



**Partial Relinquishment Report  
Exploration Permit for Minerals  
EPM 13741 Spell Paddock**

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**Tenure Holder: Ivanhoe Cloncurry Mines Pty Limited**

## SUMMARY

### Aim of Project

Exploration Permit for Minerals EPM 13741 Spell Paddock 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 22 relinquished sub-blocks of EPM 13741 conducted from 20 October 2003 to 19 October 2012.

### Location

EPM 13741 is centred approximately 135 km south of Cloncurry.

### Tenure

EPM 13741 currently consists of 23 sub-blocks. It was originally granted to Exco Resources Limited on 20 October 2003 for a period of five years with 53 sub-blocks.

### Summary of Exploration

Exploration on the 22 relinquished sub-blocks of EPM 13741 conducted from 20 October 2003 to 19 October 2012 on the ground comprised of rock-chip sampling programs and air core drilling.

An airborne magnetic and radiometric survey was flown by UTS Aeroquest between March and June 2010. It covered the western group of 21 sub-blocks that have been relinquished. Later that year, a helicopter-borne sub-audio magnetic survey was also conducted on approximately relinquished 7 ½ sub-blocks.

### Conclusions

Disappointing results from rock-chip sampling and 2010 geophysical surveys, combined with time limitations for exploration has led to the 22 relinquished sub-blocks being identified as the lowest priority parts of this tenement.

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## 1. INTRODUCTION

EPM 13741 Spell Paddock was granted on 20 October 2003 to Exco Resources Limited with 53 sub-blocks. The existing Joint Venture agreement between Exco Resources (Exco) and Ivanhoe Cloncurry Mines Pty Limited (ICM) was varied by means of a Deed of Variation in October 2010 to include all sub-blocks of EPM 13741. ICM are the operators of the Joint Venture. On 19 October 2007, eight sub-blocks were relinquished leaving 45 sub-blocks in the tenement. A further 22 sub-blocks was relinquished on 19 October 2012 (Figure 2). On 16 November 2012 the tenement was assigned to ICM (80%) and Exco (20%). There are currently 23 sub-blocks in the tenement. EPM 13741 is due to expire on 19 October 2016.

This partial relinquishment report describes all activities carried out in the relinquished area of EPM 13741 from when the permit took effect on 20 October 2003 until the sub-blocks were relinquished on 19 October 2012.

Work completed in the relinquished area comprised rock-chip sampling programs, air core drilling, an airborne magnetic and radiometric survey 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	1615	l m n o q r s t v w x y
Clon	1687	b c d j l m q r s
Clon	1689	s

**Total = 22 relinquished sub-blocks**

### Retained sub-blocks:

<u>BIM</u>	<u>Block</u>	<u>Sub-blocks</u>
Clon	1615	p u
Clon	1617	z
Clon	1618	v
Clon	1687	a f g h n
Clon	1689	c d e h j k m n o p
Clon	1690	a f l q

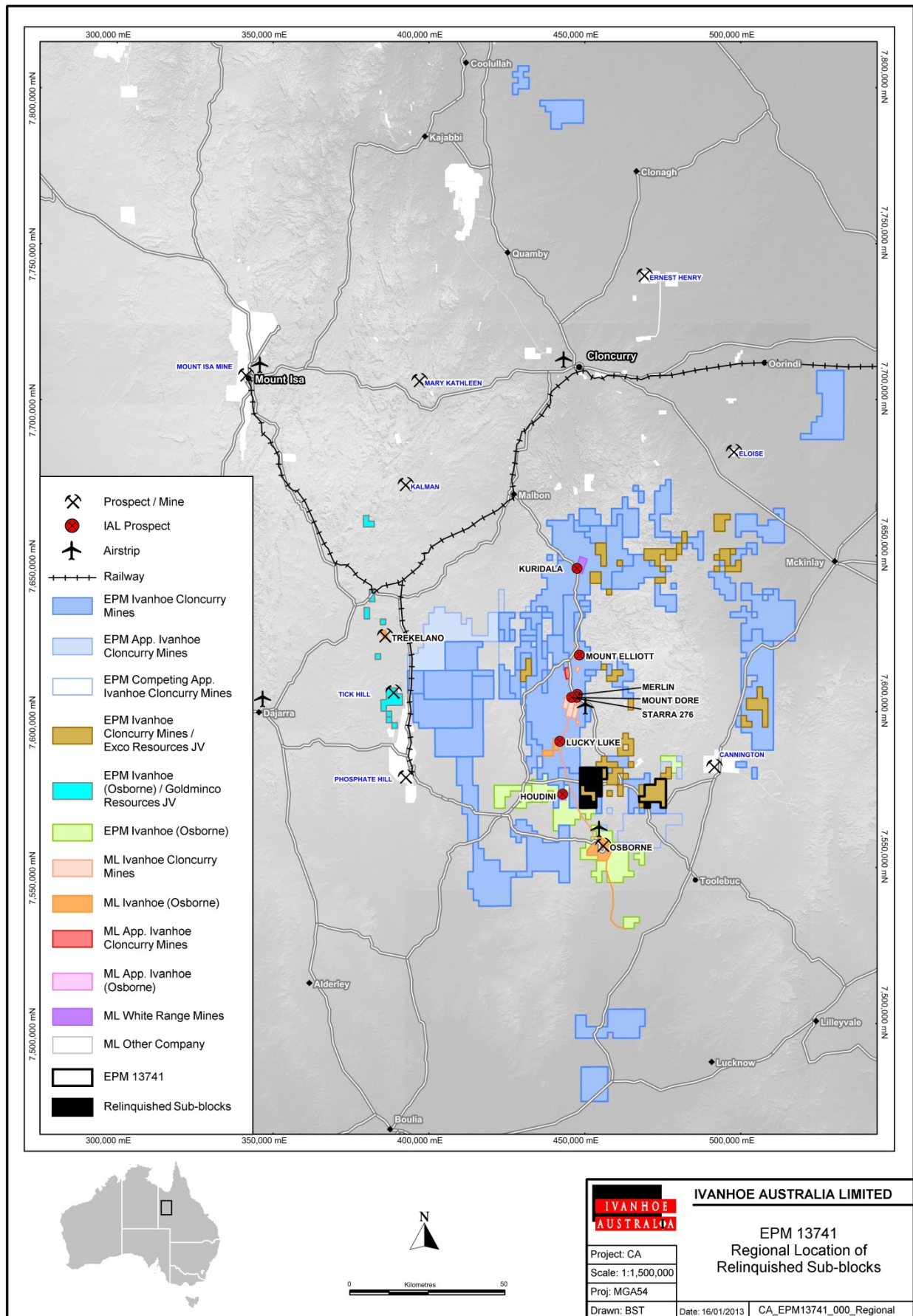
**Total = 23 retained sub-blocks**

### 3. LOCATION AND ACCESS

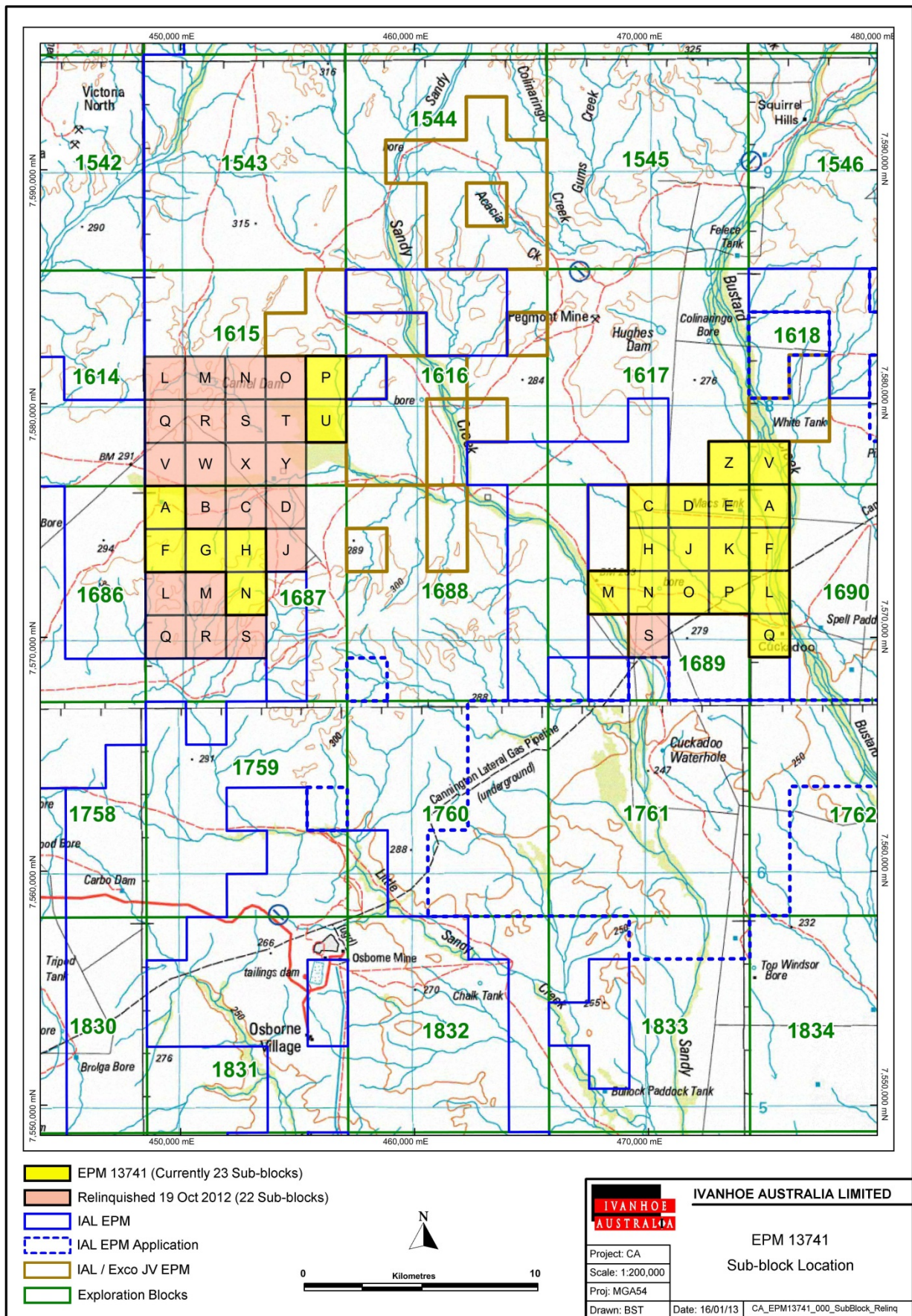
EPM 13741 Spell Paddock currently consists of 23 sub-blocks in three separate groups. These groups are centred approximately 135 km south of Cloncurry and are spread across the Burnham, Chatsworth, Cukadoo, Inveravon and Kheri Pastoral Leases (Figure 1 and Figure 2).

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 13741 is obtained via the Malbon – Mount Elliott and the Kuridala – Eureka metalled roads. Road 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.



**Figure 1: EPM 13741 regional location of relinquished sub-blocks**



**Figure 2: EPM 13741 relinquished sub-block location**

## 4. GEOLOGY

### 4.1 Tenement Geology

Approximately 65% of the western group of sub-blocks of EPM 13741 is covered with Mesozoic sediments. The exposed Proterozoic basement consists mainly of schist and metasediments of the Kuridala Formation. The regional magnetic data show several elongate magnetic features within the western block. One of these bifurcates, presumably at the axis of a regional syncline.

The eastern group of sub-blocks within EPM 13741 is almost entirely covered with between 30 and 60 m of Mesozoic to Quaternary mudstone, alluvium and black soil. A small amount of the Squirrel Hills Granite outcrops in the far northeast. A large magnetic feature is visible in the northern portion of the eastern sub-blocks. This feature has the 'rippled' characteristics shown in the magnetic response of Squirrel Hills Granite and most likely represents a small body of granite.

### 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 Inlier (Figure 3). 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.



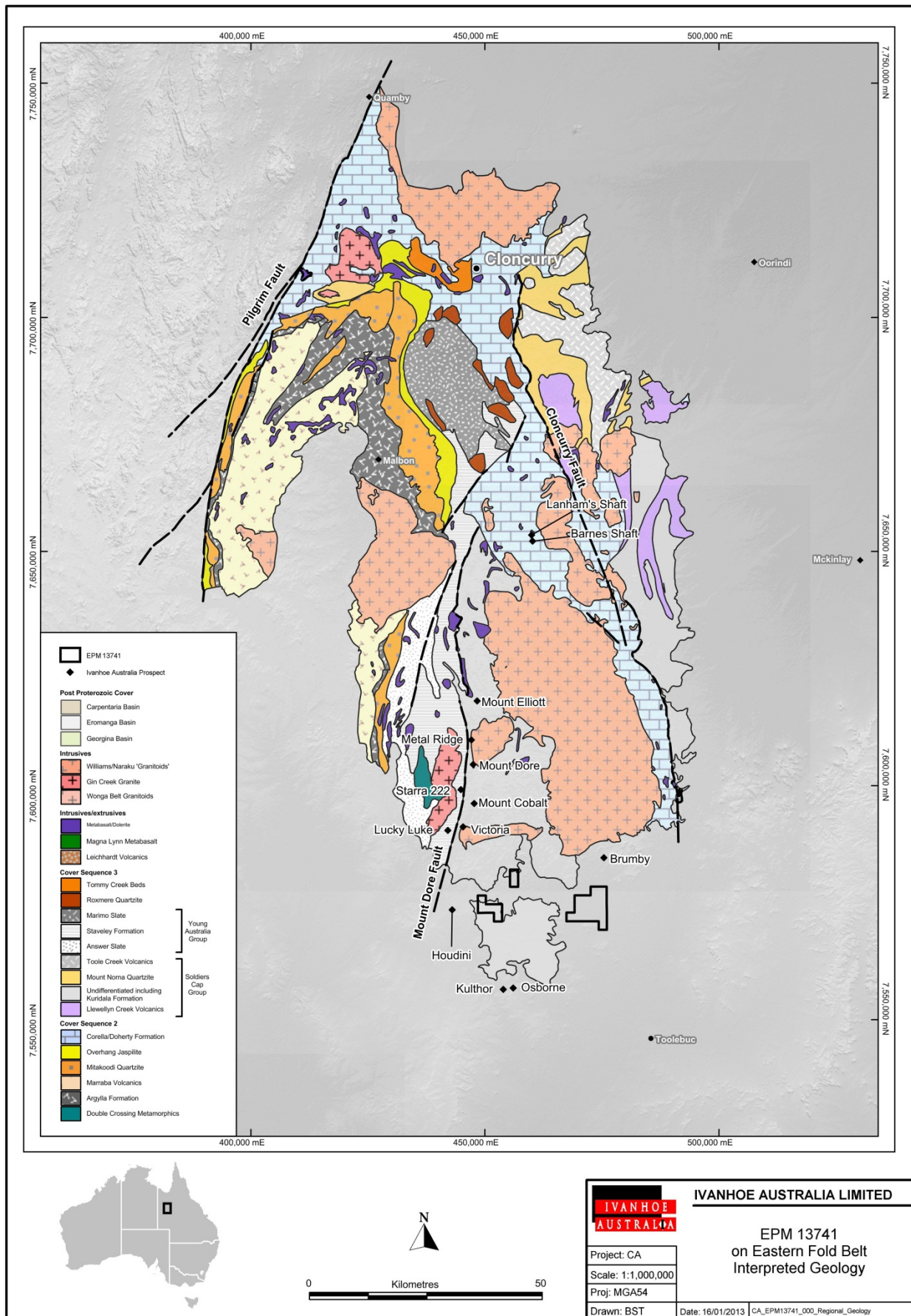
Metamorphic grade in the north of the project area is largely greenschist facies with abundant relict sedimentary textures. To the south and southeast towards Cannington the metamorphic grade increases. The grade reaches upper amphibolite facies resulting in widespread sillimanite-K feldspar-bearing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



**Figure 3: EPM 13741 on regional geology**

## 5. WORK DONE ON RELINQUISHED SUB-BLOCKS

### 5.1 Introduction

In nine years of exploring EPM 13741 (granted 20 October 2003 - relinquished 19 October 2012), one prospective target was identified in the 22 relinquished sub-blocks. This prospect is named Concorde and the majority of the exploration focus has been on capturing and interpreting geophysical and geochemical data to identify drill targets.

### 5.2 2007 / 2008 Rock-chip sampling

An extensive field campaign was conducted during 2007 and 2008 within the outcropping sections of the EPM with 104 rock-chip samples collected from the 22 relinquished sub-blocks (Figure 4).

Two of these samples were collected in September 2007, 73 samples collected in February 2008 and the remaining 29 samples collected in April 2008. Samples were submitted for a multi-element analytical suite. The best copper result was 1.67% Cu from a breccia (average 0.04% Cu). The best gold result was 1.91 g/t Au from a breccia (average 0.04 g/t Au). Other anomalous assay results were sourced from Jasperoidal gossanous horizons adjacent to the contacts with metasediment and dolerites (Appendix 1).

### 5.3 2008 / 2012 Air core drilling

Air core drilling was conducted with the aim of testing the magnetic anomalies in both the western and eastern sub-blocks. A total of 49 holes were drilled in the 22 relinquished sub-blocks of EPM 13741 – 40 holes (931 m) around the Concorde prospect in 2008 and a further nine holes (487 m) in the eastern sub-block towards the Mac's Tank prospect in 2012. Figure 4 shows the air-core collar locations.

Elevated Cu ± Au ± U and cobalt and phosphorus values were returned from a number of holes. The best intercept was in Concorde hole CCAC120 (2m @ 0.13 g/t Au and 332 ppm Co from 20 to 22m). Full assay data is provided in Appendix 2.

### 5.4 2010 Airborne Magnetic and Radiometric Survey

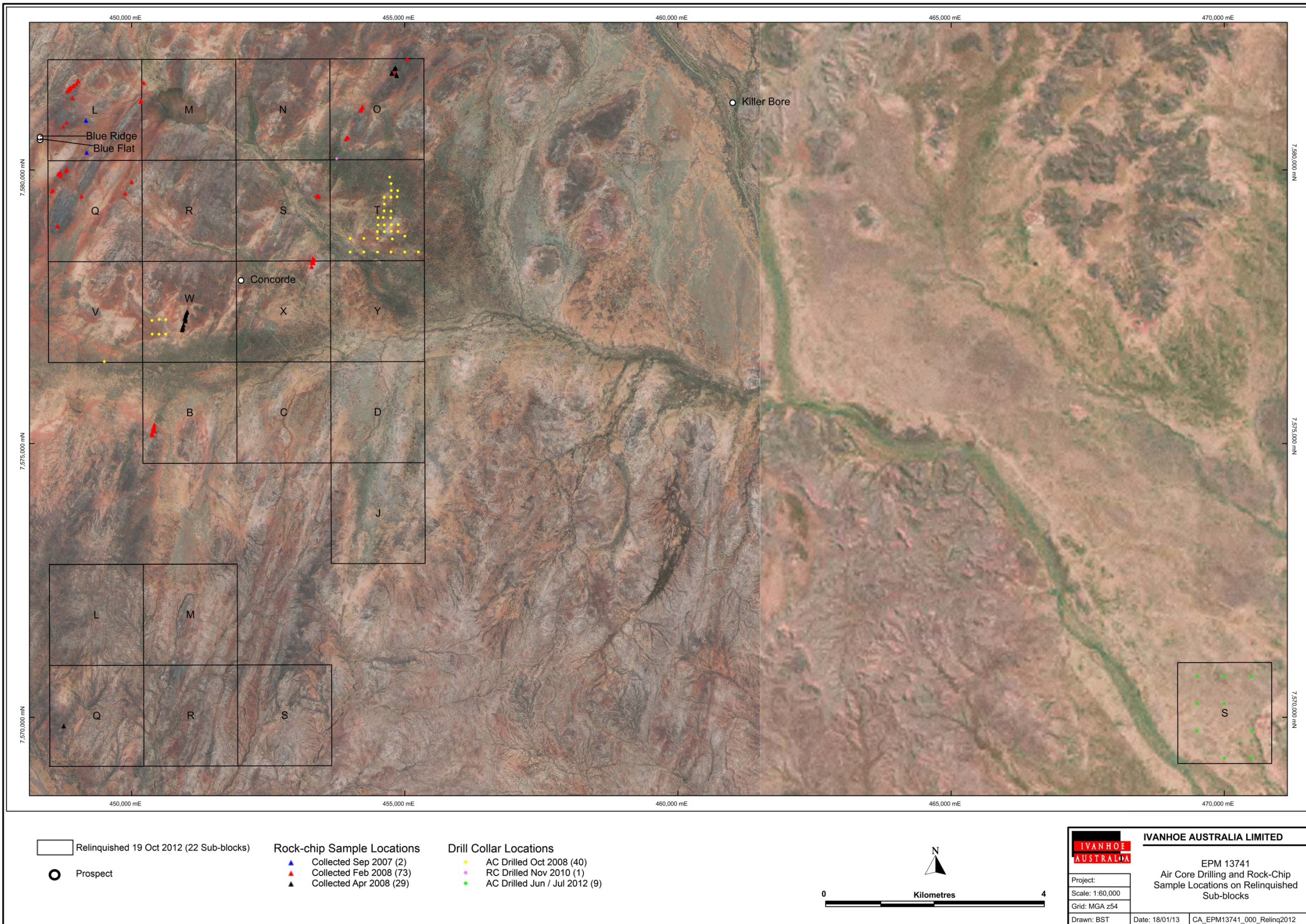
A large regional airborne magnetic and radiometric survey was flown by UTS Aeroquest between March and June 2010 that included approximately 1,469 line km in the western relinquished sub-blocks of EPM 13741. The detailed survey had a nominal terrain clearance of 30 m and a line spacing of 50 m. Full survey details including acquisition parameters, flight lines and digital data were included in Whitehead and Adiya (2011). Figure 5 shows the Total Magnetic Intensity – Reduced to Pole (TMI RTP) image and Figure 6 shows the Uranium image.

### 5.5 2010 Helicopter-borne Sub Audio Magnetic (HeliSAM) survey

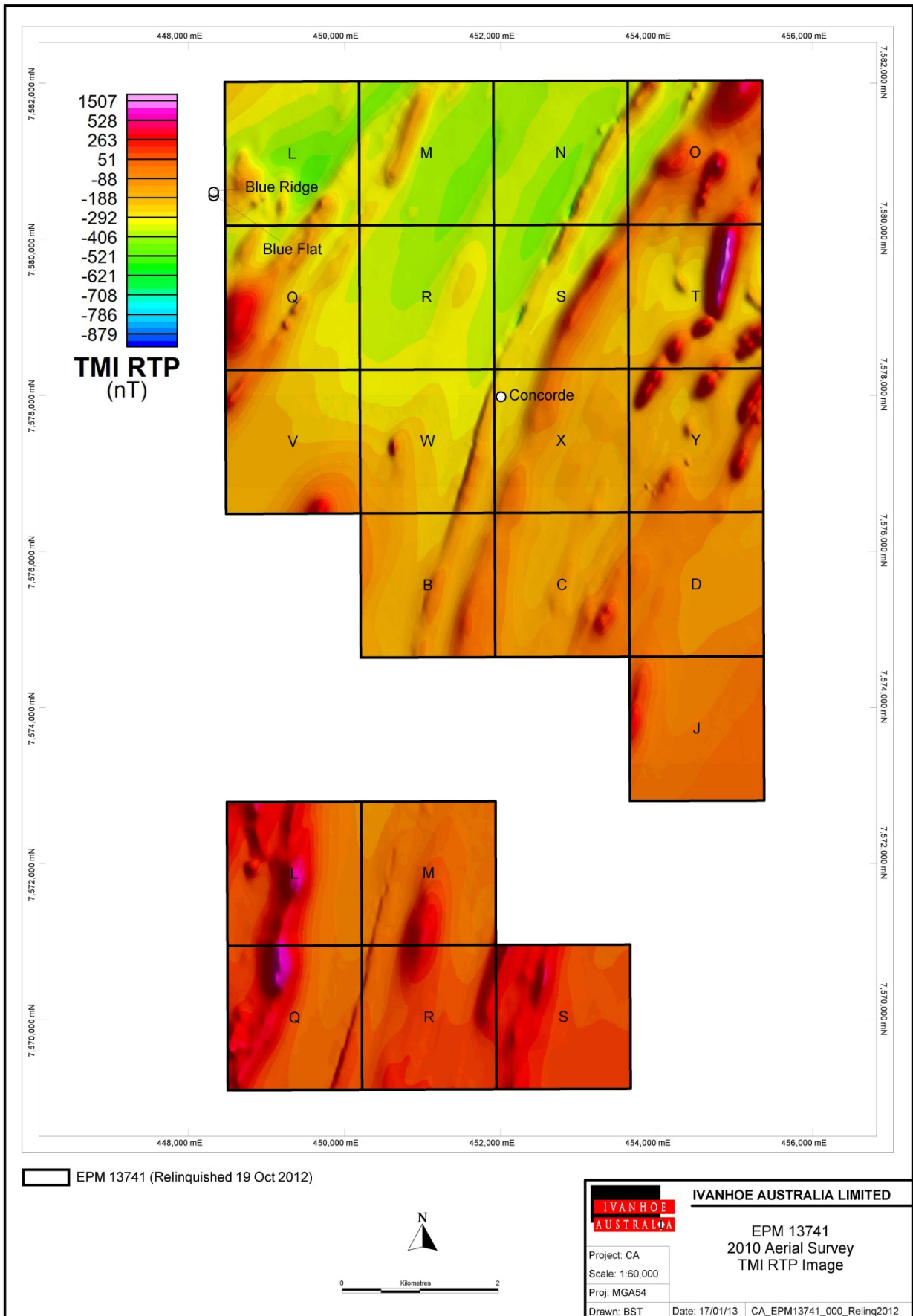
A single vertical RC hole (HER0005) was drilled on 22 November 2010 to a depth of 33 m (Figure 4) as part of a regional HeliSAM survey. One of the current electrodes was placed in the hole. The hole was not sampled. Full survey details including acquisition parameters, flight lines and digital data were included in Stokes et al. (2012). Figure 7 shows EQMMR and TMI images from this survey.

### 5.6 Conclusions

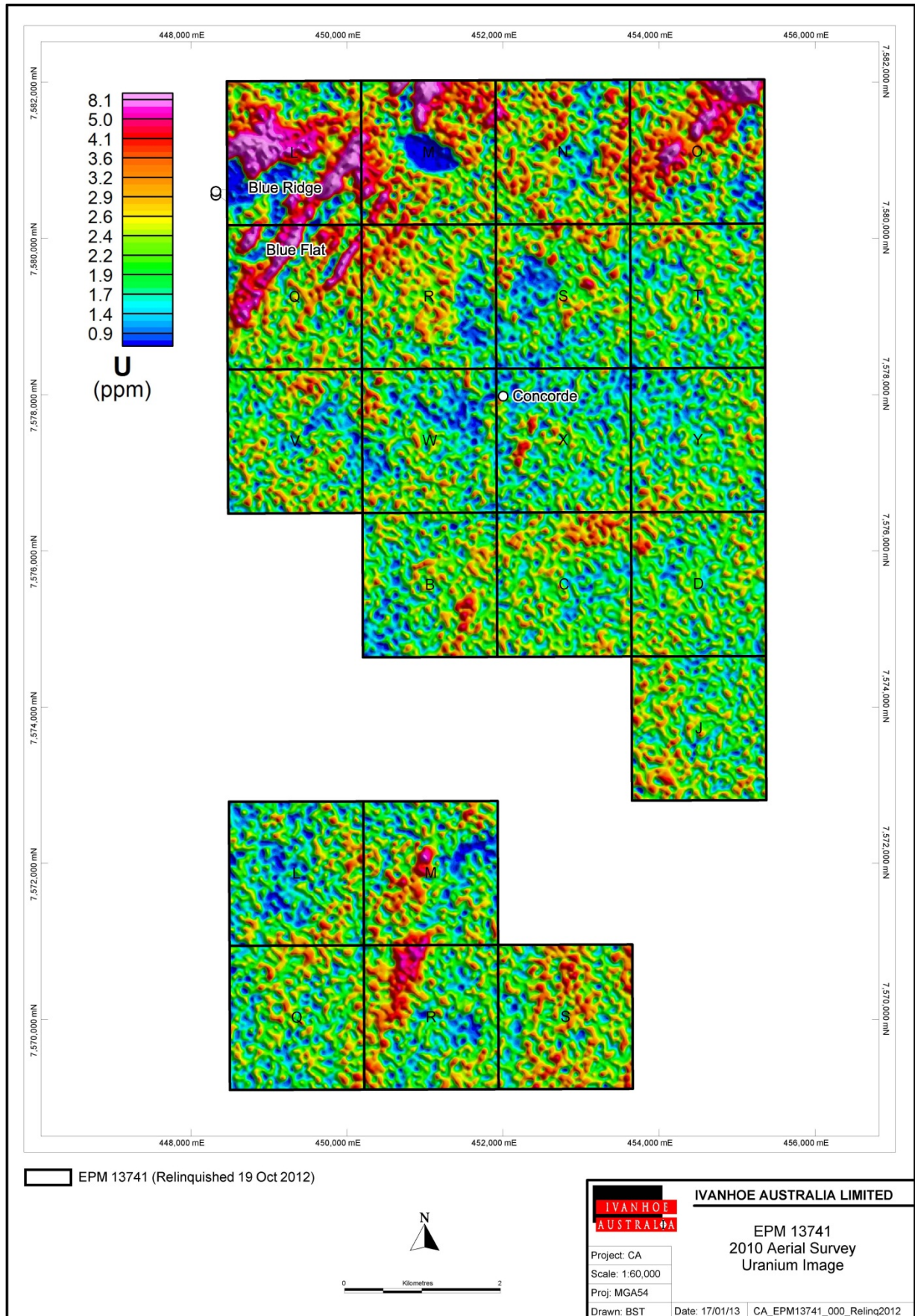
Disappointing results from rock-chip sampling and 2010 geophysical surveys, combined with time limitations for exploration has led to the 22 relinquished sub-blocks being identified as the lowest priority parts of this tenement.



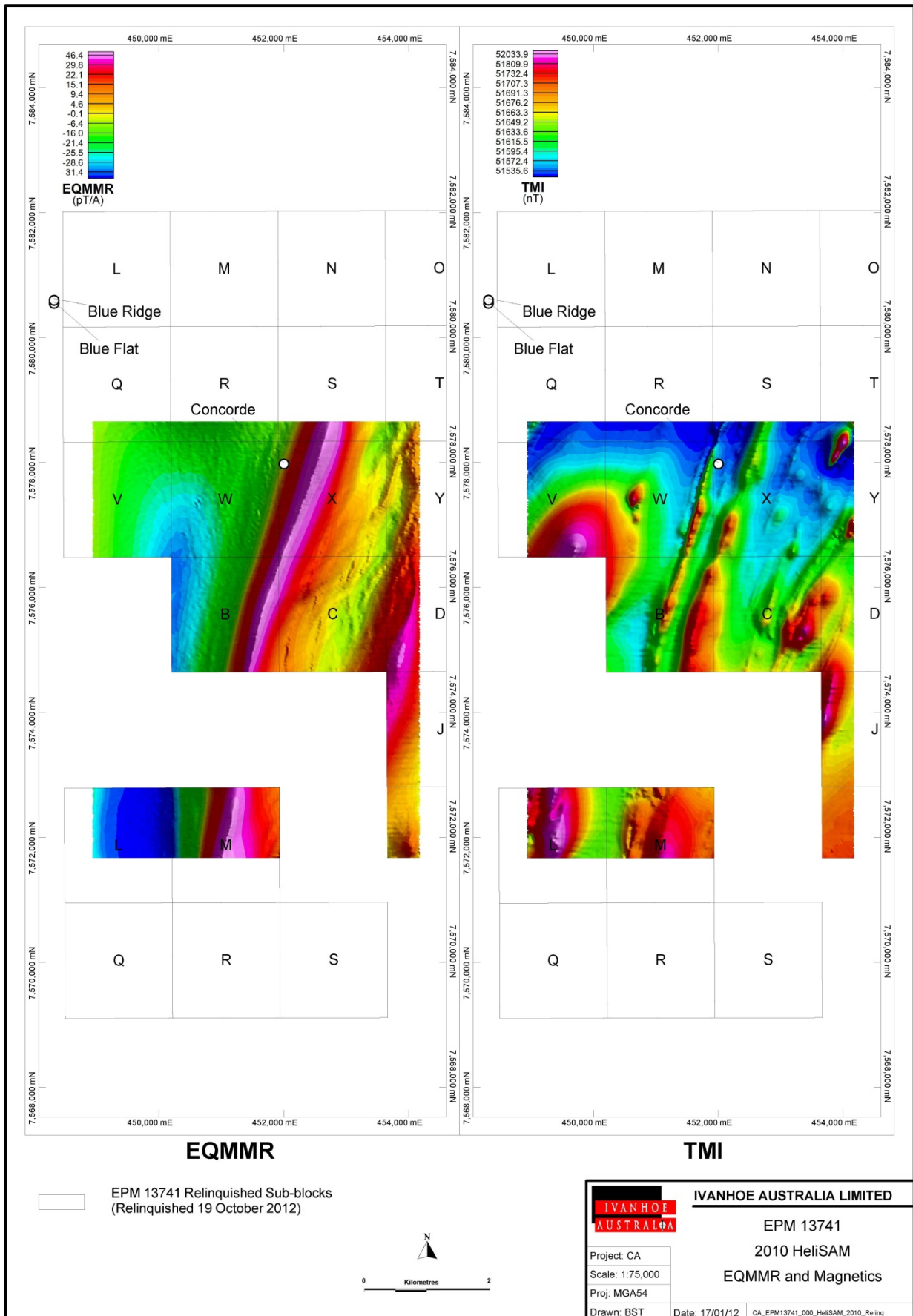
**Figure 4: Air core drilling and rock-chip sample locations on relinquished sub-blocks**



**Figure 5: 2010 aerial survey TMI RTP image**



**Figure 6: 2010 aerial survey uranium image**



**Figure 7: 2010 HeliSAM EQMMR and TMI images**

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## **APPENDIX 1: 2007 / 2008 Rock-chip Sampling – Assay Data**

Data included as a separate component in QDEX.

## **APPENDIX 2: 2008 / 2012 Air core drilling – Assay Data**

Data included as a separate component in QDEX.