Final Report

# REPROCESSING OF GEOSCIENCE AUSTRALIA TANAMI 2D SEISMIC DATA – EL 2367

| Tenements (Holder - Newmont Tanami Pty Ltd, unless stated otherwise) | | |
|---|---|---|
| EL 2366 | EL 23662 | EL 25192 (Prodigy Gold NL) |
| EL 2367 | EL 23744 | EL 26618 (Prodigy Gold NL) |
| EL 4529 | EL 24886 | EL 28785 (Prodigy Gold NL) |
| EL 8077 | EL 24895 | EL 29859 (Prodigy Gold NL) |
| EL 22170 | EL 24973 | EL 30273 (Prodigy Gold NL, under application) |
| EL 22933 | EL 24974 | EL 31855 (under application) |
| EL 23150 | EL 25013 | |
| EL 23658 | EL 25191 (Prodigy Gold NL) | |

Newmont Exploration Pty Ltd: 65 006 306 690

Minerals explored for: Au

1:250,000 Sheet Reference: TANAMI SE 52-15, THE GRANITES SF 52-03, MT SOLITAIRE SF 52-04

1:100,000 Sheet Reference: INNINGARRA 4856, FRANKENIA 4857, TANAMI 4858, GRANITES 4956, PTILOTUS 4957, GIBBESMURRAY 5056

Datum: GDA 1994 Zone 52



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# Summary

This Final report documents exploration work conducted in the Tanami by Newmont Exploration Pty Ltd (**Newmont**) as part of the Northern Territory Geological Survey's Geophysics and Drilling Collaborations Program.

In 2005, deep crustal reflection seismic data in the Tanami Region was collected along several traverses by Geoscience Australia in collaboration with the Northern Territory Geological Survey (**NTGS**) and Newmont. The reprocessing of the 2D seismic data proposed to assess the broad-scale architecture and the geometry of deep-seated structures, identify potential key fluid pathways and compare characteristics of known orogenic gold mineral systems.

Work conducted included the reprocessing of a subset of the 2D seismic dataset by geophysical consultant HiSies Pty Ltd (**HiSies**). A total of approximately 225 line km of 2D seismic data was reprocessed from two lines, 140 km of seismic line 171-05GA-T1 and 84.5 km of seismic line 171-05GA-T4.

The reprocessing of the seismic data was undertaken utilizing Pre-Stack Time Migration (**PreSTM**) sequence, as well as investigating the use of Pre-Stack Depth Migration (**PreSDM**) method on a subset of the data. It was observed that the PreSDM method, using a velocity model built from the PreSTM sequence, provided significant uplift in imaging over the PreSTM and legacy processing. As a result of this uplift, PreSDM was carried out on 140 km of seismic line 171-05GA-T1 and 84.5 km of seismic line 171-05GA-T4.

The reprocessed seismic data mapped a number of large scale thrust faults on both seismic Line T1 and T4 and identified that known gold deposits are also underlain by major fault structures, supporting an orogenic gold mineralisation model. The seismic interpretation of fault zone areas defined eight areas of interest.

The tomography data found significant lateral variation in velocities, corresponding to changes in stratigraphy including the differentiation between the Dead Bullock Formation and Mt Charles Formation and the presence of faults.

Several washed out seismically attenuated geobodies correlated with known granitic intrusions and identified several others that currently do not appear on published geology maps.

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# Introduction

This Final report documents exploration work conducted in the Tanami by Newmont Exploration Pty Ltd (**Newmont**) as part of the Northern Territory Geological Survey's Geophysics and Drilling Collaborations Program.

The Tanami project (the **Project**) is located within the Granites - Tanami Orogen (**GTO**) of the Paleoproterozoic North Australian Craton (**NAC**), located approximately 550 km northwest of Alice Springs (Figure 1). The Project comprises the world class Callie deposit, located on the Dead Bullock Soak (**DBS**) Mineral Lease (MLS 154), however this does not form part of the current works.

Access to the Project is by air or via the Tanami Highway. A basic network of pre-existing and newly formed tracks link individual prospect areas to the major Newmont village at The Granites. A bitumen ore haulage road connects the DBS mining operation with The Granites mining and village facilities. A satellite camp has also been established at the Oberon deposit, operational during exploration programs.

The Project consists of tenements held by Newmont (100 %) and two Exploration Projects under Newmont Operatorship via Farm-in and Joint Venture Agreements with Prodigy Gold NL (**Prodigy**), the Monza and Tobruk Projects. Combined, the Projects comprise 45 exploration licences (**ELs**) and 14 Mineral Leases (**MLs**), covering a total area of approximately 6,361 km$^2$ (granted exploration licences) as presented in Figure 2. Table 1 presents details of the EL's and ML that the current work was carried out on.

**Table 1: Tenement summary for the intersection of the seismic line**

| Tenement | Lease Name | Grant Date | Expiry Date | Area (blocks) | Holders |
|---|---|---|---|---|---|
| EL 2366 | Hordern Hills | 25-Mar-88 | 31-Dec-24 | 124 | Newmont Tanami Pty Ltd (100%) |
| EL 2367 | Schist Hills/ Pegasus | 25-Mar-88 | 31-Dec-24 | 206 | Newmont Tanami Pty Ltd (100%) |
| EL 4529 | The Window | 9-May-90 | 31-Dec-24 | 48 | Newmont Tanami Pty Ltd (100%) |
| EL 8077 | Tanami Downs | 04-Jun-01 | 02-Jan-24* | 66 | Newmont Tanami Pty Ltd (100%) |
| EL 22170 | Jumbuck | 21-Aug-03 | 19-Aug-25 | 20 | Newmont Tanami Pty Ltd (100%) |
| EL 22933 | Ptearaway | 25-May-06 | 30-Dec-24 | 4 | Newmont Tanami Pty Ltd (100%) |
| EL 23150 | Officer Hill | 29-July-2013 | 28-July-2025 | 64 | Newmont Tanami Pty Ltd (100%) |
| EL 23658 | Lennards | 03-Apr-03 | 31-Mar-25 | 55 | Newmont Tanami Pty Ltd (100%) |
| EL 23662 | Oberon/Cave Hills | 03-Apr-03 | 31-Mar-25 | 158 | Newmont Tanami Pty Ltd (100%) |
| EL 23744 | Rainmaker North | 25-May-06 | 30-Dec-24 | 3 | Newmont Tanami Pty Ltd (100%) |
| EL 24886 | Rainmaker | 12-Apr-07 | 30-Dec-24 | 3 | Newmont Tanami Pty Ltd (100%) |

| Tenement | Lease Name | Grant Date | Expiry Date | Area (blocks) | Holders |
|---|---|---|---|---|---|
| EL 24895 | Ptilotus South | 12-Apr-07 | 30-Dec-24 | 25 | Newmont Tanami Pty Ltd (100%) |
| EL 24973 | Salt Lake 1 | 12-Apr-07 | 30-Dec-24 | 32 | Newmont Tanami Pty Ltd (100%) |
| EL 24974 | Salt Lake Dune | 12-Apr-07 | 30-Dec-24 | 13 | Newmont Tanami Pty Ltd (100%) |
| EL 25013 | Salt Lake 2 | 12-Apr-07 | 30-Dec-24 | 3 | Newmont Tanami Pty Ltd (100%) |
| EL 25192 | Tanami Downs | 03-Jan-12 | 02-Jan-24* | 110 | Prodigy Gold NL (100%) |
| EL 26618 | Mt Panorama | 14-Dec-12 | 13-Dec-24 | 16 | Prodigy Gold NL (100%) |
| EL 28785 | Antipyrgon | 07-Sep-12 | 06-Sep-24 | 45 | Prodigy Gold NL (100%) |
| EL 29859 | Ringstand | 21-Oct-16 | 20-Oct-24 | 36 | Prodigy Gold NL (100%) |
| EL 30273 | Green Swamp Hill | - | - | 24 | Prodigy Gold NL (100%) (under application) |
| EL 31855 | Tatooine | - | - | 59 | Newmont Tanami Pty Ltd (100%) (under application) |

*Renewal pending approval

## Regional Context

The Project is located within the GTO of the Palaeoproterozoic NAC and is neighboured by the contemporaneous Pine Creek and Halls Creek Orogens to the north and northwest, respectively. The Project lies in the southern part of the GTO, in the Northern Territory.

Rocks of the GTO record a history of development from Neoarchaean to Palaeozoic times. Crystalline basement to the Paleoproterozoic stratigraphy comprises Neoarchaean amphibolite-facies quartzofeldspathic rocks of the Billabong Complex, which crop out in the southeast of the orogen. The oldest Palaeoproterozoic rocks comprise metasedimentary and metavolcanic rocks of the 1885–1840 Ma Tanami Group, which has been metamorphosed under greenschist- to lower amphibolite-facies conditions. The Tanami Group is subdivided into the lower Dead Bullock Formation and the upper, more extensive Killi Killi Formation. The basalt-rich Mount Charles Formation and the Stubbins Formation in Western Australia are inferred to be broadly correlative with the Dead Bullock Formation.

Mafic sills were emplaced into the Dead Bullock Formation and lower Killi Killi Formation prior to folding and faulting associated with the c. 1840 Ma Tanami Event. The 1824–1816 Ma Ware Group unconformably overlies the Tanami Group and both successions were deformed during the 1815–1790 Ma Stafford Event, which was accompanied by widespread granitic magmatism.

The strongly deformed Palaeoproterozoic rocks are unconformably overlain by several younger basin successions, which are best preserved in the northwestern and southwestern parts of the

region. These include the Palaeo- to Mesoproterozoic Birrindudu Basin, the Neoproterozoic Murraba Basin, the Cambrian Antrim Plateau Volcanics and Permian units of the Canning Basin.

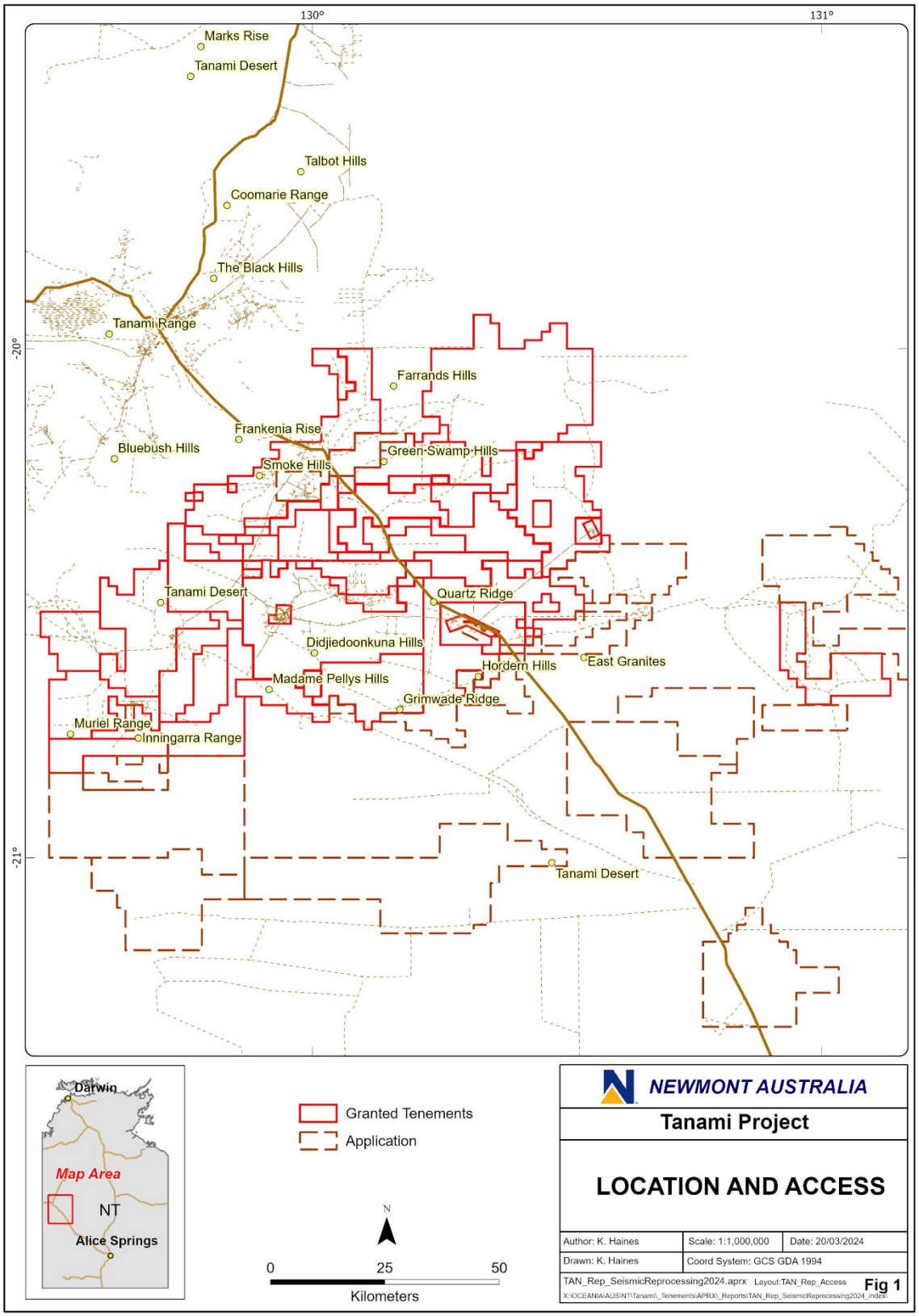


**Figure 1: Location and access of the Tanami Exploration Project**

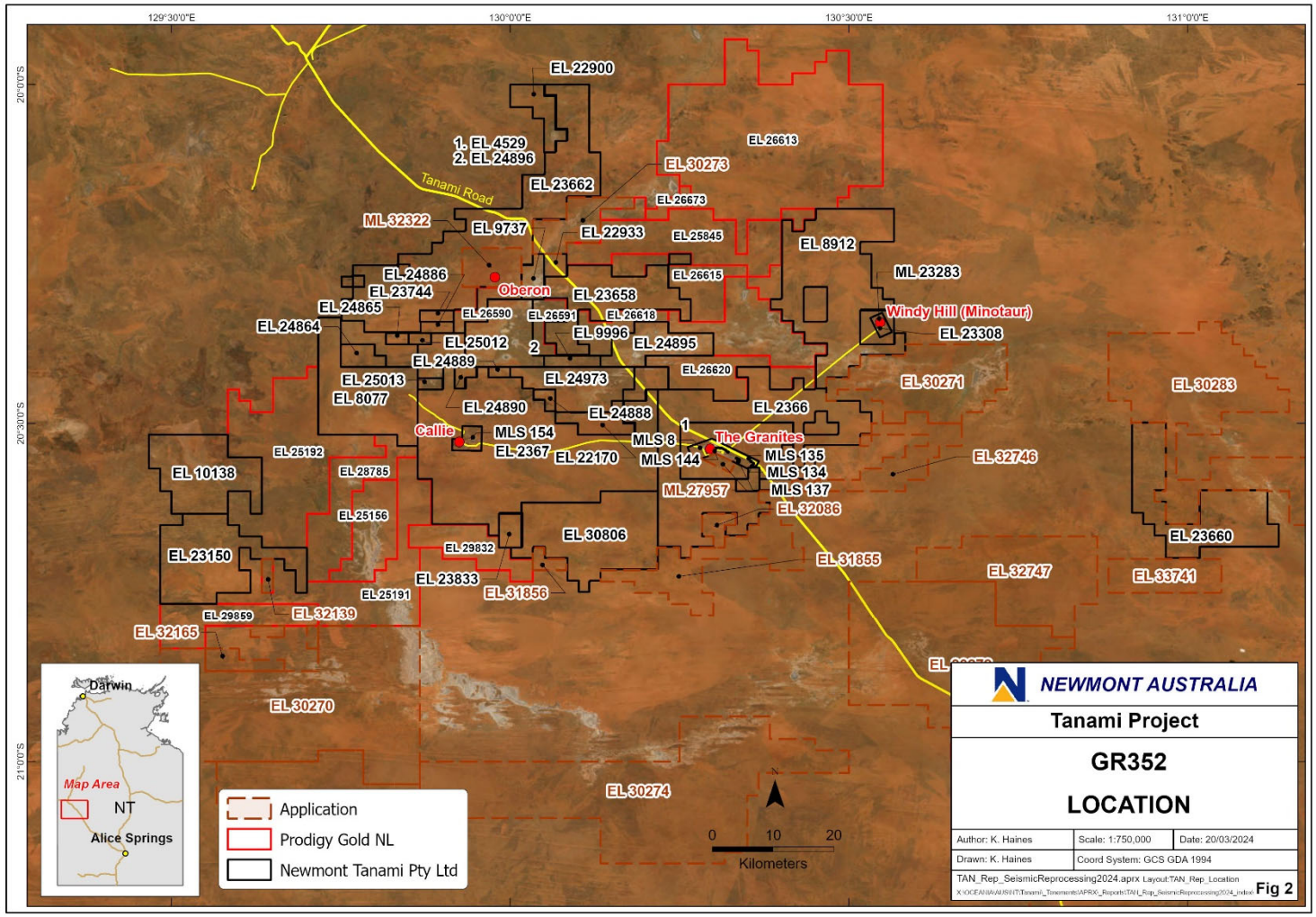


**Figure 2: Tanami Exploration Project tenements**

Tertiary drainage channels, now completely filled with alluvial, lacustrine clays and calcrete are a major feature of the region. Some drainage profiles are 10 km wide and can reach depths in excess of 100 m, presenting a formidable barrier to mineral exploration (Hawkins, 2011; Baggott, 2016). Outcrop within the region is generally sparse, with the majority of the area covered by a blanket of regolith consisting predominantly of transported sand and ferricrete generally to depths less than 20 m (Hawkins, 2011).

Gold mineralisation occurred relatively late in the tectonic history of the terrane, synchronous with Stafford Event deformation. The distribution of stratigraphic units and gold deposits is presented on Figure 3.

The absolute timing of gold mineralisation is presently constrained:

- Directly, by U–Pb ages from hydrothermal xenotime at Dead Bullock Soak (1803 ± 19, 1805 ± 11 and 1803 ± 17 Ma – Cross et al., 2005; Petrella et al., 2019) and the Coyote deposit (1791 ± 8 Ma – Bagas et al., 2007); and
- Indirectly, by mutual cross-cutting relationships between auriferous veins and felsic dykes in the Tanami Mine Corridor that are geochemically similar to the 1805 ± 5 Ma Frankenia Dome.

Available data are hence indicative of an orogen-wide mineralising event at ca. 1800 Ma.

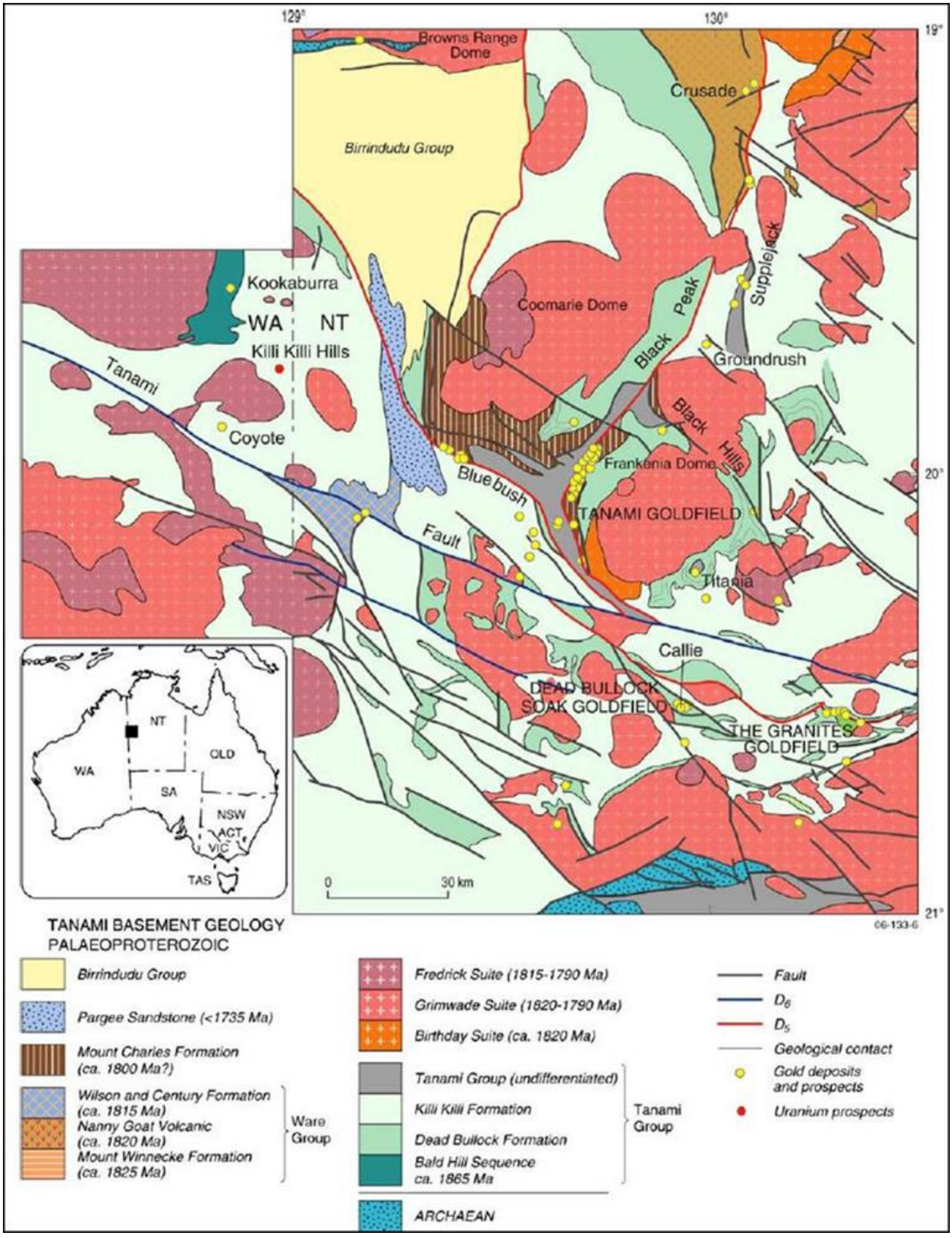


**Figure 3: Distribution of stratigraphic units and gold deposits (Huston et al., 2007)**

## Previous Exploration

The Project area and the Tanami region more broadly, has undergone exploration since the 1980s, comprising surface sampling and widespread shallow drilling, which led to the discovery of several significant orogenic gold deposits at DBS, The Granites, Oberon and the Tanami mine corridor. Intrusion-related gold mineralisation has also been identified at Buccaneer, demonstrating the potential for this style in the region. However, few new deposits have been discovered in recent times, with exploration being hampered by extensive shallow cover and a poor understanding of the nature of key mineralised structures. The proposed reassessment of seismic data was designed to provide a new understanding that will focus more effective exploration programs.

## Exploration Concept

Deep crustal reflection seismic data in the Tanami Region were collected along several traverses in 2005 by Geoscience Australia in collaboration with the Northern Territory Geological Survey (**NTGS**) and Newmont. This data provides a key constraint on the deep architecture of the region and the nature of crustal-penetrating faults, which are key components of an orogenic gold mineral system. Numerous reflectors are evident in older processed versions of the seismic data, which may represent lithological discontinuities and structures. Detailed connection of structures and units imaged in seismic data with features interpreted from aeromagnetic and gravity data is key to understand the geometry of these structures and their relationship to mineralisation. Reprocessed seismic data will be viewed in conjunction with magnetotelluric data collected by Newmont to determine the broad-scale architecture and potentially identify key fluid pathways, which may be more electrically conductive, based on comparisons with other orogenic gold mineral systems. Enhanced lower-crustal conductivity in the Tanami Region has already been demonstrated by the AusLAMP project, and fault/fluid connectivity between the lower and upper crust will be a focus. A better understanding of the position of key fluid pathways their orientation will allow for the extrapolation of these structures away from seismic lines into adjacent domains using potential field geophysics, defining focus areas for exploration beneath cover.

## Details of the Collaborative Program

Newmont commissioned geophysical consultant HiSies Pty Ltd (**HiSies**) to conduct the reprocessing of a subset of the 2D seismic dataset that was collected during 2005 by Geoscience Australia in collaboration with the NTGS and Newmont. This dataset will provide context for the DBS (Callie) and Oberon deposits, as well as several other exploration projects.

The objective of utilising the reprocessed 2D seismic data to better define the deep-seated gold bearing fluid pathways in the orogenic gold mineralisation model was achieved by conducting the following works;

- Completion of a seismic reinterpretation of significant deep seated fault structures and secondary structures that extend from basement into shallower Tanami stratigraphy;
- Investigate the extent of the granitic intrusions and their proximity to mineralization; and
- Interpret the seismic characteristics of known gold mineralization occurrences that are located along the 2D seismic lines.

The work completed included the reprocessing of approximately 225 line km of 2D seismic data from two lines, including 140 km of seismic line 171-05GA-T1 and 84.5 km of seismic line 171-05GA-T4 (Figure 4).

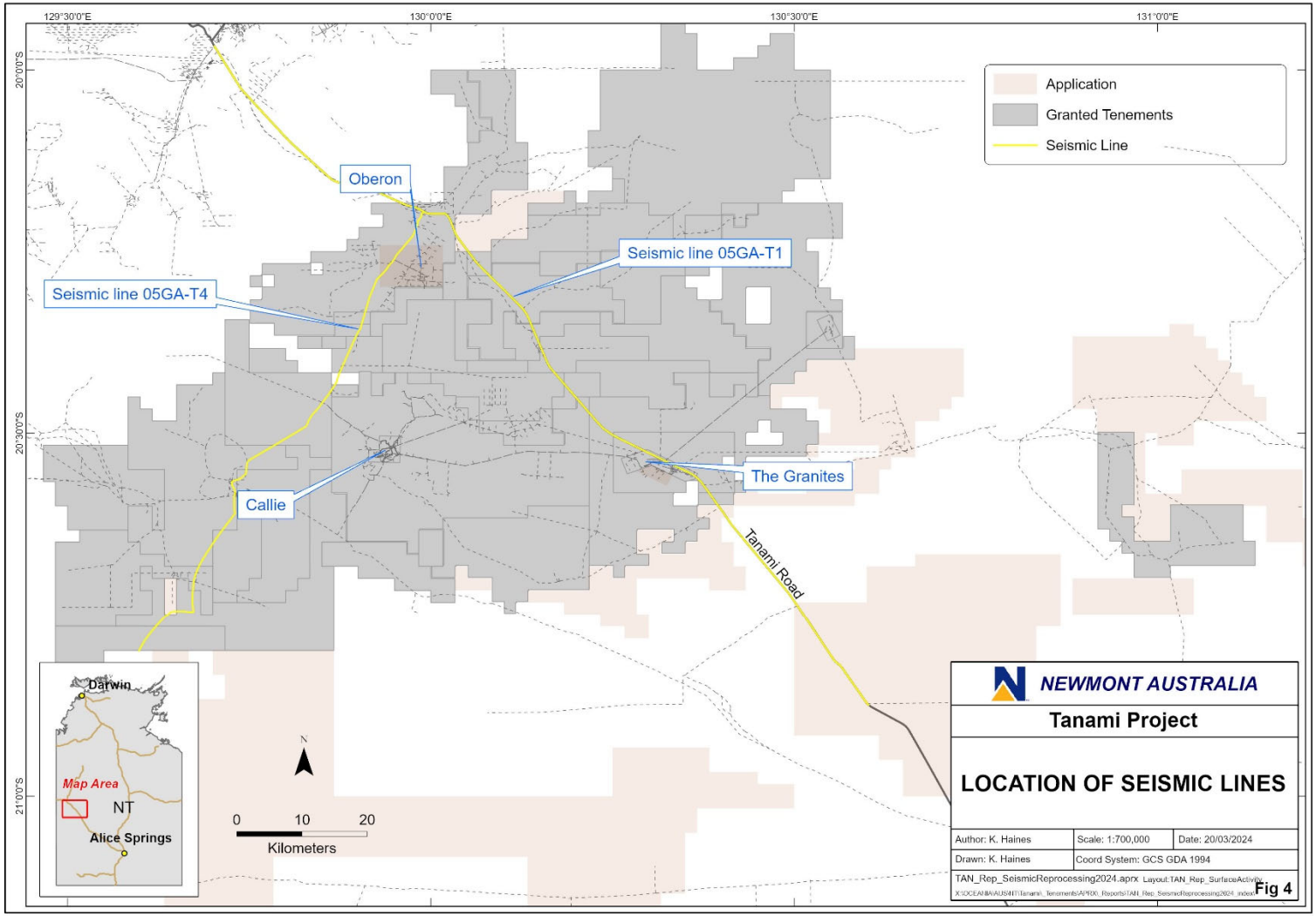


**Figure 4: Location of the reprocessed 2D seismic lines**

HiSeis conducted the reprocessing using a Pre-Stack Time Migration (**PreSTM**) sequence, as well as investigating the use of Pre-Stack Depth Migration (**PreSDM**) method on a subset of the data. It was observed that the PreSDM method, using a velocity model built from the PreSTM sequence, provided a significant uplift in imaging over the PreSTM and legacy processing. Reprocessing focussed on the top 12 km with an effort to improve upon shallow reflectivity and highlight subtle variations. Refraction tomography was also used to provide near surface insights, preserving relative amplitudes of reflectors, rather than an automatic gain control that was previously used. This is a new approach as the original processing focused on the deeper (>12km) signals and sub-horizontal features. The new approach is also sensitive to sub-vertical structures that are common and critical in the Tanami. The reprocessing report by HiSeis, which includes all technical aspects of data processing, and the reprocessed data is included as Appendix A.

## Results and Interpretations

The seismic reprocessing interpretation report by HiSeis is presented as Appendix A and findings summarised below. Line 171-05GA-T1 is referred to as Line T1 in the HiSeis reports and 171-05GA-T4 as Line T4.

The interpretation of the reprocessed 2D seismic data mapped a number of large scale thrust faults on both seismic Line T1 and T4. The known gold deposits (The Granites and Dead Bullock Soak) that are located along seismic Lines T1 and T4 are underlain by major fault structures supporting an orogenic gold mineralisation model, where large fault structures act as conduits for gold bearing fluids.

Five areas defined as 'fault zone areas' were interpreted where large scale faults appear to concentrate along the seismic lines and are considered prospective sites for gold mineralisation. Existing mineralisation occurrences correlate well with the interpretation of the fault zone areas and four seismic prospects have been identified on both seismic lines T1 and T4 using this method.

The TopRock (tomography) displayed significant lateral variation in velocities, corresponding to changes in stratigraphy and the presence of faults. Mineralisation hosting Dead Bullock Formation and Mt Charles Formation, were able to be differentiated as they both displayed anomalously fast velocities compared to surrounding units.

A number of washed out seismically attenuated geobodies correlated with known granitic intrusions presented on published solid geology map and provided further information about their geometry and depth. Several granites that are not located on the CSIRO solid geology map (Blaike et al., 2021), have been interpreted utilising the seismic data.

It was noted that at depths between 1 – 2km, known gold deposits exhibited strong seismic reflectivity. This was attributed to the presence of the banded iron formation of the Dead Bullock Formation and the Mt Charles Formation.

## Conclusion

Reprocessing of the 2D seismic data has highlighted eight areas of interest, which will be further evaluated. Evaluation of the other 2D seismic reprocessing results is also on-going.

# References

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Petrella, L., Thébaud, N., LaFlamme, C., Miller, J., McFarlane, C., Occhipinti, S., Turner, S. and Perazzo, S., 2019, Contemporaneous formation of vein-hosted and stratabound gold mineralization at the world-class Dead Bullock Soak mining camp, Australia: Mineralium Deposita, https://doi.org/10.1007/s00126-019-00902-7.

# Appendix A – 2D Seismic Reprocessing Report, Interpretation and Data

See digital folder (submitted on USB):

EL2367_2024_C_02_ HiSeis_Tanami_2D_Reprocessing