



Investor presentation | September 2023 | ASX: AHK

## SAND HOSTED RARE EARTHS

**CRITICAL MINERALS & ENERGY**  
**INVESTMENT** AUSTRALIA | EUROPE | AMERICAS | ASIA | AFRICA

**ARK MINES**  
— LTD. —



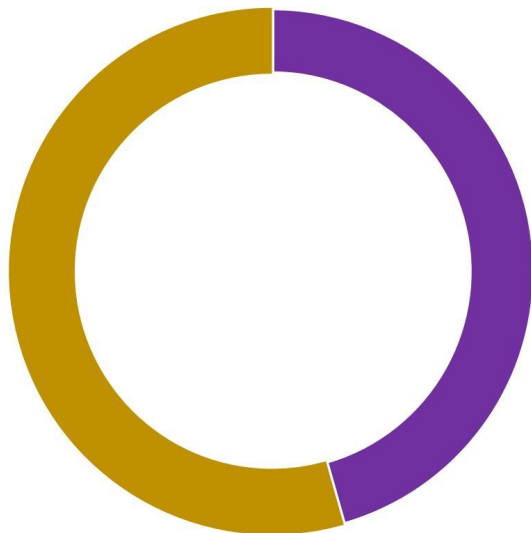
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## Overview

|                        |            |
|------------------------|------------|
| ASX Code               | AHK        |
| Shares on Issue        | 44,615,728 |
| Share price            | ~\$0.20    |
| Options on issue       | 15,172,500 |
| Market capitalisation  | \$9.00M    |
| Cash balance (approx.) | \$3.01M    |

## Top 20 shareholders



■ Remaining ■ Top 20

## Share price and volume



## Company personnel

| Name           | Position               | Experience  |
|----------------|------------------------|---|
| Roger Jackson  | Executive Chairman     | 30+ years in exploration, development and mining operations               |
| Benjamin Emery | Executive Director     | 10+ years in development and monetizing mineral projects                  |
| Ian Mitchell   | Non-Executive Director | 45+ experience years practicing law with 30+ years in the minerals sector |



**SANDY  
MITCHELL**

**ONE OF THE ONLY  
INLAND SURFACE  
EXPRESSED  
PLACER DEPOSITS  
TO HOST RARE  
EARTHS ON THE  
ASX**

**A PROJECT WITH LOW START-UP CAPEX LOW OPERATIONAL COST  
AND NEAR-TERM DEVELOPMENT POTENTIAL WITH LOW  
ENVIRONMENTAL IMPACT**

**HOSTS ALL THE RARE EARTHS, PLUS HEAVY MINERAL  
AND PHOSPHATE**

**THE PROJECT HAS ACCESS TO QUALITY NEARBY  
INFRASTRUCTURE, FAVOURABLE REGULATORY REGIME,  
SAFE JURISDICTION, EASE OF PERMITTING**

**UNDERPINNED BY A TEAM WITH MINE DEVELOPMENT,  
COMMODITIES TRADING, AND EXPLORATION SKILLS**



# SANDY MITCHELL IS A PLACER SAND RARE EARTH DEPOSIT

## THE OPPORTUNITY

- EV's, wind turbines, robotics and domestic appliances require Rare Earth Elements
- Western World is seeking sustainable independent supply chains
- Queensland is pushing its Critical Minerals credentials

## THE SANDY MITCHELL PROJECT

- 147km<sup>2</sup> EPM 28013 'Sandy Mitchell' – an advanced Rare Earths Project in North Queensland
- The sand hosts grains of mostly monazite (light rare earths) but also Xenotime (heavy rare earths) and Zirconium's and Titanium's
- Very high historical TREO grades including high grade pan concentrates of:
  - 18.4% TREO, 17.4% TREO, 15.8% TREO, 15.3% TREO, 12.3% TREO, 9.4% TREO, 4.7% TREO and 3.3% TREO
  - NdPr ratios up to 25%
- Extensive historical metallurgical work undertaken by Jogmec in 2010
- 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
- The sand-based Placer deposit means Rare Earths are amenable to panning a concentrate
- Low-cost, fast start up, straightforward beneficiation by gravity processing
- Landholder Access Agreements in place

## MAJOR NEW RARE EARTH MINERAL PROVINCE FOR QUEENSLAND

- Immense growth potential – Current drilled < 1% of the radiometric anomaly
- Further Exploration and Resource Definition Drilling is well advanced



# Sandy Mitchell REE HM Project location



300km west of Cairns and 100km North of Chillagoe





## Location, Location, Location

- Advanced REE Project in North Queensland (EPM 28013) , 100km NW of Chillagoe
- Sits on only one station – 750,000 acres in size
- Existing exploration area of 147km<sup>2</sup>, with additional 46 sub-blocks covering 138km<sup>2</sup> of sub-blocks under application

## Unique, sand mineralised with rare earths

- Historical works by JOGMEC<sup>1</sup> in 2010 includes particle mineral analysis and pan concentrates + ~100 augur drill holes
- Project contains all 8 critical Light Rare Earths elements and 8 of the 9 Heavy Rare Earths (excluding only Lutetium)
- Pan concentrates are the best measure of Rare Earths elements in sands; amenable to rapid, low-cost beneficiation by gravity processing
- Initial extraction to focus on Light Rare Earths, which were well represented in historical sampling

## Forward works program

- 1,000 metre infill and extension drill program commenced 17 May, metallurgical test work and gravity separation
- Phase 2 to Phase 4 drilling to commence shortly
- Commence application for a Mining Licence

Historical pan-concentrate sampling results show globally competitive grades for TREO (Total Rare Earth Oxide) + NdPr ratios<sup>2</sup>

### OUTSTANDING HISTORICAL TREO GRADES

| SAMPLE | GRADE | NDPR RATIO AS % OF TREO |
|--------|-------|-------------------------|
| 451    | 18.4% | 24.6%                   |
| 450A   | 17.4% | 24.5%                   |
| 452A   | 15.8% | 24.2%                   |
| 430A   | 15.3% | 25.0%                   |
| 452A2  | 12.3% | 23.7%                   |

<sup>1</sup>Japan Organisation for Metals and Energy Security

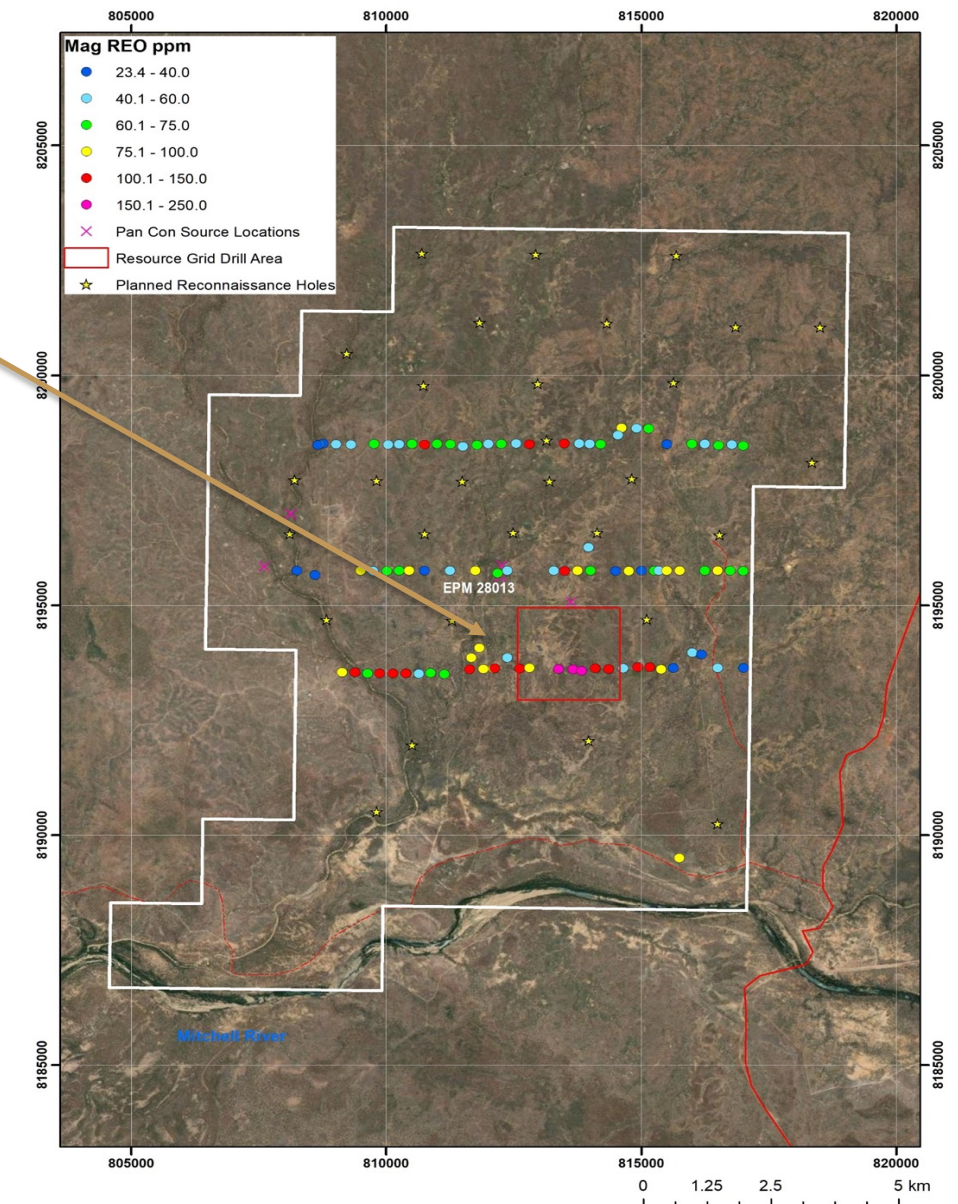
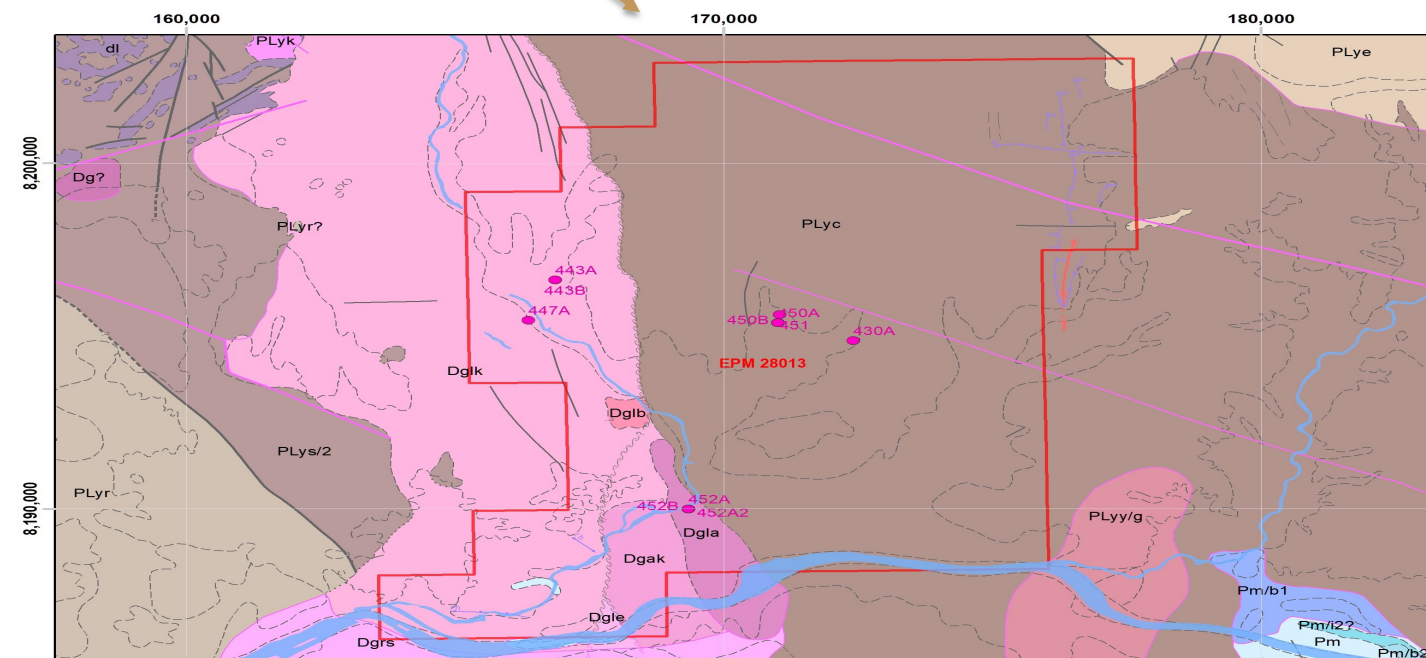
<sup>2</sup>Refer ASX Announcement 28 March 2023



**ARK MINES**  
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- **Historical work program includes particle mineral analysis and pan concentrates, plus ~100 augur drill holes.**
- **From a total of 10 pan concentrate samples, five returned historical TREO grades of more than 100,000ppm (refer table below).**
- **In May 2023<sup>1</sup>, a single panned concentrate sample using XRF technology returned 29% TREO with an elevated NDPR ratio (neodymium praseodymium) of 24% of TREO.**
- **Sample was taken from surface sand within the designated drilling area; significantly exceeded historical grades first reported in late March 2023, and validated historical sampling results.**

## Stage 1 Air Core Drilling in Red Box



| Sample | E        | N        | Samp Type | TREO    | LREO | HREO | CREO | Mag Reo | Sc <sub>2</sub> O <sub>3</sub> | 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> | Sm <sub>2</sub> O <sub>3</sub> | Eu <sub>2</sub> O <sub>3</sub> | Y <sub>2</sub> O <sub>3</sub> | Tb <sub>4</sub> O <sub>7</sub> | Dy <sub>2</sub> O <sub>3</sub> | Ho <sub>2</sub> O <sub>3</sub> | Er <sub>2</sub> O <sub>3</sub> | Tm <sub>2</sub> O <sub>3</sub> | Yb <sub>2</sub> O <sub>3</sub> |
|--------|----------|----------|-----------|---------|------|------|------|---------|--------------------------------|--------------------------------|------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
|        | MGA94z54 | MGA94z54 |           | ppm     | %    | %    | %    | %       | ppm                            | %                              | %                | ppm                             | %                              | ppm                            | ppm                            | ppm                           | ppm                            | ppm                            | ppm                            | ppm                            | ppm                            | ppm                            |
| 430A   | 813624   | 8195067  | Pan Con   | 153,969 | 95.4 | 4.6  | 23.7 | 25.9    | 225.5                          | 3.26                           | 7.10             | 8,288                           | 2.9976                         | 4,650                          | 120.4                          | 4,749                         | 349.3                          | 1,285                          | 174.1                          | 354.5                          | 29.7                           | 160.56                         |
| 443A   | 808124   | 8196989  | Pan Con   | 94,180  | 95.5 | 4.5  | 23.1 | 25.3    | 220.9                          | 2.05                           | 4.34             | 5,014                           | 1.7846                         | 2,876                          | 88.5                           | 2,806                         | 197.6                          | 797                            | 103.8                          | 215.0                          | 19.6                           | 109.77                         |
| 443B   | 808125   | 8196989  | Pan Con   | 17,554  | 91.1 | 8.9  | 25.5 | 24.3    | 309.8                          | 0.35                           | 0.76             | 887                             | 0.3126                         | 513                            | 25.5                           | 1,062                         | 46.6                           | 211                            | 37.1                           | 99.0                           | 13.6                           | 90.185                         |
| 447A   | 807601   | 8195835  | Pan Con   | 47,376  | 95.0 | 5.0  | 23.7 | 25.6    | 123.0                          | 1.02                           | 2.16             | 2,525                           | 0.904                          | 1,450                          | 56.0                           | 1,549                         | 120.0                          | 457                            | 58.2                           | 114.4                          | 9.7                            | 50.786                         |
| 450A   | 812239   | 8195625  | Pan Con   | 174,126 | 95.9 | 4.1  | 23.0 | 25.6    | 171.8                          | 3.75                           | 8.11             | 9,351                           | 3.3359                         | 5,369                          | 135.5                          | 4,661                         | 407.0                          | 1,400                          | 173.0                          | 335.0                          | 25.9                           | 133.23                         |
| 450B   | 812239   | 8195625  | Pan Con   | 17,929  | 90.6 | 9.4  | 26.1 | 24.6    | 300.6                          | 0.35                           | 0.77             | 904                             | 0.3231                         | 525                            | 24.0                           | 1,156                         | 47.0                           | 220                            | 39.7                           | 109.0                          | 15.0                           | 100.21                         |
| 451    | 812274   | 8195859  | Pan Con   | 184,777 | 95.8 | 4.2  | 23.1 | 25.6    | 199.4                          | 3.99                           | 8.59             | 9,895                           | 3.5459                         | 5,624                          | 162.1                          | 5,029                         | 441.1                          | 1,515                          | 184.4                          | 355.6                          | 28.1                           | 144.61                         |
| 452A   | 810407   | 8190286  | Pan Con   | 158,691 | 95.8 | 4.2  | 22.7 | 25.2    | 170.3                          | 3.48                           | 7.37             | 8,518                           | 2.9743                         | 4,859                          | 143.6                          | 4,407                         | 381.1                          | 1,308                          | 162.7                          | 313.3                          | 24.3                           | 125.26                         |
| 452B   | 810407   | 8190286  | Pan Con   | 30,334  | 93.8 | 6.2  | 24.4 | 25.3    | 233.1                          | 0.63                           | 1.36             | 1,583                           | 0.5715                         | 914                            | 36.6                           | 1,261                         | 74.9                           | 304                            | 45.0                           | 107.0                          | 12.6                           | 79.14                          |
| 452A2  | 810408   | 8190286  | Pan Con   | 123,058 | 95.7 | 4.3  | 22.8 | 24.7    | 135.0                          | 2.73                           | 5.72             | 5,932                           | 2.3211                         | 3,792                          | 118.1                          | 3,467                         | 297.6                          | 1,002                          | 131.7                          | 268.7                          | 19.8                           | 112.73                         |

<sup>1</sup> Refer ASX Announcement 30 May 2023

In relation to the results in this table Refer to Ark Mines Ltd ASX Announcement 1st of March 2023



# 1<sup>st</sup> Phase Drilling completed

## 1,500M PHASE 1 SANDY MITCHELL DRILL PROGRAM <sup>1</sup>

- Mineralisation is more than twice the depth encountered historically; 144 holes completed for 1,505 metres, with average depth of 10.5 metres and sands intersected down to 18 metres.
- Mineralisation panned from material at surface to the bottom of the sand profile; no overburden evident across the project.
- The air core holes were drilled at 120 by 60 metre spacing over the central Rare Earths zone as part of an assessment of Rare Earths and Heavy Mineral grade, with spacing opening up to 120 by 120 metres peripherally.
- Sampling of the sand was by 1 metre intervals for assay to inform a maiden resource, as well as for density measurements and to provide samples for metallurgical test work.
- Assay results from drilling and ongoing test work will form the basis of a Maiden Mineral Resource Estimate (MRE) under the 2012 JORC code.



## ANALYSIS INDICATES REE MINERALISATION IN ALL HOLES <sup>2</sup>

- 144 drill holes completed with preliminary assay results using a pXRF of the panned concentrates produced on site.
- Assay results so far are composites of the whole length of each hole. The air core holes averaged 10.5 metre depths with the deepest hole down to 18 metres.
- Panned metre samples, composited per hole, had up to 2.8% Heavy Minerals. Heavy Minerals in sands are often associated with rare earth elements along with other valuable minerals, including zirconium and titanium.
- There are also phosphate grades up to 8.5% and significant quantities of garnet that will be incorporated into the final economic mineralisation suite.
- All 1m interval drilling samples have been sent to a third-party laboratory for assaying with results expected in the near-term.

<sup>1</sup> Refer ASX Announcement 14 June 2023

<sup>2</sup> Refer ASX Announcement 26 July 2023



# 2<sup>nd</sup> phase drilling to commence soon

## STAGE 2 AUGUR DRILL RIG CONFIRMED<sup>1</sup>

- A hydraulic driven Augur Rig capable of being modified to drill sands has been acquired by Ark Mines to drill the Sandy Mitchell project.
- The Rig is mounted on a 4WD Landcruiser for quick movement between drill sites and low impact.
- Stage 2 to Stage 4 drill planning is now completed. Stage 2 Augur Drill Program confirmed – targeted extension program for the purpose of bolstering potential JORC-compliant resource tonnes
- Previous drilling covers an area of 1.3 km<sup>2</sup> which is 1.2% of the peak radiometric reading on the lease. Stage 2 to 4 will ultimately cover the full anomaly.
- Upgraded sampling system on the Augur drill rig, designed and installed specifically for sands, along with a new safety system.
- On-site drill team engaged and ready to commence. Rig due to be completed by end-September 2023

## ENVIRONMENTAL SCOPING STUDY COMPLETED – NO RED FLAGS<sup>2</sup>

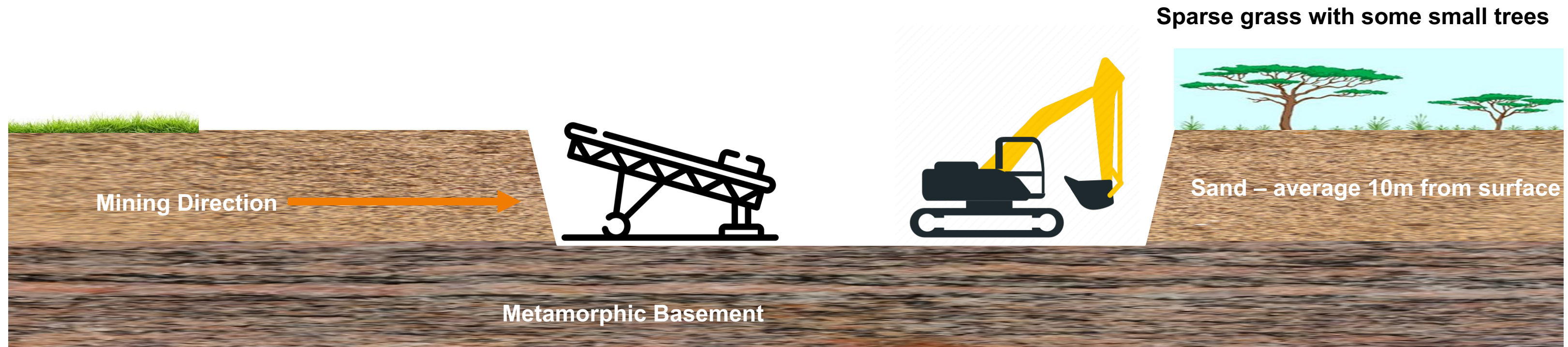
- Initial Environment Scoping Study (ESS) commissioned by Northern Environmental Assessment and Compliance
- The ESS included the Collection of groundwater and surface water samples and a key flora and fauna habitat suitability assessment
- The results will provide guidance on the required aquatic and terrestrial ecological assessments – key components of the mining approval process.
- Water monitoring continues as required to form a full year's worth of survey data.

<sup>1</sup> Refer ASX Announcement 8 September 2023

<sup>2</sup> Refer ASX Announcement 20 June 2023



## SANDY MITCHELL



### LOW IMPACT MINING







- ✓ No Drill and Blast
- ✓ No overburden
- ✓ No clay to deal with
- ✓ Only 10m deep
- ✓ At 10m – you can selectively mine
- ✓ No tails dam
- ✓ No waste piles

### LOW ENVIRONMENTAL IMPACT

- ✓ No Chemicals
- ✓ No Salts No Acids
- ✓ Simple digging
- ✓ In situ processing with gravity only
- ✓ No impact on farm country – subsidence
- ✓ The landform will be the same after mining as before
- ✓ Rehabbed to the Landholder liking by only seeding the ground down



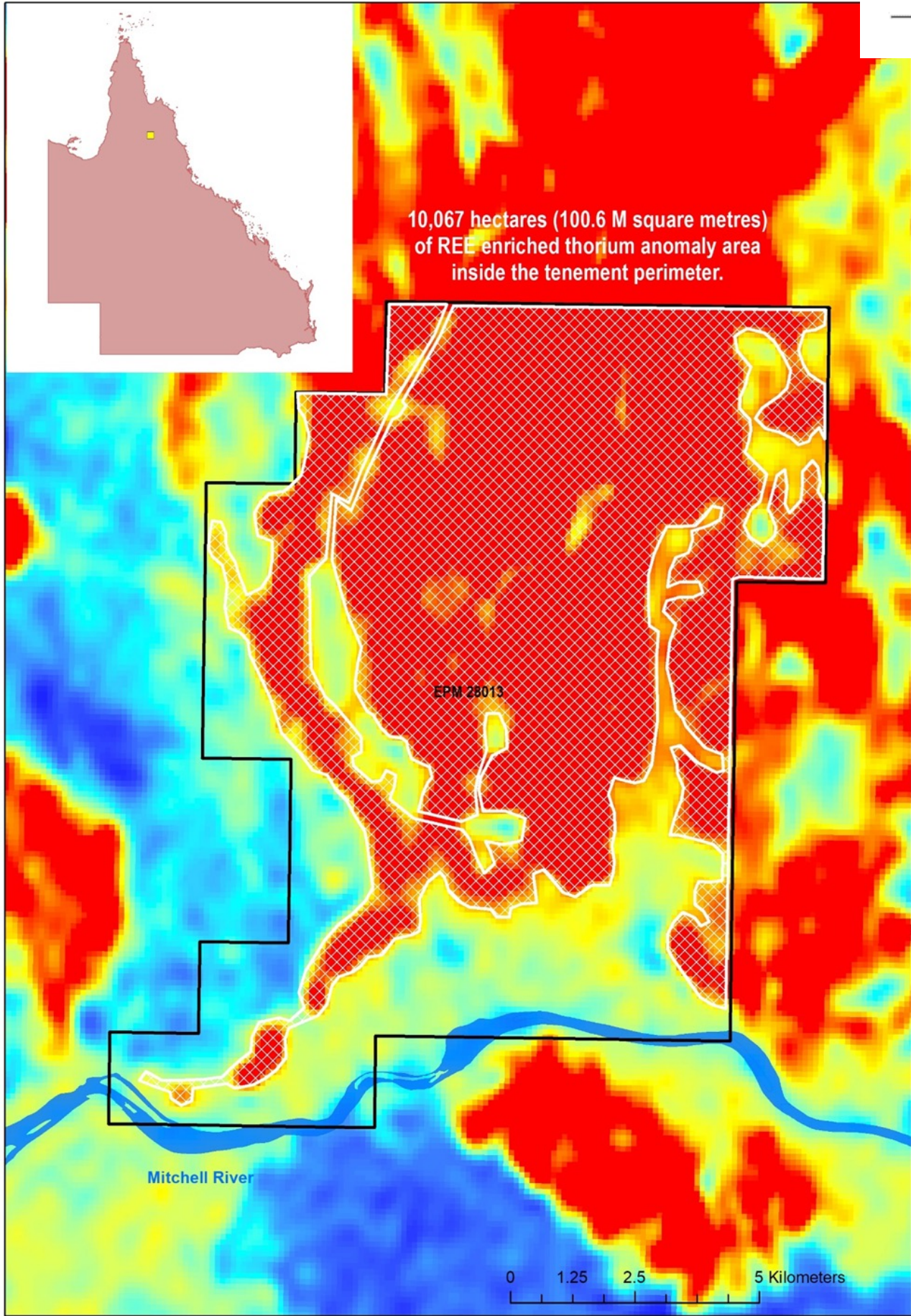
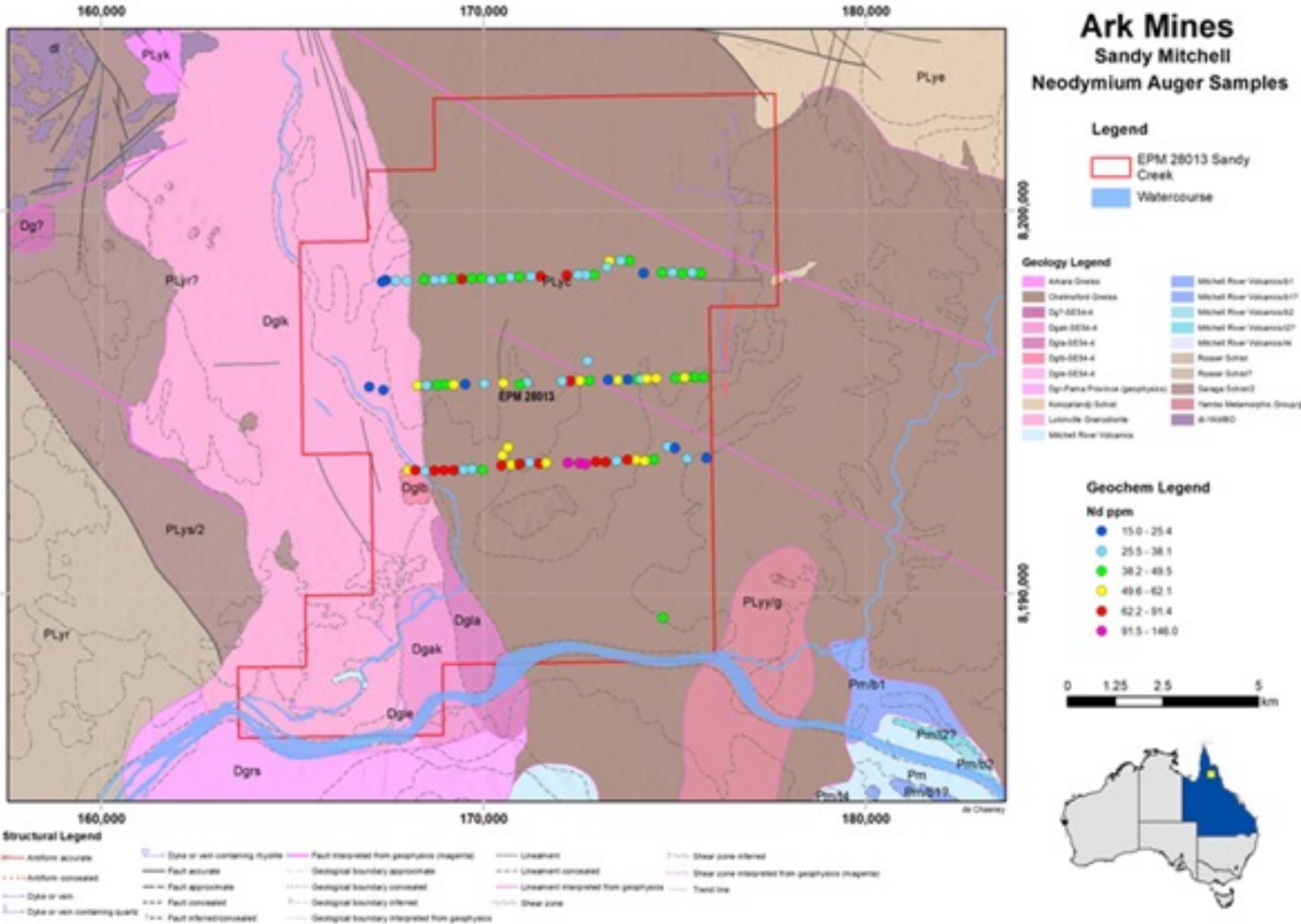
## PLACER DEPOSITS HAVE DISTINCT ADVANTAGES OVER HARD ROCK AND CLAY-BASE RARE EARTH PROJECTS

|   | Ionic Clays  | Hard Rocks   | PLACER (SANDY MITCHELL)  |
|---|--|--|--|
| <br>CAPEX        | Reasonable   | Capex Heavy, Overburden/strip development costs, Mining costs high   | Capex lite and utilizing low-cost skid-mounted gravity plant to deliver a concentrate<br>Mining cost and operating cost – negligible   |
| <br>Scale        | Typically, smaller tonnage   | Typically require significant scale for economic viability   | Potential to be massive tonnage  |
| <br>Exploration | Resources can be defined inexpensively and rapidly given shallow drilling using aircore, auger, push-tube core | Similar to other hard rock base metals requiring substantial drilling, geochemistry, geophysics etc                | Resources can be defined inexpensively and rapidly given shallow drilling using aircore, auger, push-tube core   |
| <br>Mining     | Stripping and progressive rehabilitation. Many have overburden and some strip ratio                            | Drill and blast with significant mining fleet. Higher strip ratios or expensive underground mining and development | Stripping and progressive rehabilitation. No Overburden<br>Zero strip ratio. Mined with a wheeled loader only  |
| <br>Permitting | Due to water processing and chemicals Environmental challenges will need to be met                             | Significant environmental impact   | Simple in situ gravity processing with the sand put back where it was moved from   |
| <br>Processing | Simple metallurgy; clay is washed with a desorption agent to recover REEs                                      | Strong acids and salts with high temperature +/- pressure.<br>Radioactive tailings                                 | Simple metallurgy; Gravity and magnetic in-situ processing, no water, continuous rehabilitation<br>Nature has already done our crushing and grinding<br>Mineral sands bi-product |



## SCALE

- The size of the thorium anomaly correlating with REE enriched alluvial sands within the Project tenement is 10,067 ha.
- Sands with Heavy Minerals and Rare Earths are eroded from Sandstones to the North. These sandstones were paleo beach settings where the rare earths and Heavys were sorted through wave actions.
- The tenement is 147km<sup>2</sup> and a further 138 km<sup>2</sup> has been pegged to the North.
- The anomalous rare earth historical augur drilling shows and anomalous area of 35km<sup>2</sup>. (refer to the figure below)







Immediate focus on Phase 2 drill program at Sandy Mitchell, undertake further metallurgical test work and apply for Mining Licence



Advancing processing and off-take discussions – considerable interest in Sandy Mitchell from local processors and customers seeking concentrate



Assay results for Phase 1 drill program are expected to be received prior to end of September quarter, accompanied by the commencement of Phase 2 Augur drill program



Ark expects to report further updates on metallurgy before the end of CY2023, including ore characterisation and HMC production evaluation (including suitability of beneficiation by gravity).