and noise pollution can be addressed through implementing the recommended Environmental Management and Monitoring Plans.

26.10 Legal Opinion on Mining Title and Corporate Status

ENSafrica(Namibia) generated and independent legal opinion in respect of the legal ownership (holdership) of ML 223. The key findings of ENS' Executive Risk Summary are as follows:

- ORP is the sole (100%) holder of ML 223, which, has been validly granted and issued;
- ML 223 was granted on 19th May 2022, over a certain portion of land situated in the Karas Region in the magisterial district of Karasburg in respect of base and rare metals, industrial minerals and precious metals;
- ML 223 is granted for a period of fifteen years, subject to certain terms and conditions and is in our opinion, active;
- As on 22nd August 2022 ORP is still operational, and the relevant annual duties have been paid;
- ENSafrica found no records indicating that ORP has been placed into provisional or final liquidation or judicial management, or that any resolution for ORP's liquidation or winding-up has been passed, nor have we found any records indicating that there are legal proceedings for the provisional or final liquidation or judicial management of ORP pending before the High Court of Namibia;
- ORP was issued an ECC on 19th May 2022, to undertake "The Proposed Development of a Tantalite Mine in the Karas Region, Southern Namibia". The certificate expires on 14th May 2025; and,
- The Register of Mineral Licences records no encumbrances over ML 223.

26.11 Capital and Operating Costs

The interpretations and conclusions of the DFS CAPEX and OPEX cost estimates are as follows:

- The DFS cost estimates qualifies as AACE Class 3, in accordance with Recommended Practice 47R-11;

- The accuracy of the cost estimates has been assessed at between +15% and -15%. The overall contingency provision for CAPEX and OPEX is 10.0% and 7.5%, respectively;
- All cost, commodity princes and exchange rates are as the DFS Base Date of 31st March 2023. The cost estimates applied a 4.0% escalation to allow for price increases from estimation completion in Q3 2022 to the DFS. Base Date;
- The DFS costs are presented in United State dollar (US$);
- DFS costs are based on contractors performing the mining and the operation and maintenance of the Primary/Secondary Crushing Plant and Spiral Plant;
- The total CAPEX for the Swanson DFS was estimated to total US$9,870,850. This cost includes accuracy provisions that forms part of the cost and excluding Owner's contingency allowance which has been estimated at 5.0% of the total CAPEX. The10.0% contingency has been included separately in the DCF model;
- The Swanson DFS OPEX consist of a fixed monthly and a variable component. The variable component is charged on a per ton basis; and
- The fixed monthly OPEX equates to US$283,304 per month. The variable costs equate to about US$28.60/t RoM processed.

26.12 ECONOMIC ANALYSIS

Using the Cash Flow Approach the proposed Swanson Mine has an 100% attributable value range of between US$8.0 million and US$11.0 million at a 8% real discount rate, to the post-tax un-escalated cash flows. The upper and lower value range was determined, using varying discount rates, as well as sensitivities on sales revenue, CAPEX and OPEX.

The undiscounted IRR varies between 24% and 27%.

Since the NPV is positive, it can be concluded that:

- Mineral Resources and Ore Reserves can be declared since it meets the JORC-code (2012) definition of having "reasonable prospects for economic extraction"; and,
- Excluding other material factors, the proposed Swanson Mine can proceed to the next phase basic engineering and design.

26.13 RISK IDENTIFICATION

The overall risks rating to develop the Swanson Project and operate the proposed Swanson Mine is acceptable for a DFS and is classified as moderate to low since the geology is well understood, mining will be by low-risk open cast – however, to note is the high variability between the D-pit and EF-pits and increasing stripping ratios at depth.

The design of the Spiral Plant is “modular” and is based on a simplistic process flow with a short execution schedule that require relative low CAPEX and OPEX.

The Swanson Project is located in a country with low-risk rating and has an established mining industry. The Swanson Project will produce a commodity that has extensive applications in the growing electronics market, that will be a reliable source of supply from an area not associated with the finance of armed conflict or using forced labour.

27.0 RECOMMENDATIONS

The following are recommended to improve understanding, decrease risk, and improve the engineering and design. It is proposed to perform these prior to commencement of basic engineering and design.

27.1 Geology and Mineral Resources

- Some highly prospective areas on EPL 5047 have not been surveyed and has the potential to increase the 1st May 2022 Mineral Resource Estimate;
- Additional drilling to increase the classification of the Inferred Mineral Resources can extend the LoM;
- Drilling to increase the classification to the Measured category will improve confidence and reduce uncertainty; and,
- Down-hole structural logging of orientated boreholes is recommended to better understand the nature and true displacement of the faults and structures.

27.2 Mining and Ore Reserves

- Upgrading of the Inferred Mineral Resources can allow conversion to Ore Reserves and improve the LoM;
- The Ore Reserve is sensitive to the geotechnical assumptions regarding overall slope angles. Geotechnical assumptions should be continually assessed as mining of the D-pit commences for potential cost reduction and ore extraction. Due to the nature of mining being against a hillside, overburden stripping can easily be accelerated or reduced, as required;
- Optimisation of the production schedule is possible. The current mine production schedule focus to first mine the D-pegmatite that has a lower Ta_20_5 but higher Li_2O and lower strip ratio. This is then followed by mining of the EF-pits. This schedule does result in some high and erratic stripping volumes that will require smoothing to yield an operational schedule;
- It is recommended that a detailed trade-off study be performed to smoothing waste stripping versus the benefit of prioritising mining from the D-pit that has lower Ta_2O_5 and higher Li_2O grades.

27.3 Mineral Processing and Metallurgical Testing

- By crushing to a smaller top size (<600 µm) there is recovery upside. This will require further testwork after the plant is operational. Consequently, it is proposed that the VSI should be designed to crush to a top size of 600 µm and that space is left for a possible future milling circuit to <212 µm; and,
- During the next phase, detail engineering and design, the plant configuration should be optimised with regards to grind and screen sizes.

27.4 Recovery Method

- Additional tailings testwork is required to perform the basic engineering of the tailings handling and dewatering circuit;
- The opportunity exists to increase the tantalum recovery by introducing a fines beneficiation step. The addition of a fines circuit to recover Ta_2O_5 lost to the spiral tails can add an additional 10% to 13% recovery. However, will require additional CAPEX and as such a trade-off will be required to assess the increase in cost versus revenue improvement;
- The opportunity exists to reduce the CAPEX and OPEX of the Spiral Plant and to improve recovery. The DFS identified the following value engineering initiatives that could realise these benefits. It is recommended that these initiatives be investigated before the commencement with basic engineering:
    - valuation of instrumentation requirements;
    - fines beneficiation;
    - finer grinding of coarse tails; and,
    - tailings handling and water recovery.

27.5 Infrastructure

- Bulk water, electricity and access road require geotechnical and topographical surveying before commencing of basic engineering to ensure appropriate design and accurate cost estimation.

27.6 Spiral Plant tailings

- Perform further assessment of the geochemical profile, physical characteristics and properties of the fine and coarse tailings. Long-term kinetic testing is proposed to assess pollutant release to determine appropriate mitigation measures;
- Undertake slope stability analysis on the respective tailings streams and confirm the design criteria to ensure correct detail engineering and design;
- Improvement on CAPEX and OPEX cost estimates with further optimization of the earthworks; and,
- Optimisation of the required footprint of the fine tailings since the DFS propose selling the fine tailings as lithium RoM tailings and thus different footprint size may be required should this option not materialise.

27.7 Waste Rock Dump

- Undertaken flow modelling and analysis of the ephemeral river course to determine the peak flood discharge to assess the required capacity of the diversion measure;
- Undertake a detail engineering and design of the diversion measure of the ephemeral river course;
- Assess the potential release of nitrates from the waste rock as a resulting of the blasting activities to assess the need and to propose appropriate mitigation measures; and,
- Undertake slope stability analysis of the waste rock material and confirm the design criteria to ensure correct detail engineering and design.

27.8 Marketing

- Due to the opaque nature of the tantalum industry and market it is recommended that ORP have the Argus Tantalite Market Report revised annually to ensure key technical and economical decision are based on the latest pricing, market dynamics and outlook and price forecasts. This will be a prerequisite for proper planning, budgeting and forecasting.

27.9 Environmental Studies, Permitting and Community Impacts

- Review the EMPR after basic and detail engineering to ensure conformance and to identify any changes that may require amendments or addendums; and,
- Review proposed monitoring, auditing and reporting to ensure compliance with the EMPR and recommended closure and rehabilitation activities post mining, to ensure compliance.

27.10 Legal Opinion

- It is proposed that prior to FID to update the various searches performed by ENSafrica to identify changes that can materially impact the FID; and,
- The legal opinion should be updated annually to ensure compliance with changes in mining, environmental and other applicable legislation.

27.11 Economic Analysis

- The Economic Analysis should be kept up to date with changes in costs, commodity prices and discount rate (risk) thereby ensuring decisions are correctly made and changes implement proactively to ensure the profitability of the Proposed Swanson Mine; and,
- Following detail and basic engineering the Economic Analysis should be updated to revise the economics of the Swanson Project, to proactively assess

the need to implement cost improvements, or changes in operation and procurement strategies.

27.12 Risk Identification

- All engineering disciplines should contribute throughout the basic and detail engineering phases towards the risk register which should be discussed during design review meetings and formal HAZOP to ensure appropriate mitigating or corrective actions are applied;
- To have influence on the design, it is proposed to keep the risk register up to date and to perform a HAZOP as a final check prior to finalising the detailed design;
- A HAZOP should also be performed during construction and installation to ensure recommendations are implemented; and,
- Also, a HAZOP should be performed regularly during the operational phase to identify modifications that should be implemented to reduce risk and operability problems.

28.0 DATE AND SIGNATURE PAGE

"Derick R de Wit" {signed and sealed as of report date}

Derick, R. de Wit, MBA, BTech (Chemical Engineering), PMP (PMI ®), FAusIMM, FSAIMM
Chemical Engineer and Senior Vice President, M.Plan International Ltd
Signed Date: 29th May 2023

"Matthew Mullins" {signed and sealed as of report date}

Matthew Mullins, BSc (Hons) (Geology) FAusIMM, FSAIMM, FGSSA, FGSL, Pr. Sci. Nat
Head of Advisory – EMEAA, Snowden Optiro (Pty) Ltd
Signed Date: 31st March 2023

"Matthew Jarvis" {signed and sealed as of report date}

Matthew Jarvis, BSc Eng (Mining), MBA, MSAIMM
Principal Consultant (Independent)
Signed Date: 31st March 2023

"Jac Grobler" {signed and sealed as of report date}

Jac Grobler, MEng (Metallurgical Engineering), Pr Eng ECSA, SAIMM
Technical Director, LightDeepEarth, CoreMet Mineral Processing (Pty) Ltd
Signed Date: 31st March 2023

"Peter Theron" {signed and sealed as of report date}

Peter Theron, B Eng (Civil Engineering), GDE (Civil & Environmental), Pr Eng ECSA, MSAIMM
Principal Civil Tailings Engineer / Managing Director, Prime Resources (Pty) Ltd
Signed Date: 31st March 2023

"Lisias Negonga" {signed and sealed as of report date}

Lisias Negonga, BSc (Hons) Geology, BSc (Hons) GIS, MSc. Geology, MSGA, MSEG
Environmental Assessment Practitioner, Impala Consulting
Signed Date: 31st March 2023

29.0 CERTIFICATE OF COMPETENT PERSONS

CERTIFICATE OF MATTHEW JARVIS

CERTIFICATE OF COMPLETION

As co-author of this report entitled "Feasibility Study for the Swanson Tantalum and Lithium Project, located in Namibia", dated 31 March 2023, I, Matthew Jarvis, do hereby certify that:

1. I am employed as an Associate Principal Consultant by, Snowden Optiro Pty Ltd and conducted this assignment for, Orange River Pegmatite (Pty) Ltd, with its principal place of business at Erf 30, Corner of Eugene Marais and Keller Street, Eros, Windhoek, Namibia;
2. I hold the following academic qualifications:

- BSc Eng (Mining) and an MBA;

3. I am a Member of the South African Institute of Mining and Metallurgy under membership number 701853.
4. I have worked as a Mining Engineer in the minerals industry for more than 20 years;
5. I do, by reason of education, experience and professional registration, fulfil the requirements of a Competent Person as defined by the JORC Code (2012).
6. I visited the property that is the subject of this Technical Report from 17 to 20 August 2021;
7. I am responsible for the preparation of Sections 15.0 and 16.0 and the portions of Section 1.0 summarised therefrom, of the Technical Report;
8. I am independent of Orange River Pegmatite (Pty) Ltd, their directors, senior management, and other advisers, I have had no previous involvement with the property;
9. I have read the JORC Code (2012), and this Technical Report has been prepared in compliance with the instrument; and,
10. As of the date of this certificate to the best of my knowledge, information and belief, the sections of this Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Matthew Jarvis
BSc Eng (Mining), MBA, MSAIMM
Principal Consultant (Associate), Snowden Optiro Pty Ltd
Signed Date: 31 March 2023

CERTIFICATE OF COMPLETION

As co-author of this report entitled "Feasibility Study for the Swanson Tantalum and Lithium Project, located in Namibia", dated 31st March 2023 (Release date of 29th May 2023), I, Derick Ryk de Wit, do hereby certify that:

1. I am employed as a Chemical Engineer and Senior Vice President by, M.Plan International Ltd and conducted this assignment for, Orange River Pegmatite (Pty) Ltd, with its principal place of business at Erf 30, Corner of Eugene Marais and Keller Street, Eros, Windhoek, Namibia;
2. I hold the following academic qualifications:

   MBA, B. Tech (Chem. Eng.) and PMP (PMI®);
3. I am a Fellow of the Australasian Institute of Mining and Metallurgy under membership number 301519.
4. I have worked as a Chemical Engineer in the minerals industry for 25;
5. I do, by reason of education, experience and professional registration, fulfil the requirements of a Competent Person as defined by the JORC Code (2012).
6. I have not visited the property that is the subject of this Technical Report;
7. I am responsible for the preparation of Sections 2.0, 3.0, 17.0, 18.1 to 18.3, 19.0, 21.0, 22.0, 23.0, 25.1, 25.2, 26.0, 27.0, and the portions of Section 1.0 summarised therefrom, of this CPR;
8. I am independent of Orange River Pegmatite (Pty) Ltd, their directors, senior management, and other advisers, I have had no previous involvement with the property;
9. I have read the JORC Code (2012), and this Technical Report has been prepared in compliance with the instrument; and,
10. As of the date of this certificate to the best of my knowledge, information and belief, the sections of this Technical Report for which I am responsible contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Derick, R. de Wit
MBA, B. Tech (Chem. Eng.), PMP (PMI ®), FAusIMM, FSAIMM
Chemical Engineer and Senior Vice President,
M.Plan International Ltd
Signed Date: 29th May 2023

CERTIFICATE OF JAC GROBLER

As co-author of this report entitled "Feasibility Study for the Swanson Tantalum and Lithium Project, located in Namibia", dated 31st March 2023, I, Jac Grobler, do hereby certify that:

1. I am contracted as a Metallurgical Engineer by, CoreMet Mineral Processing (Pty) Ltd and conducted this assignment for, Orange River Pegmatite (Pty) Ltd, with its principal place of business at Erf 30, Corner of Eugene Marais and Keller Street, Eros, Windhoek, Namibia;
2. I hold the following academic qualifications:
   MEng (Metallurgical Engineering)
3. I am a Professional Engineer registered with the Engineering Council of South Africa, under membership number 20090178 and a Member of the South African Institute of Mining and Metallurgy under membership number 702285;
4. I have worked as a Metallurgist in the minerals industry for 22 years;
5. I do, by reason of education, experience and professional registration, fulfil the requirements of a Competent Person as defined by the JORC Code (2012).
6. I have not visited the property that is the subject of this CPR;
7. I am responsible for the preparation of Section 13.0 and the portions of Section 1.0 summarised therefrom, of this CPR;
8. I am independent of Orange River Pegmatite (Pty) Ltd, their directors, senior management, and other advisers, I have had no previous involvement with the property;
9. I have read the JORC Code (2012), and this CPR has been prepared in compliance with the instrument; and,
10. As of the date of this certificate to the best of my knowledge, information and belief, the Sections of this CPR for which I am responsible contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Jac Grobler
MEng (Metallurgical Engineering), Pr Eng ECSA, SAIMM
Technical Director, LightDeepEarth, CoreMet Mineral Processing (Pty) Ltd

Signed Date: 31st March 2023

CERTIFICATE OF PETER THERON

As co-author of this report entitled "Feasibility Study for the Swanson Tantalum and Lithium Project, located in Namibia", dated 31st March 2023, I, Peter Theron, do hereby certify that:

1. I am employed as a Principal Civil Tailings Engineer by, Prime Resources (Pty) Ltd and conducted this assignment for, Orange River Pegmatite (Pty) Ltd, with its principal place of business at Erf 30, Corner of Eugene Marais and Keller Street, Eros, Windhoek, Namibia;
2. I hold the following academic qualifications:

   B Eng (Civil Engineering) and GDE (Civil & Environmental);
3. I am a Professional Engineer registered with the Engineering Council of South Africa, under membership number 950329 and a Member of the South African Institute of Mining and Metallurgy under membership number 703496;
4. I have worked as a Civil Engineer in the minerals industry for 35 years;
5. I do, by reason of education, experience and professional registration, fulfil the requirements of a Competent Person as defined by the JORC Code (2012).
6. I visited the property that is the subject of this CPR from 7th to 9th March 2022;
7. I am responsible for the preparation of Section 18.4 and the portions of Section 1.0 summarised therefrom, of this CPR;
8. I am independent of Orange River Pegmatite (Pty) Ltd, their directors, senior management, and other advisers, I have had no previous involvement with the property;
9. I have read the JORC Code (2012), and this CPR has been prepared in compliance with the instrument; and,
10. As of the date of this certificate to the best of my knowledge, information and belief, the Sections of this CPR for which I am responsible contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Peter Theron
B Eng (Civil Engineering), GDE (Civil & Environmental), Pr Eng ECSA, MSAIMM
Principal Civil Tailings Engineer / Managing Director, Prime Resources (Pty) Ltd

Signed Date: 31st March 2023

Peter Theron

m.PLAN INTERNATIONAL

CERTIFICATE OF MATTHEW MULLINS

As co-author of this report entitled "Feasibility Study for the Swanson Tantalum and Lithium Project, located in Namibia", dated 31st March 2023, I, Matthew Mullins, do hereby certify that:

1. I am employed as Head of Advisory for EMEAA Region by Snowden Optiro (Pty) Ltd and conducted this assignment for Orange River Pegmatite (Pty) Ltd, with its principal place of business at Erf 30, Corner of Eugene Marais and Keller Street, Eros, Windhoek, Namibia;
2. I hold the following academic qualifications:
   BSc (Hons) (Geology);
3. I am a Fellow of the Australasian Institute of Mining and Metallurgy under membership number 209421;
4. I have worked as a Geologist in the minerals industry for over 40 years;
5. I do, by reason of education, experience and professional registration, fulfil the requirements of a Competent Person as defined by the JORC Code (2012);
6. I visited the property that is the subject of this CPR from 17th to 20th August 2021;
7. I am responsible for the preparation of Sections 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 14.0, 24.0, and the portions of Section 1.0 summarised therefrom, of this CPR;
8. I am independent of Orange River Pegmatite (Pty) Ltd, their directors, senior management, and other advisers, and I have had no previous involvement with the property;
9. I have read the JORC Code (2012), and this CPR has been prepared in compliance with the instrument; and,
10. As of the date of this certificate to the best of my knowledge, information and belief, the Sections of this CPR for which I am responsible contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Matthew Mullins
BSc (Hons) (Geology) FAusIMM, FSAIMM, FGSSA, FGSL, Pr. Sci. Nat
Head of Advisory – EMEAA, Snowden Optiro (Pty) Ltd

Signed Date: 31st March 2023

____

CERTIFICATE OF LISIAS NEGONGA

As co-author of this report entitled "Feasibility Study for the Swanson Tantalum Project, located in Namibia", dated 31st March 2023, I, Lisias Negonga, do hereby certify that:

1. I am employed as an Environmental Assessment Practitioner by, Impala Environmental Consulting CC and conducted this assignment for, Orange River Pegmatite (Pty) Ltd, with its principal place of business at Erf 30, Corner of Eugene Marais and Keller Street, Eros, Windhoek, Namibia;
2. I hold the following academic qualifications:

   BSc (Hons) Geology, BSc (Hons) GIS, MSc. Geology, PGD Management, and LLB (Hons);
3. I am a Member of the Society for Geology Applied to Mineral Deposits, under membership number 3872-17 and a member of the society of economic geologists (SEG), under membership number 907025.
4. I have worked as an Environmentalist in the minerals industry for 10 years;
5. I do, by reason of education, experience and professional registration, fulfil the requirements of a Competent Person as defined by the JORC Code (2012).
6. I visited the property that is the subject of this CPR from 7th to 8th of May 2020;
7. I am responsible for the preparation of Section 20.0, and the portions of Section1.0 summarised therefrom, of this CPR;
8. I am independent of Orange River Pegmatite (Pty) Ltd, their directors, senior management, and other advisers, I have had no previous involvement with the property;
9. I have read the JORC Code (2012), and this CPR has been prepared in compliance with the instrument; and,
10. As of the date of this certificate to the best of my knowledge, information and belief, the Sections of this CPR for which I am responsible contain all scientific and technical information that is required to be disclosed to make this report not misleading.

Lisias Negonga
BSc (Hons) Geol, BSc (Hons) Gis, M.Sc. Geology, PGD Man, LLB (Hons)
Environmental Assessment Practitioner, Impala Environmental Consulting CC

Signed Date: 31st March 2023

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31.0 GLOSSARY AND ABBREVIATIONS

31.1 MINERAL RESOURCES AND ORE RESERVE DEFINITIONS

31.1.1 Mineral Resources

The Mineral Resources and Ore Reserves have been classified according to the "Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves" (the JORC Code) 2012. Accordingly, the Mineral Resources have been classified as Measured, Indicated or Inferred. The Ore Reserves have been classified as Probable, based on the Indicated Mineral Resources. No Proved Ore Reserves were declared as stated in Section 26.2.

The Mineral Resource and Ore Reserve estimation methodology applied is summarised as follows:

- A 'Mineral Resource' is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality), and quantity that there are reasonable prospects for eventual economic extraction. The location, quantity, grade (or quality), continuity and other geological characteristics of a Mineral Resource are known, estimated or interpreted from specific geological evidence and knowledge including sampling. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.
- An 'Inferred Mineral Resource' is that part of a Mineral Resource for which quantity and grade (or quality) are estimated on the basis of limited geological evidence and sampling. Geological evidence is sufficient to imply but not verify, geological and grade (or quality) continuity. It is based on exploration, sampling and testing information gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes.

  An Inferred Mineral Resource has a lower level of confidence than that applying to an Indicated Mineral Resource and must not be converted to Ore Reserves. It is reasonably expected that the majority of Inferred Mineral Resources could be upgraded to Indicated Mineral Resources with continued exploration.
- An 'Indicated Mineral Resource' is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape and physical characteristics are estimated with sufficient confidence to allow the application of Modifying Factors in sufficient detail to support mine planning and evaluation of the economic viability of the deposit.

  Geological evidence is derived from adequately detailed and reliable exploration, sampling and testing gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and is sufficient to assume geological and grade (or quality) continuity between points of observation where data and samples are gathered.

An Indicated Mineral Resource has a lower level of confidence than that applying to a Measured Mineral Resource and may only be converted to a Probable Ore Reserve.

- A 'Measured Mineral Resource' is that part of a Mineral Resource for which quantity, grade (or quality), densities, shape and physical characteristics, are estimated with confidence sufficient to allow the application of Modifying Factors to support detailed mine planning and final evaluation the economic viability of the deposit.

  Geological evidence is derived from detailed and reliable exploration, sampling and testing gathered through appropriate techniques from locations such as outcrops, trenches, pits, workings and drill holes, and is sufficient to confirm geological and grade (or quality) continuity between points of observation where data and samples are gathered.

  A Measured Mineral Resource has a higher level of confidence than that applying to an Indicated or an Inferred Mineral Resource. It may be converted to a Proved Ore Reserve or under certain circumstances to a Probable Ore Reserve.

31.1.2 Ore Reserves

The relevant sections of the JORC Code are:

- An 'Ore Reserve' is the economically mineable part of a Measured and/or Indicated Mineral Resource. It includes diluting materials and allowances for losses which may occur when the material is mined or extracted and is defined by studies at Pre-Feasibility or Feasibility level (as appropriate) and include application of Modifying Factors. Such studies demonstrate that, at the time of reporting extraction could reasonably be justified.

  The reference point at which Reserves are defined, usually the point where the ore is delivered to the processing plant, must be stated. It is important that, in all situations where the reference point is different, such as for a saleable product, a clarifying statement is included to ensure that the reader is fully informed as to what is being reported.

- A 'Probable Ore Reserve' is the economically mineable part of an Indicated, and in some circumstances, a Measured Mineral Resource. The confidence in the Modifying Factors applying to a Probable Ore Reserve is lower than that applying to a Proved Ore Reserve.

- A 'Proved Ore Reserve' is the economically mineable part of a Measured Mineral Resource. A Proved Ore Reserve implies a high degree of confidence in the Modifying Factors.

31.2 GLOSSARY

Albite ($NaAlSi_3O_8$): Sodium end member of the plagioclase feldspar minerals.

Amphibolite: A crystalloblastic rock consisting mainly of amphibole and plagioclase.

Amphibolite facies: Zone of medium to high grade metamorphic rocks characterised by moderate to high temperatures and moderate to high pressure metamorphism, typically 500°C to 750°C. Mineral suite typically consists of amphiboles and plagioclase with biotite, garnet, epidote and other amphibole minerals. Basic igneous rocks are often metamorphosed into amphibolite rocks.

Apatite ($Ca_5(PO_4)_3$ (F,Cl,OH)): Calcium phosphate.

Archaean: Meaning ancient, the oldest rocks of the Precambrian.

Beryl ($Be_3Al_2(SiO_3)_6$): A cyclosilicate mineral found in pegmatites and granites and in some regionally metamorphosed rocks.

Biotite ($K(Mg,Fe)_3(AlSi_3O_{10})(F,OH)_2$): Mafic rich mica mineral.

Block Models: Three-dimensional representations of mineralisation created using regular-sized blocks and sub-blocks to represent volumes of rock and mineral types and topographic features.

Chlorite ($(Mg,Fe)_3(Si,Al)_4O_{10}(OH)_2.(Mg,Fe)_3(OH)_6$: Sheet silicate mineral primarily found in weakly metamorphosed rocks from the alteration of either clays in sedimentary rocks or pyroxenes, amphiboles and micas in igneous rocks.

Cut-Off: An assay cut-off is the break-even economic value of the ore; the block cut-off is the economic value that optimises the net present value of the operating assets.

Cut-off criteria: A set of requirements for the quality and quantity of a mineral in subsoil, for mining and other conditions of the deposit development that define the commercial value of the deposit. The cut-off criteria are used to calculate Mineral Resources and Ore Reserves.

Cut-off grade: The minimum concentration of a valuable component in a marginal sample of the mineral. The cut-off grade is used to delineate parts of the deposit to be mined.

Deposit: An informal term for an accumulation of mineralisation or other valuable Earth material of any origin.

Dilution: Waste rock that is, by necessity, removed along with the ore in the mining process subsequently lowering the grade of the ore.

Dip angle: The angle between the direction of the described geological structure and horizontal plane.

Diorite: A medium to coarsely crystalline intrusive igneous rock containing plagioclase (sodium rich) and less than 20% quartz, amphibole and/or pyroxene. It is equivalent to andesite in composition.

Dyke: An intrusive geological body with transversal contacts. The length of a dyke many times exceeds its width, whereas the planes are nearly parallel. As such, a dyke is a fracture that has been filled with magmatic melt.

Exploration: Prospecting, sampling, mapping, diamond drilling and other work involved in searching for ore.

Feldspars: A group of silicate minerals with four distinct categories, potassium feldspars ($KAlSi_3O_4$); sodium feldspars ($NaAlSi_3O_8$); calcium feldspars ($CaAl_2Si_2O_8$); and barium feldspars ($BaAl_2Si_2O_8$).

Fluorite (CaF_2): Calcium fluoride mineral commonly found in hydrothermal veins.

Gabbro: A plutonic rock consisting of calcic plagioclase (commonly labradorite) and clinopyroxene, with or without orthopyroxene and olivine; loosely used for any coarse-grained dark igneous rock.

Geological fault: Discontinuity of rock with or without a shift on the surface. Faults occur due to the movement of rock masses.

Granite: A coarsely crystalline igneous rock consisting essentially of quartz, alkali feldspar and commonly mica.

Granodiorite: A coarsely crystalline igneous rock composed of more than 20% quartz and feldspar of which plagioclase makes up >67% of the total feldspars.

Greenschist facies: Zone of low-grade metamorphic rocks characterised by low temperature and moderate pressure metamorphism, typically 400°C to 500°C. Mineral suite typically consists of actinolite, epidote, chlorite, albite and quartz.

Host rock: Wall rock that confines the mineral occurrence zone.

Intrusion: A body of igneous rock that invades older rock. The invading rock may be a plastic solid or magma that pushes its way into the older rock.

JORC Code: The Australasian Code for Reporting of Mineral Resources and Ore Reserves prepared by the Joint Ore Reserve Committee of the Australasian Institute of Mining and Metallurgy, Australian Institute of Geoscientists and Minerals Council of Australia. The current edition is dated 2012.

Lepidolite ($K(Li,Al,Rb)_3(Al,Si)_4O_{10}(F,OH)_2$): Lithium rich phyllosilicate found in granites and pegmatites.

Magmatic: Consisting of, relating to or of magma origin.

Magmatism: Emplacement of magma within and/or on the surface of crustal rocks by igneous activity. Volcanism is the surface expression of magmatism.

Metamorphic rock: A rock that has, in a solid state, undergone changes in mineralogy, texture, or chemical composition as a result of heat or pressure.

Mine: A mineral mining enterprise. The term is often used to refer to an underground mine.

Mineral Deposit: A body of mineralisation that represents a concentration of valuable metals. The limits can be defined by geological contacts or assay cut-off grade criteria.

Mineral Resource: The JORC Code (2012) defines a Mineral Resource as "is a concentration or occurrence of solid material of economic interest in or on the Earth's crust in such form, grade (or quality), and quantity that there are reasonable prospects for eventual economic extraction. Mineral Resources are sub-divided, in order of increasing geological confidence, into Inferred, Indicated and Measured categories.

Muscovite ($KAl_2(AlSi_3O_{10})(F,OH)_2$): Sheet silicate mineral common in igneous and metamorphic rocks, occurring as a detrital mineral in sedimentary rocks.

Open pit: A mine that is entirely on surface; also referred to as open-cut or open-cast mine.

Ore: Natural mineral formation that contains valuable components in such compounds and concentrations that make the mining technically and economically feasible.

Ore body: A natural accumulation of ore confined to a certain structural and geological element or a combination of such elements. A kimberlite pipe is a pipe-shaped ore body elongated in a nearly vertical direction.

Ore Reserve: The JORC Code defines an Ore Reserve as "the economically mineable part of a Measured or Indicated Mineral Resource". Ore Reserves have been the subject of appropriate assessments, such as feasibility studies that apply realistic mining, metallurgical, economic, marketing, legal, environmental, social and governmental factors. These assessments demonstrate at the time of reporting that extraction could reasonably be justified.

Pegmatite: A very coarsely crystalline igneous rock with crystals >3 cm or larger.

Phyllite: A low temperature regional metamorphic rock, usually strongly foliated.

Pluton: A body of intrusive igneous rock that has crystallised from magma below the surface of the Earth.

Processing: A combination of processes for primary treatment of solid minerals in order to extract the products amenable to further technically and economically feasible chemical or metallurgical treatment or use.

Quartz (SiO_2): One of the most common minerals on the Earth and is the important constituent of many rocks. Quartz is composed of silica and exists in several different forms, habits and colours.

Run of Mine (RoM): A term used loosely to describe ore of average grade as produced from the mine.

Sampling: The process of studying the qualitative and quantitative composition and properties of natural formations comprising a deposit.

Schist: Medium grade metamorphic rock characterised by a parallel arrangement of the bulk constituent minerals.

Sedimentary rock: Rock formed by sedimentation of substances in water, less often from air and due to glacial actions on the land surface and within sea and ocean basins. Sedimentation can be mechanical (under the influence of gravity or environment dynamics changes), chemical (from water solutions upon their reaching saturation concentrations and as a result of exchange reactions), or biogenic (under the influence of biological activity).

Shear zone: A zone of ductile deformation between two undeformed blocks that have suffered relative shear displacement; the ductile analogue of a fault.

Spodumene ($LiAlSi_2O_6$): Pyroxene silicate mineral occurs in pegmatites associated with other lithium rich minerals. The mineral is metastable and is often found altered to mica or clay minerals.

Stripping ratio: The relation of overburden volume to a mineral volume. A stripping ratio largely defines the economic feasibility of open-pit mining.

Supracrustal rocks: These are rocks deposited above the existing basement rocks within the crust.

Tailings: Liquid wastes of mineral processing with valuable component grade lower than that of the initial material.

Tantalite (Fe, Mn)(Ta,Nb)$_2$O$_6$: Tantalum-rich variety of the mineral columbite. Tantalite forms a solid solution series with columbite known as the Columbite-Tantalite series. Columbite is the niobium-rich member, and tantalite is the tantalum-rich member. Tantalite is the principal ore of the metal tantalum.

Terrane: A region of crust with well-defined margins, which differs significantly in tectonic evolution from neighbouring regions.

Volcanic: Consists of all extrusive rocks, and these are rocks which are formed by the cooling of magma or molten rock on the Earth's surface.

Waste dump: An artificial dump formed as a result of disposing of overburden (waste rock) at specially designated sites.

31.3 Abbreviations

AACE	Association for the Advancement of Cost Engineering
Aftan	African Tantalum (Pty) Ltd
API	American Petroleum Institute
BS	British Standard
CAGR	compound annual growth rate
CBR	California Bearing Ratio
CIF	Cost, insurance, and freight
CRM	Certified Reference Materials
DRC	Democratic Republic of Congo
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMPR	Environmental Management Plan Report
EPCM	Engineering, Procurement and Construction Management
EPL	Exclusive Prospecting Licence
ERL	Exclusive Reconnaissance Licence
FEL	Front-End Loader
GPS	Global Positioning System
HAZOP	Hazard and operability
HLS	Heavy Liquid Separation
HPGR	High Pressure Grinding Rolls
ICE	internal combustion engine
IMF	International Monetary Fund
kL	kilolitres
kWhr	kilowatt hour
LCA	Life cycle assessment
LCT	Lithium-Caesium-Tantalum
mamsl	metres above mean sea level
MDRL	Mineral Deposit Retention Licence
MGS	Multi-Gravity Separator
ML	Mining Licence
NBR	National Building Regulations

NMC	Namaqua Metamorphic Complex
NNMP	Namaqua-Natal Metamorphic Province
NYF	Niobium-Yttrium-Fluorine
NYF families	Mixed LCT
OEM	Original Equipment Manufacturer
OK	Ordinary Kriging
OMC	Optimum Moisture Content
ORP	Orange River Pegmatite (Pty) Ltd
PDC	Process Design Criteria
ppm	Parts per million
PSD	Particle Size Distribution
PSZ	Pofadder Shear Zone
QA/QC	Quality assurance and quality control
QEMSCAN	Quantitative Evaluation of Materials by Scanning Electron Microscopy
REE	Rare Earth Element
RL	Reconnaissance Licence
RoM	Run of Mine
SANS	South African National Standards
SG	Specific Gravity
SMU	Selective Mining Unit
Ta	Tantalum
Ta_2O_5	Tantalum oxide
TCI	Total Capital Investment
t/h	tonnes per hour
TVS	Tantalite Valley Shear
VSI	Vertical Shaft Impactor
WBG	World Bank Group
WBS	Work Breakdown Structure

32.0 APPENDIX 1 – SECTIONS 1 TO 4

32.1 JORC TABLE 1 SECTIONS 1 SAMPLING TECHNIQUES AND DATA

Criteria	JORC Code Explanation	Commentary
Sampling techniques	*Nature and quality of sampling (e.g., cut channels, random chips, or specific specialised industry standard measurement tools appropriate to the minerals under investigation, such as down hole gamma sondes, or handheld XRF instruments, etc.). These examples should not be taken as limiting the broad meaning of sampling.* *Include reference to measures taken to ensure sample representivity and the appropriate calibration of any measurement tools or systems used.* *Aspects of the determination of mineralisation that are Material to the Public Report.* *In cases where 'industry standard' work has been done this would be relatively simple (e.g., 'reverse circulation drilling was used to obtain 1 m samples from which 3 kg was pulverised to produce a 30 g charge for fire assay'). In other cases, more explanation may be required, such as where there is coarse gold that has inherent sampling problems. Unusual commodities or mineralisation types (e.g., submarine nodules) may warrant disclosure of detailed information.*	Sampling was undertaken using industry standard practices and consist of large-scale chip and channel sampling and diamond drilling by ORP during 2020 and 2022. All 52 drillholes were drilled vertically. 234 samples were taken from the core of the drilling campaign. ORP conducted reconnaissance chip sampling and channel sampling during 2018. Samples were between 220 g and 6 kg. A total of 283 samples consisting of 204 channel and 79 chip samples were taken from 15 pegmatites during 2019. The average sample weight is 7.5 kg. Three additional samples were taken for mineralogy testwork. An additional 15 samples collected from different pegmatite feldspar types. All drillhole and sample locations are mapped in WGS84 UTM zone 34S. During 1981 Placer Development Ltd (Placer) collected 91 channel samples with an average weight of 14.22 kg. Bulk samples were taken at four locations, with 3–5 tonnes of material being obtained through drilling and blasting.
Drilling techniques	*Drill type (e.g., core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc.) and details (e.g., core diameter, triple or standard tube, depth of diamond tails, face-sampling bit or other type, whether core is oriented and if so, by what method, etc.).*	52 vertical diamond drillholes were drilled at ten pegmatites. The drillholes are HQ with a 63.5 mm☐ core. The holes were drilled with a 50 m strike spacing on drill lines and have a total core length of 1 568.92 m. The depth of the holes ranged from 4.36 m to 134.81 m.
Drill sample recovery	*Method of recording and assessing core and chip sample recoveries and results assessed.* *Measures taken to maximise sample recovery and ensure representative nature of the samples.*	Core recovery in the mineralised pegmatite was more than 90% due to the competent nature of the pegmatite bodies and even in the fractured country rock minimal core loss was recorded.

Criteria	JORC Code Explanation	Commentary
	Whether a relationship exists between sample recovery and grade and whether sample bias may have occurred due to preferential loss/gain of fine/coarse material.	Core loss was recorded as part of the operational procedures where the core loss was calculated from the difference between actual length of core recovered and penetration depth measured as the total length of the drill string after subtracting the stick-up length. Measures taken to maximise sample recovery and ensure representative nature of the samples is not recorded in available documents. No apparent bias was noted between sample recovery and grade.
Logging	*Whether core and chip samples have been geologically and geotechnically logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies.* *Whether logging is qualitative or quantitative in nature. Core (or costean, channel, etc.) photography.* *The total length and percentage of the relevant intersections logged.*	All drillholes were fully logged. The core, channel and chip samples have been logged to a level of detail to support appropriate Mineral Resource estimation, mining studies and metallurgical studies. The total length of the intersected pegmatite logged is 198.87 m and the percentage is 13% of total core drilled. It is assumed that the Placer samples have been logged according to industry standards at the time; however, the specific logging techniques used are not stated in available documents. These samples information were also not use for the MRE.
Subsampling techniques and sample preparation	*If core, whether cut or sawn and whether quarter, half or all core taken.* *If non-core, whether riffled, tube sampled, rotary split, etc and whether sampled wet or dry.* *For all sample types, the nature, quality and appropriateness of the sample preparation technique.* *Quality control procedures adopted for all subsampling stages to maximise representivity of samples.* *Measures taken to ensure that the sampling is representative of the in-situ material collected, including for instance results for field duplicate/second-half sampling.* *Whether sample sizes are appropriate to the grain size of the material being sampled.*	Three field duplicate samples of previously field channel sample F1_3, F1_25 and F1_37 were collected on the F pegmatite. The samples were dry. At the laboratory the samples were crushed to 2 mm. A 200 g subsample of the crushed material was taken to be milled in a carbon milling pot to 90% <75 micron. Samples consisted of half core, with the core being split using a saw. Approximately 200–220 g of sample was taken per drilled mineralised metre was recovered. Half core samples were also taken for comparison purposes. No information is available on subsampling techniques and sample preparation by Placer, because such procedures are not recorded in available documents.

Criteria	JORC Code Explanation	Commentary
Quality of assay data and laboratory tests	*The nature, quality and appropriateness of the assaying and laboratory procedures used and whether the technique is considered partial or total.* *For geophysical tools, spectrometers, handheld XRF instruments, etc, the parameters used in determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc.* *Nature of quality control procedures adopted (e.g. standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (i.e. lack of bias) and precision have been established.*	The samples were analysed at Scientific Services (Pty) Ltd, a laboratory based in Cape Town, South Africa. At the laboratory, the samples were crushed to 2 mm. A 200 g subsample of the crushed material was taken to be milled in a carbon milling pot to 90% <75 micron. 0.25 g of the milled material was prepared and analysed through inductively coupled plasma-optical emission spectroscopy (ICP-OES) analysis for tantalum, niobium, and lithium. The samples are measured against standards. ORP added a total of 25 standards and the laboratory added an additional nine standards to the samples. The standards used are AMIS0339, AMIS0340, AMIS0342, AMIS0355 and AMIS0408. A total of 17 blanks AMIS0439 (Blank Silica Chips) were added to the samples. The two samples were submitted to the Sci-Ba Laboratories in England where the samples were subjected to petrographic and x-ray diffraction (XRD) analyses at the University of Southampton. The Standard Method BS EN 12407-2007, natural stone method was used for a petrographic investigation of the samples. All quality assurance/quality control (QAQC) samples plotted within acceptable analytical limits as defined for their type (i.e. certified reference materials – CRMs). No reporting issues were identified with any labs in question. It is assumed that industry best practices were used by the laboratories to ensure sample representivity and acceptable assay data accuracy, however, all the QAQC procedures used are not recorded in available documents.

Criteria	JORC Code Explanation	Commentary
Verification of sampling and assaying	*The verification of significant intersections by either independent or alternative company personnel.* *The use of twinned holes.* *Documentation of primary data, data entry procedures, data verification, data storage (physical and electronic) protocols.* *Discuss any adjustment to assay data.*	All samples and data were verified by the ORP exploration geologist. The database was structured in a format suitable for importing into ArcGIS and 3D modelling software. Snowden reviewed all available sample and assay reports and is of the opinion that the electronic database supports the field data in almost all aspects and suggests that the database can be used for resource estimation. Verification was done by comparing drilling results with the closest channel sample data for each borehole. All sample material was bagged and tagged on site as per the specific pegmatite it was located on. The sample intersections were logged in the field and were weighed at the sampling site. All hard copy data-capturing was completed at the sampling locality. All sample material was stored at a secure storage site at the company site office. The original assay data has not been adjusted.
Location of data points	*Accuracy and quality of surveys used to locate drillholes (collar and downhole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.* *Specification of the grid system used.* *Quality and adequacy of topographic control.*	The sample locations are global positioning system (GPS) captured using WGS84 UTM zone 34S. All drillholes collars used for the MRE were surveyed by a qualified surveyor, African Geomatics in February 2022 with the accuracy being 20 cm.
Data spacing and distribution	*Data spacing for reporting of Exploration Results.* *Whether the data spacing and distribution is sufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied.* *Whether sample compositing has been applied.*	The drillholes were drilled at the two locations involving ten pegmatites with sections spaced 50 m apart with 50 m strike spacing on drill lines. For the channel and chip samples, each sampling point was carefully selected according to the physical quality of a sample point, normally on a 15 m, 25 m or 50 m interval, depending on the sample density required.

Criteria	JORC Code Explanation	Commentary
		The data spacing and distribution of the drillholes channel and chip sampling is insufficient to establish the degree of geological and grade continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied. Where pegmatites had a true thickness of >2 m, the channel samples were accordingly split into an equal length "top" and "bottom" channel sample. ORP prioritised the importance of bulk-pegmatite properties. Therefore, these channel sampling results were composited (i.e. weighted average of the entire intersection). The Placer samples were spaced on a 100 m grid.
Orientation of data in relation to geological structure	*Whether the orientation of sampling achieves unbiased sampling of possible structures and the extent to which this is known, considering the deposit type.* *If the relationship between the drilling orientation and the orientation of key mineralised structures is considered to have introduced a sampling bias, this should be assessed and reported if material.*	All holes were all drilled vertical. The channel and chip samples were also taken vertically from top to bottom of the pegmatites. Channel sampling conducted on pegmatite faces approximate right-angle intersections relative to the dip of the pegmatite at that specific location and thereof are unbiased by excessively oblique intersections. The tantalite is very fine and mostly not visible; therefore, no bias could take place when selecting the sample position. Orientation of the Placer sampling data in relation to the geological structure is not known, because it is not recorded in available documents.
Sample security	*The measures taken to ensure sample security.*	ORP maintained strict chain-of-custody procedures during all segments of sample handling, transport and samples prepared for transport to the laboratory are bagged and labelled in a manner which prevents tampering. Samples also remain in ORP's control until they are delivered and released to the laboratory. An export permit was obtained from the Namibian Mining Department to transport the samples across the border. Measures taken by Placer to ensure sample security have not been recorded in available documents.

Criteria	JORC Code Explanation	Commentary
Audits or reviews	*The results of any audits or reviews of sampling techniques and data.*	The deposit was visited by the Creo Competent Person during 2019 and Snowden during 2020. The visit was specifically to review the recent sampling campaign, and to review the sampling and assay procedures being used by the Company. Creo and Snowden considers that given the general sampling programme, geological investigations, check assaying and, in certain instances, independent audits, the procedures reflect an appropriate level of confidence.

32.2 TABLE 1 SECTION 2: REPORTING OF EXPLORATION RESULTS

Criteria	JORC Code Explanation	Commentary
Mineral tenement and land tenure status	*Type, reference name/number, location and ownership including agreements or material issues with third parties such as joint ventures, partnerships, overriding royalties, native title interests, historical sites, wilderness or national park and environmental settings.* *The security of the tenure held at the time of reporting along with any known impediments to obtaining a licence to operate in the area.*	EPL 5047 is located in the Karas region, southern Namibia, near the South African border, and approximately 15 km to the north of the Orange River. The EPL is held by ORP and is 14,671 hectares in size. ORP also obtained an Environmental Clearance Certificate on 4 April 2019 from the Ministry of Environmental and Tourism. A land-use agreement, including access to the property for exploration has been signed with the owners of the farms Norechab 130, Kinderzit 132 and Umeis 110
Exploration done by other parties	*Acknowledgment and appraisal of exploration by other parties.*	Swanson Enterprises held various claims on the farms Kinderzit and Umeis on EPL 5047 and mined tantalite, beryl, spodumene and tungsten on these claims in the 1970s to early 1990s. A Canadian company, Placer, also conducted detailed exploration in this area between 1980 and 1982. The Geological Survey of Namibia in collaboration with the Council of Geoscience of South Africa conducted a detailed mapping programme (1: 50,000 scale) over large parts of Southern Namibia including EPL 5047 (2012 to 2017).
Geology	*Deposit type, geological setting and style of mineralisation.*	Mineralisation is in the form of pegmatites of the lithium-caesium-tantalum (LCT) type which intruded granitic gneisses, metasediments and gabbroic-troctolitic rocks of the Tantalite Valley Complex.

Criteria	JORC Code Explanation	Commentary
		The primary mineral commodities occurring are tantalum (Ta_2O_5) and spodumene $LiAl(SiO_3O)_2$.
Drillhole information	*A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drillholes:* • *easting and northing of the drillhole collar* • *elevation or RL (Reduced Level – elevation above sea level in metres) of the drillhole collar* • *dip and azimuth of the hole* • *downhole length and interception depth* • *hole length.* *If the exclusion of this information is justified on the basis that the information is not Material and this exclusion does not detract from the understanding of the report, the Competent Person should clearly explain why this is the case.*	Drill results have been described in the report. All relevant data is included in the report.
Data aggregation methods	*In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (e.g. cutting of high grades) and cut-off grades are usually Material and should be stated.* *Where aggregate intercepts incorporate short lengths of high-grade results and longer lengths of low-grade results, the procedure used for such aggregation should be stated and some typical examples of such aggregations should be shown in detail.* *The assumptions used for any reporting of metal equivalent values should be clearly stated.*	Information about data aggregation is not stated in the available documents.
Relationship between mineralisation widths and intercept lengths	*These relationships are particularly important in the reporting of Exploration Results.* *If the geometry of the mineralisation with respect to the drillhole angle is known, its nature should be reported.* *If it is not known and only the down hole lengths are reported, there should be a clear statement to this effect (e.g. 'downhole length, true width not known').*	The drillholes were all drilled vertical, with the pegmatites dipping on average 12.33° to the southeast. The pegmatite thickness intercepted range from 0.1 m to 9.62 m.

Criteria	JORC Code Explanation	Commentary
Diagrams	*Appropriate maps and sections (with scales) and tabulations of intercepts should be included for any significant discovery being reported These should include, but not be limited to a plan view of drill hole collar locations and appropriate sectional views.*	The appropriate diagrams and tabulations are supplied in the main report.
Balanced reporting	*Where comprehensive reporting of all Exploration Results is not practicable, representative reporting of both low and high grades and/or widths should be practiced to avoid misleading reporting of Exploration Results.*	This report has been prepared to present the obvious targets and results of historical and recent exploration activities
Other substantive exploration data	*Other exploration data, if meaningful and material, should be reported including (but not limited to): geological observations; geophysical survey results; geochemical survey results; bulk samples – size and method of treatment; metallurgical test results; bulk density, groundwater, geotechnical and rock characteristics; potential deleterious or contaminating substances.*	ORP conducted reconnaissance and later detailed geological mapping to identify and prioritise targets. ORP appointed Asset Mapping Solutions (Pty) Ltd, a Cape Town based company, to conduct a detail drone survey of the Swanson prospect area in 2018. African Geomatics, a Windhoek based survey company conducted a more detail drone survey of the Swanson area in 2022.
Further work	*The nature and scale of planned further work (e.g. tests for lateral extensions or depth extensions or large-scale step-out drilling).* *Diagrams clearly highlighting the areas of possible extensions, including the main geological interpretations and future drilling areas, provided this information is not commercially sensitive.*	The next exploration and assessment phases should be aimed at establishing a resource base into hopefully an "Indicated" category, as well as undertaking the necessary research into markets and recovery processes in order to support a further assessment for the Project. The pegmatite bodies not explored yet should be mapped and sampled and mineralised pegmatites should be drilled to expand the existing resources base.

32.3 Table 1 Section 3: Estimation and Reporting of Mineral Resources

Criteria	JORC Code Explanation	Commentary
Database integrity	*Measures taken to ensure that data has not been corrupted by, for example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.* *Data validation procedures used.*	A copy of the RAW database provided by the client was kept unedited for auditing purposes of edits conducted. Overlapping intervals, duplicates and other errors were flagged by Leapfrog modelling software and corrected. Collar elevations were checked relative to the LiDAR-generated topographic surface.

Criteria	JORC Code Explanation	Commentary
		Further visual checks were also conducted to ensure a clean database for modelling and estimation; that data was in spatially in valid locations. Statistical analyses were carried out to see if data lies within valid ranges, and to identify possible outliers.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Matthew Mullins (CP Geology and Mineral Resource Estimate) undertook a site visit on 17–19 August 2021. He was accompanied by site personnel, senior company executives, and by Matthew Jarvis from Snowden. The borehole core, overall geological setting, and the nature and mineralisation in the pegmatites was observed in detail.
Geological interpretati on	*Confidence in (or conversely, the uncertainty of) the geological interpretation of the mineral deposit.* *Nature of the data used and of any assumptions made.* *The effect, if any, of alternative interpretations on Mineral Resource estimation.* *The use of geology in guiding and controlling Mineral Resource estimation.* *The factors affecting continuity both of grade and geology.*	The geological interpretation is that the tabular pegmatite bodies were formed by anatexis within existing fracture planes in the host gabbroic orebody. In terms of their geometry, most of the pegmatites at the Swanson deposit have a general northeast-southwest strike, with shallow dip angles (10-20°) to the southeast. One of the pegmatites, however, has a different strike from the rest of the pegmatites investigated. Pegmatite 'F1' strikes approximately 148° and dips on average at 14° to the northeast. The pegmatites are sub-horizontal tabular orebodies within the host gabbro, with clearly defined and sharp hangingwall and footwall contacts. Mineral Resources were defined within the well explored D and E-F pegmatite zones, respectively. These pegmatites can be traced on surface at the kilometre scale, and have been confirmed with diamond drilling intersects, so there is a high level of confidence in the geological interpretation. They are uniform in thickness over large distances. Tantalum and niobium grades are uniformly distributed within individual pegmatites and vary slightly between different pegmatites. In both areas investigated, the highest lithium grades occur in the pegmatites highest up in the sequence (D0 and E7, respectively). The data used comprised mapping data, borehole diamond drilling, channel sampling of outcrops, and chip sampling. "Bars" and/or structures that influence the termination or displacement of pegmatites have been interpreted from available mapping and drilling information.

Criteria	JORC Code Explanation	Commentary
Dimensions	*The extent and variability of the Mineral Resource expressed as length (along strike or otherwise), plan width, and depth below surface to the upper and lower limits of the Mineral Resource.*	The pegmatite orebodies show a high degree of lateral continuity and can be traced in outcrop over the kilometre scale. The extension of the pegmatite bodies beyond the outcrop positions has been confirmed by diamond drilling. Down-dip continuation of all the shallower pegmatites has been confirmed by diamond drilling. This tendency is expected for the lower E-pegmatites as well but must be proven with additional deep boreholes.
Estimation and modelling techniques	*The nature and appropriateness of the estimation technique(s) applied and key assumptions, including treatment of extreme grade values, domaining, interpolation parameters and maximum distance of extrapolation from data points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.* *The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.* *The assumptions made regarding recovery of by-products.* *Estimation of deleterious elements or other non-grade variables of economic significance (e.g. sulphur for acid mine drainage characterisation).* *In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.* *Any assumptions behind modelling of selective mining units.* *Any assumptions about correlation between variables.* *Description of how the geological interpretation was used to control the resource estimates.* *Discussion of basis for using or not using grade cutting or capping.* *The process of validation, the checking process used, the comparison of model data to drillhole data, and use of reconciliation data if available.*	The pegmatite hangingwall and footwall contacts were modelled in Leapfrog software. Based on mapping information, it appears as if D0 terminates against the hangingwall side of D1 in some areas. This relationship was shown in the modelling but could also be the result of bifurcation of a single pegmatite. Minor north-northwest-striking faults that dip steeply to the northeast were observed in both the D and the E-F areas. Notes by the ORP field geologists suggest normal movement along these faults, however, similar vertical offsets of dipping pegmatites could have occurred through sinistral strike-slip kinematics. More information is needed to confirm the true sense of movement, but the apparent downthrow is to the north of these structures. Each pegmatite was modelled separately, and as no zoning was apparent, either physically of from the chemistry, these were grade modelled as a single unit. The interpolation parameters were based on the variogram parameters. The Snowden Supervisor and Leapfrog Edge software was used for exploratory data analysis and for the variography. Ordinary kriging was used to estimate grades. No mining has taken place. The economics are based on the recovery of tantalum alone. Recovery assumptions are 67% Ta. Although economic concentrations of lithium are present, these were not considered. Niobium is present in solid solution in the tantalum. This was taken into account in the metallurgical testwork. The block size used was 10 m x 10 m x 2 m.

Criteria	JORC Code Explanation	Commentary
		It was assumed that the SMU would be equivalent to the block size. As the entire pegmatites were considered to be economic, no selective mining is envisaged. The pegmatites exhibit extremely sharp hangingwall and footwall contacts with the country rock, and these contacts were modelled as accurately as possible in the Leapfrog software. Any issues picked up during the validation were fixed immediately in the source data, to prevent reloading the same errors at a later stage. However, no edits were made to the copy of raw data.
Moisture	*Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.*	The tonnages are estimated on a dry basis.
Cut-off parameters	*The basis of the adopted cut-off grade(s) or quality parameters applied.*	The minimum cut-off was determined to be 237 ppm Ta2O5.
Mining factors or assumptions	*Assumptions made regarding possible mining methods, minimum mining dimensions and internal (or, if applicable, external) mining dilution. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential mining methods, but the assumptions made regarding mining methods and parameters when estimating Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the mining assumptions made.*	It is assumed that the mining method would be by opencast mining. Because of the extremely sharp contacts, and the clear colour differential between the orebody and the host rock, no mining dilution was included.
Metallurgical factors or assumptions	*The basis for assumptions or predictions regarding metallurgical amenability. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider potential metallurgical methods, but the assumptions regarding metallurgical treatment processes and parameters made when reporting Mineral Resources may not always be rigorous. Where this is the case, this should be reported with an explanation of the basis of the metallurgical assumptions made.*	In November 2020, CoreMet analysed a 5.45-tonne bulk sample and concluded that The ore was easily crushed but is highly abrasive. The spiral recoveries on the rougher spirals can be expected to be in the range of 70% to 80%. The lower recovery seems to be due to both liberation and particle size. At 76% spiral recovery and 90% MGS recovery, it will be possible to produce a Ta2O5 concentrate of above 20% Ta2O5 at a recovery of approximately 68%. This is without any optimisation and scavengers. This recovery value is slightly higher than the 65% recovery projected in the process plant study.

Criteria	JORC Code Explanation	Commentary
Environmental factors or assumptions	*Assumptions made regarding possible waste and process residue disposal options. It is always necessary as part of the process of determining reasonable prospects for eventual economic extraction to consider the potential environmental impacts of the mining and processing operation. While at this stage the determination of potential environmental impacts, particularly for a greenfields project, may not always be well advanced, the status of early consideration of these potential environmental impacts should be reported. Where these aspects have not been considered this should be reported with an explanation of the environmental assumptions made.*	An independent environmental assessment concluded that: The potential negative impacts associated with the proposed mineral exploration project are expected to be low to medium in significance, apart from air quality, groundwater and some social impacts. Provided that the relevant mitigation measures are successfully implemented by the proponent, there are no environmental reasons why the proposed project should not be approved. The project will have significant positive economic impacts that would benefit the local, regional and national economy of Namibia.
Bulk density	*Whether assumed or determined. If assumed, the basis for the assumptions. If determined, the method used, whether wet or dry, the frequency of the measurements, the nature, size and representativeness of the samples.* *The bulk density for bulk material must have been measured by methods that adequately account for void spaces (vugs, porosity, etc.), moisture and differences between rock and alteration zones within the deposit.* *Discuss assumptions for bulk density estimates used in the evaluation process of the different materials.*	ORP determined the specific gravity (SG) of the samples by using the Archimedes principle on 147 chip samples that were collected from all six pegmatites from the targeted pegmatite swarm. The SG of each sample was calculated using the formula SG = (weight in air) / (weight in air – weight in water). This technique measures the volume of a sample by water displacement and density is then calculated as the ratio of mass to volume. No bulk density has been measured because the SG is considered appropriate as an input into the orebody model. It was found that the 147 samples have an average SG of 2.64. This is the SG that was used for reporting.

Criteria	JORC Code Explanation	Commentary
Classification	*The basis for the classification of the Mineral Resources into varying confidence categories.* *Whether appropriate account has been taken of all relevant factors (i.e. relative confidence in tonnage/grade estimations, reliability of input data, confidence in continuity of geology and metal values, quality, quantity and distribution of the data).* *Whether the result appropriately reflects the Competent Person's view of the deposit.*	Resources in the E-F Area were classified on a distance from sample basis. A boundary "shell" was created around sampled borehole traces that were used for the estimation – this includes boreholes and channel samples. A steeply dipping north-northeast-striking fault forms the southern boundary of this classification system for the E-F Area, whereas the intermittent stream that drains the area forms the eastern and northern boundaries. Resources within this boundary were classified to have an Indicated confidence level. Based on the average variogram range for the Li2O, a buffer of 50 m was created around the boundary shell described above. Pegmatite deposits within the 50 m buffer were classified as Inferred. Any deposits beyond the 50 m buffer are considered "Unclassified" and were not included in this resource report. A similar classification method was used for the D Area, but instead of using a "shell" around the borehole traces, a polygon around the borehole collars was projected vertically downward. The reason for using the shell approach in the E-F area was to take into consideration shallower holes that did not intersect the lowermost E pegmatite layers. Applying the same resource classification method in the E-F area that was used in the D Area would give unrealistically high confidence to these lower pegmatites, with shallow holes drilled above them, but not into them.
views	*The results of any audits or reviews of Mineral Resource estimates.*	No audits or reviews were conducted.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Mineral Resource estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the resource within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors that could affect the relative accuracy and confidence of the estimate.*	The relative accuracy of the estimate is based on the geological and statistical continuity of the tabular pegmatites. The pegmatites can be traced in outcrop over tens to hundreds of metres, and their continuity has been confirmed by surface boreholes. Grade continuity has been confirmed through geostatistical analysis. The Indicated Resource forms a firm basis for global mine planning and for economic assessment of the orebodies.

Criteria	JORC Code Explanation	Commentary
	The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used. *These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	

32.4 TABLE 1 SECTION 4: ESTIMATION AND REPORTING OF ORE RESERVES

Criteria	JORC Code explanation	Commentary
Mineral Resource estimate for conversion to Ore Reserves	*Description of the Mineral Resource estimate used as a basis for the conversion to an Ore Reserve.* *Clear statement as to whether the Mineral Resources are reported additional to, or inclusive of, the Ore Reserves.*	The Mineral Resource Estimate used as the basis for conversion to the Ore Reserve was prepared by Snowden Optiro as at 6 May 2022. The data was provided as a Datamine (Studio RM) Block model ("20220519 D Sub-blocked Model (COMP Eval)v5.csv" and "20220519 E-F Sub-blocked Model (COMP Eval)v5.csv"). This block model was cut to the most recent (March 2022) surface topography. At the time of preparation, no Ore Reserves were declared when preparing the Mineral Resource estimate. The Mineral resource statement is reported in the document "20220502 ORP Geology and Mineral Resources 2022 Final.pdf") and is summarized in Section 14.0 of this report. The resource is quoted at 236ppm Ta_2O_5 cut-off grade.
Site visits	*Comment on any site visits undertaken by the Competent Person and the outcome of those visits.* *If no site visits have been undertaken indicate why this is the case.*	Matthew Jarvis visited the site in May 2021. He has been involved with the project since January 2021 and reviewed key aspects of the project, including updated studies such as the geotechnical assessments,
Study status	*The type and level of study undertaken to enable Mineral Resources to be converted to Ore Reserves.*	This Study is to Feasibility Study standards and is based on sampling undertaken, analysis, process testing, specific studies to inform forecast operating performance.

	The Code requires that a study to at least Pre-Feasibility Study level has been undertaken to convert Mineral Resources to Ore Reserves. Such studies will have been carried out and will have determined a mine plan that is technically achievable and economically viable, and that material Modifying Factors have been considered.	All modifying factors including dilution, ore losses, geotechnical, mining and processing costs and recoveries have been accounted for. Key contributors include: • Snowden Optiro (Resource Estimate) • ORP. (Resources and Geology) • SPH Kundalila and Associates (Mining and Production) • Oreology and ORP management (Processing) • Middindi Consulting (Geotechnical studies) • Prime Resources (Waste and overburden Handling)
Cut-off parameters	*The basis of the cut-off grade(s) or quality parameters applied.*	A sign-off sheet was established for each pit and each type of pegmatite considering all costs relating to mining, processing, and site G&A. The cut-off grade as determined in the resource estimate has been validated against updated parameters and inputs used in the feasibility study as shown in Table 16.4 of this Report. Furthermore, no grades within the resource area were found to be below this cut-off.
Mining factors or assumptions	*The method and assumptions used as reported in the Pre-Feasibility or Feasibility Study to convert the Mineral Resource to an Ore Reserve (i.e. either by application of appropriate factors by optimisation or by preliminary or detailed design).* *The choice, nature and appropriateness of the selected mining method(s) and other mining parameters including associated design issues such as pre-strip, access, etc.* *The assumptions made regarding geotechnical parameters (eg pit slopes, stope sizes, etc), grade control and pre-production drilling.* *The major assumptions made and Mineral Resource model used for pit and stope optimisation (if appropriate).* *The mining dilution factors used.* *The mining recovery factors used.* *Any minimum mining widths used.*	The process of converting Mineral Resources to Ore Reserves involved the process of pit optimisation followed by a preliminary pit design process. Resources were split into two distinct areas (D pegmatite and EF pegmatites) and would be extracted from two separate pits. Sections 16.0 of this Report provide additional detail pertaining to the pit selection, mining method and design as well as assumptions made in converting the resources to reserves. • Key assumptions around geotechnical design criteria are provide in Table 16.2 • The extent of actual mining dilution is not yet known for this project as no mining has occurred. However, given the nature of the orebody, the mining method proposed and the relatively small production volumes proposed, dilution is not expected to be high and based on similar projects and opencast mining operations, 5% is deemed reasonable.

	The manner in which Inferred Mineral Resources are utilised in mining studies and the sensitivity of the outcome to their inclusion. *The infrastructure requirements of the selected mining methods.*	However, sensitivities around this have been assessed. • Given the dip of the orebody and surface terrain, the proposed pit designs result in some ore loss (through pit design constraints) (~16.8%) from the resources that were initially included in the pit optimisation process as and due to the resulting pit designs would require excessive stripping to recover. Approximately 27% of Inferred resources were used in the production schedule for the feasibility study (33% in the EF pegmatite pit and 23% in the D Pegmatite pit. Pegmatite mineralisation occurs in layered, laterally dipping orebodies as shown in Section 14.0. As such, some Inferred resources occur together with the indicated resources within the pit shells arrived at for the ore reserve. While excluded from a "reserve" perspective, they have been included in the mining schedule as they would be mined and processed as part of the RoM.
Metallurgical factors or assumptions	*The metallurgical process proposed and the appropriateness of that process to the style of mineralisation.* *Whether the metallurgical process is well-tested technology or novel in nature.* *The nature, amount and representativeness of metallurgical test work undertaken, the nature of the metallurgical domaining applied and the corresponding metallurgical recovery factors applied.* *Any assumptions or allowances made for deleterious elements.* *The existence of any bulk sample or pilot scale test work and the degree to which such samples are considered representative of the orebody as a whole.* *For minerals that are defined by a specification, has the ore reserve estimation been based on the appropriate mineralogy to meet the specifications?*	Mineral processing would be in the form of crushing, screening and concentrators to produce a concentrate product with a 25% Ta_2O_5 grade. The recovery assumed would be 65% which is regarded as conservative relative to bulk sample tests undertaken to date. Lithium Oxide would be sold as a by-product from the waste/fines product from the D pegmatite only. A LoI has been concluded on 23rd March 2023 with Hebei Xinjian Construction, which is conducting processing operations adjacent to the Swanson Project, for the offtake of >0.2% Li_2O grade RoM tailings (average grade ≥0.3% Li_2O). This is only achievable in the D Pegmatite pit as the Li_2O grades in the EF ore are too low for recovery. No Niobium Pentoxide (Nb_2O_5) has been included in the Ore Reserves and there are no deleterious elements that are expected to impact recovery or processing performance. In November 2020, CoreMet analysed a 5.45-tonne bulk sample and concluded that: • The ore was easily crushed but is highly abrasive.

		• The spiral recoveries on the rougher spirals can be expected to be in the range of 70% to 80%. The lower recovery seems to be due to both liberation and particle size. • At 76% spiral recovery and 90% MGS recovery, it will be possible to produce a Ta_2O_5 concentrate of above 20% Ta_2O_5 at a recovery of approximately 68%. This is without any optimisation and scavengers. This recovery value is slightly higher than the 65% recovery projected in the process plant study. • Metallurgical test work on a 60-t bulk sample has been completed, results pending to confirm these results.
Environmental	*The status of studies of potential environmental impacts of the mining and processing operation. Details of waste rock characterisation and the consideration of potential sites, status of design options considered and, where applicable, the status of approvals for process residue storage and waste dumps should be reported.*	An independent environmental assessment (Impala, 2020) concluded that the potential negative impacts associated with the proposed mineral exploration project are expected to be low to medium in significance, apart from air quality, groundwater and some social impacts. Provided that the relevant mitigation measures are successfully implemented by the proponent, there are no environmental reasons why the proposed project should not be approved. An environmental clearance certificate was issued on 14 May 2022 for a further period of 3 years and is renewable.
Infrastructure	*The existence of appropriate infrastructure: availability of land for plant development, power, water, transportation (particularly for bulk commodities), labour, accommodation; or the ease with which the infrastructure can be provided, or accessed.*	The project is located in a relatively remote region of Southern Namibia but within reasonable proximity to the well established township of Warmbad The site does not currently have any major infrastructure but is located within close proximity to the town of Warmbad. Water and electricity will be drawn from the national services supplied to the town and employees will be accommodated in the town and commute via bus. Roads to the project are well developed dirt roads and additional roads to the proposed site will be established as part of the project. Concentrate will be transported via road to the town of Luderitz. The project area is located in a dry desert region and not likely to be highly impacted by seasonal rainfall.

Costs	*The derivation of, or assumptions made, regarding projected capital costs in the study.* *The methodology used to estimate operating costs.* *Allowances made for the content of deleterious elements.* *The derivation of assumptions made of metal or commodity price(s), for the principal minerals and co- products.* *The source of exchange rates used in the study.* *Derivation of transportation charges.* *The basis for forecasting or source of treatment and refining charges, penalties for failure to meet specification, etc.* *The allowances made for royalties payable, both Government and private.*	Capital Costs pertaining to the project have been derived from quotations provided based on design details for the mine infrastructure and development requirements A detailed capital budget for the project has been provide by the individual contractors what was responsible for each aspect: • Plant Capex provided by Obsideo • Mine Infrastructure and Roads by SPH Kundalila • Geology and grade control by LexRox • Waste Dump and plant waste design by Prime Resources • Power line construction by Walters Engineering • Water pipe line construction by Spes Bona Engineering Operating costs have been derived from first principals and from benchmarks against other operations. Mining will be carried out by an industry experienced mining contractor SPH Kundalila on a fixed monthly cost basis for the initial commencement of production. Due to the fact that the monthly tonnages fluctuate during the initial production phases of the mine schedule ORP and SPH Kundalila have agreed that that the equipment to be supplied on site would have the capacity to produce the peak production demand of the mine schedule and ORP will pay for the full suite of equipment. This will result in production stability and ensure that equipment would not need to be removed from site on a regular basis. • Mining costs - provided by SHP Kundalila • Processing costs - provided by Obsideo • Logistics costs - Kuehne & Nagel • Mining and plant services – Lexrox • Overhead costs – ORP Management

Revenue factors	*The derivation of, or assumptions made regarding revenue factors including head grade, metal or commodity price(s) exchange rates, transportation and treatment charges, penalties, net smelter returns, etc.* *The derivation of assumptions made of metal or commodity price(s), for the principal metals, minerals and co-products.*	Macro-economic assumptions were determined based on information provided by leading commodity industry analysts and banks. Prices for 25% Ta_2O_5 concentrate have been sources from FastMarkets and supported by the (Argus market assessment) is based on a 3 year (TBC) historical average price. Ta_2O_5 concentrate is a well traded commodity and pricing is transparent. Exchange rates for the Namibian Dollar/South African Rand were sourced from publicly available information provided by ABSA bank.
Market assessment	*The demand, supply and stock situation for the particular commodity, consumption trends and factors likely to affect supply and demand into the future.* *A customer and competitor analysis along with the identification of likely market windows for the product.* *Price and volume forecasts and the basis for these forecasts.* *For industrial minerals the customer specification, testing and acceptance requirements prior to a supply contract.*	A detailed market assessment report was undertaken by Argus for Orange River Tantalite in Mar 2022 detailing the market supply and demand outlook for Tantalite and the key suppliers on the region.
Economic	*The inputs to the economic analysis to produce the net present value (NPV) in the study, the source and confidence of these economic inputs including estimated inflation, discount rate, etc.* *NPV ranges and sensitivity to variations in the significant assumptions and inputs.*	A detailed economic evaluation of the Project was undertaken as presented in Section 22.0 of this Report.
Social	*The status of agreements with key stakeholders and matters leading to social licence to operate.*	ORP has entered into landuse agreement with the private land owner on which property the mining license has been issued. The land use agreement allow for mining to take place within the license area and all infrastructure plant, road, power lines and water lines to be constructed over this property.

Other	*To the extent relevant, the impact of the following on the project and/or on the estimation and classification of the Ore Reserves:* *Any identified material naturally occurring risks.* *The status of material legal agreements and marketing arrangements.* *The status of governmental agreements and approvals critical to the viability of the project, such as mineral tenement status, and government and statutory approvals. There must be reasonable grounds to expect that all necessary Government approvals will be received within the timeframes anticipated in the Pre-Feasibility or Feasibility study. Highlight and discuss the materiality of any unresolved matter that is dependent on a third party on which extraction of the reserve is contingent.*	ORP has been awarded a Mining license over the project area ML223 issued on the 19 May 2022 valid for a period of 15 years. An Environmental Clearance Certificate (02187) for the project was issued on the 14 May 2022 and expire on the 14 May 2025.
Classification	*The basis for the classification of the Ore Reserves into varying confidence categories.* *Whether the result appropriately reflects the Competent Person's view of the deposit.* *The proportion of Probable Ore Reserves that have been derived from Measured Mineral Resources (if any).*	The Mineral Reserves were based on only Indicated Resources.
Audits or reviews	*The results of any audits or reviews of Ore Reserve Estimates.*	No external audit or reviews of Ore Reserve Estimates has been performed.
Discussion of relative accuracy/ confidence	*Where appropriate a statement of the relative accuracy and confidence level in the Ore Reserve Estimate using an approach or procedure deemed appropriate by the Competent Person. For example, the application of statistical or geostatistical procedures to quantify the relative accuracy of the reserve within stated confidence limits, or, if such an approach is not deemed appropriate, a qualitative discussion of the factors which could affect the relative accuracy and confidence of the estimate.* *The statement should specify whether it relates to global or local estimates, and, if local, state the relevant tonnages, which should be relevant to technical and economic evaluation. Documentation should include assumptions made and the procedures used.*	The relative accuracy of the estimate is based on the geological and statistical continuity of the tabular pegmatites. The pegmatites can be traced in outcrop over tens to hundreds of metres, and their continuity has been confirmed by surface boreholes. Grade continuity has been confirmed through geostatistical analysis. The Indicated Resource forms a firm basis for global mine planning and for economic assessment of the orebodies. The Probable Ore Reserve has been derived from Indicated resources only and conservative conversion factors have been applied to the conversion of resources to reserves. Between 72% and 79% of the Indicated Resources have been included as Probable Reserves based on economic and other technical inputs and assumptions.

	Accuracy and confidence discussions should extend to specific discussions of any applied Modifying Factors that may have a material impact on Ore Reserve viability, or for which there are remaining areas of uncertainty at the current study stage. *It is recognised that this may not be possible or appropriate in all circumstances. These statements of relative accuracy and confidence of the estimate should be compared with production data, where available.*	