



**RESOURCING
THE TERRITORY**

Northern Territory Geological Survey

Department of INDUSTRY, TOURISM AND TRADE

A new exploration boom for the Territory driven by critical minerals

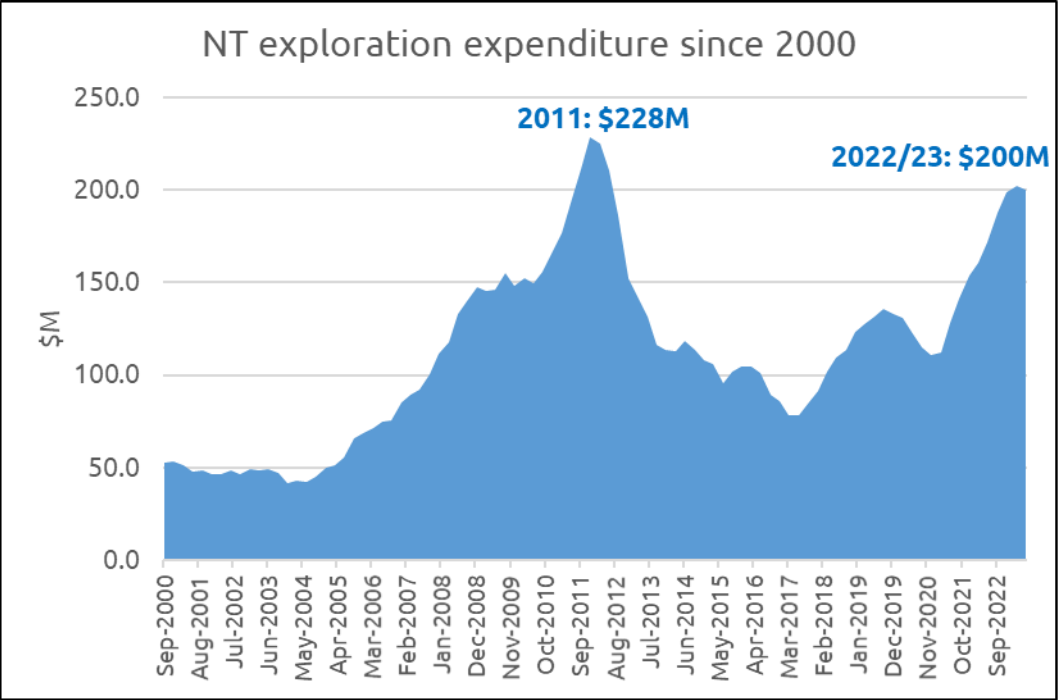
Ian Scrimgeour

Mining the Territory

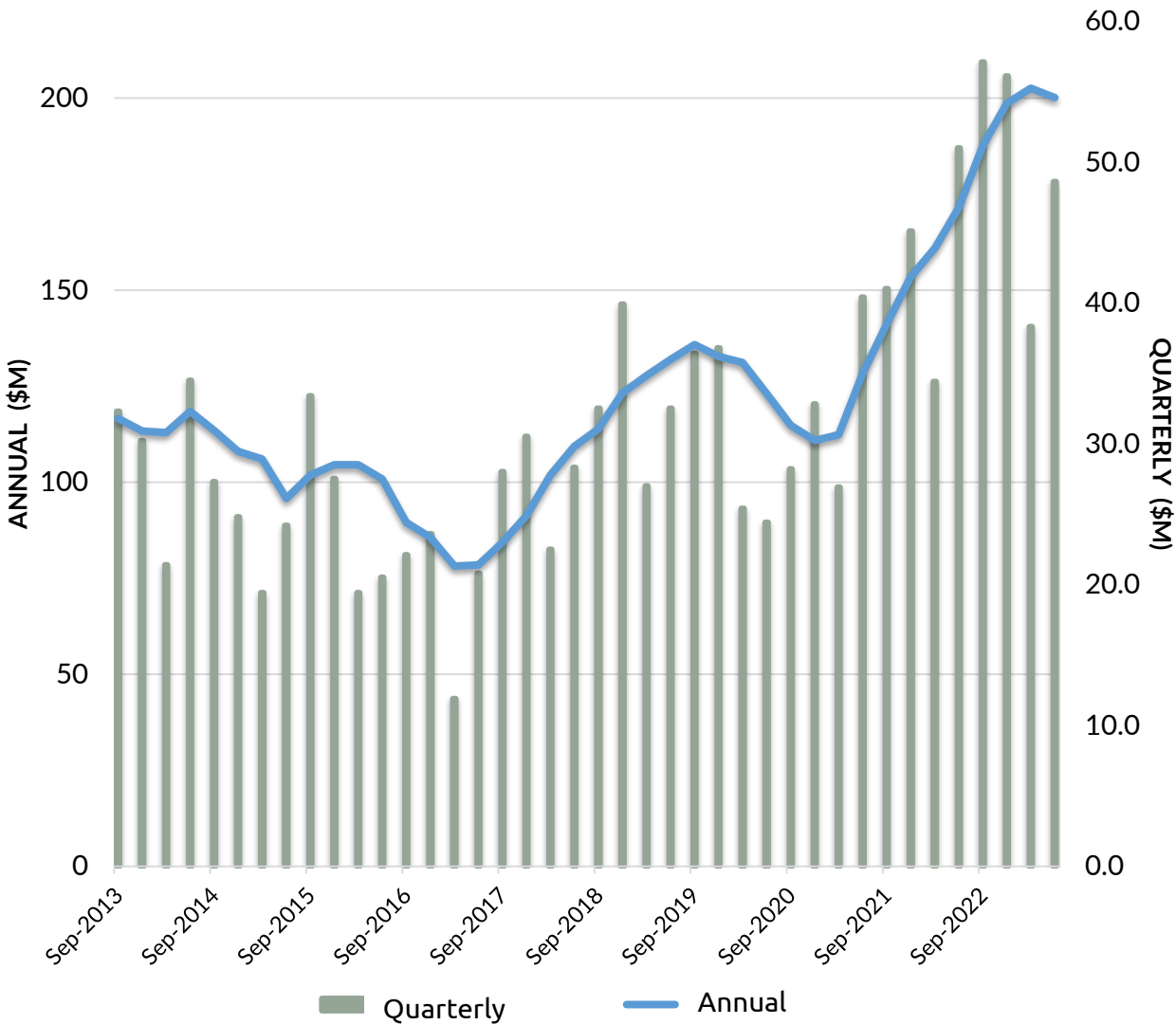
13 September 2023

NT mineral exploration expenditure

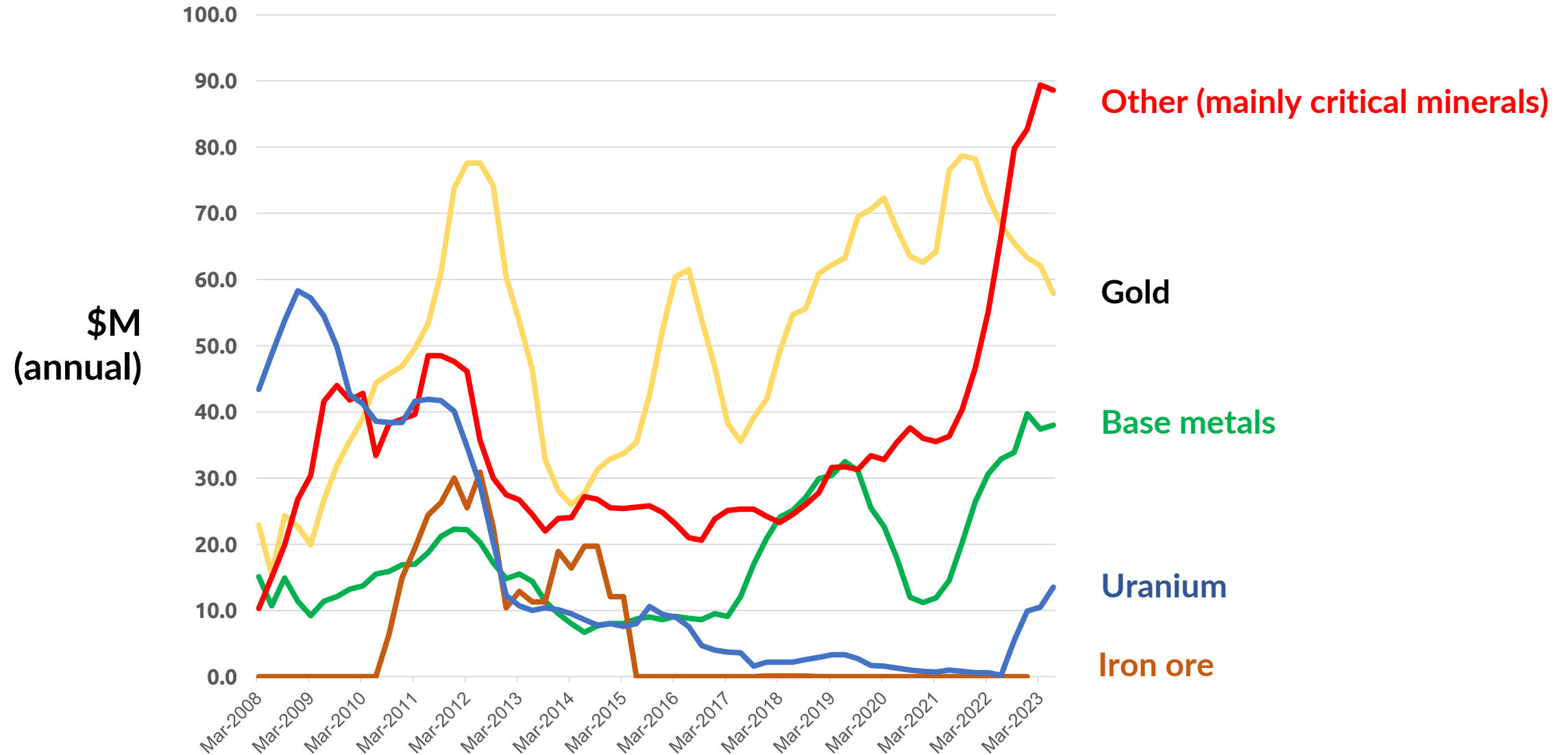
- Mineral exploration expenditure is at its highest levels since 2011
- \$200.1 million spent in 2022/23
- Growth led by critical minerals (lithium, rare earths), copper and uranium



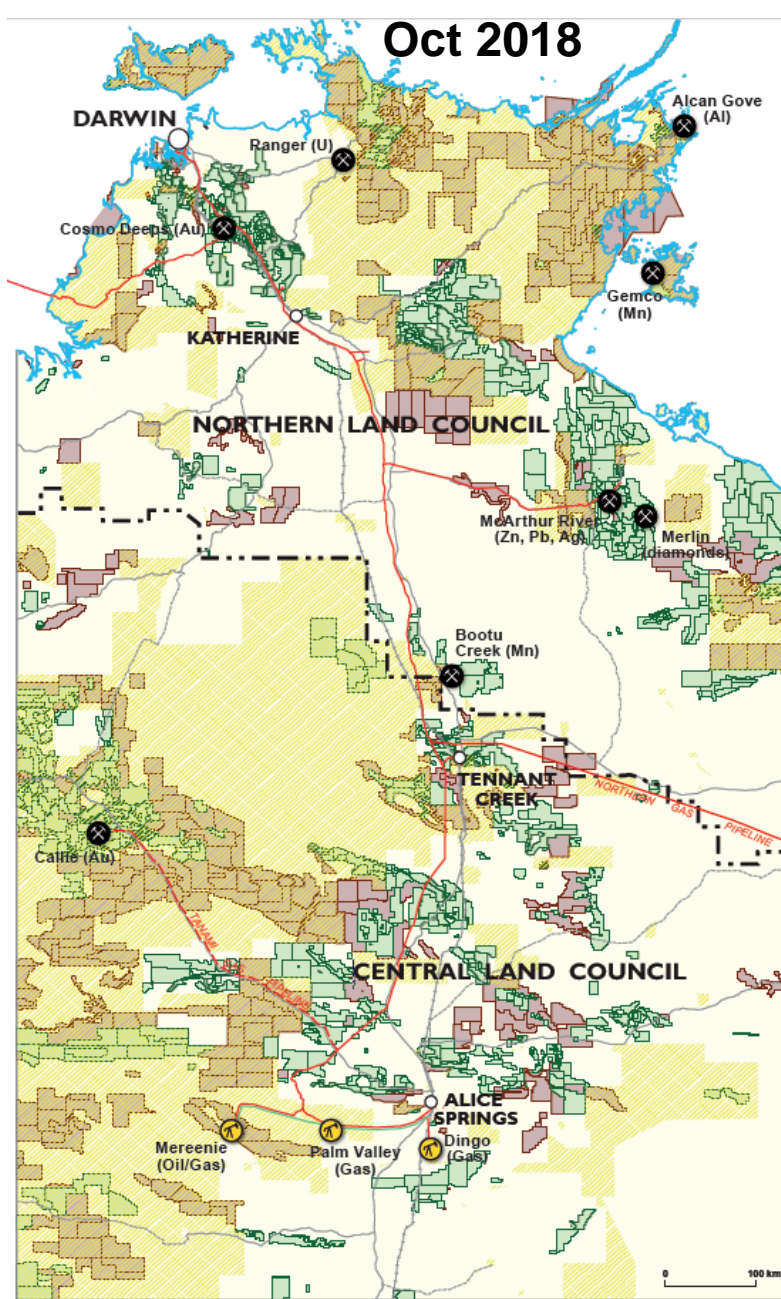
10 year trend of Northern Territory mineral exploration expenditure



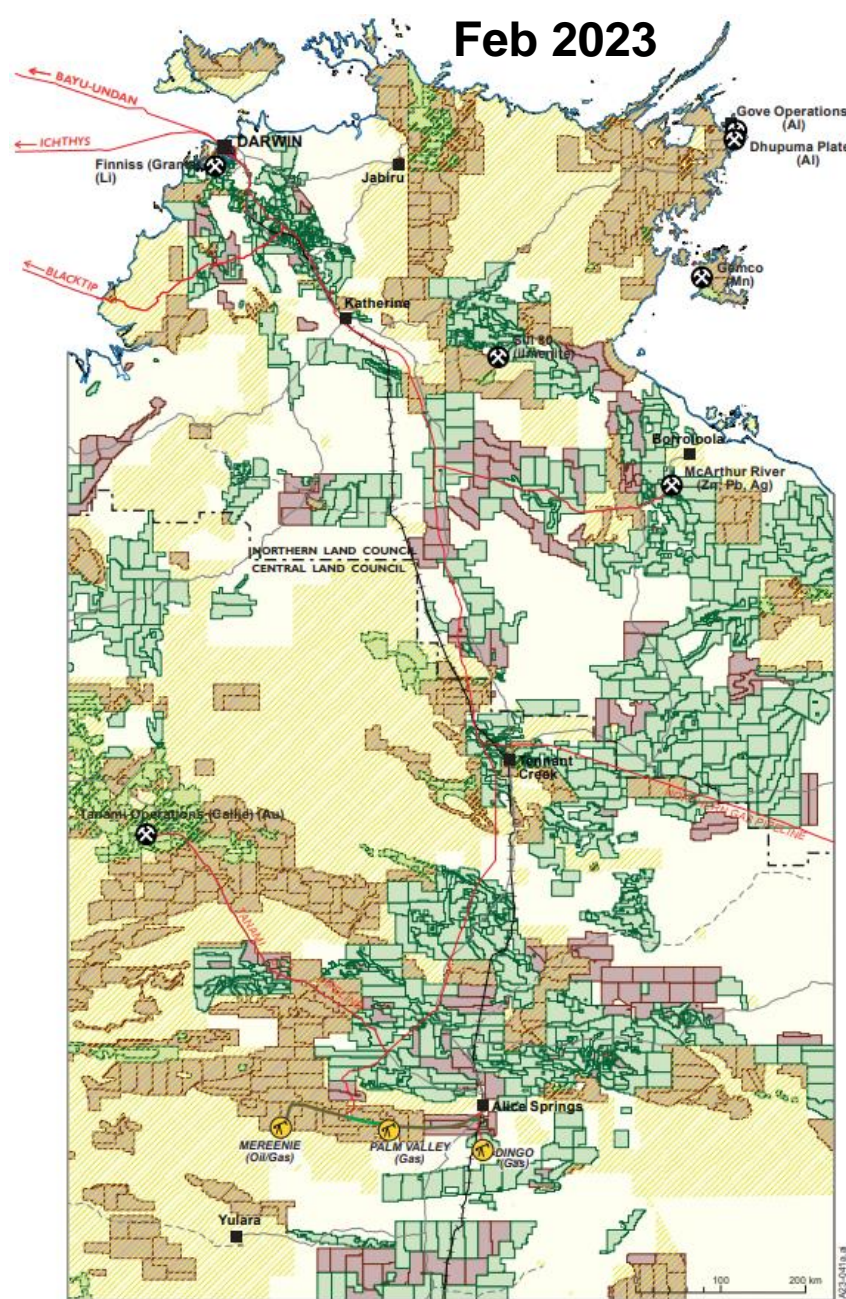
NT mineral exploration by commodity since 2008



Oct 2018



Feb 2023



Substantial increase in ELs in Barkly, Gulf and central Australia in 2020-21

Largely driven by search for sediment-hosted copper, iron-oxide copper gold and critical minerals

Critical Minerals in the Northern Territory 2023

- Released March 2023, to be updated annually
- Overview of current critical minerals mines, projects, resources and potential in the Northern Territory

Nd

Pr

Rare earth elements

WIND TURBINES

MAGNETS

ELECTRIC VEHICLES

There is growing global demand for permanent NdFeB magnets used in wind turbines, audio and electronics, electric vehicles and emerging fusion energy technology.

The Territory's most significant rare earth deposit, Arafura Rare Earths Ltd's Nolans project, is located in the Aileron Province north of Alice Springs, and promises to be Australia's first integrated mining and rare earth separation project. The deposit is hosted within fluorapatite veins containing allanite and monazite, and is rich in the magnet-feed rare earths neodymium and praseodymium (NdPr).

The Territory has high exploration potential for a range of rare earth mineralisation styles. This includes rare earth elements within xenotime and monazite in heavy mineral sands in central Australia and the Tiwi islands, carbonate-related rare earth elements in Central Australia, discoveries of clay-hosted rare earth elements in the northern half of the Territory and vein-hosted xenotime (heavy rare earth elements) in the Tanami Region.

Rare earth oxide (REO) mineral resources

Name	Total JORC mineral resource	Contained REO (kt)	Company
Nolans	56 Mt @ 2.6% REO, 11% P ₂ O ₅	1456.0	Arafura Rare Earths Ltd
Charley Creek	805 Mt @ 0.029% TREO including 0.04% Monazite, 0.01% Xenotime 0.05% Zr	233.45	Enova Mining Ltd
Total		1,689	

Case study: Nolans

Arafura Rare Earths Ltd | ASX:ARU
www.arultd.com

Arafura Rare Earths Ltd's Nolans project is globally significant with the potential to meet up to 5% of the world's global supply of NdPr.

The company has all approvals in place for mining through to onsite separation of rare earths to produce 4,440 tonnes per annum (tpa) of NdPr oxide and 470 tpa of a mixed middle-heavy rare earth (SEG/HRE) oxide (REO). They also plan to produce 144,000 tpa of fertilizer-grade phosphoric acid (54% P₂O₅).

>39 year mine life icon"/>

Proposed rare earth production in the Territory:

- First rare earth production in the Territory is scheduled for 2025-26.
- Australia's first integrated mining and rare earth separation operation planned at Nolans.

Northern Territory Geological Survey
Department of Industry, Tourism and Trade

Critical Minerals in the Northern Territory
2023

resourcingtheterritory.nt.gov.au

THE TERRITORY
BOUNDLESS POSSIBLE

THE TERRITORY'S
CRITICAL MINERALS

EMERGING CRITICAL
MINERALS IN THE TERRITORY

13AlAluminium

27CoCobalt

29CuCopper

3LiLithium

12MgMagnesium

25MnManganese

42MoMolybdenum

28NiNickel

15PPhosphate

REERare earth elements

22TiTitanium

74WTungsten

23VVanadium

30ZnZinc

40ZrZirconium

51SbAntimony

83BiBismuth

31GaGallium

32GeGermanium

6CGraphite

2HeHelium

HPAHigh purity alumina

41NbNiobium

PGMPlatinum-group elements

21ScScandium

14SiSilicon

73TaTantalum

50SnTin

Northern Territory is now a lithium producer



Core Lithium – Finniss lithium mine

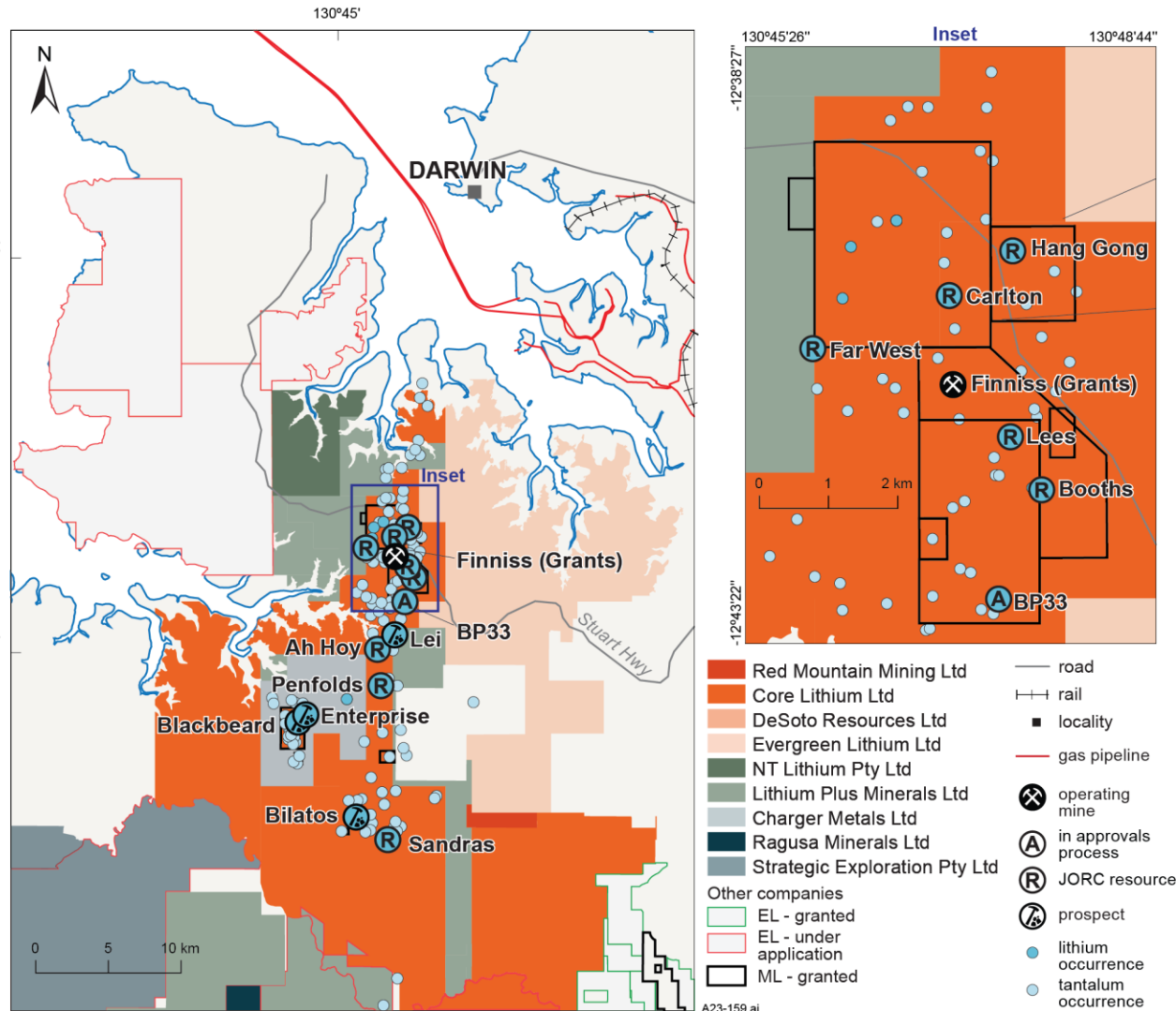
- First spodumene concentrate shipped April 2023
- Significant resource upgrade to 30.6 Mt @ 1.31% Li_2O
- Second mine at BP33 approved; early construction works underway
- Current reserves support >12 year mine life
- Substantial ongoing drilling, discovery and resource growth across numerous prospects.

Bynoe pegmatite field

- Resources defined by Core Lithium at 10 deposits totalling 30 Mt
- BP33 pegmatite resource now 10.1 Mt @ 1.48%

Lithium Plus Minerals Ltd - drilling large mineralised pegmatite at Lei to define maiden resource

Charger Metals – drilled 12,000m in 2023 at multiple prospects



ASX ANNOUNCEMENT

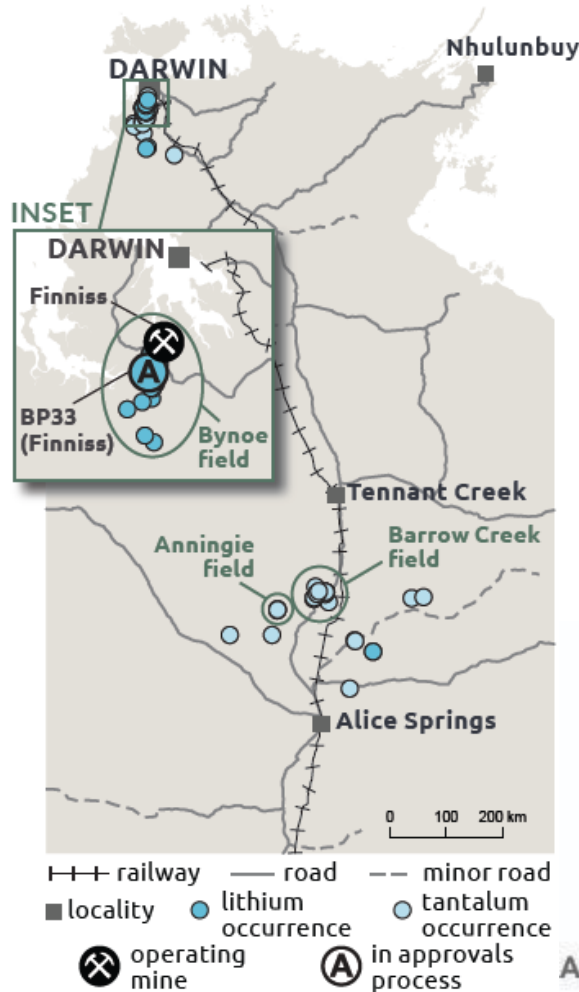
7 September 2023

EXCEPTIONAL 127M MINERALISED PEGMATITE INTERSECTION AT LEI

Highlights

- Infill and extensional drilling recommenced at the Lei Prospect in August 2023
- First completed diamond hole BYLDD019 intersected **127m of strongly mineralised pegmatite** from 609m (with a true width of ~60m), with assays pending^{1,2}
- Represents one of the **largest mineralised intersections ever recorded from the Bynoe pegmatite field**, putting the Lei pegmatite in company with Core Lithium Ltd.'s (ASX: CXO) previously reported world-class 119m intercept at the BP33 deposit (refer ASX announcement 12 December 2019).

Numerous lithium explorers active in the Northern Territory





AUSTRALASIAN METALS

NT's first significant graphite discovery at Leliyn



- 30 km northeast of Pine Creek
- High grade graphite over substantial widths
- Best intersection of 206m @ 10.0% TGC
- Exploration Target 200-250 Mt @ 8-11% TGC
- Flake size <150 microns, favourable for anode material



ASX ANNOUNCEMENT

ASX: **KNG**
kingslandminerals.com.au

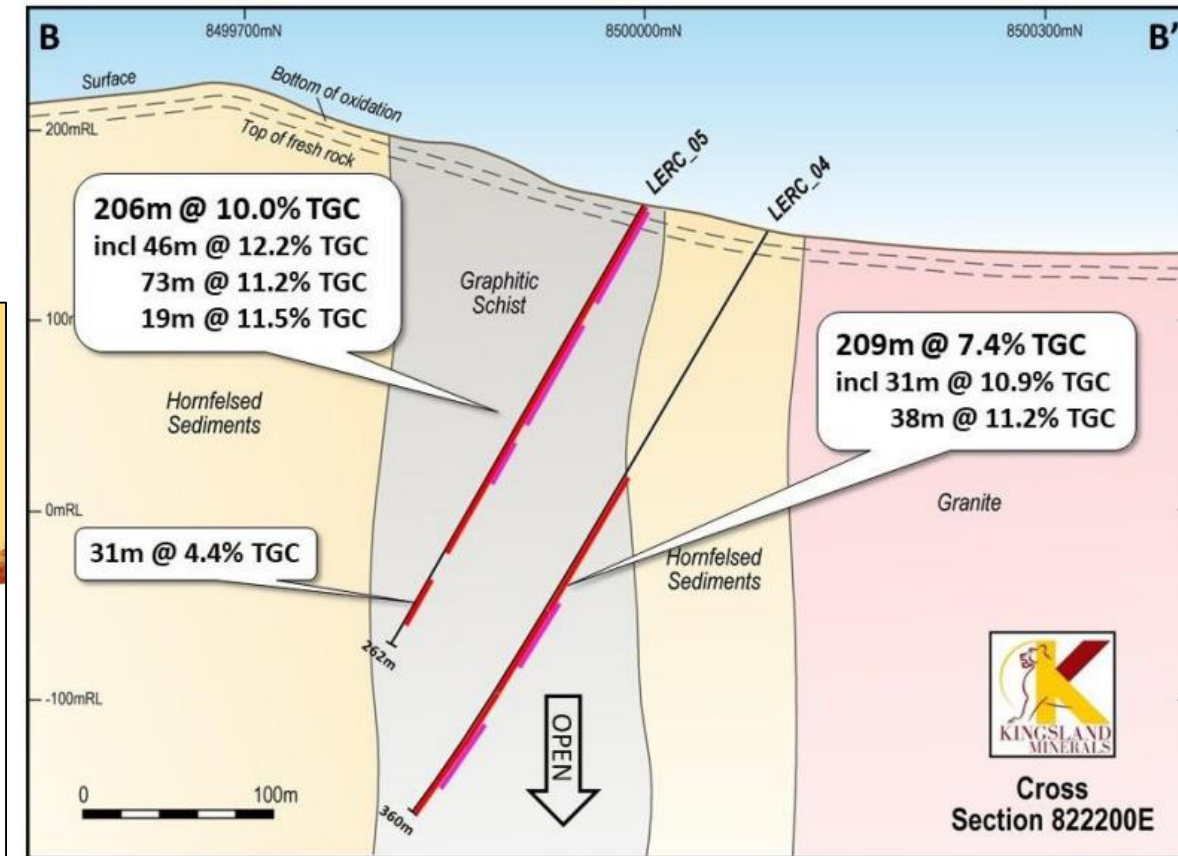
5 September 2023

Bonanza intersection of 206m at 10% Graphite confirms Leliyn's world-class potential

Stunning result shows Leliyn boasts both scale and grade, positioning it to be a highly sought-after supplier to lithium battery industry

Highlights

- The latest Total Graphitic Carbon (TGC) assays from diamond holes include:
 - 206m @ 10.0 % TGC from 0m (LEDD_05)



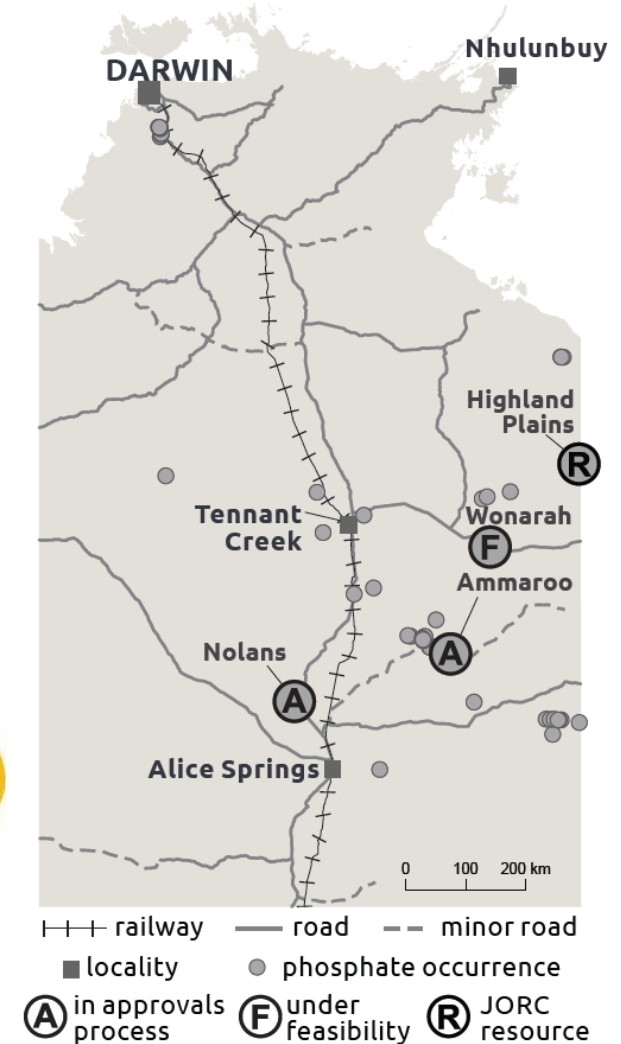
Maiden Resource due Q1 2024

Phosphate

- Australia's largest undeveloped rock phosphate resources; potential for production of phosphoric acid, fertiliser and or precursors to LiFePO_4 (LFP) batteries

Avenira Ltd - Wonarah deposit:

- MMP progressing for bulk sample testing for initial DSO operation.
- Scoping Study released March 2023 for the LFP Cathode Manufacturing Plant utilising phosphate from Wonarah.
- Land identified at Middle Arm Sustainable Development precinct near Darwin for LFP cathode production



Diversity of rare earths opportunities

Northern Minerals – co-funded for maiden drilling program at Boulder Ridge unconformity-style HREE prospect

Potential for carbonatite-hosted REE-Nb mineralisation in western Aileron Province

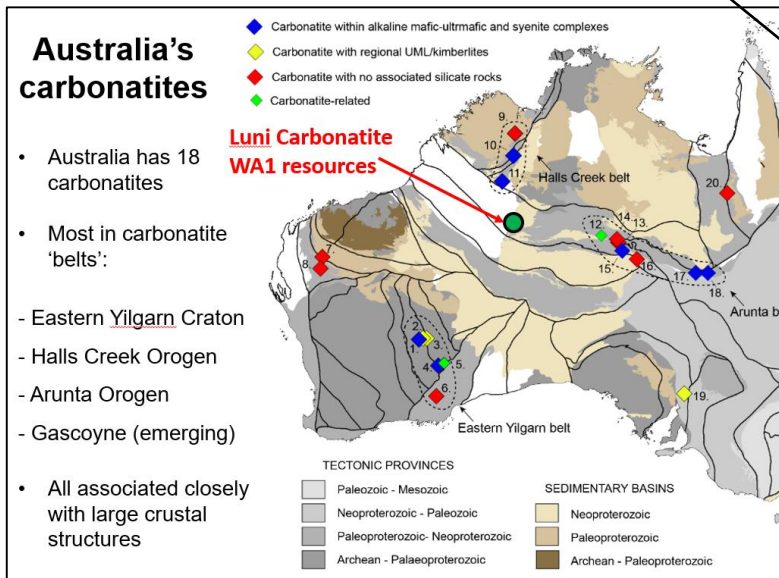
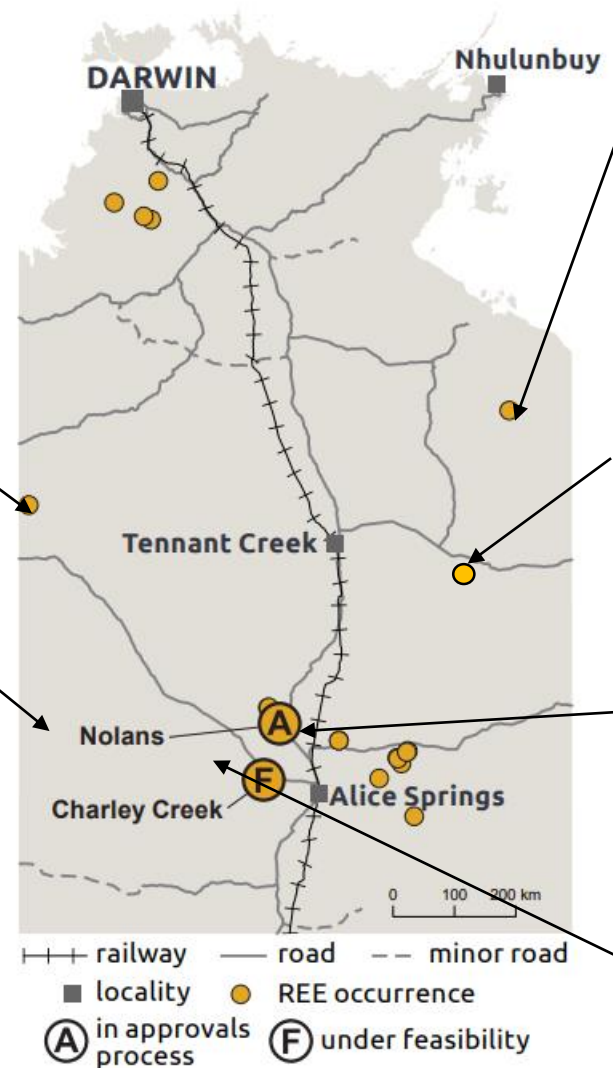
Transition Metals - New NdPr rich clay-hosted REE discovery in northern Barkly supported by NT Govt exploration grant

Avenira – identified high REE (up to 0.2% TREO) in layer above and within sedimentary phosphorite at Wonarah

Arafura Resources – Nolans NdPr

Carbonatite-associated deposit, project approaching FID

Energy Metals – assessing REE-rich regolith materials and saprolite at Crystal Creek near Yuendumu for ionic adsorption clay style mineralisation



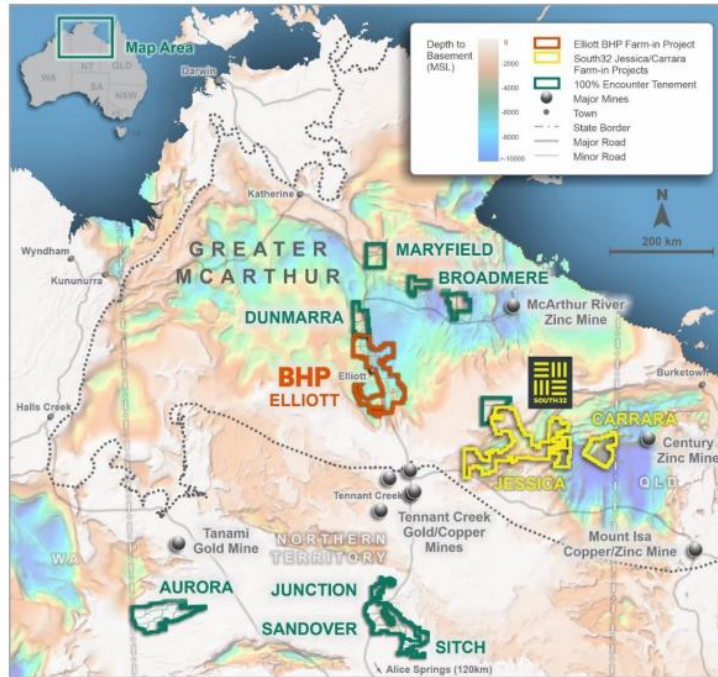
Copper – the search is on in the NT

BHP and South32 drilling deep holes targeting copper in the Barkly based on pre-competitive geoscience

Northern Territory: globally significant opportunity for copper

Major exploration programs targeting Tier 1 discoveries in new areas

- New Government data has transformed the exploration potential of the NT
- Vastly underexplored regions under shallow cover
- Highly prospective for sedimentary hosted copper-zinc deposits
- Located between major copper-gold districts of Mt Isa and Tennant Creek
- Encounter has a portfolio of fast mover copper opportunities:
 - Elliott – \$25m farm-in with BHP
 - Jessica & Carrara – \$15 & \$10m farm-ins with South32
 - ENR carried to Scoping Study
 - 100% owned projects



3 August 2023

DRILLING COMMENCED AT THE BENMARA BATTERY METALS PROJECT, NT

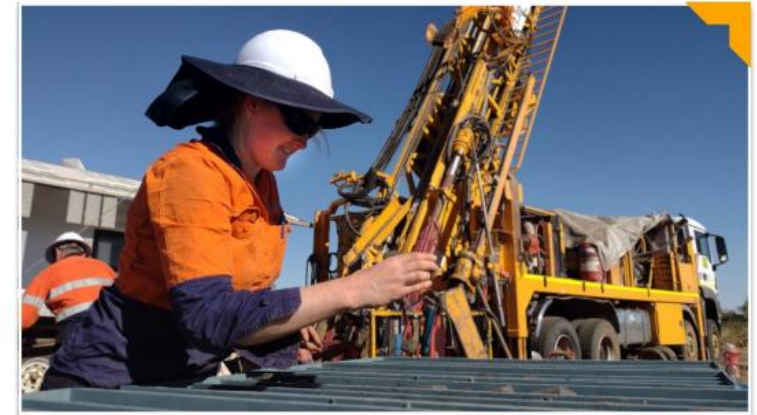


Figure 1. RML geologist reviewing diamond core from hole #23BNM001 at the Benmara Battery Metals Project

HIGHLIGHTS

- Drilling has commenced on two 1,000m deep stratigraphic diamond core drill holes at the Benmara Battery Metals Project in the Northern Territory

16

New phase of mining emerging in Tennant Creek area

Warrego Tailings

(Northern Iron Pty Ltd) –

Construction due to commence late 2023.

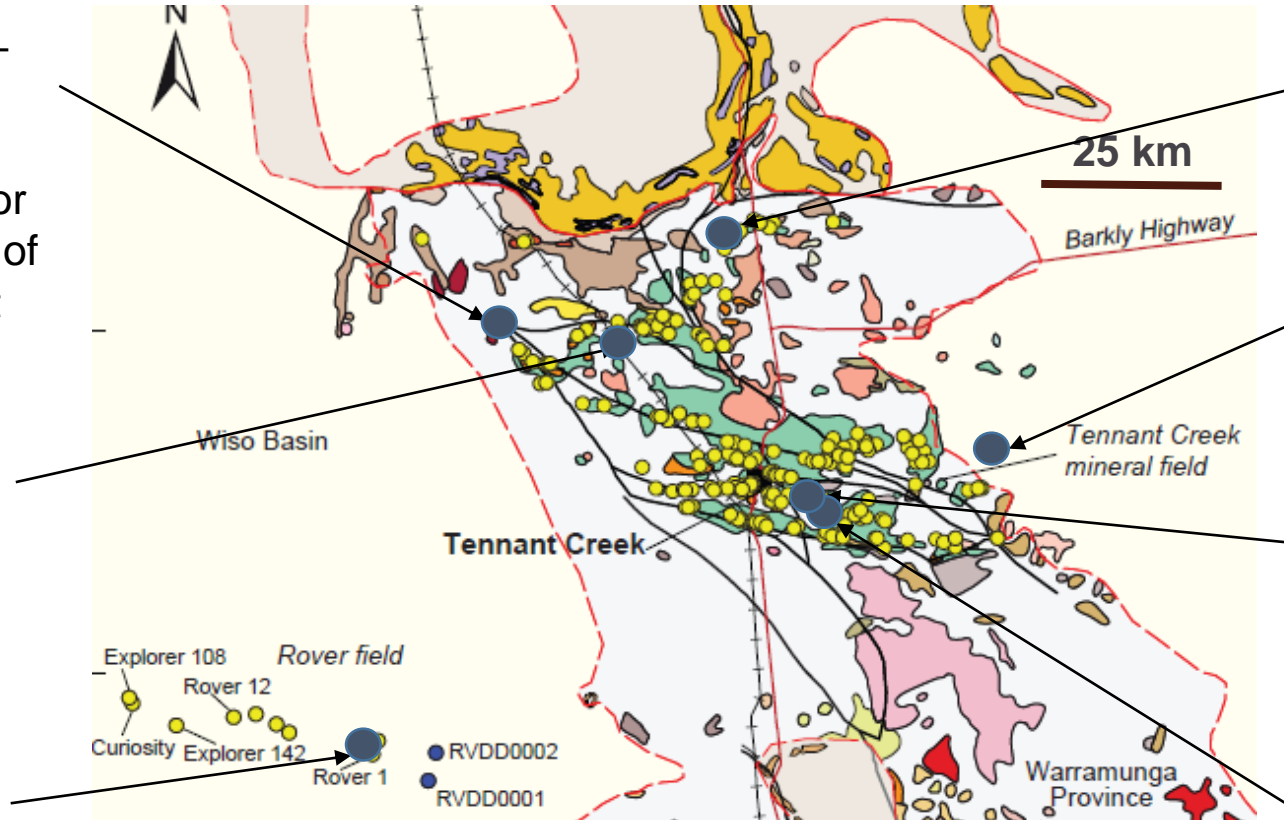
Agreement with Aurizon for new siding, and transport of 1.2Mtpa magnetite to port

CuFe Ltd - Orlando

Investigating feasibility of cutback at Orlando mine

Castile Resources – Rover 1

Progressing EPA Referral for Rover 1 copper-gold-cobalt-iron project



Emmerson Resources – Hermitage

New high-grade copper-rich discovery – Phase 3 drilling underway

Tennant Minerals – Bluebird

New high grade copper-gold discovery – extensional drilling underway

Elmore Ltd – Peko tailings

Magnetite production continuing from tailings – third shipment due late Sept

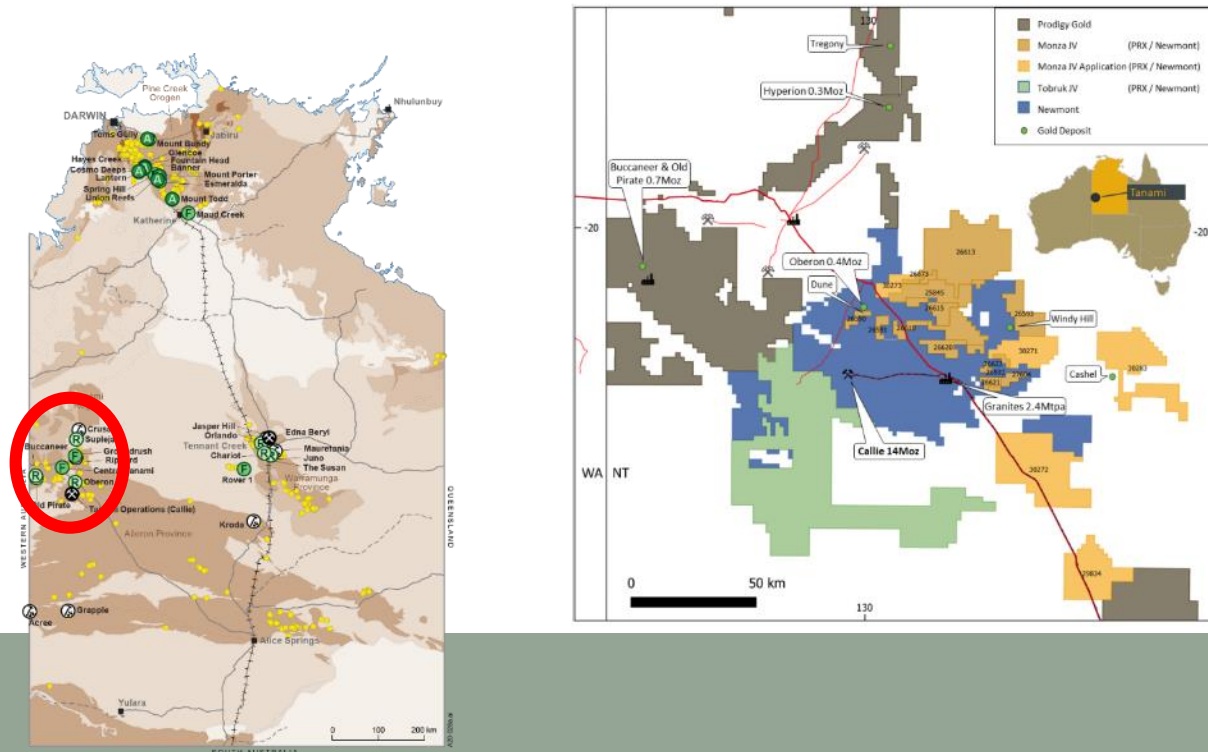
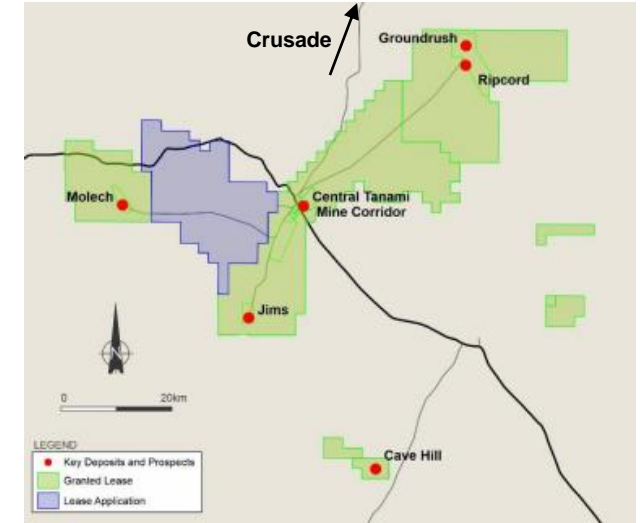
Tennant Mining – Nobles Nob

Gold plant planned at Nobles Nob to process waste rock and be central processing plant for numerous small mines

Gold in the Tanami

Central Tanami JV (Northern Star Resources –Tanami Gold) – *Central Tanami*

- \$15M exploration budget for FY24; 36,000m of diamond, RC and aircore throughout Central Tanami
- Updated combined Mineral Resource of **13.0 Mt @ 3.7 g/t Au** for 1.5 Moz; further updated resources announced and in progress
- Two GDC grants for drilling at Groundrush-Ripcord and Beaver



Prodigy Gold – *Tregony*

- 37 RC holes completed for 4848m at Tregony
- Co-funded diamond drilling (Tregony) and gravity underway
- Agreement with **Stockton Mining** regarding Old Pirate and 23 surrounding tenements.

RESOURCING THE TERRITORY

Resourcing the Territory: A\$9.5 million per year ongoing program to support resource exploration, commenced July 2022

Strategic themes:

1. **Accelerating resource development in known mineral provinces**
2. **Attracting and supporting resource exploration in frontier areas**
3. **Applying geoscience to support a low emissions future**
4. **Modernising geoscience data to support a digitally enabled industry**

Key activity streams:

- ❖ **Promoting industry growth**
 - Geophysics and Drilling Collaborations grants
 - Promotion and industry engagement
- ❖ **Building geoscientific knowledge**
 - Upgrading geophysical data coverage
 - Resource potential of onshore sedimentary basins
 - Framework and mineral potential of basement provinces
 - Geological potential for critical minerals and low emissions energy
- ❖ **Modernising geoscience and exploration data**
 - Digital capture of legacy exploration data
 - Modernising databases and systems

RESOURCING THE TERRITORY

Geophysics and Drilling Collaborations grants

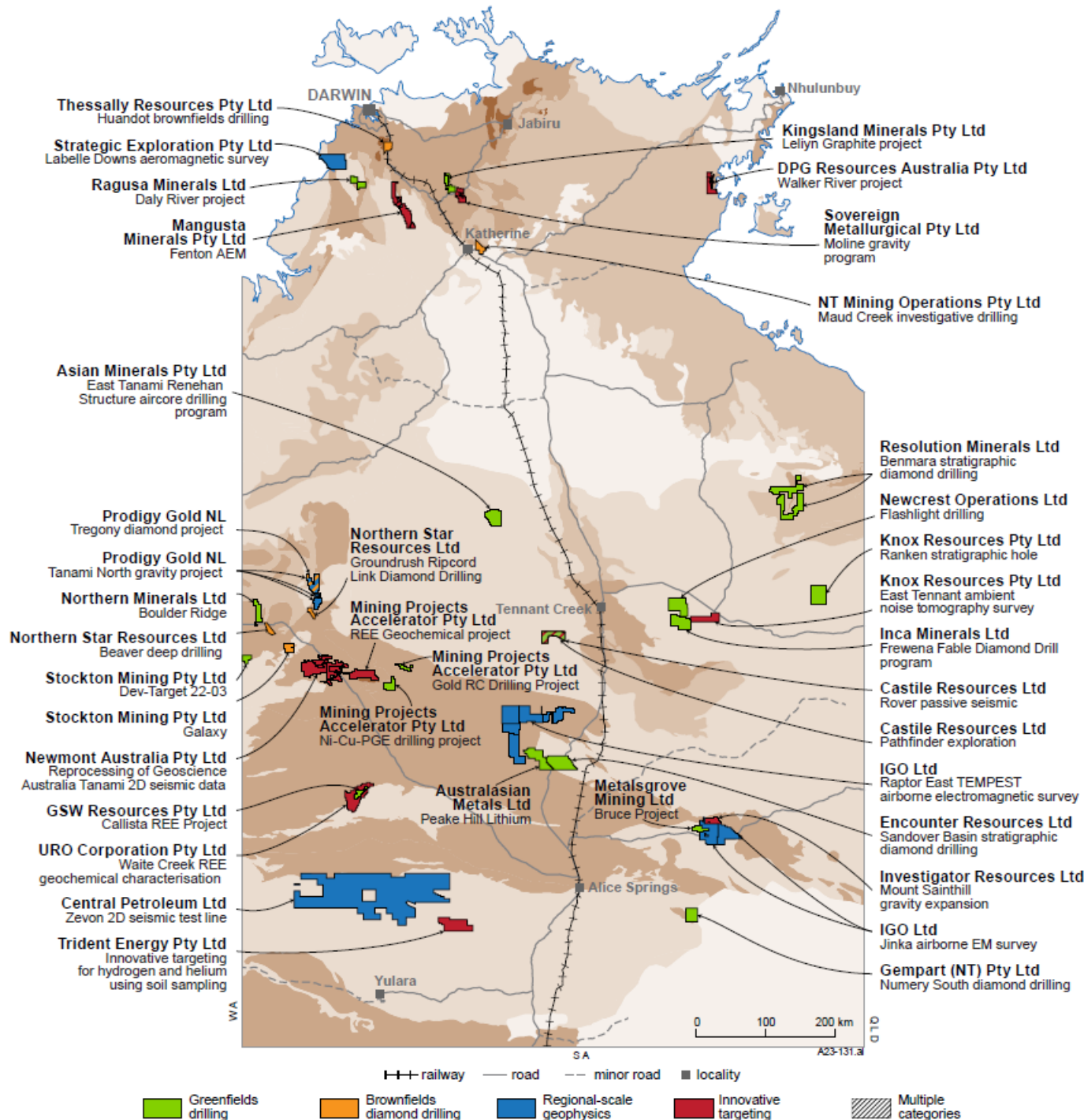
Substantial increase in funding amount and scope of program

\$3.7 million in co-funding awarded to 38 projects from 30 companies in 2022/23

- 17 greenfields drilling
- 6 brownfields drilling
- 5 regional geophysics
- 10 innovative targeting

Round 17 (2024)

- Applications open 26 Feb 2024
- Applications close 29 April 2024



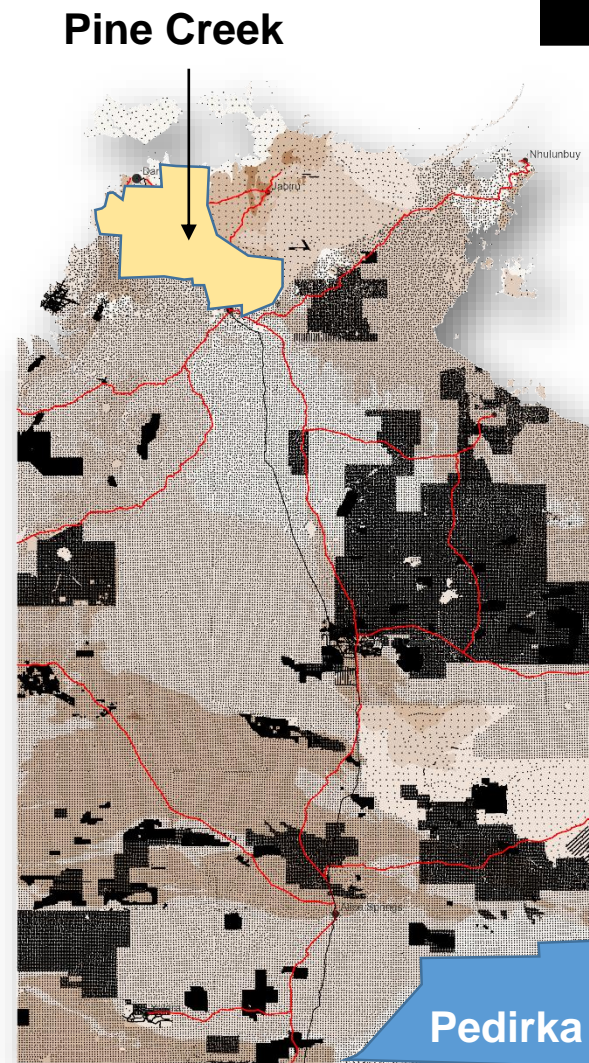
Underpinning exploration success through enhanced geophysics

Campaign gravity acquisition to improve the resolution of gravity stations to ≤ 4 km spacing.

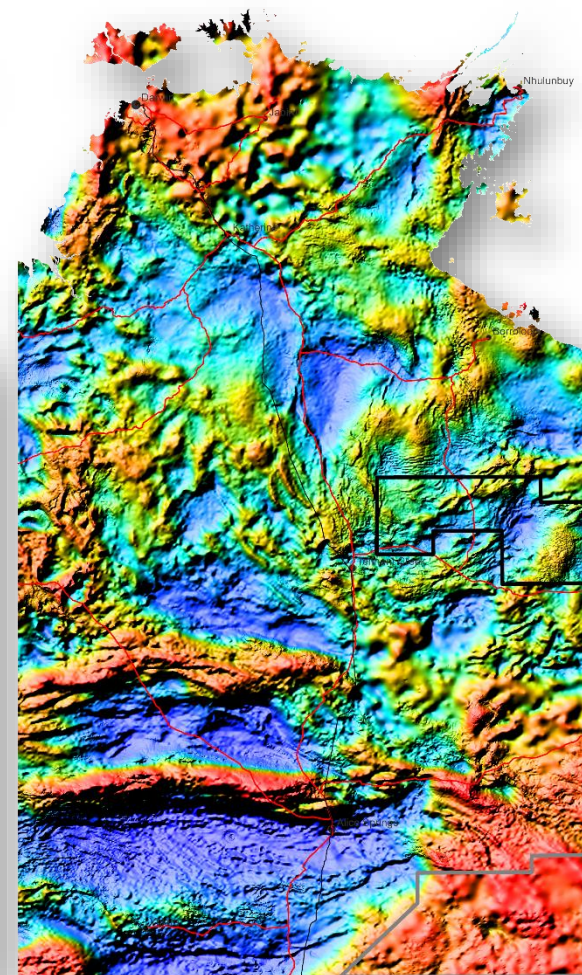
Key areas currently at 11 km ground spacing

Pedirka Gravity Survey: improve coverage to 2 km and 4 km spacing, acquisition completed 1 September 2023

Pine Creek Orogen: improve to 2 km and 4 km spacing, acquisition to commence 2024 – will seek industry infill interest



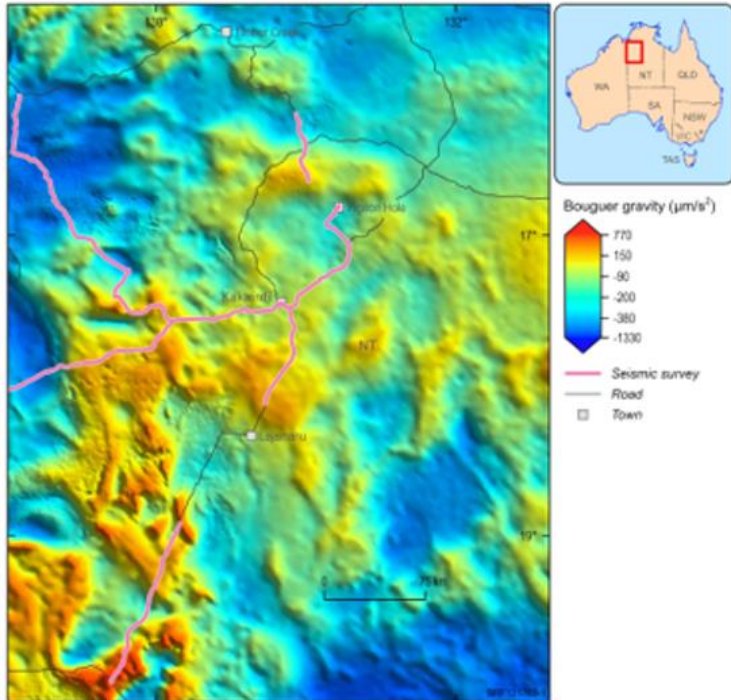
RESOURCING THE TERRITORY



Birrindudu Basin (western greater McArthur Basin)

- Underexplored area with high potential for sediment-hosted mineralisation
- Focus for new greenfields studies with GA, CSIRO and University of Adelaide

Northwest Northern Territory reflection seismic survey – in progress

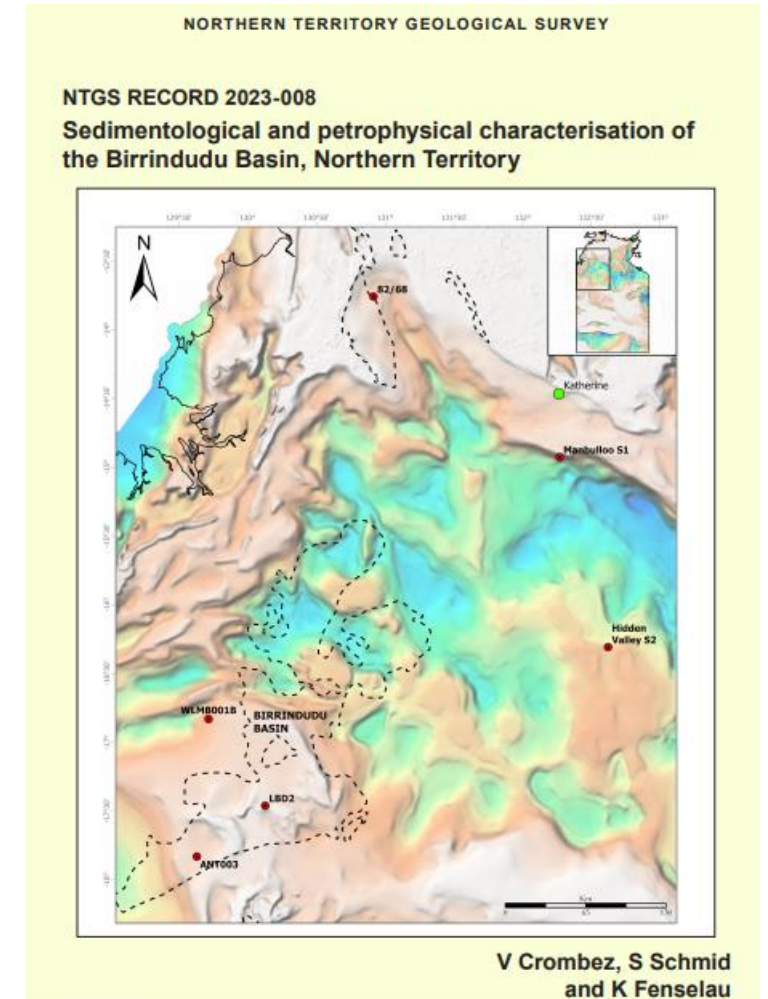


Andrew Heap (Geoscience Australia)
Mining the Territory 2023,

New organic and inorganic analysis from the Birrindudu Basin: <https://ecat.ga.gov.au/geonetwork/srv/eng/catalog.search#/metadata/148608>

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Earth sciences for Australia's future | ga.gov.au



V Crombez, S Schmid
and K Fenselau



Annual Geoscience Exploration Seminar (AGES)

The Territory's premier exploration-focussed technical event
Alice Springs, April 16-17 2024



Record 308
attendees in 2023



NT Geological
Survey



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Exploration
grants



Energy



Minerals



Data and
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Supporting resource exploration in the Northern Territory

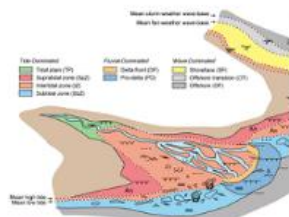
Resourcing the Territory is a \$9.5 million per annum ongoing program supporting mineral and petroleum exploration and development in the Territory through a range of geoscience and exploration stimulus programs.

Find out more



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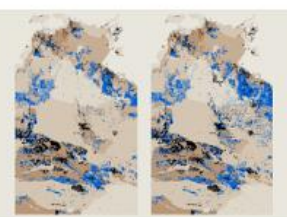
Latest news



**NTGS release the first
phase of a collaborative
study with CSIRO on the
Birrindudu Basin**

05 Sep 2023

A newly released study on the
sedimentary facies and



**More legacy exploration
data released from the
Pine Creek region**

04 Sep 2023

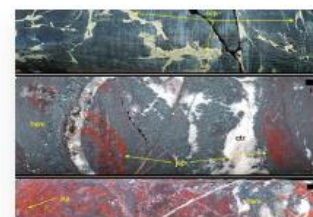
NTGS has released legacy
exploration data the Koolpinyah
and Noonamah 1:100,000 map



**NTGS release new age
data from the western
Warburton Basin**

04 Sep 2023

The results from the study
include the first geochronology
data published by NTGS for the



**NTGS release DIPS on the
Gecko Corridor and
Nobles Nob in Tennant
Creek**

24 Aug 2023

The new DIPS on the Gecko
Corridor and Nobles Nob provide

RESOURCING THE TERRITORY

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