

# **BOWGAN MINERALS LIMITED**

BOMGAN MINERALS LIMITED

**EXPLORATION LICENCE 24253  
NEUTRAL JUNCTION PROJECT**

## **SUMMARY REPORT FOR SURRENDERED PORTION OF TENEMENT**

Barrow Creek  
1:250,000 Map Sheet

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## SUMMARY

EL24253 Neutral Junction is located in the Barrow Creek-Mount Skinner area 220-280km to the north of Alice Springs. EL24253 is currently operated under a joint-venture agreement, between Bowgan Minerals Limited, Mega Hindmarsh Pty Limited and the original tenement manager Mithril Resources Limited. Bowgan Minerals Limited is the current operator of the Neutral Junction project.

Mithril Resources Limited initially explored for nickel and cobalt on EL24253. A joint-venture agreement was then signed with Mega Hindmarsh Pty Limited, whom explored for uranium within an unconformity-related deposit setting on EL24253. EL24253 is managed by Bowgan Minerals Limited, whom are currently exploring for economic occurrences of; gold, silver, copper and base-metal and other elements within an iron oxide-copper-gold ('Tennant Creek-style' IOCG) deposit setting.

EL24253 was originally granted April 2005 and comprised of 454 graticular blocks. Three tenement surrenders have been completed in accordance with Section 26 and 28 of the Mining Act. The first surrender was completed in April 2007 which reduced EL24253 to 227 blocks and the second, a partial surrender in June 2009 reduced EL24253 to 140 graticular blocks. In March 2010, a final block reduction was completed by Bowgan Minerals Limited which reduced EL24253 from 140 to 67 graticular blocks.

A fourth, voluntary surrender of 26 of the remaining 67 blocks was conducted on 24<sup>th</sup> March 2018 with 41 blocks being currently retained by Bowgan Minerals Limited.

This report presents a summary of exploration work completed on the surrendered portion of EL24253 by Mithril Resources (period 2005, Mega Hindmarsh Pty Limited (period 2006-9) and Bowgan Minerals Limited (period 2010-2018).

## 1. INTRODUCTION

The Neutral Junction project is located 280 km north of Alice Springs, Northern Territory on the Barrow Creek (SF53-6) and Alcoota (SF53-10) 1:250 000 map sheets (Figure 1). Access to the district is via the Stuart Highway or via the Sandover Highway, with access to exploration areas provided by a network of graded station tracks.

This surrender report for EL24253 (Neutral Junction) details all mineral exploration activities undertaken by Mithril Resources, MegaHindmarsh Pty Limited and Bowgan Minerals Limited (Bowgan) on the surrendered portion of EL24253 during the period 2005-2018.

## 2. TENEMENT DETAILS

### 2.1 Tenure

Mithril Resources Limited is the registered titleholder of the exploration licence EL24253 (Table 1). The licence lies within the Neutral Junction, Stirling Downs and Mt Skinner Pastoral Leases (Figure 1).

**Table 1:** Neutral Junction project tenement details

Tenement	Name	Tenement Holder	No. of graticular blocks	Date Granted
EL 24253	Neutral Junction	Mithril Resources Limited	454 blocks (1433km <sup>2</sup> )	7/4/2005

The Neutral Junction project is operated under a joint-venture agreement, between Bowgan Minerals Limited (Bowgan), Mega Hindmarsh Pty Limited (Mega) and the original tenement manager Mithril Resources Limited (Mithril).

Bowgan are the current operators of EL24253 Neutral Junction under a joint-venture agreement.

EL24253 (Neutral Junction) was originally granted April 2005 and comprised of 454 graticular blocks. Three tenement surrenders have been completed in accordance with Section 26 and 28 of the Mining Act. The first surrender was completed in April 2007 which reduced EL24253 to 227 blocks and the second, a partial surrender in June 2009 reduced EL24253 to 140 graticular blocks. In March 2010, a final block reduction was completed by Bowgan Minerals Limited which reduced EL24253 from 140 to 67 graticular blocks.

A voluntary surrender of 26 blocks was conducted on 24<sup>th</sup> March 2018 prior to anniversary No13 with 41 blocks being retained.

## **2.2 Native Title Parties and Aboriginal Heritage**

An AAPA survey was conducted by previous JV managers Mega Hindmarsh in which a number of areas of significance (registered sites) were identified. Field work was subsequently conducted in a manner to avoid these designated sites.

In August 2006, Hindmarsh Pty Limited (Mega) convened a meeting with Central Lands Council (CLC) representatives and registered native title claimants at Tara Community Hall. Site visits were conducted by local native title representatives and CLC staff, which included an anthropologist and site clearances issued.

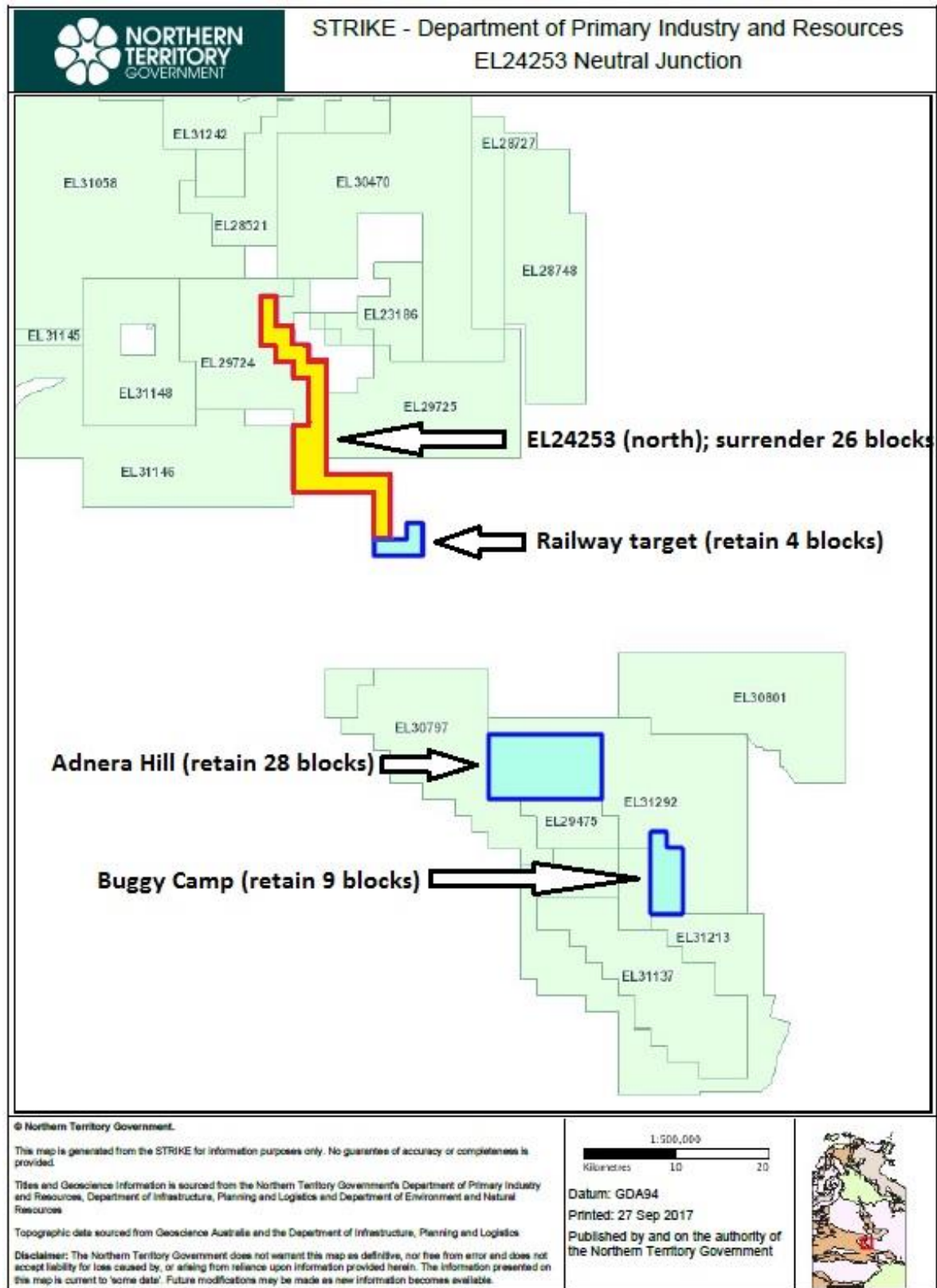
A number of areas of significance were identified during this visit, combined with sites identified by previous AAPA surveys. After detailed discussion with native title holders and the CLC, Hindmarsh Pty Limited planned its exploration program so that these sites are avoided.

Bowgan Minerals Limited currently conducts its field exploration activities according to this original agreement.

## **2.3 Consultation with Pastoralists**

The station managers at Neutral Junction, Stirling Downs and Mount Skinner pastoral stations were contacted by staff from Bowgan Minerals Limited both, before commencement and, at the conclusion of field exploration programs on EL24253.

All aspects of the program were discussed in detail with management and staff at each pastoral station before commencement of field work and on-going discussions were conducted during the course of, and at the completion of each field program.



**Figure 1:** Strike image for EL24253, Neutral Junction project; showing surrendered portion (26 blocks) and currently retained portion (41 blocks).



### **3. REGIONAL GEOLOGY**

The Neutral Junction project consists of five EL's, with EL24253 (Neutral Junction) being the subject of this report. The tenement straddles the boundary between two geological provinces; Arunta Inlier on the south and the Tennant Creek Inlier/Davenport Province on the north. The contact between these tectonic blocks constitutes a wide northwest-southeast trending corridor which includes intensely folded and faulted rock types of both provinces (Lennartz, 2006).

At surface across most of the EL24253 tenement area, Neoproterozoic-aged Georgina Basin sediments comprising; Adelaidean Central Mt Stuart Formation (sandstones and quartzite) occur within shallow-dipping outcrops, or under shallow cover. These flat-lying units rest unconformably above steeply inclined and deformed/metamorphosed Paleoproterozoic-aged metasediments which exhibit amphibolite-grade metamorphism and are largely obscured apart from a small number of exposures at surface or under shallow cover. The metasedimentary package includes the prospective Hatches Creek Group (HCG) which hosts the Home of Bullion mine as well as a number of other potentially economic prospects. Proterozoic-aged, radiometrically-anomalous granites have intruded along the northwest-southeast structural trend and outcrop in the Barrow Creek area immediately north-west of EL24253 as well as further towards the south-east, in the Adnera Hill and Tomahawk Range areas on Mount Skinner station.

Previous modelling of the depth of the HCG metasediments by the NTGS indicates that a major fault forms the western margin of the Georgina Basin. The depth of the basin sediments in the southern half of the EL24253 increases from less than 100 m to greater than 1 km from west to east over a distance of less than 500 m. This suggests a major crustal discontinuity, which could provide a pathway for migrating mafic magma.

This fault bounds the HCG in the northern half of EL 24253 and further towards the north-west of the tenement the fault approximately coincides with the Strzeleckie nickel sulphide occurrence.

### **4. PREVIOUS EXPLORATION**

Historically, limited prospecting and small-scale mining has been reported in the local area for copper, lead silver, nickel, tin, tantalum, tungsten, molybdenum and mica (NTGS, 1991). The largest mining operation occurred at Home of Bullion mine site where high-grade copper ore was extracted (6,100 tonnes officially recorded) between 1923 and 1951. Exploration of the Home of Bullion deposit was recommenced in 2012 by Kidman Resources.

Aerial surveying (magnetics) was completed by NT Geological Survey on N-S oriented 500 metre line-spacing at 100 metres height during 1981.

Uranium exploration was carried out in the district by Otter Exploration (1977) and C.R.A. Exploration (1978). In 1977, Otter undertook exploration in the Mt Ida region. Trace amounts of uranium mineralisation (maximum 215 ppm)

were discovered in micro-gneisses adjacent to pegmatite bodies in Lower Proterozoic metasediments and intrusive granite bodies.

In 1978, C.R.A.E. recognised the potential for uranium occurrence in the Arunta Complex basement and at the unconformity with the overlying Central Mount Stuart Formation. Magnetic and radiometric surveys were completed with ground follow-up (stream sediment sampling) in the northern portion of EL24253.

Exploration for base metals was conducted by Kennecott Exploration (1966), Department of Mines and Water Resources (1968), Alcoa Australia Ltd. (1983) and Otter Exploration (1989). In 1980, C.R.A.E. collected approximately 20 samples over the area within the northern part of EL24253. These samples were analysed for base metals however, uranium was not included in the suite.

Previous work for wolfram, tantalum and tin was conducted by BHP Minerals Ltd (early 1980's) and R.B. Mining (1981).

Exploration for diamonds was undertaken by C.R.A.E. in 1977.

#### **4.1 Discussion**

The area is prospective for nickel, copper and cobalt in sulphides hosted by mafic intrusions. Two nickel sulphide occurrences (Prospect D and Strzeleckie) occur to the north-west of EL24253. These occurrences are mapped as being within amphibolites associated with HCG metasediments (Fowler, 2006).

Mafic intrusions have not been located at/near surface by exploration conducted to date within EL24253. However, outcrops of the prospective HCG stratigraphy in association with a major fault provided the basis for follow up of the Prospect D and Strzeleckie nickel sulphide occurrences along strike in the south-east direction.

From a continental scale it is apparent that EL24253 is on major magnetic and gravity breaks as well as major lineament trends. Prospect D and Strzeleckie also occur on or near the regional magnetic break with prospect D occurring at an inflection point.

Mapped outcrops of HCG with amphibolites are restricted to three areas on the Barrow Creek 1:250,000 Sheet. The prospect D and Strzeleckie occurrences are associated with two of the outcrops with the third outcrop occurring on EL24253 in Target Area A.

## **5. EXPLORATION BY MITHRIL RESOURCES LIMITED**

In June 2005, geological mapping and reconnaissance geochemical surveying was conducted to explore for nickel associated with any extensions of the Hatches Creek Group (HCG), plus to confirm any possibility of mafic intrusive rocks in the area. Geological mapping did little to improve the nickel prospectivity in the area.

Outcrops examined within EL24253 did not contain any mafic rocks and HCG units were only confirmed where mapped and not identified further to the south in the Springs Range area, as was hoped. Gabbroic float was identified in one stream draining an escarpment composed of uplifted Georgina Basin sediments. However, the source of the float was unsuccessfully sought upstream, leading to the conclusion that the alluvial gravels incised by the current stream may have been deposited by a stream draining a different area.

Similarly, the reconnaissance geochemical survey did not encourage further nickel exploration. From 27 lag fractions collected, the highest nickel value was 67 ppm and highest copper value was 24 ppm. None of the elements assayed showed any significant trends.

Mithril formed a joint-venture agreement with Hindmarsh Resources (Mega Hindmarsh) on 15<sup>th</sup> December 2005, with Hindmarsh the manager of the Neutral Junction project.

## **6. EXPLORATION BY MEGA HINDMARSH PTY LIMITED**

Hindmarsh's review of work completed by Mithril Resources Limited highlighted the fact that; although results achieved were not greatly anomalous, the generally elevated concentrations for elements such as Ni and Cr were indicative of the potential occurrence of mafic lithologies in the areas sampled.

As Hindmarsh were Uranium explorers, the possibility that mafic rocks may be present at shallow depth below cover in these areas was identified as a potential 'reducing' trap where an economic uranium occurrence may potentially occur.

The primary mineralisation model considered by Hindmarsh was; for unconformity-related uranium at the contact between early Proterozoic-aged metasediments (HCG) and late Proterozoic sediments of the Georgina Basin sequence. Occurrence of a potential chemical trap, such as a cross cutting dolerite or graphitic shale was identified as a priority targeting criteria.

### **6.1 2006-07 Exploration**

A reconnaissance geological survey was undertaken to the surrendered portion of EL24253 during August 2006. Following this, geological and geophysical ground surveying was completed in selected exploration areas by

Hindmarsh staff between September-November 2006 and April 2007. Hawke Geophysics Pty Ltd was contracted to review and interpret geophysical data in order to identify anomalies.

Based on the review by Hawke, exploration was first prioritised towards evaluation of a large area, or 'window' of HCG, surrounded by an exposed Palaeozoic/Neo-Proterozoic unconformity with the overlying Stuarts Range sediments (Target Area A). A detailed program of geological mapping and magnetometer surveying on 400m spacing (N-S lines) was conducted during September-November 2006 (Tables 3&4, Appendix) which failed to identify any occurrence of dolerite and/or graphitic shale units within this target.

Several magnetically anomalous zones were identified in other areas by subsequent surveys (Target Area B). A program of spectrometer surveying was also conducted using the Exploranium GR 320 instrument (1.8 litre crystal) which identified one area containing anomalous uranium concentration of 12.5ppm\_eU (402910mE, 7604000mN).

The interpretation of all geological and geophysical data by was completed by Hawke Geophysics Pty Ltd. Magnetic anomalies at Target area B were modelled and interpreted to be located 650-800m below surface, which precluding further work by Hindmarsh at that point.

## **6.2 2007-08 Exploration**

Exploration work completed on the surrendered portion of EL24253 during the 2007-08 reporting period included a review of geophysical data from the 2006-07 reporting period, along with completion of further field investigations at Target Areas A&B.

Geophysical surveying completed during the reporting period included;

- 112.4 line-kilometres of radiometric surveying completed during April-June 2007,
- 26.4 line-kilometres of magnetic surveying completed in August 2007.

At Target Area A; scintillometer surveys explored potential radiometric anomalies interpreted from open-file regional airborne survey dataset, and at Target Area B; scintillometer and magnetometer surveys explored the gamma anomaly (12.5 ppm eU) detected by previous radiometric surveys.

Geological mapping and geochemical sampling was conducted in two prospect areas;

- Soil sampling explored the potential for a uranium anomaly in association with an area of outcrop containing steeply-plunging boudinaged textures within isoclinally folded metasediments at Target Area A,
- Soil and stream sediment sampling explored the potential for uranium anomalies in the areas immediate to the geophysical anomaly and samples were collected for petrological analysis at Target Area B.

Ground Magnetic surveys were completed on-foot, using a G856 magnetometer hired from Fugro Instruments. A total of 13 traverses were conducted in one prospect area (Target Area B) at 400m to 100m between traverses (Table 5, Appendix). Individual point measurements were taken every 20m (hand-held GPS surveyed). Data was forwarded to the contract geophysicist (Phil Hawke) for interpretation.

In the first geochemical sampling program, a total of 17 soil samples were collected (50 x 50m grid) in an area of prospective outcrop at Target Area A. In the second program, a total of 117 samples were collected (50 x 400m grid) from two prospective areas within Target Area B (Table 9, Appendix).

Samples were collected from holes dug to 0.3m depth using a hand auger, sieved (<0.8mm.) and dispatched to ALS Chemex for sample preparation and analysis via multi-acid (4 acid) digest, ICPOE/M determination (multi-element).

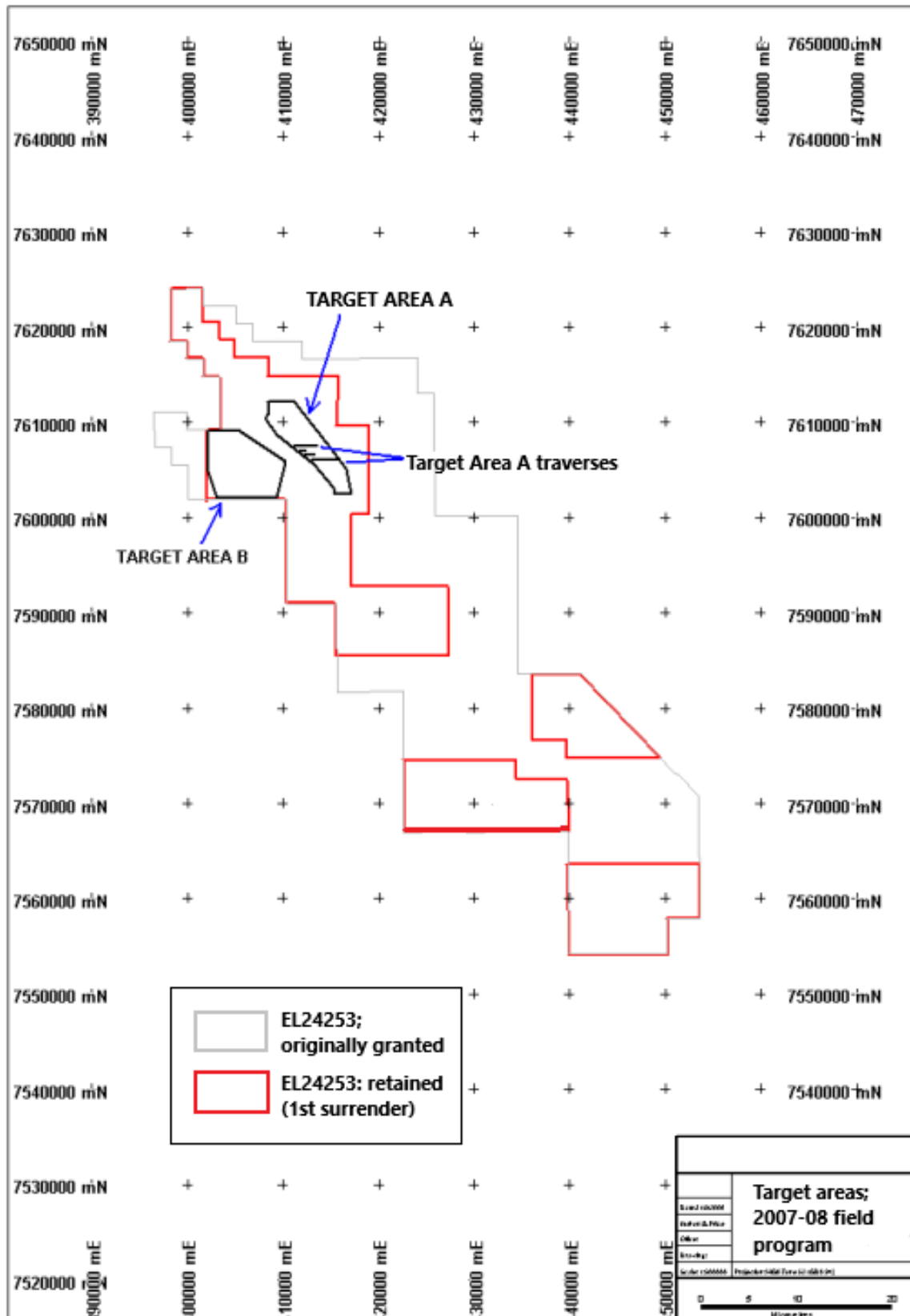
A total of 13 stream sediment/gravel samples were collected (non-sieved) at selected points along a creek traverse, located directly downstream from an anomalous zone detected by magnetometer survey (Table 10, Appendix). Samples were submitted to ALS Chemex for preparation and analysis via multi-acid (4 acid) digest, ICPOE/M determination (multi-element).

For Target Area A; preliminary ground spectrometer surveying failed to identify any significant radiometric anomalies. Geochemical (soil) sampling at the small boudinaged outcrop confirmed elevated base metal values, but no anomalous values for uranium or thorium were confirmed.

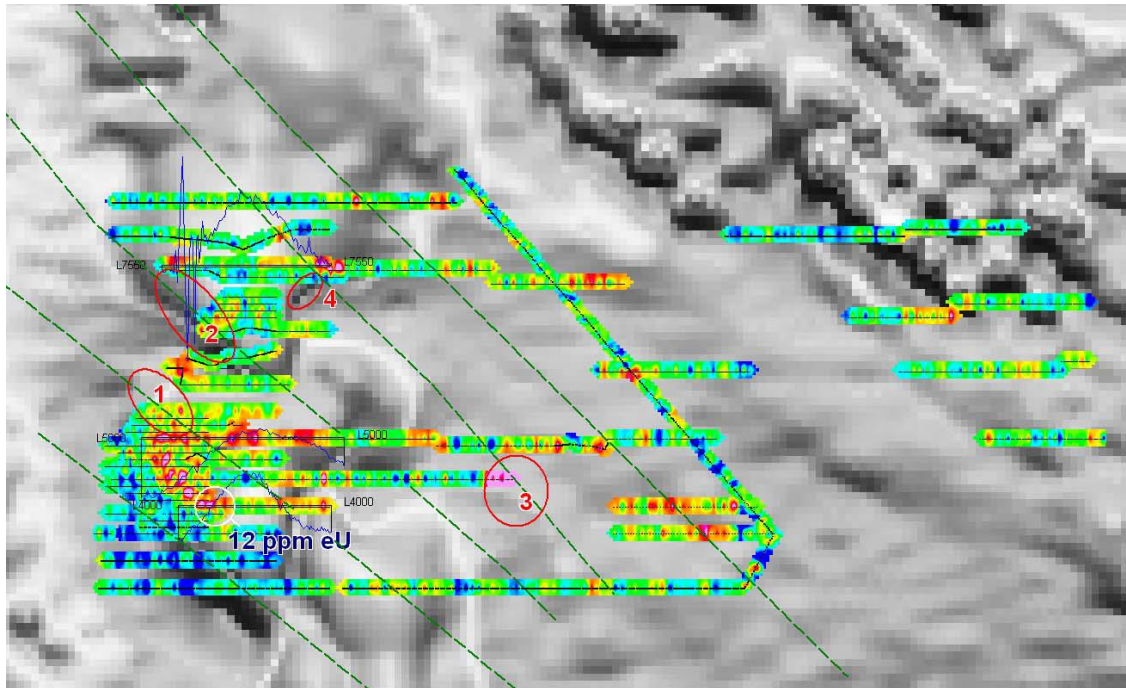
For Target Area B; ground spectrometer surveying identified a N/S-striking zone of elevated radiometric values over a strike length of ~3 to 4 km from the previously identified 12.5 ppm eU anomaly. Magnetic surveying confirmed the presence of a number of sub-parallel zones containing elevated magnetic response (maximum 524350nT) within the northern part of the same anomalous zone detected by radiometric surveying.

Geological mapping examined part of the regional N/S-trending thrust fault, which coincided with the eastern edge of the prominent ridgeline and confirmed this structure to correlated with the western edge of the radiometric/magnetic anomaly. Soil sampling confirmed elevated uranium and base metals within the vicinity of the anomaly (maximum 2.4ppm U, 15.6ppm Co, 6.6ppm Mo, 20.2ppm Ni, 79ppm V and 21ppm Zn).

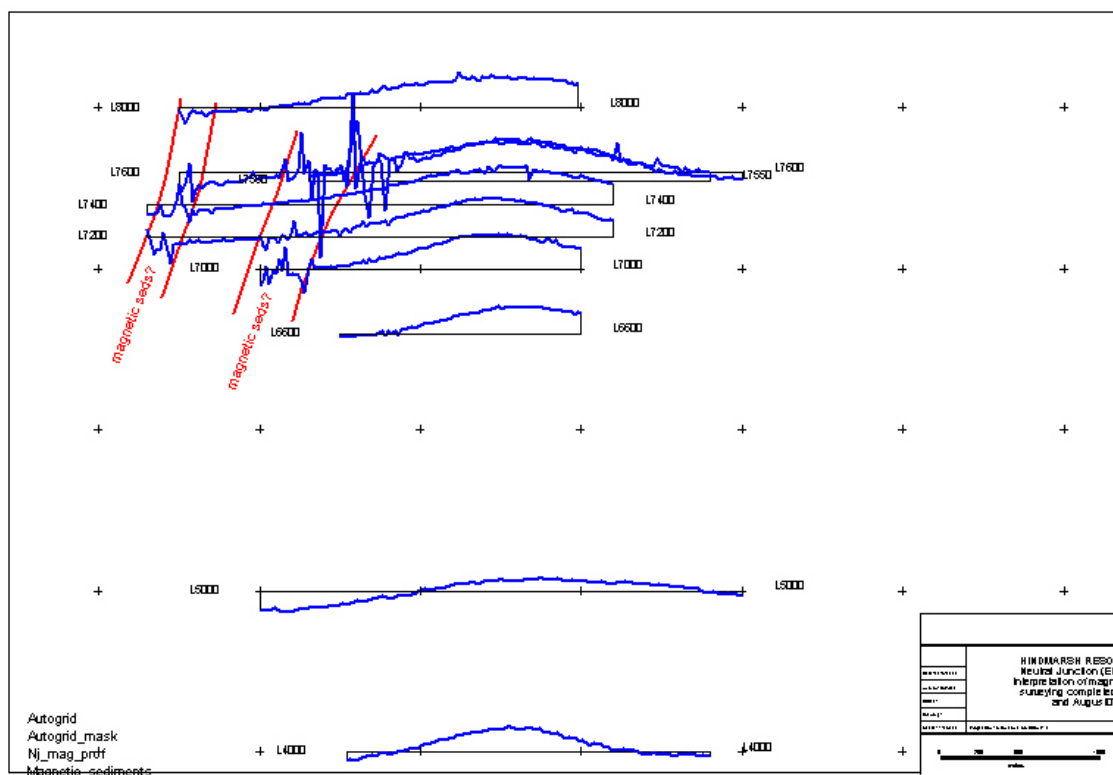
Petrology of samples of strongly magnetic iron-rich pebbles failed to confirm the presence of primary magnetite, but the strong magnetism was interpreted to be associated with secondary/supergene-style magnetite emplacement (Pontifex, 2007).



**Figure 2:** Areas of surrendered portion of EL24253 where field exploration was completed during 2007-08 reporting period.



**Figure 3:** Plot of ground radiometric traverses (uranium field) completed at Target Area B during November 2006 and April-June 2007 (Hawke, 2007).



**Figure 4:** Magnetic profile showing interpretation of potential magnetic corridors, based on ground magnetic traverses completed in Target Area B, during August 2007 (Hawke, 2007).

### **6.3 2008-09 Exploration**

Work completed during this period included a review of geophysical, geochemical, mapping and petrological data from previous Mega Hindmarsh exploration programs. Interpretation of the 2008 Central Arunta Block gravity survey program (NTGS-sponsored) was also completed.

No exploration field activity was completed by the company during this reporting period.

A joint venture agreement was formed between Mithril Resources Limited, Mega Hindmarsh Pty Limited and Bowgan Minerals Limited during September 2009 with Bowgan Minerals Limited the manager of the Neutral Junction project.

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## **6. EXPLORATION BY BOWGAN MINERALS LIMITED**

### **6.1 Period 2009–2010**

Exploration field work conducted within the surrendered portion of EL24253 included; completion of geological reconnaissance of the tenement area and completion of a magnetic surveying program at two targets.

A total of 5 traverses were completed in the Tara targets; NJM001-2 for a combined distance of 9.3line-kilometres over 2 field days during February 2010 (Table 6, Appendix). This work explored two magnetic targets; NJM001-2 (Figure 5), both were interpreted from regional open-file magnetic data by Hawke during 2006.

All traverses were conducted on-foot, using a hand-held G856 proton magnetometer hired from Fugro Instruments. Individual survey point readings were taken every 20 metres along each traverse, positioned using a hand-held GPS. Additional readings (at 10 metre intervals), were recorded around points with high deviation in magnetic field (mag highs/lows). A second G856 unit was operated in base-station mode during the program and set to a 30 second automatic cycle.

During the first field day, surveying commenced on two short traverses immediately north of NJM001 with the intention of surveying this line towards the end of the day. Field work was halted before the NJM001 traverse was commenced however, owing to health and safety concerns due to conditions of extreme heat and humidity during early afternoon. Target NJM002 was surveyed on the final day of the program during the formation of a large low-pressure storm-front through the central Northern Territory region. The first two surveys were conducted with minor interruption, due to wet connections within the magnetometer unit. The third survey (E-W across the NJM002 target) encountered problems owing to low magnetic field values, interpreted to be a function of the encroaching storm-front.

Geological mapping conducted during surveying identified that NJM001&2 survey traverses were conducted across areas under shallow regolith cover, flanking a steep and rugged quartzite ridgeline (Late Proterozoic Georgina Basin sequence) on the eastern edge of the tenement. Localised magnetic anomalies were identified close to the edge of this ridgeline, suggesting the possible occurrence of another unconformity contact in this area.

All magnetic point and base-station data was collated and submitted to consultant geophysicist Phil Hawke at the conclusion of the program for QC checks, diurnal corrections and review and interpretation.

## 6.2 Period 2010–2011

A total of 10.6 line-kilometres of ground magnetic surveying were completed at Tara targets NJM001&2. All surveying was conducted on-foot, using a G-856AX Memory-Mag Proton Precession Magnetometer (Geometrics Inc.). A second G-856AX Magnetometer unit was operated in base-station mode over the duration of the magnetic surveying program.

The survey program focused on gaining additional data on both targets, owing to unreliability of part of the previous data gathered during the preliminary surveying conducted in February 2010, where equipment tuning problems and incremental weather conditions caused quality control problems with much of the data gathered.

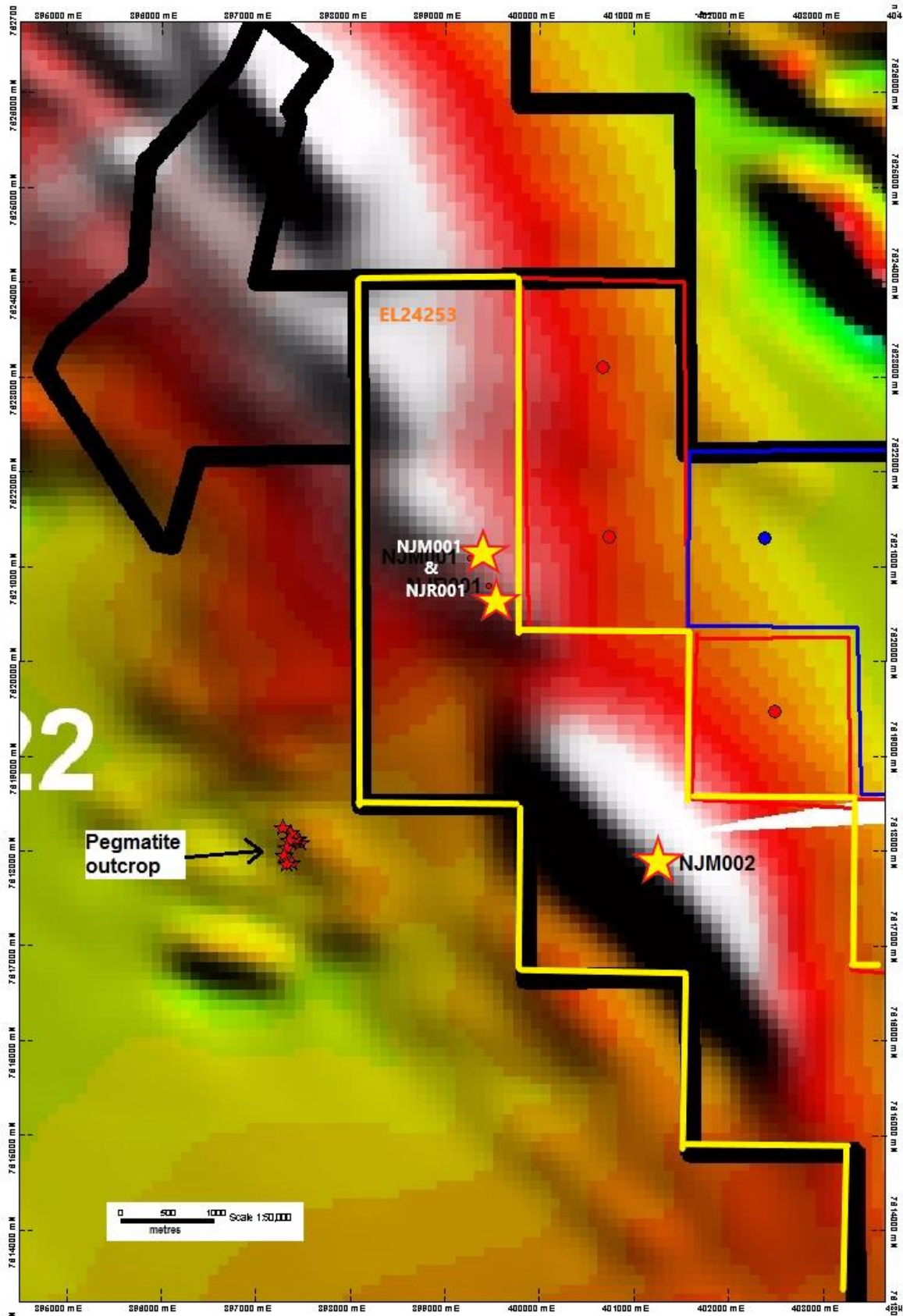
A total of 7 traverses were conducted during December 2010 (Table 7, Appendix) to further test target NJM002, earlier surveyed by 2 preliminary traverses in February 2010. Here, surveys identified a discrete magnetic body at depth, which generally conformed to the regional NNW-SSE structural trend as observed on the regional aeromagnetic data. Highest magnetic contrasts (up to 300nT) were identified at the northern-most traverse 7618300mN and between traverses 7617900mN to 7617500mN. Traverse 7618300mN, the magnetic contrast is lower (around 150nT) with a discrete magnetic di-pole (co-incident magnetic high/low) was identified on the eastern flank of the broader magnetic body. In traverse 7617900mN, a similar discrete di-pole was identified on the western flank of the broader body.

NJM002 was the only target examined in detail during this reporting period as a heavy rain event caused the early conclusion of the Tara survey program before planned survey traverses could be conducted at NJM001.

Exploration conducted to date at Tara targets suggests that the magnetic features may be either; gabbroic, dolerite intrusive or magnetite-rich sediments. Both targets NJM001&2 are totally obscured at surface either by Quaternary and Tertiary gravels within the valley floor, or by flat-lying sandstones/quartzites (Georgina Basin sequence rocks) that outcrop along the east and west flanks of the target area.

Gabbro was identified in outcrop at the pegmatite area located just outside the tenement boundary immediately west of NJM002 which suggests that there is a good possibility that the magnetic features are associated with a deeper gabbroic intrusive.

At NJM002, a large and continuous magnetic body could be interpreted at depth which conformed to the dominant NNE-SSW structural trend. Locally, a much sharper and shallower magnetic feature was also interpreted between the traverses 7618300mN and 7617900mN which suggests the possibility of an oblique, cross-cutting structure trending approximately NNE/SSW (030°/210° strike).



**Figure 5:** Tara targets NJM/NJR001 & NJM002 over regional TMI (NTGS) data (Hawke, 2006). Location of the mapped pegmatite is identified immediately west of the EL24253 tenement boundary.

### **6.3 Period 2011-2012**

Exploration completed in the surrendered portion of EL24253 during the 2011-12 reporting period included; completion of 35.6 line-kilometres of magnetic surveying at the NJM001&2 target and completion of geological mapping and outcrop sampling at Target Area B during May 2011.

Magnetic surveying was completed by contract staff from Arnhem Exploration Services using a G-859 Mineral Mag Portable Cesium Vapour magnetometer (Geometrics Inc.) hired from CormaGEO, Sydney. In addition, a G-856AX Proton Magnetometer was operated in base-station mode over the duration of the magnetic surveying program, with an additional G-856AX being held as a standby unit.

All traverses were conducted in an east-west direction, with individual traverses conducted at 400m and 200m-line spacing for a distance of more than 8 kilometres along the strike of the NNE-SSW trending magnetic corridor. Traverses completed are detailed in Table 8 (Appendix), with a summary report detailing processing and interpretation by Phil Hawke is presented in Appendix 3.

Geological mapping and outcrop sampling was conducted over one field day to examine to examine the southward extension of the Donkey Creek fault in the area immediately north of Target Area B. Following completion of the field program, a total of 12 rock chip samples (NJRK\_2011\_001-12) were submitted to ALS Chemex for analysis.

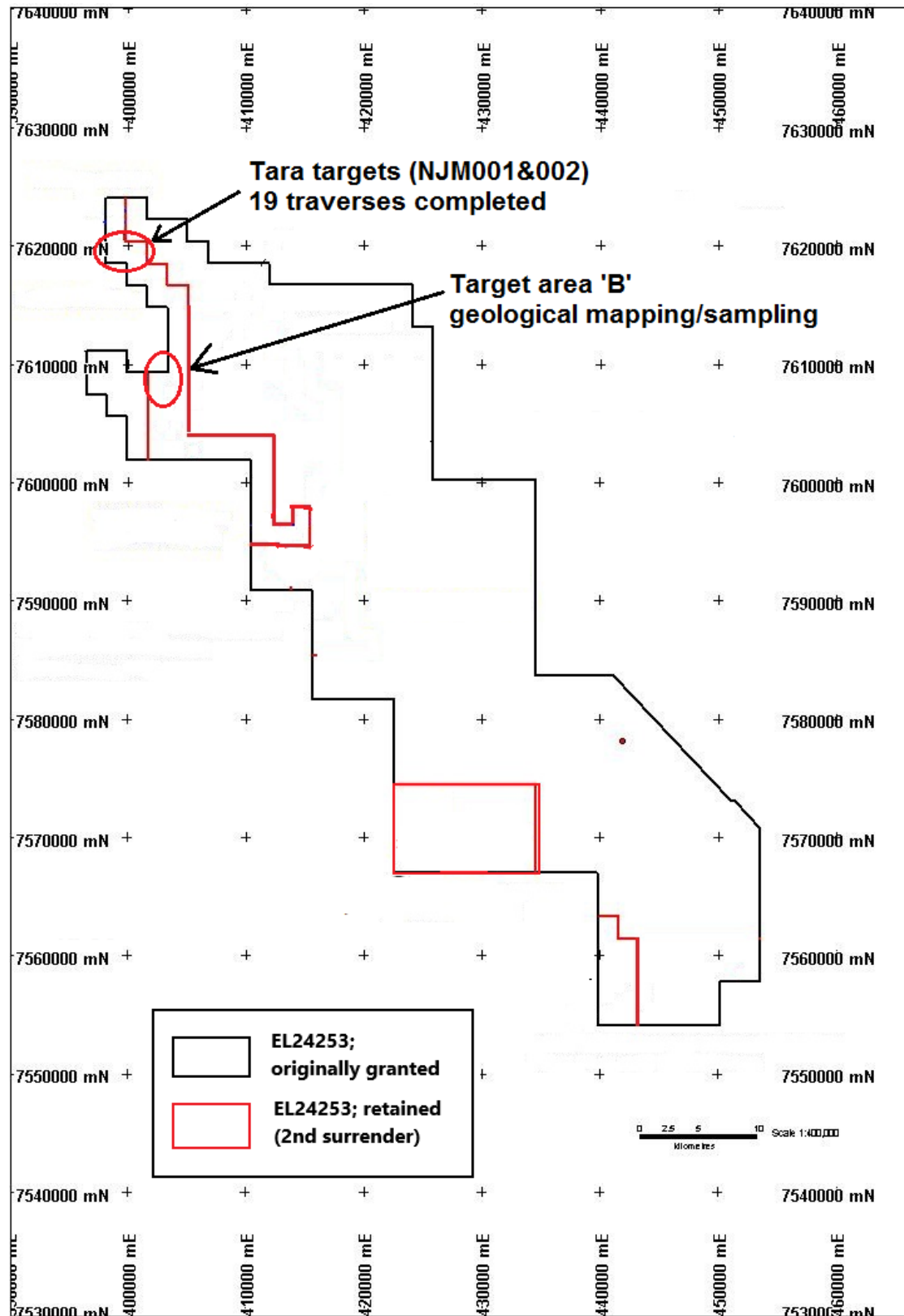
This exploration target consists of a steeply plunging magnetic feature hosted by sedimentary units that containing more magnetic horizons. Results identified elevated, but not anomalous concentrations of only a few of the 48 elements analysed including; arsenic, uranium, thorium, vanadium and chromium (Table 2). Elevated uranium, thorium and vanadium in rock chips suggests a possibility that uranium mineralisation may occur in an unconformity setting at Target Area B.

### **6.3 Period 2012-2015**

No exploration work was conducted on the surrendered portion of EL24253.

### **6.3 Period 2015-2016**

Testing of the 12 rock chip samples (NJRK\_2011\_001-012) collected from the surrendered portion of EL24253 was conducted using a Niton hand-held pXRF analyser. Comparison of results for a limited range of elements is also presented in Table 2.



**Figure 6:** EL24253 showing areas explored during the 2011-12 reporting period.

**Table 2:** Maximum assay values from chemical analysis (conducted 2012) versus pXRF (conducted 2016) for 12 rock chip samples (NJKR\_2011\_001-12), collected from Target Area B.

Element	Maximum (ppm/%)	Maximum pXRF"	Element	Maximum (ppm/%)	Maximum pXRF"
Gold	<detection		Uranium	7ppm	
Silver	0.07ppm		Thorium	43.7ppm	
Arsenic	53.4ppm	100ppm			
Bismuth	1.49ppm	100ppm	Beryllium	2.35ppm	
Cobalt	3.5ppm	400ppm	Cadmium	0.02ppm	
Copper	15.7ppm	100ppm	Cerium	33.5ppm	
Molybdenum	5.91ppm	100ppm	Chromium	413ppm	3110ppm
Nickel	11.3ppm	100ppm	Caesium	1.44ppm	
Lead	29.1ppm	100ppm	Gallium	33.9ppm	
Antimony	4.09ppm		Germanium	0.22ppm	
Tin	19.1ppm	100ppm	Hafnium	11.5ppm	
Vanadium	722ppm	820ppm	Indium	0.137ppm	
Tungsten	18ppm		Lanthanum	25.9ppm	
Zinc	26ppm		Lithium	9ppm	
			Niobium	85.8ppm	100ppm
Aluminium	1.82%		Rubidium	17.9ppm	
Barium	650ppm	300ppm	Rhenium	<detection	
Calcium	0.04%	0.19%	Selenium	4ppm	
Iron	21.2%	28.4%	Strontium	31.7ppm	
Potassium	0.3%	0.6%	Tantalum	7.47ppm	
Magnesium	0.06%		Tellurium	0.52ppm	
Manganese	167ppm	300ppm	Thallium	0.16ppm	
Sodium	0.01%		Yttrium	30.2ppm	
Phosphorus	890ppm		Zirconium	176.5ppm	800ppm
Sulfur	0.04%				
Titanium	2.61%	1.37%			

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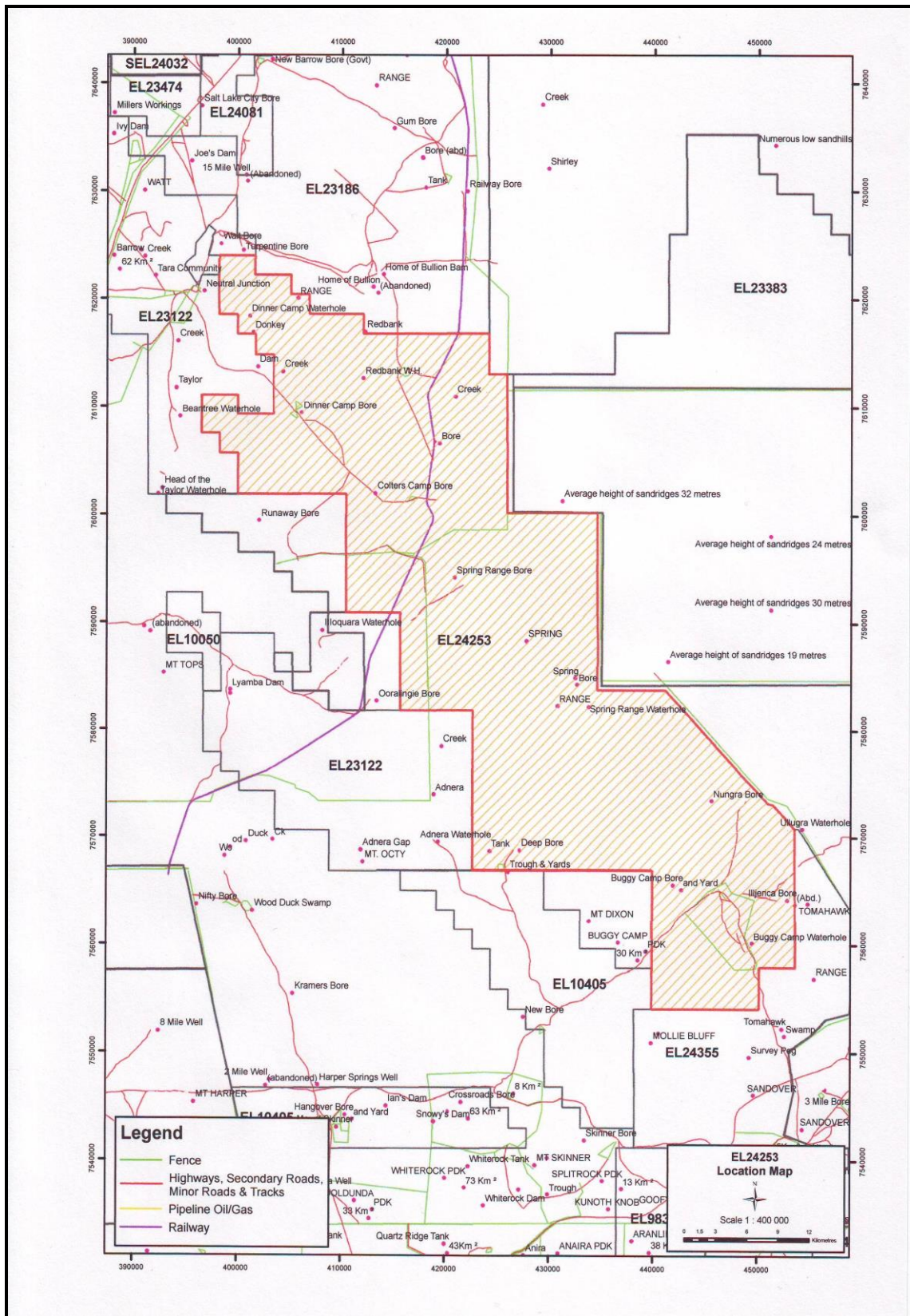
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**APPENDIX 1: Tenement map**



**Figure 7: EL24253 Neutral Junction, original tenement map.**



## APPENDIX 2: Geophysical traverses completed on the surrendered portion of EL24253

**Table 3:** Summary of magnetometer and geological mapping traverses conducted on the surrendered portion of E24253 during September 2006;

Date	Line	Easting1	Northing1	Easting2	Northing2	Distance(m)
20/09/06	1	415300	7602800	417000		1700
	2	415300	7603200	417000		1700
21/09/06	3	415000	7603600	416900		1900
	4	414700	7604000	416800		2100
25/09/06	5	414300	7604400	416600		2300
	6	413800	7604800	416500		2700
27/09/06	7	413600	7605200	416400		2800
	8	413300	7605600	416100		2800
	9	414000	7606000	415800		1800
28/09/06	13	411000	7607600	413300		2300
	14	410500	7608000	414300		3800
2/10/06	15	409900	7608400	414000		4100
	16	409400	7608800	413700		4300
6/10/06	17	409100	7609200	413300		4200
	18	408900	7609600	413000		4100
7/10/06	19	408600	7610000	412800		4200
	20	408300	7610400	412400		4100
8/10/06	21	408700	7610800	412200		3500
	22	408700	7611200	411800		3100
9/10/06	23	408500	7611600	411400		2900
	24	408500	7612000	411200		2700

**Table 4:** GR320/magnetometer traverses completed on the surrendered portion of E24253 during November 2006;

Date	Line	Easting1	Northing1	Easting2	Northing2	Distance(m)
24/11/06	A	404800	7604000	402550		2250
	B (GR2)	402000	7605000	405000		3000
25/11/06	C	404800	7607550	402300		2500
	D (GR1)	398450	7621000	401000		2250
	E*	411000	7606000	408750		2250

\* GR320 survey by 4WD (magnetometer not completed), line stopped 750m short of target owing to rugged ridgeline.

**Table 5:** GR320 spectrometer/mapping traverses completed in the surrendered portion of EL24253 during April-May 2007;

Date	Line	Easting1	Northing1	Easting2	Northing2	Distance(m)
24/04/07	1	411350	7603600	409000		2350
	2	409000	7604000	411100		2100
	3	411350	7603600	409000		2350
	4	411100	7604000	409000		2100
29/04/07	5	411350	7608970	406650	7603600	4700
	6	411350	7603600	410920	7602800	430
	7	410920	7602800	408500		2420
	8	408500	7602800	405000		3500
	9	405000	7602800	401400		3600
	10	404000	7603200	401440		2560
	11	404000	7603600	401360		2640
	12	407500	7604400	401590		5910
30/04/07	13	416200	7605000	414400		1800
	14	416000	7606000	414600		1400
	15	416000	7607000	412450		3550
	16	415000	7608000	410630		4370
1/05/07	17	406670	7608500	401600		5070
	18	404800	7608000	401600	7608100	3200
	19	409150	7607500	404800	7607300	4350
5/05/07	20	410500	408000	7605000		2500
	21	408000	404100	7604900		3900
	22	404100	401700	7604700		2400
	23	403000	401800	7604200		1200
	24	403000	402000	7604100		1000
	25	403000	401500	7604900		1500
	26	403000	401680	7604800		1320
	27	403000	401500	7604600		1500
	28	403000	401500	7604500		1500
	29	403000	401500	7604300		1500
	30	403220	401500	7603900		1720
	31	403000	402000	7603800		1000
	32	403000	402000	7603700		1000
6/05/07	33	403500	401880	7605200		1620
	34	403000	401800	7605100		1200
	35	403000	401950	7605300		1050
	36	404000	401990	7605400		2010
	37	404200	402400	7605800		1800
	38	404000	402680	7606200		1320
7/05/07	39	404800	402910	7606600		1890
	40	404000	402920	7606800		1080

	41	404000	403100	7606900		900
	42	404000	403150	7607000		850

**Table 6:** Summary of magnetometer traverses completed on surrender portion of EL24253, February 2010;

Date	Line	Easting	Northing	Easting	Northing	Distance(m)
19/02/10	1	398000	7623000	399800		1.8km
	2	398000	7621700	399800		1.8km
24/02/10	3*	399800	7618600	401600		1.8km
	4*	401600	7617500		7618600	1.1km
	5*	399800	7617800	402500		2.7km

\*Stormy weather, problems detected with magnetic field

**Table 7:** Summary of magnetometer and mapping traverses completed on surrendered portion of EL24253, December 2010;

Date	Line	Easting	Northing	Easting	Northing	Distance(m)
11/12/10	1	399600	7617500	402500		2900
	2	402500	7617500		7618300	800
	3	402500	7618300	400500		2000
	4	400500	7618300		7617900	400
	5	400500	7617900	401600		1100
	6	401600	7617900		7618700	800
	7	401600	7618700	399000		2600

**Table 8:** Summary of magnetometer traverses (G859) completed by Arnhem Exploration Services on surrendered portion of EL24253, May 2011;

Date	Line	Easting	Northing	Easting	Northing	Distance(m)
23/05/11	1	398000	7624000	399700		1700
	2	399800	7623600	398000		1800
	3	398000	7623200	399800		1800
	4	399800	7622800	398000		1800
24/05/11	5	398000	7622200	399800		1800
25/05/11	6	397500	7621300	399800		2300
		399800	7621100	398000		1800
		398000	7620800	399800		1800
		400200	7620400	398000		2200
		398000	7620000	400200		2200
		400400	7619600	398000		2400
26/05/11		398000	7619200	400600		2600
		399800	7618500	401600		1800
		402000	7618100	400200		1800
		400200	7617700	402000		1800
		402800	7617100	401000		1800
27/05/11		401600	403000	7616700		1400
		403000	401600	7616300		1400
		401600	403000	7615900		1400

**APPENDIX 3: Geochemical samples****Table 9:** Summary of sampling/mapping traverse conducted on surrendered portion of EL24253, April and August 2007;

<b>Easting</b>	<b>To Easting</b>	<b>Northing</b>	<b>Samples</b>	<b>Date</b>	<b>Comments</b>
411300	411400	7611250	3	25/04/07	Main Target area
411300	411450	7611200	4	25/04/07	Main Target area
411300	411500	7611150	5	25/04/07	Main Target area
411300	411500	7611100	5	25/04/07	Main Target area
401000	401800	7607600	17	12/08/07	Target area B
401000	401500	7607200	11	12/08/07	Target area B
401550	401800	7607200	6	13/08/07	Target area B
401000	401500	7606800	11	13/08/07	Target area B
400800	401200	7606400	9	13/08/07	Target area B
401900	402500	7607200	13	13/08/07	Target area B
402100	402600	7607600	11	13/08/07	Target area B
401700	402000	7606800	7	14/08/07	Target area B
402100	402500	7604800	9	14/08/07	Target area B
402200	402800	7604400	13	14/08/07	Target area B
402700	403100	7604000	9	14/08/07	Target area B
		<b>TOTAL:</b>	<b>134</b>		

**Table 10:** Summary of stream sediment/gravel samples collected on surrendered portion of EL24253, August 2007;

<b>Sample</b>	<b>Easting</b>	<b>Northing</b>	<b>Date</b>	<b>Comments</b>
1	401505	7606765	14/08/07	Target area B
2	401500	7606700	14/08/07	Target area B
3	401490	7606600	14/08/07	Target area B
4	401510	7606565	14/08/07	Target area B
5	401460	7606500	14/08/07	Target area B
6	401430	7606400	14/08/07	Target area B
7	401395	7606320	14/08/07	Target area B
8	401305	7606250	14/08/07	Target area B
9	401560	7606750	14/08/07	Target area B
10	401595	7606750	14/08/07	Target area B
11	401660	7606780	14/08/07	Target area B
12	401690	7606810	14/08/07	Target area B
13	401700	7606900	14/08/07	Target area B

**APPENDIX 4: Technical memorandums, Hawke Geophysics Pty Limited****TECHNICAL MEMORANDUM**

To: John Howard  
From: Phil Hawke  
Cc: Gary Price



Date: 29 Nov 2006

**Re: Notes on the imaging and modeling of ground magnetic and spectrometer data from Neutral Junction.**

---

**Background**

The Neutral Junction project is located on the Barrow Creek 1:250000 sheet in the Northern Territory. Four lines of ground magnetics and five lines of ground spectrometer data were collected, primarily along the length of a north-south magnetic ridge (Figure 1), to provide further drill control for unconformity-style uranium mineralization.

**Data Acquisition and Processing**

Four east-west ground magnetic profiles were collected, for a total of 7.3 line km, using a Scintrex MP3 magnetometer. Data were recorded at regular spaced (approximately 25m) intervals, which were then geo-located by correlation with a hand-held GPS reading taken at the start and end (and sometimes middle) of each traverse. Magnetic diurnal corrections have been applied using data from a base station magnetometer collected at a 20 second interval. Excel spreadsheets containing a listing of the ground magnetic data are attached as Appendix 1. Profiles of the diurnally corrected magnetic data are shown in Figure 1.

Broad magnetic anomalies of 150-200nT amplitude, coincident with the main magnetic ridge, were detected by the ground magnetics. High frequency magnetic features on line 7627550N occurs near a cross cutting NW trend in the regional magnetics may be due to a (dolerite filled?) fault / shear zone. Data from the northern-most line (7621000mN) is not presented in Figure 1. This profile contained numerous dropouts (almost 50% of the line), which may be due to a very high magnetic field gradient along this traverse upsetting the reading mechanisms within the proton precession magnetometer.

A total of 1412 ground spectrometer readings were made at a nominal 5m using a vehicle-mounted Exploranium GR-320 with a 1.8 litre crystal. The spectrometer readings were converted to %K, ppm eU and eTh using internal (factory setting) conversion coefficients. A tabulation of the ground spectrometer data is included as Appendix 3. Spectrometer readings were gridded using a 50m cell size. An image of the uranium

channel of the spectrometer data is presented overlain on the regional magnetic data in Figure 2.

The peak radiometric reading for the survey (12 ppm eU) was located on the western side of the main magnetic ridge at 402910mE, 7604000mN. An elevated uranium response (5-8 ppm eU) was also identified near the margins of the targeted magnetic ridge on line 7604000mN, 7605000mN and 7607550mN.

### **Ground Magnetic Modelling**

Constrained inversion of the ground magnetic profiles was performed using Modelvision to help constrain the depth and position of the magnetic sources. The locations of the modelled features are shown in plan and section as Figure 3.

- The main magnetic ridge is modeled to have a source depth of approximately 650-800m on all three sections modeled. The modeled magnetic susceptibility for these sources (0.1 SI) implies an equivalent magnetite content of around 1-2%.
- A very shallow to outcropping magnetic source is modeled for the high frequency anomalies at the western end of line 8707550mN. To obtain a good fit for these anomalies, some magnetic remanence for the sources will be required (not completed here). Provided the data here is reliable (ie not affected by high gradients) this would be consistent with a fresh mafic dyke source.

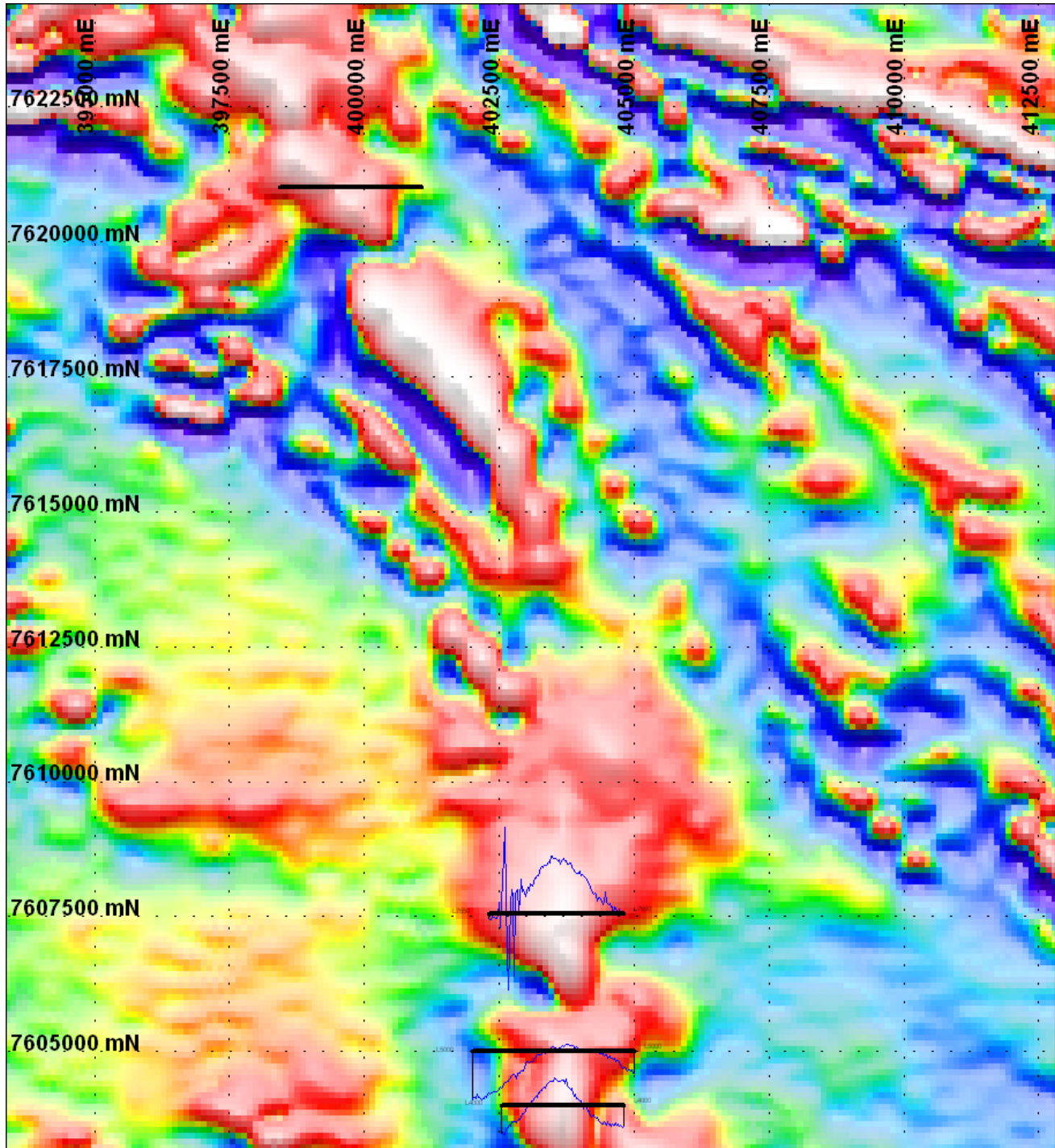


Figure 1: Ground magnetic profiles overlain on the first vertical derivative of the regional NTGS magnetic compilation.



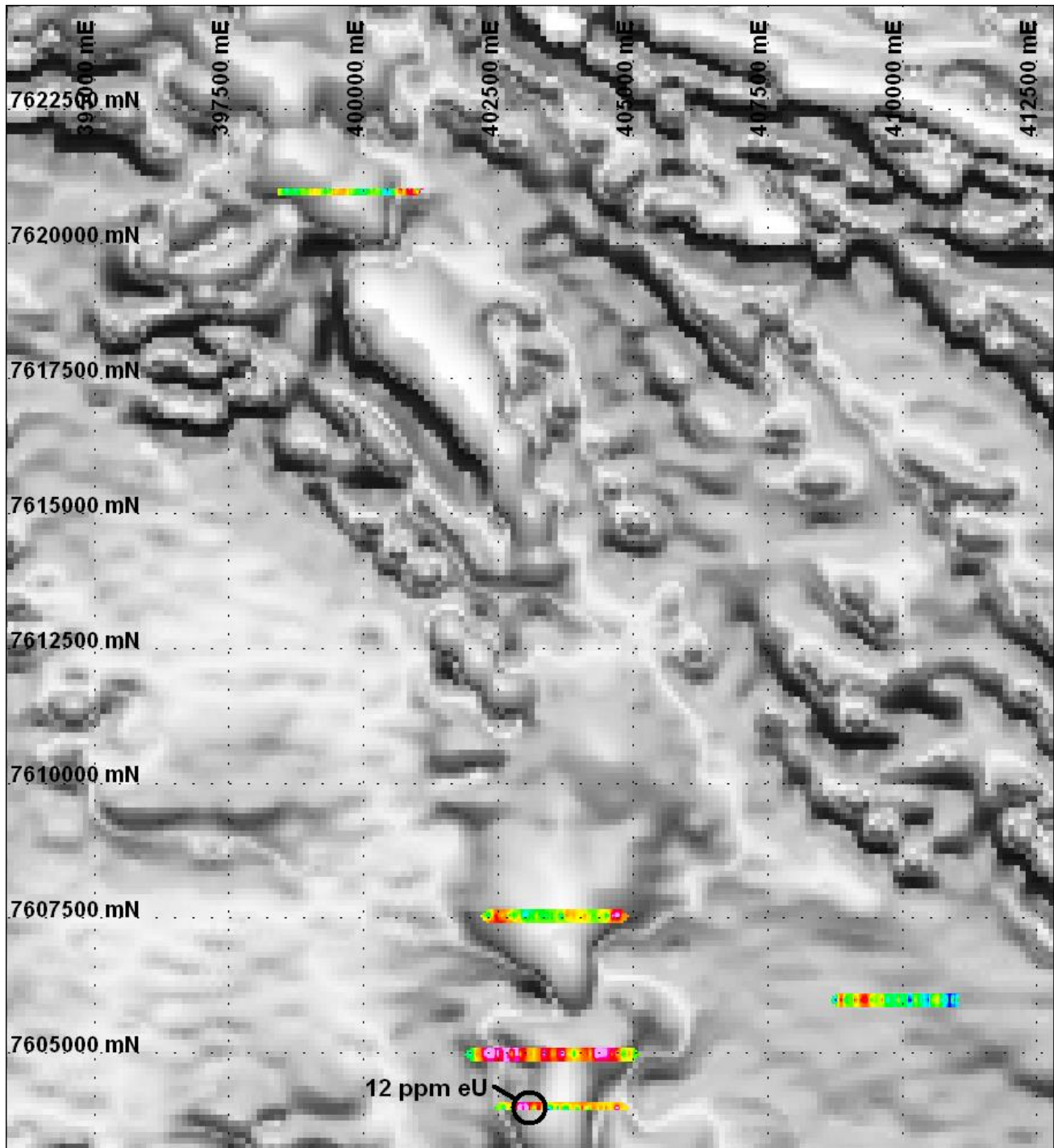


Figure 2: Equivalent uranium image (linear colour stretch from 0-4 ppm eU) overlain on the first vertical derivative of the regional magnetics.

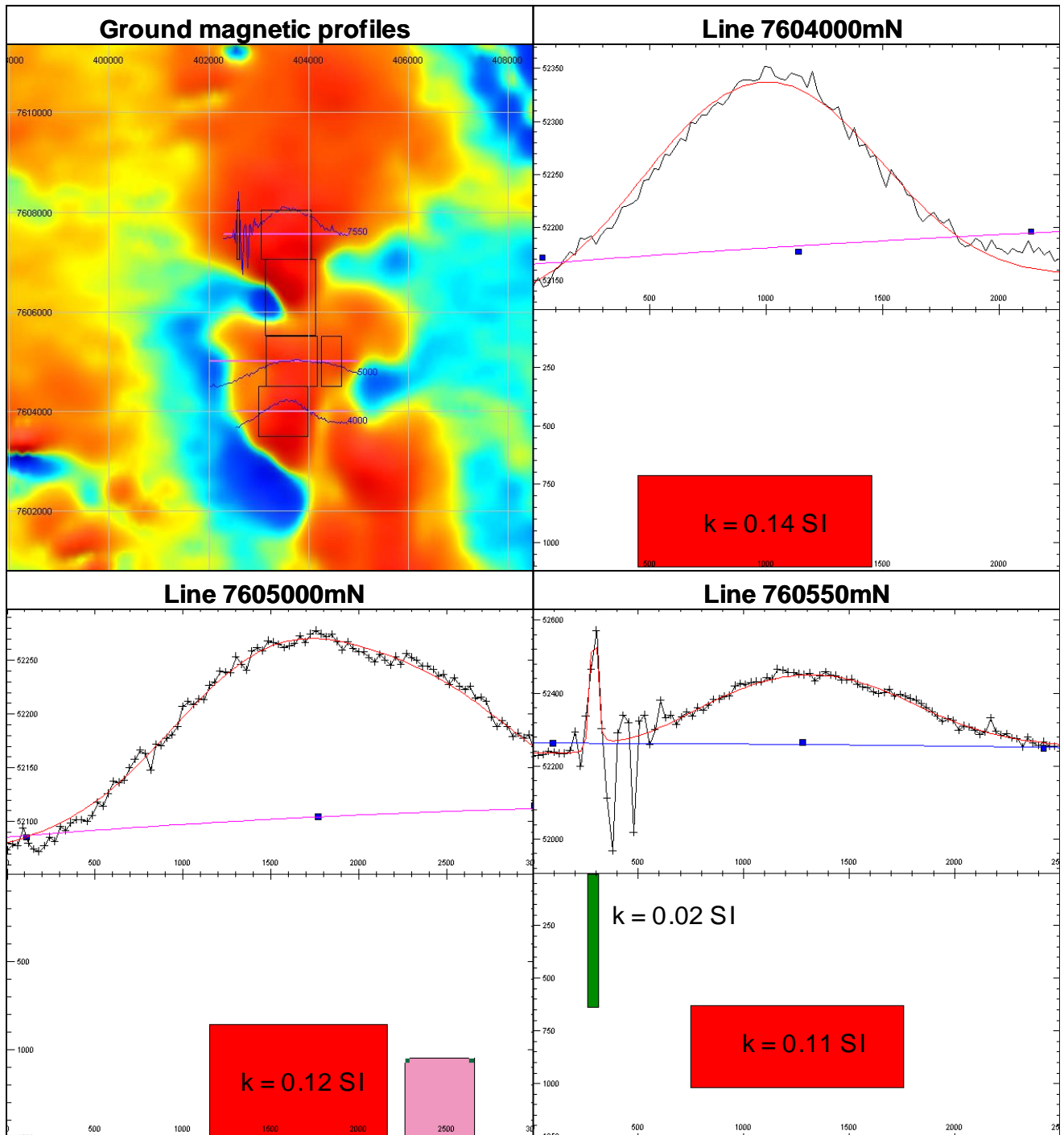


Figure 3: Modelling of ground magnetic data.

**Memorandum To:** Gary Price  
**From:** Phil Hawke  
**Date:** 26 April 2011



**Re:** Results of ground magnetic surveys collected at Neutral Junction during 2010-11.

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### Background

Ground magnetic data were collected in the Neutral Junction project area during several campaigns during 2010 and 2011. These were largely aimed at following up on historical (Hindmarsh Resources) targets and attempt to direct detect trap potential lithologies (e.g. dolerite) for capturing uranium mineralisation.

The regional geology of the project area showing the TMI image results of the three ground magnetic surveys completed in the Neutral Junction project area are shown in Figure 1.

Basement geology in the areas of ground magnetic survey consists almost entirely of Cambrian and Neoproterozoic metasediments of the Georgina Basin; including arenites of the Cambrian Neutral Junction Formation (light purple) and Octy Formation (darker purple) and siltstones and sandstones of the Proterozoic Central Mt Stuart Formation (light browns). These in turn overlie metasediments of the older Hatches Creek Group (grey).

### Target Areas 1&2

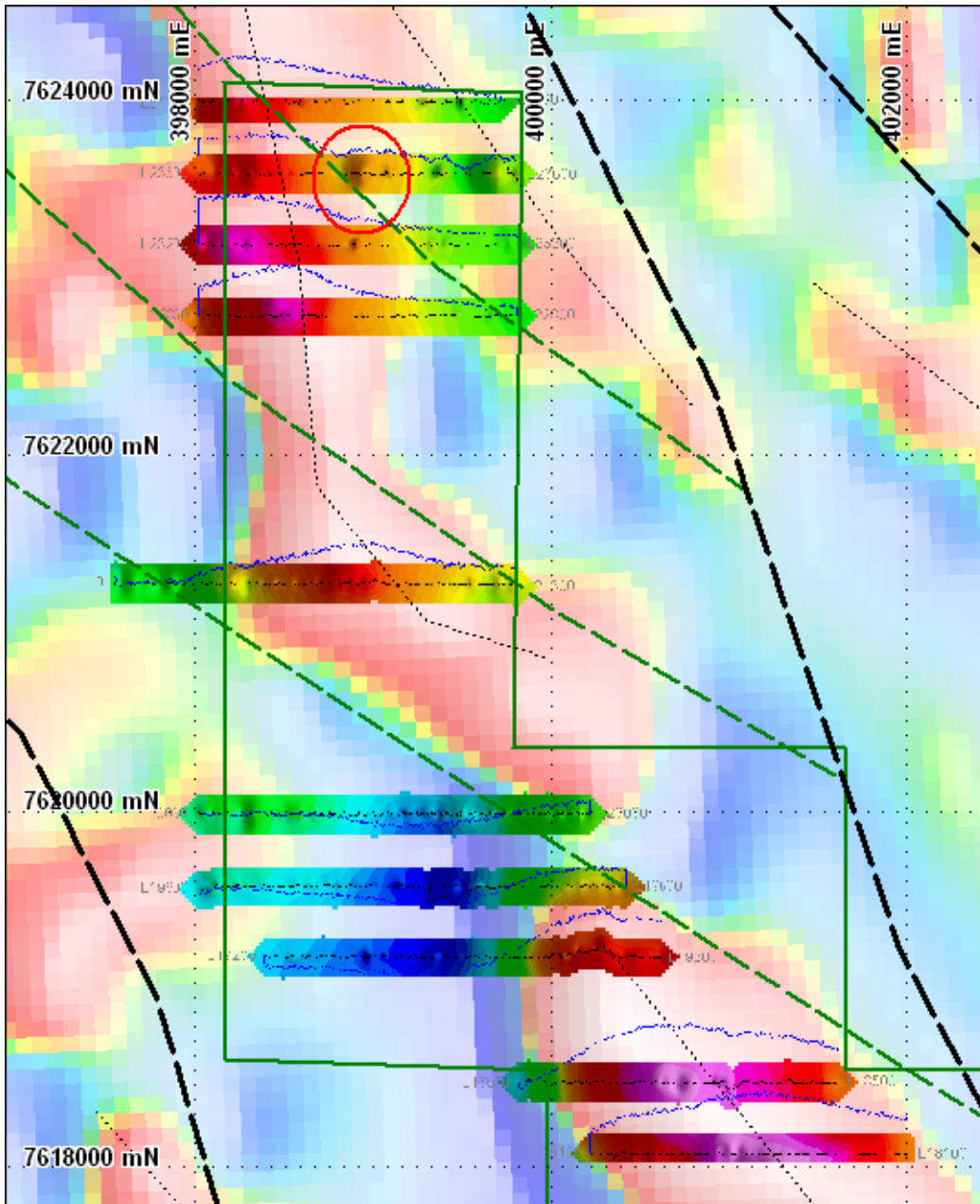
Ground magnetic data were collected by Bowgan Minerals using a Geometrics 859 Cs-vapor magnetometer. A total of 10 lines of data for 19.5 line km were collected in two stage; the first in February 2010 with the remainder being collected in May 2011. Data were generally collected at 0.5 second intervals roughly corresponding to 40cm distance.

Intervals of data were often quite noisy, with a high frequency, large amplitude “chatter” overprinting the response due to deeper magnetic sources. This was attributed to accumulations of near surface maghemite. To reduce this effect the data was first resampled to a 5m station interval and then a non-linear de-spiking filter applied to a de-sampled data. Profiles and grids of the final, resampled and filtered TMI results are shown in Figure 2.

The final ground magnetic data largely reflects the trends seen in the regional aeromagnetics, with the most prominent response represented by a NNW trending high, with a fairly consistent amplitude of approximately 100nT amplitude along its length. This magnetic marker is located spatially within the upper Central Mt Stuart Formation. While not presented here, simplified modeling of the data suggests a target depth of approximately 250m.

Several minor, cross-cutting fault structures are interpreted from dislocations and direction changes in these magnetic trends (green dashed lines in Figure 2). The orientation of these in relation to the regional structural corridors suggests they may represent riedel-like fault structures. As such they may be viable corridors for intrusives including, possibly, dolerite.

A small isolated magnetic anomaly at 398900mE, 7623600mN (shown by a red circle in Figure 2) is identified as a potential target for intrusives along one of these structures.



**Figure 1: TMI Ground magnetic results in the Target 1 and 2 area overlain on the first vertical derivative image of the regional government aeromagnetic data. Green lines indicate the locations of possible cross cutting faults with potential for dolerite fill.**