

# ASX ANNOUNCEMENT

30 JANUARY 2024

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## QUARTERLY ACTIVITIES REPORT FOR THE PERIOD ENDED 31 DECEMBER 2023

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*“Our efforts in the December quarter were further focused on the ongoing development of the Sandy Mitchell Rare Earth project, including a second phase of drilling, environmental scoping and metallurgical test work. We remain of the view that the Rare Earth placer sand deposit package at Sandy Mitchell is highly prospective, with assay results and metallurgical studies to date indicating we have a unique rare earth deposit which is amenable to simple mining, gravitational beneficiation and marketing from a sand which carries both Rare Earth and Heavy minerals from surface to approximately 12m over an extensive area in North Queensland.” Roger Jackson, Executive Chairman.*

### EXPLORATION HIGHLIGHTS FOR THE QUARTER

- The initial batch of assays returned for the first phase of drilling during the quarter reported Total Rare Earth Oxides plus Yttrium and Scandium averaging grades of 503.5ppm with highest grades of 1175.4 ppm per meter. Light Rare Earth average grade for every meter assayed 454.3 ppm with the highest grades of 1048 ppm. Heavy Rare Earth plus Yttrium average grade for every meter assayed 49.2 ppm with the highest grades of 129.3 ppm<sup>1</sup>
- Magnet metals made up 23% of the TREO.<sup>1</sup>
- Stage 2 of Ark Mines Sandy Mitchell resource drill programme was completed during the quarter for 2426 m of drilling with REE and HM mineralisation visible in every hole.
- Reconnaissance Augur drilling, with the company’s drill rig, was undertaken over the greater extent of the tenement during the quarter.
- Mineralisation in sand from surface to the metamorphic bedrock averages 12.9 m in depth with the deepest hole to date being 25.5 m of sand above bedrock.
- There is no overburden at this project; logging and assays returned to date show mineralisation from bedrock to surface.
- Further assay results during quarter indicated representative metre samples assayed to date show:
  - The area of resource grid drilling, including stage 2 and stage 1 (completed in June 2023), covers an area of 3.6 km<sup>2</sup>; only 3.6% of the total high range radiometric area on the tenement. (Refer to Image 2)

For the assays received to date:

- Total Rare Earth Oxides plus Yttrium and Scandium average grade of 435.7 ppm, with highest grade of 1642.9 ppm; <sup>2</sup>
- Light Rare Earth plus Scandium average grade 392.0 ppm with the highest grade of 1603.1 ppm, and comprised 89.9% of TREO+Y+Sc. <sup>2</sup>
- Heavy Rare Earth plus Yttrium average grade of 43.7 ppm with the highest grade of 319.3 ppm, and comprised 10.0% of TREO+Y+Sc. <sup>2</sup>
- Magnetic Rare earth Oxides average grade of 93.2 ppm with the highest grades of 317.8 ppm, and comprised 21.4% of TREO+Y+Sc. <sup>2</sup>

(Note: This is without a cutoff grade and is an average for every meter drilled)

- First pass un-optimised beneficiation test work of the Sandy Mitchell Rare Earth sands has produced a high-grade rare earth concentrate. (I.e. >50% Monazite)
- The beneficiation test work has shown the greatest upgrade is by simple gravity separation, confirming the material is amenable to straightforward beneficiation by gravity processing.<sup>2</sup>
- The final concentrate assays returned 51.9% TREO, and contained mostly La, Ce, Pr and Nd, plus Heavy Rare Earths Dy and Tb, which collectively represents a very high value saleable product.<sup>3</sup> (Refer to Table 1)
- Direct cerium oxide (CeO<sub>2</sub>) recovery from gravity feed to REM concentrate is estimated to be 71.7%, with indications that >83% may be achievable.
- In ceric oxide recovery, the CeO<sub>2</sub> content is used as a tracer for the rare-earth bearing mineral monazite which was subsequently upgraded from 0.04% in the as-received feed, to 23.6% in the cleanest product.
- Similar upgrade trends are observed for zirconium dioxide (ZrO<sub>2</sub>).
- The Rare Earths at Sandy Mitchell are all hosted in sand, the preferred style of Rare Earth deposit as they do not need to be extracted from clay with chemicals or rock by comminution and processing.
- Water monitoring bores were drilled and constructed at the Sandy Mitchell project as part of the environmental base line study.

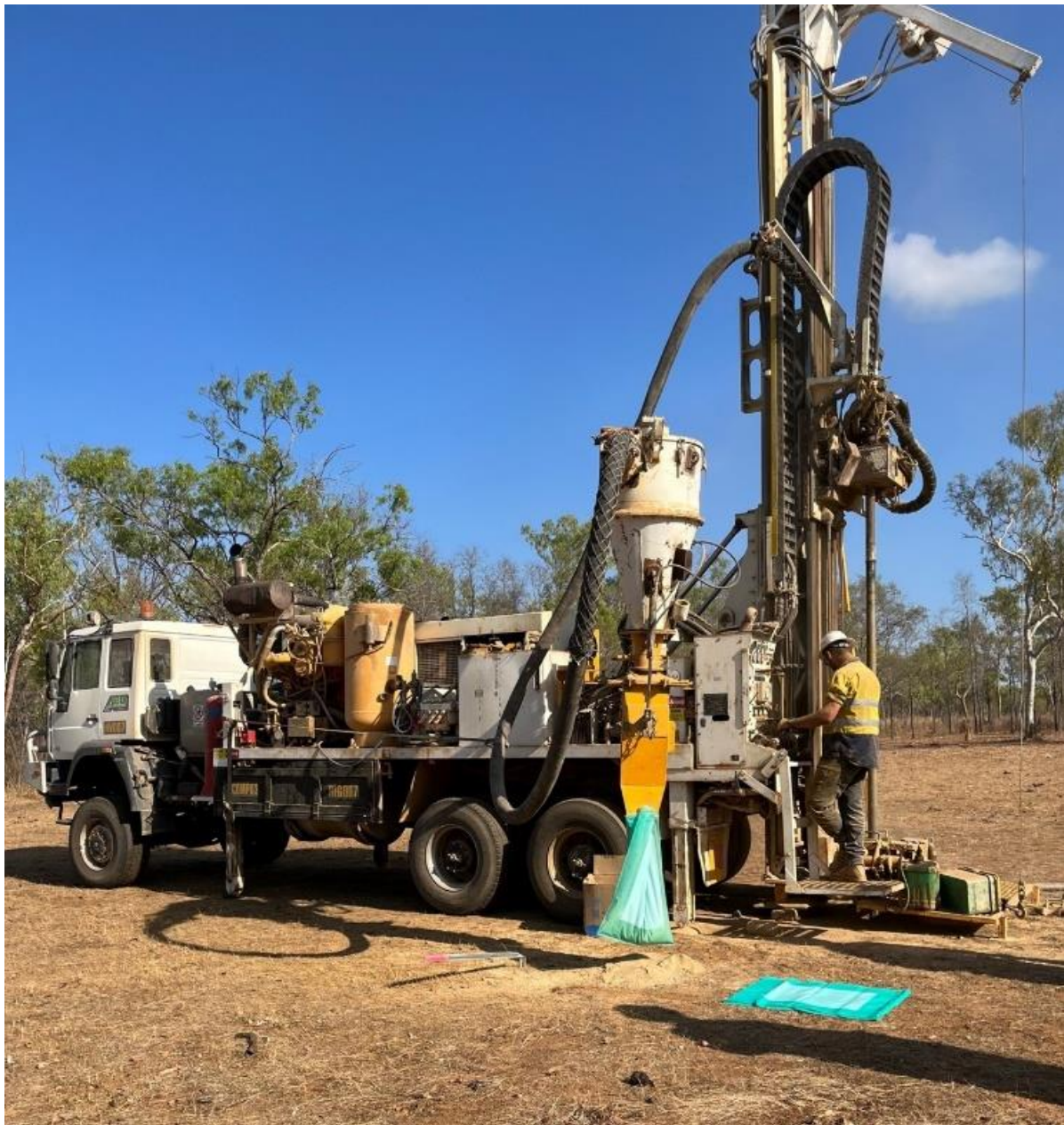
<sup>1</sup>Refer to AHK ASX Announcement 30<sup>th</sup> of October 2023

<sup>2</sup> Refer to AHK ASX Announcement 18<sup>th</sup> of December 2023

<sup>3</sup> Refer to AHK ASX Announcement 24<sup>th</sup> of November 2023

### SANDY MITCHELL - 2<sup>nd</sup> Phase of Drilling

- During the quarter the Second phase of Ark Mines Sandy Mitchell resource drill programme was completed for 2426 m of drilling with REE and HM mineralisation visible in every hole.
- Mineralisation in sand from surface to the metamorphic bedrock averages 12.9 m in depth with the deepest hole to date being 25.5 m of sand above bedrock.
- There is no overburden at this project; logging and assays returned to date show mineralisation from bedrock to surface.
- The area of resource grid drilling, including stage 2 and stage 1 (completed in June 2023), covers an area of 3.6 km<sup>2</sup>; only 3.6% of the total high range radiometric area on the tenement. (refer to image 2 and 3)



*Image 1: The mounted Aircore RC drill rig on site at Ark's 100%-owned Sandy Mitchell Rare Earths Project.*

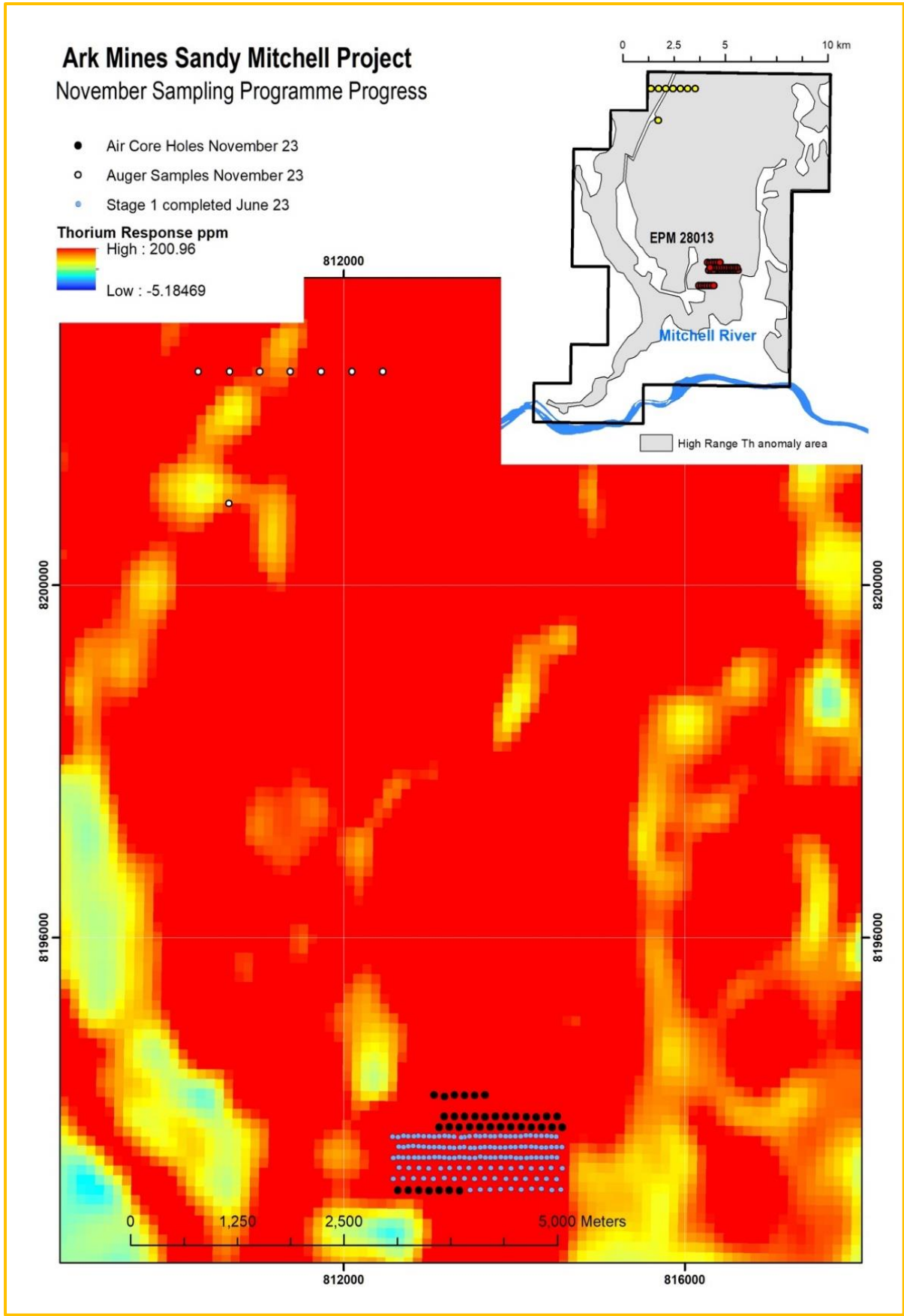
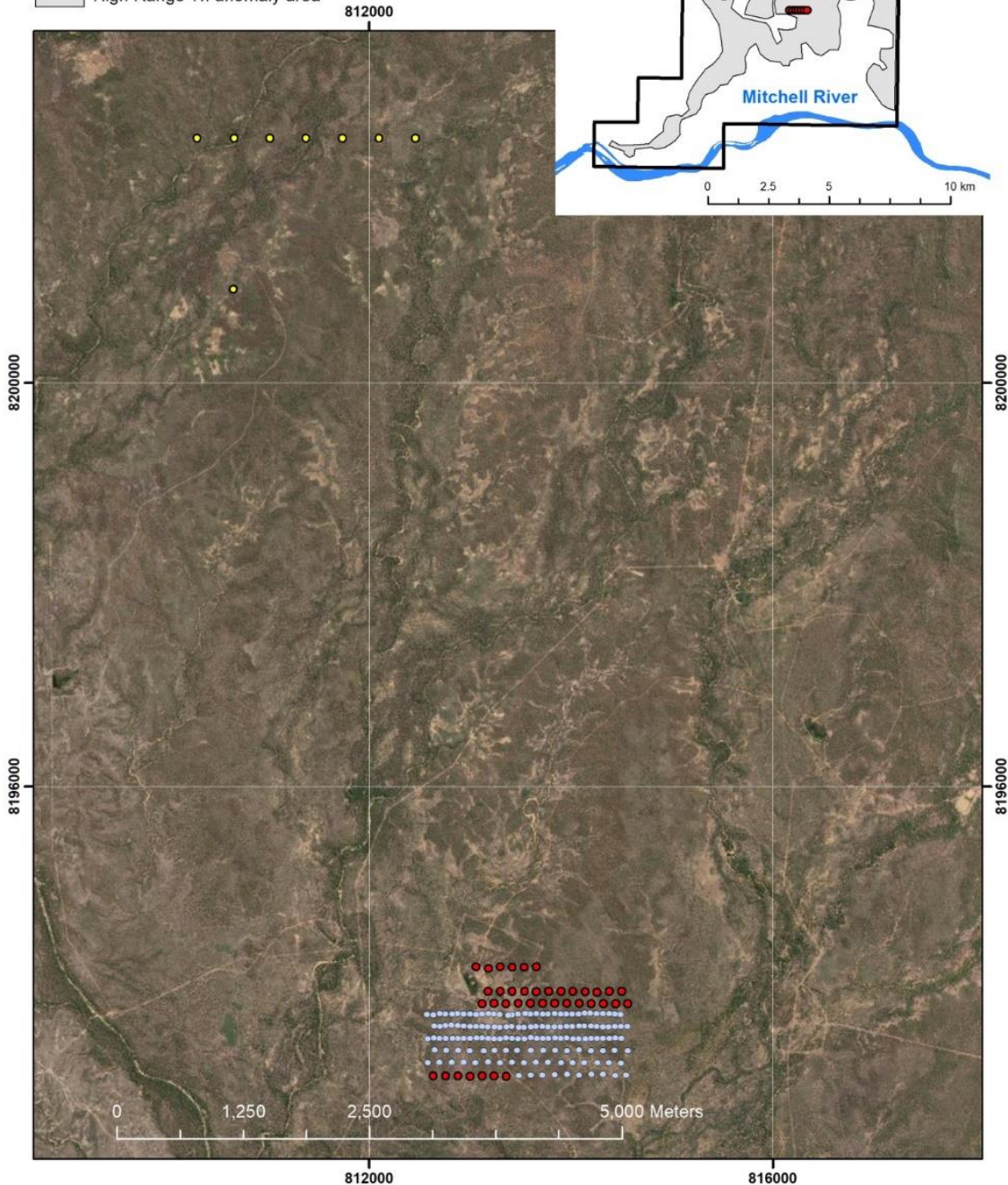


Image 2: The expansion of Ark's drilling program across the broader target area, including the latest Air Core drillholes in November 2023.

**Ark Mines Sandy Mitchell Project**  
November Sampling Programme Progress

- Air Core Holes November 23
- Auger Samples November 23
- Stage 1 completed June 23
- High Range Th anomaly area



*Image 3: The expansion of Ark's drilling program across the broader target area, including Augur drill samples at the north end of the high-range Th (thorium) anomaly area.*

**SANDY MITCHELL - Sands Met Test Work**

Metallurgical test work with expert independent processing firm, Mineral Technologies, remains ongoing with final results to be incorporated into a Scoping Study at Sandy Mitchell ahead of a planned Pre-Feasibility Study

Product Description	Mass %	La <sub>2</sub> O <sub>3</sub>	CeO <sub>2</sub>	Pr <sub>6</sub> O <sub>11</sub>	Nd <sub>2</sub> O <sub>3</sub>	Tb <sub>4</sub> O <sub>7</sub>	Dy <sub>2</sub> O <sub>3</sub>	Y <sub>2</sub> O <sub>3</sub>	TREO
	to Grav. Fd	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%
<b>Gravity Feed</b>	100	216	462	55	204	3	11	45	<b>0.11</b>
<b>Gravity Concentrate</b>	1.13	12,784	27,516	3,153	11,407	139	512	1,880	<b>6</b>
<b>REM concentrate</b>	0.08	109,891	235,853	26,942	97,393	1,176	4,109	13,843	<b>52</b>

Table 1: Progressive characterisation mass and rare earth oxide assays by laser ablation ICP-MS.

REM: Rare earth mineral concentrate.

TREO: Total rare earth oxides, see Appendix A for standard calculation method.

The metallurgical characterisation was performed using approximately 55kg of feed material sourced from medium grade Sandy Mitchell drill cuttings. (refer to image 5) Bench scale equipment was used to assess the response of the sample to conventional beneficiation techniques and show product purity after each stage of separation. This simulated industrial process plant stages with aims:

- Size classification to remove slimes, trash oversize and prepare sand suitable for beneficiation,
- Gravity separation and dense media separation to recover the valuable heavy mineral components to concentrate, (image 4)
- 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.

Cerium Oxide (CeO<sub>2</sub>) is used throughout testing as a rapidly assessable marker for monazite, the mineral which carries the majority of rare earth elements. Since CeO<sub>2</sub> can be measured instantaneously by pXRF and a response overlap in the result means that such measurements capture several rare earth elements, allowing a reasonable representation of the mineral itself. CeO<sub>2</sub> grades were used for initial sample selection by Ark, as well as throughout testing by Downer Mineral Technologies.

The CeO<sub>2</sub> recovery of gravity feed reporting to the rare earth mineral concentrate was 71.7%. However, Mineral Technologies measured that 16.9% of CeO<sub>2</sub> was trapped within intermediate material streams, and calculated that in a normal recirculating gravity plant, overall recovery of 83.8% may be achieved.

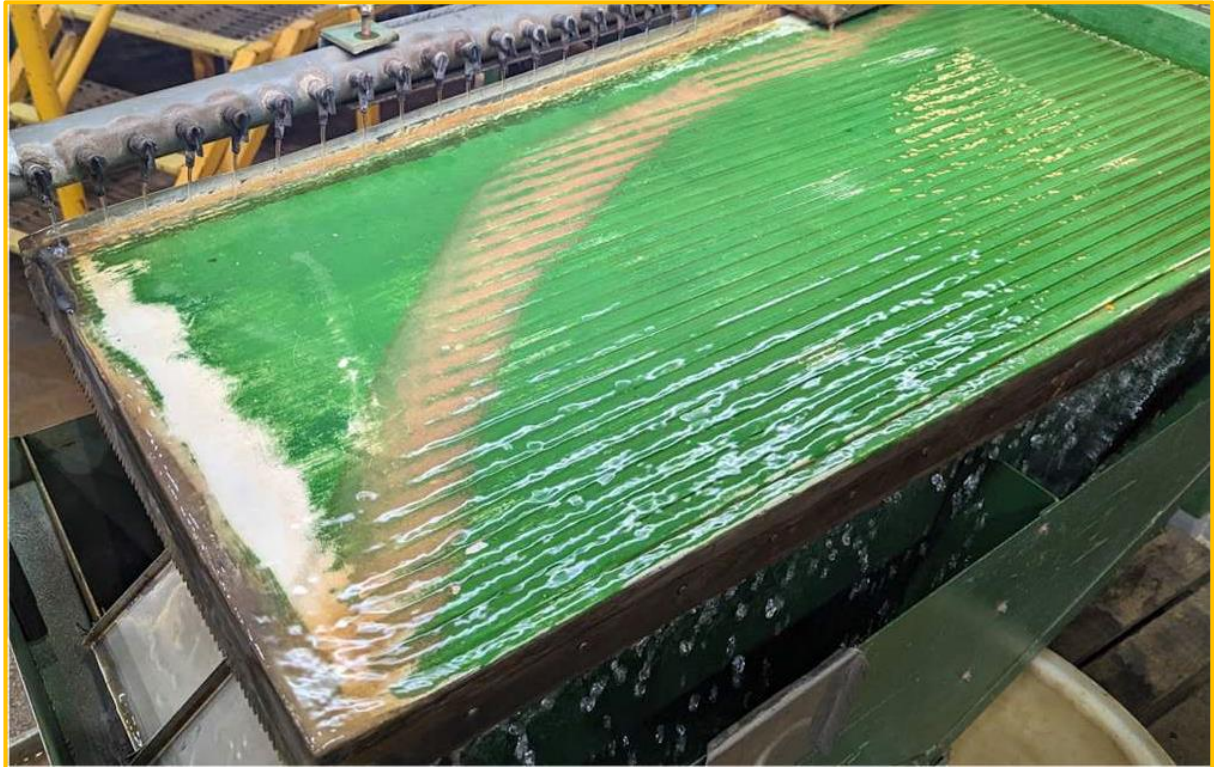
The majority of this upgrade was achieved on the two stages of Wilfley table processing (see image 4), simulating rougher and cleaner stages of a gravity plant, with a 52:1 upgrade (0.05% CeO<sub>2</sub> to 2.61% CeO<sub>2</sub>) and 50% mass rejection. The accessory zirconium oxide upgrade was similarly encouraging at 0.03% upgrading to 2.36%.

Subsequent froth floatation stages produced only minor upgrades, with the final magnetic separation stage yielding a low impurity 23.6% CeO<sub>2</sub> product, which equated to 52% total rare earth oxides as measured by laser ablation ICP-MS at Bureau Veritas (see Table 1).

Impurities, dominated by aluminium bearing minerals, were progressively rejected throughout processing, but again the largest effect was through the gravity processing.

These studies can be utilised in a class 5 FEL1AACE engineering design study and will assist commercial market evaluation of final products to inform Ark's business case and will be conducted in parallel with Ark's resource estimation at the Sandy Mitchell Project.

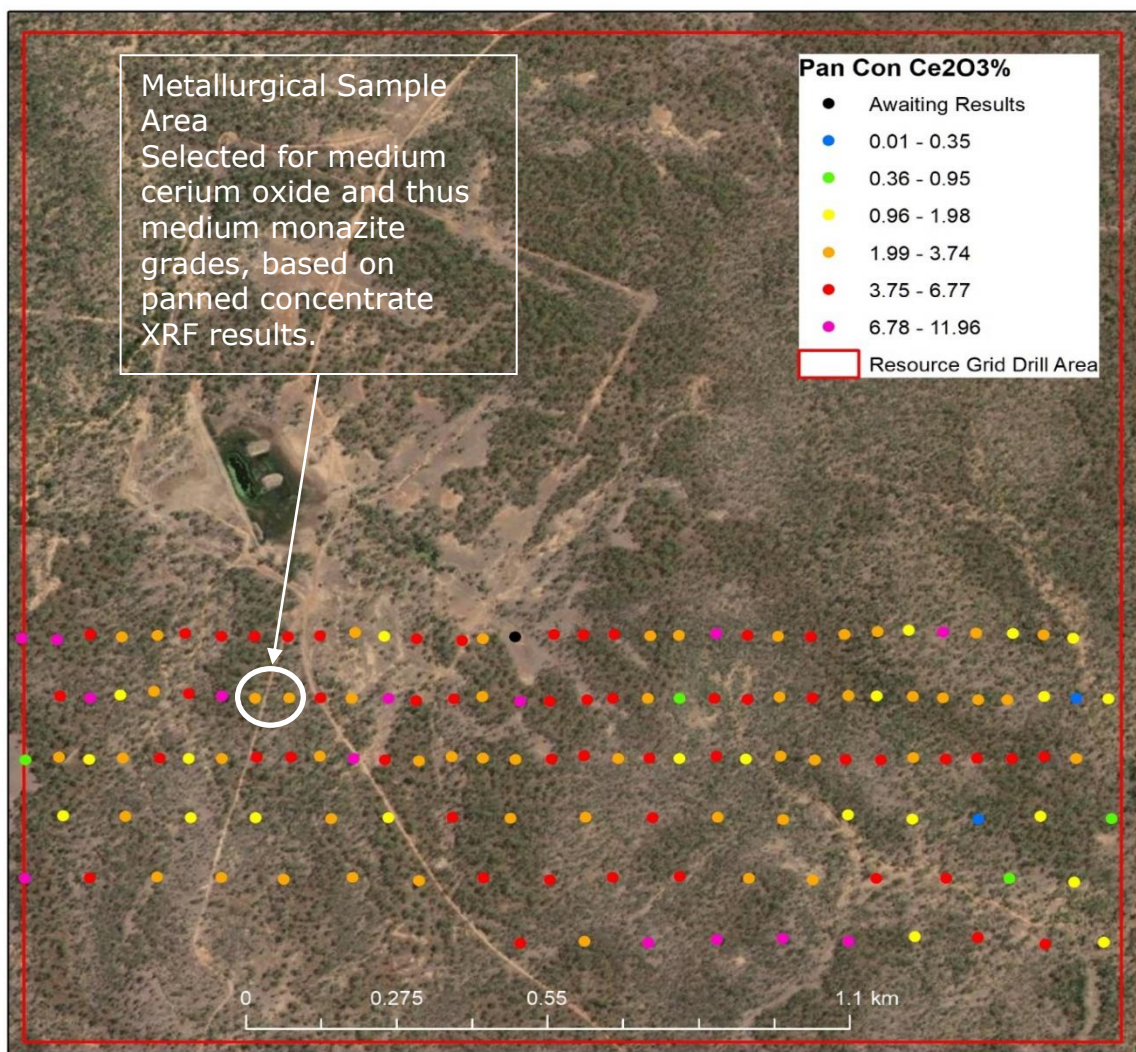
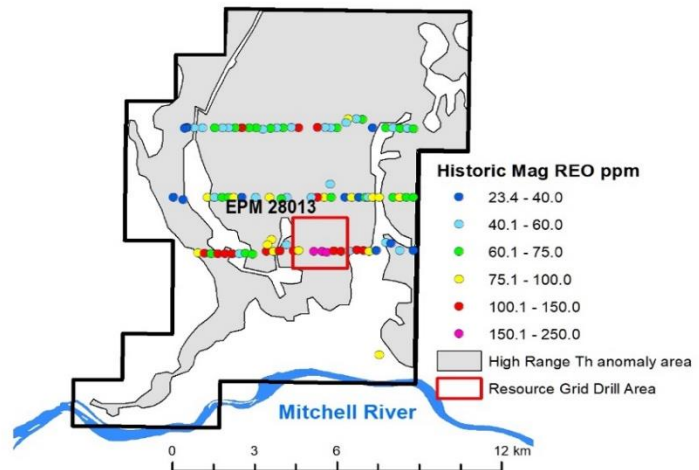
Final results from the metallurgical test work are expected to be incorporated into a Scoping Study at Sandy Mitchell ahead of a planned Pre-Feasibility Study.



*Image 4: Wet shaker table separation simulating a plant cleaner*

**Ark Mines Ltd  
Sandy Mitchell Project**

**Stage 1 Drill Pattern &  
Metallurgical Sample Area**

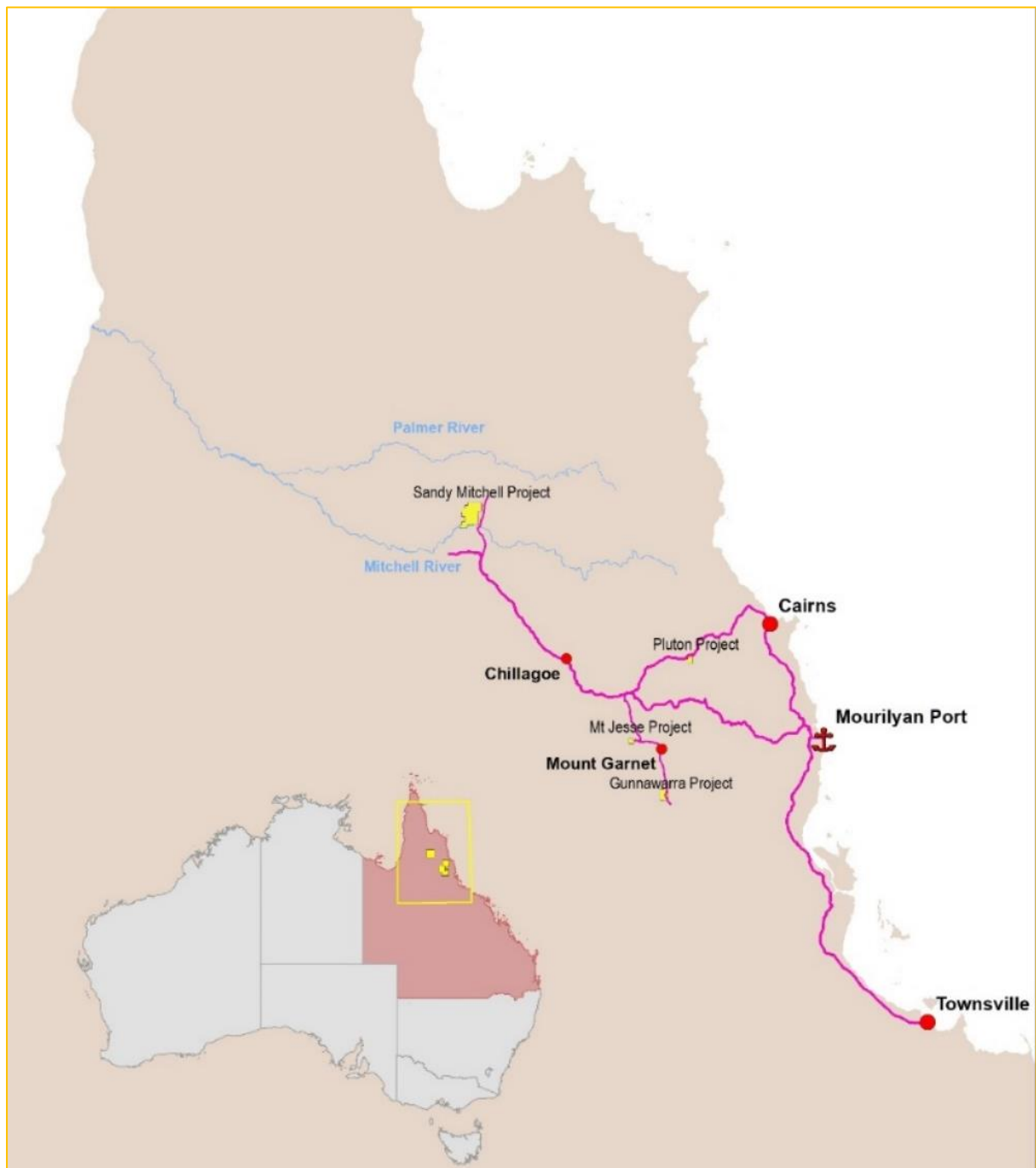


*Image 5: Initial metallurgical sample source drill hole location, showing Ark's Stage 1 drilling coloured by pan concentrate cerium oxide results which were used to select a medium grade sample for testing by Downer Mineral Technologies.*

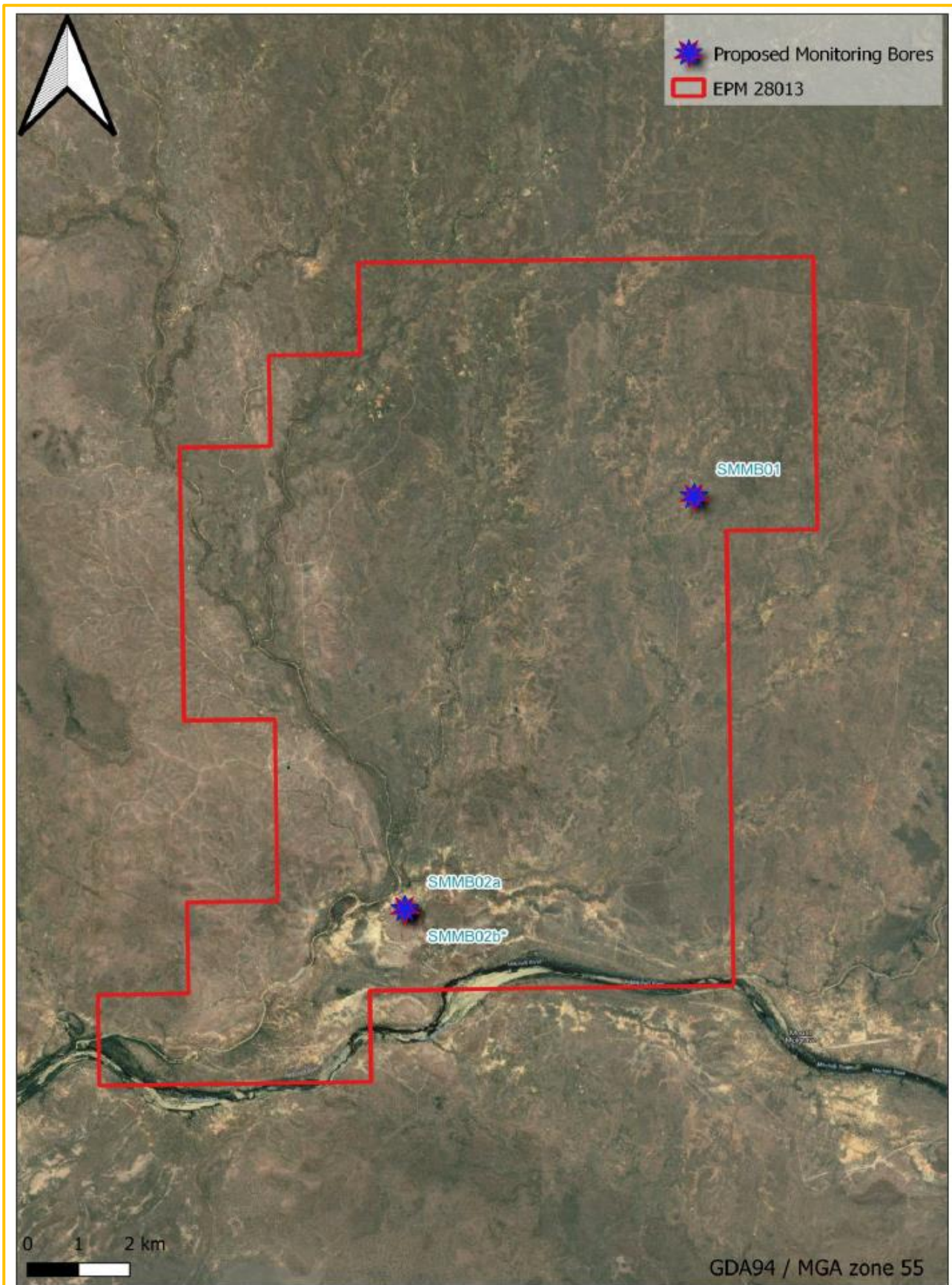


**SANDY MITCHELL - Water Monitoring Bores**

- 3 Water monitoring bores were installed over the quarter. (refer to image 7)
- The bores are required for testing the underground water.
- A base line study will be undertaken over the 23/24 wet season and then into the 2024 dry season.
- Ark have taken the view that the permitting of Sandy Mitchell should be undertaken parallel with resourcing the project.
- Ecologists have been engaged to undertake further studies at Sandy Mitchell as part of the Environmental work required for permitting Sandy Mitchell.



*Image 6: Location of Arks 100% owned Sandy Mitchell Rare Earth and Heavy Mineral project.*



*Image 7: Location of the water monitoring bores at Sandy Mitchell*

### SANDY MITCHELL – Next Steps

- Final 1 m assays to be received for the 1<sup>st</sup> phase drilling.
- 1m assays to be received for the 2<sup>nd</sup> phase of drilling.
- Water monitoring to be undertaken at the bores and from surface water flow.
- Stage 3 and 4 drilling to continue.
- Advanced metallurgical studies to be undertaken.
- Phase 1 and 2 drilling to be resourced.
- Continued efforts to move the project on to production.

No work was undertaken this quarter on Gunnawarra, Mt Jesse or Pluton.

### SAFETY AND ENVIRONMENT FOR THE QUARTER

• Reportable Incidents	Nil
• Medical Treatments	Nil
• LTIs	Nil
• Environmental incidents	Nil
• Landholder Issues	Nil

### EXPLORATION EXPENDITURE SUMMARY FOR THE QUARTER

	Current Quarter A'(000)	Year to Date (six months) A'(000)
Drilling	386	717
Laboratory work	12	46
Geophysical work	2	14
Surface exploration	2	12
Tenure	8	18
Travel and accommodation	22	32
Compilation activities	54	56
Other	8	8
<b>Total</b>	<b>494</b>	<b>903</b>

Table 2: Ark Expenditure Summary for the Quarter

### TENEMENT SUMMARY

Permit	Transferee Holder	Project	Ownership	Area km2
EPM 26464	Mt Jesse Pty Ltd	Mt Jesse	100%	4
EPM 26560	Gunnawarra Pty Ltd	Gunnawarra	100%	11
EPM 26883	Mt Pluton Base Pty Ltd	Mt Pluton	100%	6
EPM 28013	Ark Mines Ltd	Sandy Mitchell	100%	138

The Group did not acquire or dispose of any tenements during the quarter.  
 The Group has not entered into any farm-in agreements.

Table 3: Ark Tenements

**CORPORATE**

Pursuant to ASX Listing Rule 5.3.5, payments of A\$136,000 were made to related parties during the Quarter, being the payment of the Executive Director's fees, in addition to Non-Executive Directors' fees as set out in Section 6 of the Quarterly Cashflow Report.

**PREVIOUSLY REPORTED INFORMATION**

The information in this announcement references previously reported announcements. The announcements are available to view on the Company's website ([www.arkmines.com.au](http://www.arkmines.com.au)) and on the ASX website ([www.asx.com.au](http://www.asx.com.au)). The Company confirms that it is not aware of any new information or data that materially affects the information included in the previous announcements and that all material assumptions and technical parameters underpinning the exploration results continue to apply and have not materially changed.

**AUTHORITY FOR RELEASE**

This announcement has been approved by the Board of Ark Mines Ltd.



**Roger Jackson**

Executive Chairman  
28 January 2024

**Further Information:**

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## ABOUT ARK MINES LIMITED

Ark Mines is an ASX listed Australian mineral exploration company focused on developing its 100% owned projects located in the prolific Mt 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 rare earth elements.

### Sandy Mitchell Rare Earth and heavy Mineral Project

- Ark has recently Acquired the 147km<sup>2</sup> EPM 28013 'Sandy Mitchell' – an advanced Rare Earths Project in North Queensland with additional 138km<sup>2</sup> of sub blocks under application
- Project contains all critical Light Rare Earths as well as Heavy Rare Earths including dysprosium (Dy), terbium (Tb), holmium (Ho), erbium (Er), thulium (Tm) ytterbium (Yb), yttrium (Y) and excluding only Lutetium
- Up to 25% of the TREO is Nd and Pr (magnet metals)
- Rare Earths at 'Sandy Mitchell' are amenable to panning a concentrate; Planned low-cost, fast start up, straightforward beneficiation by gravity processing

### Mt Jesse Copper-Iron project

- Project covers a tenure area of 12.4km<sup>2</sup> located ~25km west of Mt Garnet
- Centred on a copper rich magnetite skarn associated with porphyry style mineralization
- Three exposed historic iron formations
- Potential for near term production via toll treat and potential to direct ship

### Gunnawarra Nickel-Cobalt Project

- Comprised of 11 sub-blocks covering 36km<sup>2</sup>
- Borders Australian Mines Limited Sconi project - the most advanced Cobalt-Nickel-Scandium project in Australia
- Potential synergies with local processing facilities with export DSO Nickel/Cobalt partnership options

### Pluton Porphyry Gold Project

- Located ~90km SW of Cairns near Mareeba, QLD covering 18km<sup>2</sup>
- Prospective for gold and associated base metals (Ag, Cu, Mo)
- Porphyry outcrop discovered during initial field inspection coincides with regional scale geophysical interpretation.

## COMPETENT PERSONS 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 and a Fellow of the Australasian Institute of Geoscientists. 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). 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.

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