



**Partial Relinquishment Report  
Exploration Permit for Minerals  
EPM 14520 Willy's Bore**

**Tenure Holders:** Inova Resources Cloncurry Mines Pty Ltd  
Exco Resources Limited

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**Date:** August 2013

## SUMMARY

### Aim of Project

Exploration Permit for Minerals EPM 14520 Willy's Bore was obtained to explore for iron oxide-copper-gold mineralisation, copper-gold mineralisation, massive sulphide lead-zinc-silver deposits, and uranium mineralisation.

### Datum

Data are presented in MGA94 (z54) datum.

### Object of Report

This report documents the results of exploration on the two relinquished sub-blocks of EPM 14520 conducted from 13 May 2005 to 12 May 2013.

### Location

EPM 14520 is centred approximately 55 km west of McKinlay (Figure 1).

### Tenure

EPM 14520 currently consists of two sub-blocks. It was originally granted to Exco Resources Limited on 13 May 2005 for a period of five years with nine sub-blocks.

### Summary of Exploration

Exploration on the two relinquished sub-blocks of EPM 14520 conducted from 13 May 2005 to 12 May 2013 on the ground comprised of rock-chip, stream sediment and soil sampling programs.

In November and December 2011, a helicopter-borne Sub-Audio Magnetic (HeliSAM) survey was completed over both relinquished sub-blocks of EPM 14520.

### Conclusions

The 50% reduction in area of EPM 14520 was required as part of the renewal application granted on 19 April 2013. Two of the four sub-blocks needed to be dropped. The northern sub-blocks were considered more prospective with the Willy's Bore prospect, so the southern sub-blocks were selected for relinquishment.

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## 1. INTRODUCTION

EPM 14520 Willy's Bore was granted on 13 May 2005 to Exco Resources Limited (Exco) with nine sub-blocks. On 12 May 2007 five sub-blocks were relinquished, leaving four sub-blocks in the tenement. On 18 April 2013 the tenement was assigned to Ivanhoe Cloncurry Mines Pty Limited (ICM) (80%) and Exco (20%). A further two sub-blocks were relinquished on 12 May 2013, there are currently two sub-blocks in the tenement (Figure 2).

ICM changed its name to Inova Resources Cloncurry Mines Pty Ltd (IRCM) on 12 June 2013. IRCM is a 100% owned subsidiary of Inova Resources Limited (IVA). EPM 14520 is due to expire on 12 May 2015.

This partial relinquishment report describes all activities carried out in the relinquished area of EPM 14520 from when the permit took effect on 13 May 2005 until the sub-blocks were relinquished on 12 May 2013.

Work completed in the relinquished area comprised rock-chip, stream sediment and soil sampling programs and a helicopter-borne sub-audio magnetic survey.

## 2. SUB-BLOCK RELINQUISHMENT

Below are the details of the sub-blocks that were relinquished and retained (Figure 2).

### Relinquished sub-blocks:

<u>BIM</u>	<u>Block</u>	<u>Sub-blocks</u>
Clon	1114	b c

**Total = 2 relinquished sub-blocks**

### Retained sub-blocks:

<u>BIM</u>	<u>Block</u>	<u>Sub-blocks</u>
Clon	1042	w x

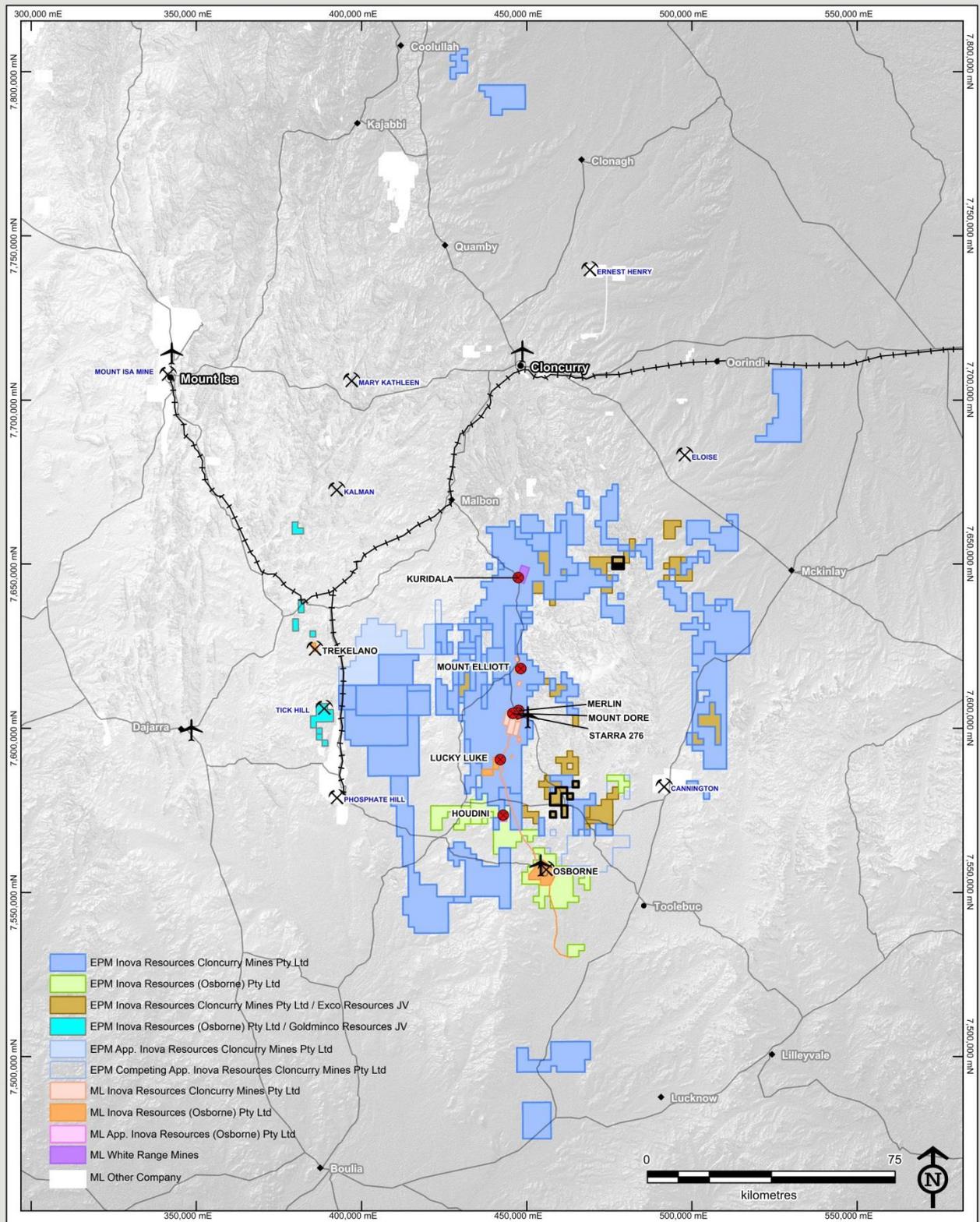
**Total = 2 retained sub-blocks**

### **3. LOCATION AND ACCESS**

EPM 14520 Willy's Bore currently consists of two sub-blocks that are located on the Glen Idol pastoral lease approximately 55 km west of McKinlay.

The tenement area is characterised by open wooded, semi arid landscape, incised by intermittent creeks and gullies. All creeks are ephemeral and major drainage consists of the Cloncurry River, Florence Creek and Farley Creek.

Vehicle access to EPM 14520 is obtained via the Landsborough Hwy heading south from Cloncurry and then via tracks directly to the EPM. Access is good from March to December with intermittent closure due to flooding and heavy rains possible from January to March. Limited existing tracks can be used by 4 wheel drive vehicles for access within the tenement.



- IVA Prospect
- ⚡ Prospect / Mine
- Major Town
- Town
- Main Road
- +—+— Railway
- ✈ Airstrip

- EPM 14520 (retained)
- EPM 14520 (relinquished)

**inova**  
resources

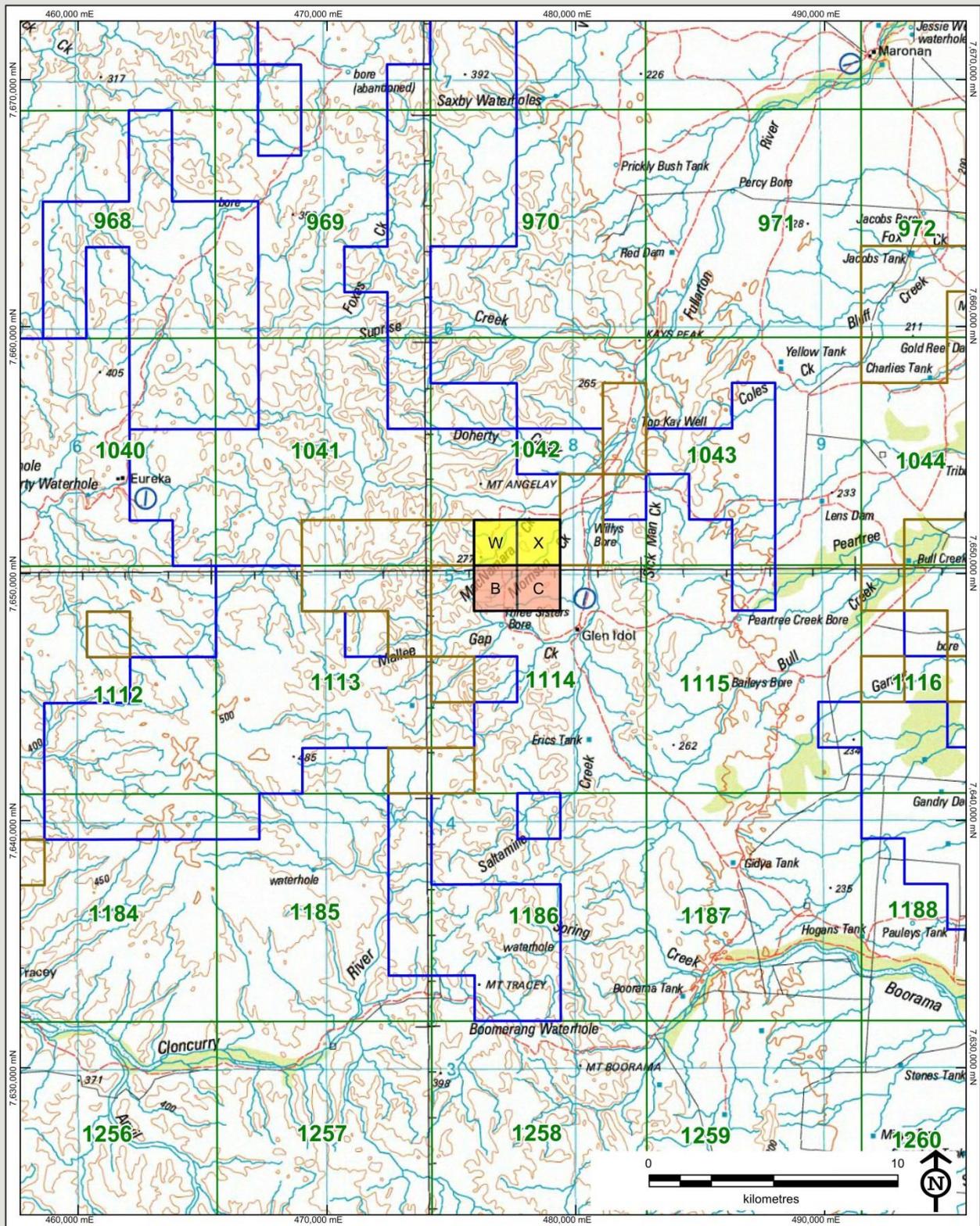
✉ gis@inovaresources.com  
☎ +61 7 4748 0472 (ext 8472)

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EPM 14520  
Regional Location

DRAWN BY: BST 15/08/2013  
1:1,500,000 @ A4 (MGAz54)

**Figure 1: EPM 14520 regional location of relinquished sub-blocks**



- EPM 14520 (Currently 2 sub-blocks)
- Relinquished 12 May 2013 (2 sub-blocks)
- EPM Inova Resources Cloncurry Mines Pty Ltd
- EPM Inova Resources Cloncurry Mines Pty Ltd / Exco Resources JV
- Exploration Blocks

EPM 14520  
Sub-Block Location

gis@inovaresources.com  
+61 7 4748 0472 (ext 8472)

DRAWN BY: BST 15/08/2013  
1:200,000 @ A4 (MGA254)

**Figure 2: EPM 14520 relinquished sub-block location**

## 4. GEOLOGY

### 4.1 Tenement Geology

The tenement contains rocks of the Soldiers Cap Group with small intrusions of Williams Granite. Some Mesozoic and Cainozoic cover is present in the northeast of the area.

### 4.2 Regional Geology

The project area lies on the western margin of the Mesozoic Eromanga Basin, close to the exposed eastern boundary of the Eastern Succession of the Proterozoic Mount Isa. Most of the project area is covered by Mesozoic to Quaternary sediments. There are isolated outcrops of Proterozoic basement in the extreme western margins of the project area.

The Eromanga Basin cover units comprise monotonous, mostly carbonaceous mudstones, siltstones and rarer sandstones and gravels of the Mesozoic Rolling Downs Group - dominantly the Wallumbilla Formation - and locally the overlying calcareous mudstones and dirty limestones of the Toolebuc Formation. These Mesozoic deposits are overlain by a thin veneer of Quaternary and Tertiary sands, gravels and clays, forming a flat-lying, featureless terrain broken only by a number of river channels and associated terraces. To the south around Dingading homestead a major water divide occurs with the Mesozoic exposed as a series of low hills and mesas possibly reflecting more recent uplift. Rivers north of this divide merge and drain towards the Gulf of Carpentaria. Those rivers to the south ultimately feed the Diamantina River and the Lake Eyre system.

A variable 3-20 m thick basal fluvial clastic sequence directly overlies basement over much of the project area. This basal cover unit is interpreted to be the late Jurassic Gilbert River Formation (Ryburn and Grimes, 1988) or its equivalent and generally occupies topographic lows, paleodrainage channels and probably broader braided river plains on the pre-Mesozoic surface. The unit contains fragments and reworked portions of the mineralisation and alteration, as seen at Ernest Henry and Cannington. Regionally the basal cover unit is characterised by subangular to subrounded quartz-feldspar-clay gravels and sands with pieces of pyritized wood and fine-grained pyrite spotting throughout. Feldspar is commonly replaced by kaolinite indicating that acid-oxidizing conditions must have occurred within this unit either during or subsequent to deposition. Alternatively, the provenance of the sediments may have been from a weathered protolith. The formation of pyrite within this unit is indicative of overprinting reduced conditions of an earlier oxidised sequence. As a result this unit is geochemically active and represents a good regional geochemical sampling medium.

Much of the project area south of Cloncurry is underlain by sub-units of the Proterozoic Soldiers Cap Group (1695 - 1665 Ma; Giles and Nutman, 2003). The dominant lithologies in the Soldiers Cap Group are meta-siliciclastics which include planar-bedded pelitic schists with graded bedding; thin units of cross-bedded immature quartzo-feldspathic meta-arenites and orthoquartzites; and intervals of more abundant interbedded basic volcanics and basic sills with minor carbonaceous schists, calc silicates and quartzites. Overall there is a distinctive absence of significant carbonate sequences or acid volcanics and a dominance of immature clastics. Thin horizons of banded iron formation associated with small base metal showings occur at restricted stratigraphic levels, generally within the Mount Norna Quartzite.

Metamorphic grade in the north of the project area is largely greenschist facies with abundant relict sedimentary textures. To the south and southeast towards Cannington the metamorphic grade increases. The grade reaches upper amphibolite facies resulting in widespread sillimanite-K feldspar-bearing schists and migmatitic gneisses.

Poor outcrop and the differences in metamorphic grade complicate clear correlation of these higher grade metamorphic sequences with the previously defined Soldiers Cap Group around Cloncurry. Interpretation

of unpublished regional magnetic surveys indicates that the higher metamorphic grade sequences within the Soldiers Cap Group extend for up to 50 km under cover to the east and southeast. Many of the lithostratigraphic units interpreted from the magnetic data are not well represented in areas of outcrop. The Cannington deposit occurs within these undercover extensions, and is interpreted to lie within broad litho-magnetic equivalents of the Mount Norna Quartzite of the Soldiers Cap Group. However, given lack of outcrop, complex deformation and high grade metamorphism, detailed correlations are uncertain.

Beardsmore, Newberry and Laing (1988) proposed an informal stratigraphic scheme for the Eastern Succession. Higher grade metamorphics south of Cloncurry were assigned to the Fullarton River Group, overlain by components of the previously defined Soldiers Cap Group, with the two groups included in a newly defined Maronan Supergroup. However, type sections, critical age relationships and contacts have not been formally defined. Host lithologies evident in drilling from the Cannington area are comparable with units of the proposed Fullarton River Group in this informal terminology. Based on broad lithostratigraphic and geophysical similarities between the Soldiers Cap Group and the Fullarton River Group, the authors believe they are equivalent sequences.

Dating of a garnetiferous felsic gneiss from the proposed Fullarton River Group (some 30 km north of Cannington), has given an age of  $1677 \pm 9$  Ma (Page, 1983), which would imply an age equivalence with Cover Sequence 3.

A range of small silver-lead-zinc prospects with Broken Hill-type affinities occur within the outcropping higher grade metamorphics within the Soldiers Cap Group (Dingo, Maramungee, Fairmile, Black Rock, Pegmont), as well as in under-cover equivalents (Altia, Maronan, Cannington). Interestingly, all of these prospects are hosted within psammite-rich packages that are correlated with the Mount Norna Quartzite.

## **5. WORK DONE ON RELINQUISHED SUB-BLOCKS**

### **5.1 Introduction**

In eight years of exploring EPM 14520 (granted 13 May 2005 - relinquished 12 May 2013), no targets were identified in the two relinquished sub-blocks. A prospect named Willy's Bore is located immediately to the north in the retained part of EPM 14520 and the majority of the exploration focus has been on capturing and interpreting geophysical and geochemical data to identify drill targets here.

### **5.2 2008 Stream sediment sampling**

Due to access issues, a helicopter supported stream sediment sampling program was carried out in August 2008. Four dry stream samples were collected from the two relinquished sub-blocks and submitted for multi-element analytical suite analysis (Figure 3 and Figure 4). The maximum values were 76 ppm Cu, 3 ppb Au, 8.73 ppm U and 49 ppm Zn. The digital assay data is provided in (Appendix 1).

### **5.3 2009 Soil sampling program**

Geological mapping and a 100 x 100 m grid Niton XRF soil sampling survey was completed on the two relinquished sub-blocks in July 2009. A total of 74 samples were collected from within the relinquished area, sample locations are shown in (Figure 3 and Figure 4). The maximum values were 351 ppm Cu and 127 ppm Zn. The digital XRF data is provided in (Appendix 2).

### **5.4 2009 Rock-chip sample**

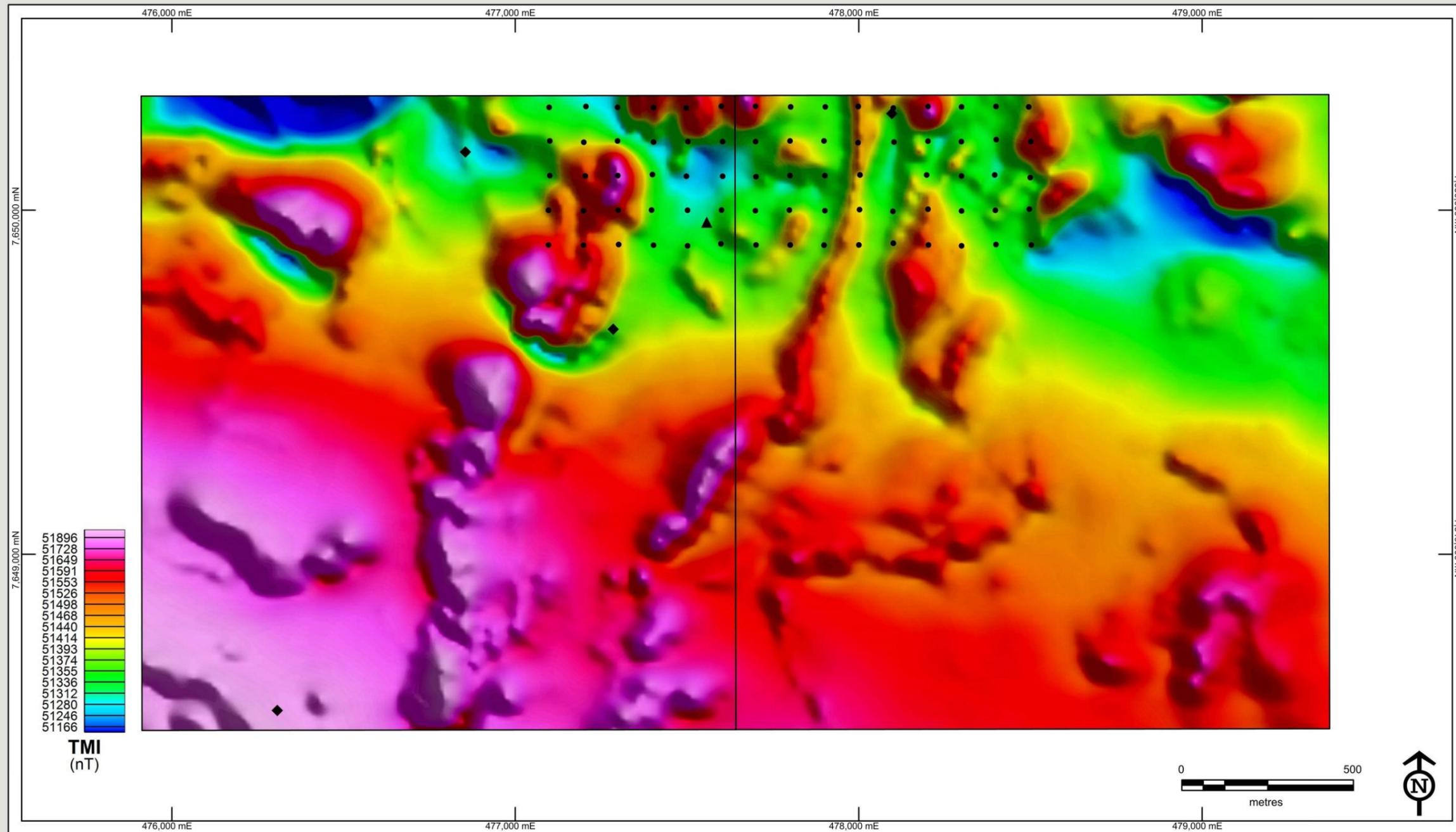
A single rock-chip sample was collected from an outcrop within the relinquished area of EPM 14520 on 2 December 2009. The sample returned values of 1,220 ppm Cu, 5 ppb Au, 10.2 ppm U and 11 ppm Zn. The digital assay data is provided in (Appendix 3).

### **5.5 2011 Helicopter-borne Sub Audio Magnetic (HeliSAM) survey**

In November and December 2011 a helicopter-borne Sub-Audio Magnetic (HeliSAM) survey was completed in a number of areas including all four sub-blocks of EPM 14520. Approximately 131 line km were flown within the relinquished area of EPM 14520 at a 50 m line spacing. Full survey details including acquisition parameters, flight lines and digital data were included in Stokes and Adiya (2012).

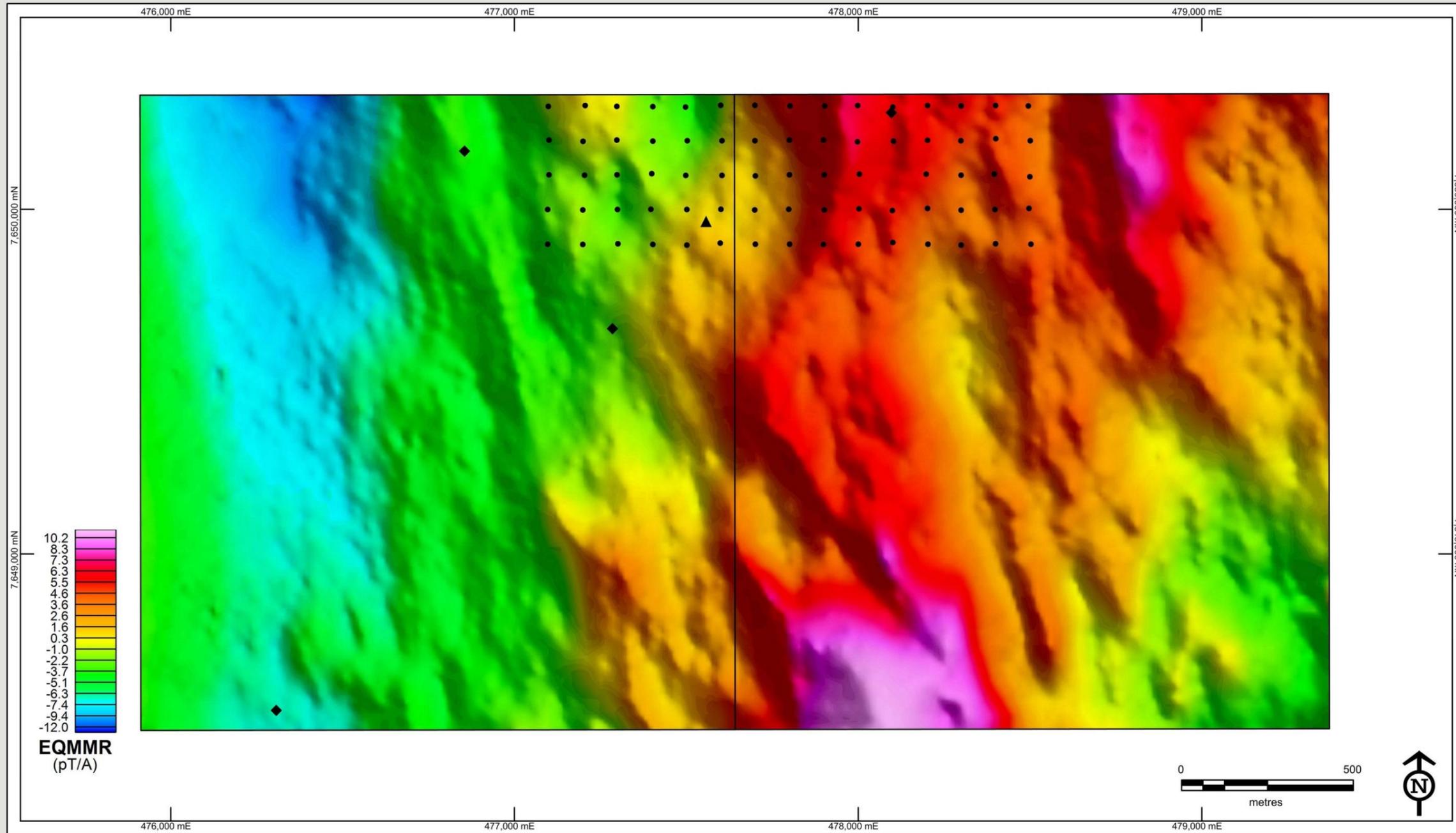
### **5.6 Conclusions**

The 50% reduction in area of EPM 14520 was required as part of the renewal application granted on 19 April 2013. Two of the four sub-blocks needed to be dropped. The northern sub-blocks were considered more prospective with the Willy's Bore prospect, so the southern sub-blocks were selected for relinquishment.



- ◆ 4 x stream sediment samples (collected 15/8/2008)
- 74 x soil samples (collected 23/7/2009)
- ▲ 1 x rock-chip sample (collected 2/12/2009)

**Figure 3: Stream sediment, soil and rock-chip sample locations over 2011 HeliSAM TMI image for relinquished sub-blocks**



- ◆ 4 x stream sediment samples (collected 15/8/2008)
- 74 x soil samples (collected 23/7/2009)
- ▲ 1 x rock-chip sample (collected 2/12/2009)

**Figure 4: Stream sediment, soil and rock-chip sample locations over 2011 HeliSAM EQMMR image for relinquished sub-blocks**

## 6. REFERENCES

Beardsmore TJ, Newberry SP, Laing WP (1988) The Maronan Supergroup; an inferred early volcanosedimentary rift sequence in the Mt Isa Inlier and its implications for ensialic rifting in the Middle Proterozoic of northwest Queensland. *Precambrian Research* 40/41:487-507

Giles D, Nutman AP (2003) SHRIMP U-Pb zircon dating of the host rocks of the Cannington Ag-Pb-Zn deposit, southeastern Mt Isa Block, Australia. *Australian Journal of Earth Sciences* 50:295-309

Page RW (1983) Timing of superimposed volcanism in the Proterozoic Mount Isa Inlier, Australia. *Precambrian Research* 21:223-245

Ryburn RJ, Grimes KG (1988) Cloncurry, Queensland - 1:100,000 geological series Sheet 7056. 1<sup>st</sup> edition, Bureau of Mineral Resources, Australia and Geological Survey of Queensland

Stokes B, Adiya B (2012) Soldiers Cap Group Tenements Exploration Permits for Minerals EPM 11169, 11676, 12023, 12285, 12290, 14033, 14520. Annual Report for the Period 1 April 2011 to 31 March 2012. Ivanhoe Australia Limited, 3 April 2012

## **APPENDIX 1: 2008 Stream Sediment Sampling – Assay Data**

Data included as a separate component in QDEX.

## **APPENDIX 2: 2009 Soil Sampling – XRF Data**

Data included as a separate component in QDEX.

## **APPENDIX 3: 2009 Rock-Chip Sample – Assay Data**

Data included as a separate component in QDEX.