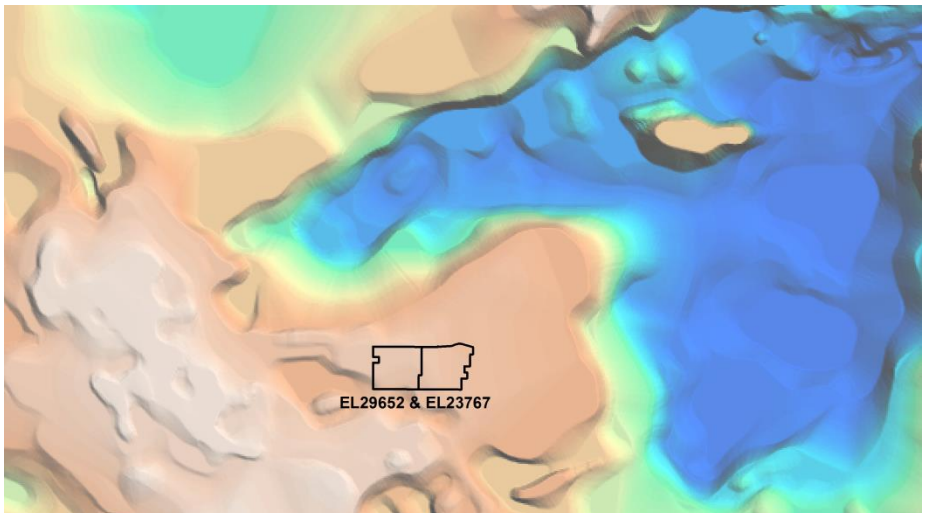
EL29652 & EL23767, Northern Territory – Geology Review

Report Prepared for

Jacaranda Alliance



Report Prepared by

SRK Consulting (Australasia) Pty Ltd

HCK007

December 2013

EL29652 & EL23767, Northern Territory – Geology Review

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Executive Summary

The Jacaranda Alliance (Jacaranda) - a joint venture (JV) between Minerals Australia Pty Ltd (Minerals Australia) and Jacaranda Minerals Ltd (Jacaranda Minerals) - has two mineral exploration licences; EL29652 and EL23767, located south of the South Nicholson Basin within the Northern Territory. This report outlines results based from a review of available, albeit limited, drilling information and geological datasets.

The review work conducted was based from medium to high-resolution magnetic and regional gravity datasets, limited surface geology, and published literature and company reports. Some mineral exploration drilling and a few stratigraphic wells were available within the surrounds of the tenement to constrain interpretations.

Based from the work outlined within the body of the report, much of the area is covered by Palaeozoic and younger strata as well as extensive Middle Cambrian Georgina Basin units. Underlying sequences most likely represent Davenport Province Ooradidgee Group volcanic and metasedimentary units of the Tennant Creek Region.

Only limited mineral exploration has previously been conducted within this region, with the main exploration focus being phosphate.

Summary of principal objectives

The aim of this project was to improve the geological understanding of area, including EL29652 and EL23767 and thereby lower the risk for Jacaranda in their exploration program.

This study interpreted the geology and structure of the Proterozoic Ooradidgee and Hatches Creek Groups and the overlying Middle Cambrian aged Georgina Basin units of the Northern Territory. The key aim of this study was to provide a better understanding of the distribution of the units within the region. This work will ultimately provide guidance toward additional phases of exploration to be conducted within the region, if required.

This report presents the results from interpretations of the structural and stratigraphic distributions within the region based from available magnetic, gravity, satellite imagery and geological datasets. Results and interpretations from this study are also provided within an ArcGIS database.

Outline of work programme

The initial phase of the project was conducted by Ben Jupp with support from Peter Stuart Smith, Chris Woodfull, Marie-Chantal Bergeron and Maggie Ma. The work program consisted of several stages, which are briefly summarised below.

- Initial data compilation and data review (for both hydrocarbon and mineral prospectivity, as Jacaranda have an EPA which covered the same area as EL29652 and EL23767;
- Geophysical and remotely sensed image processing;
- 2D data interpretation and map development; and
- Reporting and presentation of results, including a commentary on the mineral and petroleum prospectivity of the area. The hydrocarbon prospectivity is presented in a separate report (SRK, 2013).

Focus on results

Major outcomes of the 2D interpretation are:

- Interpretation of the Proterozoic solid geology inclusive of the Ooradidgee Group;
- Mapping of key structures including faults, folds and definition of structure type;
- Mapping of the Cambrian Georgina Basin sedimentary units and distribution of volcanic sequences;
- Mapping of the distribution of granitic bodies and intrusive dyke units; and
- Data confidence map.

The geology of EL29652 and EL23767 has been interpreted to correlate with units of the Davenport Province of the Tennant Creek Region, which has been identified as a north-eastward trending extension under thin Georgina Basin sequences. The Mesoproterozoic South Nicholson Group was interpreted to lie further to the north and east of the tenement, largely correlating with lower intensity magnetic and gravity features in this region. These units were otherwise absent within the tenement. No recognised correlations have been defined between the Davenport Province and the South Nicholson Groups, with the South Nicholson Group representing younger basin stratigraphy.

The Davenport Province sequences within the tenement are interpreted to likely correlate with the Ooradidgee Group and minor sedimentary units of the overlying Hatches Creek Group. These interpretations are based from the presence of very high broad magnetic features near surface, likely reflecting the bi-modal volcanic sequences of the Treasure Volcanics. Minor thin overlying sediments are recognised to the east of the tenement where the volcanic signatures appear to be dampened, reflecting overlying sediments.

Within the tenement, the Davenport sequence units have been folded, faulted and metamorphosed to greenschist facies during the Davenport Orogeny. Folds are generally upright with a NE-SW trend recorded. A high degree of faulting along a general northeast trend is also recognised largely affecting and wrapping around the highly magnetic volcanic sequences.

The Davenport Province is known to host numerous mineral occurrences including Tungsten, Gold, Tin, Copper, Lead-Zinc, Nickel, Tantalum, Niobium and Uranium. Mineralisation within this province is largely related to rocks of the Treasure Suite, ironstones within the Warramunga Formation as well as granites of both the Tennant Creek Suite and Devils Suite. The presence of Treasure Suite units and associated mafic intrusions within the exploration leases provide critical components to the mineral potential for the area, with strong known genetic links evident with these units and mineralisation. However the highly prospective ironstone host rocks within the Warramunga Formation are likely absent within the Davenport Province, limiting the potential for economic Au and Cu mineralisation. Some potential remains for vein hosted mineral deposits within units older than the Treasure Suite, which may be present at depth. Additionally, the presence of a major granitic body to the south of the permits provides potential, albeit minor, for vein hosted W mineralisation. **Whilst there is moderate mineral potential for the Davenport Province sequences and intrusions within the exploration leases, the presence of up to 400 m of Georgina Basin cover will substantially increase exploration costs should these units be the focus of exploration within the tenement areas.**

Overlying the Proterozoic sequences are units of the Barkly Sub-basin of the Central Georgina Basin. These units are composed primarily of thin flat lying (100–400 m) carbonates and dolostones, which are interpreted as relatively undeformed with only minor folding recognised. These structures possibly reflect far-field deformation from the Early Cambrian to Late Devonian Alice Springs Orogeny.

Interpreted Cambrian units within the leases are considered prospective for phosphate mineralisation with the large scale Wonarah Phosphate deposit lying to the immediate east of EL23767. Prospective sequences of the Wonarah and Gum Ridge Formations have been interpreted as widespread within the exploration leases and warrant further investigation for phosphate potential.

In order to better assess the phosphate potential of the Georgina Basin Units within the exploration leases, the following recommendations of initial further work are identified:

- Depth to source magnetic modelling. This process will assess thickness of Cambrian units to define shallow zones and conversely thick zones of potentially prospective units of the Gum Ridge and Wonarah Formations; and
- A limited number of regular spaced drillholes in order to investigate the true thickness and phosphate potential of the Gum Ridge and Wonarah Formations.

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Disclaimer

The opinions expressed in this Report have been based on the information supplied to SRK Consulting (Australasia) Pty Ltd (SRK) by Jacaranda Alliance (Jacaranda). The opinions in this Report are provided in response to a specific request from Jacaranda to do so. SRK has exercised all due care in reviewing the supplied information. Whilst SRK has compared key supplied data with expected values, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. SRK does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this Report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

List of Abbreviations

Term	Meaning
~	approximately
°	degrees
=	equals
>	greater than
<	less than
%	precent
±	plus-minus sign
1VD	First Vertical Derivative
ANALY	Analytical Signal
BPF	Band Pass Frequency Slice
DEM	Digital Elevation Model
E	east
ENE	east-northeast
EL	Exploration Lease
GADDS	Government Online Database
GB	Georgina Basin
HPF	High Pass Frequency Slice
IR Gravity	Isostatic Residual Gravity
Jacaranda	Jacaranda Alliance
Jacaranda Minerals	Jacaranda Minerals Ltd
JV	Joint Venture
km	kilometre(s)
K	thousand
Hancock	Hancock Prospecting Pty Ltd
LPF	Low Pass Frequency Slice
LSB	Leichhardt Superbasin
m	metre(s)
Ma	Million Years
Minerals Australia	Minerals Australia Pty Ltd
N	north
NABRE	Northern Australia Basin Resource Evaluation Project
NE	northeast
NT	Northern Territory
NTGS	Northern Territory Geological Survey
NW	northwest
RTP	Reduced to Pole
Pb	Lead

Term	Meaning
S	south
SE	southeast
SRK	SRK Consulting (Australasia) Pty Ltd trading as SRK Consulting
SRTM	Shuttle Radar Topography Mission
Th	Thorium
TILT	RTP Tilt Derivative
TMI	Total Magnetic Intensity
TMI-RTP	TMI Reduced to Pole
W	west
W	Tungsten
U	Uranium
Zn	Zinc

1 Introduction and Scope of Report

Jacaranda Alliance (Jacaranda), a joint venture (JV) between Minerals Australia Pty Ltd (Minerals Australia) and Jacaranda Minerals Ltd (Jacaranda Minerals), has two mineral exploration licences; EL29652 and EL23767, located south of the South Nicholson Basin within the Northern Territory (NT). This report has been developed at the request of Peter Collings (Chief Geologist - Jacaranda) and provides a summary of the interpreted geology and structure of the Proterozoic and Middle Cambrian sequences within EL29652 and EL23767. Jacaranda wishes to lower exploration risk by gaining a better understanding of the subsurface geology and structure of the ELs and surrounding areas.

2 Background and Brief

2.1 Background of the project

Jacaranda has acquired exploration permits for EL29652 and EL23767 in the NT. SRK has recently completed studies for EP144 to the north of the tenements within the South Nicholson Basin and also EPs 153 and 154 to the north west of this area in the Beetaloo Basin, which provided new structural, lithological and stratigraphic information on the tenements. In addition, to this work 3D modelling and preliminary assessments of conventional and unconventional oil and gas plays were conducted for EPs 153 and 154, including the development of a Prospects and Leads inventory and the estimation of Prospective oil and gas Resources. Jacaranda is interested in the mineral and petroleum prospectivity of the area covered by EL29652 and EL23767. (NB: The hydrocarbon prospectivity is covered by a separate EPA (SRK, 2013). Based from the work completed on other EPs, Peter Collings of Jacaranda has requested that SRK conduct a similar geological study based from currently available datasets.

2.2 Nature of the brief

With the overall aim of generating a better understanding on the geology and the potential prospectivity of the tenement area to guide Jacaranda's exploration programme, Stage 1 of the project is designed to focus on compiling, reviewing data, interpreting the subsurface geology and structure area and subject to the results of this interpretation, identify areas which may be prospective for mineral potential. The study involved the interpretation of magnetic, gravity, satellite, well and other borehole data and development of a 2D model. Should the area be assessed as prospective, the 2D model would form the basis for field-based data acquisition and ongoing geological/prospectivity assessment work.

3 Programme Objectives and Work Programme

3.1 Programme objectives

The key aims of this project are to provide a review all available prospectivity data, albeit limited, and provide insight into potential prospective Proterozoic-aged formations, as well as the overlying Georgina Basin sequences evident within the tenements. A solid geology interpretation of the region was to be developed, highlighting any key prospective units including structural styles and evolution. Additionally, distributions of potential structures as well as igneous rocks were to be highlighted. Depth ranges of all sequences were also to be assessed based from preliminary interpretations.

3.2 Purpose of the Report

The purpose of this Report of work is to provide a 2D geological interpretation of EL29652 and EL23767. This work will form the basis for assessing the mineral and hydrocarbon potential within the area and developing recommendations for follow up exploration if required, to better constrain economic resources, (with the hydrocarbon potential presented in a separate report).

Specific deliverables include:

- ArcGIS™ project including all datasets and interpretations; and
- Report outlining key results and recommendations.

3.3 Reporting Standard

This Report is not a Valuation Report and does not express an opinion as to the value of petroleum assets and the tenement involved. This Report has been prepared as an internal Report for client use only and has not been prepared for publication.

3.4 Work programme

The work program for this study was conducted between June to August of 2013 and consisted of several tasks, outlined as follows;

- Initial data compilation and data review, including a limited prospectivity assessment;
- Image processing;
- 2D data interpretation and ongoing prospectivity assessment; and
- Reporting and presentation.

3.5 Project Team

Ben Jupp (SRK Melbourne); conducted structural and geological interpretations, supported by Peter Stuart Smith (SRK Newcastle). Ben also carried out the initial data compilation and prospectivity analysis, supported by Peter Stuart Smith and Maggie Ma (SRK Sydney).

Marie-Chantal Bergeron (SRK Newcastle); conducted initial compilation of geophysical and satellite datasets and produced image enhancements.

Chris Woodfull (SRK Newcastle); managed the project, provided technical/interpretive support and peer reviewed the work including the report.

3.6 Statement of SRK independence

Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no prior association with Jacaranda in regard to the mineral assets that are the subject of this Report. SRK has no beneficial interest in the outcome of the technical assessment being capable of affecting its independence.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

4 Data Sets

4.1 Data Types

All readily available public datasets, including geological, satellite and geophysical imagery were compiled by SRK for the purpose of interpretations compiled in this report. Datasets used are summarised as follows:

- 1:250,000 scale scanned geological map sheets and digital geology;
- Magnetic datasets and image enhancements;
- Gravity datasets and image enhancements;
- Radiometric imagery and satellite imagery;
- Stratigraphic/petroleum well and mineral exploration drillholes;
- Cultural data;
- SRTM and DEM images; and
- Published Literature.

4.2 Digital Data

The project deliverable is a 2D digital geological model based on interpretations of structure, lithology and stratigraphy. An ArcGIS project has been produced. The GIS database contains registered grids, images and vector files with relevant attribute and metadata information. The GIS project includes the following data and interpretations:

- Interpreted Proterozoic solid geology;
- Interpreted lithological trends;
- Interpreted extent of Cambrian volcanics and sedimentary units;
- Interpreted structures (fold axes, faults); and
- Interpreted confidence map.

4.3 Overview of Key data/images used

4.3.1 Magnetic Data

Magnetic data of the project area and surrounds were acquired from the government online database (GADDS) from which several image enhancements were conducted in order to better highlight structural and geological elements within the datasets for interpretation. A summary of data enhancements and filters carried out are summarised as follows:

- Total Magnetic Intensity (TMI) (Figure 4-1);
- TMI Reduced to Pole (TMI-RTP);
- First Vertical Derivative (1VD);
- Analytical Signal Amplitude (ANALY);
- RTP Tilt Derivative (TILT);
- Low Pass Frequency (LPF) Slice;
- High Pass Frequency (HPF) Slice; and
- Band Pass Frequency Slice (BPF).

Magnetic datasets are integral for helping define and interpret fault related breaks, lithological changes and variations related to magnetic basement sequences under overlying younger cover units. The magnetic data is ultimately a measure of variations in the earth's magnetic field, which are the result of variations of the magnetic susceptibility of underlying rocks. Most units within the basement sequences have a distinctive magnetic signature, which is characterised by the magnitude, heterogeneity and fabric of the magnetic signal. By calibrating known outcropping units with their distinct magnetic signatures, the geologist can facilitate the mapping of these units below overlying sequences, providing a powerful tool in predicting regional architecture.

Descriptions of each of the magnetic filters used within this study and their key functions are briefly described below.

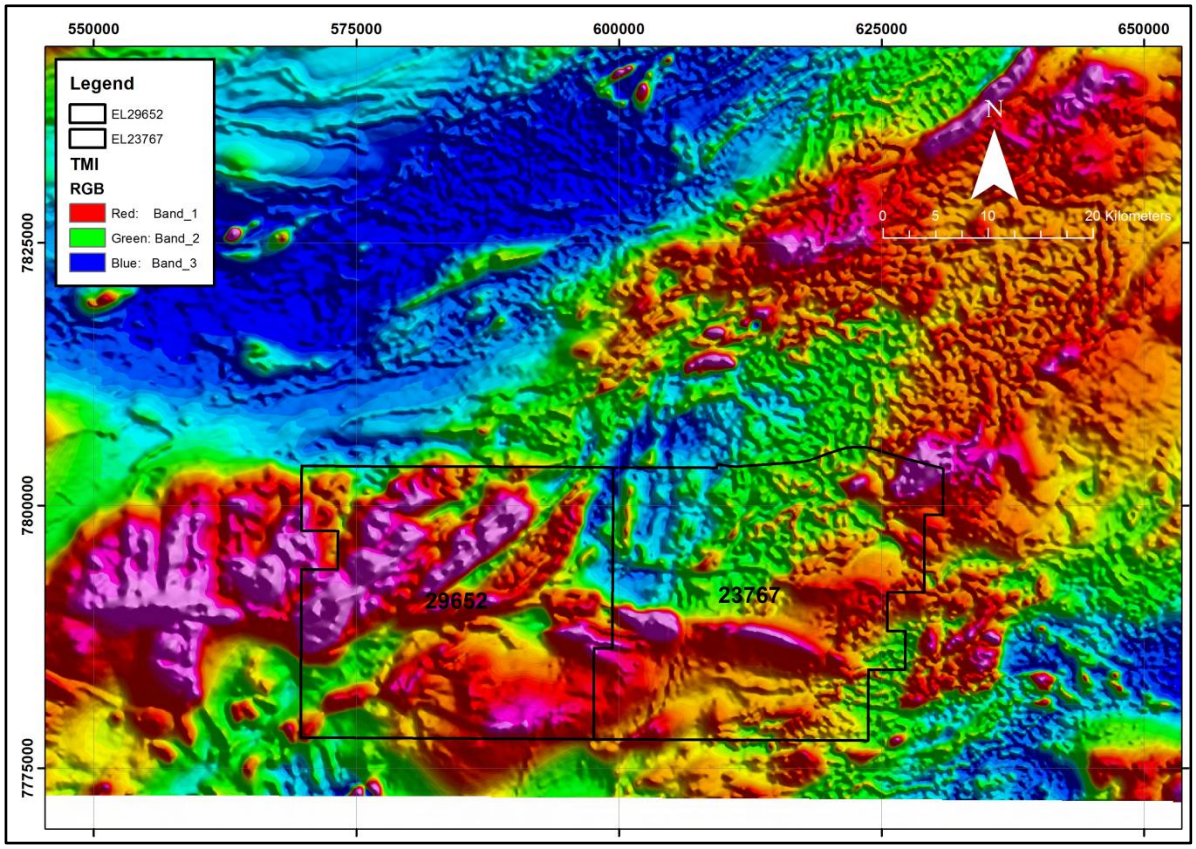


Figure 4-1: Image of Total Magnetic Intensity image

First Vertical Derivative

This filter is a useful as it reduces the influence of regional fields and enhances the effects of shallow sources.

Reduced to Pole

RTP is used to centre the peaks of a magnetic anomaly over their source. Ultimately this provides accuracy for positioning interpreted boundaries and bodies when interpreting magnetic data.

Analytical Signal

The ANALY is a combination of the Modulus horizontal gradient and 1VD filters. The ANALY filter produces positive anomalies from both induced and remanent magnetised sources. It greatly enhances high amplitude anomalies while reducing the signal from low amplitude anomalies. This result in broad anomalies centred over the magnetic source(s) and some loss in response along strike (reducing trends in the data).

RTP Tilt Derivative (TILT)

The TILT enhances weak magnetic anomalies, which are otherwise overwhelmed by stronger features. This makes this a useful tool to interpret shallow basement structures. Using the Tilt of the RTP enables a greater estimation of both location and depth of magnetic sources.

High Pass Filter (HPF)

This filter retains only the data within the high frequency wavelength (shorter than 500 m), while discarding the lower frequency ranged (long wavelengths >500 m). This filtering procedure reduces the effect of regional linear trends and broad background anomalies. It also amplifies short wavelength anomalies from shallow sources and can help trace the continuity of lineaments, faults structures and fractures.

Low Pass Filter (LPF)

Conversely to the HPF, this filter displays the effects from regional fields derived from deep and broad magnetic features and results in enhancement of major features. Artefacts may be introduced into the data along flight lines from this process.

4.3.2 Gravity Data

Gravity datasets of the project area have been acquired from the government online database (GADDS) from which several image enhancements has been created in order to aid interpretations. The gravity datasets and the additional image enhancements form a keystone tool for defining basin architecture by enabling the definition of subtle changes in the Earth's gravitational field, which result from variations in the density of underlying rocks. The data is of particular use for identifying deeper elements within the crust beneath overlying basin features ultimately allowing definition of key structures and geometries within the basin architecture.

Image enhancements were created from gravity data acquired from the national grid archive database (GADDS). An Isostatic Residual Gravity (IR Gravity) image was produced from the data, which removes large amplitude long wavelength gravity variations from the isostatic roots, enabling interpretation of the density distributions of interest within the upper crust.

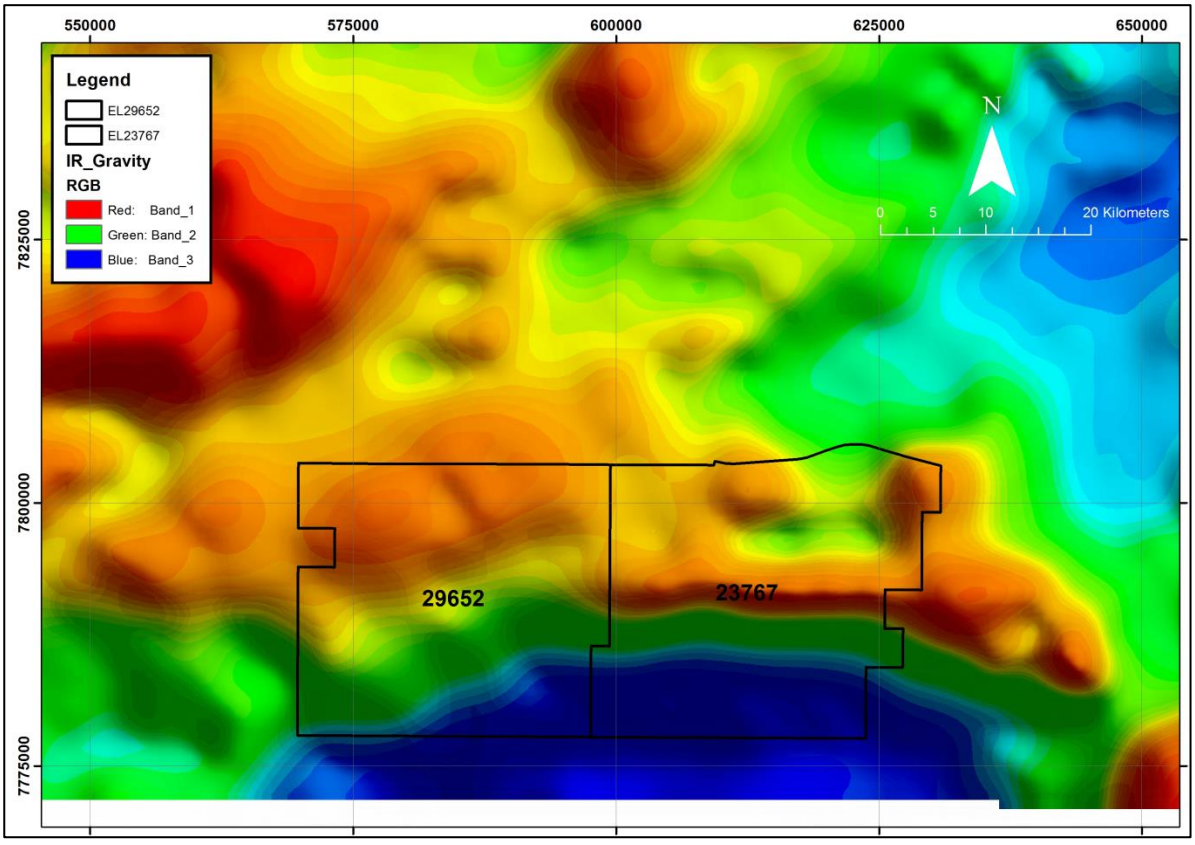


Figure 4-2: Image of IR Gravity

4.4 Radiometrics

Radiometric images provided some constraint for Cambrian units where these sequences were outcropping and surrounding sub-crop. However, in areas of deeper cover there proved ineffective within the region. Phanerozoic cover units blanketed much of the region ultimately obscuring much of the underlying units. These units form distinct northwest trending banding from windswept dunes (Figure 4-3).

Several grids were downloaded from GADDS and reprocessed:

- Total Dose;
- Ratio Th over K;
- Ratio U over K;
- Thorium %;
- Uranium ppm; and
- K Th U Total Count.

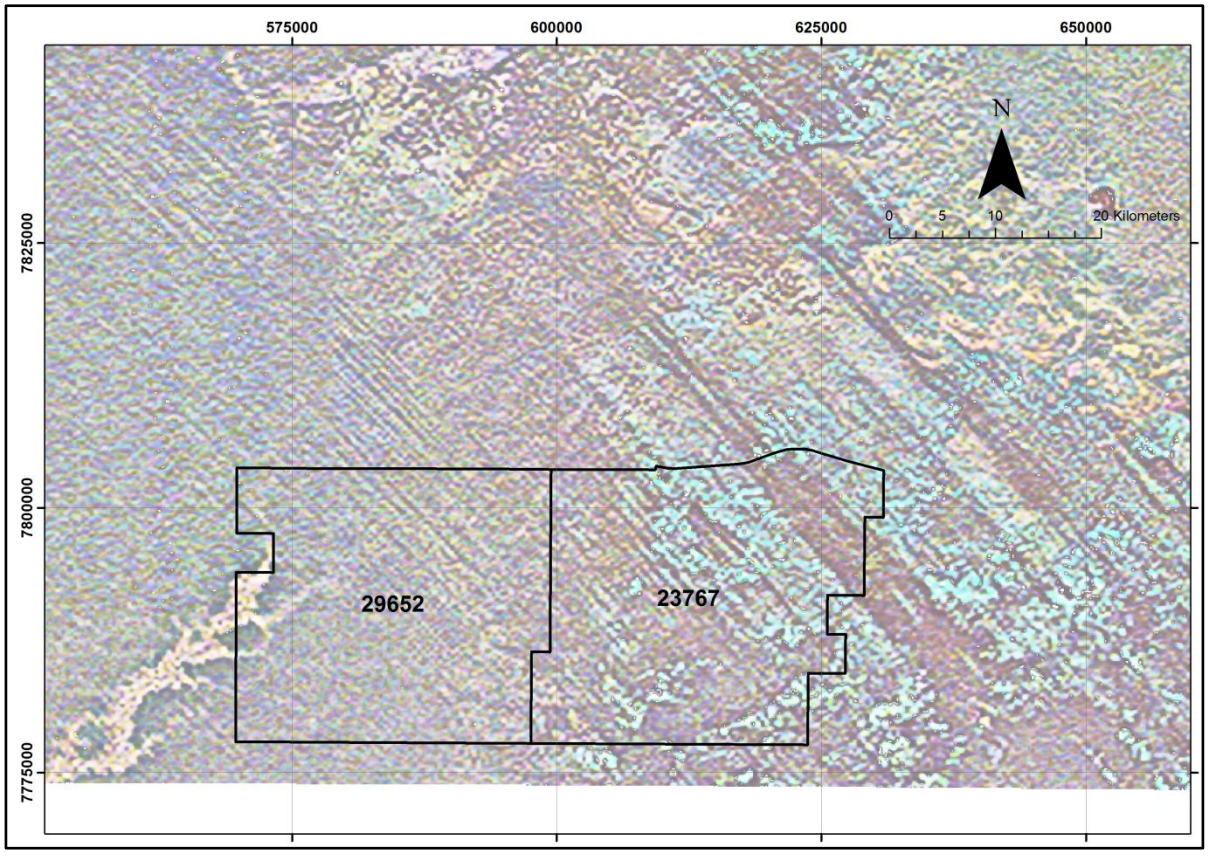


Figure 4-3: Image of Radiometric Total Count

4.4.1 Surface Geology

The surface geology of the region was acquired for the project area as both geological 1:250,000 scale map scans and digital GIS datasets. No Proterozoic geological outcrop was available for the project area and therefore, no reference calibration of geological units from geophysical datasets could be conducted. Far field correlations were possible from the south eastern Frew River region where some limited outcrop was evident. Minimal Cambrian outcrop was evident within the tenement.

The 1:250,000 scale digital and scanned geological maps (ALROY, RANKIN, FREW RIVER and AVON DOWNS) were compiled within an ArcGIS™ database and used for geological interpretations (Figure 4-4).

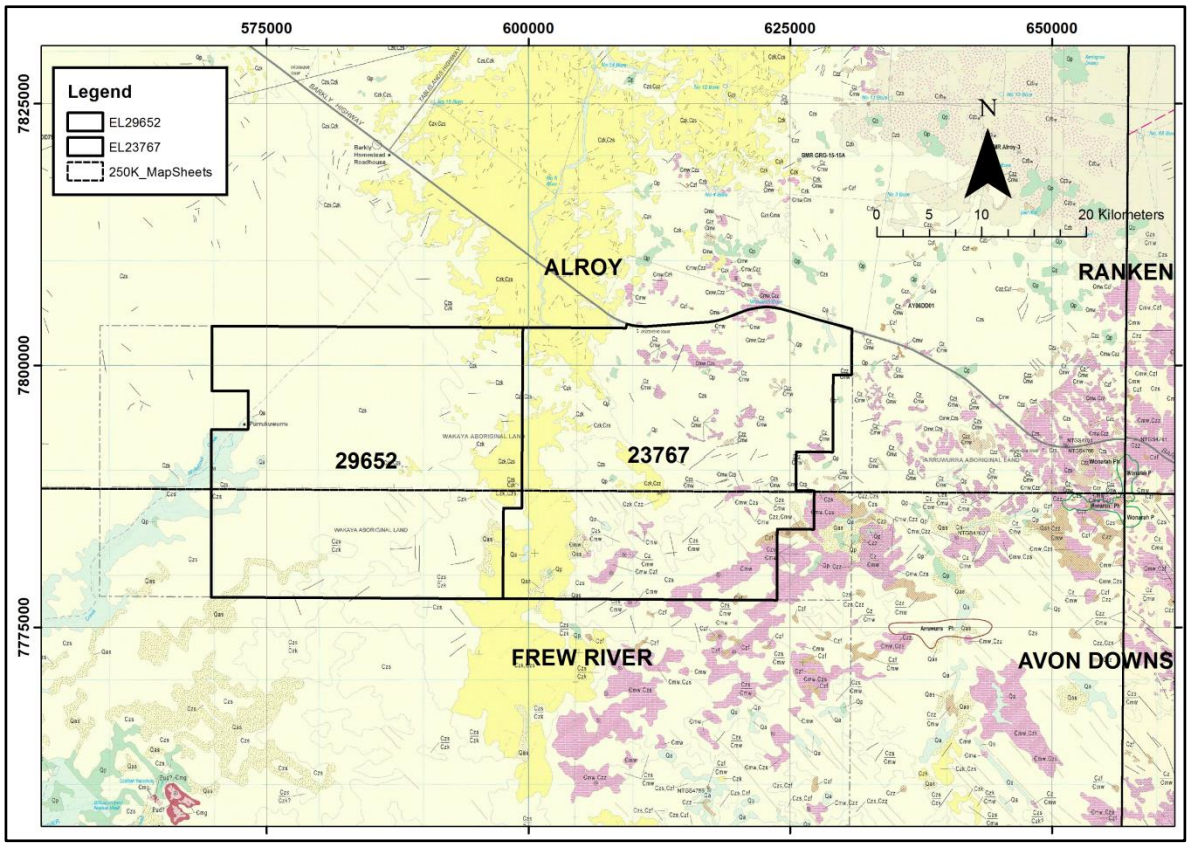


Figure 4-4: NTGS 1:250,000 Geological map series sheets within EL29652 and EL12767

4.4.2 Drillhole and well data

The NTGS stratigraphic well database was acquired for the broader project area and included only five wells within proximity of the tenement (Figure 4-5). Stratigraphic wells on adjacent map sheets were available for far field correlations.

Additional stratigraphic, mineral exploration wells and company reports were acquired to help provide supplementary geological constraints for the area, however, only limited additional drill information was available with the majority of the drilling lying outside of the tenement or with limited stratigraphic correlations provided and of limited depth extent.

As drilling information was found to be minimal within the tenement, interpretations of Proterozoic sequences relied principally on remotely sensed and mapped datasets.

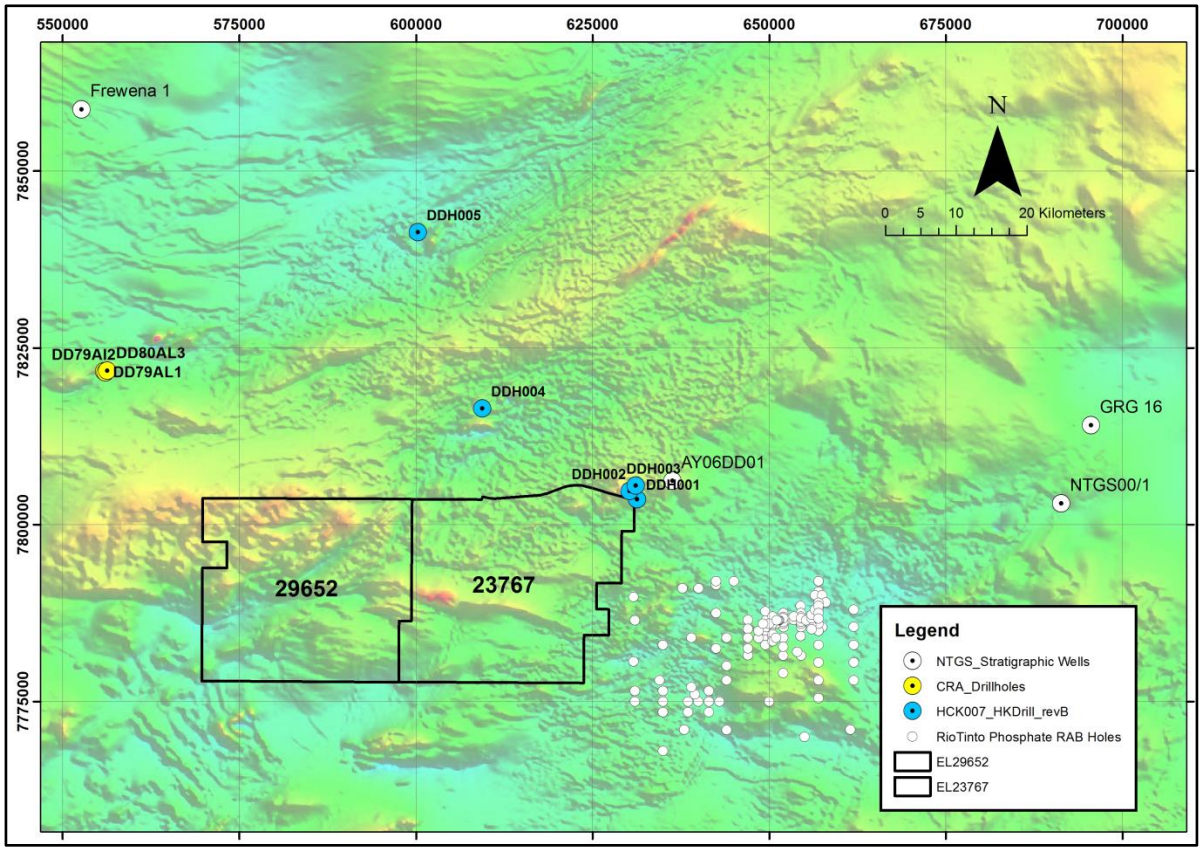


Figure 4-5: Well Location Map

4.4.3 Confidence Map

Proterozoic Geology

Within EL29652 and EL23767, or within close proximity of the tenements, there are no mapped exposures of Proterozoic rocks. Therefore, there has been a reliance on remotely sensed datasets and published literature. Limited well data exists within the surrounding region, with only eight wells with Proterozoic stratigraphic information within the region; however, correlations are poorly constrained with no precise units provided, which hinders interpretations and calibrations of the key geophysical data. No seismic information is available within the area and as such the subsurface distributions and true geometries of interpreted units remains uncertain. In order to define areas of greatest confidence, a confidence map has been created in order to highlight areas of greatest uncertainty and where additional geological information may be required to better constrain interpretations.

Table 4-1: Confidence assessment criteria for geological interpretation

Component	Description/Supporting evidence	Weighting
Exposure	• Outcropping or intersected in well. • Intersected in well with no stratigraphic correlations & limited age constraint. • Mostly covered by thin residual soils near outcrop (reliance on Radiometrics). • *Covered by Palaeozoic and/or Mesozoic sediments and/or volcanics.*	**1** **0.8** **0.5** **0.1**
Magnetics	• Lies within area of high-resolution data. • Lies within area of regional data. • *None of the above.*	**1** **0.5** **0.1**
Gravity	• Lies within area of high-resolution data. • Lies within area of regional data. • *None of the above.*	**1** **0.5** **0.1**
Seismic	• *No seismic available.*	**0.1**

Note: For a given component, values between 0.1 and 1.0 are assigned to the relevant criteria based on an evaluation of either relative exposure or geophysical data resolution. The values are based on a subjective assessment. The total value of each of the four components ranges between 0.1 and 1.0, where 0.1 represents all areas that do not satisfy any of the criteria for that component. A final "Confidence Index" is calculated by multiplying the 4 components yielding final rankings with a maximum of 1.0 and a theoretical minimum of 0.0001.

Confidence mapping has been conducted using confidence values applied to interpreted areas of the map. In order to assess the confidence or reliability, the relative surface exposure characteristics of the available geophysical data sets for subsurface interpretation were assessed under three criteria. Details of the assessment are given in Table 4-1 and the resultant calculated "*Confidence Index*" plotted in Figure 4-6. The confidence index enables objective assessment of the reliability of interpretations based on the datasets available within the region. A logarithmic plot of the confidence index against percentage of confidence is provided in Figure 4-7. Based on this plot a confidence index of 0.0001 has a confidence % of 0, while a confidence index of 1 equates to 100% confidence.

As illustrated in Figure 4-6 limited information for Proterozoic stratigraphy was available with no outcrop and minimal well intercepts with no unit correlations available. As such generally low confidence index was achieved, ranging from 0.02 where drilling was available, down to 0.0025 where interpretation solely relied on magnetic and gravity datasets, equating to a confidence range of 35% to up to 60%. Areas with highest confidence are represented in warm colours and relate to drilling within the area. Areas of low confidence are given cooler colours and illustrate a greater reliance on geophysical datasets.

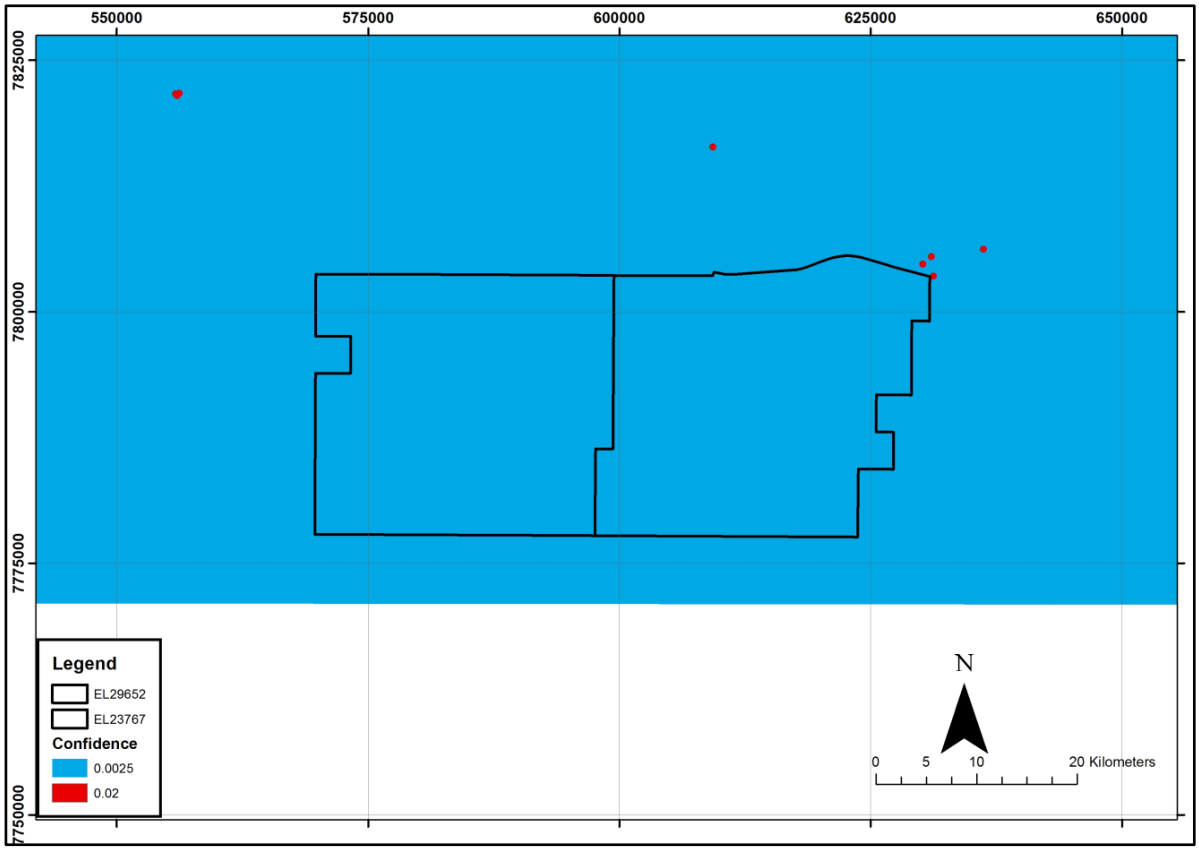


Figure 4-6: Image of Proterozoic geological interpretation confidence or reliability, based on a calculated "confidence index"

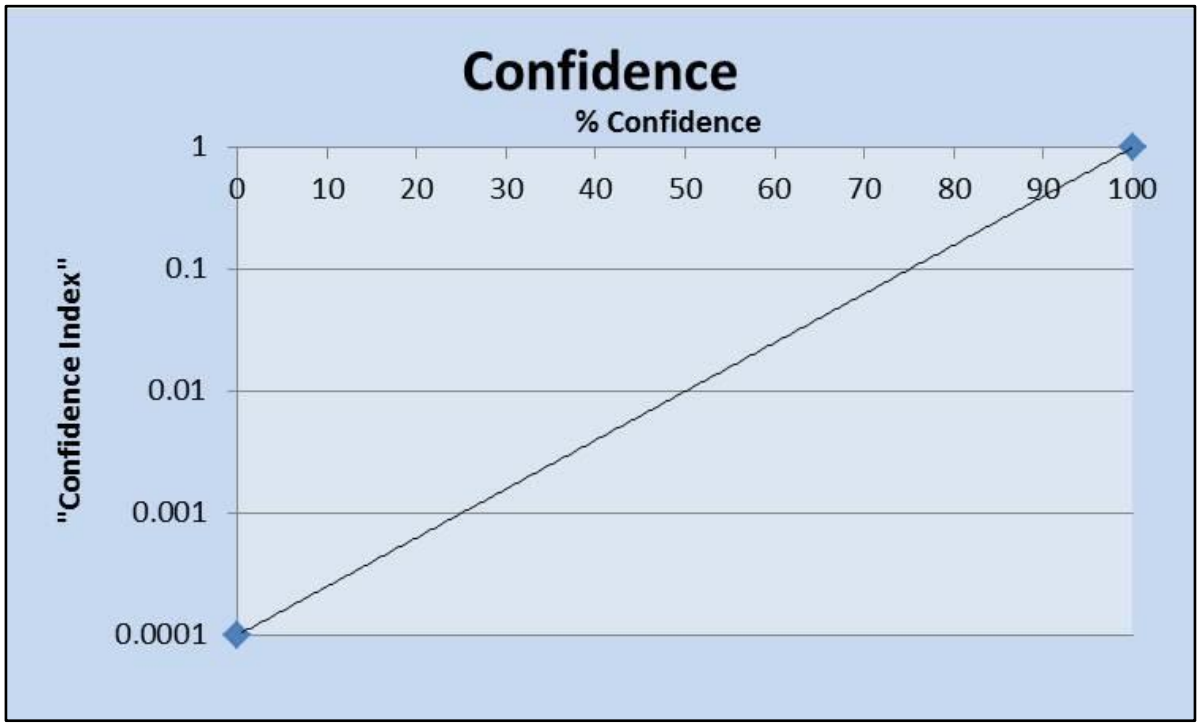


Figure 4-7: Logarithmic plot, defining confidence index against confidence %

Note: Plot showing approximate relationship between Confidence Index (CI) and % Confidence, where the lowest possible CI value (0.0001) = 0% confidence and the highest possible CI value (1.0) = 100% confidence. Conversion: y = 10.857ln(x) + 100 x=CI, y = % confidence.

Cambrian Geology

As illustrated within Figure 4-8, considerably more Cambrian stratigraphic data was available with a high quantity of drilling conducted and outcrop within the area providing good stratigraphic control. Confidence index values were applied based on values outlined within Table 4-1. As illustrated within Figure 4-8 greatest confidence is evident within the eastern half of the tenement, with the western half becoming more reliant on geophysical datasets. Confidence % values ranged from less than 35% to up to 100% in areas of outcrop.

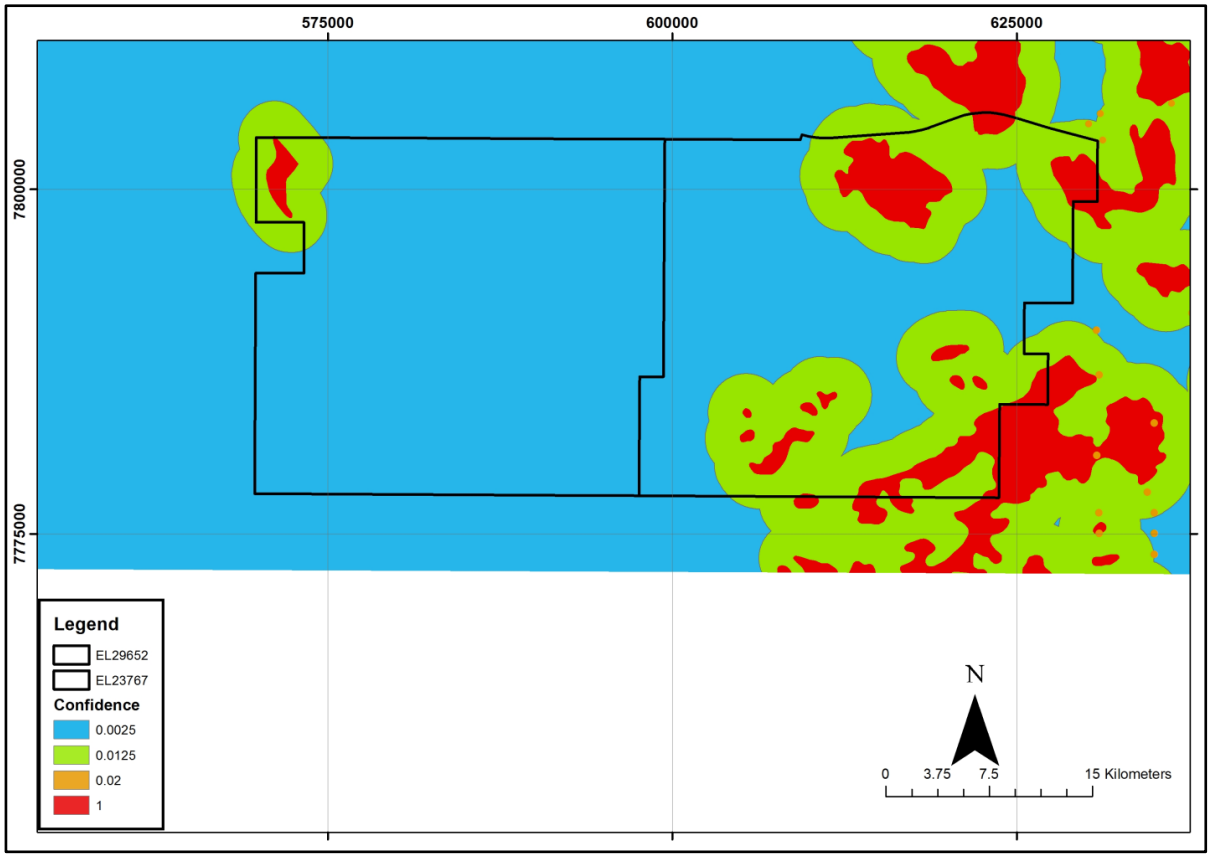


Figure 4-8: Image of Cambrian geological interpretation confidence or reliability, based on a calculated "confidence index"

5 Program Results

5.1 Regional Geology

EL29652 and EL23767 are located within the Northern Australian Craton within the central Georgina Basin, potentially marginal to, or to the south of, the South Nicholson Basin. Geographically the area is located in within central Australia close to the Queensland border and extends west within the Northern Territory (Figure 5-1). The project area covers a small area of approximately 2,000 km^2, and straddles two 1:250,000 scale NTGS geological map sheets - Alroy and Frew River (Figure 4-4).

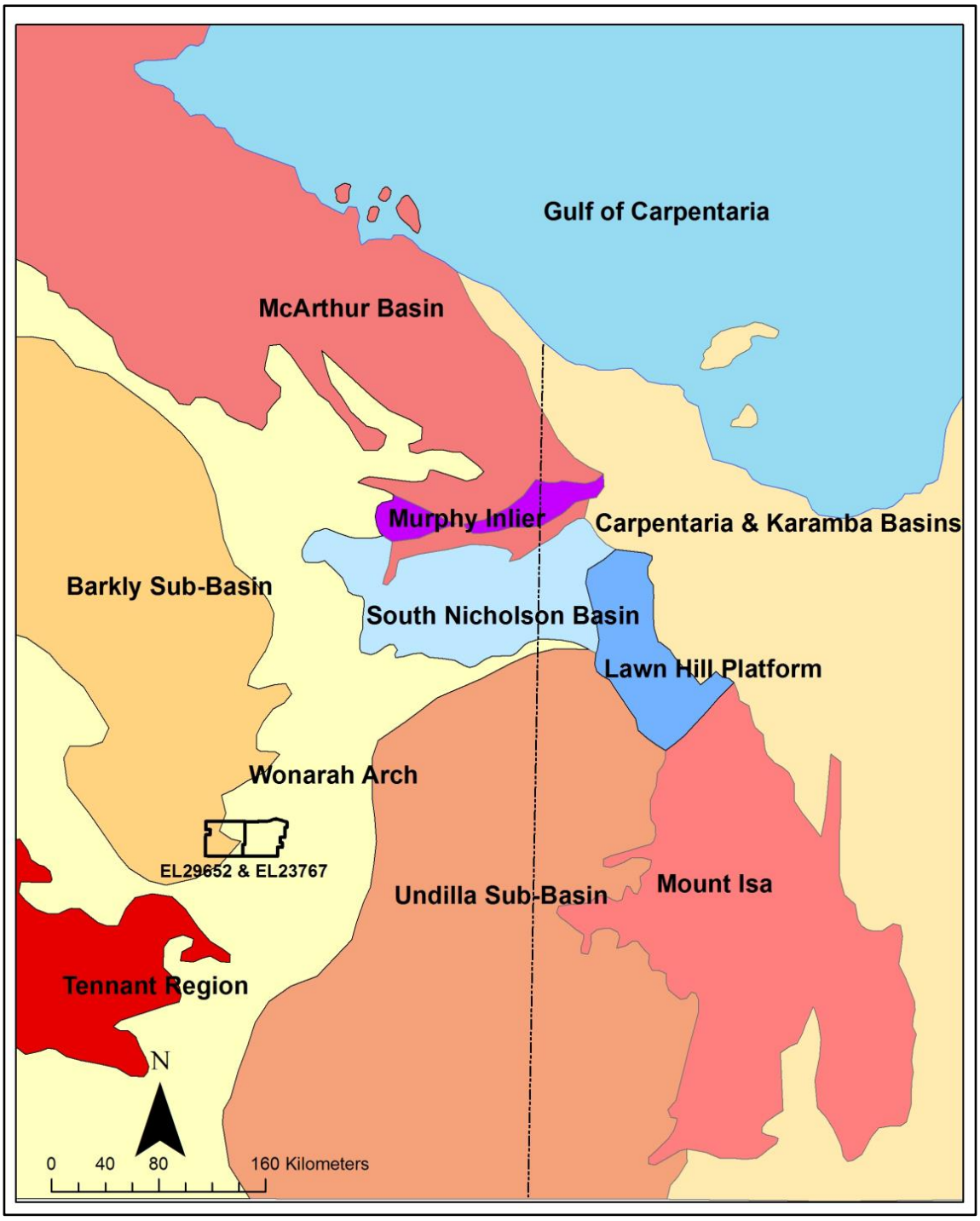


Figure 5-1: Location of EL29652 and EL23767 within northern Australia relative to major geological provinces

Geologically, the tenement has been interpreted to occur within the northern extension of the Davenport Province of the Tennant Creek Region and south of the South Nicholson Basin. The Davenport Province is the southernmost extension of the Tennant Creek region, which also consists of the Warramunga and Tomkinson Provinces in the centre and northern respectively. The region consists of consists of three major stratigraphic sequences, which represent three Proterozoic basin phases and are recognised as the Warramunga Group, the Ooradidgee Group and overlying Hatches Creek Group as well as several minor intrusions (Claoue-Long et al., 2007). These units are overlain by the middle Cambrian sedimentary rocks of the Georgina Basin and thin cover sequences of the Carpentaria Basin.

The Warramunga Group (ca 1880–1870 Ma) is interpreted as the oldest units within the region and consists of turbiditic greywacke, siltstone and shale, which were deposited in deep marine settings. Economic gold and copper has been recognised within these sequences. These units underwent deformation and greenschist metamorphism during the Barramundi Orogeny (~1870 Ma), which was widespread and affecting much of northern Australia (Blake and Page, 1988). Following inversion, these units were intruded by large granitic bodies. In the north of the region, the Warramunga Group is unconformably overlain by the Ooradidgee Group (1840 Ma), which is composed of siliciclastic sedimentary rocks and bimodal volcanics (Claoue-Long et al., 2007).

Overlying the Ooradidgee Group is the Hatches Creek Group, which has been interpreted to have been deposited in an intracratonic sag phase basin in fluviatile to marine settings, during post-Barramundi and Leichhardt Extension events (Figure 5-2). The Hatches Creek Group consists of successions of sandstone, basalt and rhyolitic volcanics, which are up to 10 km thick. Sills are recognised to intrude this group, possibly co-magmatic to the bi-modal volcanism. These units underwent two periods of deformation resulting in upright folding. Granites of the Devils Suite intruded the sequences at approximately 1710 Ma (Blake and Page, 1988).

Sedimentary rocks of the Georgina Basin overlie the Proterozoic sequences within EL29652 and EL23767, forming part of a relatively thin cover sequence. Deposition of the Georgina Basin within the central Georgina Basin region commenced during the Edicarian, post the initial onset of deposition in the southern region during the Crogenian (ca 840 Ma). Extensive flood basalts of the Kalkarindji Group also blanket much of the region and underlie the Georgina Basin sedimentary sequences.

The majority of the project area lies under extensive cover of the Cretaceous Carpentaria Basin, which was deposited as the result of a major marine transgression during the Aptian to Early Albian and which inundated much of northern Australia (Kruse et al., 2008). These sequences form a broad thin flat lying sheet over much of the Northern Territory from Arnhem Land south toward the Queensland border.

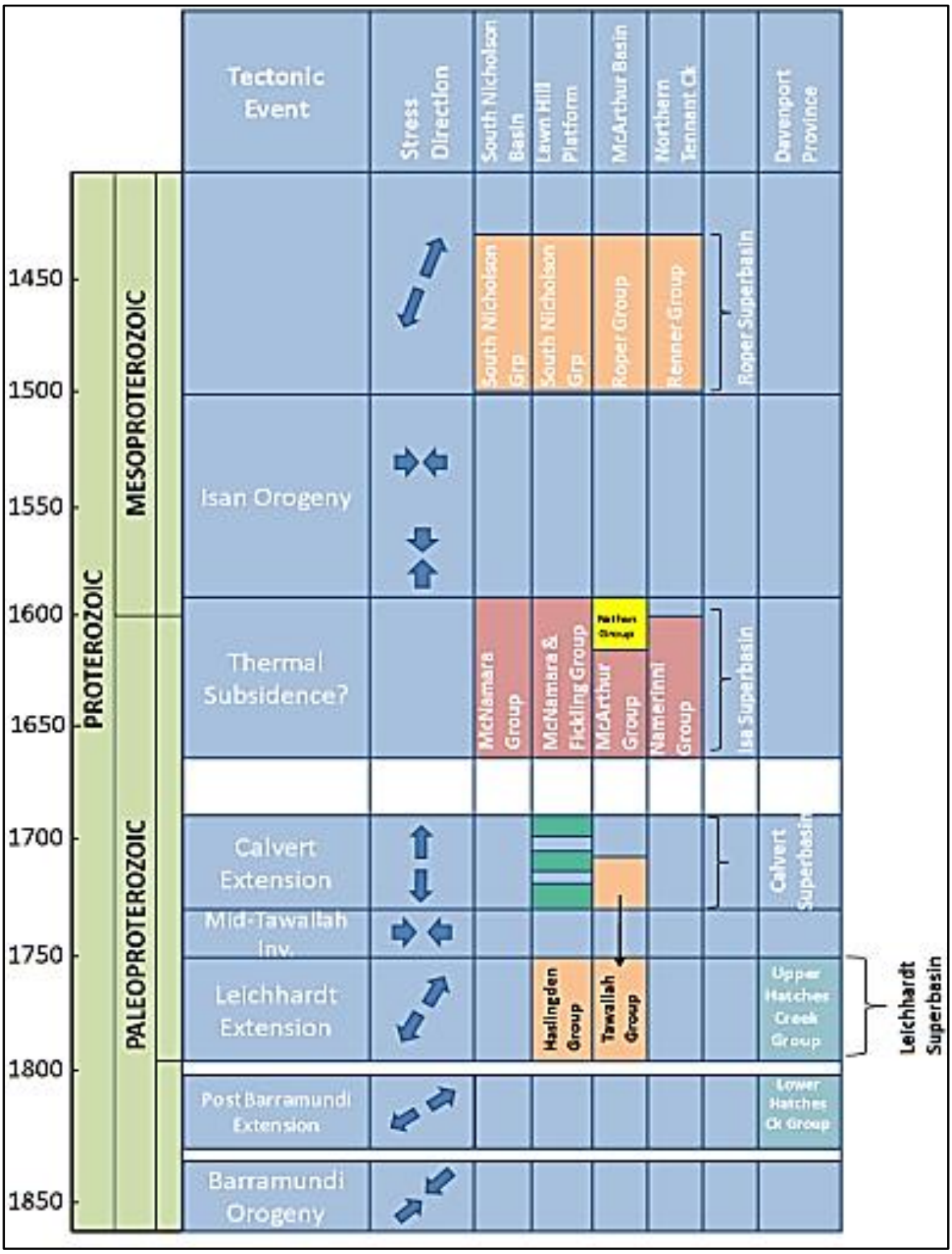


Figure 5-2: Summary Time Space Chart (modified from DeVries, 2008)

5.2 EL29652 and EL23767 Geology

Solid geology interpretations of the units within EL29652 and EL23767 have been conducted and define the distributions of the Proterozoic sequences, interpreted to be the Davenport Province and the overlying Cambrian Georgina Basin. These units have been defined from reprocessed and enhanced magnetic, gravity, radiometric and satellite datasets, limited drilling, published maps and literature and Public Access Company reports (Section 3.1).

The following sections outline the key geological features evident within EL29652 and EL23767 and summarise the depositional, structural and geological elements observed.

5.2.1 Georgina Basin 840–400 Ma

The Georgina Basin is a widespread intracratonic basin covering in total over 325,000 km^2 within Australia and includes rocks of Cryogenian to Devonian age (Khan et al., 2007). EL29652 and EL23767 are located within the Central Georgina Basin, which forms as a relatively thin near flat lying sequence of Middle Cambrian carbonates and dolostones.

Two Sub-basins of the Georgina Basin are evident within proximity of EL29652 and EL23767, which are separated by the Wonarah Basement High to the east (Figure 5-3). EL29652 and EL23767 are situated on the eastern fringes of the Barkly Sub-basin, which extends westward into central Northern Territory. To the east of EL29652 and EL23767, beyond the Wonarah Basement High, the Undilla Sub-basin is recognised. The Wonarah Basement high forms as a pronounced broadly north-south trending gravity high to the east of the tenement and defines the boundary between the eastern Undilla Sub-basin and western Barkly Sub-basin (Figure 5-4).

Rocks of the Georgina Basin vary compositionally from west to east with a gradual shift from predominantly siliciclastic to more carbonate rich components (Shergold et al., 1976) (Table 5-1). These compositional changes reflect a paleogeographic setting shift, which varied from a marine slope, ramp dominated facies to sabka-type, supratidal depositional settings.

Basin rocks within EL29652 and EL23767 include units of the Barkly and Narpa Groups, which are defined in Table 5-1. Within the region, the Wonarah Formation is interpreted as widespread and locally overlies the Gum Ridge Formation and Kalkarindji Volcanics, which locally are termed the Helens Creek or Peaker Piker Volcanics.

The Middle Cambrian sedimentary units within this region are characterised by cherty and dolomitic limestones with the carbonate strata interleaved with clastic beds varying from shale and siltstone. Drilling within the broader area indicates a predominance of the Wonarah Formation transitioning into the lateral equivalent Anthony Lagoon Formation to the west (Figure 5-4 and Figure 5-5).

Within the Middle Cambrian sequences within the tenement there is some recognised phosphate potential. The Gum Ridge Formation is recognised as prospective for phosphate mineralisation with the Wonarah Phosphate Deposit (JORC compliant resource of 300Mt @ 18.3% P_2O_5) recognised to the immediate east of EL23767 and is hosted within this unit (www.australinminesatlas.gov.au). The Wonarah Formation similarly hosts some phosphate potential with the Alexandra deposit (pre-JORC estimate of 15Mt @ 10% P_2O_5) recognised to the north of the exploration lease (Rawlings et al., 2008).

The underlying Kalkarindji Volcanics are recognised as widespread within the region with intercepts recorded within all except one drillhole proximal to the tenement (DDH001). Based from drilling within the region the volcanics are typically thin and have a variable thickness ranging from 15 up to 60 m in thickness, but the absence within DDH001, also suggests a variable distribution. These units are easily recognised in the magnetic data as a distinctive short wavelength feature which in places obscures underlying units (Figure 5-7).

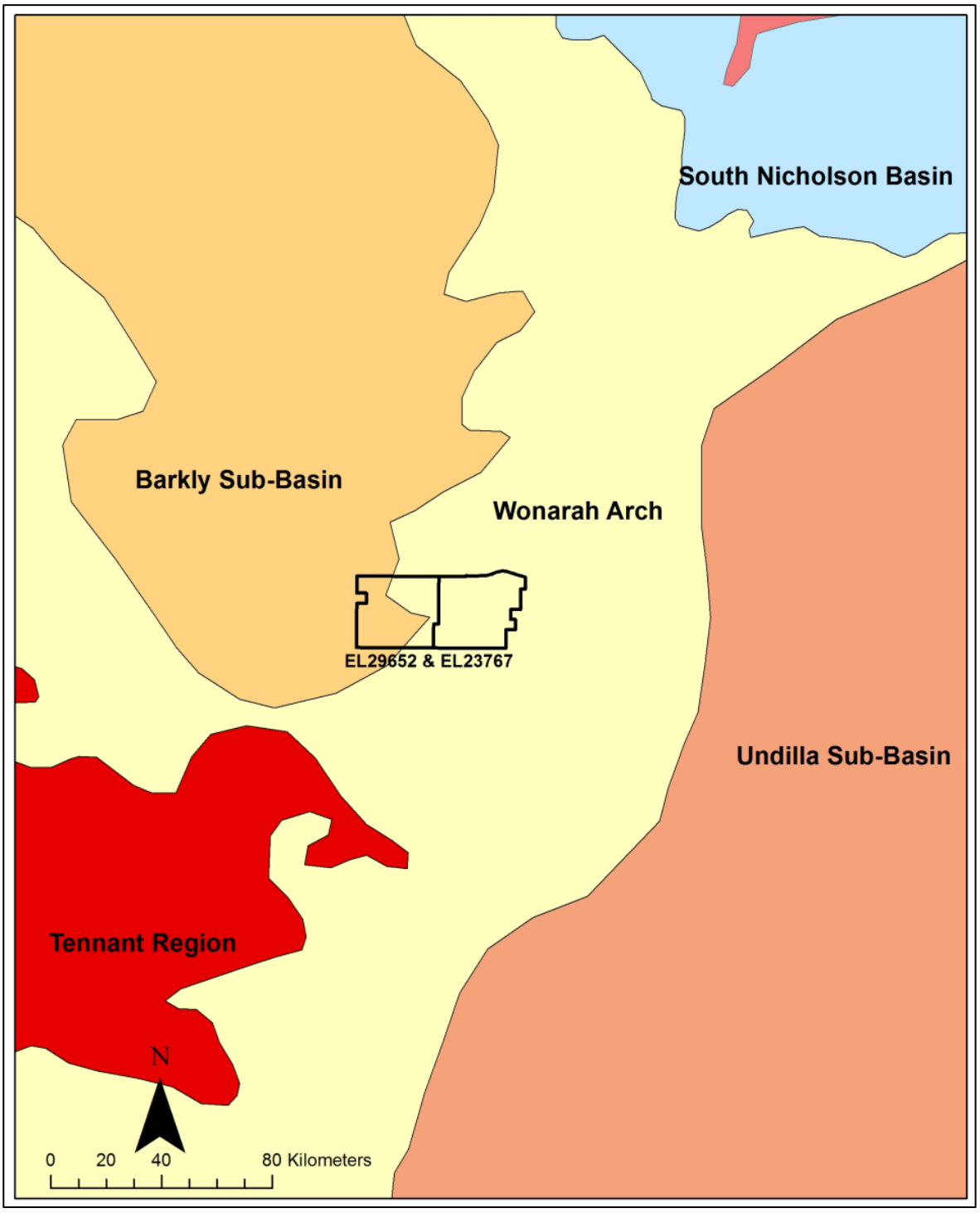


Figure 5-3: Distribution of Sub-basins forming the Central Georgina Basin region and Proterozoic geological provinces surrounding EL29652 and EL23767

Table 5-1: Schematic stratigraphic column from west to east across the Georgina Sub-basins (Barkly and Undilla)

	Central Georgina Basin		
	Barkly Sub-basin	**Undilla Sub-basin**	
	Unit		
Barkly Group	*Camooweal Dolostone*		**Narpa Group**
	Anthony Lagoon Beds	*Ranken Limestone*	
		Wonarah Formation	
	Gum Ridge Formation	*Thorntonia Limestone*	

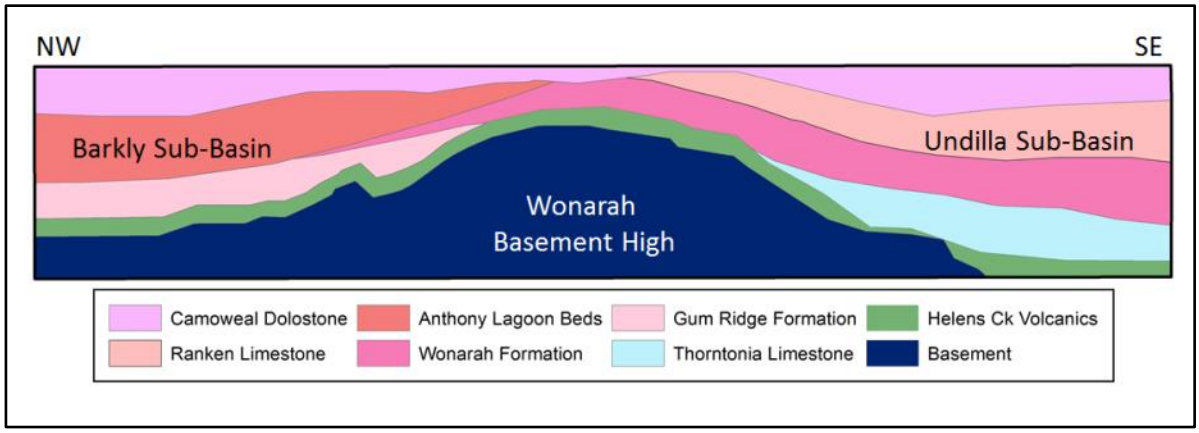


Figure 5-4: Schematic cross section of Alexandria-Wonarah Basement High

The Georgina Basin sequence within the tenement is relatively thin with no drill intercepts within proximity of the tenement exceeding 400 m (Figure 5-5). To the northeast and northwest of the tenement the preserved Georgina Basin sedimentary sequence is also thin with drilling intercepts rarely exceeding 100 m (i.e. Hancock Prospecting Pty Ltd (Hancock) mineral exploration holes DDH001 to 5). Within the Southern Georgina Basin thicknesses are recognised to exceed 2,000 m (Kruse et al., 2010).

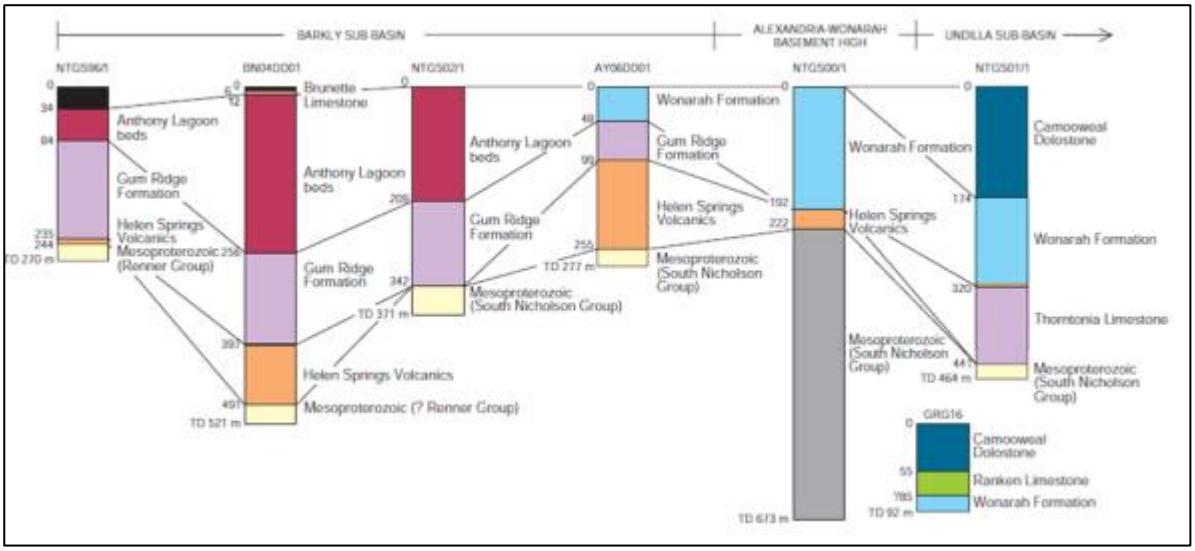


Figure 5-5: Drill sections in the south of the tenement illustrating distributions of Georgina Basin sediments through the Barkly and Undilla Sub-basins. Source: Kruse et al., (2008)

Solid Geology Interpretations

Solid geology interpretations of the undercover extents of the Cambrian units have been conducted based from outcropping geology and drilling (Figure 5-6). The Wonarah Formation has been interpreted as widespread, blanketing much of the tenement. Extending westward deeper into the Barkly Sub-basin, the Anthony Lagoon Beds becomes the dominant lithology. The Gum Ridge Formation is interpreted within the northwest of the tenement where recognised in outcrop. The Thorntonia Limestone has not been interpreted within the area and this interpretation is supported by drilling and published regional mapping/analysis of the Barkly Sub-basin (Figure 5-5). The Kalkarindji Volcanics do not outcrop but their distinct magnetic character is evident in much of the eastern tenement (Figure 5-7).

Within the tenement the Middle Cambrian sequence maintains a relatively flat lying character with minimal folding and faulting recognised based from the magnetic and published map data. Folds appear typically small scale (<1–2 km) with gentle dips likely. Some faulting appears to have affected the Kalkarindji Volcanics, with linear breaks evident within the magnetic datasets. To the south, the Georgina Basin sequences are known to have been deformed by the Early Cambrian to Late Devonian Alice Springs Orogeny, which resulted in moderate folding and faulting. Folding and faulting resulting from this event reactivated basement faults and the minor folding evident within the Kalkarindji Volcanics may be related to this orogenic event as well.

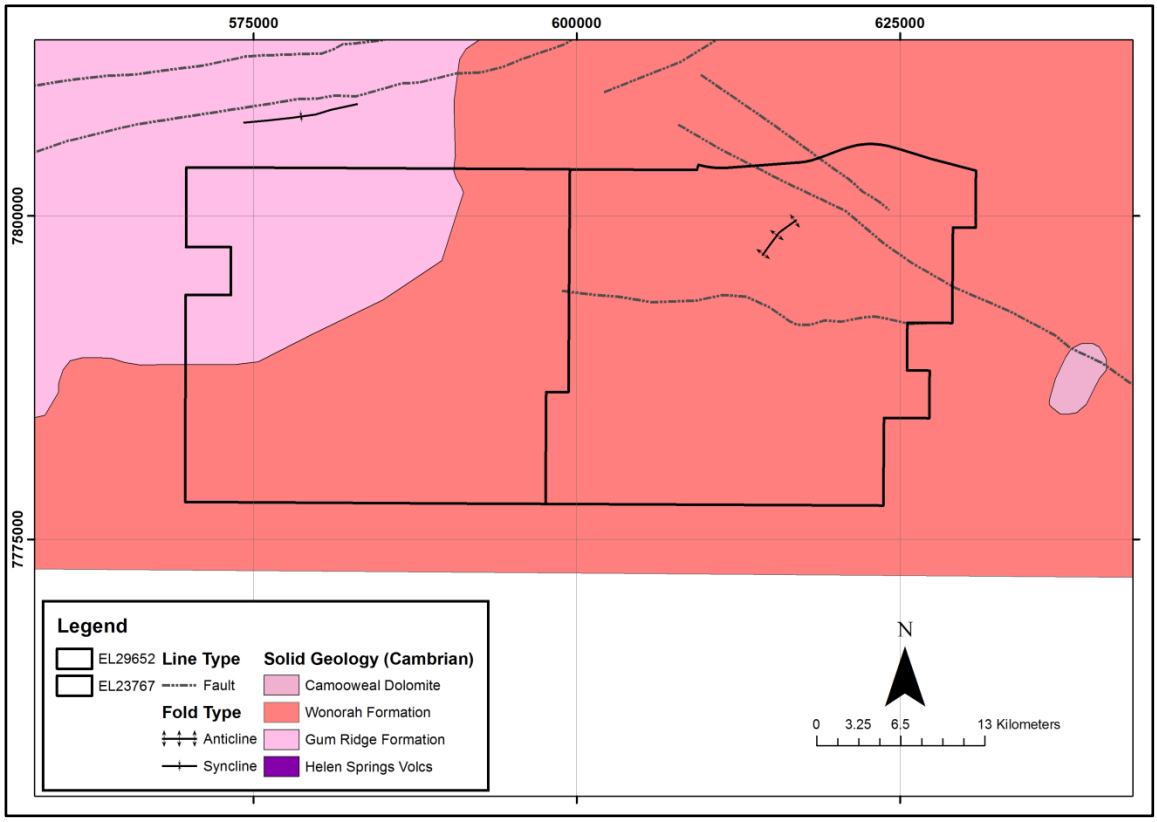


Figure 5-6: Cambrian Solid Geology Interpretations

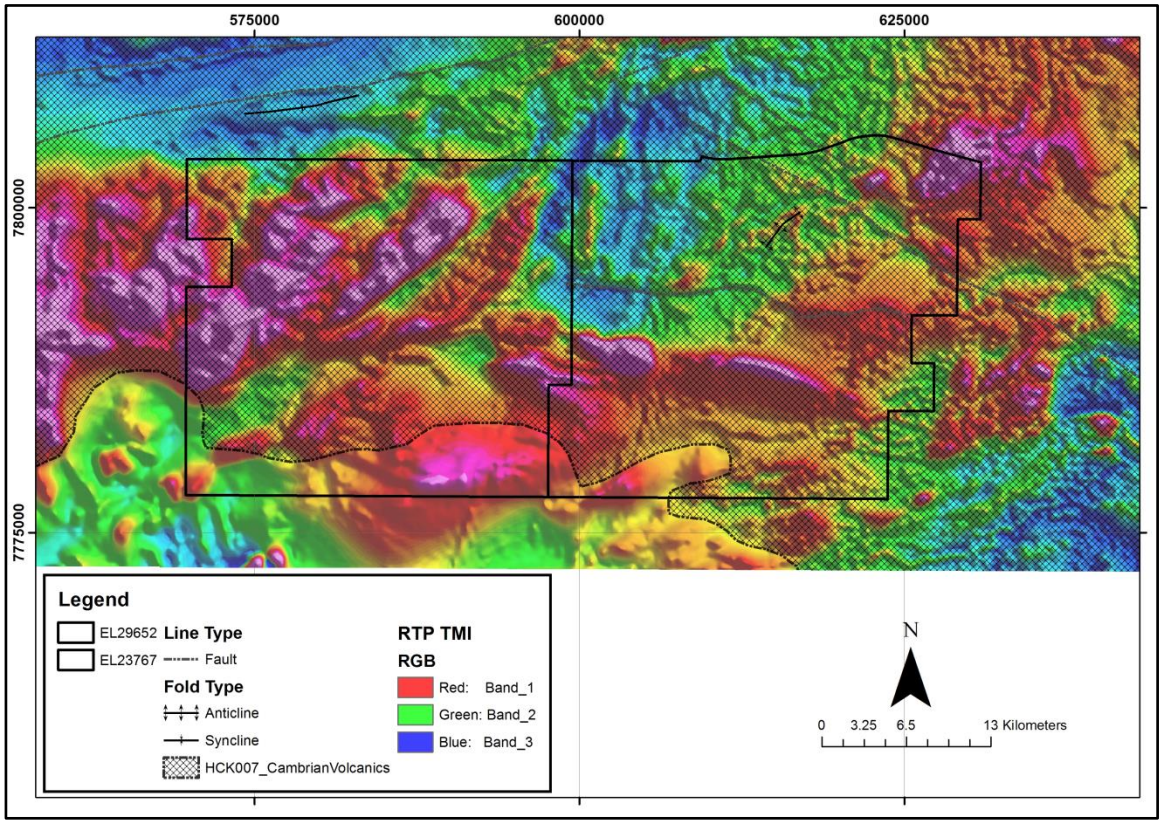


Figure 5-7: Cambrian Kalkarindji Volcanic distributions over First Vertical Derivative magnetic image

5.2.2 Davenport Province – Tennant Region (1840–1660)

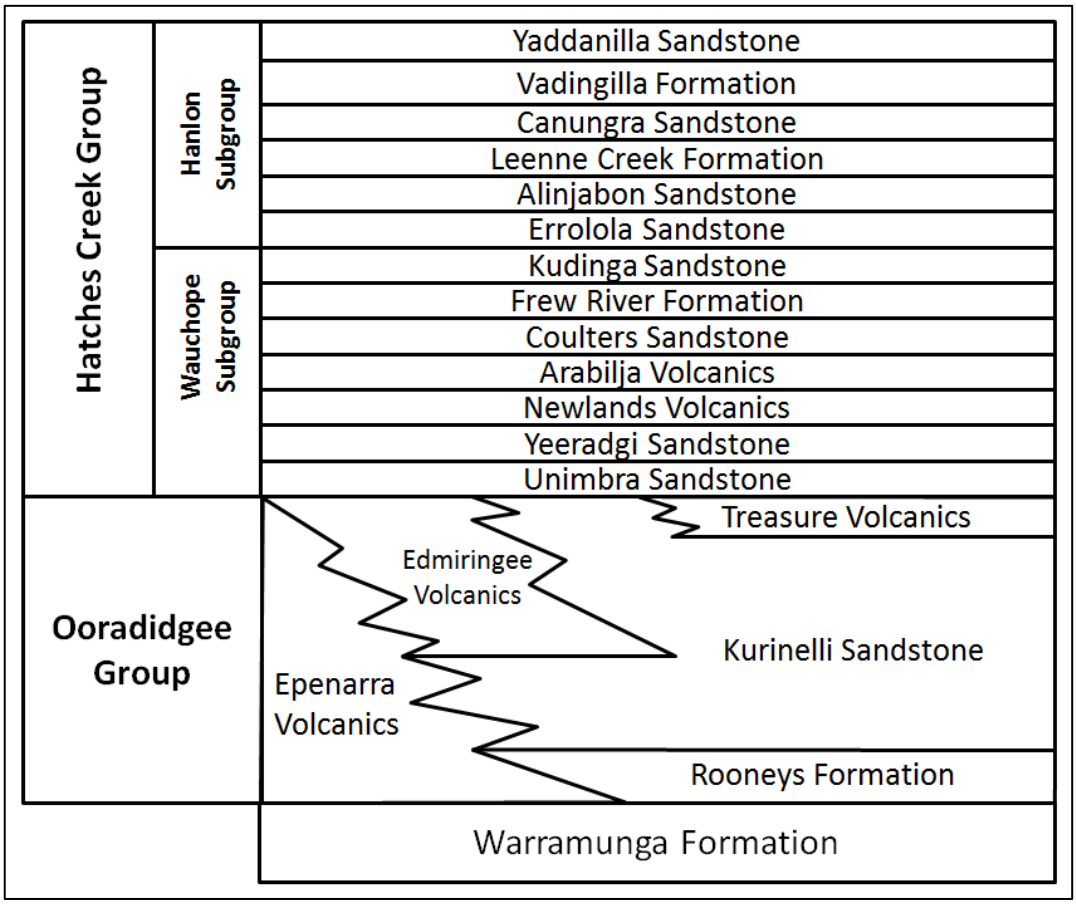
The Tennant Creek Region of the Northern Territory consists of three provinces, defined from north to south as the Tomkinson, Warramunga and Davenport provinces. Within EL29652 and EL23767, units of the Davenport Province have been interpreted to extend north and northeast under Georgina Basin cover from outcropping distributions mapped within the Frew River 250 K map sheet to the south.

Compositionally the Davenport Province consists of the Hatches Creek and Ooradidgee Groups, which unconformably overlie a deformed and metamorphosed basement composed of the Warramunga Group. The Warramunga Group consists of turbiditic greywacke, siltstone, haematitic shale and felsic volcanics (Blake & Page, 1988). The Warramunga Formation was deformed and metamorphosed to greenschist facies at which time ironstones formed. These units are associated with Iron Oxide Copper Gold mineralising systems recognised within the broader Tennant Creek region (Wyborn, 2001). Postdating deformation of the Warramunga Group, granites intruded possibly of the Tennant Creek or Cabbage Gum granite age and belonging to the Tennant Creek Suite (Blake and Page, 1988). Minor tungsten mineralisation is recognised to be associated with granites of this suite.

The Ooradidgee Group is a volcanosedimentary sequence composed of shallow marine to sub-aerial sedimentary rocks and bimodal volcanics, which demonstrate major lateral facies changes around volcanic centres (Claoue-Long, et al., 2008). The components of this group are defined in Table 5-2. The upper sequences consist of the Treasure Volcanics and the lateral equivalent Mia Mia Volcanics have been interpreted to have been deposited during the Murchison extensional event at approximately 1814 Ma. These units are broadly grouped into the Treasure Suite and consist of thick (>1500 m) felsic lavas including rhyolite and rhyodacite with basaltic lavas in the lower sequences. Underlying these units are sequences of fluvatile to shallow marine sandstones and siltstones defined as the Taragan Sandstone, Kurinella Sandstone and lowermost Rooneys Formation. The Epenarra Volcanics is recognised as an extensive volcanic sequence consisting of up to 3000 m of felsic tuffs, porphyritic and mafic lavas.

The Ooradidgee Group was intruded by sills and dykes of granophyre and dolerite, which are interpreted as co-magmatic with the Treasure Volcanics within this group. An approximate age of 1810 Ma has been interpreted for these intrusions by Claoue-Long, et al., (2008); however, Kruse et al., (2008) also suggests these may be constituents of the overlying Hatches Creek Group.

Table 5-2: Stratigraphic column of the Davenport Province



The Hatches Creek Group overlies the Ooradidgee Group and consists of siliciclastic successions with subordinate volcanics. A rift-sag model has been proposed for the formation of these groups involving crustal extension in an intracratonic setting. Plumb et al., (1981) and Blake (1986) initially suggested the Hatches Creek Group may have been lateral equivalents to the McArthur Group in the north; however, this was later considered unlikely by Blake and Page (1988) based from U-Pb zircon data suggesting an older deposition of this group, occurring roughly equivalent to the Leichhardt Extension event.

The units of the Hatches Creek Group form a distinct layer cake type stratigraphy and have been sub-divided in the upper Hanlon Subgroup and lower Wauchope Subgroup. Fluvatile near shore deposition has been proposed for the Wauchope Subgroup, while the upper Hanlon Subgroup was deposited in entirely marine conditions. Within the group, internal sequences are laterally conformable and have been interpreted to have formed while transfer and normal faults were active, creating thickness variations across faults (Blake and Page, 1988).

The Hanlon Subgroup is composed of dominantly marine sequences of quartz and feldspathic sandstones with minor shales and siltstones recognised within the Vadingilla Formation. These sequences are up to 5000 m thick forming as a widespread conformable package overlying the more volcanic Wauchope Subgroup.

The Wauchope Subgroup consists of both felsic and mafic volcanic horizons. The mafic volcanics are recognised as the upper most sequence and consist of regionally extensive lavas (Kruse et al., 2008; Blake and Page, 1988). The felsic sequences (Newland Volcanics and Arabulja Volcanics) consist of lavas, ignimbrites, bedded tuffs and coarse pyroclastic to fine ash beds that were erupted from a number of volcanic centres (Blake and Page, 1988). The Frew River Formation and Coulters Sandstone divide the mafic and felsic volcanic sequences and together are up to 1500 m thick. The Frew River Formation is interpreted to have formed in very shallow marine to sabkha conditions with stromatolites recognised. This unit is otherwise composed of kaolinitic arenite, fine grained siltstones, cherty mudstone and is dolomitic within the upper part (Kruse et al., 2008). Intersections from CRA mineral exploration holes targeting Tennant Creek style mineralisation in the northwest of EL29652 and EL23767 have been interpreted to have intersected these horizons.

The lowermost sequences of the Hatches Creek Group are the Yeeradgi and Unimbra sandstones and consist of largely feldspathic, quartz lithic and kaolinitic arenites. These units are discriminated by the presence of siltstones, mudstones and shales and rare carbonaceous beds recognised within the Yeeradgi sandstone. Minor rhyolitic lava lenses and pebbles are recognised within the Unimbra Sandstone.

Following deposition of the Hatches Creek Group, these units were deformed and metamorphosed by the Davenport Orogeny, which consisted of two periods of upright NE-SW and NW-SE oriented folding. Units were metamorphosed to greenschist facies as well as undergoing associated regional hydrothermal alteration, which is interpreted to have been resulted in localised mineralisation of Tungsten, Copper, Bismuth and Molybdenum (Blake and Page, 1988).

Solid Geology Interpretations

The Proterozoic sequences within EL29652 and EL23767 have been interpreted as belonging to the Davenport Province based from regional magnetic, gravity datasets and published literature and maps (Figure 5-8). As illustrated in Figure 5-9 there is a distinct change in the magnetic and gravity character when compared with the northern region where units of the South Nicholson Basin sequences are recognised as widespread. This likely reflects a change in the geological composition from the sediment dominated units of the South Nicholson Group, which are magnetically quiet into the more volcanic rich units of the Davenport Province, which have a strong magnetic character. As illustrated in Figure 5-11 below, there is also a distinct gravity high trending northeast from the Tennant Creek region, likely correlating with the extension of the Davenport Province under Georgina Basin cover. South Nicholson Group units have been interpreted as absent over this region where Davenport Province sequences have been interpreted as shallow. To the east of the tenement, the Wonarah Basement High is evident as a prominent gravity high, over which South Nicholson Group units have been interpreted to thin or not be present (Figure 5-10). Corresponding magnetic highs within this zone, likely reflect shallowing of older Proterozoic basement sequences.

A broad gravity low within the centre of the gravity image (Figure 5-11) has been interpreted as likely reflecting older Tennant Creek aged (1870–1846 Ma) granites at depth; however, no drilling extends at depth to confirm their presence. Extension of the South Nicholson Group through this gravity low zone may be possible; however, these units would likely be thinning across shallow Paleoproterozoic sequences, which are evidenced by coincident strong magnetic highs (Figure 5-9).

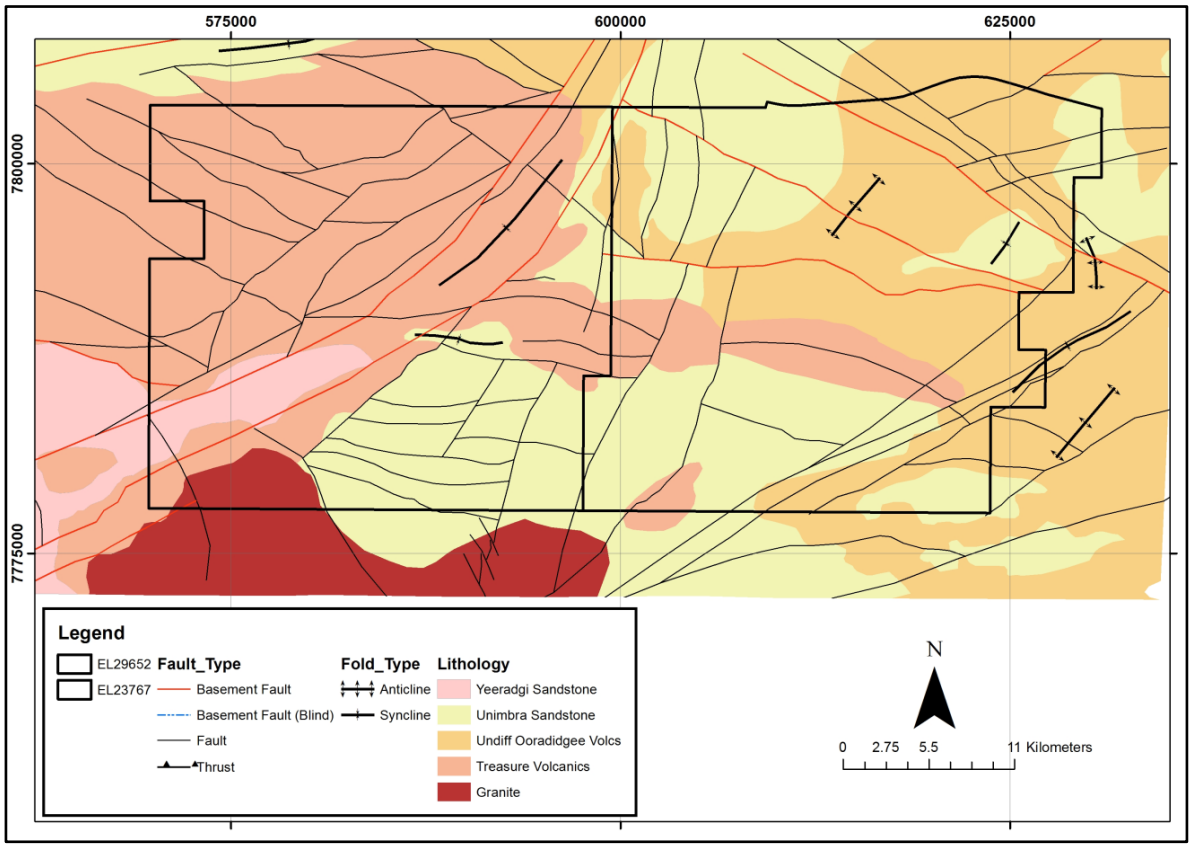


Figure 5-8: Interpreted Proterozoic Solid Geology within EL29652 and EL23767

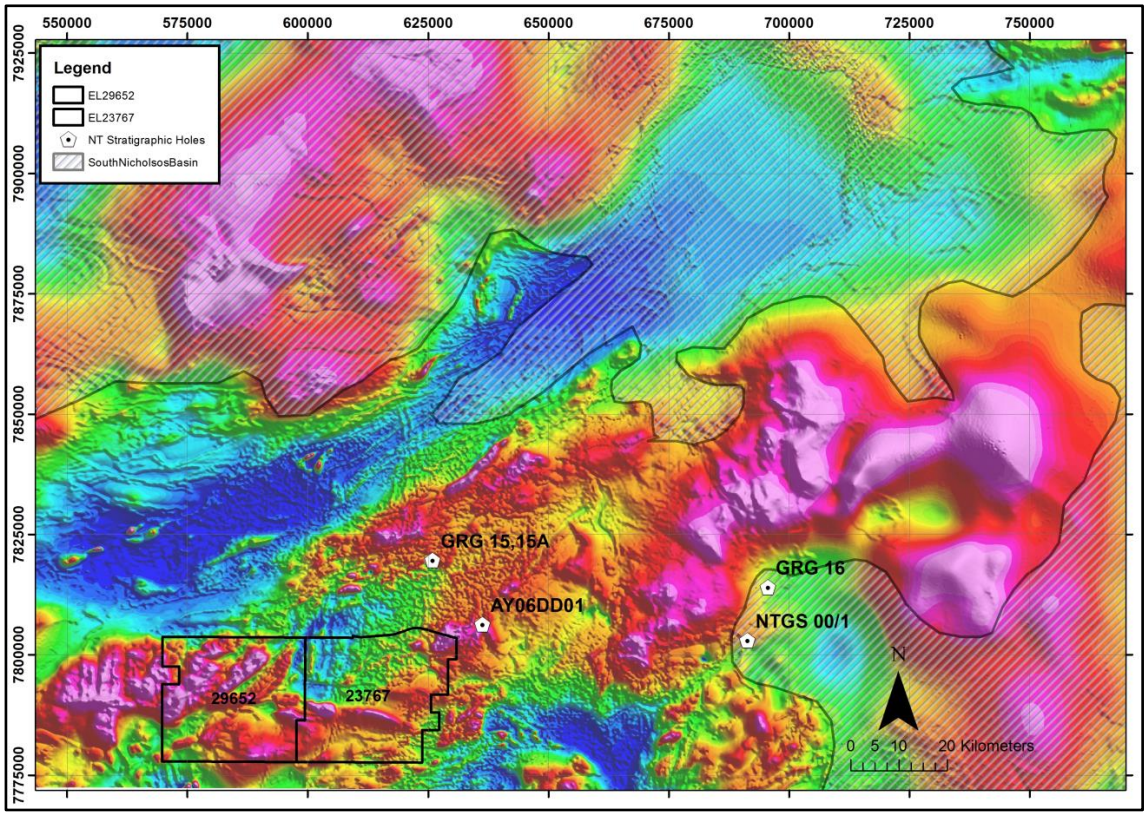


Figure 5-9: Interpreted distribution of the South Nicholson Basin units based from regional magnetic, gravity and drilling data draped over regional Total Magnetic Intensity (TMI) image

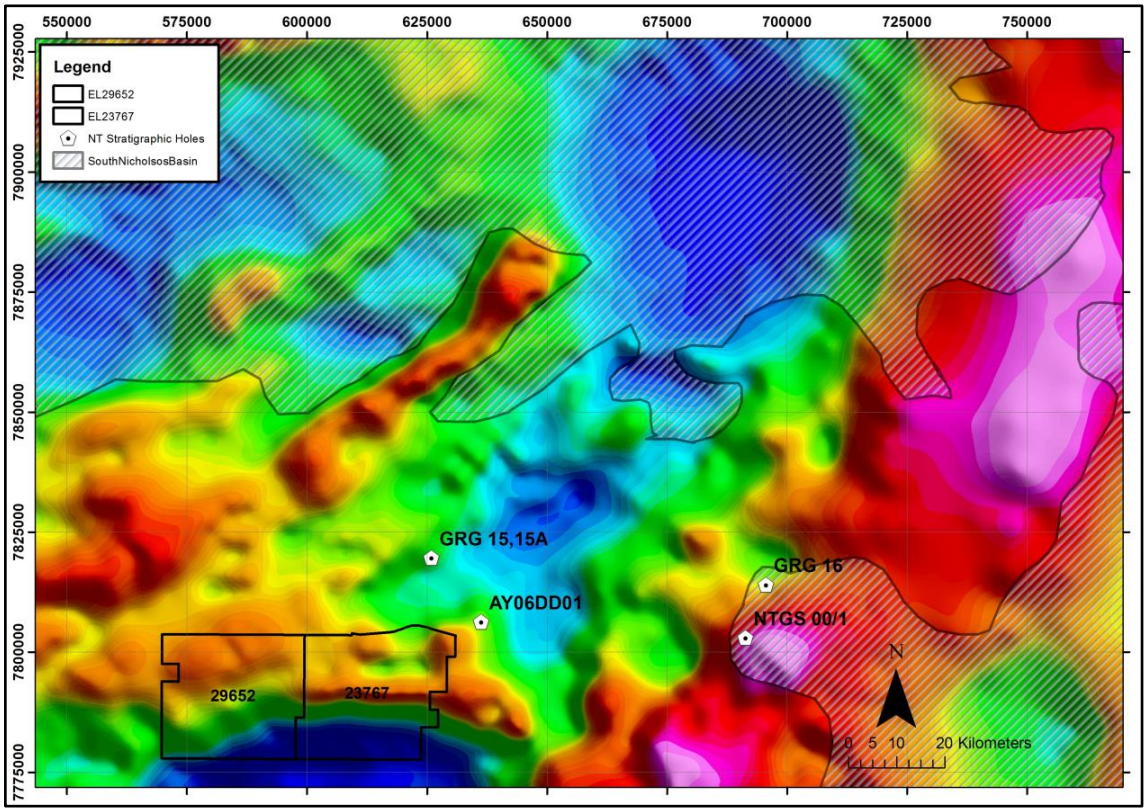


Figure 5-10: Interpreted distribution of the South Nicholson Basin units based from regional magnetic, gravity and drilling data draped over regional Isostatic Residual gravity image

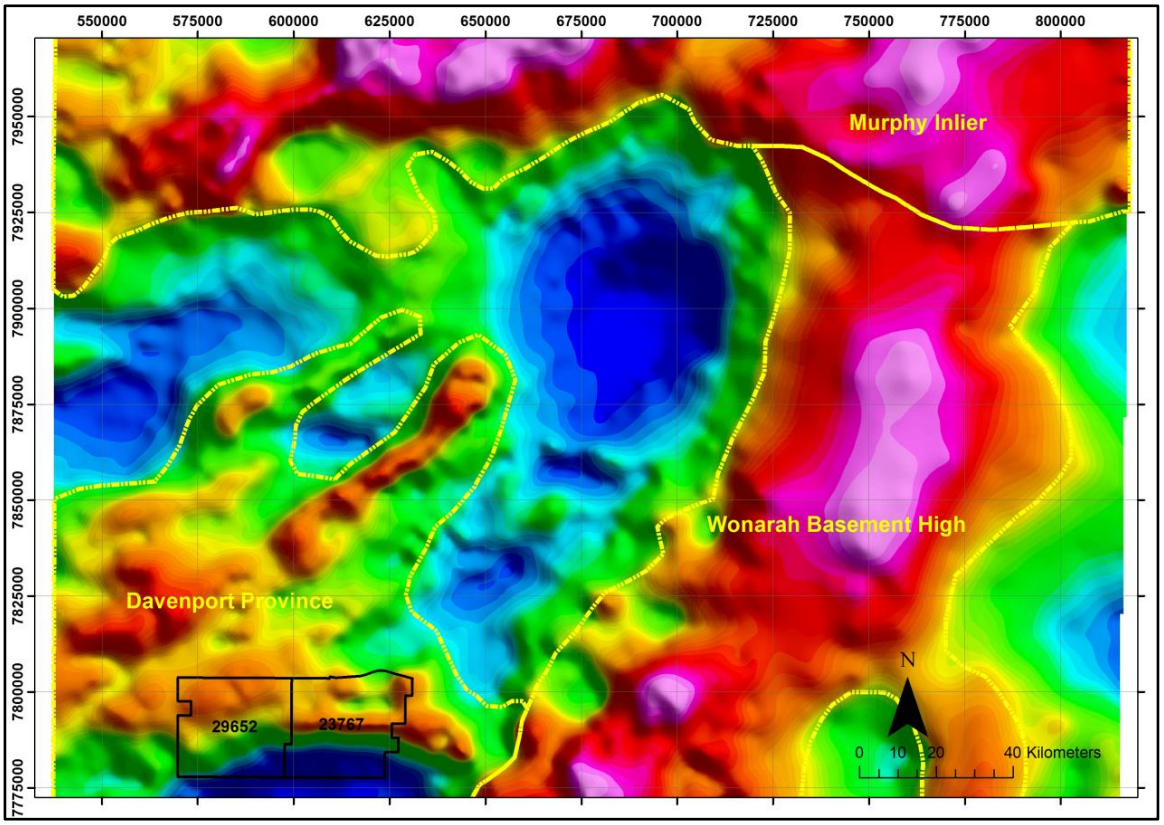


Figure 5-11: Basement Domain interpretations over Isostatic Residual Gravity image illustrating three distinct basement highs correlating with the Davenport Province, Murphy Inlier and Wonarah Basement High

As illustrated within Figure 5-14, there are several distinct magnetic features evident within the tenement, which likely represent compositional variations of the underlying units within the tenement. Within the northwest of the tenement there is a large block of what is interpreted as highly faulted volcanics. This unit is bound by long strike-length northeast trending anastomosing faults (interpreted as primarily strike-slip), which define a large scale augen shaped body. The very high magnetic character of this block suggests high magnetite content possibly indicating a volcanic origin. The bi-modal Treasure Volcanics have been interpreted here. This correlates with interpretations conducted by Kruse et al., (2008) to the south of the region, which attributes high magnetic bodies undercover to the Treasure Volcanics.

To the northeast of the tenement there is a distinct short wavelength magnetic feature, which blankets much of the northern and western extents of the region. These are interpreted as the Cambrian Kalkarindji Volcanics. Drilling within the northeast of the tenement has confirmed the Cambrian volcanic unit at shallow depths (<150 m).

A thin sedimentary sequence of the Hatches Creek Group has been interpreted to overly the Undifferentiated Ooradidgee Group Volcanics and has been interpreted to be somewhat restricted in extent. Based from the stratigraphic succession order these units may be the Unimbra Sandstone, which immediately overlie rocks of the Ooradidgee Group. Mineral exploration drilling by Hancock (DDH001, 2 and 3) intersected metasedimentary rocks within these interpreted units although no unit correlations were made within the drilling. These units have been described as fine to medium grained with quartz common throughout. A distinct (hydrothermal) alteration has been interpreted with an abundant green mineral, possibly chlorite noted. The presence of quartz and calcite veins with sulphides evident is also described. A red-brown colour is defined with a high quantity of haematite present.

Wyborn (2001) defines the clastic sequences of the Hatches Creek Group as relatively oxidised with common magnetite and haematite, which correlates with the above descriptions. Late alteration within the Hatches Creek Group has also been defined by Blake and Page (2008); however, this was more common within the felsic volcanic horizons. Recognised alteration assemblages include chlorite, muscovite, biotite and iron oxides, which again may correlate with observed intersections. Within drillhole AY06DD01, five kilometres to the northeast of the Hancock drillholes, metasedimentary rocks have also been intercepted at approximately 155 m depth (Figure 5-12). Correlations proposed by Kruse et al., (2008) are poorly defined, interpreting these units as either of Hatches Creek affinity or South Nicholson Group. However, it appears more likely these units have a Hatches Creek affinity based from the broad similarities observed within the magnetic and gravity datasets and the proximity with Davenport Province units to the south (Figure 5-12).

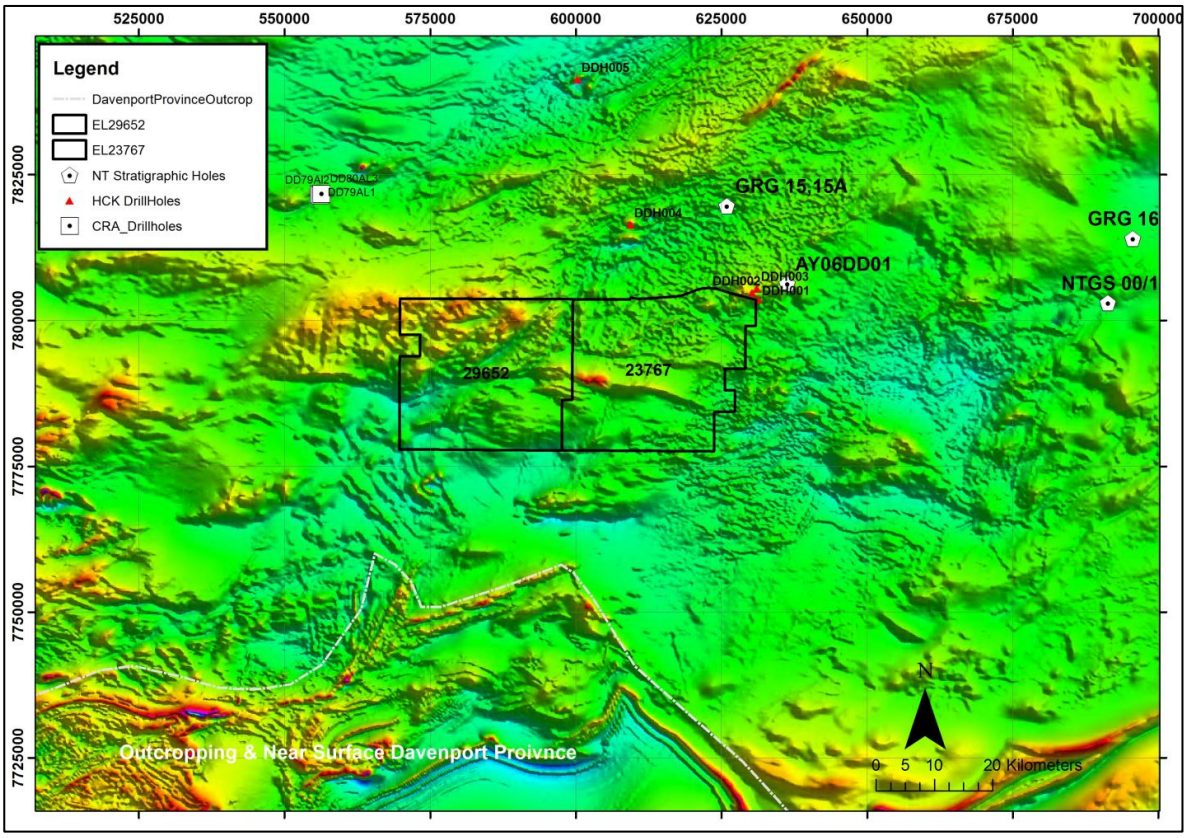


Figure 5-12: Regional Total Magnetic Intensity image, illustrating similar magnetic character observed between outcropping Davenport Province sequences and EL29652 and EL23767

Additional mineral exploration holes conducted by CRA in the 1980's targeting Tennant Creek style mineralisation are located directly over a gravity ridge to the northwest of the tenement (Figure 5-13). Units intersected were metasedimentary, with stromatolites of middle Proterozoic age defined. If of Davenport Province affinity, the presence of stromatolites would correlate with the Frew River Formation, which has been recognised as a prospective for Pb-Au-Cu. Whilst an exact correlation of units was not made by the CRA geologists it seem likely these units correlate with the Davenport Province sequences interpreted.

To the south of the interpreted Treasure Volcanics, a distinct low in the magnetic data is observed forming a narrow band trending northeast across the tenement. This zone has been interpreted as a deepening of the volcanic sequence with a thicker distribution of overlying metasedimentary rocks recognised, possibly correlating to the Yeeradgi Sandstone overlying the Unimbra Sandstone, however, exact correlation remains uncertain.

To the south of the tenement there is a broad gravity low coincident with a flattening of the magnetic signal. Based from these signals, a large granitic body has been interpreted, with a likely Tennant Creek or Cabbage Gum Granite suite age (1870–1846 Ma).

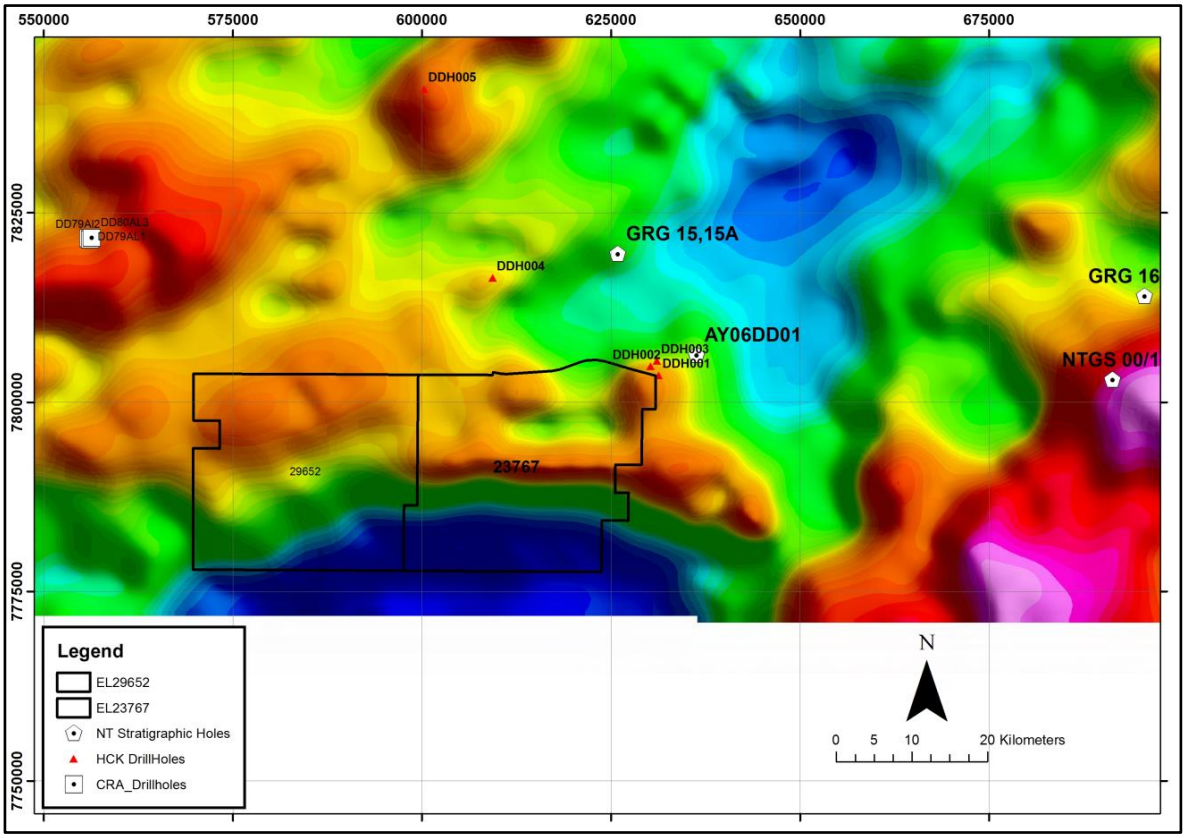


Figure 5-13: Regional Isostatic Residual gravity image with proximal mineral exploration drillholes and stratigraphic well locations

5.3 Structure

The region surrounding EL29652 and EL23767 has undergone multiple phases of deformation and basin development. The underlying dominant NE-SW, E-W and NW-SE architecture, or structural fabrics, within the tenement is interpreted to be related to early fault development/reactivation associated with the Barramundi Extension (2050–1870 Ma), which were subsequently reactivated during the Barramundi Orogeny (1870–1820 Ma) and Davenport Orogeny (1730–1720 Ma). A number of northeast striking structures are observed to the northwest of the tenement and form as long strike length (interpreted strike-slip) features typically on the scale of 10's to 100's of kilometres beyond the tenement bounds. Upright folding on the scale of <1 km wavelengths have been defined within the Davenport Province sequences by Blake and Page (1988); however, these have not been recognised within the tenement based form the geophysical datasets.

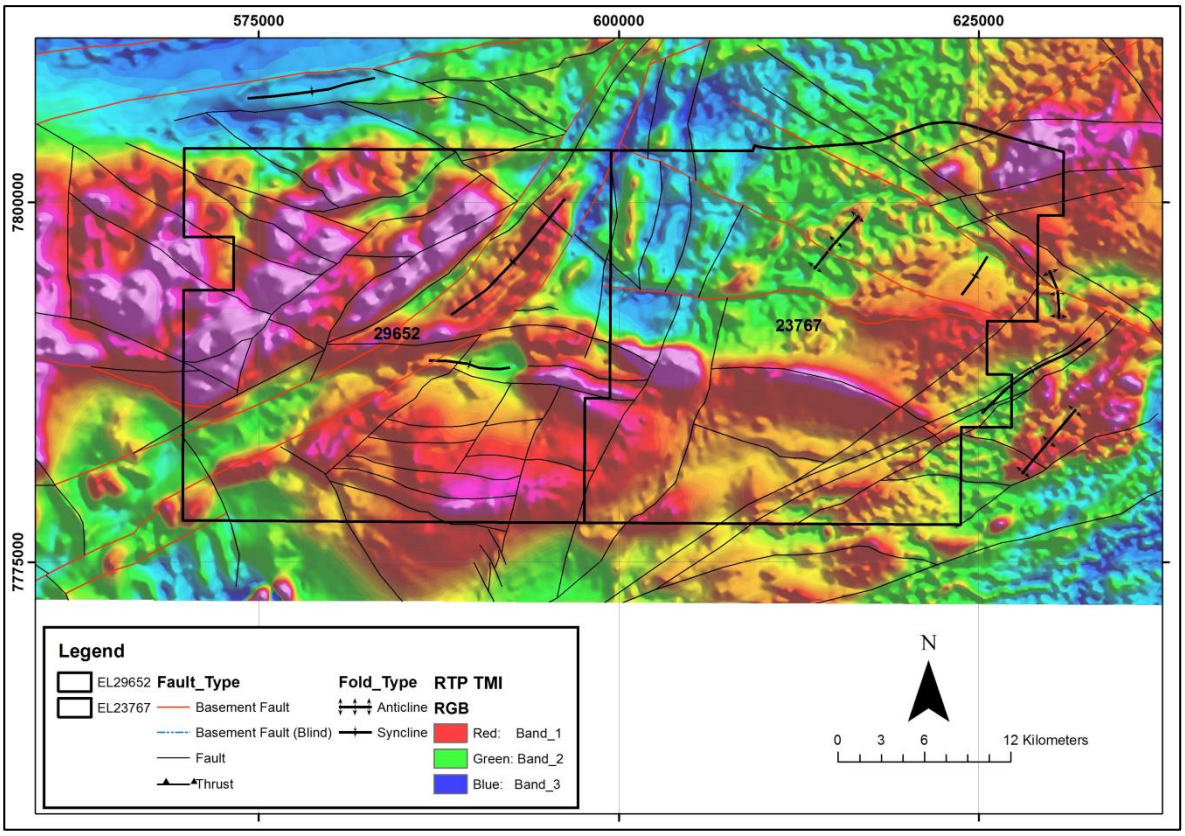


Figure 5-14: Total Magnetic Intensity - Reduced to Pole image and interpreted structural elements of EL29652 and EL23767

Following deposition of the Hatches Creek Group these units were deformed and metamorphosed to greenschist facies during the Davenport Orogeny (1730–1720 Ma). This event has been interpreted as thick-skinned in nature and involved two episodes of upright concentric folding and faulting. Folding was initially along NW-SE trends followed by NE-SW trends resulting in fold interference patterns, which are observed within the outcropping units on the Frew River map sheet to the south of EL29652 and EL23767. These folds typically form on wavelengths of 10–20 km, typical of the Davenport Orogeny. Within the west of the tenement folding is evident within the Ooradidgee sequences and striking along a NE-SW trend. Wavelengths of approximately 5 km have been interpreted.

Extensive faulting associated with the Davenport Orogeny has been interpreted within the tenement. To the northwest of the exploration leases, several long strike length features (>100 km) have been interpreted trending northeast and defining a distinct boundary between high mag and low magnetics (Figure 5-14). These structures are also observed to form anastomosing structures surrounding the interpreted Treasure Volcanics within the northwestern corner of the tenement. Within the Treasure Volcanics distinct NS and NW-SE oriented faulting between the enveloping strike-slip faults is observed likely activating during strike-slip displacement along the main structures.

Additional NE-SW oriented faults are observed within the east of the tenement, forming large scale features extending into the Tennant Region to the south. These structures are clearly defined by strong breaks within the magnetic data. E-W structures are displaced but also terminate some NE-SW oriented faults. These faults are largely focused within the center and south of the tenement and are interpreted to have had a thrust component to their movement history. These are interpreted to have formed contemporaneous to the main Davenport faulting event.

Some minor folding is observed within the tenement within the overlying Cambrian Kalkarindji Volcanics. These folds are typically 1–2 km wavelength and likely gentle in nature. These are interpreted to have formed as a result of far field stresses from the Late Cambrian to Early Devonian Alice Springs Orogeny, which affected much of the southern Georgina Basin. However, these structures more likely represent drape folding of the volcanic sequences over the underlying Davenport aged structures (Figure 5-15; Figure 5-16).

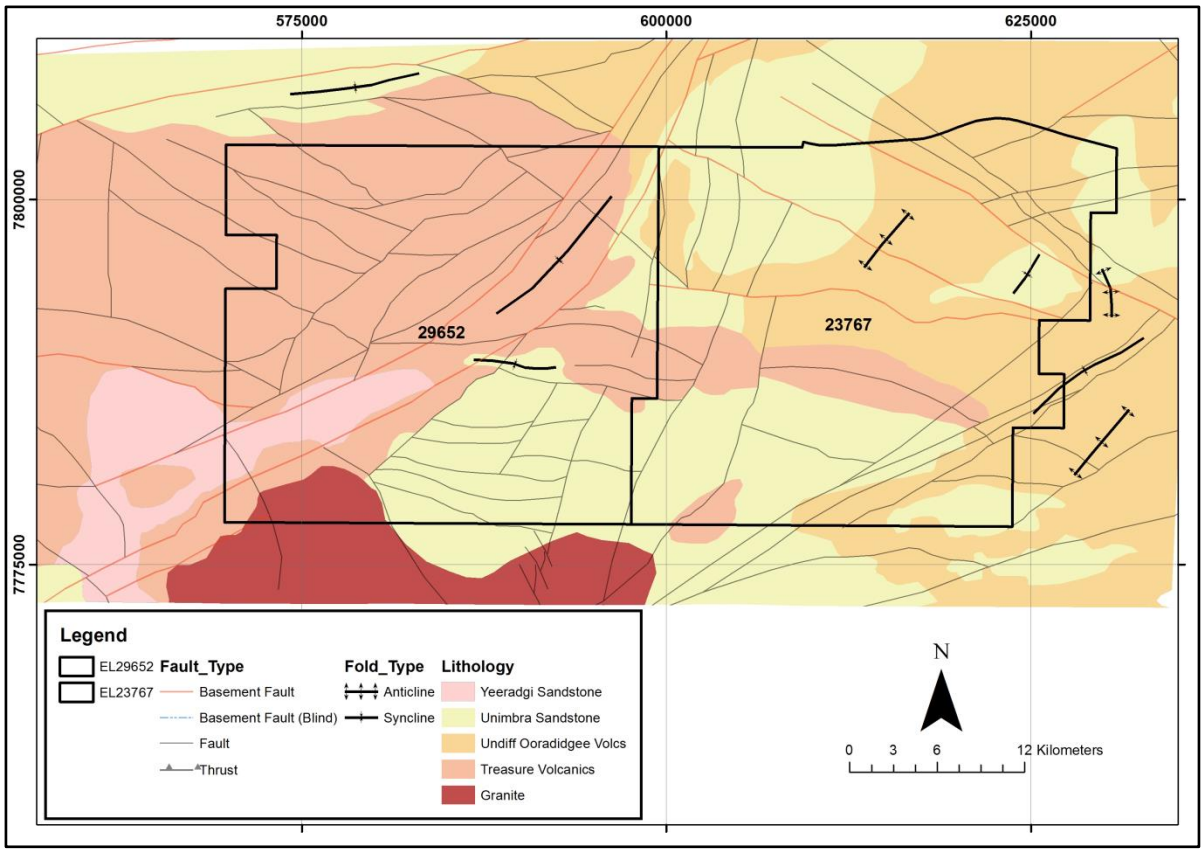


Figure 5-15: Interpreted Proterozoic aged fold structures

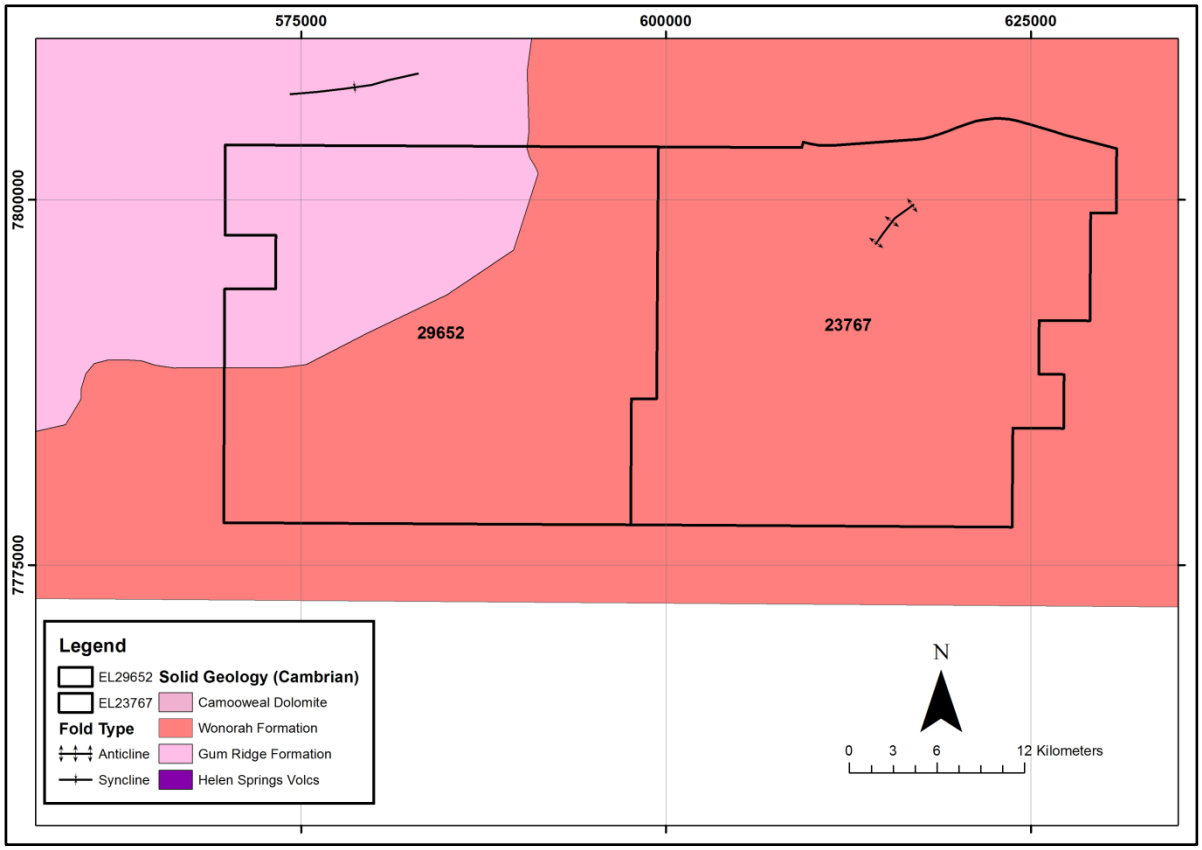


Figure 5-16: Interpreted Cambrian aged fold structures

5.4 Intrusions

Several intrusions have been interpreted within the project area based from gravity and magnetic datasets. Within the centre of the tenement five dykes have been interpreted to cross-cut the tenement along a general N-S to NE-SW strike. These features are likely composed of dolerite or gabbro and are intruded contemporaneous with the Treasure Volcanics (Treasure Suite) and the Murchison extensional event. These features are interpreted as thin in nature and in some cases have been displaced by Davenport Orogeny aged faulting (Figure 5-17).

Along the southern fringes of the tenement a deep broad gravity low is observed and has been interpreted to relate to an early granite body of likely Tennant Creek Granite or Cabbage Gum Granite age of the Tennant Suite. These granite bodies have been dated at 1870 Ma and 1846 Ma respectively. Minor Tungsten, mineralisation is known to be associated with Tennant Suite granites (i.e. Mosquito Creek Tungsten field in Tennant Creek).

Within the exploration leases this granite forms as a broad amorphous body covering approximately 33 kilometres in diameter in the solid geology interpretations. The full extent of this granite is interpreted as much larger based from the gravity signature, which has a 65 kilometre east-west extent and extends much further south within the Frew River region. The magnetic data suggests overlying sedimentary and volcanic sequences to the north within the tenement, constraining a possible age of emplacement to pre-Ooradidgee Group deposition.

To the north of the tenement, distinct subrounded granites coincident with gravity lows have been interpreted as correlating with Tennant Creek aged granites. These bodies tend to correlate with magnetic lows, suggesting a low magnetite content of these granites. These bodies are much smaller in diameter than the southern body extending less than 20 km in diameter.

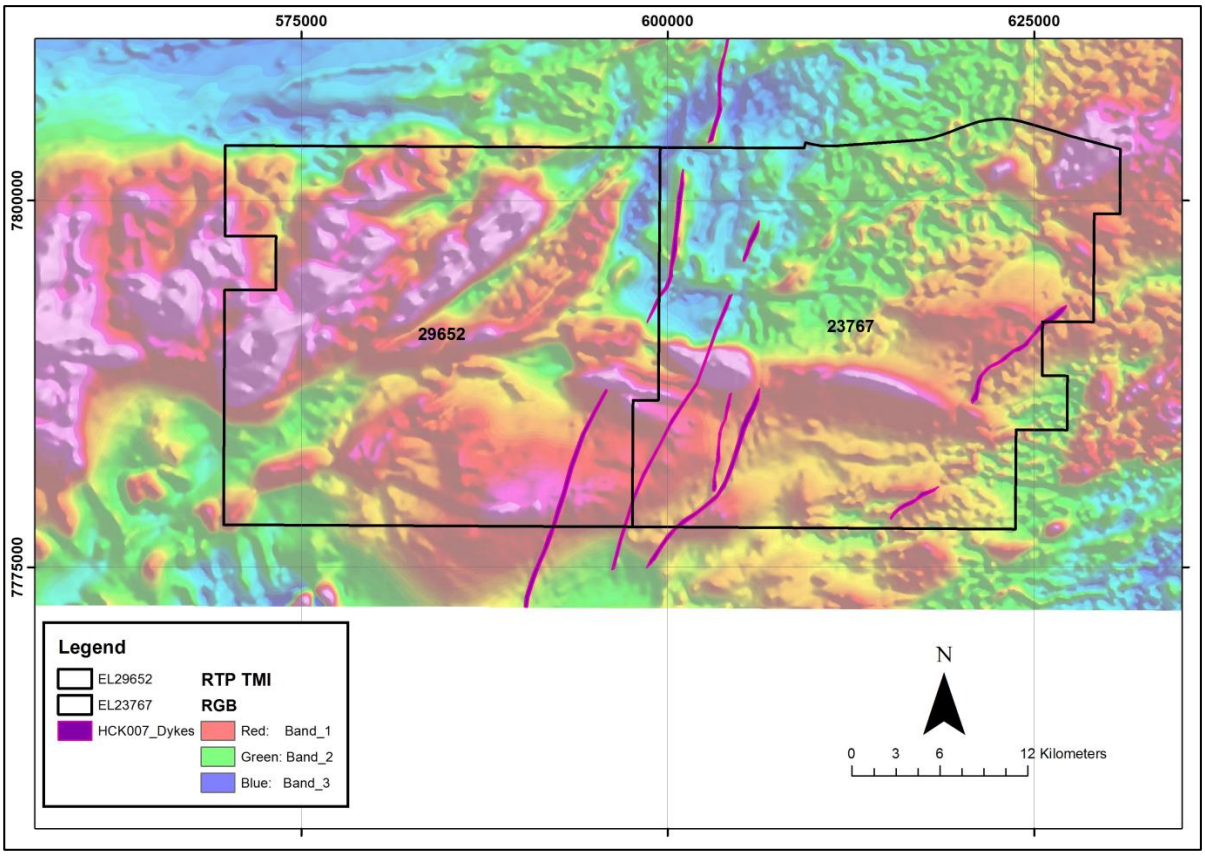


Figure 5-17: Distributions of interpreted dykes overlain on Reduced to Pole Total Magnetic Intensity image

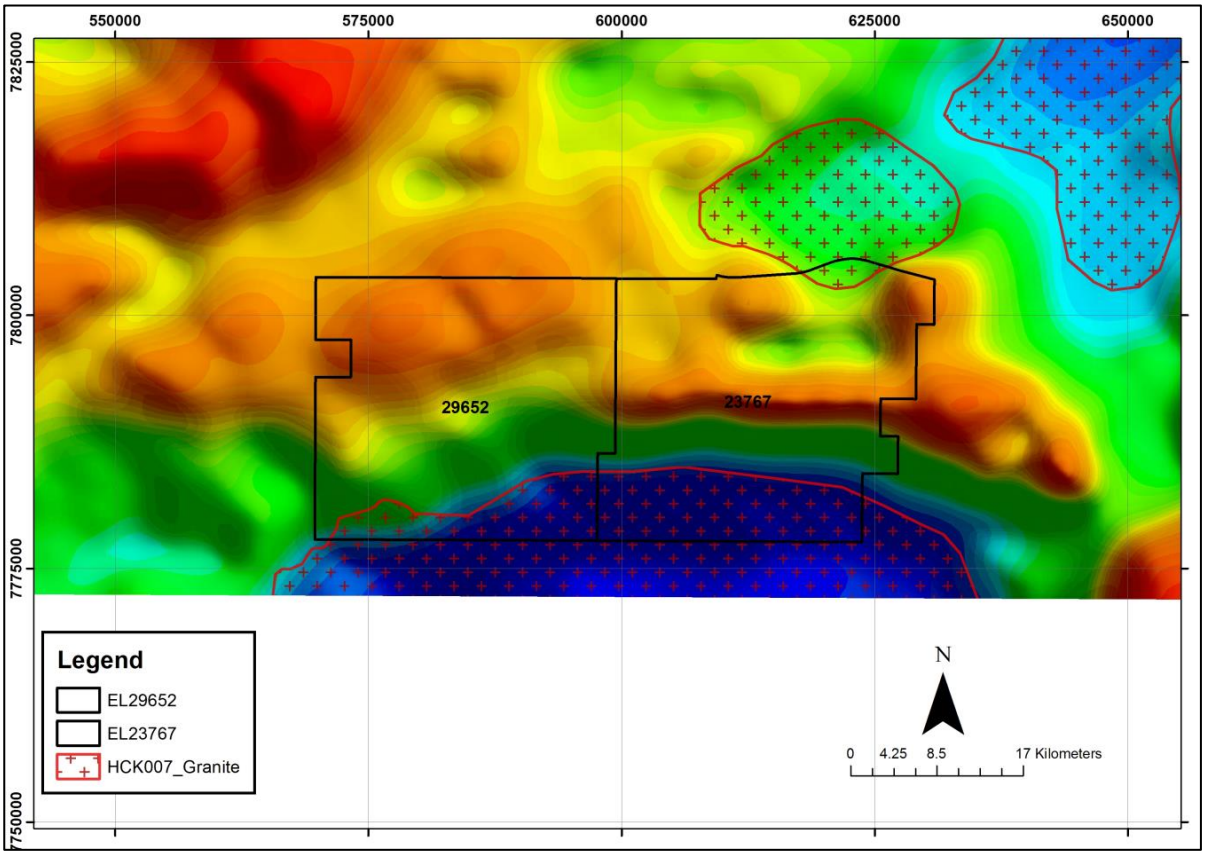


Figure 5-18: Distributions of interpreted intrusions over Isostatic Residual Gravity image

5.5 High level mineral prospectivity review

5.5.1 Georgina Basin

Phosphate exploration within the Cambrian Georgina Basin has occurred since the 1960's, however in the NT, largely sub-economic deposits have thus far been discovered. Within proximity of EL29652 and EL23767, phosphate deposits are dominantly located along the Alexandra-Wonarah Basement high located to the east of the exploration leases (Figure 5-19). The largest phosphate deposit within the region, the Wonarah deposit, lies immediately to the east of the EL23767 and has a JORC compliant estimated resource of 300Mt @ 18.9% P_2O_5 (www.australianmiunesatlas.gov.au) (Figure 5-19). Within the deposit phosphatisation is hosted within the Gum Ridge Formation below the Wonarah Formation and above the Helens Creek Volcanics. To the north of the exploration area phosphate has also been delineated within the Wonarah Formation, however, at sub-economic levels. This deposit has a pre JORC compliant estimated resource of 15Mt @ 10% P_2O_5 (Rawlings et al, 2008). **Solid Geology interpretations within the exploration leases suggest extensive coverage of both the prospective Gum Ridge and Wonarah Formations below thin Phanerozoic cover**.

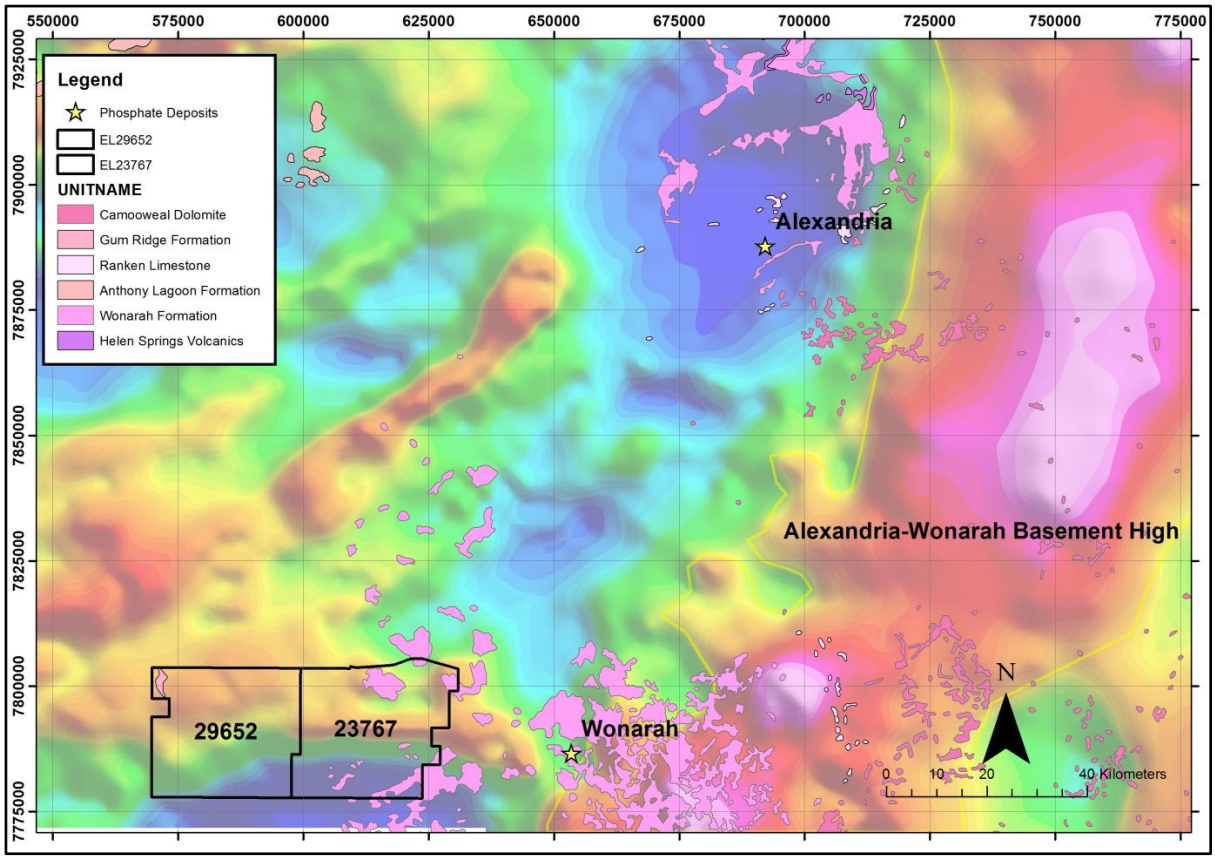


Figure 5-19: Locations of phosphate deposits over Cambrian outcrop extents and Isostatic Residual Gravity image highlighting Alexandria-Wonarah Basement High.

Based on the proximity to the adjacent Wonarah Phosphate deposit to the east and the presence of prospective Cambrian sequences within EL29652 and EL23767 a high potential exists for phosphate mineralisation. To date there are has been no drilling activity within the tenement and minimal outcrop to confirm the extents of these units. At current no phosphate has been recorded within the exploration leases and as such further work is required in order to assess the areas true phosphate potential.

5.5.2 South Nicholson Group

Within EL29652 and EL23767, the interpreted South Nicholson Group does not extend on to the ELs, therefore is not considered prospective from a mineral exploration perspective.

5.5.3 Davenport Province

The Davenport Province contains numerous small scale mineral occurrences and includes Tungsten, Gold, Tin, Copper, Lead-Zinc, Nickel, Tantalum, Niobium and Uranium. Mineralisation within this province is largely related to rocks of the Treasure Suite, ironstones within the Warramunga Formation as well as granites of both the Tennant Creek Suite and Devils Suite. A brief review of the metallogenic potential within EL29652 and EL23767 is outlined below.

The Warramunga Formation is the oldest formation within the Tennant Creek and Davenport Province and has high recognised Gold and Copper potential within the Tennant Creek region with several major known deposits within the metamorphosed ironstones of these sequences. Banded ironstones of this unit are well developed within the Tennant Creek region, however, the ironstones within this formation are less well developed or absent within the Davenport Province. Due to the limited development or absence of ironstones within the Warramunga Formation in the Davenport Province, Gold, Copper and associated mineralisation potential within EL29652 and EL23767 is considered limited. Furthermore, the Warramunga Formation likely occurs at several kilometres depth and beyond economic potential and below the interpreted volcanic sequences of the Ooradidgee Group within the exploration area. As such, the economic potential of these units within EL29652 and EL23767 is considered low.

To the south of the exploration leases a large scale granitoid has been interpreted at shallow depths. The affinity of this granite remains uncertain, however, this has been interpreted to have intruded contemporaneous with Tennant Supersuite between approximately 1870 and 1846Ma. This granite may alternatively belong to the Devils Suite, which was emplaced at approximately 1710Ma. Minor Tungsten mineralisation is associated with the granites of Tennant Creek Suite, with the Mosquito Creek Tungsten field occurring within the Leaders Granite to the west of the exploration leases. Mineralisation within the Mosquito Creek area occurs as scheelite and wolframite bearing quartz veins (Wyborn, 2001). The Devils Suite is also recognised to host potential, albeit minor, vein-associated W deposits, with the Wauchope Tungsten field spatially associated with granites of this suite (Blake, 1987). Within the south of the ELs, there is potential for similar style of vein hosted W mineralisation within the interpreted granite intrusion. The depth and geological affinities and mineral endowment of this granite are currently untested and as such further work is required in order to assess the true W potential. As W mineralisation within these granites is considered minor, the economic mineral potential is considered to be low.

The igneous units of the Upper Ooradidgee Group (Treasure Volcanics, Mia Mia Volcanics) and the lower Hanlon Subgroup (Arabulja and Newland Volcanics) are broadly grouped as the Treasure Suite. Mineralisation within the region has been interpreted to be associated with the Treasure Suite, with a magmatic input postulated for the origins of the mineralisation fluids as well as mineralisation occurring contemporaneous to this suites emplacement (Wyborn, 2001). However, there has been wide debate over the origins of these fluids over time.

Within the Davenport Province Gold and Tungsten mineralisation is hosted by units equivalent in age or older than the Treasure Suite, with similar mineralisation and emplacement ages recorded. Within the broader Tennant Creek/Davenport Province region, the most significant Gold deposits are hosted within the older ironstones of the Warramunga Formation. However, outside of the Warramunga ironstones potential exists for quartz vein hosted gold within units of equivalent or older age than the mineralising fluids associated with the Treasure Suite. Such deposits are recognised within the Rooneys Formation or Kurinelli Sandstone within the south of the Davenport Province with minor shear hosted gold deposits recognised (Wyborn, 2001).

Within EL29652 and EL23767 a significant area has been interpreted as belonging to units of the Treasure Suite with sedimentary packages of the lower Hatches Creek Group also recognised through the centre of the exploration area, thus providing a possible suitable mineralisation fluid source and host for mineralisation within the exploration area. Some potential for vein hosted mineralisation may exist within metasedimentary units to the northeast of the exploration leases with haematite alteration, veining and sulphide development recognised within HCK mineral exploration holes (~250m depth within DDH001-003). Alternatively this may also reflect interaction with fluids derived from granitic intrusions interpreted to the north of these exploration holes. No assay results were available at the time of this report.

Whilst nearby drilling does indicate some hydrothermal activity and associated sulphide development, the depth of cover to the Proterozoic sequences as well as an interpreted absence of the Warramunga Formation (a preferred exploration target sequence within the region) limits the potential for shallow targets at this stage. The exploration leases can therefore be considered high risk and potentially high cost for future base and precious metals exploration.

6 Conclusions

The key aim of this project has been to provide a better understanding of the geological and structural elements of EL29652 and EL23767 with specific focus on the Georgina Basin and underlying Proterozoic rock units. Additionally, based from this work a preliminary or high level understanding of the resource potential across the tenement was to be defined in order to guide Jacaranda's exploration strategy within EL29652 and EL23767. Interpretations within this project were based form sparse geological mapping and limited drilling information, which was supplemented by remotely sensed and geophysical datasets inclusive of magnetic, gravity and satellite imagery. As factual geological information was limited a level of interpretive uncertainty exists. This report is accompanied by an ArcGIS database of all interpreted results and datasets.

The study highlights a number of key findings, most notably the likely presence of the Davenport Province (predominantly Treasure Volcanics/Undifferentiated Ooradidgee Group Volcanics in the north and east and a large scale granitoid at shallow depths to the south (possibly part of the Tennant Supersuite or Devils Suite granite). The South Nicholson Group has been interpreted as likely absent within the exploration leases. If present, the highly prospective Warramunga Formation is expected to be at considerable depth. Additional prospectivity for phosphate within the Georgina Basin sequences is also highlighted.

The interpretive outcomes from this study include:

- Interpretation of the Proterozoic solid geology across the ELs inclusive of the Davenport Province sequences; however, exclusive of South Nicholson Basin units;
- Mapping of a Cambrian Georgina Basin sedimentary sequence and distribution of an underlying Cambrian volcanic sequence;
- Mapping of the distribution of intrusive units;
- Mapping of key structures including faults and folds; and
- Development of a data confidence map.

The geology of EL29652 and EL23767 was interpreted to be mainly units of the Davenport Province of the Tennant Creek Region, forming a north-eastward trending extension under thin Georgina Basin sequences. The Mesoproterozoic South Nicholson Group was interpreted to lie further to the north and east of the tenement, largely correlating with lower intensity magnetic and gravity features. There are no recognised correlations between the Davenport Province and the South Nicholson Groups, with the South Nicholson Group representing younger basin stratigraphy.

Davenport Sequences within the Tenement are interpreted as likely correlating with the Ooradidgee Group and sedimentary units of the lower Hatches Creek Group. These interpretations are based from the presence of very high broad magnetic features near surface, likely reflecting the bi-modal volcanic sequences of the Treasure Volcanics of the Treasure Suite. A minor thin overlying metasedimentary sequence is recognised to the east of the tenement, where the magnetic/gravity response of the Proterozoic volcanics appear to be dampened by an overlying sedimentary package.

Structurally the region has been complexly faulted and folded through at least two major periods of deformation. The underlying basement of the region, which is interpreted to comprise the Warramunga Formation, has been folded and faulted by the Barramundi Orogeny (1870 Ma). Following deposition of the Ooradidgee and overlying Hatches Creek Group a period of shortening was recorded correlating with the Davenport Orogeny and resulting in two periods of folding. These fold structures are large scale (>10 km) and common throughout the region, forming upright NE-SW and NW-SE trending folds. Minor folding is observed within the tenement, largely within the east. Considerable faulting is also evident in the region, largely recognised within the more massive volcanic sequences within EL29652 and EL23767, forming long strike length strike slip structures.

Several intrusions are recognised within the region and relate to the Tennant Suite, which intruded the Warramunga Group at approximately between 1870 Ma 1846 Ma. The Tennant Suite is associated with minor W mineralisation. Several broadly north south trending mafic dykes are also evident within the tenement, likely intruding synchronous to the Treasure Volcanics within the Ooradidgee Group.

The Davenport sequences within the exploration leases may be considered to be moderately prospective for Au and Cu, however, a laterally extensive and in places thick Georgina Basin cover sequence and lack of outcrop within the region provides constraints for more detailed assessments. The interpreted presence of the Treasure Suite including mafic intrusive dykes within the exploration area are believed to be genetically related with Au and Cu mineralisation within the region, providing a possible geochemical or thermal driver to the mineral systems, with all known mineral deposits within the region hosted by rocks equivalent in age or older than this suite. However, to date, the most significant Au mineralisation associated with this suite is predominantly hosted within ironstones of the Warramunga Formation, which if present forms the basement to an overlying Davenport Province sequence. The ironstones of the Warramunga Group present within the Tennant Creek region have been interpreted to be absent within the Davenport Province, therefore significantly reducing the possibility for ironstone hosted Au deposits within this region. Some potential still exists for quartz vein Au mineralisation associated with Treasure Suite aged sedimentary units within the region. It should be noted that the thick Georgina Basin cover (100–400m) across the tenement areas will increase the cost of any future exploration of the Proterozoic sequence, a cost which may be difficult to justify.

Overlying the Proterozoic sequences within EL29652 and EL23767, a sequence (<400 m) of Middle Cambrian Georgina Basin is recognised, forming the eastern margin of the Barkly Sub-basin. This sequence is primarily composed of carbonates and dolostones and overlies a thin to variably distributed layer of Cambrian volcanics, the Kalkarindji Volcanic Group. The Cambrian units are relatively undeformed with only minor folding recognised within the underlying volcanic sequences. These possibly reflect far-field deformation from the Early Cambrian to Late Devonian Alice Springs Orogeny.

Interpreted units within the leases are considered to be prospective for phosphate mineralisation with the Wonarah Phosphate deposit lying to the immediate east of EL23767. Prospective sequences of the Wonarah and Gum Ridge Formations have been interpreted as widespread within the exploration leases and warrant further investigation for phosphate potential.

7 Recommendations

Based from the work outlined in this report and the uncertainties highlighted, the following recommendations have been made for possible future work within the tenement should further exploration work continue.

The initial recommendations aim to better constrain the phosphate potential within the Georgina Basin sequences:

- Depth to source magnetic modelling. This process will assess thickness of Cambrian units to define shallow zones and conversely thick zones of potentially prospective units of the Gum Ridge and Wonarah Formations; and
- A limited number of regular spaced drillholes in order to investigate the true thickness and phosphate potential of the Gum Ridge and Wonarah Formations.

EL29652 & EL23767, Northern Territory – Geology Review

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