11 December 2024

Sandy Mitchell Scoping Study delivers a commercial Rare Earth and Heavy Minerals operation

Scoping Study confirms low-cost, scalable world-class REE development covering the Mineral Resource Estimate for the company's Sandy Mitchell Rare Earths and Heavy Minerals Project.

All amounts are in Australian dollars (AUD)

Key Study Highlights

- The Scoping Study calculated a three-to-four-year life of mine (LOM) based on the MRE overall tonnage.
- Based on the results of the Scoping Study the Board has determined that - for Ark Mines' 100%-owned Sandy Mitchell Rare Earths and Heavy Minerals project (Sandy Mitchell), is commercial.
- The Board will now progress the works program to advance project development at Sandy Mitchell, including the commencement of a Pre-Feasibility Study (PFS) expected in 2025.
- The input metallurgy and processing will be optimised with further metallurgical testwork

Ark Mines Limited (ASX: AHK) (Ark or the Company) is pleased to announce the results of the Sandy Mitchell Rare Earths Project Scoping Study (SMP-SS-001). The study was prepared by Harrier Project Management, Australia. The report sets out compelling project economics and the Ark Mines board has unanimously recommended to advance the project to the next phase of development, starting with the commencement of a Pre-Feasibility Study.

Cautionary Statements

The Scoping Study referred to in this announcement has been undertaken to determine the viability of the Sandy Mitchell project surface-free dig strip mining and synchronous gravity beneficiation to produce a monazite concentrate. It is a preliminary technical and economic study of the potential viability of the Project. It is based on low-level technical and economic assessments that are not sufficient to support estimation of ore reserves. Further evaluation work and appropriate studies are required before Ark Mines (Ark) will be able to estimate any ore reserves or to provide any assurance of an economic development case.

The scheduled mined tonnes over the current 3-4 year mine life incorporated into the scoping study are wholly contained in the Measured Mineral Resource. There is no inclusion of Inferred material in the model. The Mineral Resource estimates underpinning the development target has been prepared by a Competent Person in accordance with the requirements of the JORC Code (2012). The scoping study is based on the material assumptions outlined below. These include the availability of funding. While Ark considers all the material assumptions to be based on reasonable grounds, there is no certainty that they will prove to be correct or that the range of outcomes indicated by the scoping study will be achieved.

To achieve the range of outcomes indicated in this scoping study, funding in the order of $120m-150m will likely be required. Investors should note that there is no certainty that Ark will be able to raise that amount of funding when needed. It is also possible funding may only be available on terms that may be dilutive to, or otherwise affect, the value of Ark shares. It is also possible that Ark could pursue other 'value realisation' strategies, such as a sale, partial sale or operational joint venture of the Project. If it does, this could materially reduce Ark's proportionate ownership of the Project. Potential funding options may also include third parties through right to mine JV, operational JV or a processing agreement.

At this stage, the Company has not yet secured any offtake contracts and accordingly cannot make an assurance that it will have a processing contract available and, on the assumptions made, in this scoping study. The Company will update the market accordingly if any contracts are entered into. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of the scoping study.

This announcement contains forward-looking statements. Ark has concluded that it has a reasonable basis for providing these forward-looking statements and believes it has a 'reasonable basis' to expect it will be able to fund development of the Sandy Mitchell Project in Far North Queensland. However, a number of factors could cause actual results or expectations to differ materially from the results expressed or implied in the forward-looking statements. Given the uncertainties involved, investors should not make any investment decisions based solely on the results of this study.

Mineral Processing

- Beneficiation test work carried out to-date on the mineral sands at Sandy Mitchell has produced a high-grade rare earth concentrate through straightforward beneficiation by gravity processing
- Recent test work on ultra-fines material has proven that a small increase in recovery has a significant improvement in overall benefits to the Project metrics
- These benefits increase when maximising mined tonnes, which reduces cost per unit (mined tonnes).

Input Costs

- Initial Capex requirement of $120m-$150m (including an estimated 10% contingency). Project capital costs have been assessed to a Class 5 Association for the Advancement of Cost Engineers (AACE) International 2020 guidelines

Financial Returns

- The base case study includes approximately 85% of the Measured Resource allowing for mine losses at Sandy Mitchell and delivers an annual EBITDA of $45m-$53 m, with annual post-tax-free cash flow totalling ~$25m-$30 m

- Under the base case, 20.8 megatonnes per annum (Mtpa) sand movement operating scenario and 3-4 year mine life, the scoping study outlines annual net revenue totalling ~AUD120m-130 m

- Post-tax capital payback of ~3-4 years from first rare earth mineral concentrate (REMC) production with total initial capex of AUD120m-150m (including contingency).

Material assumptions on which the scoping study is based include:

- Grades will be consistent and within or greater than the ranges reported in both the MRE
- Prices of products will remain within or greater than the quoted prices
- The mining will be consistent in depth of mineralisation and mineability and will remain above the water table
- Markets for the products will be within or greater than current estimates.

Mining Rate

The mining rate assessment process has used the current Measured Mineral Resource Estimate (MRE), ASX Announcement 2 October 2024, and applied a 700-ppm monazite equivalent (mzeq) grade cut-off. This has provided a raw mining volume estimate. This process has resulted in 60Mt-60-65Mt grading approximately 1,700 ppm mzeq containing approximately 1,200 ppm monazite, 660 ppm zircon, and ± accessory garnet and Ti heavy minerals for the Project.

Material assumptions that have been used as modifying factors in optimising the mining rate include a 15% mining loss assumption, production hours, plant availability, processing recovery, infrastructure capex and regulatory environment.

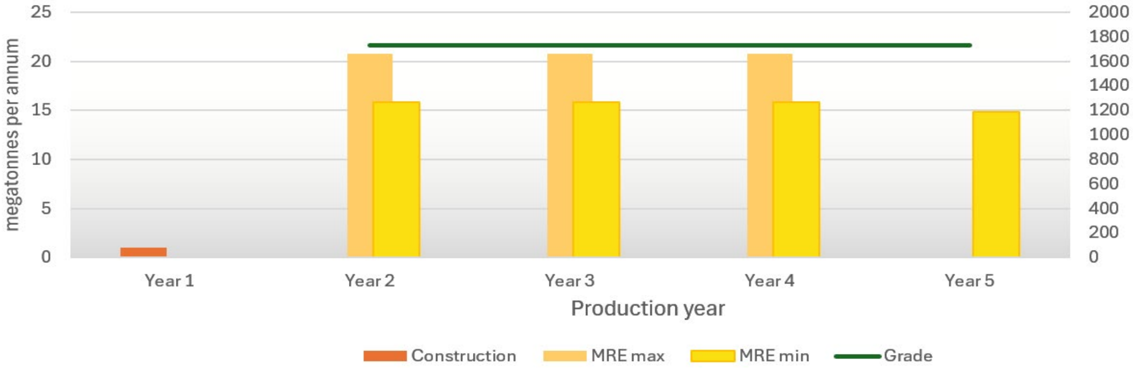
The mine life for the scoping study comprises 85% (60Mt-65Mt - allowing for losses) of the MRE.

Measured Resource Estimate (MRE)

	Dry tonnes	monazite equivalent (ppm)
Measured mineral resource estimate*	71,789,616	1,732

As reported ASX announcement 2 October 2024;

Annual mined tonnages - Sandy Mitchell Project



Extraction sequencing shall be MRE for the first 3-4 year's

Set out below is a summary of the Sandy Mitchell's project attributes, with respect to forecast operational expenditure, metallurgy and low-cost processing, and low environmental impact from mine development.

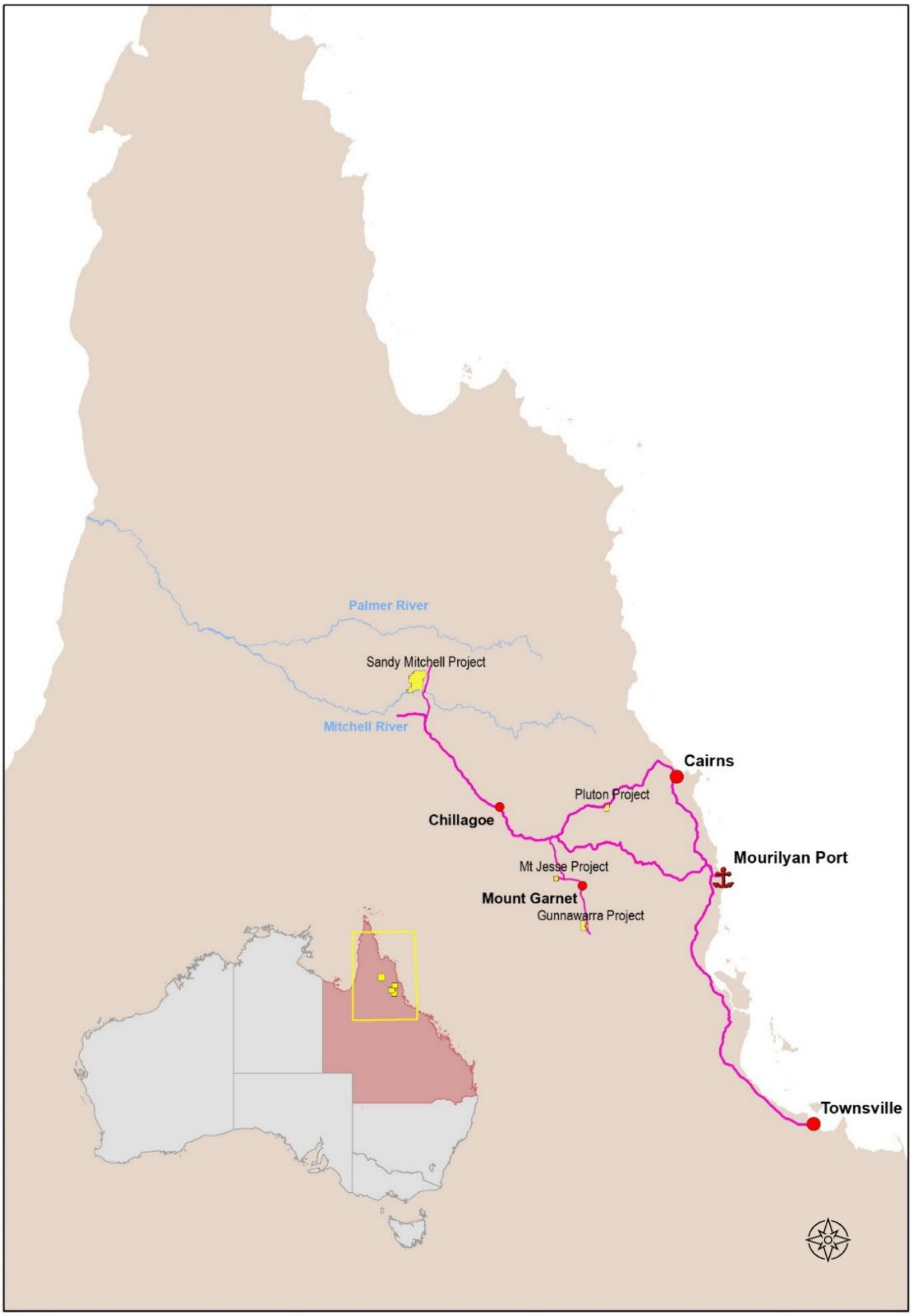
Low Opex attributes

- ✓ Favourable geology and mining economics
  - ➢ mining with 1 large loader
  - ➢ no drill and blast
  - ➢ no overburden
  - ➢ minimal topsoil
  - ➢ mineralisation from surface
  - ➢ no clay to deal with
  - ➢ at 12 m deep – selective mining can be employed
  - ➢ no tailings dam
  - ➢ no waste piles

- ✓ Favourable metallurgy and simple downstream processing:
  - ➢ screen approximately 12% to oversize upfront whilst mining
  - ➢ in situ processing using gravity only
  - ➢ no chemicals
  - ➢ no salts, no acids

- ✓ low environmental impact:
  - ➢ no impact on farm country, as there is no subsidence
  - ➢ the landform will be the same after mining as it was before
  - ➢ land can be rehabilitated to the landholder's liking by seeding the ground

The scoping study has indicated that this project scenario is economically robust. However, the study is based on base case metallurgical recoveries which have highlighted areas for significant process improvement. Further test work and optimisation will likely increase the recoveries and grade of the concentrates.



Sandy Mitchell Rare Earth and Heavy Mineral Project location

Reliance on Information Provided

Funding

To achieve the range of outcomes indicated in the scoping study, funding in the order of AUD120-150m will likely be required, of which approximately 50% will be for mobile equipment. Components of funding will be raised through: equity markets; off-take funding; equipment vendor finance; supplier finance and debt financing. The Company has formed the view that there is a reasonable basis to believe that requisite future funding for development of the Project will be available when required. The grounds on which this reasonable basis is established include:

- The Project has strong technical and economic fundamentals which provides an attractive return on capital investment and generates robust cash flows based on market rare earth element (REE) and zircon pricing. This provides a strong platform to source the debt and equity funding required.
- Demand for REE concentrate and zircon at the source is a significant driver for the Project, and the Company has been in discussions with both offtake and strategic partners for a number of years as fully disclosed in various Company announcements over the same period.
- Potential offtake or strategic partner discussions have been held with firms from Australia, Japan, China and the USA. Preliminary discussions continue with these partners, and the release of the scoping study will provide the Project background to the various partners who have been seeking to advance discussions. These partners provide a further strong platform to source the debt and equity funding required.
- The Company has received initial interest from various financial institutions. The Company has a strong track record of raising equity funds as and when required to further the exploration and evaluation of the Sandy Mitchell Project.

The Company has had initial discussions and will seek an appropriate corporate debt advisor in relation to the funding of the Sandy Mitchell Project on release of the scoping study. Investors should note that there is no certainty that Ark will be able to raise funding when needed. It is also possible that funding may only be available on terms that may be dilutive to, or otherwise affect, the value of Ark shares.

The entity confirms in the subsequent public report that it is not aware of any new information or data that materially affects the information included in the relevant market announcement and, in the case of estimates of mineral resources, that all material assumptions and technical parameters underpinning the estimates in the relevant market announcement continue to apply and have not materially changed.

Authority For Release

This announcement has been approved for release to the ASX by the Board of Ark Mines Ltd.

Roger Jackson
Executive Chairman
11 December 2024

FURTHER INFORMATION

For further information please contact:

Roger Jackson **Executive Chairman** **info@arkmines.com.au**	**Ben Emery** **Executive Director** **info@arkmines.com.au**

Or visit our website and social media:
www.arkmines.com | www.twitter.com/arkmineslimited

About Ark Mines Limited

Ark Mines is an ASX-listed Australian mineral exploration company focused on developing its 100%-owned projects located in Northern Queensland. The Company's exploration portfolio consists of four high quality projects:

The flagship Sandy Mitchell Rare Earths Project

- **Ark owns 100% of the 161.2 km^2 EPM 28013 *'Sandy Mitchell'* – an advanced rare earths project in Far North Queensland with an additional 138 km^2 of sub-blocks under application.**
- **Measured Mineral Resource Estimate (MRE) of 71.8 Mt @ 1,732.7 ppm monazite equivalent (mzeq) calculated using a 700 ppm mzeq lower cut-off grade (see ASX release for Mineral Resource Report).**
- **Very high historical total rare earth oxide (TREO) grades, including high-grade pan concentrates of 17.7% total heavy minerals including 16.1% monazite plus xenotime.**
- **Project contains all critical light rare earths as well as heavy rare earths including dysprosium (Dy), terbium (Tb), holmium (Ho), erbium (Er), thulium (Tm) and ytterbium (Yb), excluding only lutetium.**
- **Up to 25% of the TREO is Nd and Pr (i.e. heavy magnet metals).**
- **Rare earths at *'Sandy Mitchell'* are amenable to panning a concentrate, a planned low-cost, and rapid start-up, and straightforward beneficiation by gravity processing.**

Gunnawarra Nickel–Cobalt Project

- Comprised of 11 sub-blocks covering 36 km2
- Borders Australian Mines Limited Sconi Project – the most advanced Co-Ni-Sc project in Australia.
- Potential synergies with local processing facilities with export DSO nickel/cobalt partnership options.

Mt Jesse Copper–Iron Project

- Project covers a tenure area of 12.4 km2 located ~25km west of Mt Garnet.
- Centred on a copper-rich magnetite skarn associated with porphyry style mineralization.
- Three exposed historical iron formations.
- Potential for near-term production via toll treat and potential to direct ship.

Pluton Porphyry Gold Project

- Located ~90 km southwest of Cairns near Mareeba, QLD covering 18 km2.
- Prospective for gold and associated base metals (Ag, Cu, Mo).
- Porphyry outcrop discovered during initial field inspection coincides with regional-scale geophysical interpretation.

Competent Person's Statement

The information in this report that relates to exploration results, mineral resources or ore reserves is based on information compiled by Mr Roger Jackson, who is a Fellow of the Australian Institute of Mining and Metallurgy (AusIMM) and a Fellow of the Australasian Institute of Geoscientists (AIG). Mr Jackson is a shareholder and director of the Company. Mr Jackson has sufficient experience which is relevant to the style of mineralisation and type of deposits under consideration and to the activity that he is undertaking to qualify as a Competent Person as defined in the 2012 edition of the *Australian Code for Reporting Exploration Results, Mineral Resources and Ore Reserves* (the JORC Code, 2012). Mr Jackson consents to the inclusion of this information in the form and context in which it appears in this report. Mr Jackson confirms information in this market announcement is an accurate representation of the available data for the exploration areas being acquired.

Forward-Looking Statements and Important Notice

This report contains forecasts, projections and forward-looking information. Although the Company believes that its expectations, estimates and forecast outcomes are based on reasonable assumptions, it can give no assurance that these will be achieved. Expectations and estimates, and projections and information provided by the Company are not a guarantee of future performance and involve unknown risks and uncertainties, many of which are out of Ark Mines' control.

Actual results and developments will almost certainly differ materially from those expressed or implied. Ark Mines has not audited or investigated the accuracy or completeness of the information, statements and opinions contained in this announcement. To the maximum extent permitted by applicable laws, Ark Mines makes no representation and can give no assurance, guarantee or warranty, express or implied, as to, and takes no responsibility and assumes no liability for the authenticity, validity, accuracy, suitability or completeness of, or any errors in or omission from, any information, statement or opinion contained in this report and without prejudice, to the generality of the foregoing, the achievement or accuracy of any forecasts, projections or other forward-looking information contained or referred to in this report.

Investors should make and rely upon their own enquiries before deciding to acquire or deal in the Company's securities.

Appendix A - SCOPING STUDY

SANDY MITCHELL RARE EARTHS PROJECT

Scoping Study – SMP-SS-001

Prepared by:
Harrier Project Management Pty Ltd,
3/12 Sunshine Avenue, Woorim, Qld, Australia, 4507
On behalf of Ark Mines Ltd. Project No. AMSM-002/24

Stephen Marrable, Project Director
harrier@harrierprojectmanagement.com

November 5, 2024
ARK MINES LTD

Sandy Mitchell Rare Earths Project
Scoping Study

Harrier Project Management disclaimer

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Contents

Tables

Figures

1. EXECUTIVE SUMMARY

1.1 Scoping study highlights

- The Sandy Mitchell is a large deposit in regard to rare earth product potential
- Monazite concentrate with both light and heavy rare earth elements, zircon and garnet
- No requirement for comminution like hard rock sources
- Cheaper mining and processing route than is available to hard rock deposits
- Mining, construction, development, production and maintenance costs are minimal
- Low water volumes
- Lower mining costs that are needed for efficient extraction from ionic clay (IC) deposits
- More environmentally responsible mining footprint that is more readily rehabilitated
- Flexibility and staged development
- The Sandy Mitchell boasts several benefits and advantages over other types of deposit
- Potential for future downstream hydrometallurgical plant to produce a mixed rare earth carbonate (MREC).
- Key takeaways include:
  - lower opex and capex due to simple mining and processing requirements
  - low power demand
  - Steady state production over LOM
  - high-grade REMC production and highly sought after co-products
  - easily accessible deposits, resulting in a extremely low strip ratio
  - Well proven technology
  - short development and construction time and fast ramp-up to production
  - earlier payback on investments
  - long-term production potential
  - low environmental impact with no drilling or blasting
  - located in historically mining friendly state of Queensland
  - Australian standards of employment and environmental conditions
  - Production of government recognised critical minerals
  - Low-cost production and distribution.
- Source for future titanium and rare earth materials.
- Located with favourable mining conditions.
- Production of government-recognised critical minerals.
- Low-cost production and distribution.

1.2 Scoping study metrics

Table 1: Operational parameters at Sandy Mitchell

Category	
Production	
Life of mine (LOM)	3-4 years
Mineral Resource Estimate (MRE)	71.3 megatonnes
Average throughput (per annum)	20–22 megatonnes
Production range – monazite (per annum)	10–11.2 kilotonnes
Production range – xenotime (per annum)	975–1,050 tonnes
Production range – zircon (per annum)	7–7,800 tonnes (t)
Production range – rutile (per annum)	120–140 t
Production range – garnet (per annum)	34-37,000 t
Capital expenditure (capex) and operating expenditure (opex)	
Total capex estimate	AUD120–150 million
Contingency	Approximately 10 %
Unit opex estimate	AUD3–4 per mined tonne
Average opex (per annum)	AUD75–78 million
Financial performance	
Average revenue (per annum)	AUD120–130 million
Free cash flow - post royalties and transport (per annum)	AUD25-30million
Average EBITDA (per annum)	AUD45–53 million
Payback period from first production	3–4 years

1.3 Purpose of the scoping study

The purpose of this scoping study is to present results of recent test work to investigate realistic options for progressing the project. It also serves a status report on the development tasks undertaken to date on the Sandy Mitchell Project. Its main purposes include:

- identifying key concepts to clarify the options available in mining and processing the ore body to produce suitable marketable products
- Identifying gaps in existing research and indicating areas that need further investigation
- providing an overview of different methodologies and perspectives
- setting out guidelines for the next phase approach and future studies by identifying relevant questions and methodological approaches
- providing information to interested stakeholders
- clarifying the groundwork for a focused PFS.

1.4 Project overview

The Ark Mines (ASX: AHK) Sandy Mitchell Rare Earths Project (Sandy Mitchell Project) is a well-advanced prospect boasting both light and heavy rare earths in mineral sands deposits in Far North Queensland. Rare earth elements (REE) are critical in the manufacture of electric vehicles (EV), wind turbine generators and portable electronics.

The Sandy Mitchell Project site is on pastural land with a single owner which is currently used for farming that produces grains, wool, citrus fruits and dairy products.

1.5 Mining

Mining will be outsourced to credible experienced contractors with proven track records in similar operations. Conventional open-pit advance mining techniques will take place above the water table using standard machinery to excavate the ore body at rate of 20.8 megatonnes per annum (Mt/a) for processing.

Relevant inputs regarding processing for this study (operating expenditure, process recoveries and product prices) generated eight saleable products: 1) a monazite and xenotime rare earth mineral concentrate (REMC); 2) a zircon concentrate; 3) a rutile; 4) a high-Ti leucoxene; 5) a low-Ti leucoxene; 6) an altered ilmenite: 7) an ilmenite; 8) a garnet concentrate.

1.5.1 Mine planning

Mineral Technologies carried out a scoping study to provide background information on various mining methods that could be used which summarised the options considered, the design concept, process description, capex and opex estimates, risks, opportunities, key areas for future investigation and for the Ark Mine’s prefeasibility study (PFS).

1.5.2 Mining method

Complete extraction of ore is planned with oversize material used to build in-pit bunds to contain residue that will be returned to previously mined areas with minor additional earthworks as required.

Exploration drilling indicated that drill and blast methods will not be needed as the rare earth ore body is not in hard rock. It is in sand that is easily dug by front-end loaders (FEL).

Mining will employ a block/strip operation where each block will have a final floor footprint of about 200 m long by 500 m wide. Areas ahead of the mining operations will be cleared of organic material and topsoil which, upon closure, will be replaced to rehabilitate the area suitable for farming. Oversize reject material will be backfilled to remove any visual effects of mining.

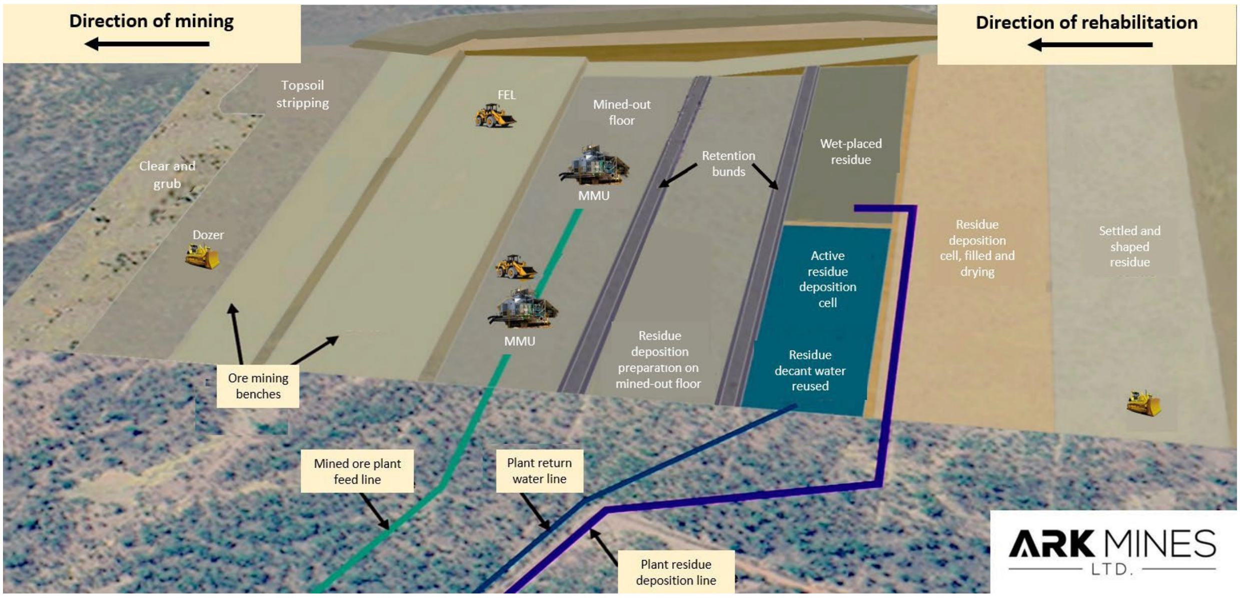

Figure 1: Schematic of mining sequence, including progressive backfill and rehabilitation

Large-wheeled FEL are considered the best approach for greater flexibility and lower costs. The Mineral Technologies' scoping study considered a range of mining rates with ore mined to a depth of between 10 m and 15 m, depending on the base rock topography.

The FELs will transport ore to the mobile mining unit (MMU) as shown in Figure 1; or mining unit plant (MUP). Oversize material or organics will be removed. Mining units will be track- or skid-mounted and spiral plants will be on relocatable concrete rafts so the whole process can advance using low-loaders or FELs. MMUs will pump ore in a slurry to the wet concentrator plant (WCP) via pipes.

Bulldozers will be used for any cross-ripping of sands, pushing up bunds for tailings cells and contouring waste dumps. FELs will help clean the pit floor, and graders and water carts will maintain suitable operating conditions.

The total mining area is approximately two kilometres long by two kilometres wide (i.e. 4 km^2) and will be fully mined at about 3000 tonnes per hour (t/h). No specific pit design or pit optimisation has been undertaken at this stage. Operations will be 24/7 throughout the year with a loss of two weeks per year is factored into account for weather interruptions.

1.5.3 Mineral processing and metallurgical testing

Metallurgical characterisation of a composite of approximately 40 kg of core samples was conducted by Mineral Technologies to determine its response to conventional beneficiation techniques and to show product upgrade after each stage of separation. The simulated industrial stages used conventional gravity separation to recover the valuable heavy mineral (HM) to concentrate and use mechanical attrition to clean mineral surfaces. Froth flotation to extract rare earth minerals (REM), as well as a magnetic separation to perform a final upgrade of the flotation REMC followed.

The mass yield relative to the as-received feed sample, intermediate and final product assays is in Table 2.

Table 2: Progressive characterisation mass and assays

Product description	mass to feed (%)	Al_2O_3 (%)	CeO_2 (%)	FeO_3 (%)	P_2O_5 (%)	SiO_2 (%)	TiO_2 (%)	U+Th (ppm)	Zr(Hf)O_2 (%)
Run-of-mine (ROM)	100	14.7	0.04	2.40	0.05	73.6	0.34	62	0.02
Gravity feed	51.0	13.9	0.05	2.31	0.06	76.5	0.34	72	0.03
Gravity concentrate	0.58	46.8	2.61	4.22	3.04	33.7	1.34	5,580	2.36
Flotation concentrate	0.42	51.9	2.92	1.48	3.48	32.6	0.59	5,720	1.21
REMC	0.04	4.46	23.3	2.47	24.9	5.99	1.58	47,080	1.28

The CeO_2 content, used as tracer for RE-bearing minerals monazite, is upgraded from 0.04% in the as-received feed to 23.3% in the cleanest product.

Each processing stage increases the CeO_2 content, with the most significant upgrade achieved by the gravity concentration stages (from 0.05% to 2.61%, corresponding to an upgrade ratio of 52:1). Similar upgrade trends are observed for ZrO_2.

The majority of the TiO_2 and Al_2O_3 minerals were rejected through the processing stages. Composition of the gravity feed sample, intermediate and final product is reported in Table 2 and Table 3.

Table 3: Progressive characterisation mass and rare earth oxides (REO) assays (ICP assay)

Product description	Mass to gravity feed (%)	La_2O_3	CeO_2	PR_6O_{11}	Nd_2O_3	Tb_4O_7	Dy_2O_3	Y_2O_3	TREO
		parts per million (ppm)							(%)
Gravity feed	100.0	216	462	55	204	3	11	45	0.11
Gravity concentrate	1.13	12,784	27,516	3,153	11,407	139	512	1,880	6.10
REMC	0.08	109,891	235,853	26,942	97,393	1,176	4,109	13,843	51.9

Final concentrate assays were 51.9% TREO and contained mostly the heavy REE. Direct CeO_2 recovery from gravity feed to REMC was estimated to be 71.7%.

A 650 kg (dried weighed 450 kg) representative sample was tested at Mineral Technologies to confirm its metallurgical characteristics, compare information with historical data and investigate options for improving grades and recoveries.

Test work included processing the ore through a typical ore feed preparation plant (FPP) to produce a preconcentrate for upgrading to HMC grade. The HMC was fractionated to produce a mixed rare earth carbonate (MREC). Final products will be tested by the Australian Nuclear Science and Technology Organisation (ANSTO) for hydrometallurgical assessment.

The test work also included mineralogy by QEMSCAN® to assess composition of monazite, xenotime and zircon and help improvement in recoveries.

The test work and characterisation results form the basis of this scoping study to provide necessary information to progress to a level that will support design activities with the results suitable to complete a JORC-compliant Ore Reserve estimate at a prefeasibility study (PFS) level.

Additional QEMSCAN® test work in August 2024 showed samples are dominated by biotite (51.6%), garnet (10.5%) and 'goethite/limonite' (12.4%) and the elemental deportment data for titanium (Ti) indicating that 68.8% of the Ti is contributed by biotite. The investigation also found a high proportion of the rutile through to ilmenite.

The sample will undergo laser ablation inductively coupled mass spectrometry (LA-ICP-MS) to confirm the compositions of the monazite, xenotime and zircon which will provide more information on the praseodymium (Pr), samarium (Sm) and heavy rare earth elements (HREE), as well as ytterbium (Yb), uranium (U) and thorium (Th). Magnetic separation was highly effective in producing an REMC.

1.5.4 Processing recovery

Processing recoveries were estimated using available test work results and for each mineral across each process. After separation of oversize and fines, ore will pass through dewatering cyclones with underflow material sent to the wet concentrator plant (WCP) for product recovery. HMC will undergo further treatment to separate it into the final REMC with the zircon and rutile products in the mineral separation plant (MSP).

Further test work is underway to produce the garnet product and is yet to be completed; however, for the purposes of this scoping study, titanium products are not included, and garnet is an assumed number based on the in situ values. The recovery numbers shown in Table 4 are envisaged and are in line with scoping study accuracies. Further test work is being conducted to achieve PFS-level accuracy and will be reported in due course.

Table 4: Product in situ volumes and recoveries as a percentage

Product basket	In situ (g/t)	Contained (%)	Estimated recovery (%)
zircon	686.9	0.06869	55–58
xenotime	117.3	0.01173	40–44
monazite	1220.5	0.12205	40–44
garnet	3250.0	0.0325	55–58

1.6 Capex and opex estimates

Capital expenditure (capex) estimates are being developed. Until process engineering is developed no detailed capex estimate can be given.

It is anticipated that this stage of the project development will start in November 2025. It is anticipated that capex will be in the order of AUD120–150 million, including a contingency of ±10%.

A more detailed estimate will be developed during the prefeasibility study (PFS). The capex presented here is at a level commensurate with the level of accuracy defined in the Association for the Advancement of Cost Engineering (AACE) International guidelines 2020.

The opex estimate is more advanced than the capex estimate as equipment suppliers have contributed.

Mining costs are based on a mining rate sufficient to deliver 20.8 Mtpa of ore to the processing plant working 333 days per year, 7 days per week, with two 12-hour shifts per day.

The major components of opex can be classified as mining, processing, consumables and administrative with expected cost per tonne of mined ore anticipated to be ~AUD3–4 and is considered with scoping study levels of certainty. Detailed estimates of both capex and opex will be undertaken during the PFS phase of the Project.

1.7 Economic analysis

The 2024 assessment of mineral resource underpins Ark Mines’ early production estimates and is anticipated to generate sufficient free cash flow (FCF) to enable subsequent expansion and acceleration opportunities to further develop Ark Mines’ regional reserves and resources.

The scoping study demonstrates strong financial returns and sustained high-margin cash flows based on phase 1 targets of 20.8 megatonnes per annum (Mt/a) mined ore. The phase 1 approach is based on a three to four-year plan mining from the current MRE (71Mt) of 60-65 megatonnes. The current Exploration Target is anticipated to extend the LOM to over 100 years.

An Exploration Target is a statement or estimate of the exploration potential of a mineral deposit in a defined geological setting where the statement or estimate, quoted as a range of tonnes and a range of grade (or quality), relates to mineralisation for which there has been insufficient exploration to estimate a Mineral Resource (JORC Code, 2012, p.9).

The Project located in the low-risk jurisdiction of Queensland has a net present value (NPV), life cycle, robust cash margins and significant internal rate of return (IRR), to provide a compelling commercial case for advancement of the prefeasibility study (PFS) through to the definitive feasibility study (DFS).

Test work to support the inclusion of a mineral separation plant (MSP), enabling the production of zircon, rutile and garnet with additional titania products being investigated. Recent laboratory-scale tests on ultra-fines material have shown that additional recoveries are possible.

The economics for the scoping study are based on the Ark Mines' Mineral Resources, as well as capital expenditure (capex) and operating expenditure (opex) forecasts developed during the scoping study phase and presented herein.

Capex estimate:	AUD120–150 million
Revenue range:	AUD120–130 million per annum
EBITDA range:	AUD45–53 million per annum
Payback period:	3-4 years from start of production

1.8 Contributors to the study

Harrier Project Management acknowledges and is grateful for the following contributors to the study:

Ark Mines Limited
ALS Global
KeyPointE
Hastings Deering (Australia) Limited
Hawkeye Technical and Scientific Editors
Hydro Element Solutions
IHC Mining
Mineral Technologies
Qube

1.9 References:

Ark Mines Ltd., 02 October 2024, Updated measured mineral resource estimate (MRE) at Sandy Mitchell rare earth and heavy mineral project [ASX Announcement], Ark Mines Ltd.: Sydney.

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2. INTRODUCTION

The Ark Mines (ASX: AHK) Sandy Mitchell Rare Earths Project (the Sandy Mitchell Project) is a well-advanced prospect boasting rare earths in mineral sands deposits in Far North Queensland. Rare earth elements (REE) are critical in the manufacture of electric vehicles (EVs), wind turbine generators and portable electronics.

The project, part of a portfolio of tenements, is wholly owned by Ark Mines and presents a unique and exciting investment opportunity in the mining-friendly state of Queensland.

The rare earths at Sandy Mitchell are hosted in the phosphate minerals, monazite and xenotime, which are part of an unconsolidated sediment package of mineral sands, similar to that of placer deposits.

Placer and similar types of deposits generate a very high-grade rare earth mineral concentrate (REMC), the main source of the elements, praseodymium (Pr) and neodymium (Nd), used in the production of light magnets; and often also contain the more valuable elements terbium (Tb) and dysprosium (Dy), used to produce heavy magnets.

The ore body was found following an in-depth mineral analysis using quantitative evaluation of minerals by scanning electron microscopy (QEMSCAN®) in 2010 by the Japan Organization for Metals and Energy Security (JOGMEC). The results enabled Ark Mines to determine a Mineral Resource estimate (MRE) for the project in compliance with the Joint Ore Reserves Committee (JORC) publication *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves* (JORC Code, 2012) which was delivered in May 2024 and updated in September 2024.

Also present are the highly sought-after co-products: zirconium (Zr) found in zircon – used in glass and ceramics manufacture; and titanium (Ti) found in ilmenite and rutile – used in the aerospace, automotive and electronics sectors, as well as a wealth of other industries.

Extracting rare earths from placer and similar sand deposits has many benefits and advantages compared with the other two types of rare earth deposits: hard rock, and ionic clay (IC).

Mining is considerably cheaper than it is for hard rock deposits as the sands are near-surface and readily accessible to standard excavating equipment with no overburden removal, underground development or drilling and blasting involved. Processing, using gravity, magnetic and small flotation circuits, has a low energy demand without the need for primary and secondary crushing, grinding or high-temperature slurries associated with hard rock deposits.

There is also a far lower environmental footprint, as mining has a low strip ratio (i.e. less waste per unit of ore); processing uses less water that is fully recyclable and only need be of a low quality; and site rehabilitation is relatively straightforward compared with the high strip ratio and large amounts of water and environmental impacts involved with hydraulic extraction at IC mines.

Rare earth concentrates, along with zircon and ilmenite, can be sold to existing refineries in China, as well as developing markets in the USA and Australia, where there are emerging rare earth refineries. This approach can be adopted to generate intermediary revenue, allowing for the staged development of a processing plant to eventually supply the more valuable mixed rare earth carbonate (MREC) and NdPr oxides.

All the benefits and advantages outlined here regarding the mining and processing factors means that the Sandy Mitchell Project can quickly be developed and begin production.

In April 2024, Harrier Project Management Ltd (Harrier) commissioned a metallurgical review and commentary on behalf of Ark Mines Ltd which was independently conducted by Met-Chem Consulting Pty Ltd. The report was prepared to present the REE assemblage and outline the benefits and advantages of mining and processing placer and placer-like deposits over other rare earth deposit types.

Harrier boasts significant experience with active and significant engagement in large mining projects in Australia and abroad over many years; not least, as the managing firm producing the definitive feasibility study (DFS) for a large rare earths project in Victoria.

Harrier presents this scoping document as a platform for understanding Ark Mines continued commitment in developing the Sandy Mitchell Project given the significance of rare earths within the geopolitical climate.

2.1 Project history

Ark Mines Limited (Ark Mines, or the Company) is an Australian owned and operated publicly listed (ASX:AHK) mineral exploration company focused on developing its wholly owned projects located in the prolific Mount Garnet and Greenvale mineral fields of Northern Queensland. The Company's exploration portfolio consists of three four quality projects that are prospective for copper, iron ore, nickel–cobalt, porphyry gold and REE.

Sandy Mitchell

Ark Mines acquired the 161.2 km^2 EPM 28013 Sandy Mitchell Project – an advanced heavy mineral sands and rare earths project in Far North Queensland – to produce zircon, titanium heavy minerals, garnet and rare earth mineral concentrate (REMC) with an additional 138 km^2 of sub-blocks currently under application.

The project contains all critical light REE as well as heavy REE, including dysprosium (Dy), terbium (Tb), holmium (Ho), erbium (Er), thulium (Tm) ytterbium (Yb) and lutetium (Lu). Up to 25% of the total rare earth oxide (TREO) is Nd and Pr (which are magnet metals).

Rare earths at Sandy Mitchell are amenable to panning a concentrate, a planned low-cost and rapid start-up, and straightforward beneficiation by gravity processing.

Ark holds the EPM 28013 tenement (Figure 2), which has significant historical exploration data, upon which the Company has built its own exploration programme as a basis for targeted drilling to generate its own data for a Mineral Resource estimate (MRE).

2.2 Property description

The Sandy Mitchell Project is 230 km northwest of Cairns and 200 km north-northwest of Chillagoe in Far North Queensland. Access to the tenement is via Dimbulah to Chillagoe, then along the Burke Developmental Road to the Mount Mulgrave turnoff, proceeding north, then via station tracks and cleared fence lines to the west of the station. The road distance from Mareeba is approximately 250 km. Access is not available during the wet season. The tenement lies on a property with a single owner who operates it as a pastural farm for grazing stock. Upon completion, the land will be rehabilitated to its original state.

2.3 Weather

The mean annual maximum and minimum temperatures are 32.8 degrees Celsius (°C) and 19.1 °C, respectively, with June and July being the lowest mean maxima at 30 °C each. The mean annual maximum rainfall is 1036 mm, with December to March being the highest rainfall months.

2.4 Project overview

2.4.1 Location

The project is within the Shire of Mareeba near to Mount Mulgrave, and to the north of Chillagoe, a rural township on the south of the Walsh River. With a population of about 150 (ABS 2016 Census), Chillagoe is the centre of an area of intensive irrigation farming that produces grains, wool, citrus fruits and dairy products. It offers an existing rail network for industrial and commercial transport applications.

2.4.2 Tenement

The Sandy Mitchell Project, EPM 28013, is an area of 161.2 km². The licence was granted on 22 August 2022 with an expiry date of 21 August 2027 (Figure 2). Ark has established a MRE on a retention licence (RL).

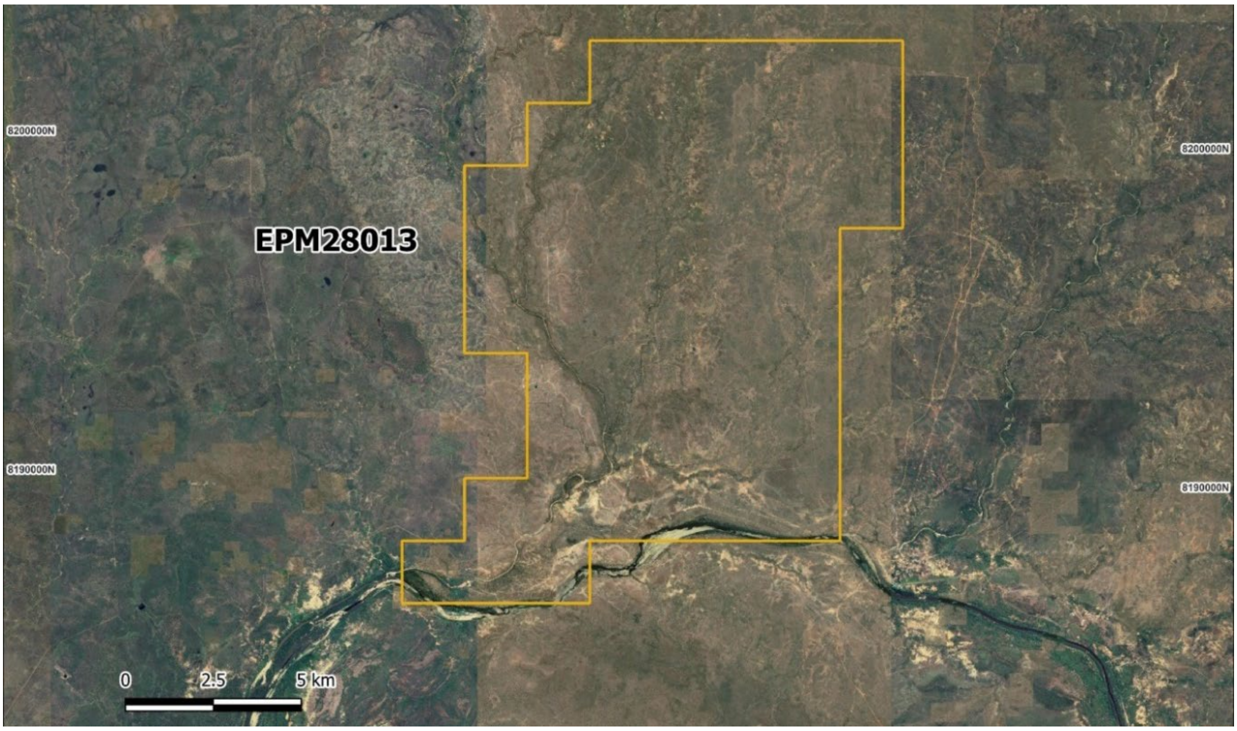

Figure 2: Ark Mines' Sandy Mitchell tenement.

2.5 Project description

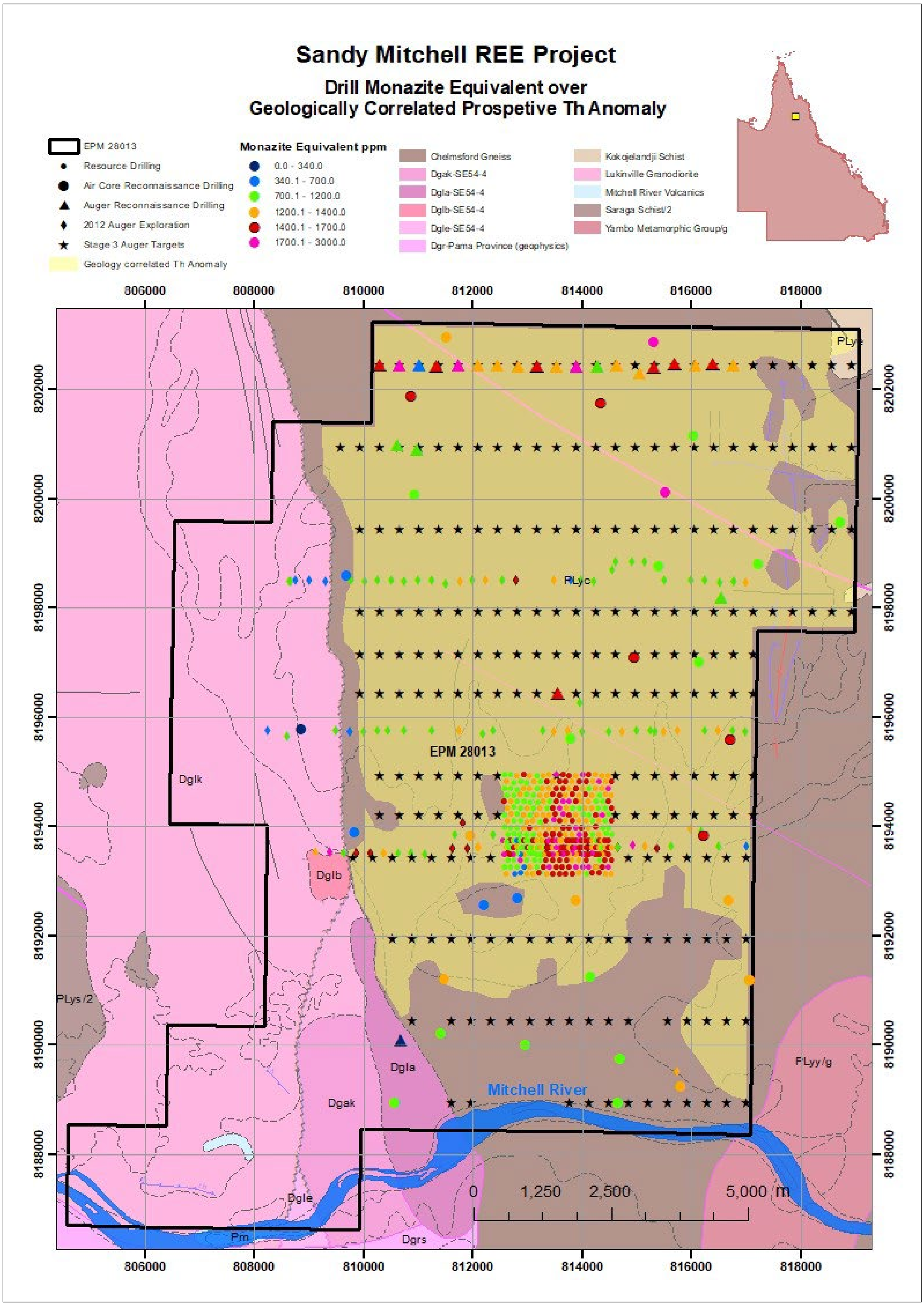

Figure 3: Drilling program Sandy Mitchell.

Mining and processing will occur within the project footprint shown in Figure 3, operated as a single mining and processing campaign that can generally be described as mining and processing of heavy mineral sands from within grazing stock farming pastures.

Mining will employ one of the following methods:

- dry-strip mining with excavator feeding an in-mine mobile mining unit (MMU) for screening oversize and slurrying of run-of-mine (ROM) ore for transport to a fixed wet concentrator plant (WCP)
- dredge mining with a floating concentrator
- a ROM processing rate of 20.8 Mt/a.

Processing will employ a slurry-based mineral sands separation. There is the potential for further processing using flotation, magnetic and electrostatic separation into mostly end-user products. Further options will be considered as part of a prefeasibility study (PFS).

There is also potential for further processing a heavy mineral concentrate (HMC) to produce a highly sought-after rare earth mixed carbonate (REMC) using a hydrometallurgical cracking process This is also being considered. All processing waste (residues), mining overburden and topsoil will be returned to the pit and the land will be completely rehabilitated so that it is suitable for its original, or other approved use.

3. GEOLOGICAL SETTING, MINERALISATION AND DEPOSIT

3.1 Sandy Mitchell Project location, access and tenure

The project tenement, EPM 28013, is on Mount Mulgrave Station, 105 km northwest of Chillagoe and 203 km west-northwest of Cairns (see Figure 4). Access is via the Burke Development Road (State Route 27) from Chillagoe, past Wrotham Park airfield, turning north on Mount Mulgrave Road (also named Palmerville Road on some maps), and then station tracks west from the Mount Mulgrave Station house.

The initial application for EPM 28013 was made by Aurum Vale Pty Ltd on 8 September 2021 and granted from 22 August 2022 for five years, ending on 21 August 2027. In March 2023, Ark Mines Ltd took over Aurum Vale Pty Ltd as a wholly owned subsidiary, including EPM 28013. On 15 December 2023, EPM 28013 was transferred to Ark Mines Ltd. The tenement comprises 49 sub-blocks equating to 161.2 km^2 (see Figure 5).

3.2 Sandy Mitchell geology and mineralisation

EPM 28013 is underlain by the Paleo- to Mesoproterozoic Chelmsford Gneiss in its eastern two thirds (see Figure 5). The Chelmsford Gneiss is part of the Yambo Metamorphic Group. It is a sillimanite–biotite–garnet gneiss of upper amphibolite to granulite grade, and incorporates spatially associated two-mica granite, hornblende amphibolite, a two-pyroxene mafic granulite and areas of metapelites, including quartzite (Withnall et al., 2013). Migmatization is apparent in some areas of outcrop with clear separation of leucosome and melanosome components. Outcrop is sparse and largely confined to low hills.

The western third of the tenement is underlain by later intrusions belonging to the Kintore Supersuite, dominated by the early Devonian, foliated and porphyritic, S-type, Lukinville Granodiorite which geochemically is known to show positive europium (Eu) anomalism (Bultitude et al., 2013) thought to be related to incorporation of cumulate plagioclase, but is not genetically related to the Sandy Mitchell mineralisation. Three other early Devonian intrusives have been identified by the Geological Survey of Queensland (GSQ), based on remote geophysics, but are unnamed. These are mapped as Dglb, Dgak and Dgla (see Figure 5).

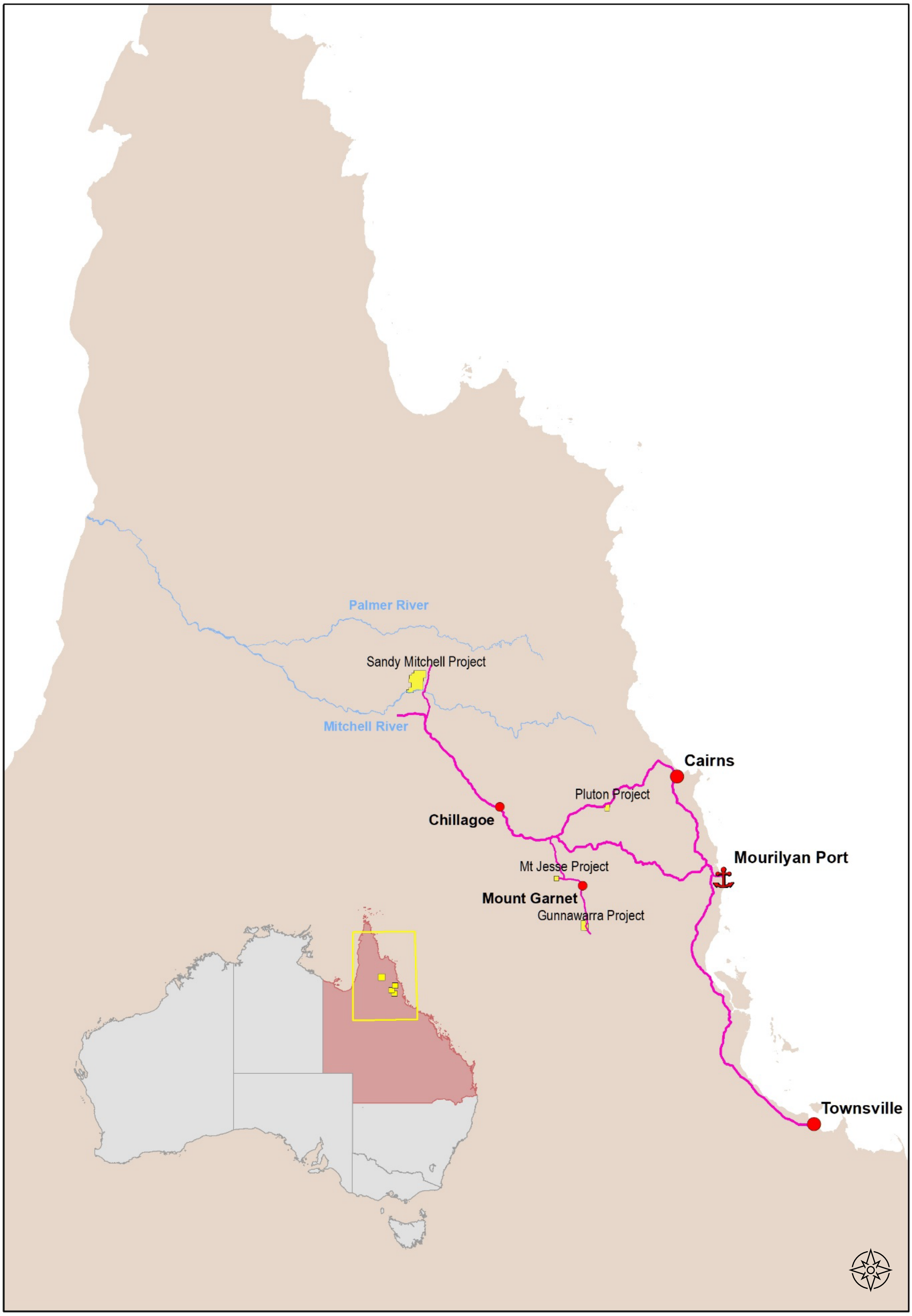

Figure 4: Ark Mines project locations, including the Sandy Mitchell Project

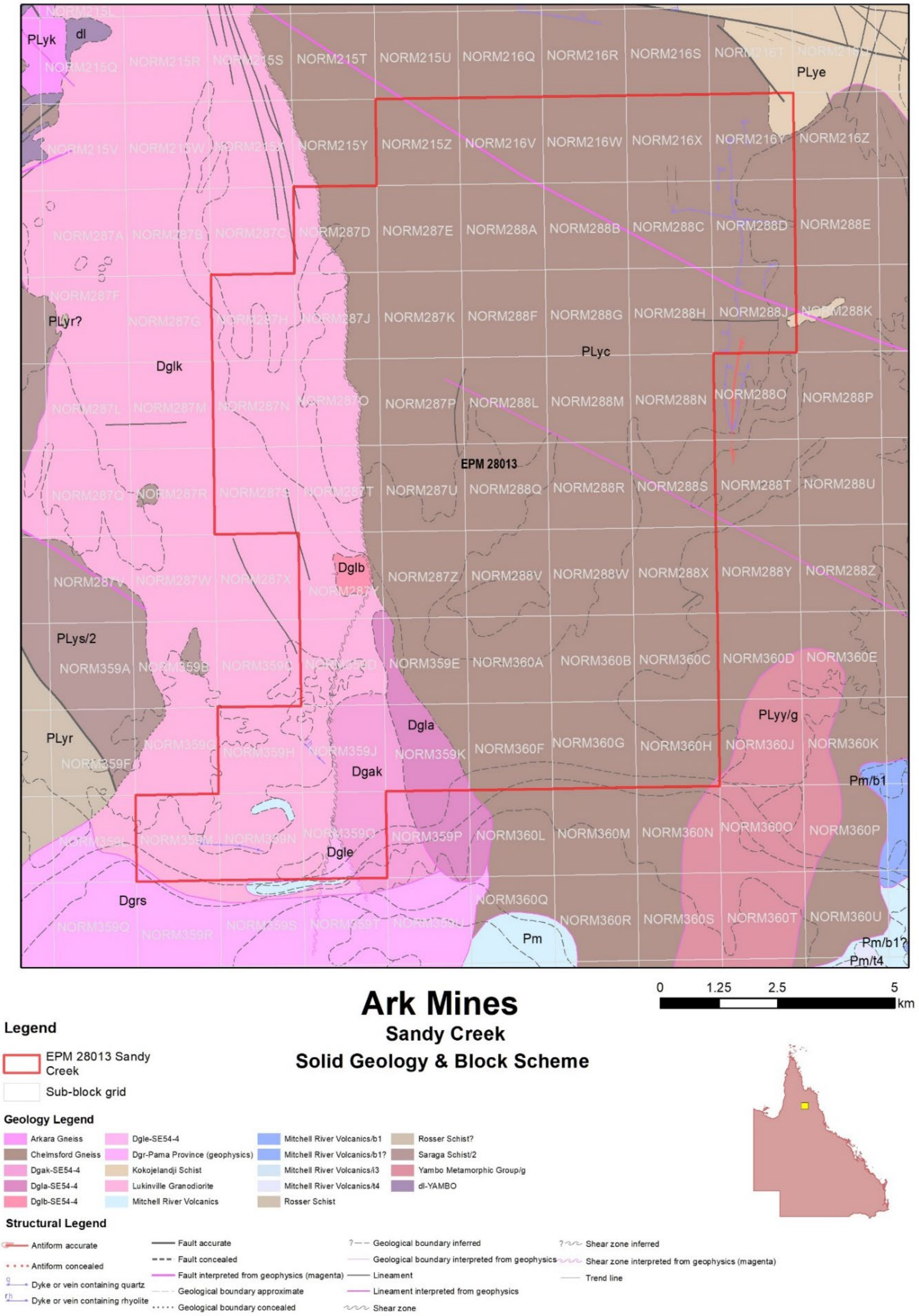

Figure 5: Geology of the Project showing the EPM 28013 boundary and graticular block scheme

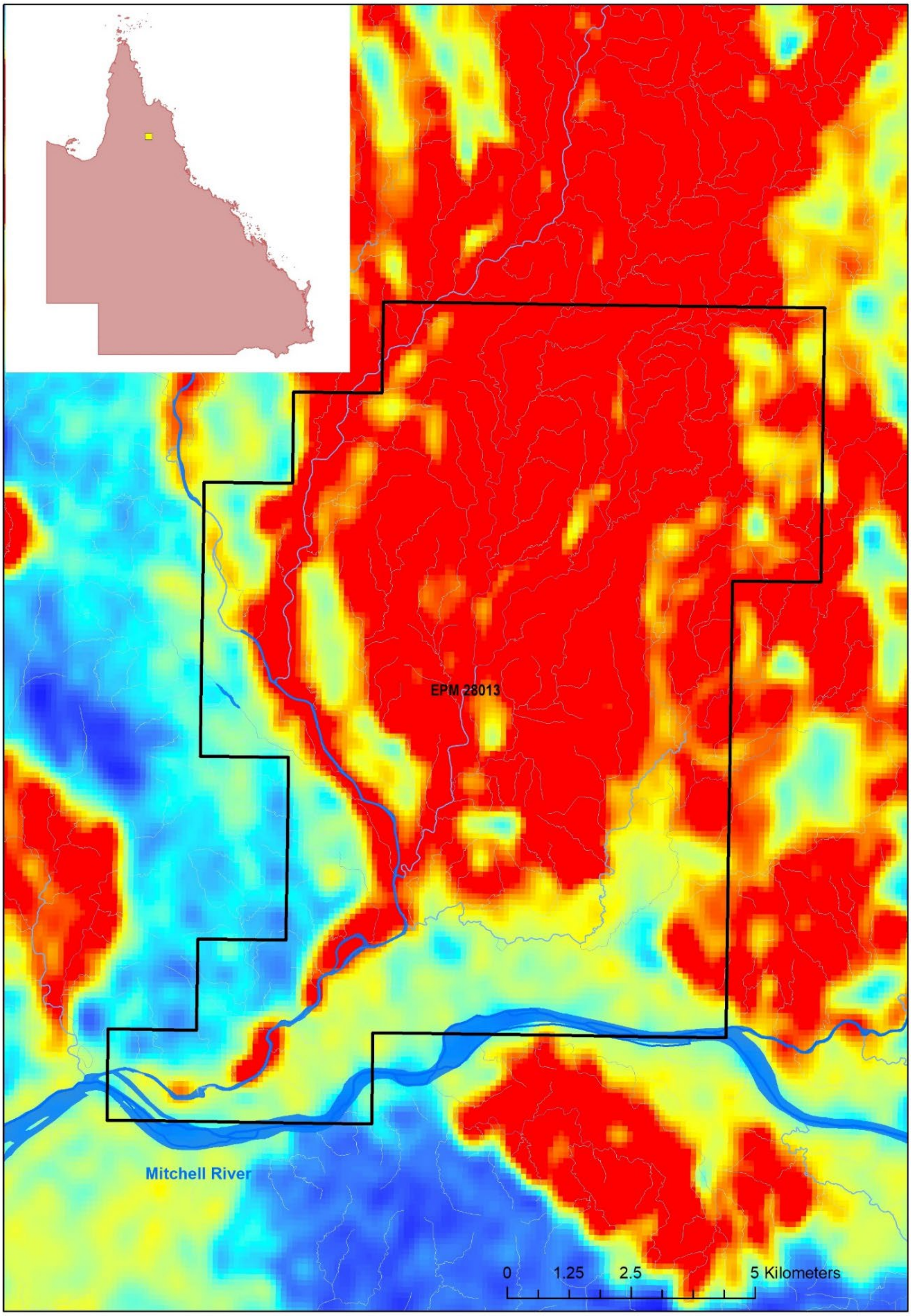

Figure 6: EPM 28013 thorium band radiometric anomaly

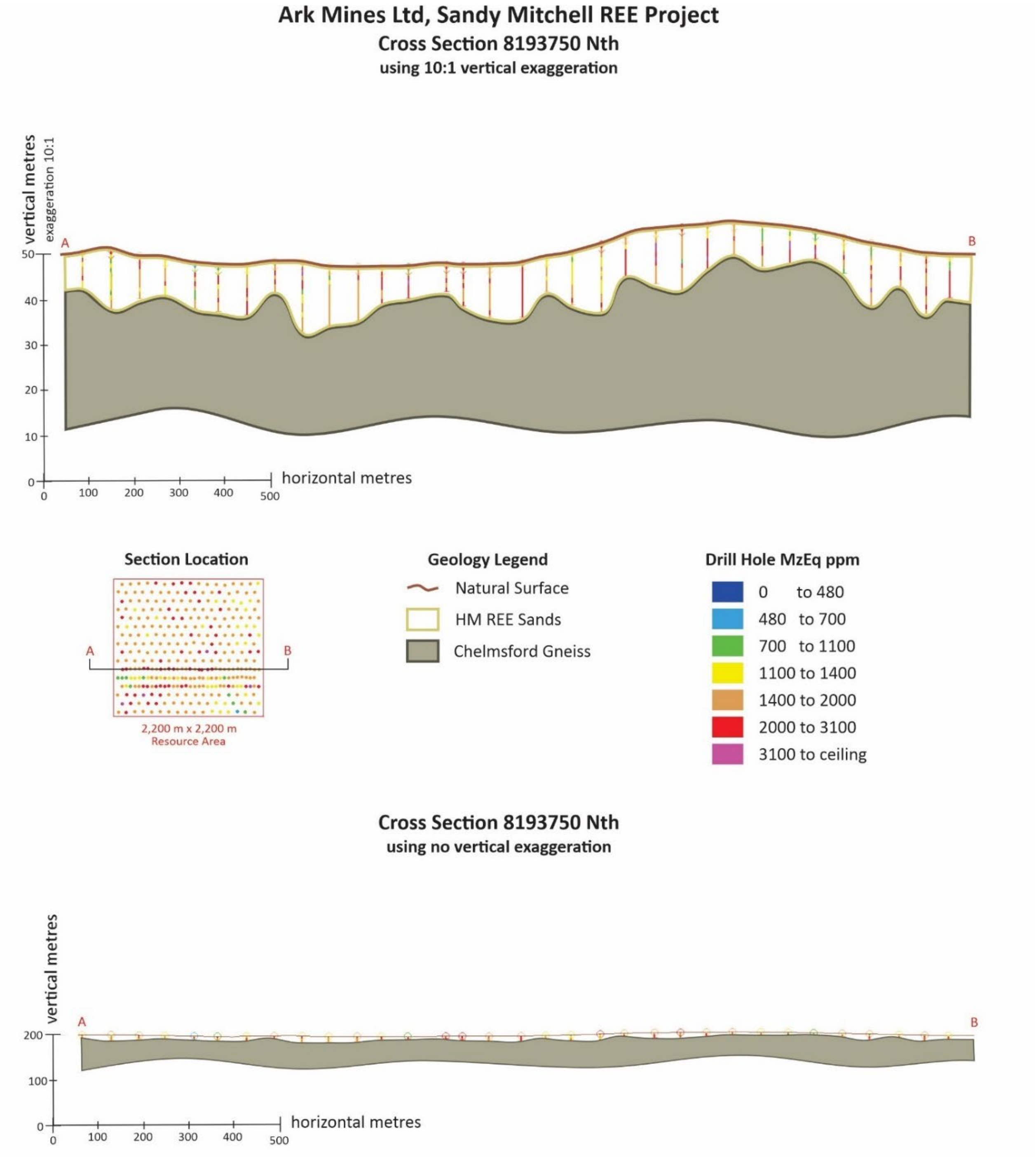

Figure 7: Sandy Mitchell Project, west-to-east cross-section at 8193750 m north through the REE and HM sand, showing drill data from the Stage 1 resource air core (AC) drill grid coloured for monazite equivalent (mzeq).

The upper section has a vertical exaggeration of 10:1 to afford visibility of the drill data at the scale of the drill section. The lower section is the same section without vertical exaggeration, i.e. at true scale, illustrating why exaggeration is required to visualise the data. Note, the vertical exaggeration has the effect of magnifying topological variation as well as making the drill data visible. The lower section provides a realistic idea of the topography and basement variability of this relatively low-relief terrain.

From the intrusive mapped as Dlgb, north to the tenement boundary and beyond, the contact between the Lukinville Granodiorite and the Chelmsford Gneiss is marked by a sheer zone which turns westward of the contact at the southern margin of Dlgb and continues on the west side of Dgak.

The tenement is prospective for REE in the form of monazite and xenotime, as well as zircon, rutile and ilmenite heavy minerals (HM).

The REE-bearing material is a fine to very fine sand fraction (de Nooy, 2010, 2024) in a polymictic, polymodal, angular to sub-rounded, unconsolidated sediment package which is largely devoid of clays and mud-size fractions. This unconsolidated HM sediment overlies the Chelmsford Gneiss and appears in minor ephemeral streams that are fed from or cross, the Chelmsford Gneiss. This includes Sandy Creek which traverses the Lukinville Granodiorite but starts within the gneiss north of the tenement and is fed from multiple minor streams that drain the gneiss area in the wet season. The HM sands are well correlated with a strong thorium band radiometric anomaly (see Figure 6 in comparison with Figure 5) which also highlights their relationship with local drainage.

The HM sands are considered to have formed in situ by weathering-driven disaggregation of the underlying Chelmsford Gneiss. There are several compelling lines of evidence to support this in Ark’s exploration data, namely:

- Angular clasts of moderately soft monazite and xenotime are pervasive.
- Muscovite flakes and well-crystallized biotite books up to 15 mm are common throughout.
- The polymictic clasts identified in logging were Chelmsford Gneiss lithologies such as biotite amphibolite or mafic granulite, with occasional quartzites or muscovite quartzite.
- The sands, which can be over 20 m thick in places, are extremely tightly packed to the point where a boosted air core rig struggles to penetrate.
- There is no real sorting; even though rounded to subrounded pebble-sized material occurs in definite horizons they are dispersed throughout the sand layer.
- The HM grades are relatively evenly distributed with respect to profile depth, with no substantial lagging enrichment at the top of the pile, or gravity settling at the bottom; however, there is very substantial enrichment in even the smallest ephemeral stream.
- Where drilling penetrates the gneiss, grades of REE and HM are only slightly lower than the overlying sands.

This type of HM sand mineralisation is sometimes referred to as saprolite sands, though this is a misnomer in the case of the Sandy Mitchell Project, as there is very little secondary clay through the profile, and surficial clays in the top metre are considered transported by the wet season flood wash.

The entire sand horizon, and the top of the underlying bedrock is fully oxidised. Figure *7* shows a typical cross-section through the REE and HM sands from within the heavily drilled Stage 1 resource area.

3.3 Sandy Mitchell drilling

So far, there have been four periods of drilling within the Sandy Mitchell Project, detailed below and summarised in Table 5:

2012

- Walter Scott & Partners drilled 101 auger holes (Scott, 2013)
- Drilling was three lines, approximately 9 km long with holes at approximately 250 m.
- Depths were not recorded but a 102 mm auger on a mini excavator with a reach of 6 m was used; drilling was to refusal with all holes vertical.

- Samples were collected off the collar and riffle split 25:75 to yield a representative single composite sample.
- Assay was for Ce, Cs, Dy, Er, Eu, Ga, Gd, Hf, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Tm, Al, Ca, Cr, Fe, K, Mg, Mn, Na, P, Si, Ti, Zr, Y and Yb.
- QC included duplicates at 1 in 13 and twins at 1 in 100.
- Collar survey was by handheld GPS.

June–July 2023

- Ark Mines drilled its Stage 1 resource programme of 144 air core (AC) holes for 1488.3 m.
- Drilling was by 100 mm AC bit using a Comacchio track-mounted rig and auxiliary compressor.
- Drilling consisted of 3 lines at 60 m × 120 m, plus 3 lines at 120 m × 120 m.
- Depths varied between 3 m and 18 m with an average depth of 10.3 m and holes were drilled to refusal at the bedrock horizon, with all holes vertical (Figure 7).
- Samples were collected by the metre by passing through a cyclone and opening a manual gate at the end of each metre to release the sample into a tuff tub, which was then put through a 12.5:87.5 splitter to produce a metre representative sample in a prenumbered calico bag, and a conserved reject in a plastic bag.
- Assay was conducted at North Australian Laboratories (an Austest facility):
  - Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, U, Zr, Hf, Nb, Ta, Sr, Pb and As were assayed by sodium peroxide fusion in nickel crucibles with inductively coupled mass spectrometry (ICP-MS) finish.
  - Al, Ca, Cr, Fe, Mg, P, S, Si and Ti were assayed by sodium peroxide fusion in nickel crucibles with inductively coupled plasma optical emission spectroscopy (ICP-OES) finish.
  - Na and K were assayed by four-acid digest with ICP-OES finish.
  - Gravimetric moisture was measured at 1 in 5.
  - Gravimetric dry loose bulk density was measured at 1 in 3.
- QC included:
  - field duplicates at 1 in 40 by 50:50 riffle split of representative sample
  - laboratory repeats at 1 in 8
  - standards at 1 in 24
  - grind size tests at 1 in 34
  - 1 drill twin.
- Samples were logged by the metre on site and drilling/sampling operations were under geological supervision.
- Survey was by qualified surveyor using real-time kinematic differential GPS (RTKdGPS).

November–December 2023

- Ark Mines drilled its Stage 2 resource programme of 187 AC with reverse circulation (RC) holes for 2437 m.
- Drilling was by 100 mm air core bit with 100 mm RC face hammer finish, using an Ausroc 4000 multi-purpose rig with onboard air.

- Drilling consisted of 10 lines at 120 m × 120 m.
- Depths varied between 4.1 m and 26 m, with an average of 13 m and the last metre finishing in bedrock by face hammer, with all holes vertical.
- Samples were collected by the metre by passing through a cyclone and opening a manual gate at the end of each metre to release the sample through a rig-mounted 12.5:87.5 splitter to produce a metre representative sample in a prenumbered calico bag, and a conserved reject in a plastic bag.
- Assay was conducted at North Australian Laboratories (an Austest facility):
  - Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, U, Zr, Hf, Nb, Ta, Sr, Pb and As were assayed by sodium peroxide fusion in nickel crucibles with ICP-MS finish.
  - Al, Ca, Cr, Fe, Mg, P, S, Si and Ti were assayed by sodium peroxide fusion in nickel crucibles with ICP-OES finish.
  - parts per billion (ppb) gold (Au) by low-level fire assay with ICP-MS finish on the second metre and last metre samples.
  - Na and K were assayed by four-acid digest with ICP-OES finish.
  - gravimetric moisture was measured at 1 in 4.
  - loss on ignition (LOI) was measured at 1 in 8.
  - gravimetric dry loose bulk density was measured at 1 in 3.
- QC included:
  - field duplicates at 1 in 45 by 12.5:87.5 riffle split of bulk reject sample
  - laboratory repeats at 1 in 9
  - standards at 1 in 10
  - eight AC drill twins equating to 1 in 22 (excluding 2 auger twins).
- Samples were logged by the metre on site and drilling/sampling operations were under a geologist's supervision.
- Survey was by qualified surveyor using RTKdGPS.
- The Stage 2 resource programme was accompanied by a Stage 2 reconnaissance programme of 32 AC/RC holes for 393 m.
- The drill, sampling methodology, assay regime, survey and QA/QC were in all respects identical to the Stage 2 resource programme.
- Depths varied between 4 m and 30 m with an average of 12.3 m and the last metre finishing in bedrock by face hammer, with all holes vertical.
- Drilling was widely spaced to cover as much of the tenement as possible, with distribution controlled by rig access on existing tracks and fence lines.

December 2023

- Ark Mines conducted its Stage 3 auger exploration grid to test the total prospective area of the tenement. The initial line of this programme was drilled in December as a proof of concept:
- Drilling was by 105 mm auger bit using a Rockmaster ute-mounted auger.
- Hole spacing was at approximately 360 m.
- Depths were varied between 1.5 m and 5 m with an average of 3 m controlled by penetration refusal in the very tight sands using the relatively lightweight rig.

- All holes were vertical.
- Samples were collected by the metre by being lifted up a collection tube via rotation of the auger flights, then passing through a collection chute into a tuff tub which was then put through a 12.5:87.5 splitter to produce a metre representative sample in a prenumbered calico bag, and the reject allowed to spill.
- Assay regime and QA/QC were in all respects identical to the Stage 2 resource programme:
  - two auger twins of AC holes within the Stage 2 resource grid (5.8 m and 4.1 m) were produced for auger programme QC, and these are not counted as reconnaissance metres.
- Survey was by handheld GPS, which is considered adequate for this type of widely spaced reconnaissance work.
- Two vertical water-monitoring bores of 30 m and 32 m were drilled by 102 mm open-hole percussion (OP) bit.
- Hole locations were set out by Ark's hydrologist.
- Samples were collected at the collar by spear and released into a prenumbered calico bag without splitting.
- An assay regime and QA/QC were as per the Stage 2 resource grid, with the exception that no field duplicates were taken.
- For analytical purposes, this scoping study treats the above bedrock assay data of these holes as part of the auger reconnaissance data set.
- Survey was by a qualified surveyor using RTKdGPS.

Table 5: Summary of Sandy Mitchell Project drilling

Type	Year	Number of collars	Total drilled metres (m)	Number of assays	Average depth (m)	Min. depth (m)	Max. depth (m)	Average sand depth (m)
Historical auger exploration	2012	101	~500	101	~5	?	6.0	~5
S1 AC resource	2023	144	1,488.3	1,508	10.3	3.0	18.0	10.3
S2 AC/RC resource	2023	187	2437	2,463	13.0	4.1	26.0	12.2
S2 AC/RC reconnaissance	2023	32	393.0	394	12.3	4.0	30.0	11.3
S3 auger exploration	2023	22	66.6	69	3.0	1.5	5.0	3.0
S3 OP water bore	2023	2	62.0	62	31.0	30.0	32.0	15.0

Detailed analysis of Stage 1 and Stage 2 QA/QC shows a well-conditioned and comprehensive series of checks that have been applied to self-correct sampling issues as they arose. Few assay anomalies are present, such as a slight downward bias of some elements in some standards, and they have been quantified as minor and not materially significant.

Stage 3 is considered to be of equivalent QA/QC quality, with the results being considered as below resource confidence standards due only to the drill type involving outside sample return with concomitant contamination potential, equivalent to a rotary air blast (RAB) sample. The data is of good quality for exploration purposes and examination of the data shows none of the patterns or biases typical of significant up-hole contamination.

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4. SAMPLE PREPARATION, ANALYSIS AND SECURITY

4.1 Drilling and sampling techniques

Drilling was carried out with a Comacchio track-mounted air core rig using a 100 mm air core bit, with sampling at 1 m intervals, except for the final interval, which may be less than 1 m depending on the refusal depth at the bedrock intersection.

This yields an ideal sample volume of 0.008 cubic metres (m^3) per metre drilled which, at the mean dry loose bulk density of 1.52, yields ideal samples of 11.94 kilograms per metre (kg/m).

4.1.1 Sampling techniques

Samples were passed through a cyclone and retained by a manual gate to minimise loss of fines, with the gate opened at the end of each sampling interval to pass into a collection bucket which was distributed across the riffles of a truck-mounted 87.5/12.5 riffle splitter. This derived a 1.5 kg representative sample collected in a prenumbered calico sample bag. A 10.4 kg reject was collected in a green bag and retained for pan concentrate production and further metallurgical testing.

The splitter was cleaned after each metre and the cyclone was also cleaned by an air blast after each metre, and by opening and air hosing after each hole.

4.1.2 Logging and assaying

Samples were logged by the metre on site by Empirical Earth Science (EES) who provided oversight of drilling and sampling by a senior geologist. At the end of the programme, drill collar coordinates were picked up by Twine Surveys using RTKdGPS equipment with a 20 mm accuracy, which is considered best practice.

4.1.3 QA/QC

Quality assurance and quality control (QA/QC) measures were used to control samples and statistical analysis of assay results to ensure suitability and reliability of the assay results in order to yield an assay to inform a JORC-compliant (JORC Code, 2012) resource model, estimation and report.

Procedures put in place were:

- a single pair of twin holes (further twins were drilled in the later Stage 2 programme)
- field duplicates at 1 in 40
- laboratory repeats at 1 in 8
- standards at 1 in 16
- a blank flush of the Essa® LM-5 pulverising mill after each grind, with blanks assayed at 1 in 40
- grind size testing at 1 in 34.

4.1.4 Assaying method

Samples were taken to Chillagoe each night and locked in pumpkin crates at the Ark Mines' undercover laydown area. At the end of the programme, the crates were wrapped in plastic and transported for assay to North Australian Laboratories (NAL), an Austest facility in Pine Creek, Northern Territory.

Samples were submitted for:

- sodium peroxide fusion in nickel crucibles for ICP-MS assay of Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, U, Zr, Hf, Nb, Ta, Sr, Pb and As
- sodium peroxide fusion in nickel crucibles for ICP-OES assay of Al, Ca, Cr, Fe, Mg, P, S, Si and Ti
- a four-acid digest for ICP-OES assay of Na and K
- gravimetric moisture measurement at a rate of 1 in 5 samples
- gravimetric dry loose bulk density at a rate of 1 in 3 samples.

The elements of economic interest are Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Zr, Hf, Ti ± Nb, defining the minerals monazite, xenotime, zircon, rutile and ilmenite.

The assay techniques applied are considered to be total digest methods and suitable for the elements of interest.

Samples were prepared by weighing, kiln-drying, reweighing, and pulverisation to 94% passing 75 micrometres (µm), followed by two aliquots taken by laboratory splitter for fusion and four-acid digest.

5. DATA VALIDATION

5.1.1 Database

The database was created by HGS using Dassault Systèmes Geovia Surpac data-importing software into a Microsoft Access database. The data was sent to HGS as csv files containing collars, downhole surveys, assays, geology and downhole density data.

A full and comprehensive QA/QC report, as well as spreadsheets of all data, were given to HGS for resource evaluation. The data QA/QC analysis and report brief summary follows.

Report summary

In June 2023, Ark Mines completed the first stage of a grid drilling programme to inform a maiden resource on the Sandy Mitchell Project. The Stage 1 air core drilling programme, sampling unconsolidated residual in situ sands, drilled 1488.3 m on 144 collars with an average depth of 10.3 m.

The QA measures applied to drilling and sampling were excellent with any procedural deficits identified and corrected on site. The QC measures applied to samples and assays were best practice and the resultant QC data affords comprehensive analysis of the assay set. The minor anomalies identifiable in the QC data are of a small enough magnitude to make them not material.

The QA/QC shows the assay data to be of good quality and fit for the purpose of estimating a JORC-compliant resource mode with good confidence.

6. MINERAL PROCESSING AND METALLURGICAL TESTING

Following encouraging results of exploratory ore sample analysis and as a next stage in the development of the Sandy Mitchell Project, metallurgical characterisation of a composite material made of drill core samples sourced from the deposit was completed at Mineral Technologies'(MT) Carrara Laboratory in Queensland.

6.1 Characterisation test work

The metallurgical characterisation was performed using approximately 40 kg of feed material and response of the ore sample to conventional beneficiation techniques and show product upgrade after each stage of separation. The simulated industrial stages and their aims are listed below:

- size classification to remove slimes, trash oversize and prepare sand suitable for beneficiation
- gravity separation to recover the valuable heavy mineral (HM) components to concentrate
- mechanical attrition to clean mineral surfaces, followed by froth flotation to extract rare earth
- minerals (REM)
- magnetic separation to perform a final upgrade of the flotation rare earth mineral concentrate (REMC).

A table of the mass yield relative to the as-received feed sample, intermediate and final product assays after each sequential fraction is reported in Table 6.

Table 6: Progressive characterisation mass and assays

Product description	% mass to feed	Al_2O_3 (%)	CeO_2 (%)	FeO_3 (%)	P_2O_5 (%)	SiO_2 (%)	TiO_2 (%)	U+Th (ppm)	Zr(Hf)O_2 (%)
Run-of-mine (ROM)	100	14.7	0.04	2.40	0.05	73.6	0.34	62	0.02
Gravity feed	51.0	13.9	0.05	2.31	0.06	76.5	0.34	72	0.03
Gravity concentrate	0.58	46.8	2.61	4.22	3.04	33.7	1.34	5,580	2.36
Flotation concentrate	0.42	51.9	2.92	1.48	3.48	32.6	0.59	5,720	1.21
REMC	0.04	4.46	23.3	2.47	24.9	5.99	1.58	47,080	1.28

- The CeO_2 content, using a tracer for REE-bearing monazite, is upgraded from 0.04% in the as-received feed to 23.3% in the cleanest product.
- Each processing stage increases the CeO_2 content, with the most significant upgrade achieved by the gravity concentration stages (from 0.05% to 2.61%, corresponding to an upgrade ratio of 52:1).
- Upgrade from the flotation of the gravity concentrate is small.
- Similar upgrade trends are observed for ZrO_2.
- The majority of the TiO_2 and Al_2O_3 minerals are rejected through the process stages.

Rare earth elemental composition of the gravity feed sample, intermediate and final product is reported in Table 7

Table 7: Progressive characterisation mass and rare earth oxides (REO) ICP assays

Product description	% mass to gravity feed	La_2O_3	CeO_2	PR_6O_{11}	Nd_2O_3	Tb_4O_7	Dy_2O_3	Y_2O_3	TREO
		parts per million (ppm)							(%)
Gravity feed	100.0	216	462	55	204	3	11	45	**0.11**
Gravity concentrate	1.13	12,784	27,516	3,153	11,407	139	512	1,880	**6.10**
REMC	0.08	109,891	235,853	26,942	97,393	1,176	4,109	13,843	**51.9**

Final concentrate assays were 51.9% TREO and contained mostly the heavy rare earth elements La, Ce, Pr and Nd. Direct CeO_2 recovery from gravity feed to REMC is estimated to be 71.7%.

6.2 Bulk sample test work

A 650 kg representative sample taken from drill holes was logged, weighed and sent to Mineral Technologies for analysis, processing test work and reporting of outcomes. Samples were recorded and a chain of custody path was kept. The sample was dried and weighed to be 450 kg.

Bulk test work studies are to:

- confirm metallurgical characteristics of ore samples and compare information with historical data
- investigate options for improving grade and recovery of products.

Test work includes:

- process the ore through a typical ore feed preparation plant (FPP) processing circuit configuration to produce feed suitable for beneficiation, including upfront screening and desliming
- process the gravity feed sample through multiple stages of spirals to confirm performance and produce a preconcentrate
- upgrade the preconcentrate to final heavy mineral concentrate (HMC) grade.

Fractionate the HMC using:

- flotation to make an interim rare earth concentrate and magnetic separation to produce a mixed rare earth concentrate. Final products will be dispatched to the Australian Nuclear Science and Technology Organisation (ANSTO) for hydrometallurgical test work.
- conventional dry mill techniques to assess other mineral concentrate quality and recoveries.

Figure 8 below shows a general schematic of the test work programme.

The work also includes mineralogy by QEMSCAN® particle mineral analysis (PMA) with microprobe analyses to assess the REE and Th composition of select minerals, including monazite, xenotime and zircon.

6.2.1 Initial bulk test work status

Based on the bulk test work, up to 30% of the CeO_2 units reported to the <0.020 mm size fraction. An option for characterisation of the feed preparation plant (FPP) slimes (nominal

<20 micrometres) in terms of assay by size and mineralogy to help identify the practicality and feasibility of beneficiating of the slimes to improve recovery will be undertaken.

Similarly, up to 11% of the CeO_2 units reported to the >2.0 mm size fraction. An additional characterisation of the feed preparation plant (FPP) oversize (nominal >2.0 mm) in terms of attrition/scrubbing followed by assay by size to help identify the practicality and feasibility of beneficiating the oversize to improve recovery.

6.3 Level of study

The test work deliverables and process described in this document, along with results from characterisation test work form the basis of the MT scoping study. It is intended to provide necessary information to progress test work to a level that will support design activities to a front-end loading 2/Class 4 Association for the Advancement of Cost Engineering (AACE) study as described in the Australasian Institute of Mining and Metallurgy (AusIMM) cost estimation handbook.

The results of which will be targeted to be suitable to complete an Ore Reserve estimate (ORE) at a prefeasibility study (PFS) level based on the processing of ore sourced from the project footprint.

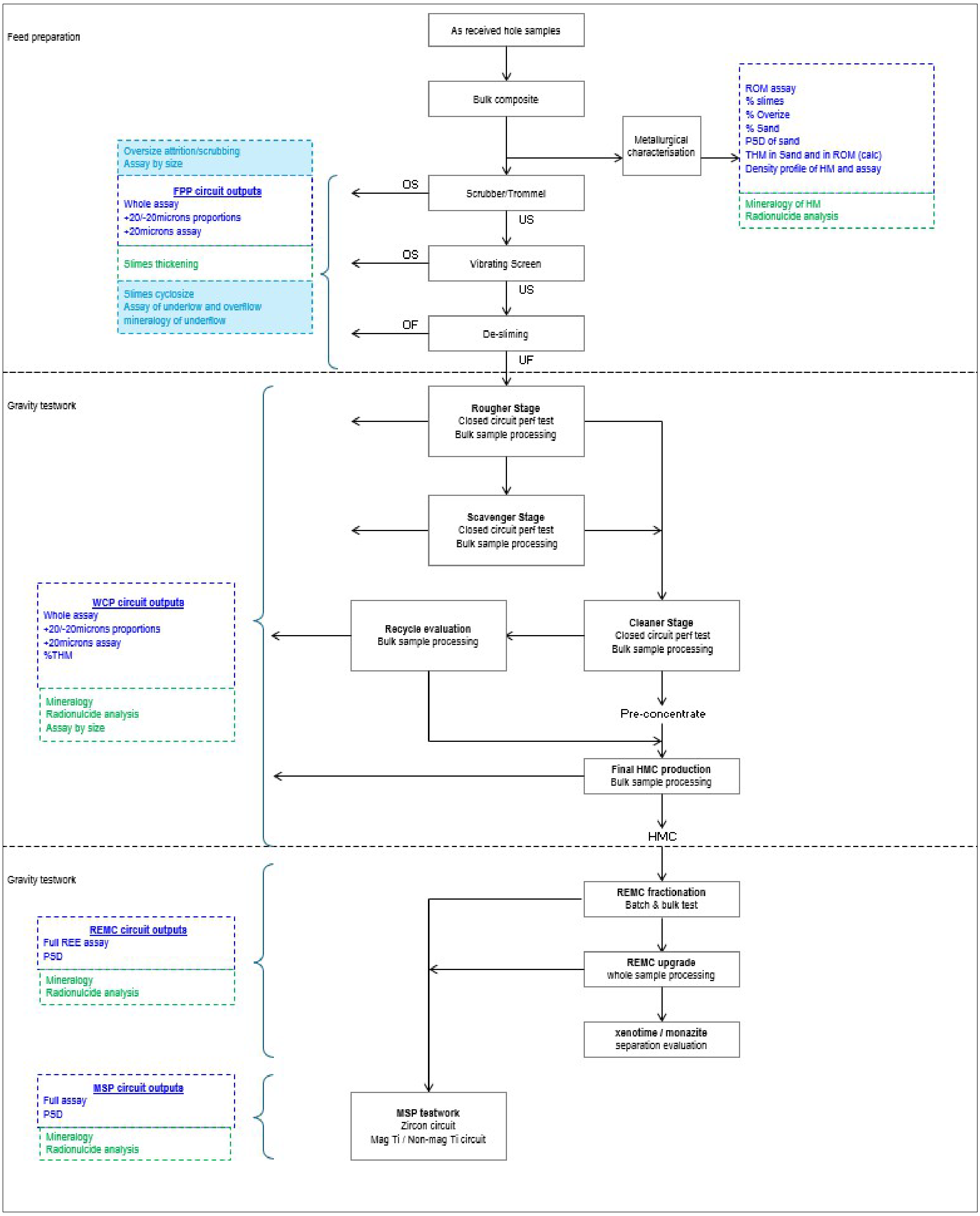

Figure 8: Test work schematic and flow diagram being carried out at Mineral Technologies

Additional QEMSCAN® test work in August 2024 was conducted on two size fractions of composite feed which consisted of removal of >1 mm and <20 micrometre with heavy liquid separation (HLS) at 2.85 specific gravity (sg) on the <1 mm and >20 micrometre fractions. The resulting HLS heavy minerals were screened at 250 micrometres. Both size fractions were submitted for the QEMSCAN®. The following is a summary of the findings:

- the sample is dominated by biotite (51.6%), garnet (10.5%) and 'goethite/limonite' (12.4%) which together account for 74.5% of the sample
- the elemental deportment data for titanium (Ti) indicates that 68.8% of the Ti is contributed by biotite
- the investigation also found that a high proportion of the rutile through to ilmenite occurs in impure particles, mainly associated with silicates – only 4.5% of the Ti occurs in clean Ti-rich particles.

Similar data indicates:

- Ce, La, Nd which are mainly hosted by monazite
- Y which is mainly hosted by xenotime
- Zr and Hf which are exclusively contained in zircon.

The sample will be submitted for laser ablation inductively coupled mass spectrometry (LA-ICP-MS) analyses of key mineral groups to confirm the compositions of the monazite, xenotime and zircon, and to provide more information on:

- the Pr, Sm, and heavy rare earth elements (HREE) – assumed to be hosted by the monazite.
- the Yb – likely to be contributed by the xenotime.
- the U – likely to be contributed by the zircon.
- the Th – probably contained in the monazite.

The previous characterisation test work showed that magnetic separation was highly effective in beneficiating the flotation concentrate [float] to produce an REMC. If this material performs similarly, a combination of flotation and magnetic circuits on the HMC should be capable of generating an REMC.

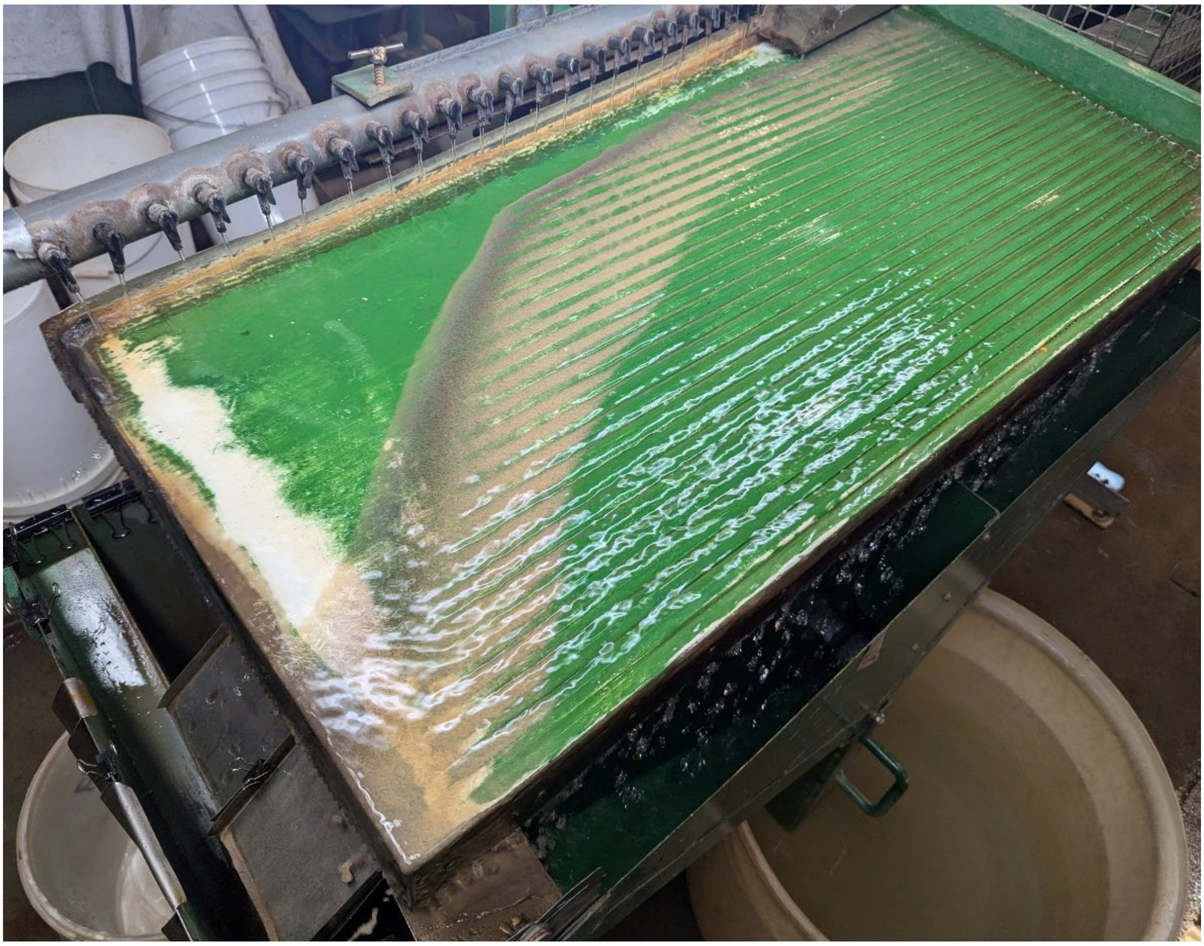

Figure 9: Sandy Mitchell recovery testwork clearly showing mineral separation

6.4 Processing

Processing recoveries were estimated using the available test work results and for each mineral across each process. The processing method anticipated is that run-of-mine (ROM) ore is fed through a scalping grizzly to remove the >2 mm material. From there, it will report to a dry trommel which will scalp at 1 mm. The oversize will be stacked for use in backfilling the mine void. The undersize will be mixed with water and passed over a 1 mm screen to refine the sizing.

The undersize will be sent to the feed preparation area where it will pass through dewatering cyclones with the fine residue material being pumped and reapplied to the mined void. The cyclone underflow material will report to a set of spirals for product recovery in the wet concentrator plant (WCP).

The fines and spiral residue material will be pumped to multi-gravity separators to further recover heavy minerals before being dewatered through centrifuges, with the residue material being 'dry-stacked' in the mined void then covered with topsoil for preparation to rehabilitation.

Supporting water, air and electrical reticulation will be installed in the WCP. The HMC will undergo further treatment to separate the concentrate into final products in the mineral separation plant (MSP).

The MSP produces the rare earth mineral concentrate (REMC) and zircon product. Further test work is underway to produce titanium oxide (TiO_2) and garnet products. Test work has not been completed for this stage of the processing. For the purposes of the scoping study, titanium products have not been included. Garnet is an assumed number based on the in situ values.

The recovery numbers shown in Table 8 are estimated based on current test work results and are in line with scoping study accuracies. Further test work is being conducted to achieve PFS level accuracy and will be reported in due course.

Table 8: In situ grades and estimated recoveries based on current levels of testing

Product basket	In situ (g/t)	Contained (%)	Estimated recovery (%)
zircon	686.9	0.06869	55-58
xenotime	117.3	0.01173	40-44
monazite	1220.5	0.12205	40-44
garnet	3250.0	0.0325	55-58

6.4.1 Multi-gravity separator (MGS) test work

Given the recovery (reduction) of CeO_2 (as proxy for monazite) into the slimes stream from the current test work programme, further explorative test work was undertaken to ascertain if any contained valuable minerals within the slimes stream could be recovered. For this purpose, the multi-gravity separator (MGS) was assessed as a vehicle for the potential. The laboratory-scale test rig was used by ALS Metallurgy in Balcatta, Western Australia, which provided the results.

The initial results indicated that recoveries to the MGS concentrate were:

- 59% – 73% of the available CeO_2
- 67% – 84% of the available ZrO_2.

These proved encouraging and future testwork will be commissioned to evaluate the recovery of valuable mineral within the slimes stream.

6.4.1.1 Monazite recovery

It is anticipated that the Monazite (based on CeO_2 assay) recovery to a final REMC will be 40% – 44%.

This estimation is based the results from the sighter Characterisation Testwork carried out in 2023 as previously reported and the progressive results from the current ongoing testwork programme which is using a larger ROM sample than was used for the characterisation testwork. This ensures that sufficient mass is available for separation testwork to provide a greater degree of certainty for any recovery figure.

Current testwork, plus planned future testwork will target increasing the recovery figure for the REMC. The REMC produced to date has the following assays.

Table 9: XRF assays of REMC

Element	REM concentrate
Al_2O_3	4.46 %
CeO_2	23.5 %
Fe_2O_3	2.47 %
P_2O_5	24.9 %
SiO_2	5.99 %
TiO_2	1.58 %
$ZrO_2 + HfO_2$	0.28 %
CaO	2.22 %
Cr_2O_3	0.051 %
La_2O_3	10.9 %
K_2O	0.22 %
MgO	0.43 %
MnO	0.01 %
Nb_2O_5	0.042 %
SO_3	0.04 %
Th	45100 ppm
U	1980 ppm
V_2O_3	0.05 %

Table 10: Detailed assay of rare earth oxides in the REMC

Element	REM concentrate (ppm)
Light rare earth oxides	
La_2O_3	109,891
CeO_2	235,853
Pr_6O_{11}	26,942
Nd_2O_3	97,393
Sm_2O_3	16,582
Eu_2O_3	501
Gd_2O_3	10,546
Heavy rare earth oxides	
Tb_4O_7	1,176
Dy_2O_3	4,109
Ho_2O_3	534
Er_2O_3	948
Tm_2O_3	81
Yb_2O_3	351
Lu_2O_3	38
Y_2O_3	13,843
Total rare earth oxides (TREO)	**52%**

7. MINERAL RESOURCE ESTIMATE

The Mineral Resource estimate (MRE) incorporates results from Ark Mine’s initial Stage 1 drilling programme completed in 2023 and Stage 2 drilling (Figure 10) for an overall 50.1 megatonnes (Mt) resource increase (231%) over the May 2024 MRE and a confidence classification upgrade from an Indicated Mineral Resource in May 2024 to a Measured Mineral Resource in September 2024 (Figure 10).

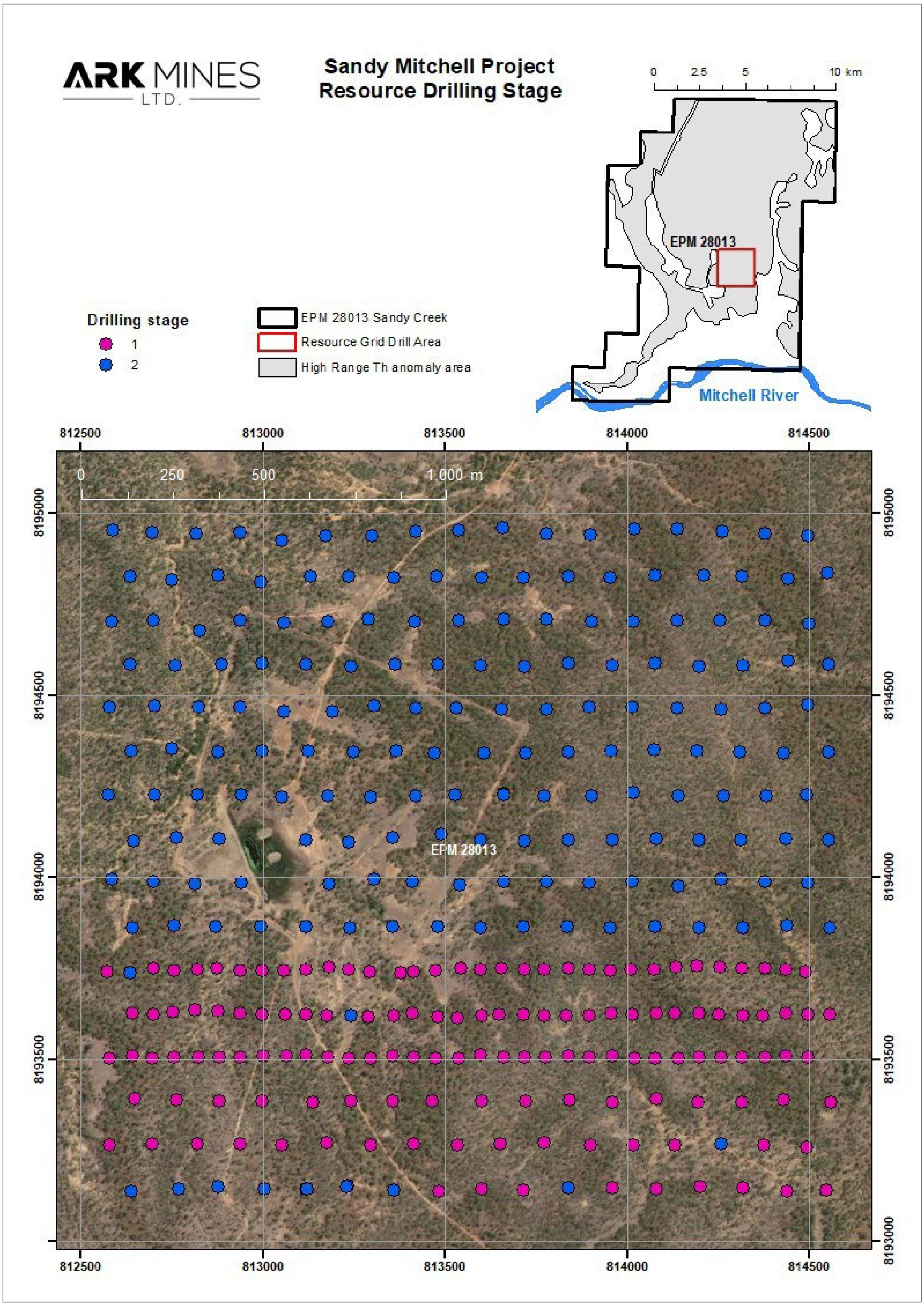

Figure 10: Sandy Mitchell resource area showing Stage 1 (pink) and Stage 2 (blue) drill collars against a 500 m grid

The MRE was carried out by independent consultants, HGS Australia, in accordance with the Joint Ore Reserves Committee (JORC) *Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves* (JORC Code, 2012 Edition) using variographically informed ordinary kriging (OK) coupled with an inverse distance squared (ID2) validation model. The MRE is wholly categorised as a Measured Mineral Resource and totals 71.8 Mt at 1733 parts per million (ppm) monazite equivalent (mzeq) using a lower cut-off grade of 700 ppm. Uppercuts were applied on specific elements to control statistical outliers.

In addition to the high-value economic commodities modelled, the MRE included estimates for arsenic (As) and scandium (S) for environmental considerations. The modelling shows these to be at very low levels: S (dominantly as a sulphate in this oxide zone orebody) was estimated to average 143 ppm; and As, a common contaminant in monazite, was estimated to average 9 ppm.

The updated MRE leaves Ark Mines well positioned to execute its stated development strategy for the Sandy Mitchell Project, with low-cost mining of rare earths and heavy minerals combined with low-cost downstream processing through simple gravity separation.

The grades observed in the MRE build on previous drilling results which were used for metallurgical testing by independent processing firm, Mineral Technologies. First-pass, water-based beneficiation test work on air core samples returned final concentrate assays of 51.9% total rare earth oxides (TREO) i.e. 519,000 ppm (refer to Ark Mines Ltd. ASX announcement of 24 November 2023).

The assays contained mostly lanthanum (La), cerium (Ce), praseodymium (Pr) and neodymium (Nd), plus heavy rare earths, dysprosium (Dy) and terbium (Tb), which collectively represents a very high value saleable product when incorporated into a basket of minerals as part of a monazite concentrate.

Metallurgical analysis subsequently commissioned by consulting firm, Harrier Project Management,

Ref: Low-cost mining and processing of rare earths at Sandy Mitchell – April 2023, concluded that, based on the beneficiation test work by Mineral Technologies, rare earth mineral concentrate (REMC) from Sandy Mitchell will almost certainly be suitable for existing sulphuric-acid-baking refiners; the most widely used and understood process for treating refractory concentrates.

The MRE is based on a number of factors and assumptions:

- the data was supplied by Ark Mines in Microsoft Excel file format.
- validation work was conducted and the database is considered valid
- mineralised outlines were interpreted by HGS within the coordinates:
  - 8193000N to 8195100N,
  - 812400E to 814700E
  - 130 RL to 190 RL
- the interpretation was used in compositing the sample data
- sample data was composited over 1 m intervals, and all 25 elements were extracted for interpolation
- a surface topography profile was created by HGS using drill hole collars
- the mineralisation is flat and exposes the surface to a depth of approximately 11 m
- geological block models were constructed by HGS using Dassault Systèmes Geovia Surpac

(version 6.6.2 x64). The main model cell sizes are 50 m north, 25 m east and 2 m relative level, with sub-celling to a minimum of 12.5 north, 6.25 m east and 0.5 m RL

- bulk density data was significant and sufficient to interpolate into the model
- ordinary kriging (OK) interpolation methods were used for the evaluation of each of the 25 elements. ID2 interpolations were conducted for validation purposes
- high-grade cutting was conducted on outlier assays for most of the elements
- the resource is classified as a Measured Mineral Resource due to data density, continuity of mineralisation, structural definition and geostatistical evaluations.

Three block models were created in Surpac due to limitations on the number of attributes that could be entered into the model. The models are identical, the only change due to interpolation processes were as follows:

- ‘sandy mitchell model sept2024.mdl’ – uses OK interpolation on the uppercut datasets. This is the main reportable model.
- ‘sandy mitchell id2_ucut sept2024.mdl’ – uses inverse distance squared (ID2) interpolation on the uppercut datasets. This is used for validation purposes to compare complex and simple algorithms.
- ‘sandy mitchell ok_uncut sept2024.mdl’ – uses OK interpolation on the uncut datasets. This is used in determining the variability in models between cut and uncut datasets. A significant difference would indicate the probability of excessive upper cutting.

The monazite equivalent (mzeq) value is considered the appropriate combination for reporting due to the potential to process the ore as a concentrate for shipment; therefore, providing a more representative grade.

The Sandy Mitchell MRE is reported at a 700 ppm mzeq lower cut-off grade. HGS considers the grade cut-off to be within expected mining cut-off grades. The supporting reported numbers are within the mzeq cut-off.

Table 11: Reported MRE for Sandy Mitchell at a 700 ppm mzeq lower cut-off.

	Mzeq	CREO	HREO	LREO	MagREO	monazite	TREO	TREO+Y+Sc	xenotime
Tonnes	**parts per million (ppm)**								
71,790,000	1,732.7	110.9	13.9	389.6	99.4	1,229.0	403.5	457.2	115.7

Note: CREO = critical rare earth oxides (oxides of Nd, Dy, Eu, Y and Tb – a set of oxides the US Department of Energy, in December 2011 defined as critical due to their importance to clean energy requirements); HREO = heavy rare earth oxides; LREO = light rare earth oxides; MagREO = magnetic rare earth oxides (commonly used in the fabrication of high operating temperature permanent magnets, notable for their durability and strength: Nd, Pr, Dy and Tb; TREO = total rare earth oxides; Y = yttrium; Sc = scandium.

The mineralisation is flat lying from the surface down to approximately 11 m. It is consistent throughout the drilling area except for a small inlier along the southwestern corner where assay data has dropped below the 700 mzeq cut-off, Figure 11.

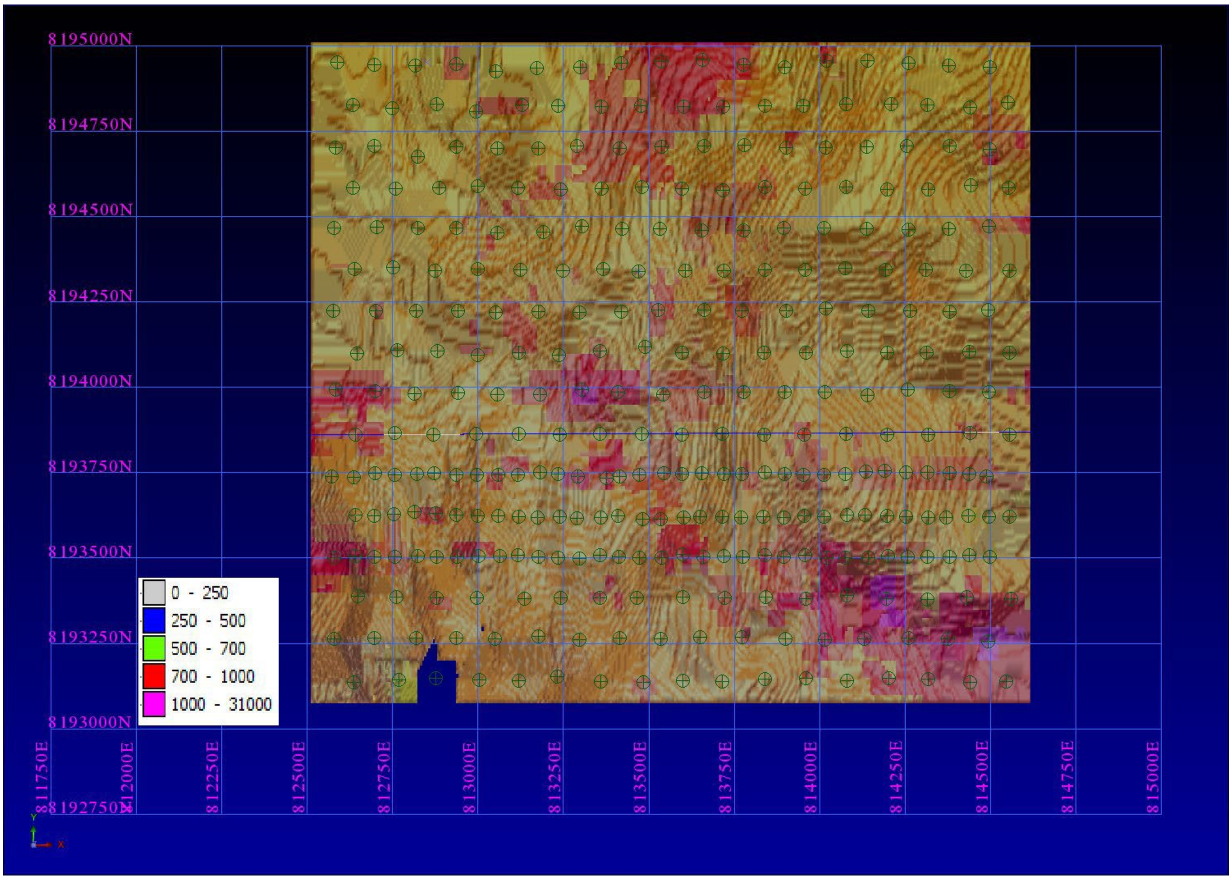

Figure 11: Sandy Mitchell block model showing mzeq grade distribution.

References:

Hawker, A. 2024. Sandy Mitchell REE project resource evaluation report for Ark Mines Ltd, HGS Australia: Perth.

8. MINING METHODS

Mining will take place above the water table using standard front-end loaders (FEL) to excavate and dig the ore body, providing 20.8 megatonnes per annum (Mt/a) of ore for processing.

The processing scenario used to determine the relevant inputs for this study (operating expenditure, process recoveries and product prices) generated eight saleable products: 1) a monazite and xenotime rare earth mineral concentrate (REMC); 2) a zircon concentrate; 3) a rutile; 4) a high-Ti leucoxene; 5) a low-Ti leucoxene; 6) an altered ilmenite: 7) an ilmenite; 8) a garnet concentrate.

8.1 Mine planning

Mineral Technologies is completing a scoping study to provide background information on various mining methods that could be adopted.

The deliverables are:

- the development of a preliminary block flow diagram for the processing plant
- the development of conceptual process mass balances
- a preliminary assessment of project infrastructure requirements within the mine boundary
- a preliminary assessment of project power and water requirements
- production of an order of magnitude capital expenditure (capex) and operating expenditure (opex) estimates for three different throughput rates for a land-based or floating processing plant, considering mining methods of truck and shovel, mobile mining unit (MMU) or floating dredge mining. The order of magnitude was within an accuracy between –30% and +75%.
- a report summarising the options considered, the design concept, process description, capex and opex estimates, risks, opportunities, and key areas for future investigation, as well as project fundamentals for input into Mineral Technologies' contribution to Ark Mine's prefeasibility study (PFS).

A draft report has been received and evaluated by Ark Mines and, following updates to include comments made to Mineral Technologies, a final report is imminent. It was considered that the draft report had sufficient information to make some decisions on which will be the favoured options to use for the purpose of inclusion in this scoping study.

8.1.1 Mining method

The complete extraction of ore is planned. Oversize material will be used to create in-pit bunds to contain residue material that has been returned to the previously mined areas. Minor additional earthworks may be required in each 'residue cell' to aid water recovery, as well as drying and consolidation time.

Exploration drilling penetration response indicates that drill and blast operations will not be required as the resource is not in a hard rock; the ore body is made up of friable competent sand, easily dug by mechanical means. Cross-ripping of cemented sand horizons by dozers may be required but is not expected.

Mining will employ a block/strip operation. Each block will have a final floor footprint of about 200 m long by 500 m wide. Areas ahead of mining will be cleared and grubbed of organics which will be stockpiled and disposed of or used to create a mulch product. Topsoil and oversize reject material will be stockpiled separately on the surface, close to the initial mining area. Once there is sufficient capacity and under suitable conditions, the oversize material will be placed back into the mine voids along with the processing plant residue material. As mining progresses, topsoil removed ahead of mining will be placed over residue material in the backfilled voids, allowing for continual rehabilitation behind the mine. This will remove any visual effects of mining and help return the area to its original condition. Upon closure, topsoil that was stockpiled at the start of mining will be replaced over the last of the backfilled mine voids to complete rehabilitation.

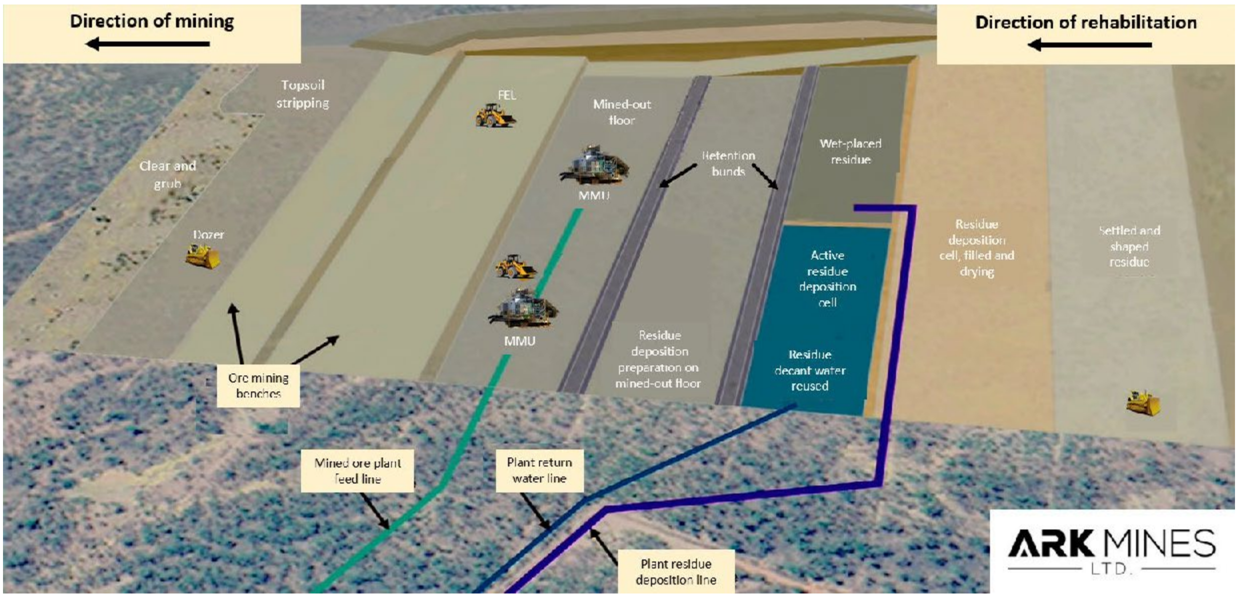

Figure 12: Schematic of mining sequence, including progressive backfill and rehabilitation

A preliminary mining option assessment was undertaken to review potential mining methods. Excavator and truck (rigid and articulated), scraper, in-pit conveyor and dredging methods were initially assessed. Likely issues with in-pit conveyors (i.e. high capital costs, inflexibility in scheduling) and dredging (i.e. material properties and expected water losses, section 8.1.2.1 below, at the mine face) resulted in both methods being less favoured. Operating costs for scraper production were found to be generally higher than for excavator and truck operations and were therefore discarded as the primary production method. Ultimately, a wheeled front-end loader (FEL) was considered the best option as it provides greater flexibility and lower costs.

8.1.2 Equipment selection

The Mineral Technologies' study considered a mining rate of 1500-3000tonnes per hour (t/h). Clearing and grubbing, and topsoil removal, to a depth of about half a metre will be carried out before mining. The ore will be mined to a depth of between 10 m and 15 m, depending on the base rock topography. As the ore body is considered contiguous and consistent within the mine area, selective mining will not be undertaken. The decision to mine in this way is seen as beneficial in not having to carry out grade control or perform selective mining methods; thereby, reducing cost and time.

8.1.2.1 Water seepage test

In September 2024, Ark Mines commissioned a water seepage test, to assess the likely loss of water to the surrounding ground if a reservoir was filled to be used in the case of a floating dredge, and/or concentrator method of mining and recovery.

The primary objective of the test programme was to evaluate the permeability and infiltration rates of the surface sand layers within the project area. This information was to determine whether the sand can hold water or if it will rapidly seep away, influencing the decision to use wet mining practices.

The high infiltration rates observed across the exploration holes suggested that the sand layers have a high hydraulic conductivity, making them prone to rapid water seepage. This characteristic is critical when considering wet mining practices. High infiltration rates in the sand profile imply that maintaining water within the mining area may be challenging, as water will likely infiltrate and disperse quickly through the sand layers.

The recorded data and the high infiltration rates indicate that a significant volume of water would be required to maintain desired water levels within the mining area. This could result in increased water consumption, leading to higher operational costs and potential logistical challenges in sourcing and managing water supply (source report: *Water Infiltration Test Report – Sandy Mitchell Project*, Hydro Element Solutions, September 2024)

On this basis, the decision to use dry mining methods was taken as the preferred method to evaluate for the scoping study. A mobile mining unit (MMU) or mining unit plant (MUP) may be used. Ongoing work to assess the benefits of each method is underway to inform a decision on which will be the preferred option.

8.1.3 Dry mining method

FELs (e.g. Caterpillar 992 or 993; Komatsu WA900-8R-HL, or similar) will be used to dig, mine and transport most ore from its in situ location to the hopper of the MMU (as shown in Figure 11) or MUP.

Figure 13: Mineral Technologies' mobile mining unit (MMU)

Current knowledge indicates that in-pit road conditions will provide good trafficability for FELs. Loading of the MMU or MUP will be from either side of the hopper, which will include 'hungry boards', allowing continuous operation. Material will pass over a grizzly to remove oversize and any remaining organics. This material will be cleaned up by FELs and the oversize will be stockpiled or backfilled.

While the primary mining will use FELs, a combination of Caterpillar D9 and D10 large dozers (or similar) may be used for cross-ripping where required; pushing up bunds for in-pit tailings cells; and contouring waste dumps (both in-pit and in external areas). FELs will feed the MUP and help clean the pit floor to improve mining recoveries. Graders and water carts will be used to maintain suitable operating conditions across the site.

The total mining area is two kilometres long by two kilometres wide (i.e. 4 km^2) and will be fully mined. As exploration drilling holes were stopped or interrupted when refusal was encountered, the base rock is considered to be competent for bearing mining, heavy vehicles and mine equipment.

Mining units will be relocatable using remote controlled track-mounted units or skid-mounted so that they can be moved with low-loaders or dragged by FEL. The spiral plants will stand on relocatable concrete rafts on the pit floor and relocated as required. The MMUs will pump slurried ore to the wet concentrator plant (WCP) via high-density polyethylene (HDPE) pipes, or similar, which allows the WCP to be moved less frequently than the MMU.

Options to use smaller 750 t/h mining units or larger 1500 t/h units offered by IHC Mining will be studied during the PFS. The WCP capacity is expected to be 1950 t/h following removal of oversize and silts.

No specific pit design or pit optimisation has been undertaken at this stage in the project, although a grid system is expected to be implemented to allow replaced residue material to settle and dewater sufficiently to have mining activities come alongside as mining progresses. Mining will progress on a front approximately 500 m wide. Once an advancement of approximately 200 m is reached, the mining unit will be relocated close the face. This is expected to take place every 55–60 days. Once sufficient distance has been mined out, bund walls will be constructed to develop open cells or mine-voids. An empty mine void between two bunds will be maintained between the mining equipment and any backfilling operations. This is to avoid liberated water from the residues affecting mining operations and allow recycle water collection back to the processing facilities.

Operations will be 24/7 throughout the year. Allowance has been made for two, one-hour shift changes, and a loss of two weeks per year is factored into account for weather interruptions.

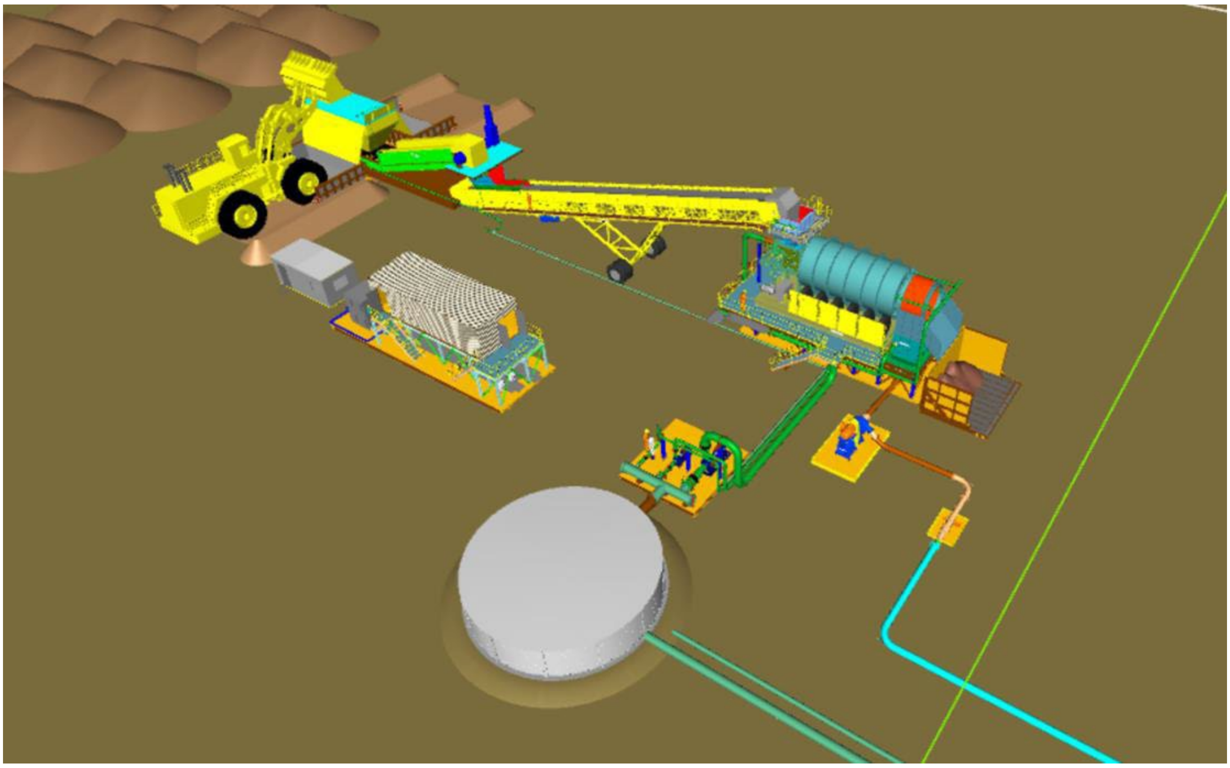

Figure 14: Modelled example of a mining unit plant (MUP) with scrubber trommel to remove oversize

References:

Minerals Technologies*, 2024, ARK MINES LIMITED, SANDY MITCHELL RARE EARTHS PROJECT, Scoping Study Report, 30612-1000-AA-REP-0001*

9. INFRASTRUCTURE

The Sandy Mitchell Project is being designed with highly mobile, relocatable plant and equipment to avoid creating fixed and permanent or semi-permanent buildings and infrastructure wherever possible. The location of the project and in particular the current land use as a farming area requires that the project includes all necessary support services, such as:

- site access
- access roads
- transport in and out for personnel, product, consumables messing, parts and spares
- rainwater drainage and capture
- laydown areas during construction and operation
- water supply
- power supply and distribution, and lighting
- sewerage, recycling facilities and waste management
- temporary accommodation
- construction-phase power and water – where messing and accommodation demands will need to be carefully planned and managed
- buildings for workshops, warehousing, ablutions, etc. – these will generally be modular, transportable and relocatable
- first aid and security posts will be required.

These matters will be further addressed in the ongoing prefeasibility study (PFS), currently started, and further refined as a project definition becomes clearer after test work is completed and engineering is underway. Communications and data storage will be addressed as a part of the PFS which will also include dust suppression, noise and lighting studies to determine the requirements.

10. RESIDUE MATERIAL MANAGEMENT

10.1 Phased implementation

Residue material creation and management within the processing plant will be detailed in a later study. No chemical processing is required; however, some flocculation may be needed to help separate the silt fractions.

Management of residue materials emanating from the processing plant will be implemented in four phases during the life-of-mine (LOM):

- Phase 1 – temporary surface storage of processing plant residue created from the initial mine-void.
- Phase 2 – continuous return to the pit as part of backfilling behind the mining face.
- Phase 3 – return to pit of the temporary residue material storage for backfill and closing of the mine void.
- Phase 4 – relocation of topsoil in preparation for rehabilitation.

10.2 Assumptions to be refined by further test work

The residue material management concepts described here will be refined by test work during the detailed study phases, with some considerations to include:

- determining the surface residue material volumes generated from the initial mining void
- materials handling characteristics of fines waste (which includes some clay)
- materials handling characteristics of the sand residues, either dewatered in the processing plant or slurry pumped to a field unit dewatering module near the final location
- water recovery efficiency from the residue materials
- unconsolidated fines waste slurry density
- rate of consolidation/dewatering of combined residues
- lapsed time until the residue material returned to the mine voids can be overlain with overburden
- potential for improved water recovery from residues by mechanical processes.

The performance of the residue material management and water recovery system will be designed with the objective of operating a safe, stable, non-polluting landform while also maximising water recovery.

10.3 Sand and fines waste residues

The mining method described above requires temporary residue material storage for processing plant residues management outside the mining pit until the initial mining face is sufficiently advanced to allow it to be returned to the pit. The approximate locations of storage area are yet to be determined.

The temporary storage will be used for either sand residue material only, or a comingled sand and fines waste, with the intention that the landform created will have material characteristics to allow reclamation by mechanical equipment and transported to the final mine void as part of the backfilling and rehabilitation process.

Processing plant fines residue will be initially stored in temporary surface storage to allow for the creation of the first usable mining void and, thereafter, returned to the pit as part of the backfill process. Refer to Figure 11. Fines residue, when in its original form, will be moved by slurry pumping and dewatered/dried fines residue, attained through mechanical means in the processing plant will be handled by mobile mechanical plant.

The performance of either mobile mechanical dewatering equipment or comingling with sand residue is yet to be tested and determined. Dried fines residue may be used for pastural enhancement, or otherwise comingled (mixed) with the sand residue for pit backfilling or a combination of both. Temporary storage areas will be rehabilitated by replacement of topsoil and retuned to a condition suitable for the original, or approved, land use.

10.4 Residue materials return for in-pit backfilling

When an adequate mine void has been established, ongoing minerals processing residues will be placed directly into the pit. This may be done via three considered strategies:

- comingled beforehand – where the coarse stream and fine streams will be separately dewatered and then blended via a mixing box before mechanical transfer into the pit
- comingled in the pit – where the coarse stream is dewatered and mixed with the fines stream, then either hydraulically or mechanically handled, blended and finally positioned in the pit
- segregated and placed in layers/sections – where a structured plan is predetermined in layers and rows within the pit to discretely place the coarse and fine residues to satisfy designed geotechnical ground conditions.

The optimal approach will be determined by specific test work, review of dewatering technologies, dewatering performance and geotechnical requirements.

In-pit deposition facilities will be designed with temporary embankments, formed from oversize material, to allow sequential mining and filling of residue. Embankments will be in the order of 2–4 m high and designed as barriers to stop slumping in storms and to collect process water seepage from the deposited residue material for reuse at the MMU or WCP.

Subject to a detailed study, it is possible that when a sufficient open-pit void becomes available, separate cells would be developed by minor additional earthworks, each at a different phase of settling and drying, to assist in water recovery, and drying and consolidation time.

10.5 Residue material characterisation and handling

The Company will undertake a desktop study to assess the potential for handling of residue material with conventional earthmoving equipment with the objective of creating a material able to be transferred into the final mining void in the shortest possible time before the end of mining operations.

The study will be based on residue characterisation from bulk metallurgical test work programmes and an assessment will be made of the potential to reconstitute materials from post-processing streams into a consolidated type that can be handled by truck and loaders.

The study will determine:

- whether it is possible to construct a temporary residue storage from materials available on site
- how many stockpiles will be required for sand residue material
- the embankment height, assuming a 500 mm freeboard
- the discharge management and decant control required during the operational life of mine (LOM).

Underdrainage may improve dewatering and the rate of settlement. This will be determined during detailed studies and designed accordingly if it is deemed to provide an advantage.

11. WATER MANAGEMENT

Water management will be optimised for efficient use of available water resources. Aspects of water services management to be further investigated and designed include raw water supply; process water reuse; field water delivery and recovery; potable water; and wastewater.

11.1 Annual water demand

Preliminary annual new water demand studies, based on the total operational throughput relating to mining activities and with consideration for all water circuits that will be needed on site, will be undertaken when process design can provide a more detailed assessment of the balance between new and available water.

11.2 Raw and process water

The raw water circuit will include raw water ponds for the main buffer storage to cater for the overall demand of the site. These will serve as delivery points from the external water supply and will be sized to hold approximately a week’s supply. In turn, they will feed raw water ponds and storage tanks for the water needed in the various circuits relating to the mobile mining units (MMUs) and wet concentrator plant (WCP); whereafter, it will be referred to as process water.

Pumping equipment and piping infrastructure will transfer and balance the requirements for raw and process water between the various processing modules. Process water circuits will be designed to optimise the reuse of water recovered from the various processing modules which will draw water from the raw water ponds.

11.3 Field water

Additional water will be sourced or recovered from slimes and fines ponds dewatering, mine dewatering and remote rainwater catchment areas, then directed to the nearest raw water ponds. Mobile diesel-powered pumps and piping infrastructure will be positioned and relocated in the field to enable continuous operation of these water circuits.

11.4 Potable water

Potable water will be needed for workforce consumption and ablutions, as well as workshop requirements. Water from the raw water ponds will be fed to an on-site water treatment plant, with the treated water stored in tanks. Potable water will be trucked to facilities and remote areas as required.

Ongoing water quality management and testing will be employed within site operations, or by external contractors, to ensure pH levels and UV sterilisation are monitored and maintained. Rejected streams of concentrated brine and effluent will be directed to the wastewater circuit.

11.5 Wastewater

Wastewater, including sewage, potable water reject stream and other discharged wastewater, will be directed to an inground centrally located sewage pumping station and periodically transported off site for processing by a licensed provider.

12. LOGISTICS

Ark Mines is undertaking a logistics study focusing on bulk and container transport from the Sandy Mitchell Project at Mount Mulgrave in Queensland to three key destinations:

- Townsville, Queensland, 630 km south of the project
- Darwin, Northern Territory, 2500 km west of the project
- Mourilyan Harbour, approximately 100 km south of Cairns, or 400 km east of the project.

The study will evaluate container transport to Townsville and Darwin offering flexibility for a variety of goods, and bulk transport to the Mourilyan Harbour, which specialises in handling bulk commodities.

The choice of these locations is based on their proximity to the site; or in the case of Darwin, closeness to southeast Asian markets.

Key aspects of the study will include:

- assessing the road infrastructure from Mount Mulgrave, analysing the logistical feasibility of each transport mode, and comparing costs, handling times, and capacity.
- exploring the efficiency of container transport to Darwin and Townsville for diverse cargo
- assessing the suitability of Mourilyan Harbour for handling bulk goods, as it is known for its bulk-only operations.

The study will aim to identify opportunities for optimisation, potential bottlenecks, and strategies to improve the efficiency of all transport options. The findings will provide a comprehensive understanding of the logistical pathways available, guiding future decisions on transporting goods from this remote area to major global markets.

Ark Mines already owns bulk loading equipment at Mourilyan Harbour which includes two shiploaders and six conveyors, allowing for flexible low-cost bulk shipments of up to 40,000 tonnes (t) per vessel.

The below estimates are trial rates working with Qube Logistics who have indicated that a further $20 per tonne discount may be applied once full-scale mining is adopted.

- Bagged product in containers from the site to Townsville: $124.09 per tonne free alongside ship (FAS).
- Bagged product in containers from the site to Darwin: $384.07 per tonne, FAS.
- Bulk from processing plant site to Mourilyan Harbour, with Handymax Incorporated loading stockpile management, using Ark Mines' shiploading equipment: 30–40 kilotonnes (kt) at $111.66 per tonne, free on board (FOB).

Figure 15: Loading bulk iron ore with one of Ark Mines' shiploaders at Mourilyan Harbour

13. MARKETING

13.1 Rare earth mineral concentrate (REMC)

The Sandy Mitchell Project deposit is capable of producing a high-grade REMC through the standard beneficiation techniques of screening, gravity, flotation and magnetic separation. This was confirmed in the November 2023 Mineral Technologies' report *Metallurgical Characterisation of One Composite Ore Sample (MS 23/4443690/1)* where an REMC with a grade of 51.9% REO was produced.

In the report, the REMC is described as having a low content of the high-value terbium (Tb) and dysprosium (Dy) elements representing approximately 1% of the total proportion of REE present. This suggests that the predominant rare earth host mineral is monazite, with only minor xenotime present. This aligns with the 2010 SGS Australia report commissioned by the Japan Organization for Metals and Energy Security (JOGMEC).

As a comparison, the Tb/Dy proportion at Sandy Mitchell will be lower than Iluka's deposit in the Wimmera region of Western Australia, as reported in the company's WIMM100 February 2024 Mineral Resource estimate update (https://www.iluka.com/media/t5nctvdr/wim100-mineral-resource-estimate-update.pdf) which gives a monazite to xenotime ratio of approximately 1:4.

However, there are many deposits; notably, the Tronox Australia operations at Chandala and Wonnerup in Western Australia, and Ginkgo in New South Wales, that have lower Tb/Dy contents than the REMC from the Sandy Mitchell deposit.

13.2 Marketability of mixed rare earth carbonate (MREC)

The TREO grade of the MREC reported in the 2023 Mineral Technologies' report will almost certainly be acceptable to existing sulphuric-acid-bake refiners accepting third-party concentrates (mainly China) and those in Australia under construction (Lynas and Iluka). It is also noteworthy that North America is implementing the acid-bake conversion processing route at plants being constructed in Saskatchewan, Canada; and Utah, USA.

Traditionally, monazite has been traded with pricing reported via sites such as Shanghai Metal Markets (metal.com); however, more recently, price contract structures have become somewhat opaque as the West pushes to secure supply of these critical metals, especially praseodymium (Pr), neodymium (Nd), terbium (Tb) and dysprosium (Dy).

13.3 Refinery options

It is expected that the possibility of adding a refinery to take the REMC through to a value-added MREC will be considered. Flow sheets of sulphuric-acid-bake or caustic conversion described in the 30 April 2024 report by Harrier Project Management, *Low-cost Mining and Processing of Rare Earths at Sandy Mitchell*, show that either process is suitable for the expected REMC composition as presented previously. If the xenotime content rises, the sulphuric-acid-bake process may have the advantage, as this process maximises extraction of the high-value Tb and Dy from the xenotime mineral.

13.4 Products

Test work completed to date suggests that the likely product suite will include zircon, rutile, REMC (predominantly monazite) and garnet. The grade of garnet has yet to be determined; although it is anticipated that, even at the low end, the proportion of garnet in the resource indicates a significant revenue return for the project.

13.5 Market survey

As part of the upcoming prefeasibility study (PFS), Ark Mines will engage suitably qualified heavy metal and rare earth marketing consultants to provide up-to-date information on the global market. The report will focus on Ark Mines' products and target known markets.

14. ENVIRONMENTAL, PERMITS, COMMUNITY AND STAKEHOLDER ENGAGEMENT, CLOSURE

14.1 Federal and state approvals

As part of the Sandy Mitchell Project development Ark Mines will require a number of local, state and federal approvals. The project currently operates under Environmental Authority (EA) authorising exploration activities and accommodation facilities. It is anticipated that development will involve the following two stages requiring different approvals.

14.1.1 Stage 1 – Infrastructure establishment and bulk sampling

Infrastructure establishment will take place immediately upon the granting of the mining lease and will essentially involve the excavation and proper storage of topsoils and subsoils at the proposed infrastructure areas, which include the following:

- office and administration areas
- workers' accommodation
- onsite laboratory
- water storage dam
- erosion and sediment control infrastructure
- trial mining and mineral separation areas
- access roads, etc.

Analysis of multiple bulk samples of up to 10,000 tonnes (t) of material containing ore will be undertaken during Stage 1 to allow for the refinement of the mining and proposed mineral processing methodologies.

Topsoils and subsoils will be extracted using earthmoving equipment, such as an excavator and dump trucks. The topsoil will be replaced to ensure its integrity is maintained. It is proposed that these activities will begin upon a mining lease being granted.

All activities will be performed under and in compliance with the Queensland Department of Environment and Science document *Eligibility criteria and standard conditions for mining lease activities–Version 2*.

Given the extent and level of impact of the proposed activities, a referral under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) to the Commonwealth government, will not be required.

14.1.2 Stage 2 – Full-scale mine development (May 2026 onwards)

Full-scale mining activities will be undertaken under an amended site-specific environmental authority, supported by a full environmental impact assessment.

Stage 2 infrastructure will include:

- a processing plant
- a product storage and management area
- a mining front
- active rehabilitation areas
- additional water storage dams
- clean water diversion infrastructure.

The purpose of the environmental impact assessment is for an amendment to the Stage 1 environmental assessment site-specific assessment and will be in accordance with section 226 of the *Environmental Protection Act 1994* (Qld) and in consideration of the following Queensland Department of Environment, Science and Innovation guidelines:

- ESR/2015/1684 – Major and minor amendments
- ESR/2015/1836 – Application requirements for activities with waste impacts
- ESR/2015/1837 – Application requirements for activities with impacts to water
- ESR/2015/1838 – Application requirements for activities with noise impacts
- ESR/2015/1839 – Application requirements for activities with impacts to land
- ESR/2015/1840 – Application requirements for activities with impacts to air.

Given the increased level of impacts and mining operations from Stage 2 onwards, it is likely that the project will be referred under the EPBC Act to the Commonwealth government for determination whether or not the action be deemed as a 'Controlled Action'. If it is deemed to be, additional impact assessment and development of additional management plans may be required.

14.2 Local government

Approval from local government will be required for the use of council-managed roads by project-related traffic. which can be obtained concurrently with state approvals through the submission of a road use management plan and road impact assessment.

14.3 Rehabilitation

As part of the life-of-mine (LOM) resource development, mine closure and progressive rehabilitation processes will be incorporated into operational planning processes. They will be formalised before full-scale mining activities and contained within the Project's progressive rehabilitation and closure plan which will be reviewed on a continual basis. Work programmes will be developed to include progressive rehabilitation monitoring, to ensure the Company's focus of minimising the disturbance footprint of the operations.

14.4 Environmental management system

To ensure environmental and social permitting and approval requirements are understood, the Company will develop and implement an environmental management system which will adopt and align with the structure and principals of the International Organization for Standardization's *ISO 14001:2015 Environmental Management Systems Environmental management systems — Requirements with guidance for use*. As a part of this system, the Company will regularly review its obligations for activities undertaken and look for opportunities for continual improvement.

15. CAPEX AND OPEX ESTIMATES

More detailed estimates of both capex and opex will be undertaken during the PFS phase of the project.

15.1 Capital expenditure (capex) estimate

Capital expenditure (capex) estimates are being developed. Until process engineering is developed to be able to make a preliminary assessment of the size of equipment and power, water and other consumable requirements, no detailed capex estimate can be given.

It is anticipated that this stage of the project development will start in November 2024. Using benchmarking practices with similar projects provided by a number of vendors, it is anticipated that the required capex will be in the order of AUD120–150 million, including a contingency of 10%.

A more detailed estimate will be developed during the prefeasibility study (PFS) which will be broken into direct and indirect costs and a contingency study will be undertaken. This scoping study capex is at a level commensurate with the Class 5 level of accuracy defined in the Association for the Advancement of Cost Engineers (AACE) International *Guide to Cost Estimate Classification Systems* (2020), which are aligned to industry standards.

The capex estimate direct costs will include processing plant equipment; structural steel and platework; piping; civils; installation costs; electrical equipment and reticulation of conductors; instrumentation; ancillary equipment; spares and first-fill requirements; infrastructure, including buildings and site roads and earthworks; and mobile equipment, such as light vehicles for maintenance and supervisory staff cars. All construction costs and construction management costs will be included, as well as owner's costs.

A work breakdown structure (WBS) has been implemented with components broken down into sets and subsets. The WBS will form the basis of providing procurement package details, equipment numbering, scheduling and cost control during the construction phase of the project. It informs engineering and procurement tasks from the outset and is a continuous document from front-end engineering design (FEED) through to mine closure. It will be the basis of compiling equipment history, maintenance records and spares usage. It provides a long-term record-keeping method and feeds to asset management and costs to provide senior management with reporting parameters.

The WBS will inform the method used to build a capex estimate. Each component will be priced and, from that, will form the basis of a contingency analysis providing the capex estimate.

15.2 Operating expenditure (opex) estimate

Similarly, the operating expenditure estimate has been compiled and determined to a scoping study level of detail (Class 5) following the AACE guidelines. The opex is more advanced than the capex as the mining method is further developed and equipment suppliers have contributed to the inputs in relation to the anticipated size of the mining equipment.

The estimate includes operational, consumables, maintenance and running costs related to the LOM for all related on-site and off-site services. The estimate reflects the operations of a facility capable of operating at an annual run-of-mine (ROM) ore feed processing rate of 20.8 megatonnes per annum (Mtpa).

As for the capex, benchmarking and factoring techniques have been applied. They represent the best information available at hand when compared to publicly available estimates from like operations that are well understood and are familiar to study personnel and suppliers. The expected cost per tonne of mined ore is anticipated to range between AUD3–4 ±35%.

The opex estimate covers all costs associated with mining and processing the ore to a saleable product and delivering it for export from Australia via a seaport, or for further processing within Australia. The estimate is within scoping study levels of certainty.

The major components of opex can be classified under the following groups:

- mining
- processing
- consumables
    - diesel fuel
    - flocculant and reagents
    - liquefied natural gas (LNG)
    - product packaging
    - raw and process water
    - potable water and sewage
    - product transport and logistics
- administrative and support
- external services
- logistics.

Excluded from these costs is expenditure of a capital nature; depreciation or taxes or royalties paid for extraction; sunk costs associated with procuring mining leases, land acquisition and exploration; and contingency for unexpected variations.

Costs to construct and commission the plant are generally considered as capex. During plant commissioning production will begin and ramp-up to nameplate capacity. Once this production is underway these costs are typically applied to opex.

15.2.1 Method

Operating costs data for the scoping study have been obtained and prepared from a number of sources including:

- Ark Mines Ltd.
- Mineral Technologies
- IHC Mining
- the mining contractor
- engineering consultants
- vendors and suppliers.

Every effort has been made to ensure costs are reasonable and current as at the fourth Quarter 2024. No escalation has been included.

The opex estimate makes several assumptions including:

- mining is by an experienced contractor
- the mining rates planned for are achieved
- the processing plant operates as expected by labour directly employed by Ark Mines
- workforce productivity meets industry standards
- availability of plant meets project design criteria.

15.2.2 Mining

Mining costs are based on a mining rate sufficient to deliver 20.8 Mtpa of ore to the processing plant working 333 days per year, 7 days per week, with two 12-hour shifts per day.

Estimations provided by mobile equipment suppliers, Hastings Deering, as well as benchmarking against other publicly available information has been applied. Mining costs include:

- fixed monthly contractor charges
- variable costs based on quantity of ore delivered to the feed hopper
- labour
- mining equipment hire and maintenance costs
- fuel and consumables.

15.2.3 Processing

Processing costs are based on treating ROM ore at a rate of 20.8 megatonnes per annum (Mt/a) and processing it into separate products for sale according to the product mix. The labour needed for processing includes:

- processing plant costs and maintenance
- residue strategy.

Processing plant labour costs are based on experience with similar operations and equipment as well as vendor input. The estimate represents averaged maintenance costs over several years of operation, an allowance has been included for infrastructure maintenance in the opex.

15.2.4 Services

Services are made up of the following:

- electrical power
- water supply
- fuel gas.

Electrical power costs are based on a processing plant site with a duel-fuel power plant contracted under a build–own–operate model with Ark Mines committing to take or pay for electrical power according to a contract schedule. The costs used in this scoping study are based on historical knowledge and consultant input.

15.2.5 Product logistics

This covers the costs associated with packaging the final saleable products and transporting them to an export seaport. It does not include shiploading or sea freight to customers and is based on quotations supplied by Qube Logistics.

15.2.6 General and administration

These costs include, but are not limited to:

- ongoing corporate costs
- communications
- property costs
- IT
- staff recruitment and training
- insurances
- costs for outsourced services, such as security, cleaning and waste disposal
- general site and road maintenance.

15.2.7 Contingency

No contingency allowance has been included in the opex estimate. Invariably real-world circumstances result in higher or lower costs being achieved which, when running financial models, needs to be taken into consideration for determining the robustness of a project to impacts from costs.

15.2.8 Owner’s costs (for the duration of build-up to production)

- administrative support
- owner's project manager
- process support
- computers and software
- communications
- travel and accommodation
- vehicles/hire cars and fuel
- other consultants
- surveying
- geotechnical surveying
- hydrologist
- environmental management plan development
- mine closure plan development
- establishing site induction

- recruitment of operators
- pre-operational training of operators
- safety inductions and mandatory mine department training
- development of training programme and trainers
- accounting expenses
- landowner compensation
- vendor representatives at commissioning
- establishment of operating company
- business systems development
- sunk costs
- project insurances
- legal fees
- technology fees
- permits and licences
- project financing fees
- working capital
- interest on loans
- duties and taxes
- freight and logistics
- first-fill reagents
- commissioning spares
- insurance spares
- maintenance spares.

16. ECONOMIC ANALYSIS

The 2024 assessment of the Sandy Mitchell Project underpins Ark Mines early production estimates and is anticipated to generate sufficient free cash flow (FCF) to enable subsequent expansion and acceleration opportunities to further develop Ark Mines regional reserves and resources.

The scoping study demonstrates strong financial returns and due to the low variance in mineral distribution a uniform and predictable cash flow for the life of the mine, Figure 15. The Project's, life cycle, and robust cash margins, demonstrate its viability and provide a compelling commercial case for advancement of the prefeasibility study (PFS) through to the definitive feasibility study (DFS) – the next phase for the implementation of the Sandy Mitchell Project. The project has a significant geographical advantage in that it is in a low-risk mining jurisdiction in Far North Queensland where the majority of all resource projects have been approved and will be well-serviced by an existing and efficient logistics network. The material and consistent net pre-tax cash flow generated under the initial six-year project plan and the overall long- term predicted mineral resources underpins its strategic value.

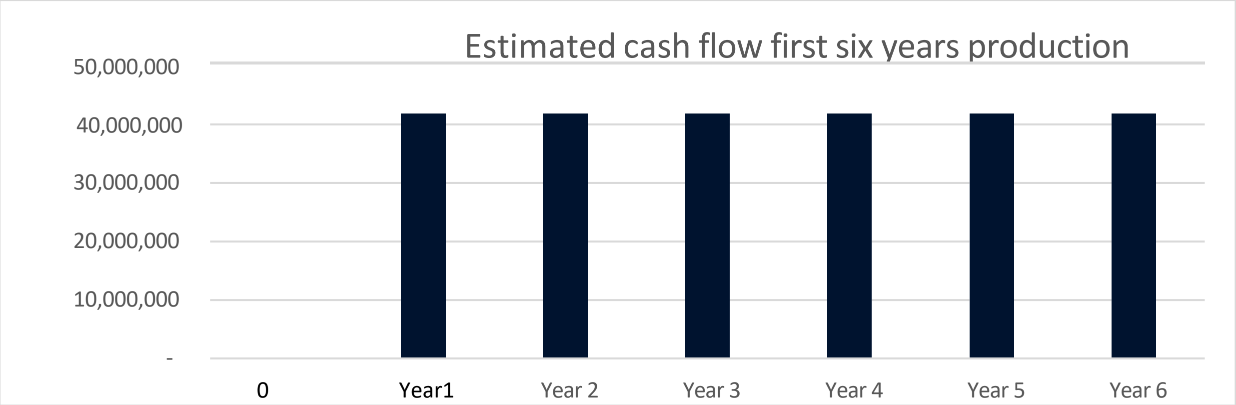

Figure 16: Estimated cash flow (AUD) based on consistent ore and recovery grades for first six years of production

Robust revenues are delivered from high-quality, high-value rare earth oxides (REO), as well as zircon and garnet products, providing a security of supply into key regional and global markets. The Sandy Mitchell Project is based on a nominal throughput rate of 20.8 megatonnes per annum (Mt/a) of ore using conventional and well-understood processing plant technology to produce a rare earth mineral concentrate (REMC) and zircon feedstock concentrate.

Test work to support the inclusion of a mineral separation plant (MSP), enabling the production of further refined high-value zircon and titania products. Table 14 also provides the subset of economic data in respect of the mining and processing operations (at a scoping study level of certainty) as a standalone operation. This scoping study financial analysis is based on capital, cost and revenue assumptions derived from market engagement, including equipment, transport and materials suppliers, and industry experts for independent product pricing. Foreign exchange and escalation rates are not included.

The economics for the scoping study are based on Ark Mines' MRE, as well as capital expenditure (capex) and operating expenditure (opex) forecasts developed during the scoping study phase. Owner's costs have been included with approximately a 10% cost of capex allowance. Project start-up is associated with high-confidence approvals, construction and a commissioning schedule.

The mining rate for the first six years of operation is based on 85% of the reported MRE or 20-22 megatonnes.

For the purpose of the scoping study, construction is estimated to be 10-12 months and first revenue within 6-9 months of start-up.

For completion, this section addresses Ark Mines' overall project development plan and anticipated operating life cycle. Therefore, certain aspects of this section necessarily incorporate data that is not addressed in detail in the foregoing sections of the scoping document. As noted above, such elements will be further addressed in detail during the PFS and DFS phases of the project cycle.

Basis of product prices assumptions

Monazite concentrate = ~AUD7400–7500 (https://www.metal.com/Concentrate/202403260008).

The scoping study uses AUD7400.

Zirconium silicate ($Zr(Hf)O_2 \geq 65\%$) = ~AUD2800–3200 (https://www.metal.com/Other-Minor-Metals/202210240001).

The scoping study uses AUD3100.

Titanium dioxide ($TiO_2 \geq 90\%$), Rutile = ~AUD3300 (https://www.metal.com/Titanium/202209050001).

The scoping study uses AUD2100.

Between 2013 and 2018, the average price for garnet was USD251.00 in Australia (https://arijco.com/garnet-abrasive-price/); therefore, the scoping study used AUD400.

Given the range of product tonnages, the status of testing and the short timeframe for phase 1 of the project (6 years), AHK have assumed pricing ranges applied will be the same for the current quoted LOM.

Prices are given per tonne in Australian dollars (AUD) and based on an exchange rate (USD0.67=AUD1) as of 1 November 2024.

Table 12: Estimated recoveries of product basket value

Product basket	**Estimated average value range**	**Unit of measure**	**Recovery (%)**
ROM	**20-22**	**Mt/a**	
Zircon	20-24 million	AUD	55-58
Rutile	220-240,000	AUD	2-3
Xenotime	7-9 million	AUD	40-44
Monazite	80-85 million	AUD	40-44
Garnet	13-16 million	AUD	55-58

The data obtained from the scoping study endorses Ark Mines' strategy of expediting the development of the greater Sandy Mitchell opportunity within the tenement.

The information set out below provides a summary of the material estimated economic outputs from the mine and the processing plant.

Table 13: Summary estimated economics of the Sandy Mitchell Project

			Mine 19-21 Mt/a (nominal)
Payback from commencement of production			3-4 years
Capex estimate			AUD120-150 million
First six-years metrics	LOM		3-4 yrs
	Processing capacity (ROM)		20-22 Mtpa
	Average strip ratio (i.e. waste:ore)		0.1:1
	production range (t/a)	zircon	7,500-8,000
		rutile	120-140
		REMC	12-14,000
		garnet	34-37,000
	Revenue range (per annum)		AUD120-130 million
	Opex range (per annum)		AUD75-83 million
	EBITDA range (per annum)		AUD45-53 million
	Revenue range per tonne of ore		AUD6-6,5 million
	Operating cost range per tonne of mined ore		AUD3–4
	Rare earth mineral concentrate (REMC) price (AUD/kg) (*15/08/22024, metal.com)*		7400-7500/t

The compelling economic benefits and high level of confidence in respect of the existing data leads Ark Mines to the decision to progress the Sandy Mitchell Project. The economic and associated production data herein incorporates the further development case. Where appropriate, project and economic information specific to the development case is separately identified.

The scoping study demonstrates that a 20.8 Mt/a run-of-mine (ROM) processing facility with a three-year plus mining operation (based on the Ark Mines' MRE) delivers a robust operation:

- A three to four year payback period from the start of production.
- Capex for the mine development and processing facilities estimated to be incurred before production are AUD120–150 million on a real 2024 basis, including costs to be incurred on preparatory and ancillary costs for front-end engineering and design (FEED), detailed design, land purchases and a pre-production mining operations phase of six months.

16.1 Key macroeconomic assumptions

Outcomes presented here are expressed in nominal Australian dollars (AUD).

Discount rate	8%
Landowner fees	1%

Taxes

Income tax – Ark Mines will be subject to Australian corporate income tax at 30%. All mineral products sold to international parties will be sold free alongside ship (FAS) or free on board (FOB). No international income tax liability is anticipated; however, the following taxes will apply:

- Goods and services tax (GST) – Ark Mines will be subject to Australian GST and exported mineral products will be zero-rated.
- Royalties – Queensland state royalties of 5% will be imposed on the NPV of the minerals and has been included in the financial analysis.

The loading options are FAS – Townsville, FAS – Darwin, FOB – Mourilyan Harbour.

Sensitivity Analysis

A sensitivity analysis was tested using key project inputs. Annual EBITDA is most sensitive to recoveries and REMC prices.

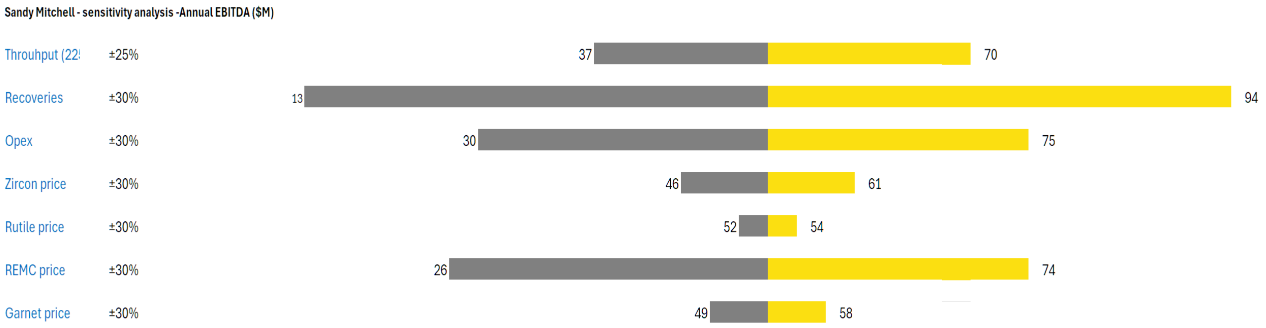

Figure 16: Sensitivity analysis for Annual EBITDA ($M) for the first six years of production

17. ADDITIONAL RELEVANT INFORMATION

All relevant information used throughout the Scoping Study is contained within the study document.

18. CONCLUSIONS AND RECOMMENDATIONS

The explorative test work to date has produced some positive results, however, some results suggest that further investigate and test work with other and additional processing options and techniques would be beneficial to lifting recoveries still further and allow a final flowsheet to be developed.

These include options to recover valuable minerals in oversize streams, wet gravity residue streams and dry processing streams.

Separation processes such as other wet gravity separation technology to compliment wet gravity spirals, targeted screening, upward current water classification, liberation of oversize will be assessed.

This proposed testwork will further enhance the knowledge of the in-ground material base, leading to achieving better overall mineral recoveries with greater returns for the Company.

19. RELIANCE ON INFORMATION PROVIDED

Information to support the Scoping Study has been provided by in-house geological investigations, internal work and that of supporting testing laboratories, engineering companies and equipment vendors as indicated in the scoping document and Ark Mines ASX announcements as listed below.

Ark Mines Ltd., 02 October 2024, Updated measured mineral resource estimate (MRE) at Sandy Mitchell rare earth and heavy mineral project [ASX Announcement], Ark Mines Ltd.: Sydney.

Ark Mines Ltd., 06 November 2024, Sandy Mitchell Project exploration target update [ASX Announcement], Ark Mines Ltd.: Sydney.

Competent Persons JORC Compliance Statements

I, Eugene Dardengo, a consultant to Harrier Project Management Pty Ltd and a Registered Member [106358] of the Australian Institute of Mining and Metallurgy confirm that, I am a Competent Person as defined by the JORC Code, 2012 Edition, having five years' experience that is relevant to the style of mineralization and type of deposit and to the activity for which I am accepting responsibility. I have reviewed the metallurgical testwork to date [8th November] and verified that the metallurgical testwork is fairly represented and reflects in the form and context in which it appears.

The information in this report that relates to Exploration Targets or Exploration Results, is based on information compiled by Mr Daemon de Chaeney, a Competent Person who is a Member of The Australasian Institute of Mining and Metallurgy (3003799), and the Australian Institute of Geoscientists (8284). Mr de Chaeney is a Principal Geologist employed by Empirical Earth Science (EES).
Mr de Chaeney has sufficient experience that is relevant to the style of mineralisation and type of deposit under consideration and to the activity being undertaken to qualify as a Competent Person as defined in the 2012 Edition of the 'Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves'. Mr de Chaeney consents to the inclusion in the report of the matters based on his information in the form and context in which it appears.

Daemon Sturt-Lindsay McMurtrie de Chaeney

SCOPING STUDY ENDS

Appendix B

JORC Code, 2012 Edition – Table 1 report template

Section 1 Sampling Techniques and Data

(Criteria in this section apply to all succeeding sections.)

Criteria	JORC Code explanation	Commentary
Sampling techniques	- *Nature and quality of sampling (eg 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 (eg '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 (eg submarine nodules) may warrant disclosure of detailed information.*	Ark Mines May to June 2023 Sandy Mitchell programme sampling techniques: - Samples are rock chips and accompanying bulk fines collected on 1m intervals by air core drill using 100mm bit. - Sample was passed through an 82.5: 12.5 riffle splitter to yield a representative aliquot of approx. 1.5 kg collected in prenumbered calico bag, and a remainder retained in a numbered plastic bag, with recoveries volumetrically estimated with periodic checks by mass using digital scale, compared against laboratory loose bulk density measurements. - Historic works by SGS (SGS Oretest Job No: S0580, 2010 for JOGMEC) shows mineralisation to have grainsize < = 125µm (very fine sand) and thus the sample mass is adequate for representivity. - Sample for total digest assay was sent to North Australian Laboratories for Assay. - Sample for pan concentration was sub-sampled by spade channel through the remainder sample to a mass of approx. 1kg per metre as determined by digital scales. These were then panned to a concentrate and the subsequent concentrates composited per hole. - Pan Con composite samples were sent to IHC Mining where samples were screened to -1mm, heavy minerals were further separated by heavy liquid separation with yields weighed at each stage. - The final heavy mineral concentrate was subject to Portable XRF analysis for a limited indicative assay. - Samples for preliminary metallurgical testing were sent to Downer Mineral Technologies and comprised the entire bulk metre remainder after riffle splitting the representative aliquot and removal of the 1kg pan concentrate aliquot. Ark Mines November to December 2023 Sandy Mitchell programme sampling techniques: - All sampling methodologies were as per the June programme, but the air core bit was exchanged for a reverse circulation face hammer to complete the end of hole, at the same diameter. - The bedrock horizon was determined by geological chip logging supported by driller's run sheet records of penetration. Ark Mines December 2023 Sandy Mitchell auger programme: - All sampling methodologies were as per the June

Criteria	JORC Code explanation	Commentary
		programme, but the drilling was via 100mm auger using 105mm bit sampled on 1m intervals. • Bedrock was not intersected and depth was constrained by penetration. • No concentrate or metallurgical samples were produced
Drilling techniques	• *Drill type (eg core, reverse circulation, open-hole hammer, rotary air blast, auger, Bangka, sonic, etc) and details (eg 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).*	Ark Mines May to June 2023 Sandy Mitchell programme: • Drill was by Comacchio track mounted air core rig using 100mm air core bit. • All holes were vertical and drilled to refusal or 17.5m, whichever came first. Ark Mines November to December 2023 Sandy Mitchell programme: • Drill was by AusRoc 4000 multi-purpose rig using 100mm and changing to slim line 100mm RC face hammer at depth. • All holes were vertical and drilled to complete the final metre in bedrock. Ark Mines November to December 2023 Sandy Mitchell auger programme sampling techniques: • Drilling was by Rockmaster utility mounted auger using 100mm flights and 105mm bit. • All holes were vertical and drilled to refusal whilst still in sands.
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.* • *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.*	Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme: • Recoveries were assessed by volumetric estimation by the metre based on total sample weights using a digital scale with comparison made via laboratory loose bulk density measurements. • Sample was passed through a cyclone with a gated chute to allow fines to fall out of the air stream. The chute was kept closed until the end of each metre had been drilled, then opened to collect sample, and closed prior to recommencement of drilling. • No relationship between recovery and grade has been identified. Ark Mines November to December 2023 Sandy Mitchell auger programme sampling techniques: • Recoveries were not estimated and the samples wit potential contamination by outside return, are treated as soils.
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*	Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme: • Sample was logged by the metre for all drilling, by the site geology team for both qualitative and quantitative criteria. • Drill logs for 100% of drilling are available with overall length of 3914.2m. • Logging is sufficient to support resource estimation, mining and metallurgical studies.

Criteria	JORC Code explanation	Commentary
	nature. Core (or costean, channel, etc) photography. - *The total length and percentage of the relevant intersections logged.*	Ark Mines November to December 2023 Sandy Mitchell programme sampling techniques: - Sample was logged by the metre for basic qualitative criteria only.
Sub-sampling 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 sub-sampling 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.*	Ark Mines May to June 2023 Sandy Mitchell programme: - All sample passed through the drill cyclone dry. - Sub-sampling for laboratory assay was by 87.5:12.5 riffle splitter: the bulk sample was passed evenly through the riffles with the assay aliquot collected in a pre-numbered calico bag, and the reject collected in a numbered plastic bag. - Field duplicates were taken at 1:40 by 50:50 riffle splitter. - Historic works by SGS (SGS Oretest Job No: S0580, 2010 for JOGMEC) shows mineralisation to have grainsize < 125µm (very fine sand) and thus the sample mass is representative. - Sample for pan concentration was sub-sampled by spade channel through the reject to a mass of approx. 1kg per metre as determined by digital scales. - Sample for preliminary metallurgical testing was selected from the 11m twinned hole SMDH 00014b and comprised the entire 87.5% bulk metre sample after riffle splitting to yield the representative sample and removal of the 1kg pan concentrate aliquot. Ark Mines November to December 2023 Sandy Mitchell programme: - All sampling was conducted as per the June 2023 programme, but duplicates at 1 in 40 were taken by passing the total reject sample through an 87.5:12.5 riffle splitter in the same manner as the primary sample. Ark Mines November to December 2023 Sandy Mitchell auger programme sampling techniques: - Sample was funneled up by spiral flights through a closed steel collar tube, to a collector plate, then funneled through a chute to a plastic collection tub. - Sub-sampling for laboratory assay was by 87.5:12.5 riffle splitter: the bulk sample was passed evenly through the riffles with the assay aliquot collected in a pre-numbered calico bag, and the reject was allowed to spill. - but duplicates at 1 in 40 were taken by passing the total reject sample through an 87.5:12.5 riffle splitter in the same manner as the primary sample.
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*	Ark Mines May to June 2023 Sandy Mitchell programme: - Metre samples were sent to North Australian Laboratories (NAL) for total digest assay: - Samples were weighed then kiln dried and re-weighed. - 1 in 5 samples was tested for moisture content. - 1 in 3 samples was tested for dry loose bulk density. - Sample was then pulverization in an LM-5 to 94% passing 75 µm with assay aliquot selected by laboratory splitter.

Criteria	JORC Code explanation	Commentary
	determining the analysis including instrument make and model, reading times, calibrations factors applied and their derivation, etc. • *Nature of quality control procedures adopted (eg standards, blanks, duplicates, external laboratory checks) and whether acceptable levels of accuracy (ie lack of bias) and precision have been established.*	• Al, Ca, Cr, Fe, Mg, P, S, Si and Ti were assayed by sodium peroxide fusion in nickel crucibles with ICP-OES finish. • Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, U, Zr, Hf, Nb, Ta, Sr, Pb and As were assayed by sodium peroxide fusion in nickel crucibles with ICP-MS finish. • Na and K were assayed by 4 acid digest with ICP-OES finish. • Field duplicates were taken at 1:40 by 50:50 riffle split of the assay aliquot. • For total digest samples: • Laboratory repeats were assayed at than 1 in 8. • Standard insertion was carried out by the laboratory at 1 in 24. • Assay of blank quartz flushes was carried out at 1 in 40. • Grind size testing was carried out at 1 in 34. • For pan concentrate samples • Laboratory repeats were requested at no less than 1 in 40. • Standard insertion was requested of the laboratory at no less than 1 in 40. • Assay of blank quartz flushes was requested at 1 in 40. • Total radiometric count was measured on all assay samples using a SAIC Exploranium GR-110G hand held scintillometer, hired from Terra Search Townsville, pre-calibrated. • Reading times were 10 second accumulations, which was the machine maximum, with 100x10 second background accumulations taken per day, per measuring station. • IHC Mining Laboratory procedures for pan concentrate composite samples was: • Creation of duplicates by split at a rate of 1 in 24 • Screen to -1mm and weigh • Heavy liquid separation and weigh • Pulverization of the heavy mineral fines by extended grind • Portable XRF analysis of the pulp • QAQC implemented is believed sufficient to establish accuracy and precision with any batches showing QAQC anomalies retested by batch. • Mineral Technologies preliminary met' samples were processed at bench scale by: • 55.2kg of individual samples were combined by rotary homogenisation then split to yield a representative aliquot of 38.3 kg for process testing. • The composite sample was screened to 2000 µm, 500 µm and wet screened at 20 µm with the 500 to 20 µm fraction then passed through 2 stages of gravity separation using Wilfley table (rougher stage). • The Wilfley concentrate was passed through a bromoform heavy liquid separation flask (cleaner

Criteria	JORC Code explanation	Commentary
		stage). - The HLS sinks were attrition cleaned for 5 minutes at a 65% wet weight density and deslimed, then passed through a Geoteknica FM3 froth floatation cell using starch depressant and sodium silicate surfactant. - Both sinks and floats were separately processed through a dry induced Reading magnetic separator. - This yielded 4 final streams of mag and non-mag floats (containing the bulk of REE) and mag and non-mag sinks, containing the bulk of zircon, as well as various tails from each previous stage. - Percentages of material passing or rejecting at each stage were determined by mass. - The float magnetic fraction was further refined by semi-lift magnetic separator to determine feasibility of individual mineral species separation, but the yields of this process were not assayed due to volumetric limits from this round of processing. • Mineral Technologies sent samples of the tails and product concentrates, excluding SLM stage products, to Bureau Veritas Brisbane for assay: - Samples were dried and pulverised using tungsten carbide bowls in a vibrating pulveriser to 90% passing 75 µm with a BQF before each sample. - Sample was fused to a glass bead to determine Fe, Si, Al, Cr, Mg, Mn, P, U, Th, V, Nb, S, Ca, K, Ce, Sn, Ti, and Zr oxides by XRF. - LOI was determined by mass after heating to 105°C (drying temp) and 1000°C (fusing temp). - Ce, Dy, Er, Eu, Gd, Ho, La, Lu, Nd, Pr, Sc, Sm, Tb, Tm, Y and Yb were determined by laser ablation of fused bead with ICP-MS finish. - Standards were assayed at 1 in 3 to cover all elements in the suite for both assay methods. - Laboratory repeats were carried out at 1 in 4. Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme: • Metre samples were sent to North Australian Laboratories (NAL) for total digest assay: • Samples were weighed then kiln dried and re-weighed. • 1 in 10 samples was tested for moisture content. • 1 in 10 samples was tested for LOI. • 1 in 3 samples was tested for dry loose bulk density. • Sample was then pulverization in an LM-5 to 94% passing 75 µm with assay aliquot selected by laboratory splitter. • Al, Ca, Cr, Fe, Mg, P, S, Si and Ti were assayed by sodium peroxide fusion in nickel crucibles with ICP-OES finish. • Sc, Y, La, Ce, Pr, Nd, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, Lu, Th, U, Zr, Hf, Nb, Ta, Sr, Pb and As were assayed by sodium peroxide fusion in nickel crucibles with ICP-MS finish. • Na and K were assayed by 4 acid digest with ICP-OES

Criteria	JORC Code explanation	Commentary

		finish.
		- Field duplicates were taken at 1:40 by 87.5:12.5 riffle split of the bulk reject.
		- For total digest samples:
		  - Laboratory repeats were requested at no less than 1 in 40 but carried out by the laboratory at 1 in 8.
		  - Standard insertion was carried out by the laboratory at 1 in 24.
		  - Assay of blank quartz flushes was requested at 1 in 40.
		  - Grind size testing was carries out at 1 in 34.
		- Total radiometric count, K%, U ppm and Th ppm was measured on all assay samples using an RSI RS-230 103 cm^3 bismuth germanate oxide crystal high sensitivity hand held spectrometer, purchased for the Project and, pre-calibrated.
		- Reading times were 30 second accumulations, with 20x30 second background accumulations taken per day, per measuring station, one set before and one set after measurement.
		Ark Mines December 2023 Sandy Mitchell auger programme sampling techniques:
		- Laboratory, analytical procedures, analytes and QC were identical to that described for the AC programme above .

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.*
		Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme (including auger):
		- Significant intersections have not been separately determined or reported.
		- 11 twin holes have been drilled for a total of 104.85 twin metres Two of these twins are using power auger to twin air core, to support reconnaissance works.
		- Data was entered into MS excel then verified against hard copy data, followed by import into Datamine Studio RM for validation.
		- Primary data is stored as hard copy, electronic tables in CSV format and Datamine format.
		- Assay data yielding elemental concentrations for rare earths (REE) within the sample are converted to their stoichiometric oxides (REO) in a calculation performed using the conversion factors in the table below.
		- Rare Earth oxide is the industry accepted form for reporting rare earths. The following calculations have been used for reporting:
		  - **TREO** = La2O3 + Ce02 + Pr6O11 + Nd2O3 + Sm2O3 + Eu2O3 + Gd2O3 + Tb4O7 + Dy2O3 + Ho2O3 + Er2O3 + Tm2O3 + Yb2O3 + Lu2O3+ Y2O3
		  - **CREO** = Nd2O3 + Eu2O3 + Tb4O7 + Dy2O3 + Y2O3
		  - **LREO** = La2O3 + Ce02 + Pr6O11
		  - **HREO** = Sm2O3 + Eu2O3 + Gd2O3 + Tb4O7 + Dy2O3 + Ho2O3 + Er2O3 + Tm2O3 + Yb2O3 + Lu2O3+ Y2O3
		  - **MagREO =** Pr6O11 + Nd2O3 + Tb4O7 + Dy2O3

Criteria	JORC Code explanation	Commentary

- **Where stated as +Y and or +Sc,** the calculated values above have the addition of Y2O3 and or Sc2O3
- ND/Pr = Nd2O3 + Pr6O11
- TREO – Ce = TREO – CeO2
- %NdPr + NdPr/TREO

- Economic heavy minerals, monazite, xenotime, zircon, rutile, high titanium leucoxene, low titanium leucoxene, altered ilmenite and ilmenite are potentially marketable materials contained in the mineralisation as demonstrated by IHC pan concentrate work and Downer Mineral Technologies gravity concentration work and ALS QEM Scan work to date.
- Assay data yielding elemental concentrations for rare earths (REE), Zr, Hf and Ti within the sample are converted to their stoichiometric heavy mineralogy in a calculation performed using the conversion factors in the table below. For elements that occur in more than one mineral, the proportions of occurrence in each were reported by ALS (ALS Mineralogy Report MIN 6943, 2024 for Mineral Technologies, commissioned by Ark Mines) and the assayed element is assigned by a percentage determined by these proportion, into the appropriate mineral species.
- The following calculated mineralogy has been used for reporting:
  - **Monazite** = (0 / 100 * Sc) * 3.1125 + (31.68 / 100 * Y) * 2.0682 + (99.27 / 100 * La) * 1.6837 + (99.17 / 100 * Ce) * 1.6778 + (99.6 /100 * Pr) * 1.6740 + (98.74 / 100 * Nd) * 1.6584 + (96.75 / 100 * Sm) * 1.6316 + (90.99 / 100 * Eu) * 1.6250 + (87.96 / 100 * Gd) * 1.6039 + + (73.26 / 100 * Tb) * 1.5976 + (54.32 / 100 * Dy) * 1.5844 + (36.49 / 100 * Ho) * 1.5758 + (20.76 / 100 * Er) * 1.5678 + (9.84 / 100 * Tm) * 1.5622 + (5.27 / 100 * Yb) * 1.5488 + (3.10 / 100 * Lu) * 1.5428 + (64.20 / 100 * Pb) * 1.4583 + (98.98 / 100 * Th) * 1.4093 + (71.35 / 100 * U) * 1.3990 + (0.97 / 100 * Ca) * 3.3696 + (6.35 / 100 * Sr) * 2.0839
  - **Xenotime** = (0.51 / 100 * Sc) * 3.1125 + (63.53 / 100 * Y) * 2.0682 + (0.01 / 100 * La) * 1.6837 + (0.04 / 100 * Ce) * 1.6778 + (0.11 /100 * Pr) * 1.6740 + (0.33 / 100 * Nd) * 1.6584 + (2.4 / 100 * Sm) * 1.6316 + (5.47 / 100 * Eu) * 1.6250 + (10.5 / 100 * Gd) * 1.6039 + (24.31 / 100 * Tb) * 1.5976 + (42.37 / 100 * Dy) * 1.5844 + (59.16 / 100 * Ho) * 1.5758 + (73.73 / 100 * Er) * 1.5678 + (83.07 / 100 * Tm) * 1.5622 + (85.42 / 100 * Yb) * 1.5488 + (85.38 / 100 * Lu) * 1.5428 + (0.19 / 100 * Pb) * 1.4583 + (0.62 / 100 * Th) * 1.4093 + (16.95 / 100 * U) * 1.3990 + (0 / 100 * Ca) * 3.3696 + (0.12 / 100 * Sr) * 2.0839
  - **Zircon** = (100 / 100 * Hf) * 1.5159 + (100 / 100 * Zr) * 2.0094
  - **Rutile** = (1.23 / 100 * Ti) * 1.6685
  - **High Ti Leucoxene** = (3.03 / 100 * Ti) * 1.9507
  - **Low Ti Leucoxene** = (1.84 / 100 * Ti) * 2.0448
  - **Altered Ilmenite** = (2.20 / 100 * Ti) * 2.7805
- **Ilmenite** = (2.09 / 100 * Ti) * 3.1694
- Stoichiometric Oxide Table:

Oxides	Stoichiometry	Deportment %
Sc_2O_3	1.5338	0.51
TiO_2	1.6685	10.39
Y_2O_3	1.2699	95.21
ZrO_2	1.3508	100.00
HfO_2	1.1793	100.00

Criteria	JORC Code explanation	Commentary

La_2O_3	1.1728	99.28
CeO_2	1.2284	99.21
Pr_6O_{11}	1.2082	99.71
Nd_2O_3	1.1664	99.07
Sm_2O_3	1.1596	99.15
Eu_2O_3	1.1579	96.46
Gd_2O_3	1.1526	98.46
Tb_4O_7	1.1762	97.57
Dy_2O_3	1.1477	96.69
Ho_2O_3	1.1455	95.65
Er_2O_3	1.1435	94.49
Tm_2O_3	1.1421	92.91
Yb_2O_3	1.1387	90.69
Lu_2O_3	1.1372	88.48
ThO_2	1.1379	99.60
U_3O_8	1.1792	88.30

- Stoichiometric Mineral Table:

Mineral	Formula	Element	Deportment%
Monazite	$Ca(PO_4)$	Ca	0.97
Xenotime	$Ca(PO_4)$	Ca	0.00
Monazite	$Sr(PO_4)$	Sr	6.35
Xenotime	$Sr(PO_4)$	Sr	0.12
Monazite	$Sc(PO_4)$	Sc	0.00
Xenotime	$Sc(PO_4)$	Sc	0.51
Monazite	$Y(PO_4)$	Y	31.68
Xenotime	$Y(PO_4)$	Y	63.53
Monazite	$La(PO_4)$	La	99.27
Xenotime	$La(PO_4)$	La	0.01
Monazite	$Ce(PO_4)$	Ce	99.17
Xenotime	$Ce(PO_4)$	Ce	0.04
Monazite	$Pr(PO_4)$	Pr	99.60
Xenotime	$Pr(PO_4)$	Pr	0.11
Monazite	$Nd(PO_4)$	Nd	98.74
Xenotime	$Nd(PO_4)$	Nd	0.33
Monazite	$Sm(PO_4)$	Sm	96.75
Xenotime	$Sm(PO_4)$	Sm	2.40
Monazite	$Eu(PO_4)$	Eu	90.99
Xenotime	$Eu(PO_4)$	Eu	5.47
Monazite	$Gd(PO_4)$	Gd	87.96
Xenotime	$Gd(PO_4)$	Gd	10.50
Monazite	$Tb(PO_4)$	Tb	73.26
Xenotime	$Tb(PO_4)$	Tb	24.31
Monazite	$Dy(PO_4)$	Dy	54.32
Xenotime	$Dy(PO_4)$	Dy	42.37
Monazite	$Ho(PO_4)$	Ho	36.49
Xenotime	$Ho(PO_4)$	Ho	59.16
Monazite	$Er(PO_4)$	Er	20.76
Xenotime	$Er(PO_4)$	Er	73.73
Monazite	$Tm(PO_4)$	Tm	9.84
Xenotime	$Tm(PO_4)$	Tm	83.07
Monazite	$Yb(PO_4)$	Yb	5.27

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td>Xenotime</td><td>$Yb(PO_4)$</td><td>Yb</td><td>85.42</td></tr>
<tr><td>Monazite</td><td>$Lu(PO_4)$</td><td>Lu</td><td>3.10</td></tr>
<tr><td>Xenotime</td><td>$Lu(PO_4)$</td><td>Lu</td><td>85.38</td></tr>
<tr><td>Monazite</td><td>$Pb(PO_4)$</td><td>Pb</td><td>64.20</td></tr>
<tr><td>Xenotime</td><td>$Pb(PO_4)$</td><td>Pb</td><td>0.19</td></tr>
<tr><td>Monazite</td><td>$Th(PO_4)$</td><td>Th</td><td>98.98</td></tr>
<tr><td>Xenotime</td><td>$Th(PO_4)$</td><td>Th</td><td>0.62</td></tr>
<tr><td>Monazite</td><td>$U(PO_4)$</td><td>U</td><td>71.35</td></tr>
<tr><td>Xenotime</td><td>$U(PO_4)$</td><td>U</td><td>16.95</td></tr>
<tr><td>Zircon</td><td>$Hf(SiO_4)$</td><td>Hf</td><td>100.00</td></tr>
<tr><td>Zircon</td><td>$Zr(SiO_4)$</td><td>Zr</td><td>100.00</td></tr>
<tr><td>Rutile</td><td>TiO_2</td><td>Ti</td><td>1.23</td></tr>
<tr><td>Hi Ti Leucoxene</td><td>$Ti_3O_3(OH)_6.TiO_2$</td><td>Ti</td><td>3.03</td></tr>
<tr><td>Lo Ti Leucoxene</td><td>$Ti_3O_3(OH)_6$</td><td>Ti</td><td>1.84</td></tr>
<tr><td>Altered Ilmenite</td><td>$Fe_2Ti_3O_9$</td><td>Ti</td><td>2.20</td></tr>
<tr><td>Ilmenite</td><td>$FeTiO_3$</td><td>Ti</td><td>2.09</td></tr>
</table>

Because other elements can occur in both xenotime and monazite, the calculation for these minerals should be considered the minimum.
Because Ti and to a far lesser extent Zr, can occur in other minerals not included in calculation, the calculated mineralogy for these elements should be considered a maximum.
However, in all case the quantity of economic heavy mineral is modified by the QEM Scan deportment percentage in the above table, such that only that percentage of each element that occurs in recoverable economic minerals is used to calculate the quantity and concentration of oxide or mineral.

</td></tr>
<tr><td><i>Location of data points</i></td><td>

<i>Accuracy and quality of surveys used to locate drill holes (collar and down-hole surveys), trenches, mine workings and other locations used in Mineral Resource estimation.</i>
<i>Specification of the grid system used.</i>
<i>Quality and adequacy of topographic control.</i>

</td><td>
Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme:

An initial collar survey by hand held GPS was conducted as a failsafe, with expected accuracy of ±5000mm in x and y, and ±50000mm in z.
Full survey by Twine Surveys was subsequently carried out using RTKdGPS with accuracy of ±20mm in x and y, and ±200mm in z
Twine’s professional RTK survey was implemented between drill collars and used to generate a digital terrain model for high quality topographic control.
All survey data is recorded in MGA 2020 zone 54 and AHD.

Ark Mines December 2023 Sandy Mitchell auger programme:

Collar survey was by hand held GPS with expected accuracy of ±5000mm in x and y, and ±50000mm in z.

</td></tr>
<tr><td><i>Data spacing and distribution</i></td><td>

<i>Data spacing for reporting of Exploration Results.</i>
<i>Whether the data spacing and distribution is sufficient to establish the degree of geological and grade</i>

</td><td>
Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme:

Data spacing for 3 lines of drilling is 60m x 120m.
Data spacing for the remaining 13 lines is 120m x 120m
No compositing has been applied to 1m samples for total digest assay.

</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	continuity appropriate for the Mineral Resource and Ore Reserve estimation procedure(s) and classifications applied. - *Whether sample compositing has been applied.*	- Pan concentrates were composited per drill hole. - Preliminary metallurgical sample was composited as discussed under *Laboratory Tests.* - Representative metre samples for total digest assay were not composited, residual sub-metre hole ends were similarly assayed separately to preserve geometric representation. Ark Mines December 2023 Sandy Mitchell auger programme: - Data spacing was approx. 360m. - Representative metre samples for total digest assay were not composited, residual sub-metre hole ends were similarly assayed separately to preserve geometric representation.
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.*	Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme (including auger): - Deposit type is unconsolidated restite sand derived by in-situ weathering, sometimes called saprolite sand, with minor perturbation by small scale fluvial channels. - The applied vertical sampling is the optimal orientation for the deposit type. - No bias by orientation or spatial relationships has been identified.
Sample security	- *The measures taken to ensure sample security.*	Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme (including auger): - Samples were collected after logging and transported at the end of each day to the company locked storage in Chillagoe. - Samples were boxed in closed pumpkin crates, wrapped in plastic for shipping by courier to the laboratory in Pine Creek, NT. - Samples for IHC Mining and Downer Mineral Technologies were similarly boxed, wrapped and couriered to the laboratories, but prior to shipping were stored on site at the Ark fenced bulk bag farm. - Bagged reject was stored on site in Ark's fenced secure bag farm and covered in UV resistant tarping for future use except for auger samples where rejects were not collected.
Audits or reviews	- *The results of any audits or reviews of sampling techniques and data.*	Ark Mines May to June 2023 and November to December 2023 Sandy Mitchell programme: - Full audit of sampling techniques and data available to date was carried out by geological consultants, Empirical Earth Science. - EES notes that the composited concentrate samples results in assay representing diluted material with no internal separation possible. - EES noted that the hand panning process of such fine material is prone to heavy mineral loss, with the

Criteria	JORC Code explanation	Commentary
		possibility that concentrates underrepresent the total heavy mineral fraction. • ESS noted that the pXRF technique used in initial concentrate assays is not suited to yield full REE data, but that the results can inform approximate proxy calculations for the full REE suite. • EES noted that none of these factors apply to the representative metre samples and total digest assays, which meet best practice. • EES noted that the preliminary metallurgy was of insufficient volume and source dispersion to represent the entire eventual resource, but was well suited to its stated purpose of proof of concept, testing recovery technique, and process to inform the next stage of bulk metallurgy. • EES also noted that the preliminary metallurgy was selected by reviewing pan con composite results, representing a median grade material within that data set, and is thus a reasonable preliminary representation of grade and recovery performance. • EES noted that the extensive QAQC in both Stage 1 and @ resource drilling, as well as reconnaissance drilling, was of good quality without significant bias, and showed that the data was fit for use in resource estimation in terms of accuracy, precision and bias. • EES noted that the reconnaissance auger data correlated within acceptable limits with the AC data and showed no undue bias or significant contamination, given the short hole depths, metre sampling and full QC suite.

Section 2 Reporting of Exploration Results

(Criteria listed in the preceding section also apply to this section.)

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.*	• EPM 28013 Sandy Mitchell is 100% owned by Ark Mines Limited and was purchased on the 23rd of February 2023. • This tenement was formally EPM18308. • There are no third party agreements. • No known issues impeding on the security of the tenure of Ark Mines ability to operate in the area exist.
Exploration done by other parties	• *Acknowledgment and appraisal of exploration by other parties.*	A number of companies and individuals have explored the area for gold and base metals and for heavy minerals. The summaries presented below are from the IRTM source:

Criteria	JORC Code explanation	Commentary
		• ATP 597M was granted to Laskan Minerals Pty Ltd in 1969 over the Reid Creek area, north of the Mitchell River. From assays of rock chip and stream sediment samples, it was concluded that there was little chance of economic mineralisation occurring in the Authority. Although good monazite grades were obtained, the samples were from creeks with little available wash. Good concentrations of monazite and ilmenite were present in large areas of sandy, alluvial sheet wash in the Reid's Creek area. It was believed that there was a potential for economic exploitation if the monazite concentrations occurred in a large enough volume of sandy material. No further work was reported. • In 1970, Altarama Search Pty Ltd was granted ATP 833M over the Mitchell River in the Reid Creek, Sandy Creek and Mount Mulgrave Homestead area. Four hundred stream sediment samples, at an average density of 1.25 samples/km^2, were collected for assay. Copper and lead contents were low. Half of the zinc results were considered to be possibly anomalous. A two population distribution was obtained for zinc, with a standard threshold of about 15 ppm. It was suggested that the two population distributions represented normal background ranges present in different strata. No other work was carried out. • ATP 2580M was granted to Tacam Pty Ltd over Sandy Creek and its tributaries. Stream sediment samples averaged 0.18% monazite (0.01 to 0.45%), 0.07% rutile (0.15% in terraces), and 0.06% zircon (0.14% in terraces). The area had low economic potential and the Authority was abandoned in August 1981. • The principals involved in Tacam Pty Ltd combined with Metcalfe Holdings Pty Ltd in 1986 to take up 4 Authorities to Prospect - 4400,4401,4402 and 4403 centred on Mt Mulgrave, Arkara Creek, Sandy Creek and the Kennedy River respectively. The investigations were for the possibility of locating large-scale heavy minerals in association with major drainages and lower slope eluvial deposits associated with Cretaceous weathering as indicated in previous investigations. EPM 4400, 4401, 4402 and 4403 • Barron and O'Toole focused on Mt Mulgrave for Ilmenite, rutile, REE, Monzonite, Zircon, and Gold.Tenement EPM 4400 consisted of 96 sub-blocks centred on Mount Mulgrave (7665, 7765), EPM 4401 consisted of 97 sub-blocks centred on Arkara Creek (7665), EPM 4402 consisted of 100 sub- blocks

Criteria	JORC Code explanation	Commentary
		centred on Sandy Creek (7665) and EPM 4403 consisted of 86 sub-blocks centred on Kennedy River (7666, 7766) were granted to P.T.C. Barron, A. O'Toole and Metcalfe Holdings Pty Ltd on 22 September 1986 to explore for heavy minerals and precious metals. After three years of exploration the EPMs were surrendered on 22 August 1989. • Tenement EPM 10185 consisted of 157 sub-blocks was granted to Palmer Gold Pty Ltd on 25 October 1994 for an initial 2 year period. The exploration permit was renewed for a further 3 years on 25 October 1996 and surrendered on 3 October 2001. The tenement was situated 200km west of Cooktown. Rationale Significant gold-silver, tin and base metal deposits are known from the Georgetown and southern Dargalong Inliers to the south of EPM 10185 (e.g. Etheridge, Croydon and Oaks goldfields), from the Hodgkinson Province to the east (e.g. Palmer, Hodgkinson, Russell River, Starcke, Jordon Ck, Mareeba and Mount Peter goldfields, and Herberton-Mt Garnet tinfield), and the Coen Inlier to the north (e.g. Alice River & Potallah goldfields). However, other than brief reference to sub-economic alluvial gold occurrences near the junction of the Palmer and Mitchell Rivers, and in the Staaten, Lynd and Walsh Rivers (Culpeper 1993), no precious or base metal deposits are known to occur within rocks of the Yambo Inlier. Application for the area was made after structural interpretation of the region showed prospectivity for gold occurrence. Base metal anomalies delineated from previous exploration were also targeted for follow-up work. • In 2007 exploration activity was carried out by BHP Billiton Minerals Pty Ltd under an extremely large area (2,850 sub-blocks) of the Coen Yambo area from 2005 to 2007. EPM's 14438 and 14445 covered the majority of the Yambo Inlier. BHP targeted Ni sulphide and PGM and carried out AEM surveying, field mapping and sampling and drilling. The AEM targets were found to be related to sedimentary lithological units or obvious shear zones. • In 2007 - 2009 - MTY Resources Ltd undertook bulk sampling program along with a Panned Concentrate sampling program. • In 2012 Waverley Nominees undertook an Augur sampling program.

Criteria	JORC Code explanation	Commentary
Geology	- *Deposit type, geological setting and style of mineralisation.*	- The tenement covers a portion of the southern extent of the Yambo Inlier, one of the several Proterozoic inliers to the west of the Palmerville Fault System. Rocks of the Yambo Inlier covered by the tenement comprise those of the middle Proterozoic Yambo Metamorphic Group of mainly amphibolites and gneisses ranging in age from ~1690 Ma to ~1585 Ma. - The dominant Yambo member on the tenement is the Chelmsford Gneiss, and this is thought to be the source of REE sands. - These rocks have been intruded by Silurian-Devonian granites of the Lukinville Suite which form an integral part of the Cape York Batholith. Within the tenement they form a belt roughly 10 km wide trending NNW. - Extensive intrusions of Carboniferous-Permian dolerites occur throughout the Inlier, with only a few occurrences within the tenement. - The tenement is largely gold deficient except for the gold reporting to sediments within the Palmer River to the north. Recent Governmental radiometric surveys have highlighted areas of anomalous radiometric emission within the Yambo Inlier. The project tenements cover the majority of the anomalous radiometric areas. - The project area in the tenement has a 3 to 25m, average 10.3m (stage 1 drilling) to 12.3m (stage 2 drilling), covering of disaggregated fine to very fine sand with sparse pebble or cobble horizons. These sands carry REE as monazite and lesser xenotime, zircon, rutile, illmenite and garnet. The sands are believed to derive from weathering of the Chelmsford Gneiss, with minimal fluvial transport largely constrained to the upper 2m. There is minor clay in the top 1 to 2m of sand which extends from daylight to the bedrock.

Drill hole Information	- *A summary of all information material to the understanding of the exploration results including a tabulation of the following information for all Material drill holes:*
	  ○ *easting and northing of the drill hole collar*
	  ○ *elevation or RL (Reduced Level – elevation above sea level in metres) of the drill hole collar*
	  ○ *dip and azimuth of the hole*
	  ○ *down hole 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*
		- Ark Mines 2023 drill data, refer to table in Appendix C Ark Mines ASX Announcement 2 October 2024

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td><i>from the understanding of the report, the Competent Person should clearly explain why this is the case.</i></td><td></td></tr>
<tr><td><i>Data aggregation methods</i></td><td>• <i>In reporting Exploration Results, weighting averaging techniques, maximum and/or minimum grade truncations (eg cutting of high grades) and cut-off grades are usually Material and should be stated.</i>
• <i>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.</i>
• <i>The assumptions used for any reporting of metal equivalent values should be clearly stated.</i></td><td>• No high or Low-grade top/bottom-cut has been applied to the data presented in Appendix C Ark Mines ASX Announcement 2 October 2024, which is the total data set.
• REE Equivalent TREO (total REE oxides) is reported as this is the industry standard for presentation of REE data. Stoichiometric calculation of REE oxide equivalents were performed in units of ppm, with TREO, LREO (light REE oxides), HREO (heavy REE Oxides), CREO (critical REE oxides) and Mag REO (magnet production REE oxides), as per Table 1 page 5 to 7, yielding these factors as concentrations and percentages of TREO concentration. These are modified by the elemental deportment percentages tabulated in Table 1 Sectio 1, which reduces the reported assay to only that percentage which is contained in economic heavy minerals.
• Calculated mineralogy reduced by the deportment percentages is used to derive a monazite equivalent, which represents the economic heavy minerals proportional to their value (as determined by an analysis of extensive market data), with respect the concentration of monazite.
• The assayed elements, coupled with QEMSCAN element proportions in ALS Job No: <i>MIN6934</i>, 2024 for Downer Mineral Technologies, allow calculation of monazite, xenotime, zircon, rutile, high titanium leucoxene, low titanium leucoxene, altered ilmanite and ilmenite concentrations stoichiometrically, as described in Table 1 page 5 to 7.
• The ratio of 5 year median values of these minerals to monazite, yields a table of unitless factors:
<table>
<tr><th>Mineral</th><th></th><th>Ratio</th></tr>
<tr><td>monazite</td><td></td><td>1.000</td></tr>
<tr><td>xenotime</td><td></td><td>1.000</td></tr>
<tr><td>zircon</td><td></td><td>0.361</td></tr>
<tr><td>rutile</td><td>$TiO_2 > 95\%$</td><td>0.281</td></tr>
<tr><td>hi Ti leucoxene</td><td>$TiO_2 > 85\%$</td><td>0.165</td></tr>
<tr><td>lo Ti leucoxene</td><td>$TiO_2 > 70\%$</td><td>0.126</td></tr>
<tr><td>altered ilmenite</td><td>$TiO_2 > 55\%$</td><td>0.072</td></tr>
<tr><td>ilmenite</td><td>$TiO_2 > 50\%$</td><td>0.065</td></tr>
</table>
• These factors are applied to the corresponding separate mineral concentrations in PPM for a given element assay, and the results are summed to give a monazite equivalent in PPM for that assay:
MzEq = 1.000 * monazite + 1.000 * xenotime + 0.361 * zircon + 0.281 * rutile + 0.165 * hi Ti leucoxene + 0.126 *</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
		lo Ti leucoxene + 0.072 * altered ilmenite + 0.065 * ilmenite • If the stoichiometric conversions to mineral mass, the QEM deportment to economic heavy minerals, and the monazite equivalent factors are applied as a single equation, this can be expressed as: **MzEq** = **1.000** * ((0 / 100 * Sc) * 3.1125 + (31.68 / 100 * Y) * 2.0682 + (99.27 / 100 * La) * 1.6837 + (99.17 / 100 * Ce) * 1.6778 + (99.6 /100 * Pr) * 1.6740 + (98.74 / 100 * Nd) * 1.6584 + (96.75 / 100 * Sm) * 1.6316 + (90.99 / 100 * Eu) * 1.6250 + (87.96 / 100 * Gd) * 1.6039 + + (73.26 / 100 * Tb) * 1.5976 + (54.32 / 100 * Dy) * 1.5844 + (36.49 / 100 * Ho) * 1.5758 + (20.76 / 100 * Er) * 1.5678 + (9.84 / 100 * Tm) * 1.5622 + (5.27 / 100 * Yb) * 1.5488 + (3.10 / 100 * Lu) * 1.5428 + (64.20 / 100 * Pb) * 1.4583 + (98.98 / 100 * Th) * 1.4093 + (71.35 / 100 * U) * 1.3990 + (0.97 / 100 * Ca) * 3.3696 + (6.35 / 100 * Sr) * 2.0839) + **1.000** * ((0.51 / 100 * Sc) * 3.1125 + (63.53 / 100 * Y) * 2.0682 + (0.01 / 100 * La) * 1.6837 + (0.04 / 100 * Ce) * 1.6778 + (0.11 /100 * Pr) * 1.6740 + (0.33 / 100 * Nd) * 1.6584 + (2.4 / 100 * Sm) * 1.6316 + (5.47 / 100 * Eu) * 1.6250 + (10.5 / 100 * Gd) * 1.6039 + (24.31 / 100 * Tb) * 1.5976 + (42.37 / 100 * Dy) * 1.5844 + (59.16 / 100 * Ho) * 1.5758 + (73.73 / 100 * Er) * 1.5678 + (83.07 / 100 * Tm) * 1.5622 + (85.42 / 100 * Yb) * 1.5488 + (85.38 / 100 * Lu) * 1.5428 + (0.19 / 100 * Pb) * 1.4583 + (0.62 / 100 * Th) * 1.4093 + (16.95 / 100 * U) * 1.3990 + (0 / 100 * Ca) * 3.3696 + (0.12 / 100 * Sr) * 2.0839) + **0.361** * ((100 / 100 * Hf) * 1.5159 + (100 / 100 * Zr) * 2.0094) + **0.281** * ((1.23 / 100 * Ti) * 1.6685) + **0.165** * ((3.03 / 100 * Ti) * 1.9507) + **0.126** * ((1.84 / 100 * Ti) * 2.0448) + **0.072** * ((2.20 / 100 * Ti) * 2.7805) + **0.065** * ((2.09 / 100 * Ti) * 3.1694) • The basket of heavy mineral concentrations is equated proportional to monazite concentration. These proportions are set by their respective average market values across the 2024 financial year, which was found to be well representative of the market data set from 2016 to date when outliers had been excluded as calculated using the Z test. • The monazite equivalent purpose is to afford relative data and grade comparison and assessment as a concertation, and does not directly represent actual product value. Its main benefit is simplification of interpretation of a complex data set and reduction of human error. • The cutoff grade is calculated on monazite equivalent (Mz Eq) which allows the value in the potentially saleable commodities to be tied together in a single calculation, and visible in the drill data in a single instance. • The cutoff grade applied is 700 ppm Mz Eq.
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 drill hole 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*	• Ark Mines May to June 2023 drill data shows no regular variation in REE distribution beyond the top 1m where obvious and avoidable fluvial action may result in some supergene enrichment or silt deposition based dilution. • The mineralisation is essentially flat lying, and thus intercept width on the vertical holes drilled is at or approaching the geometric minimum width, which is optimal. • Consequently, only down hole length are reported and these are equivalent to true thickness.

Criteria	JORC Code explanation	Commentary
	(eg 'down hole length, true width not known').	
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.*	- Diagrams as appropriate accompany the announcement
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.*	- Appendix C Ark Mines ASX Announcement 2 October 2024, contains the total data set.
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.*	- All data material to this report that has been collected to date has been reported textually, graphically or both.
Further work	- *The nature and scale of planned further work (eg 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.*	- Ark plans further resource estimation based on the November to December 2023 drilling when assays are returned. - Ark plans further gravity beneficiation and metallurgical test work on a larger sample basis, investigating several different techniques to determine optimal processing. - Ark also plans pilot plant test work and other feasibility studies. - Ak plans further auger reconnaissance works across the tenement.

Section 3 Estimation and Reporting of Mineral Resources

(Criteria listed in section 1, and where relevant in section 2, also apply to this section.)

Criteria	JORC Code explanation	Commentary
Database integrity	- *Measures taken to ensure that data has not been corrupted by, for*	- The database was created by HGS Australia for the purpose of conducting a resource evaluation. - The resource evaluation was conducted by HGS Australia

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td>*example, transcription or keying errors, between its initial collection and its use for Mineral Resource estimation purposes.*
• *Data validation procedures used.*</td><td></td></tr>
<tr><td>*Site visits*</td><td>• *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.*</td><td>• No site visits were conducted by HGS Australia</td></tr>
<tr><td>*Geological interpretation*</td><td>• *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.*</td><td>• The resource area has been sufficiently interpreted by geological consultants and the geology matches grade and geological interpretations as anticipated.
• Criteria used in the interpretations were:
  • Interpretations were based on the MzEq (monzonite equivalent) grade defined from element ratios and formulas.
  • A nominal 700ppm MzEq lower cut-off grade with flexibility for geological continuity.
  • Sections extended half the distance from the previous section.</td></tr>
<tr><td>*Dimensions*</td><td>• *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.*</td><td>• Mineralised outlines were interpreted by HGS within the coordinates:
  ○ 8193000N – 8195100N
  ○ 812400E – 814700E
  ○ 130mRL – 190mRL</td></tr>
<tr><td>*Estimation and modelling techniques*</td><td>• *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*</td><td>• The models were created using Surpac software.
• Reported Interpolation method used is Ordinary Kriging
• Interpolation validation method of inverse distance squared was conducted as a check.
• Grade cutting was variable within the 24 elements due to significant outliers. A list of the cut elements are as follows:
<table>
<tr><th>Element</th><th>High Grade Cut Use</th></tr>
<tr><td>Sc</td><td>50</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr>
<td></td>
<td><i>points. If a computer assisted estimation method was chosen include a description of computer software and parameters used.</i>
• <i>The availability of check estimates, previous estimates and/or mine production records and whether the Mineral Resource estimate takes appropriate account of such data.</i>
• <i>The assumptions made regarding recovery of by-products.</i>
• <i>Estimation of deleterious elements or other non-grade variables of economic significance (eg sulphur for acid mine drainage characterisation).</i>
• <i>In the case of block model interpolation, the block size in relation to the average sample spacing and the search employed.</i>
• <i>Any assumptions behind modelling of selective mining units.</i>
• <i>Any assumptions about correlation between variables.</i>
• <i>Description of how the geological interpretation was used to control the resource estimates.</i>
• <i>Discussion of basis for using or not using grade cutting or capping.</i>
• <i>The process of validation, the checking process used, the comparison of model data to drill hole data, and use of reconciliation data if available.</i></td>
<td>
<table>
<tr><td>Y</td><td>87</td></tr>
<tr><td>La</td><td>295</td></tr>
<tr><td>Ce</td><td>No cutting</td></tr>
<tr><td>Pr</td><td>71</td></tr>
<tr><td>Nd</td><td>207</td></tr>
<tr><td>Sm</td><td>41</td></tr>
<tr><td>Eu</td><td>10</td></tr>
<tr><td>Gd</td><td>23</td></tr>
<tr><td>Tb</td><td>No Cutting</td></tr>
<tr><td>Dy</td><td>22</td></tr>
<tr><td>Ho</td><td>No cutting</td></tr>
<tr><td>Er</td><td>12.3</td></tr>
<tr><td>Tm</td><td>No Cutting</td></tr>
<tr><td>Yb</td><td>13.5</td></tr>
<tr><td>Lu</td><td>No cutting</td></tr>
<tr><td>Th</td><td>180</td></tr>
<tr><td>U</td><td>10</td></tr>
<tr><td>Zr</td><td>1400</td></tr>
<tr><td>Hf</td><td>65</td></tr>
<tr><td>Nb</td><td>76</td></tr>
<tr><td>As</td><td>85</td></tr>
<tr><td>Ti</td><td>15800</td></tr>
<tr><td>S</td><td>5100</td></tr>
<tr><td>Ca</td><td>133400</td></tr>
</table>
</td>
</tr>
</table>

Criteria	JORC Code explanation	Commentary

Type	Northing	Easting	Elevation
Minimum Coordinates	8193000	812400	130
Maximum Coordinates	8195100	814700	190
User Block Size	50	25	2
Min. Block Size	12.5	6.25	0.5
Rotation	0	0	0
Total Blocks	331730		
Storage Efficiency %	95.52		

- Model sizes and parameters are:

Attribute Name	Type	Decimals	Background	Description
alt_ilmenite	Float	2	0	Calculation for Altered Ilmenite
creo	Float	2	0	calculated CREO
hi_ti_leucoxene	Float	2	0	Calculated Hi Ti Leucoxene
hreo	Float	2	0	calculated HREO
ilmenite	Float	2	0	Calculated Ilmenite
lo_ti_leucoxene	Float	2	0	Calculated Lo Ti Leucoxene
lode	Integer	-	0	Lode = 1 waste=0
lreo	Float	2	0	calculated LREO
magreo	Float	2	0	calculated MagREO
monazite	Float	2	0	Calculated monazite
mzeq	Float	2	0	Calculated Monazite Equivilent MzEq
ok1	Float	2	0	Sc interpolation using Ordinary Kriging
ok10	Float	2	0	Tb interpolation using Ordinary Kriging
ok11	Float	2	0	Dy interpolation using Ordinary Kriging
ok12	Float	2	0	Ho interpolation using Ordinary Kriging
ok13	Float	2	0	Er interpolation using Ordinary Kriging
ok14	Float	2	0	Tm interpolation using Ordinary Kriging

Criteria	JORC Code explanation	Commentary				
		ok15	Float	2	0	Yb interpolation using Ordinary Kriging
		ok16	Float	2	0	Lu interpolation using Ordinary Kriging
		ok17	Float	2	0	Th interpolation using Ordinary Kriging
		ok18	Float	2	0	U interpolation using Ordinary Kriging
		ok19	Float	2	0	Zr interpolation using Ordinary Kriging
		ok2	Float	2	0	Y interpolation using Ordinary Kriging
		ok20	Float	2	0	Hf interpolation using Ordinary Kriging
		ok21	Float	2	0	Nb interpolation using Ordinary Kriging
		ok22	Float	2	0	As interpolation using Ordinary Kriging
		ok23	Float	2	0	Ti interpolation using Ordinary Kriging
		ok24	Float	2	0	S interpolation using Ordinary Kriging
		ok25	Float	2	0	Ca interpolation using Ordinary Kriging
		ok3	Float	2	0	La interpolation using Ordinary Kriging
		ok4	Float	2	0	Ce interpolation using Ordinary Kriging
		ok5	Float	2	0	Pr interpolation using Ordinary Kriging
		ok6	Float	2	0	Nd interpolation using Ordinary Kriging
		ok7	Float	2	0	Sm interpolation using Ordinary Kriging
		ok8	Float	2	0	Eu interpolation using Ordinary Kriging
		ok9	Float	2	0	Gd interpolation using Ordinary Kriging
		rutile	Real	-	0	calculated rutile
		sg	Float	2	0	interpolated density data
		treo	Float	2	0	calculated TREO
		treo_y_sc	Float	2	0	calculated TREO + Y + Sc
		xenotime	Float	2	0	calculated xenotime

<table>
<tr><th>Criteria</th><th>JORC Code explanation</th><th>Commentary</th></tr>
<tr><td></td><td></td><td><table><tr><td>zircon</td><td>Float</td><td>2</td><td>0</td><td>calculated zircon</td></tr></table>
• The interpolation pass parameters used are as follows for all elements:
  • Pass 1: 6-30 samples 100m max search
  • Pass 2: 3-30 samples 200m max search
  • Pass 3: 1-30 samples 500m max search</td></tr>
<tr><td><i>Moisture</i></td><td>• <i>Whether the tonnages are estimated on a dry basis or with natural moisture, and the method of determination of the moisture content.</i></td><td>• Tonnages were estimated as dry basis</td></tr>
<tr><td><i>Cut-off parameters</i></td><td>• <i>The basis of the adopted cut-off grade(s) or quality parameters applied.</i></td><td>• Univariate statistics were conducted. Upper cut determinations were conducted from histograms and probability plots.</td></tr>
<tr><td><i>Mining factors or assumptions</i></td><td>• <i>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.</i></td><td>• Resource economics identifies the probable lower cut-off to be 700ppm MzEq
• The resource is flat and exposes the surface to a max depth of 15m. The anticipated mining method will be either excavator, continuous minor or scrapers. Blasting is not considered. A large scale cheap mining method can be employed and all mineralisation will be considered for this evaluation.</td></tr>
<tr><td><i>Metallurgical factors or assumptions</i></td><td>• <i>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</i></td><td>• Ark conducted metallurgical testwork following encouraging results from initial exploration and to assist with next stage development.
• The work was conducted by Mineral Technologies Carrara Laboratory in Queensland and conducted on drill core samples sourced from the deposit.
• The metallurgical characterisation was performed using approximately 40kg of feed material and using bench-scale</td></tr>
</table>

Criteria	JORC Code explanation	Commentary
	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.	equipment to assess response of the ore sample to conventional beneficiation techniques and show product purity after each stage of separation. The simulated industrial stages and their aims are listed below: • Size classification to remove slimes, trash oversize and prepare sand suitable for beneficiation, Gravity separation to recover the valuable heavy mineral components to concentrate, Mechanical attrition to clean mineral surfaces, followed by froth flotation to extract rare earth minerals, Magnetic separation to perform a final upgrade of the flotation rare-earth concentrate. • The final concentrate assays 51.9% TREO, and contained mostly heavy rare-earth elements La, Ce, Pr and Nd. • Direct CeO2 recovery from gravity feed to REM concentrate is estimated to be 71.7%. • It is noted that approximately 16.9% of Ce-minerals were stranded in laboratory test work intermediate streams which would normally be recycled in a continuous operation, thereby suggesting overall recovery of 83.8% may be achieved.
Environmen-tal 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.*	• No assessments have been made yet
Bulk density	• *Whether assumed or determined. If assumed, the basis for the assumptions. If*	• Bulk densities for 495 samples were conducted from the drill program and interpolated into the model. Densities ranged from 1.24t/m³ to 1.92 t/m³ with an average of 1.52 t/m³

Criteria	JORC Code explanation	Commentary
	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.*	
Classification	- *The basis for the classification of the Mineral Resources into varying confidence categories.* - *Whether appropriate account has been taken of all relevant factors (ie 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.*	- The classification for this resource is conducted according to JORC 2012 guidelines. HGS considers the resource to be sufficiently drilled to be classified as **measured**. The reasons are: - Consistency of the drilling data on a 100m x 100m staggered pattern is such that any infill drilling will have no impact on the structure or grade distribution. Mineralisation and interpretation is consistent throughout the drilling area. - Quality control and quality assurance of the drilling was conducted to a high level industry standard that can identify issues in drilling methods and laboratory assaying. There were no issues raised regarding the method of drilling, quality of the sampling or laboratory preparation and assaying. - Collar pickups were conducted by a qualified surveyor. - Drill density is sufficient to have good understanding mineralisation controls. - There is a strong recognition of the geological controls on the mineralisation. - Variability in the grade distribution is sufficient to create quality variograms. - A good degree of metallurgical understanding. - Shallow mineralisation from surface indicates a simple and cheap mining method. - The results reflect the competent person.
Audits or reviews	- *The results of any audits or reviews of Mineral Resource estimates.*	- None available
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*	- The competent person has confidence in the interpretation with regards to accuracy for the classification announced. - The interpolation process was run in inverse distance squared to compare a complex algorithm to a simple one.

Criteria	JORC Code explanation	Commentary
	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 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.*	