Greenvale MINING LIMITED

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NORTHERN TERRITORY GEOLOGICAL SURVEY
AGES2022
ANNUAL GEOSCIENCE EXPLORATION SEMINAR

Insights on stratigraphy, modelling and IOCG potential of the Warramunga Province

EL 32282, EL 32296 and EL 32295, East Tennant Creek, Northern Territory

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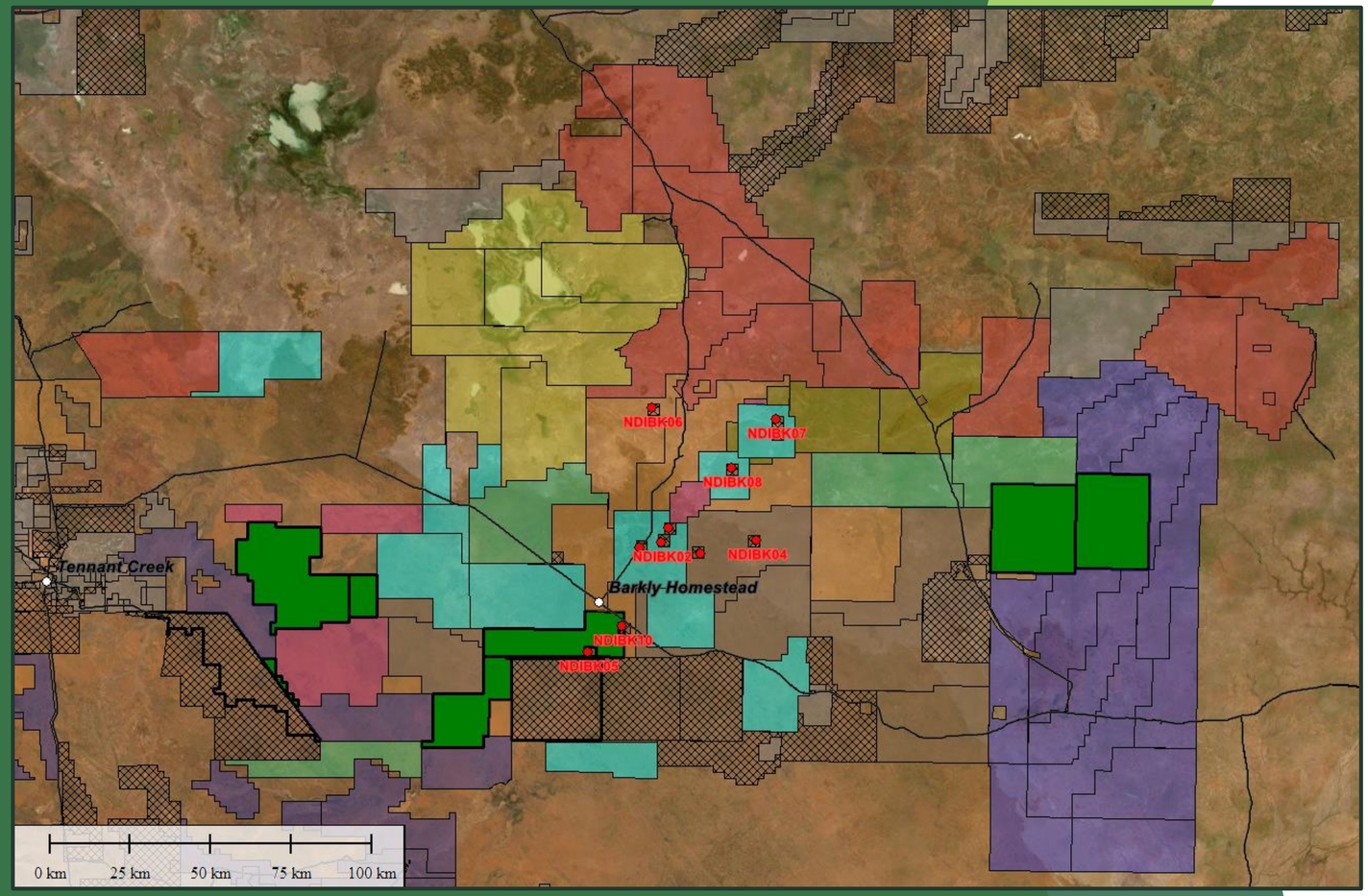
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Georgina Basin IOCG Project



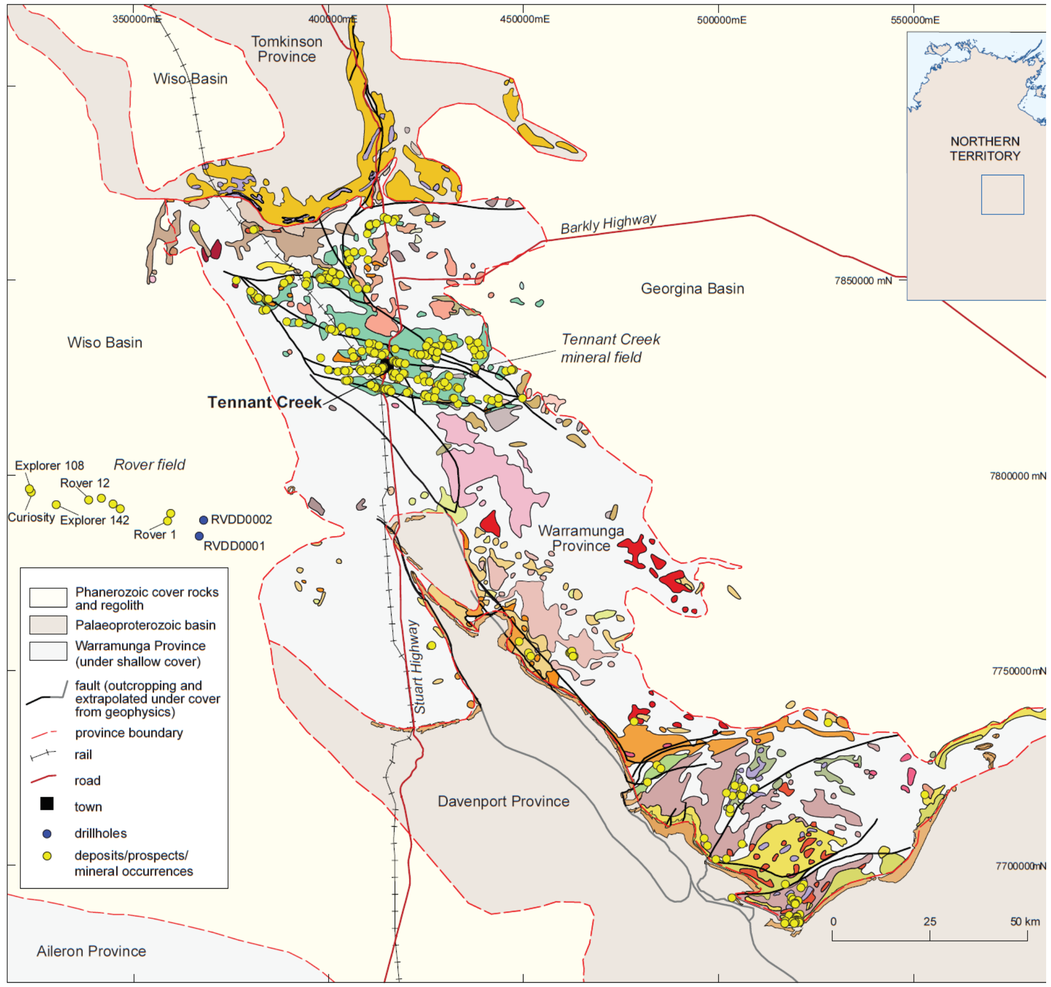
- Barkly Tablelands, east of Tennant Creek has been subject to substantial exploration focus over the past few years
- Greenvale through is wholly owned subsidiary, Knox Resources was an early explorer within this region
- Thirteen Exploration Licences/Applications (ELs) over three distinct locations covering 4,500+ km^2 between the IOCG provinces of Tennant Creek and Mount Isa
- Seven ELs granted on 23 September 2020 with three ELs subject to negotiation with indigenous freehold landholders
- Two MinEx CRC diamond holes, NDIBK05 and NDIBK10(in red) are located in tenement

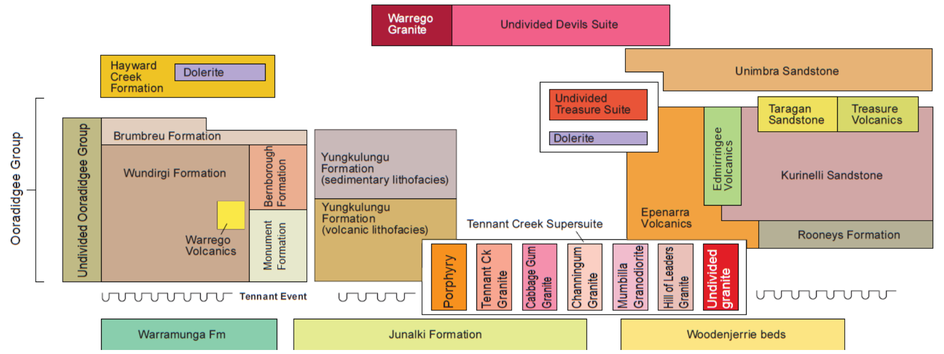
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Regional Geology

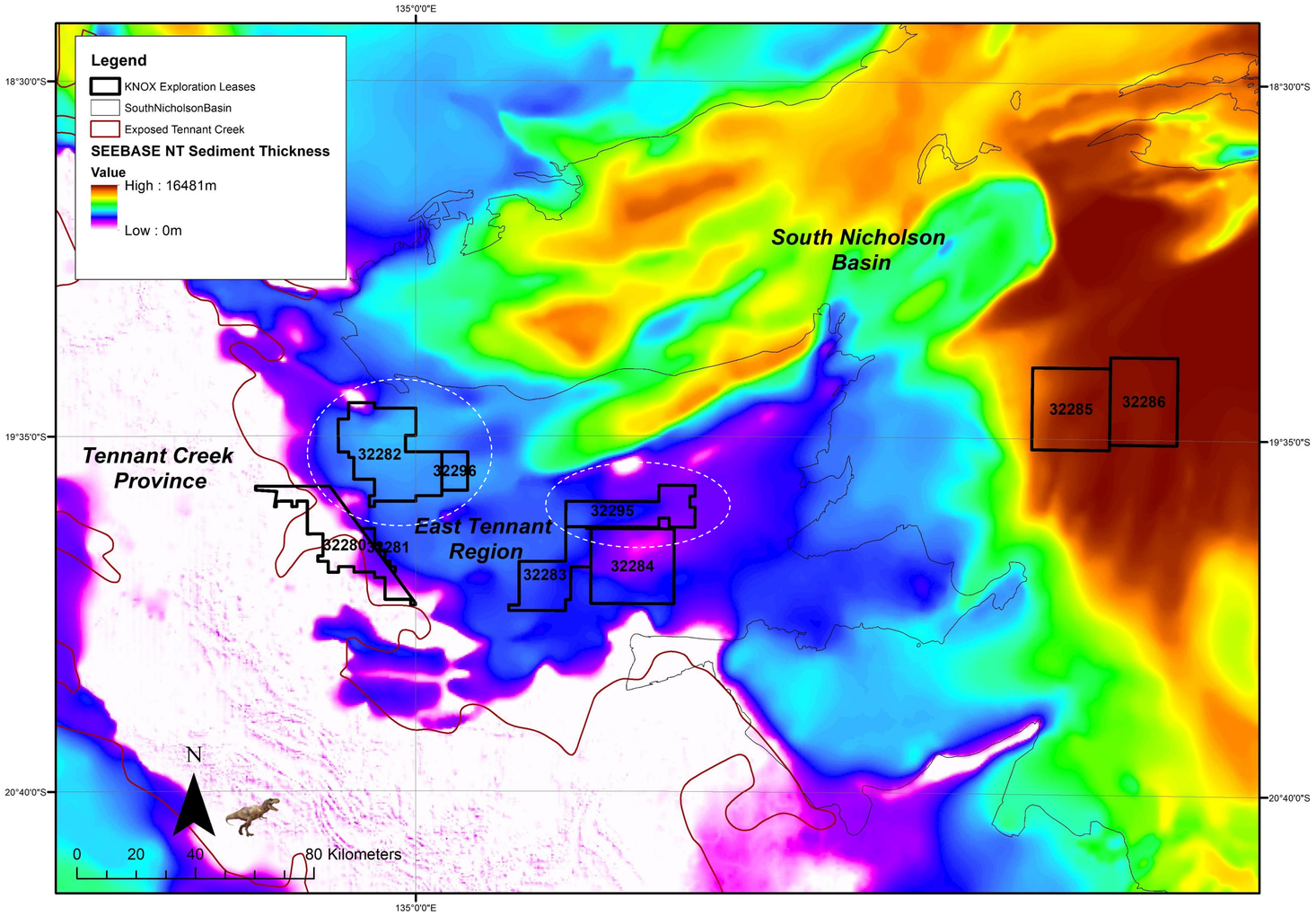
- The Warramunga Formation is characterised by turbiditic felsic volcanic derived sediments and felsic tuffs (deposited about 1862 Ma) under Georgina Basin cover sequences
- Syn-tectonic intrusive rocks of the Tennant Creek Suite comprising granites and quartz porphyries and lesser mafic to intermediate intrusions focused along pre-existing structures (1851-1847 Ma)
- Major E-W shear zones divide the area into several structural blocks of tightly folded strata
- High-grade deposits of copper and gold mineralisation associated with magnetite and/or hematite bearing ironstones hosted within the Warramunga Formation have been mined in the Tennant Creek Inlier since the 1930s
- Pre-competitive geoscience studies from Geoscience Australia and NTGS show that the Barkly Tableland area, east of Tennant Creek is prospective for IOCG mineralisation





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Initial Data Compilation



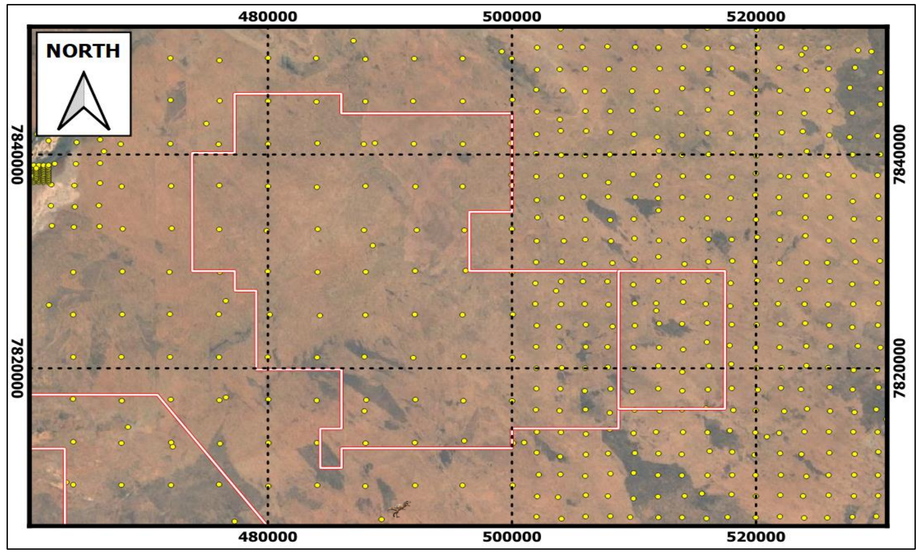
- Greenvale tenement holding in three distinct locations between the IOCG provinces of Tennant Creek and Mount Isa
- Initial focus on EL32282, EL 32296 and EL32295 where detailed geophysics data was acquired during 2021 under the Geophysics and Drilling Collaborations Program
- The ELs have been interpreted to lie within the eastern undercover extension of the Tennant Creek region, which is mostly covered by a thin veneer of unconsolidated Cainozoic deposits or Cambrian sediments of the Georgina Basin.
- Current focus on exploring for IOCG mineralisation within this undercover region.
- Exploration has relied heavily on geophysical data for geological and structural interpretations as well as exploration targeting

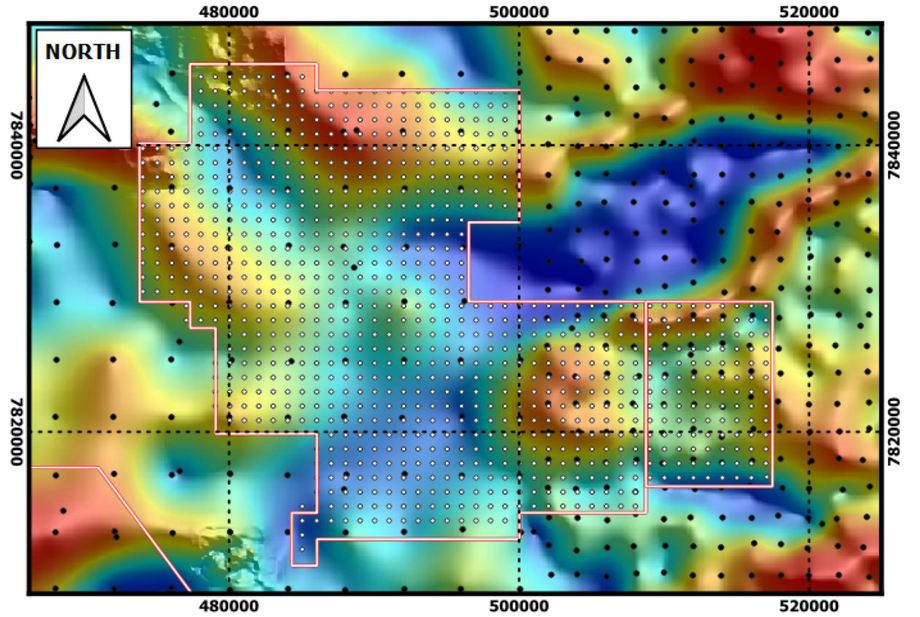
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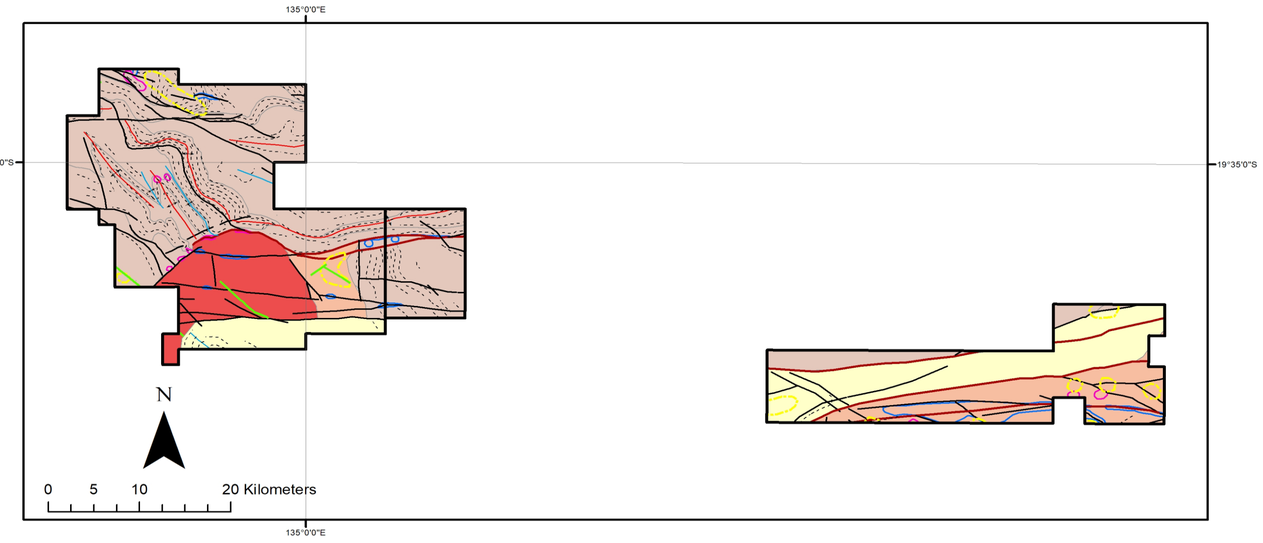
Geophysics and drilling collaboration program

- Existing Project area datasets include aeromagnetic data at 200m-400m line spacing and gravity of 2km x 2km and 4km x 4km station density
- In 2020-2021, geophysical infill programs across central and western tenements including 27,879-line km of 100m line-spaced airborne magnetics and 2,274 infill gravity station measurements, including two successful applications under the NTGS Geophysics and Drilling Collaboration co-funding program
- Applications included 911 gravity stations at a station spacing of 1 km x 1 km within EL32282 and EL32296, and a 12,618-line km magnetic survey over ELA32284 and EL32283.
- Data processing and gridding was undertaken by Resource Potentials
- This data greatly improved the data resolution and geological understanding of these areas





Interpreted Solid Geology



Legend

KNOX_Exploration_Leases
Trends
Dyke / vein
Gravity Highs

Fold Axes

Type

Anticline
Syncline

Fault_Type

Major
Fault
shear zone

Alteration

Demagnetisation
Enhanced magnetisation

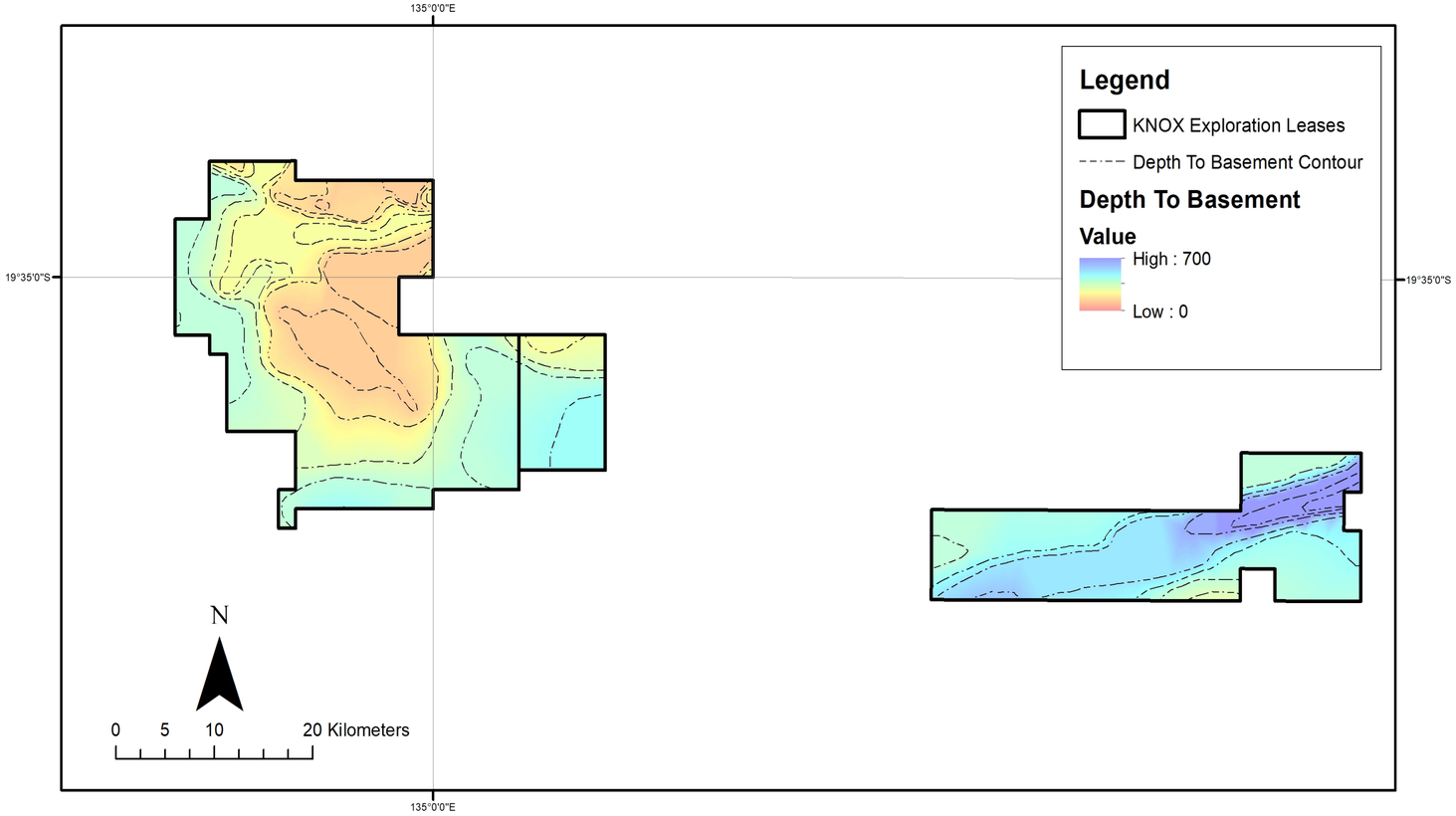
Formation

No formal name
Kurinelli Sandstone
Monument Formation
Epenarra Volcanics
Yungkulungu Formation
Ooradidgee Group
Tennant Creek Supersuite
Channingum Granite
Mumbilla Granodiorite
Woodenjerrie beds
Warramunga Formation

- solid geology and structural interpretations conducted at 1:25,000, integrating:
  - detailed magnetic and gravity data,
  - published 1:100 K geological mapping,
  - published solid geology interpretations of NT Tennant Creek and Frew River
  - open-source drilling data where available, along with published literature
- Interpretations encompassed geology, structure and alteration (magnetic enhancement/demagnetisation) – all interpretations were completed within the lease areas and surrounds (masked within these images)
- Interpretations across ELs 32282 and 32296 interpreted the basement rocks to consist primarily of metasediments and felsic volcanics of the Ooradidgee Group, either intruded or faulted against a felsic (granite?) body in the south. A zone of Warramunga was interpreted on the eastern margin of this intrusion.
- EL32295 was interpreted to consist of a zone of Warramunga to the south, faulted against Yukulungu Formation to the north
- Structurally E-W trending faults/shear zones were interpreted to divide the area into several structural blocks of tightly folded strata predominantly trending E-W to NW.

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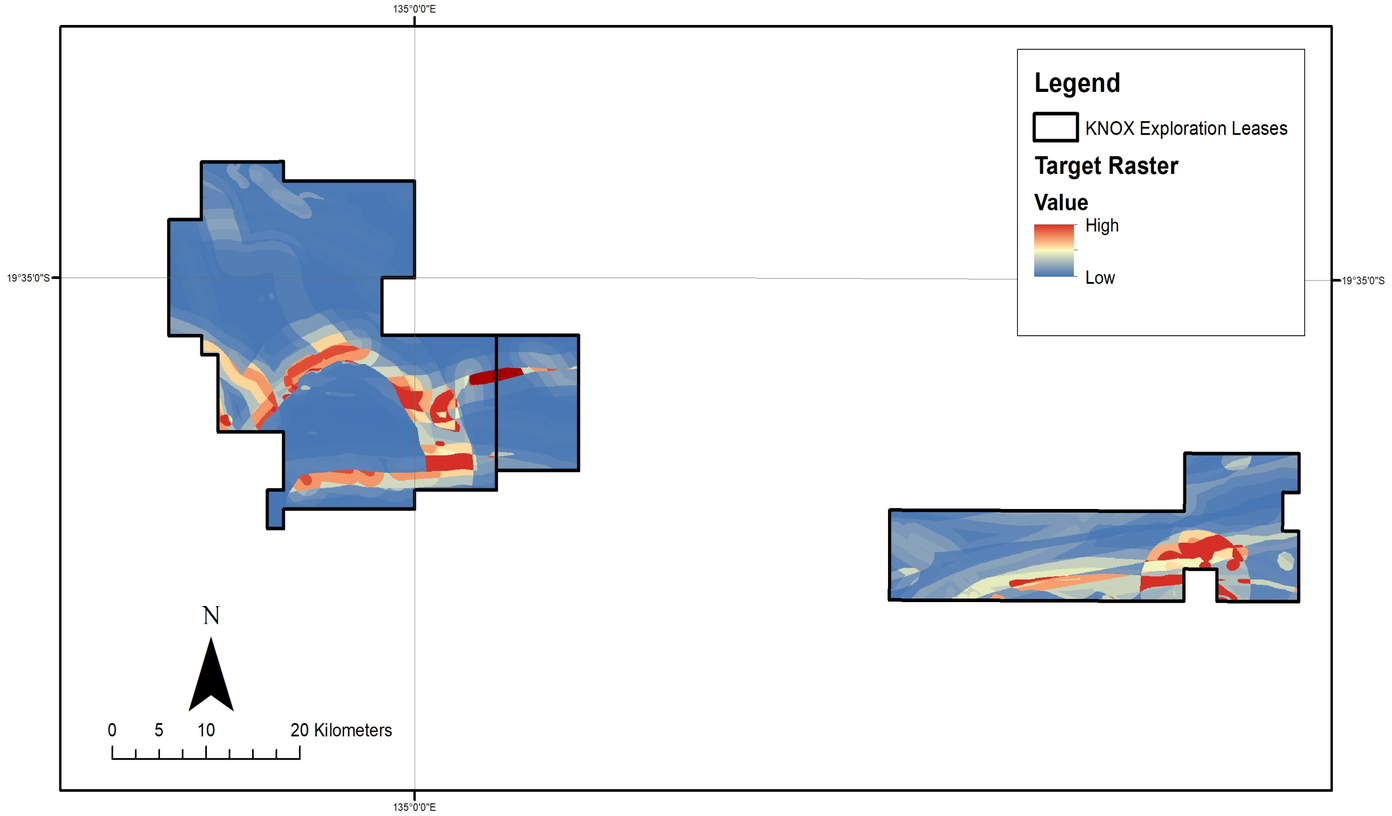
Depth to Basement Modelling



- Calculation of depth to magnetic sources by Euler deconvolution was undertaken by Resource Potentials.
- All sources modelled by this method included surficial, intra-basinal (e.g., Cambrian volcanics), top basement and deep crustal sources.
- Separation of top basement sources using magnetic, gravity data and geological interpretation was completed.
- Interpolation of depth contours was completed using selected modelled source depths, gravity and magnetic imagery calibrated with drillhole and outcrop data.
- From this process depths to magnetic basement ranges were modelled to lie between 100m and 350m within Els 32282 and EL3296 and up to 700m within EL32295

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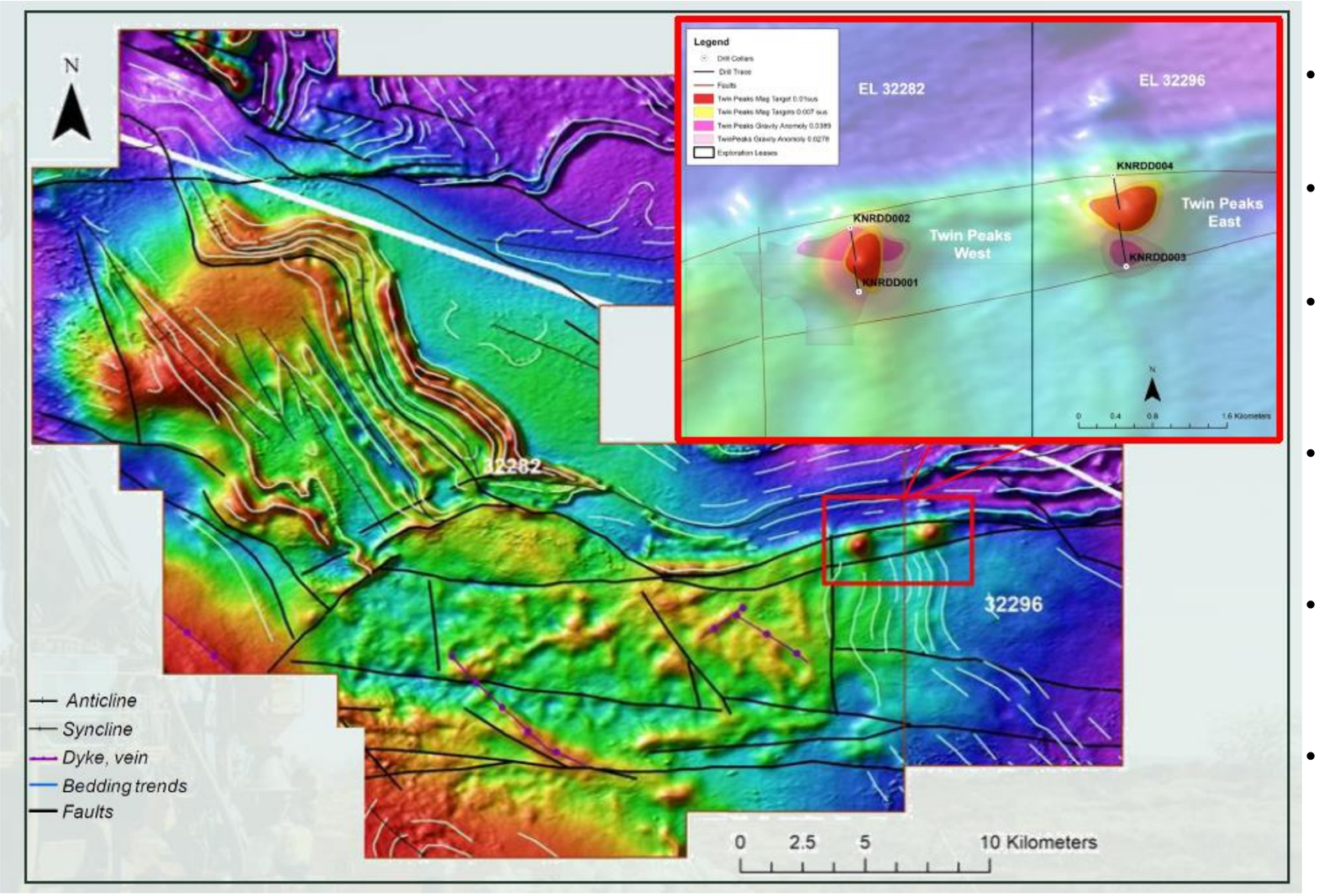
Exploration Targeting



- Mineral systems analysis and exploration targeting was conducted focusing on the Tennant Creek style IOCG mineral system
- Process aimed to break down the mineral system components (fluid source, fluid driver, fluid pathway and fluid trap) and define these as discrete mappable elements for targeting.
- Examples of mappable elements (but not limited to):
  - **Fluid Source/driver**: e.g., proximity to intrusives
  - **Fluid Pathway**: e.g., major structures, faults and intersections
  - **Fluid Trap**: e.g., ironstones within Warramunga Formation, zones of magnetic alteration e.g., enhancement/demagnetisation.
- A fuzzy logic targeting scenario was completed integrating identified targeting elements from which a mineral potential map was derived
- Favourable zones were characterised and ranked against available data for more detailed drill targeting

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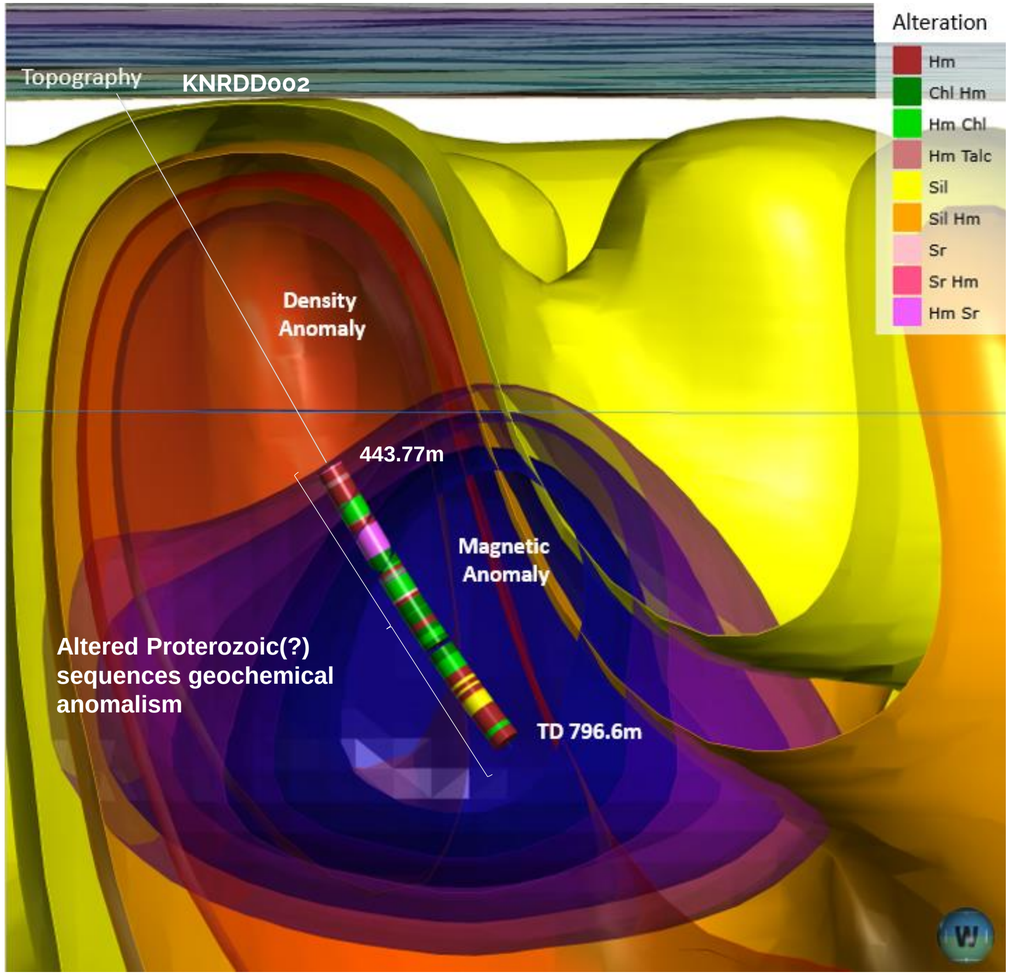
Exploration Targeting – Twin Peaks



- Two key targets identified in EL32282 and 32296 included the Twin Peaks targets
- Defined as two discrete magnetic highs bound to the north and south by major E-W trending shears
- Detailed gravity assisted in defining two discrete slightly offset gravity highs associated with these features.
- The geophysical character of these bodies were interpreted to be suggestive of the presence of an ironstone body or potential alteration
- 3D inversion modelling of the magnetic and gravity data was completed by Resource Potentials which assisted with drill targeting
- Four holes were initially planned targeting the magnetic and density bodies and areas of coincidence

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Twin Peaks - Drilling Results



- Two holes have been drilled, targeting the east and west Twin Peaks targets – have provided valuable insight into the geology of this region
- KNRDD002 intersected a 'cover sequence' of Georgina basin limestone, Helen Springs basalt and a basal sandstone-conglomerate, before intersecting a complex sequence of fine-grained alkali basaltic volcanics, autobreccias and hyaloclastites with lesser sandstone conglomerates
- Alteration throughout the sequences included zones of hematite(-talc), hematite-quartz-chlorite, sericite, smectite and iron oxy-hyroxide alteration
- The magnetic/gravity features are therefore likely explained by these alkali basaltic rocks
- Age and provenance of these basalts is uncertain at this stage as is their mineralisation potential
- Euler deconvolution estimated basement depths
  - KNRDD002 320m
  - KNRDD004 310m

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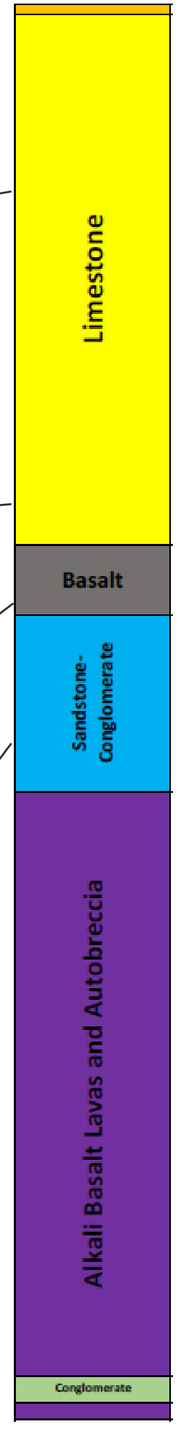
KNRDD02 Core Photos











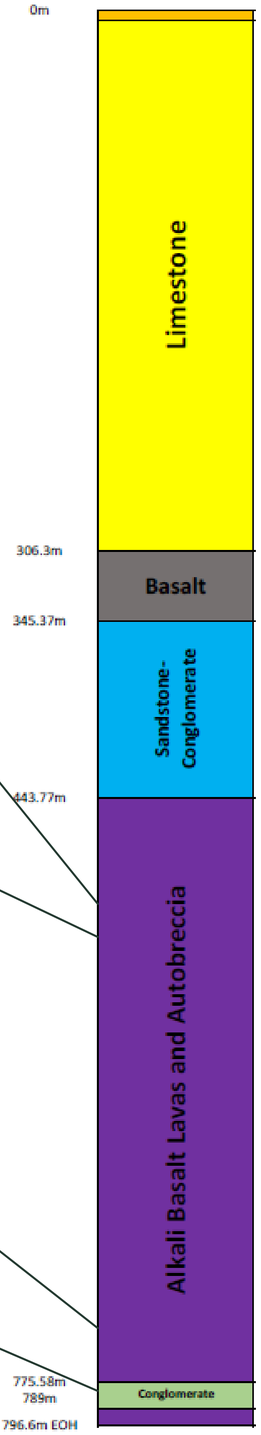
KNRDD02 Core Photos



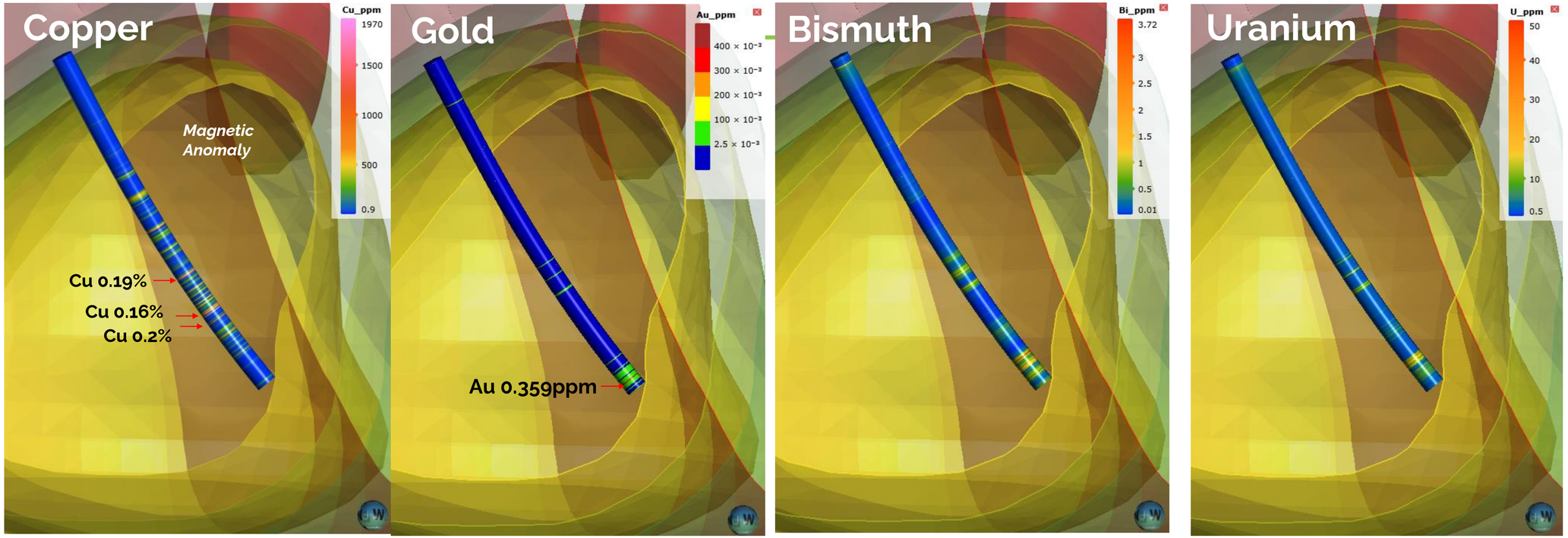








Drilling Results – Geochemistry - KNRDD002

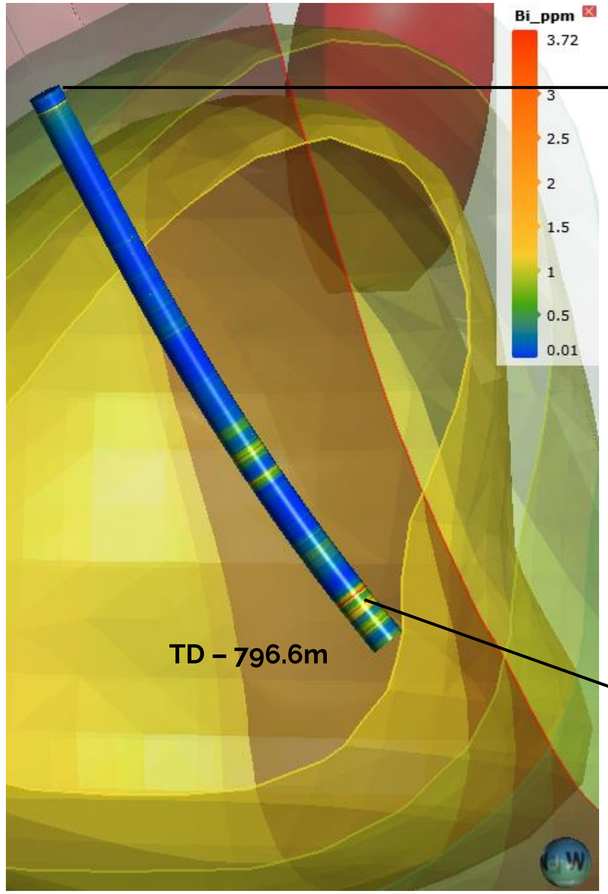


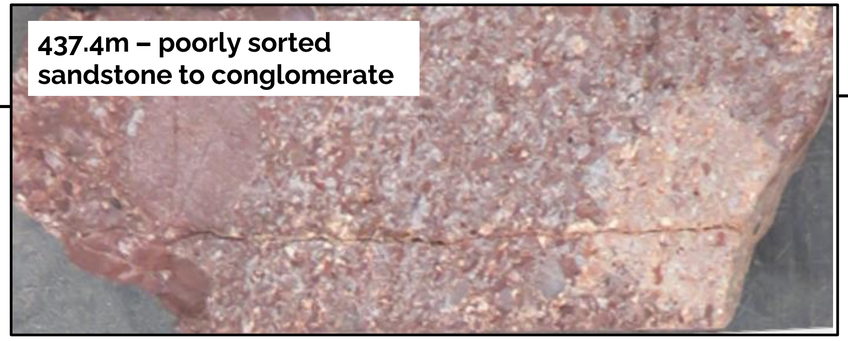
- Assay results from KNRDD002 returned a broad zone of multielement geochemical anomalism incl Bi, and U from 758m to 796.6m with zones of anomalous Cu and Au
- Best gold was intercepted from 774-790m with a maximum of 1m @ 0.359ppm
- Best Cu one-meter intercepts included
  - 0.19% @ 669m
  - 0.16% @ 709m
  - 0.2% @ 712m

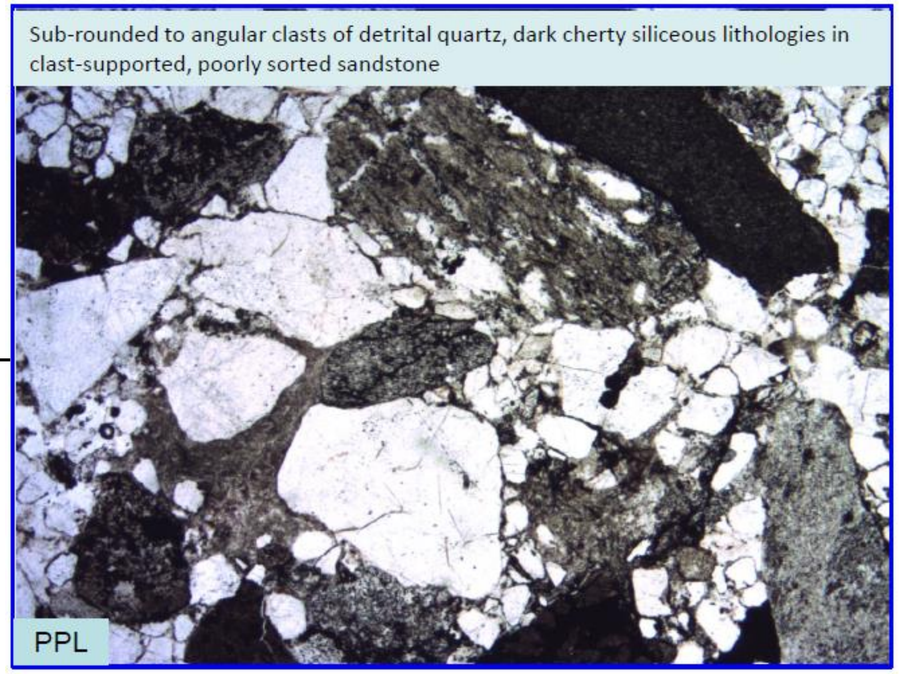
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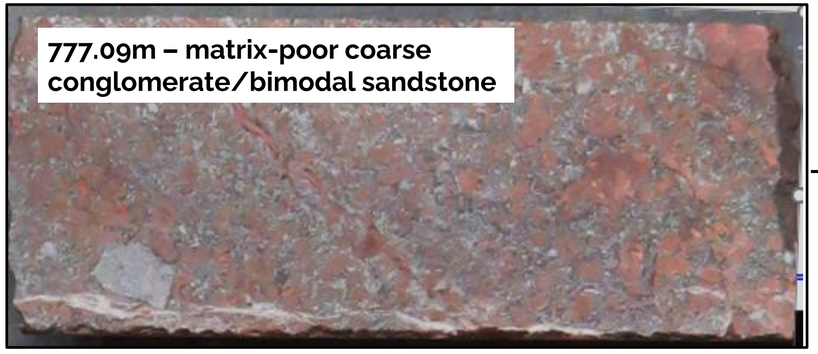
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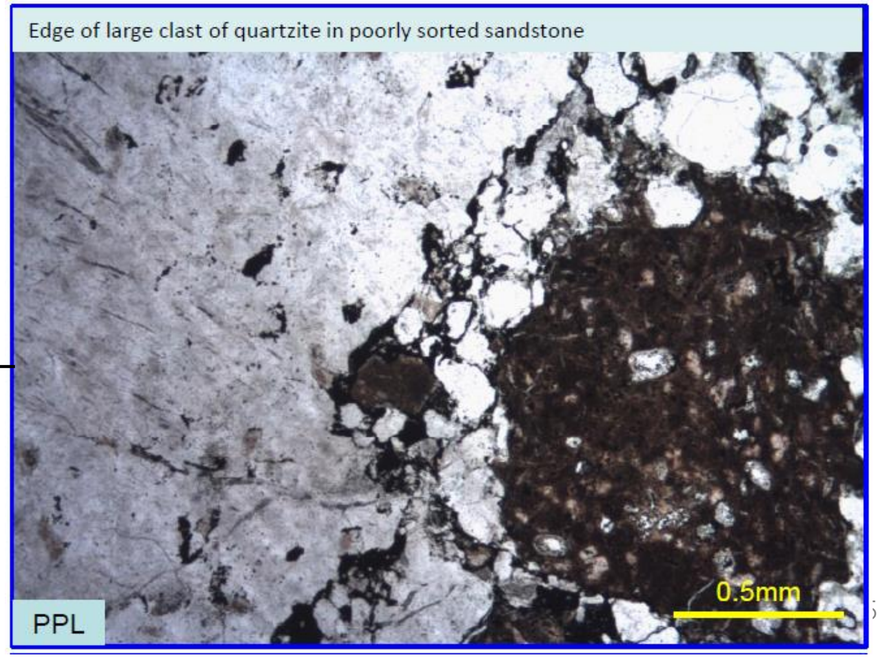
Petrography





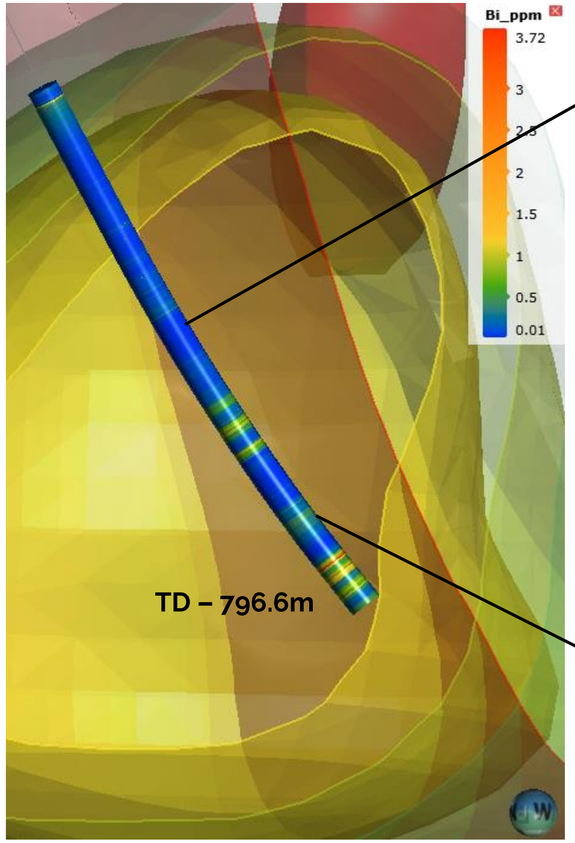




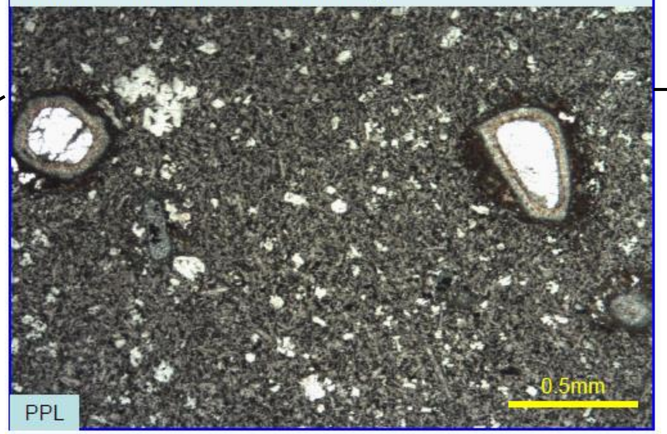


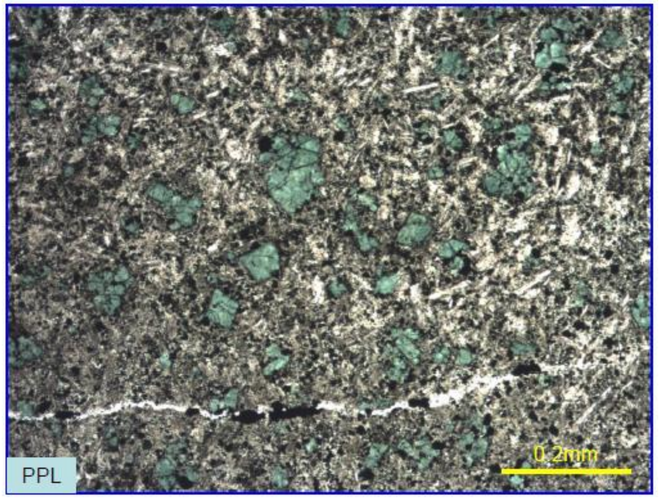
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Petrography - Basalt



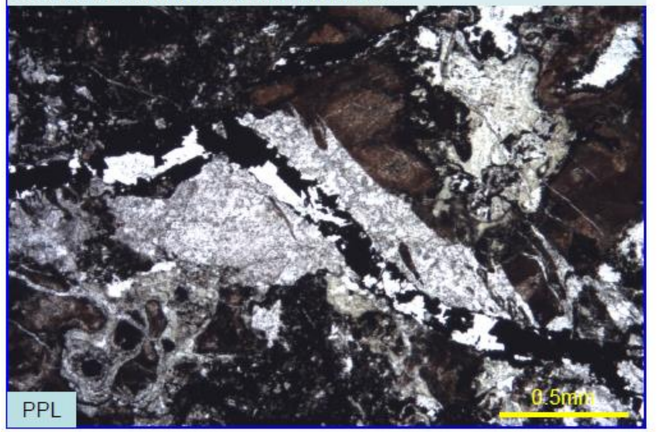
Chlorite+ Fe oxy-hydroxide-lined, quartz-filled vesicles in finely olivine-phyric basalt lava with chloritized olivines. Detail in lower image.





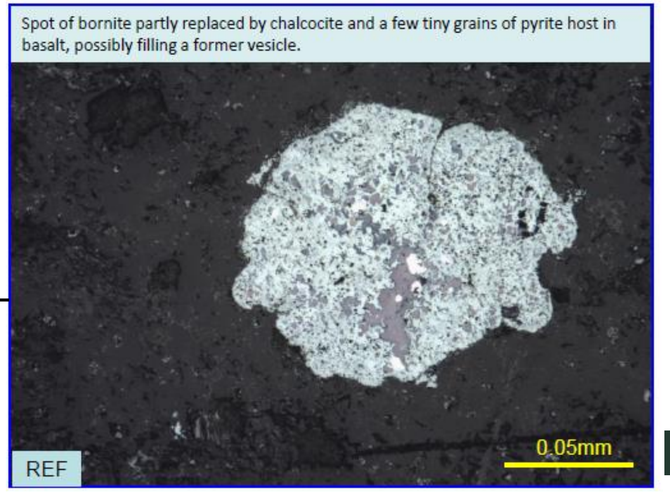


Complex veining in brecciated and altered basalt. Narrow vein of hematite (black, but partly plucked out) cutting earlier dolomite vein.



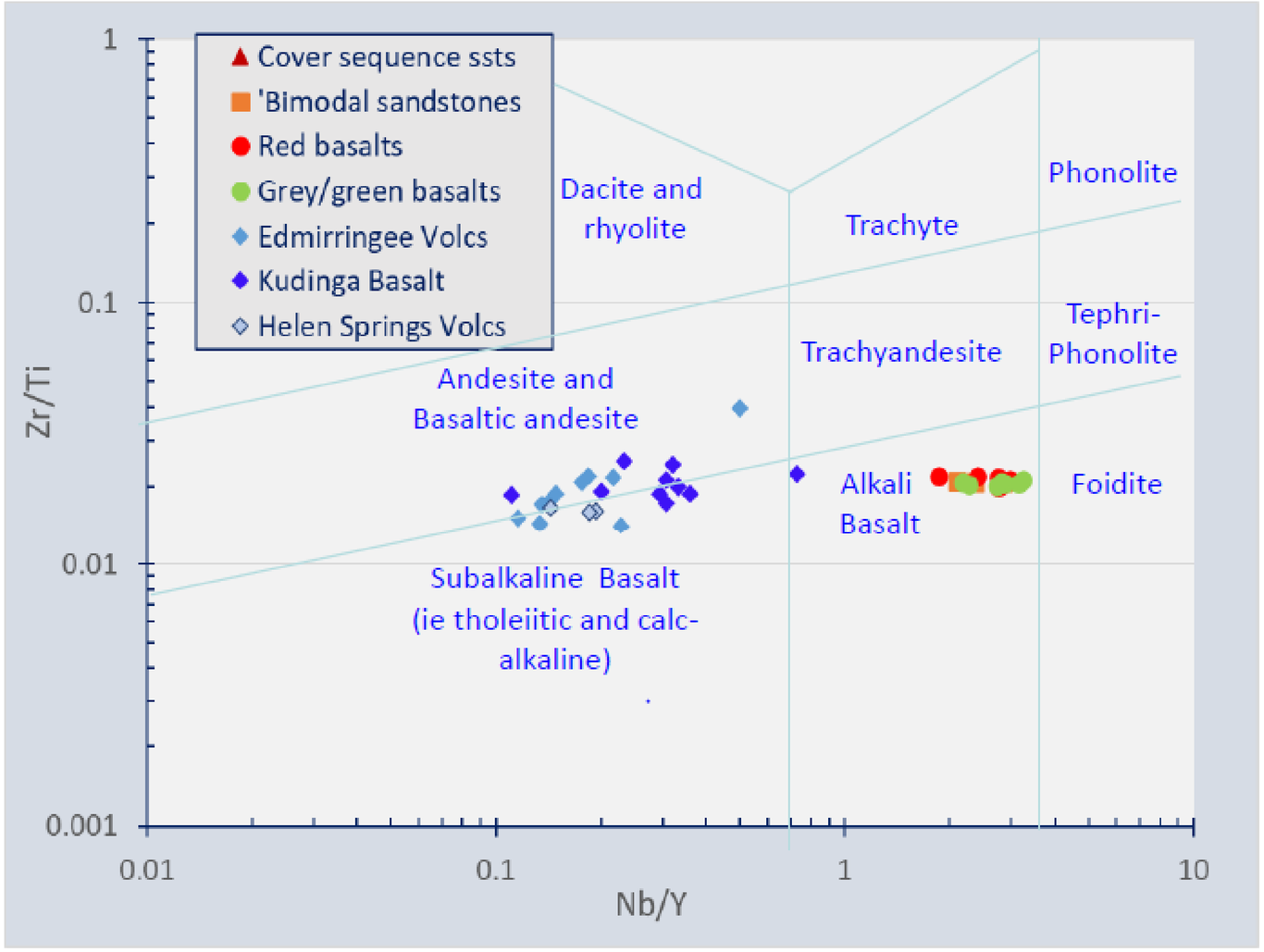


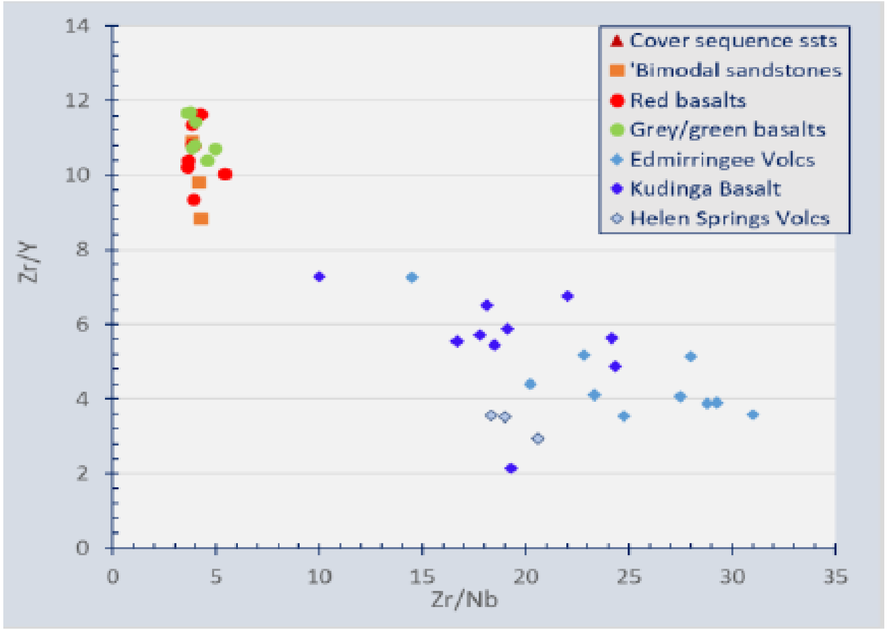
Spot of bornite partly replaced by chalcocite and a few tiny grains of pyrite host in basalt, possibly filling a former vesicle.

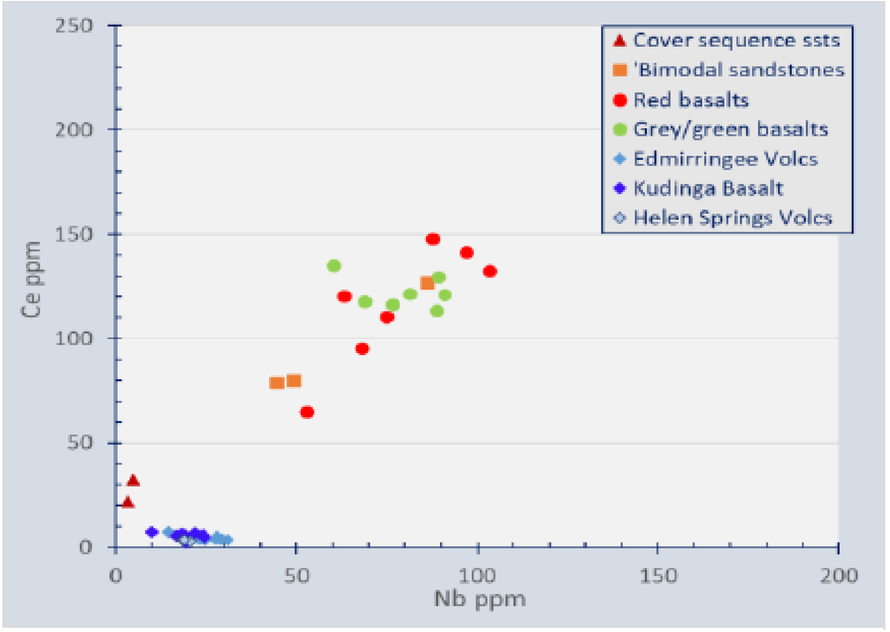


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Basalt Geochemistry

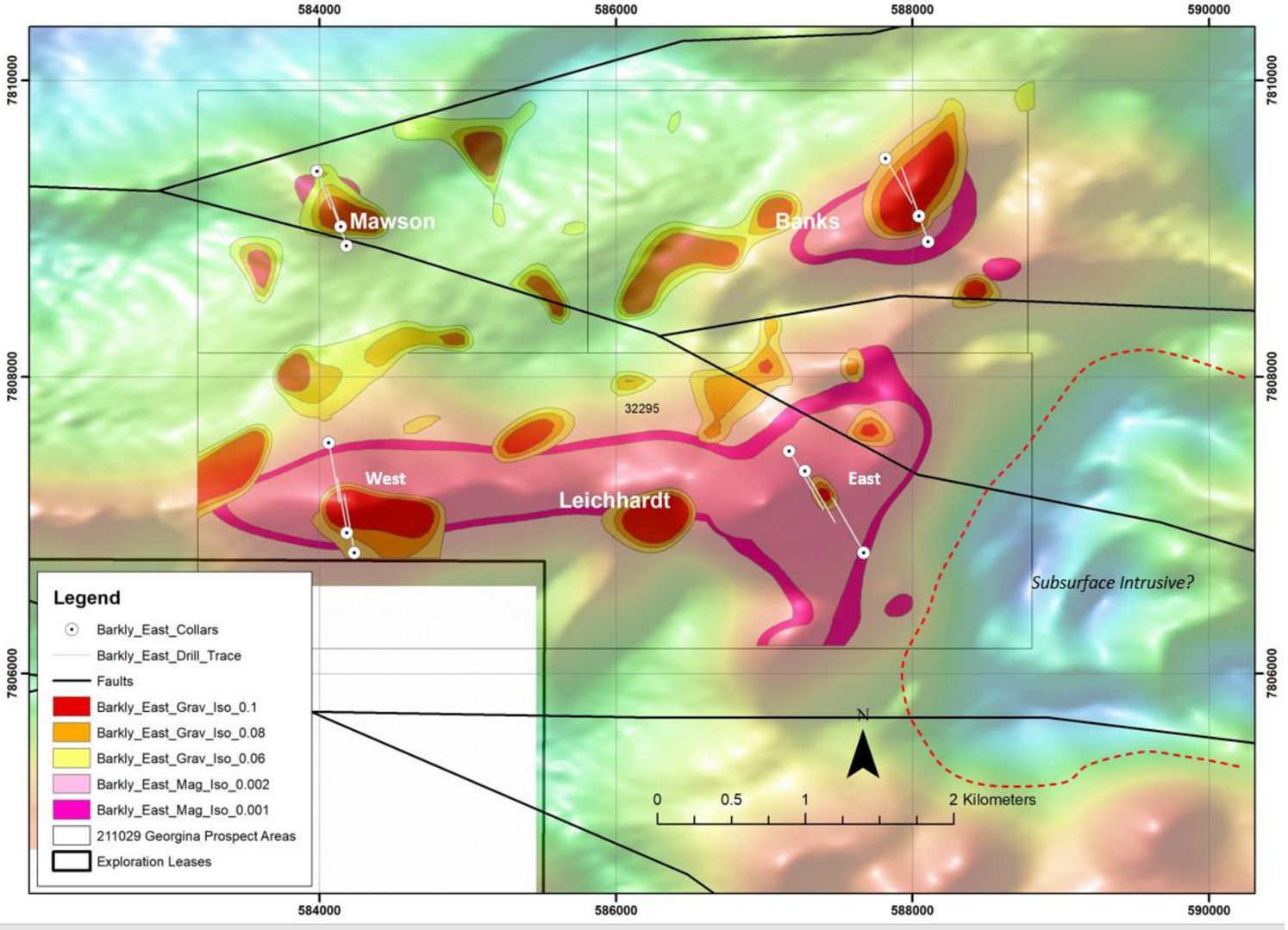






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Exploration Targeting – Mawson, Banks & Leichhardt



- Further targets have been identified within EL32295
- Targets form as coincident magnetic and gravity high features in structurally favourable locations with proximity to granodioritic intrusives
- Preliminary drill targeting completed with drilling to be conducted during the 2022 field season

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Conclusions

- In the absence of outcrop geology, exploration is relying heavily on geophysical techniques
- Acquisition of the detailed aeromagnetic and gravity data under the Geophysics and Drilling Collaborations Program has greatly helped to further the geological understanding of the East Tennant region
- Estimation of basement depth an important aspect to exploration in the region
- Recent drilling at the Twin Peaks targets has potentially characterised the source of the magnetic/gravity responses as alkali basalts
- Unclear how alkali basalts fit into the geological history of the East Tennant region
- Geochemical anomalism of Au-Bi-U in KNRDD002 remains to be explained
- Drilling planned at central tenement targets during 2022 field season

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Thank You

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