



STELLAR RESOURCES LIMITED
Rubicon MinTech Ventures Pty. Ltd.

EL 26/2009 HUSKISSON
ANNUAL REPORT FOR THE PERIOD
9 July 2010 – 8 July 2011

Compiled by/Author: R.K. Hazeldene & A. M. Rigg

DATE: May 2011

DISTRIBUTION:
Mineral Resources Tasmania, a Division of the
Department of Infrastructure, Energy and Resources - Hobart
Stellar Resources Ltd - Melbourne

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Victoria, 3000.

ABSTRACT

This Annual Report for EL26/2009 Huskisson covers the period from 9 July 2010 to 30 May 2011.

Stellar considers the area prospective for several mineralisation styles including primary ultramafic hosted Ni-Cu-Pt (Voisey Bay style) and Avebury style mineralisation formed by the alteration of Cambrian ultramafic bodies, driven largely by the intrusion of the hydrothermally active Carboniferous Meredith granite.

Previous holders of the area covered by the licence considered it prospective for nickel, tin, gold and base metals. Previous exploration has been sparse in the main area of interest in the NW, mainly due to difficult access. Exploration work over Stellar's *NW feeder zone* target is limited with little geochemistry and only moderate resolution geophysics. No drilling has been done within the licence area.

In the Melbourne office, work has included the compilation of existing open-file regional geological, geochemical and geophysical data, and map production.

As a first exploration stage, fieldwork has comprised a high resolution VTEM survey. Interpretation of the survey data will be undertaken in the next period.

Data compiled to date supports the exploration rationale for the tenement.

Expenditure on EL26/2009 for 2010-2011 totalled \$174,358.

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1. INTRODUCTION

1.1. EXPLORATION RATIONALE & GEOLOGICAL SETTING

The EL area is considered prospective for several mineralisation styles including primary ultramafic hosted Ni-Cu-Pt (Voisey Bay style) and Avelbury style mineralisation formed by the alteration of Cambrian ultramafic bodies, driven largely by the intrusion of the hydrothermally active Carboniferous Meredith granite. Such ultramafics and granite bodies are thought to be present within the EL area.

Intense alteration of the ultramafics to serpentinite would be accompanied by the formation and destruction of magnetite. This alteration pattern, commonly associated with the Avelbury style of mineralisation, along with the direct detection of primary Ni-Cu-Pt mineralisation will be substantially enhanced by a high resolution combined aeromagnetics/VTEM survey.

The entrapment of substantial (ore-body scale) volumes of mobilised nickel sulphides would require the presence of either structural or formational traps such as roofed, non-outcropping ultramafics. Alternatively, location of potential feeder structures and dykes to the primary ultramafic pile would be a pathfinder to primary Ni-Cu-Pt ore-body scale mineralisation. As such, structural and stratigraphic information provided by the aeromagnetics will be a valuable guide to exploration.

The 2001 WTRMP Area C survey (200m fls) is the only aeromagnetics survey to cover the whole area. This survey provides reasonable definition of the following (see fig 7):

(i) a large, deep magnetic anomaly beneath the faulted south-eastern margin of the Meredith Granite adjacent to a north-eastern edge of the Huskisson Syncline which may represent an ultramafic complex similar to the Heazlewood complex to the north or a major hydrothermal alteration signature due to intrusion of the Meredith Granite.

(ii) in the northern part of the magnetic anomaly northwest trending faulting is evident. The faulted zone has a width of approx. 1.8km and a length of 7km. Associated with the faulting and intrusion, approximately 1.3km northwest towards the Meredith Granite, is a discrete linear magnetic feature. This may represent a feeder zone to the ultramafic pile or may have enhanced hydrothermal activity and promoted the mobilisation and concentration of sulphides.

The licence covers the eastern flank of the Meredith Granite, which is recognised to have similar petrochemistry to the Heemskirk suite.

1.1.1. Geological Setting

EL 26/2009 covers a suite of rocks to the east of the Huskisson Syncline within the Dundas Trough.

The oldest rocks in the tenement are the thick polydeformed quartzwacke turbidite succession of the Proterozoic Oonah Formation. These isoclinally folded quartz sandstones; siltstones and mudstones form a spine down the centre of the tenement. The eastern margin of this sequence is faulted against younger rocks of the Cambrian to Ordovician Owen Group.

The Owen Group rocks, comprising large volumes of coarse siliclastic conglomerate with some turbidite and shallow marine sandstone units, run down the eastern side of the tenement. Further east they sit unconformably on the Mt. Read Volcanics.

West of the Oonah Formation rocks is a belt of Early Cambrian Dundas Group rocks, which runs the length of the tenement. This is a sequence of mafic volcanoclastic lithicwackes, siltstones and mudstones with minor carbonate and basalt units. South of the Oonah Formation rocks they are faulted against the Owen Group rocks. Fluvio-glacial deposits along the valley of the Huskisson River obscure the western margin of the Dundas Group rocks.

West of the river the western margin of the tenement covers a belt of Siluro-Devonian shallow marine quartz sandstones, part of the Eldon Group. These are on the eastern edge of the Huskisson Syncline. Refer to Figure 5.

1.2. LICENCE

TENEMENT NUMBER: 26/2009

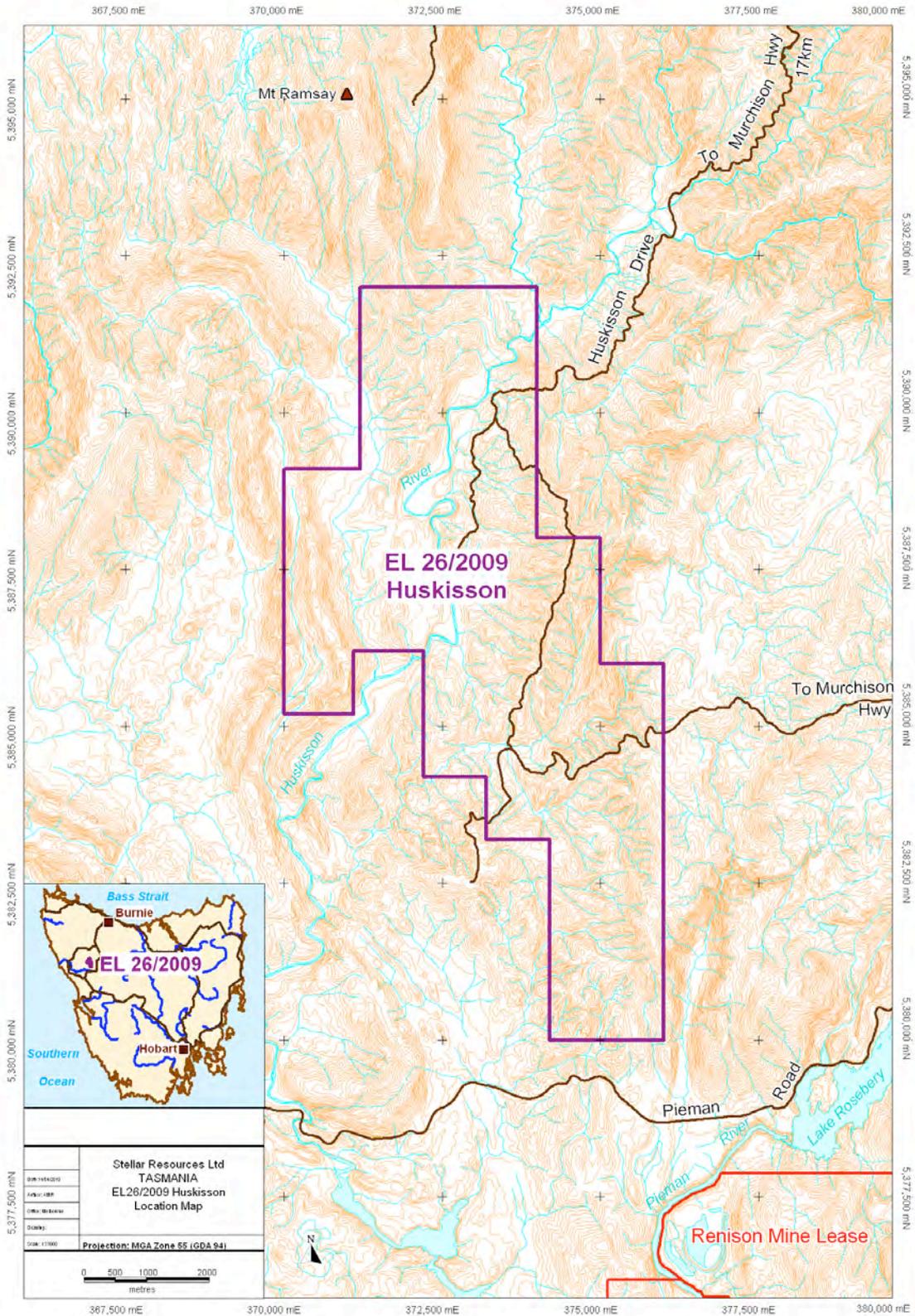
TENEMENT NAME: Huskisson

TENEMENT LOCATION: Centred 14km NNW of Rosebery, with access to the eastern side of the licence, via 30km of well-maintained gravel closed forestry plantation road (Huskisson Drive), from the Murchison Highway. The Renison Mine Lease is 2.3km south of the licence. No vehicular track access is present on the western side of the Huskisson River. Access would need to be on foot at a time of low water flow or by helicopter (Figure 1). The licence covers 39km² from 3km north of the Pieman River to 3km south of Mt Ramsay. The terrain in the area is generally rugged with the majority of the area covered in Nothofagus-Atherosperma rainforest and related scrub. The licence area does not include any conservation areas, and is tenured State Forest Reserve, Meredith Range Regional Reserve and John Lynch Forest Reserve.

REPORTING PERIOD: 9 July 2010 to 8 July 2011.

TENEMENT HOLDER: Rubicon MinTech Ventures Pty Ltd., a wholly owned subsidiary of Stellar Resources Ltd.

1.3. LOCATION OF LICENCE



• **Figure 1 EL26/2009: Location Map**

1.4. LAND TENURE

SCHEDULE

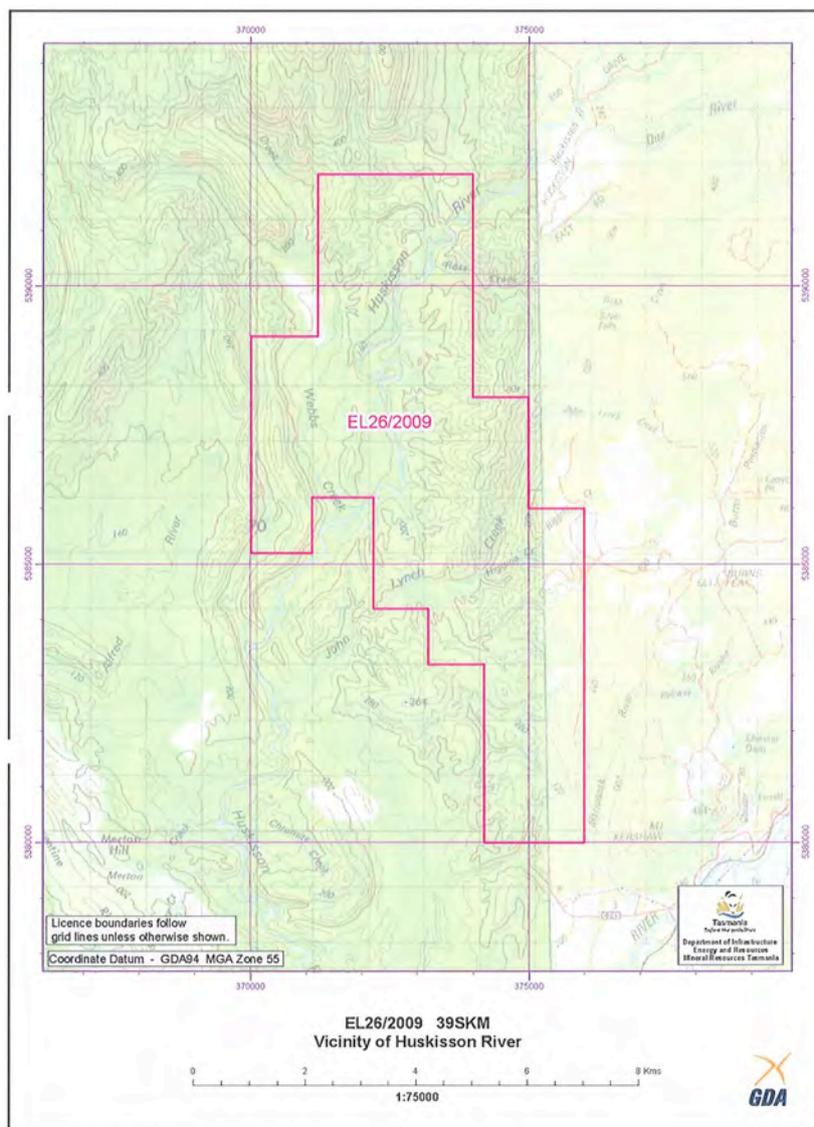
VICINITY OF HUSKISSON RIVER 14KM NNW OF ROSEBERY
MUNICIPALITY OF WARATAH / WYNYARD & WEST COAST
EXPLORATION LICENCE 26/2009 39km²
RUBICON MIN TECH VENTURES PTY. LTD.

EXCLUSIONS

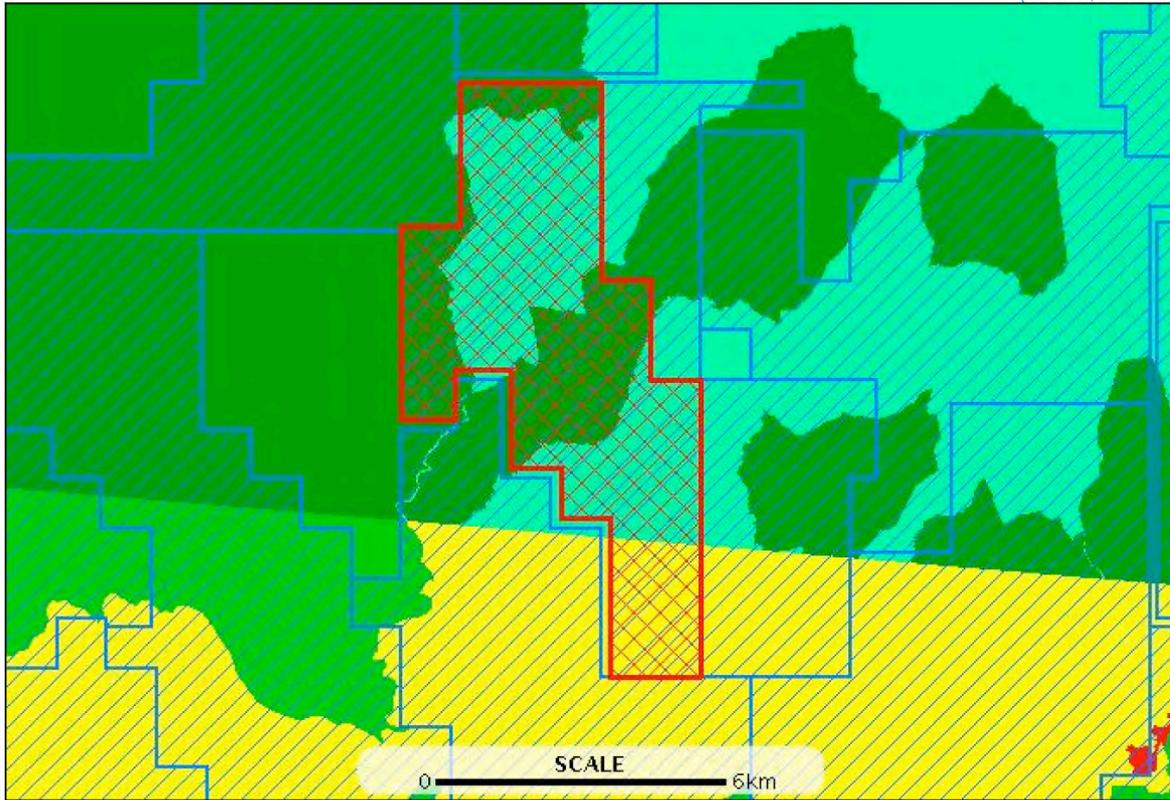
None defined.

LAND TENURE

The area comprises: Multiple Use State Forest
John Lynch Forest Reserve
Meredith Range Regional Reserve



• Figure 2 EL26/2009: MRT Licence Map



(362109,5377529)

Identify Results - Category 1 Exploration Licence

TEN_ID 31524
 TEN_REF EL26/2009
 STATUS Granted

 Category 1 Exploration Licence
 West Coast Planning Scheme
 1999 Planning Zones

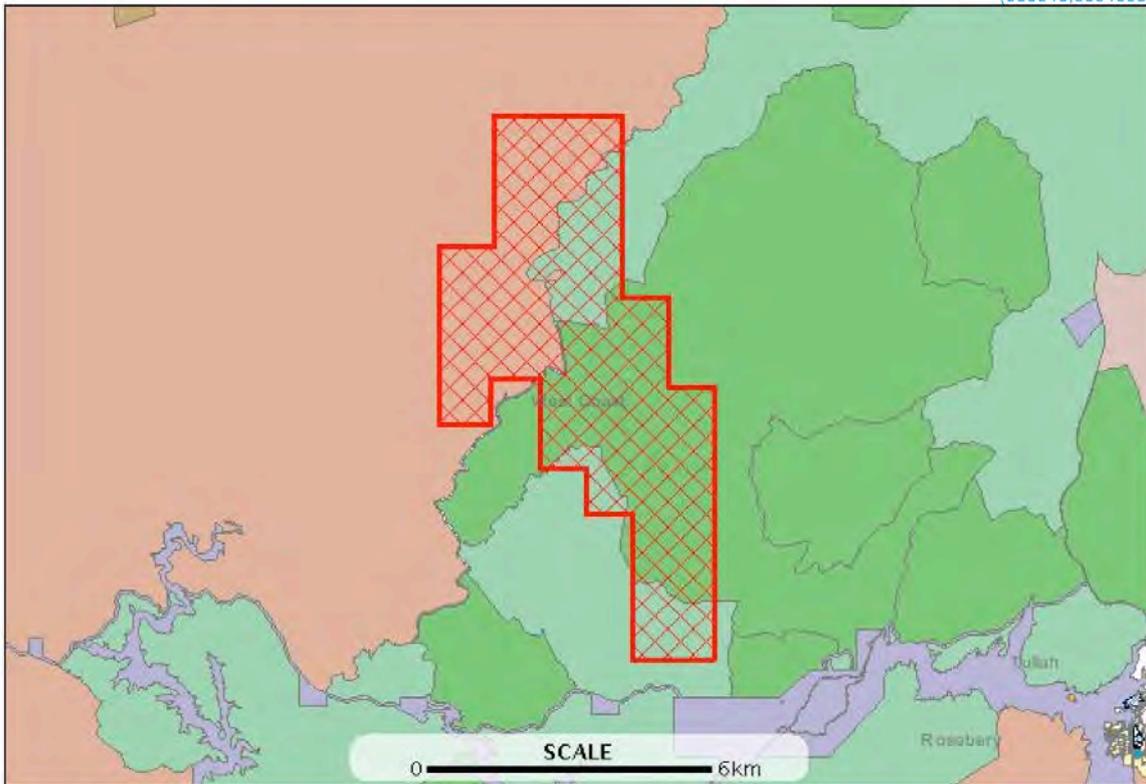
 Business & Civic (Waratah-Wynyard)

 Urban (West Coast)
 Natural Resources (West Coast)
 Environment Protection (West Coast)
 Commercial (West Coast)
 Waratah-Wynyard 2000 Planning Zones

 Residential (Waratah-Wynyard)
 Primary Industries (Waratah-Wynyard)
 Industrial (Waratah-Wynyard)
 Environmental Management (Waratah-Wynyard) (cont)



• Figure 3 EL26/2009: State Planning Schemes



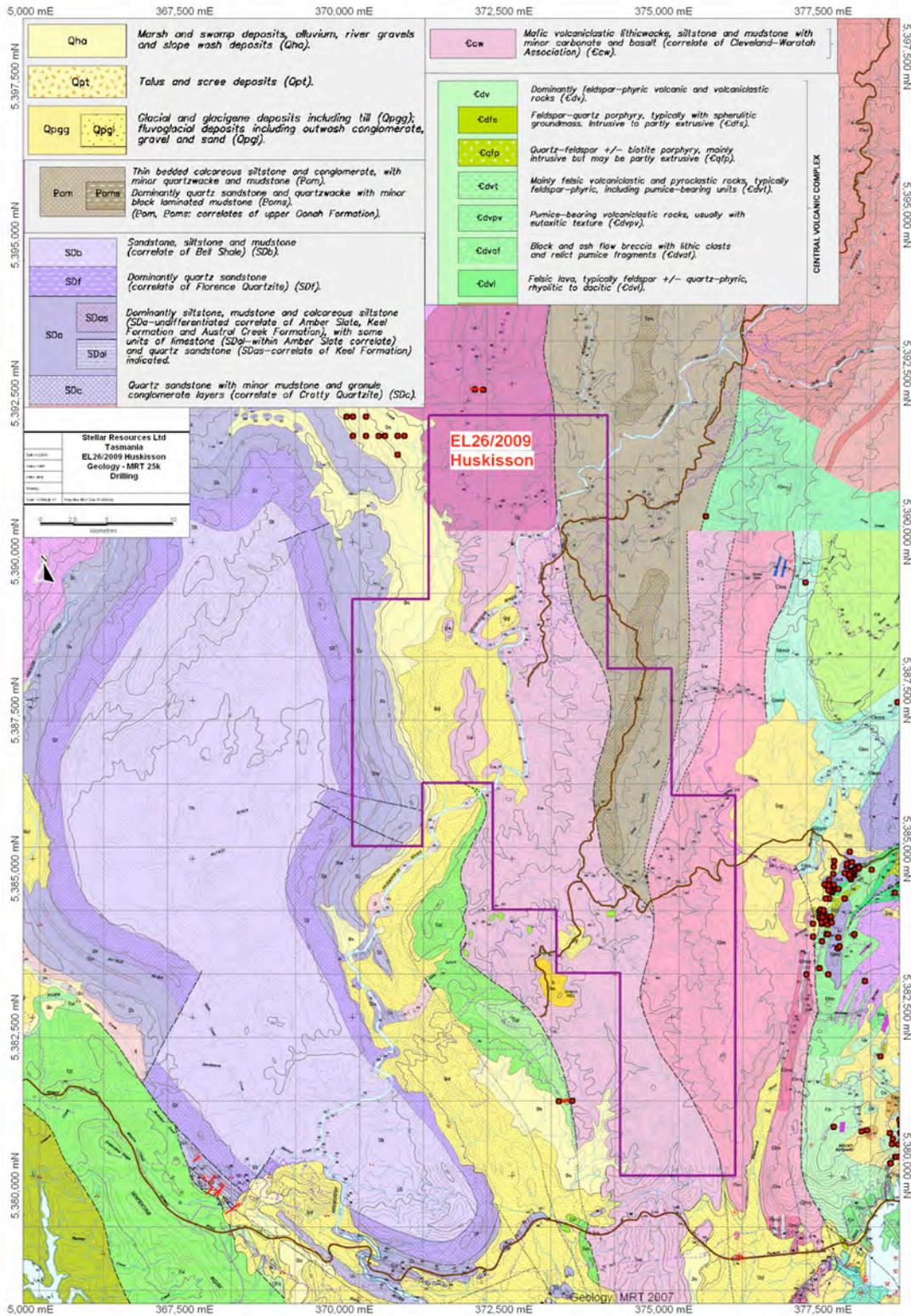
(360518,5377213)

Identify Results - Category 1 Exploration Licence

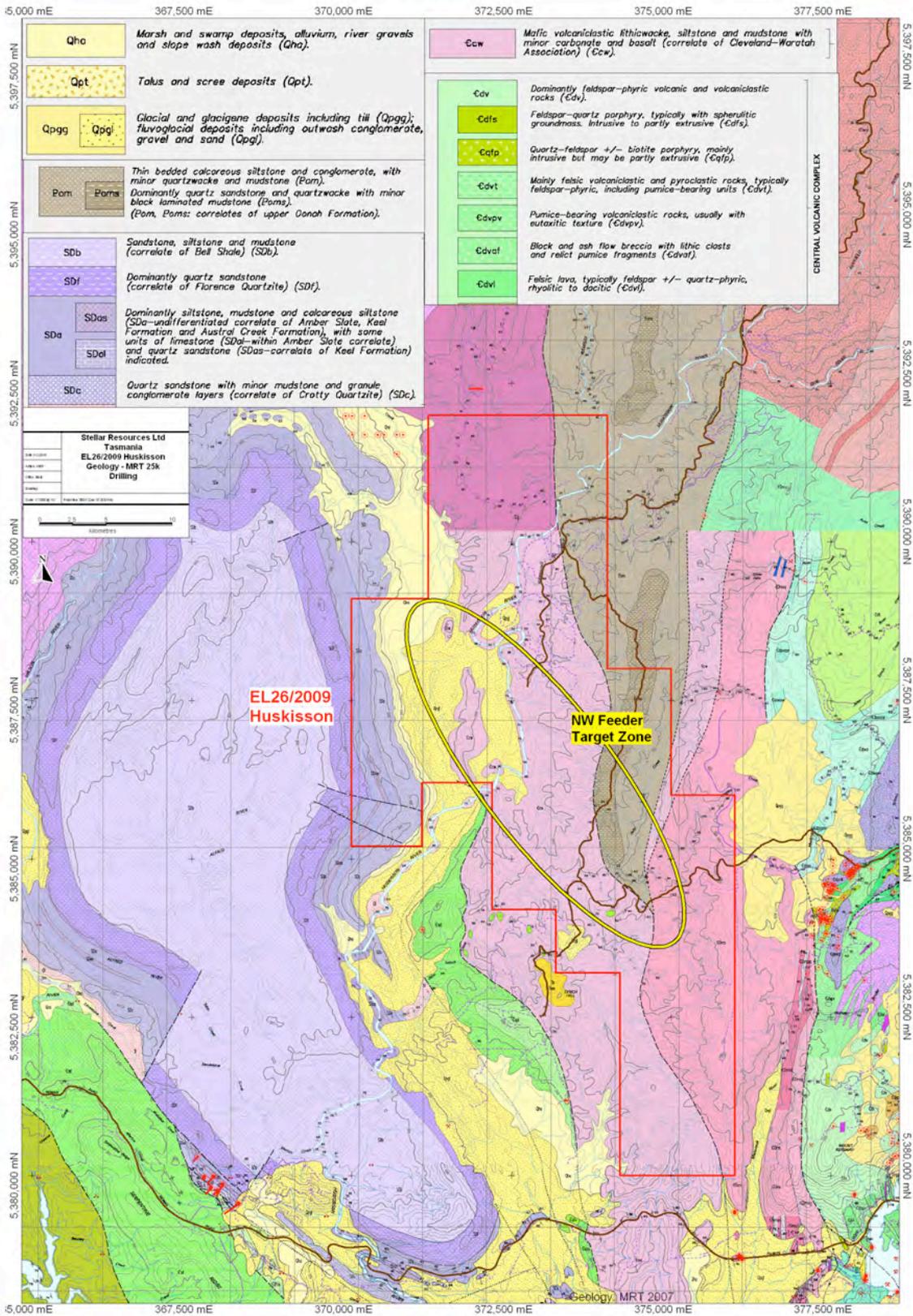
TEN_ID 31524
 TEN_REF EL26/2009
 STATUS Granted



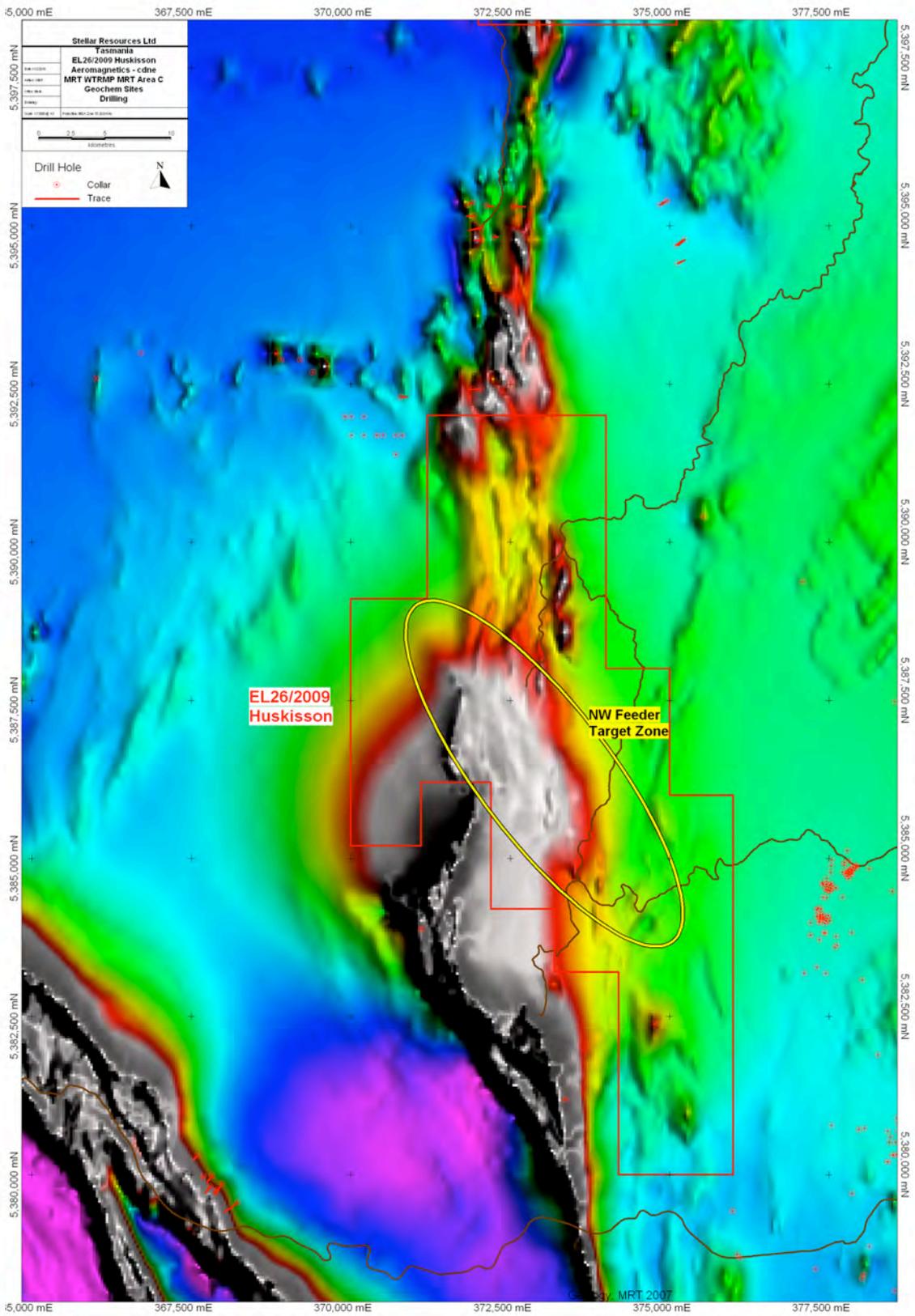
• Figure 4 EL26/2009: Land Tenure



• **Figure 5 EL26/2009: Land Tenure**



• **Figure 6 EL26/2009: MRT Geology with Stellar's NW Feeder Target Zone**



- **Figure 7 EL26/2009: MRT Aeromagnetics with Stellar's NW Feeder Target Zone**

2. REVIEW OF PREVIOUS WORK

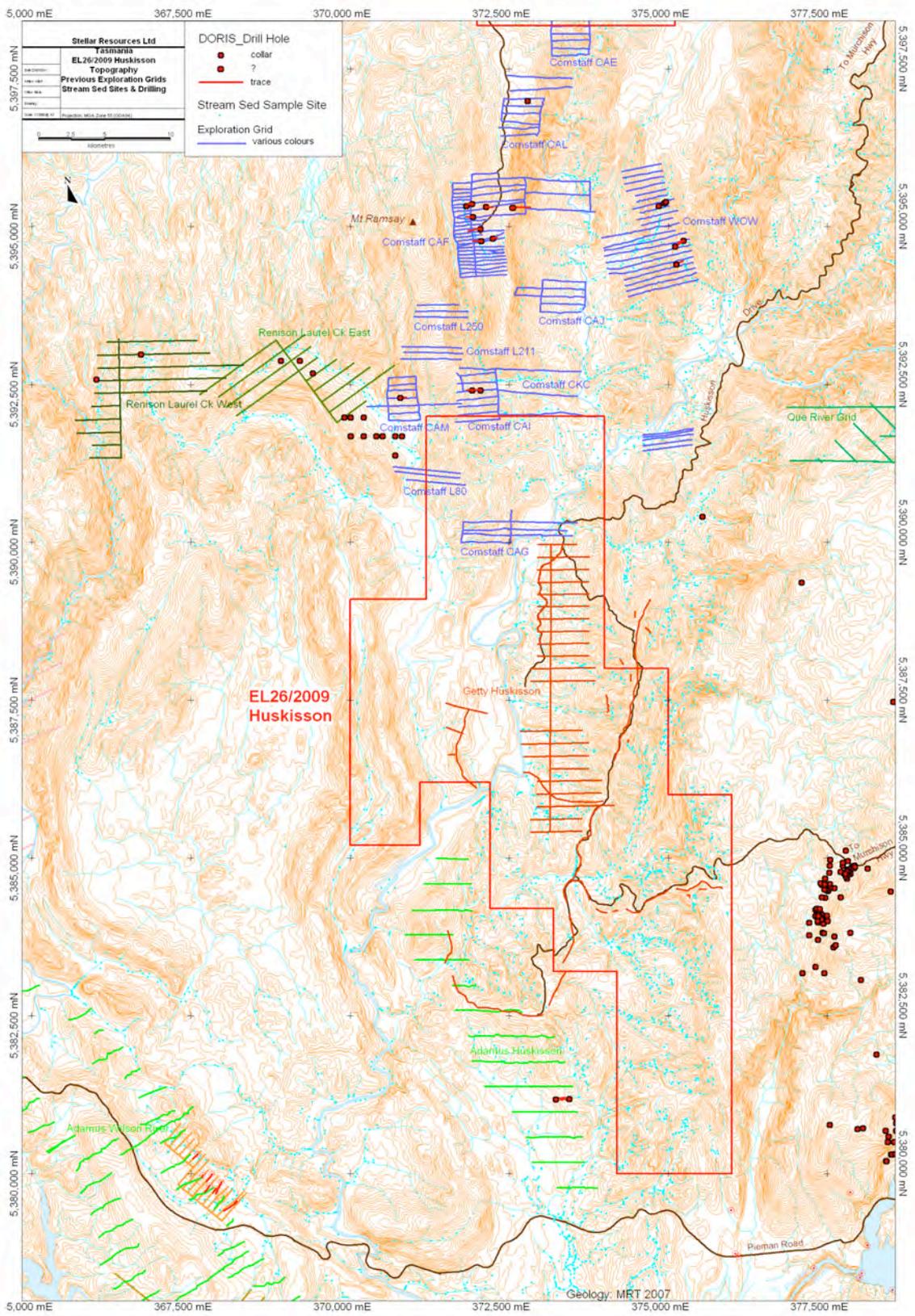
Previous holders of the area covered by the ERA area considered it prospective for nickel, tin, gold and base metals. Exploration has been sparse in the area west of the Huskisson River, mainly due to difficult access. Considerable work has been done to the east of the river where good track access is possible.

Some lines of geophysics were flown in the 1970-80's by Renison, BHP and Comstaff (see Figure 10). The 1978 Renison EM survey, an unevenly spaced survey averaging 400m fls, effectively mapped the geology, as well as some zones of moderate conductivity within the western part of the licence. The 1981 BHP DIGHEM II survey (200m fls) covered the central part of the licence, the zone of Stellar's initial primary interest. This survey did not disclose any strong conductors, but did show three weak bedrock conductors (channel 44) coincident with a north south magnetic 'ridge' on the western side of the Huskisson River, within Stellar's *NW feeder zone* target. Three other surface conductors were also indicated.

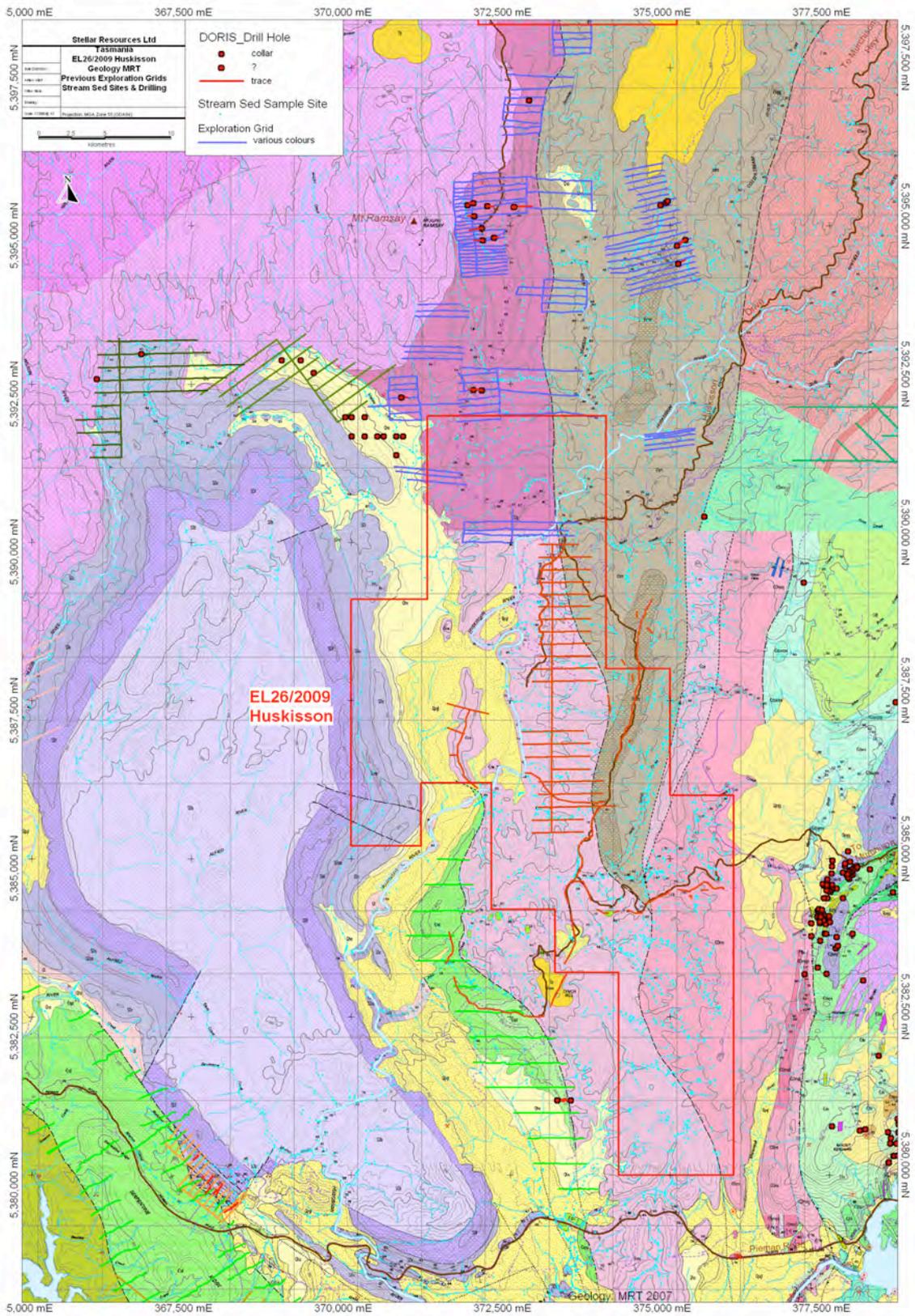
The 1984 Comstaff Dighem survey included the northern part of the licence, disclosing one anomaly within the licence (CAG) and one 400m north of the licence (CAI) These may be of the Meredith granite base-metal-skarn type, which occur in several places north along the eastern side of the Meredith granite. Comstaff duly gridded the CAG anomaly, and the Renison/Comstaff CAI anomaly, undertaking ground magnetics and soil geochemistry. The CAG anomaly work showed copper assays within the 95-130ppm range 400m east of the EM anomaly. CAG was not drill tested. Nine similar anomalies outside the EL26/2009 were similarly tested, with five being drilled. Each soil grid showed anomalous copper zones of 95-130ppm.

The MRT WTRMP Area C aeromagnetics survey covers the whole area, while the WTRMP Meredith Granite EM/mag survey covers part of the northern quarter of the licence area including a portion of Stellar's *NW feeder zone* target. Griggs did a structural interpretation of the 2002 WTRMP survey, mapping structures 3km into the north of the licence. Very little stream sediment sampling, and only one ridge traverse of 23 soil samples have taken place west of the Huskisson River. In the eastern part of the licence thorough stream sediment sampling has taken place in addition to a soil grid. Getty undertook soil grids in 1984 on the eastern side of the Huskisson River over early Cambrian volcanoclastics in the northeast to central part of the licence. The southeastern end of the *NW feeder zone* target was covered. Getty's survey showed elevated copper values on all 22 lines, with anomalous values over the first six or seven lines from the north, co-incident with the Proterozoic sediments boundary and a line of discrete aeromagnetic anomalies.

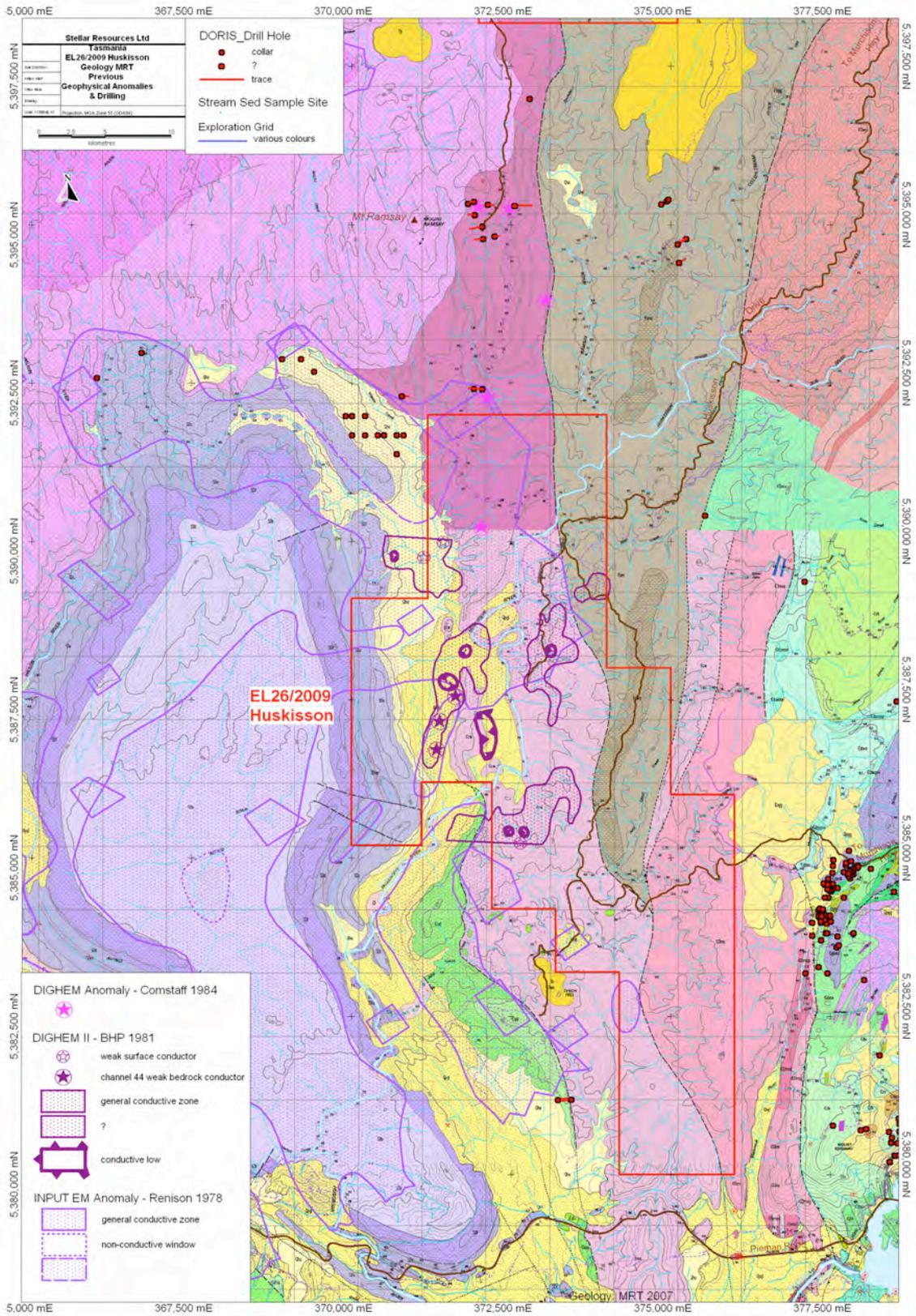
No drilling has occurred within the licence, with the nearest being approximately 5km from the centre of the initial area of interest (*NW feeder zone*). Comstaff drilled two holes approximately 1km west of the south end of the licence in 1972, to test a soil nickel anomaly, intersecting unmineralised serpentinite (see MRT rpts: 72-0903 & 87-2713). The serpentinite flanks the eastern side of the Huskisson syncline, extending north, on the western side of the licence, and may continue into the central part of the licence (BHP 1981 mapping). Comstaff drilled two base-metal-skarn target holes in 1984 as a follow-up on EM/mag/geochemical anomalies (see MRT rpt: 84-2159). Hole CAM1, 500m northwest of the licence, tested a weak/moderate As/Cu/Pb anomaly roughly coincident with a DIGHEM response. No economic assays were returned, with target alteration being due to contact hornfelsing from the Meredith granite. Holes CA11 & 2 were drilled 400m north of the licence. CA11 tested for the source of a DIGHEM response. Two skarn replacement zones of moderate to strong pyrrhotite and weak chalcopyrite mineralisation were intersected. No economic mineralisation was indicated. CA12 was drilled to test for tin mineralisation in an area where hydrothermally altered rocks assayed up to 158ppm Sn and 500ppm As. The hole intersected disseminated and vein replacement style pyrrhotite and minor chalcopyrite mineralisation, in host rocks of variably altered calc-pelites and marls. Enhanced tin (up to 66ppm) and arsenic (up to 580ppm) values were obtained throughout the hole, but there was no correlation with the intensity of the sulphide mineralisation. Comstaff considered that CA1 may represent a "failed" Cleveland type system, but did not conclusively discount the possibility of better mineralisation at depth.



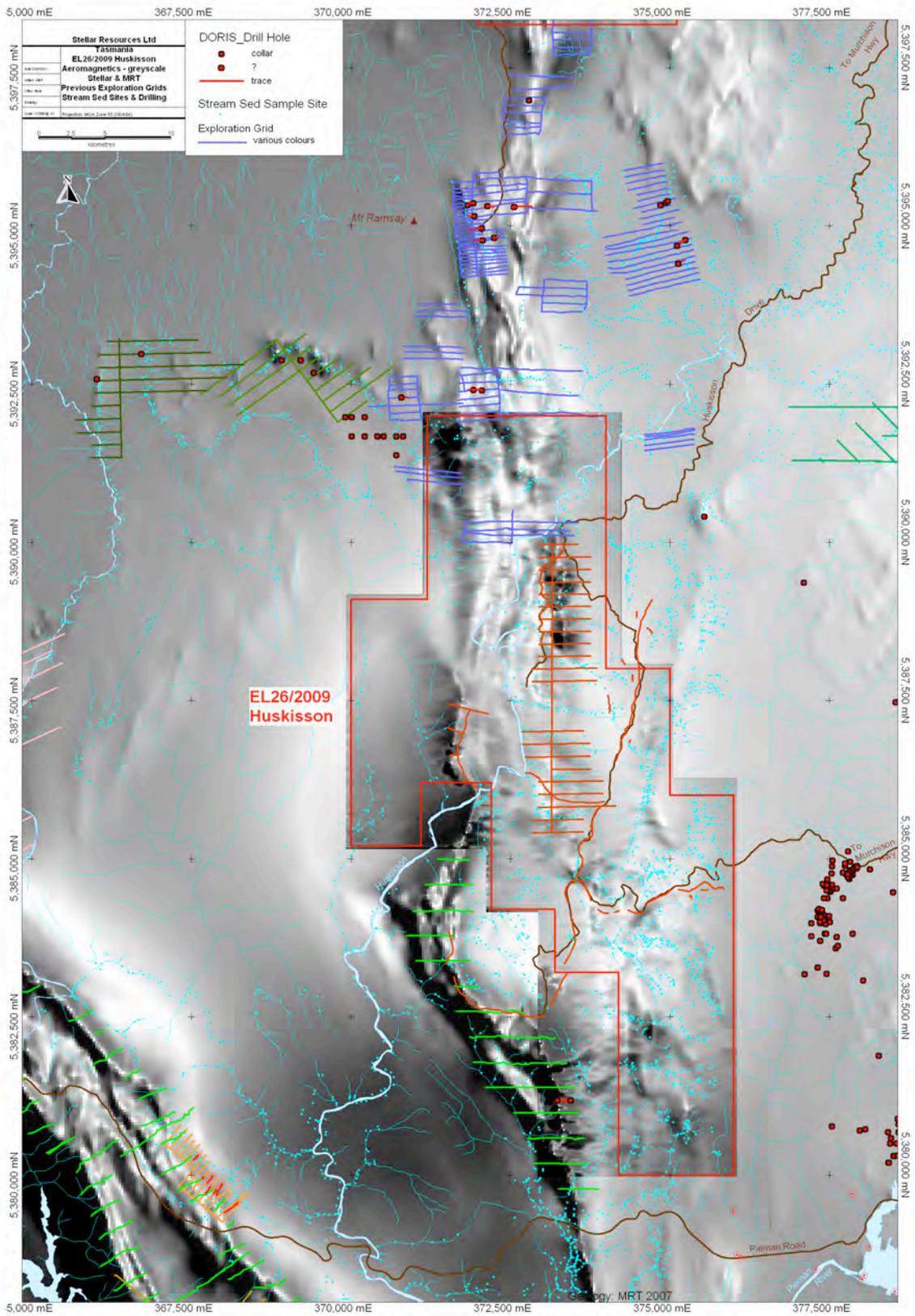
• **Figure 8 EL26/2009: Topography with Previous Exploration Grids and Drilling**



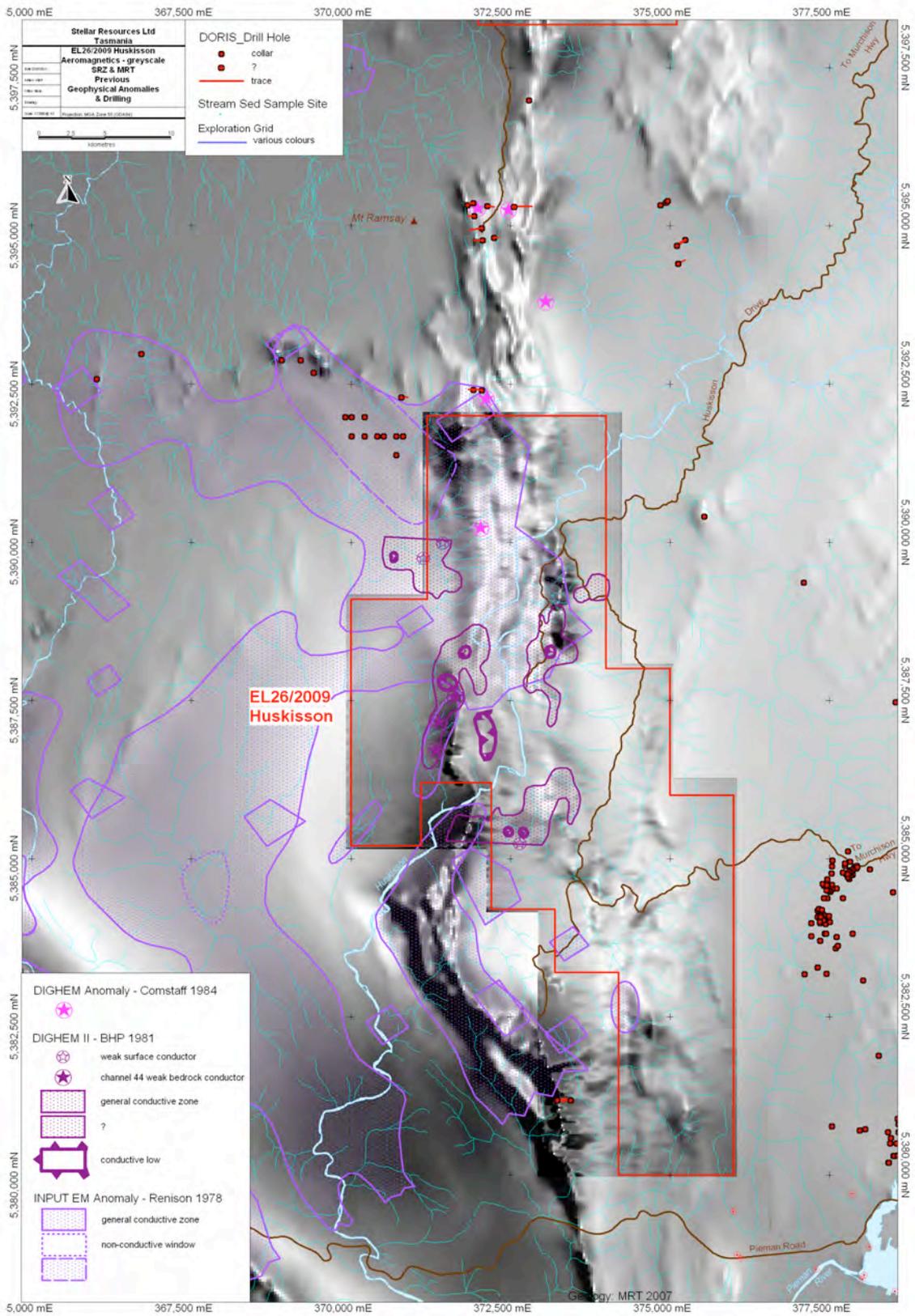
• Figure 9 EL26/2009: MRT Geology with Previous Exploration Grids and Drilling



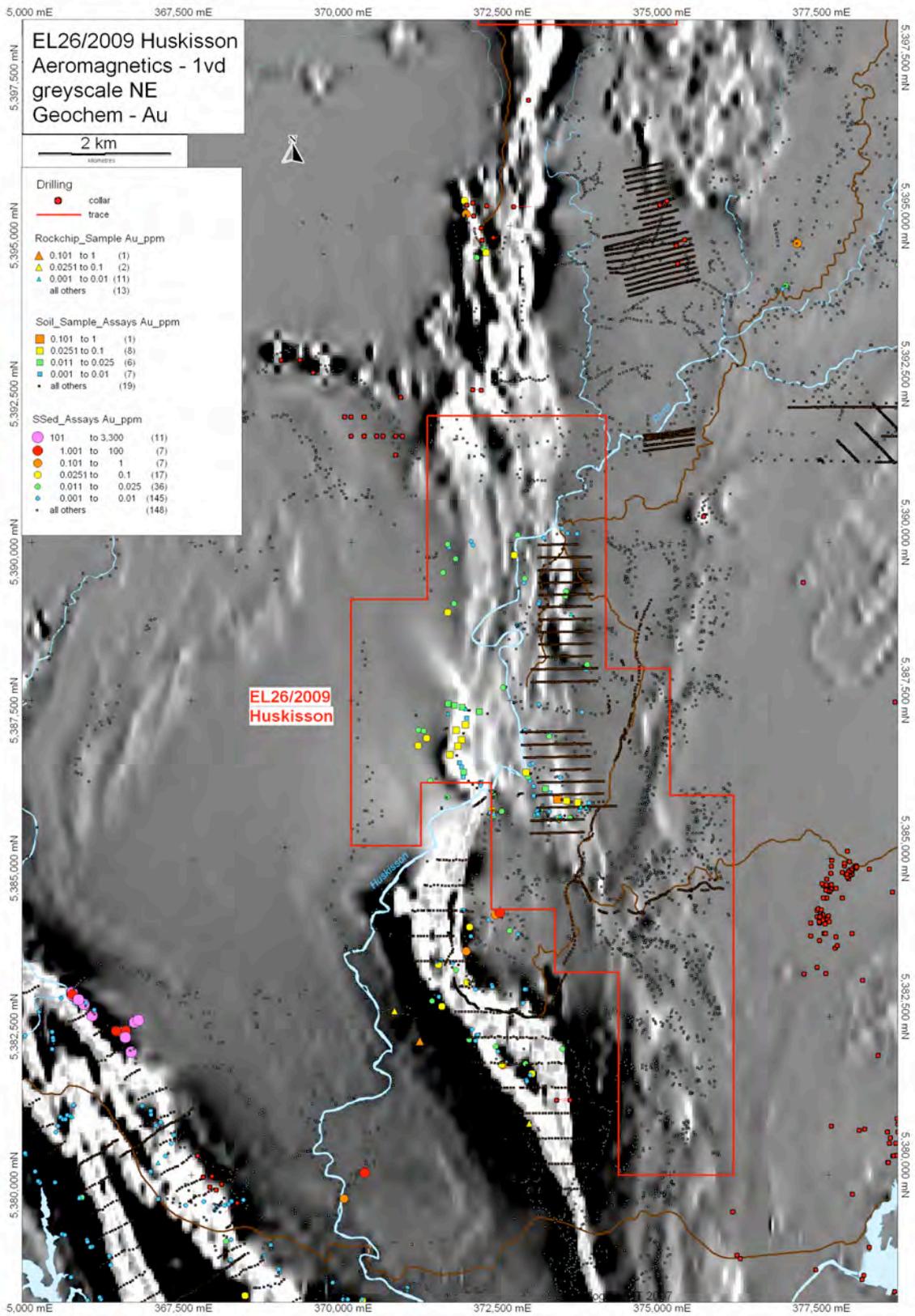
• **Figure 10 EL26/2009: MRT Geology with Previous Geophysical Anomalies and Drilling**



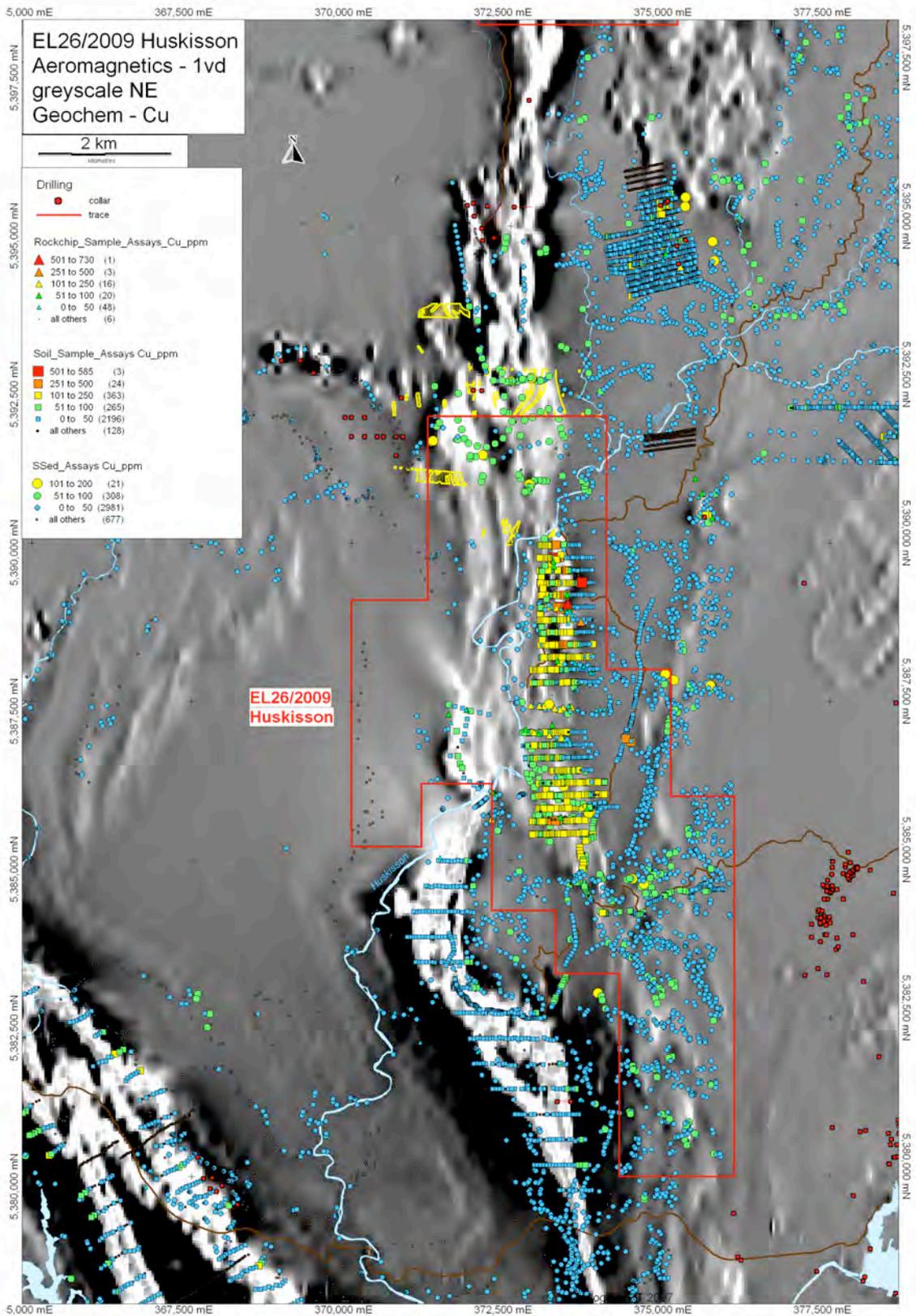
• **Figure 11 EL26/2009: Aeromagnetics with Previous Exploration Grids and Drilling**



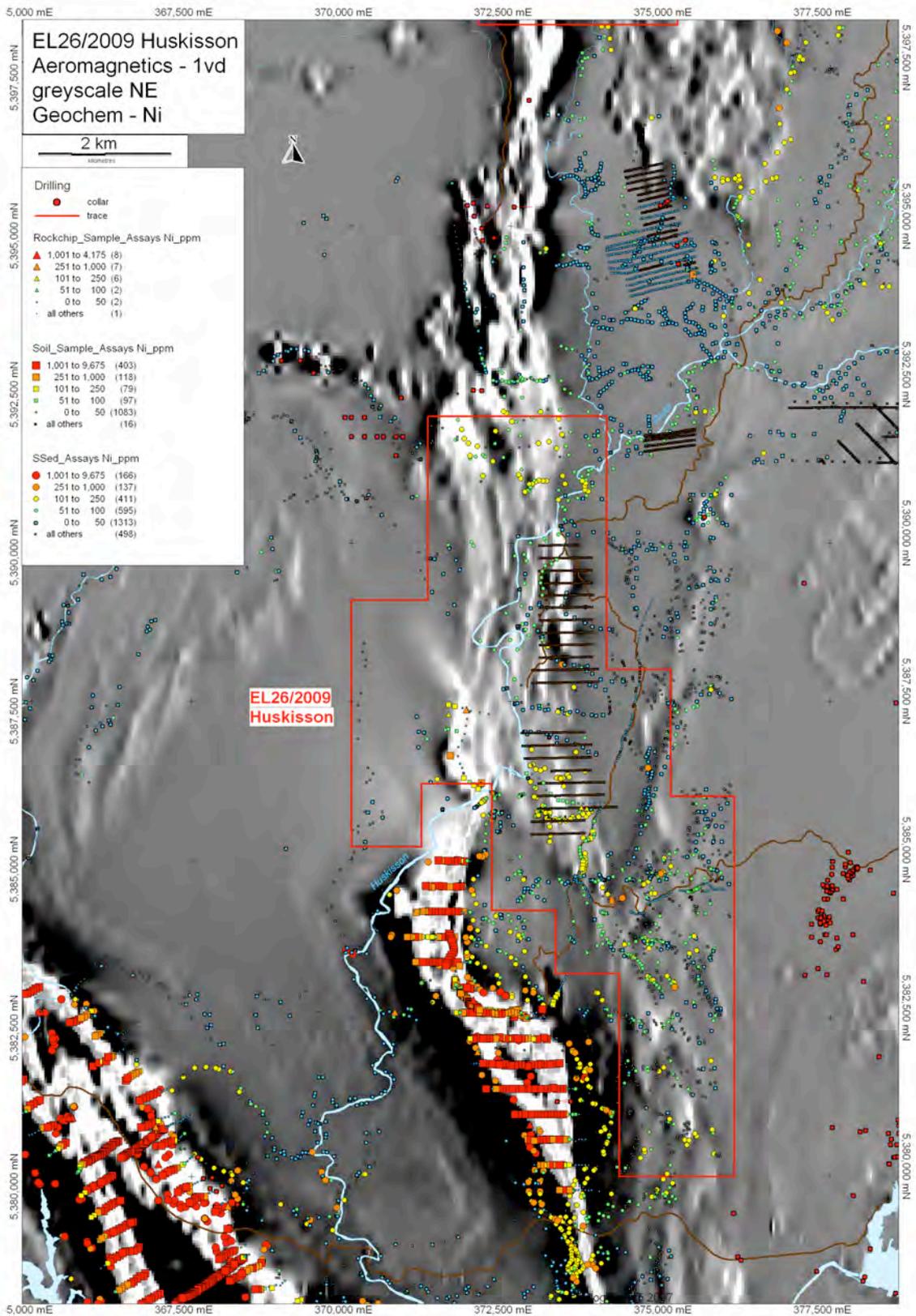
• **Figure 12 EL26/2009: Aeromagnetics with Previous Geophysical Anomalies and Drilling**



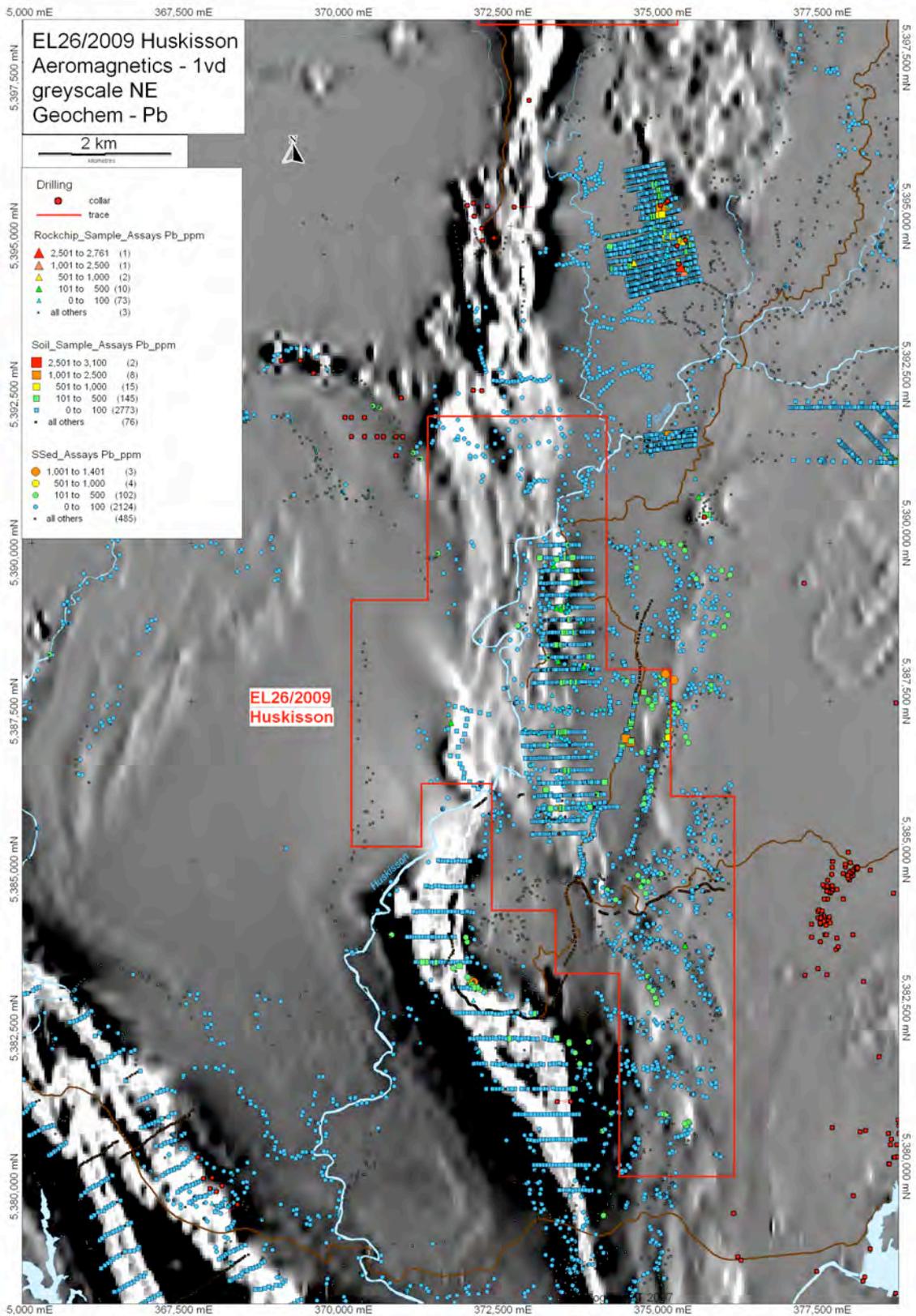
• **Figure 13 EL26/2009: Aeromagnetics 1vd, with Previous Au Geochemistry and Drilling**



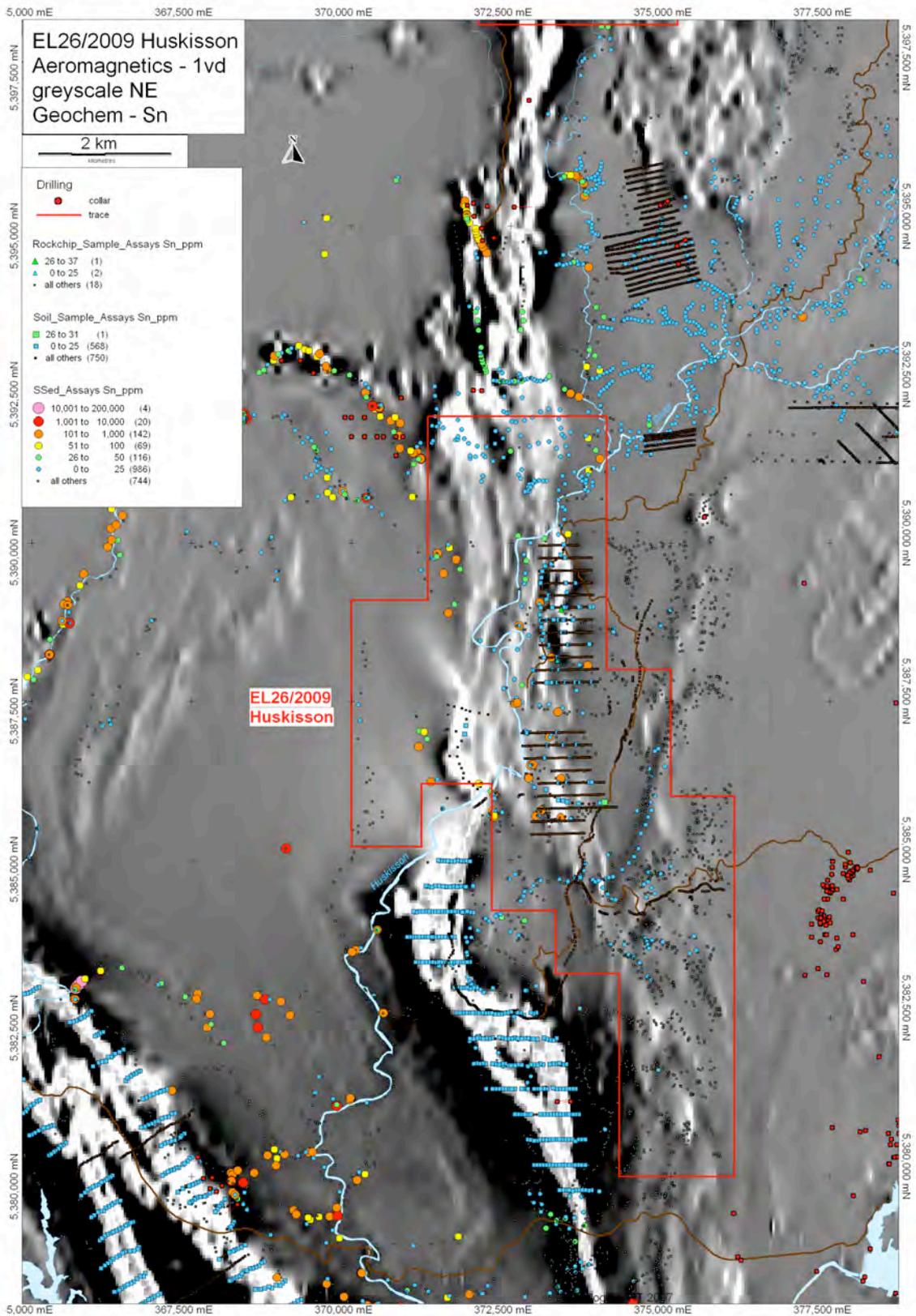
• **Figure 14 EL26/2009: Aeromagnetics 1vd, with Previous Cu Geochemistry and Drilling**



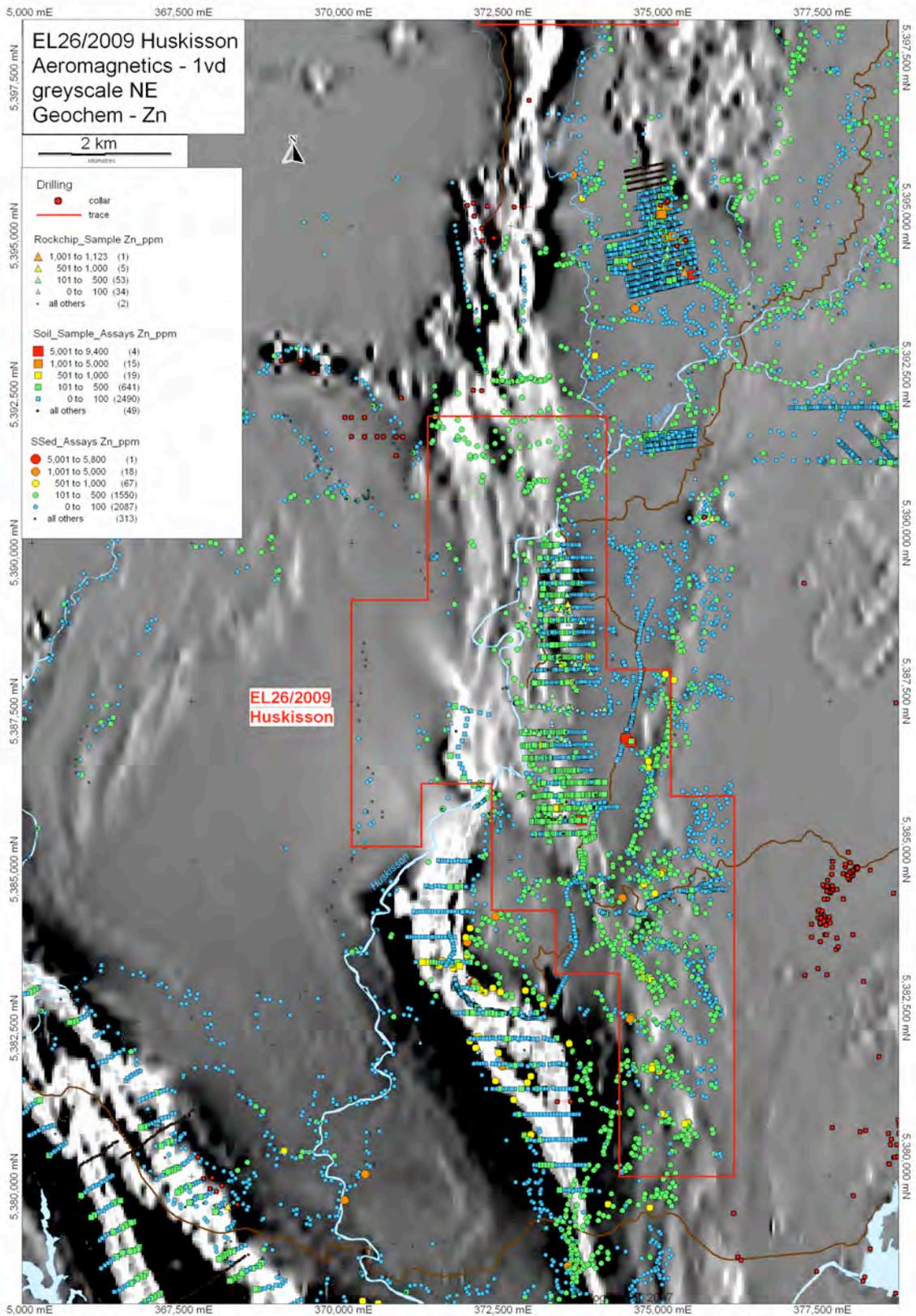
• **Figure 15 EL26/2009: Aeromagnetics 1vd, with Previous Ni Geochemistry and Drilling**



• **Figure 16 EL26/2009: Aeromagnetics 1vd, with Previous Pb Geochemistry and Drilling**



• **Figure 17 EL26/2009: Aeromagnetics 1vd, with Previous Sn Geochemistry and Drilling**

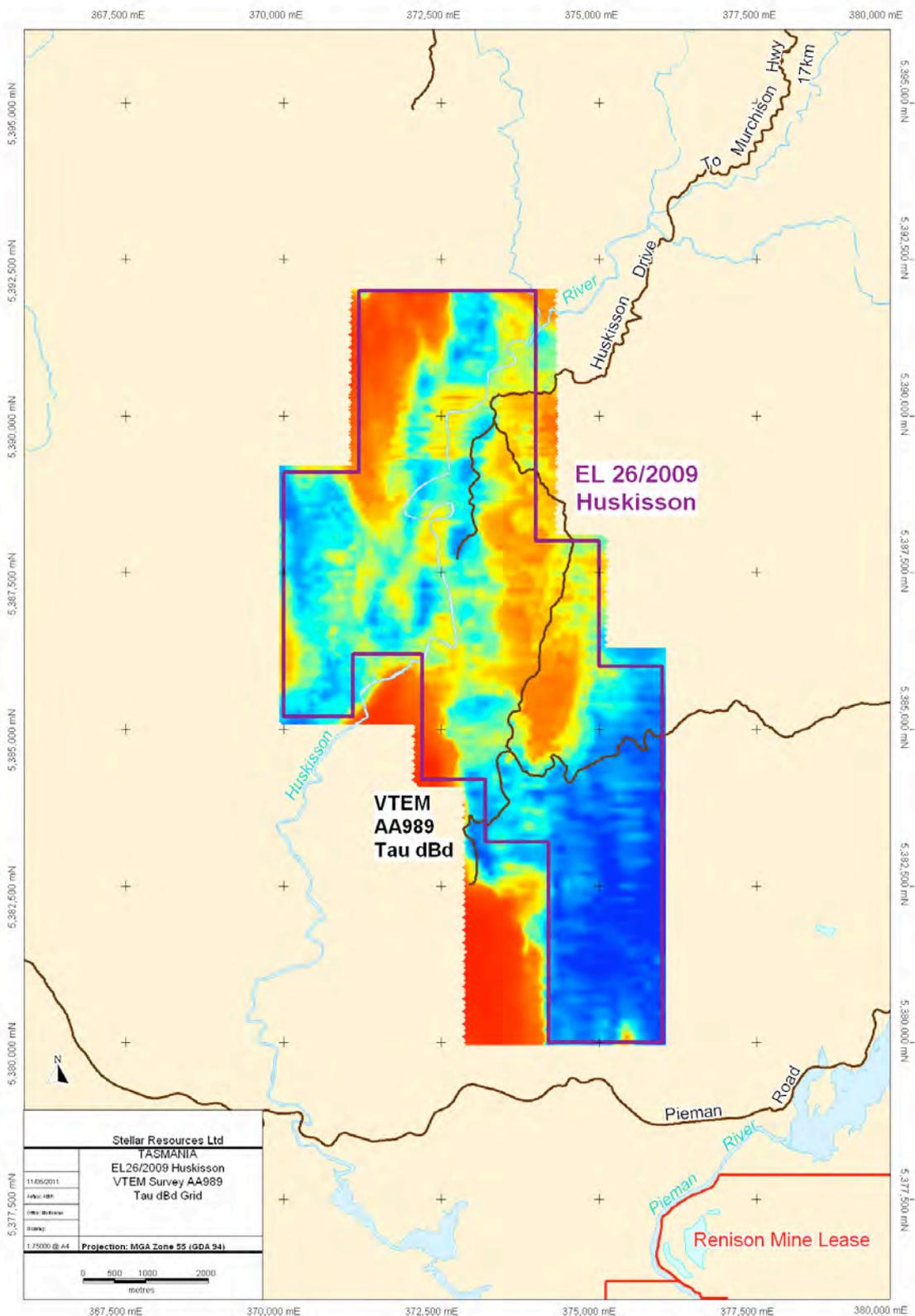


• **Figure 18 EL26/2009: Aeromagnetics 1vd, with Previous Zn Geochemistry and Drilling**

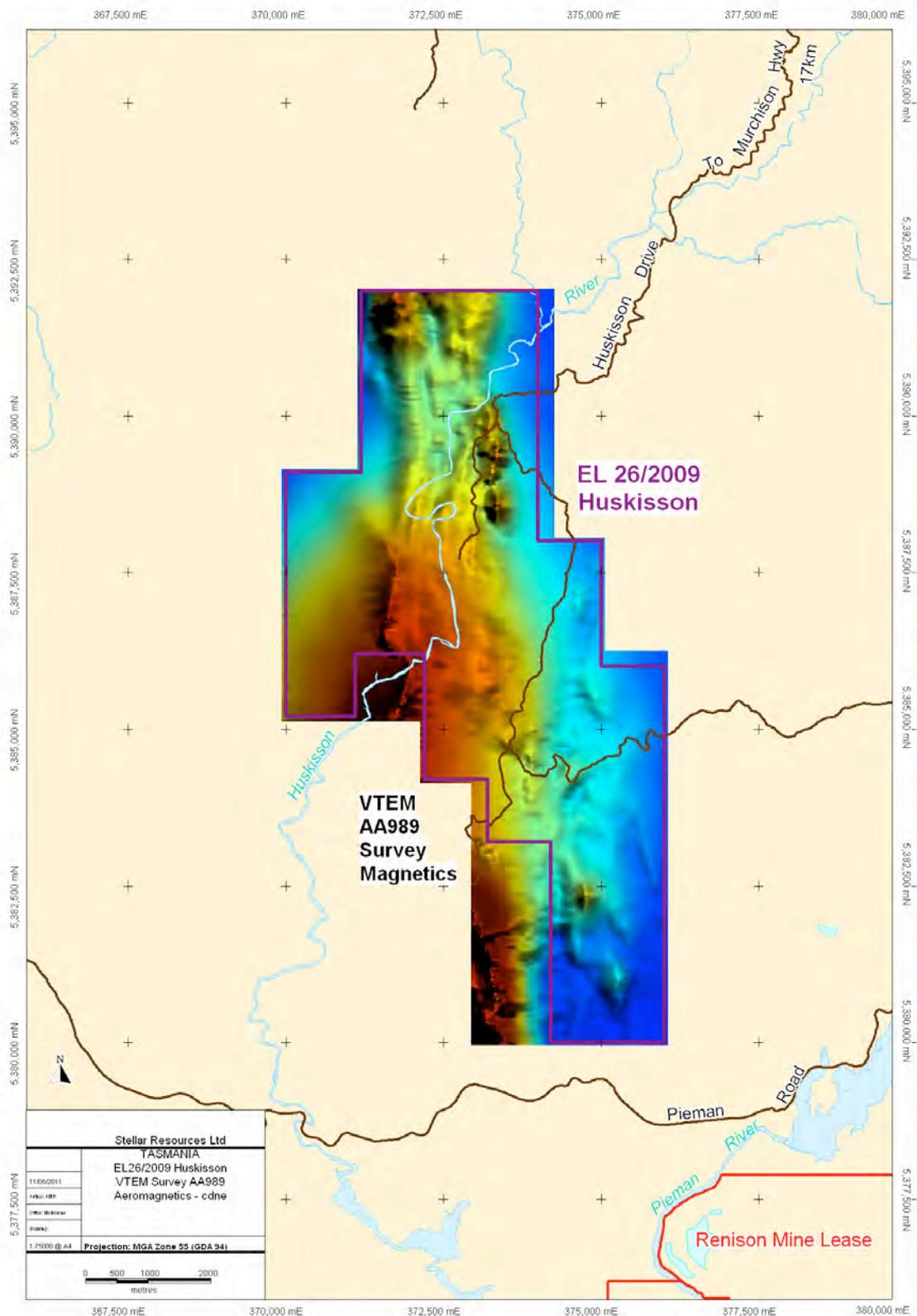
3. EXPLORATION COMPLETED DURING THE REPORTING PERIOD

MRT digital geology and geophysics datasets, as well as data captured from open-file company reports have been used to produce various maps at 1:25k and general scales. Exploration data from MRT open-file reports by Renison, Comstaff, Getty and Pasmaico have been imported and/or digitised into MapInfo.

During March 2011 Geotech Airborne P/L flew a VTEM/aeromagnetics survey for Stellar. The survey consisted of 499km e/w at 100m line spacings, with 50m infill lines between 5390500 and 5389200mN, at a nominal height of 78/100m.



• **Figure 20 EL26/2009: Stellar’s VTEM AA989 Survey EM Tau dBd Grid**



• **Figure 21 EL26/2009: Stellar’s VTEM AA989 Survey Aeromagnetics Grid (TMI)**

4. DISCUSSION OF RESULTS

The results of historical exploration data research and re-interpretation together with the interpretation of the aeromagnetic survey data has confirmed the prospectivity of the area and supports the exploration rationale.

The results of the VTEM survey were not received until close to the end of the reporting period so thorough interpretation of the data has not been carried out. Interpretation of the survey data will be undertaken in the next period.

5. CONCLUSIONS

Historic data collected and analysed to date supports the original exploration concept. Interpretation of the VTEM survey data will further refine the target areas for follow up reconnaissance, grid geochemistry ground surveys and drilling.

5.1. RECOMMENDATIONS

- **Prioritise exploration targets identified from the VTEM survey.**
- **Access, grid geochemistry and geophysical surveys of targets.**
- **Access and drill test priority targets.**

6. PROPOSED EXPLORATION PROGRAMME

Stellar's proposed programme for the area comprises:

1- Review and re-interpretation of prior holder's data and conclusions

Completed

2- Reprocess and interpret the MRT helicopter-borne electromagnetic survey data to identify any anomalous conductive zones and enhance structural interpretation.

Completed

3- Ground reconnaissance including geological mapping and initial geochemical rock chip sampling and stream sediment sampling.

Cost estimate: **\$20,000**

4- Conduct VTEM survey at 50m flight line spacing to identify any anomalous conductive zones.

Completed

5- Dependant upon the analysis of 1, 2, 3 & 4 above, produce recommendations for field exploration.

Cost estimate: **\$2,000 to \$5,000**

6- Grid Geochemistry surveys and if required, ground geophysical surveys.

Cost estimate: **\$25,000**

7- Diamond drilling, on main target zone, initially up to two 300m holes.

Cost estimate: **\$180,000**, including access costs

Items 1, 2 and 4 have been completed. Items 3, 5 & 6 will be completed in year 2, and that drilling of priority targets (item 6) should be carried out in year 3.

Work programmes beyond year 2 would be contingent on results. Until drilling is conducted, negligible field impact is expected. Some field checking would be required, but this would mostly be on foot.

Once drilling commences, site access and preparation is minimised and operations are conducted in accordance with the *Mineral Exploration Code of Practice*.

7. ENVIRONMENT

The only field activity carried out during the period was the VTEM survey and there was no environmental disturbance associated with this activity and no rehabilitation was required.

8. EXPENDITURE

Transaction Report Rubicon Limited							Page: 1
Printed At: 10/06/2011 10:41:00 AM		Job Details					
Job No	Tran. Date	Doc Ref - Description	Department	Class	Group	Posting Ref	Amount
Job Code: 6507		Huskisson River EL26/2009	D1	01	GROUP		
	1061	Professional Technical			Total		AU\$14,375.62
Phase Total	106	CONTRACT PERSONNEL					AU\$14,375.62
	1201	Geophysical Airphoto Surveys			Total		AU\$126,532.00
Phase Total	120	DATA ACQUISITION					AU\$126,532.00
	1505	Rents/ Other Utilities			Total		AU\$819.00
Phase Total	150	TENEMENT COSTS					AU\$819.00
	1651	Administration			Total		AU\$32,631.00
Phase Total	165	OVERHEADS					AU\$32,631.00
Job Total : 6507		Class 01					AU\$174,357.62
Report Total:							AU\$174,357.62

9. REFERENCES

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- Meares, M.M.D. 2004 EL 42/2002, Mt Ramsay, Tasmania. First Annual Exploration Report for the Year Ended 22 August 2004. Malachite Resources NL
- Seymour, D.B. 2006 The Geology and Mineral Deposits of Tasmania: A Summary
Green, G.R. Bulletin 72 Tasmanian Geological Survey, Mineral Resources Tasmania.
& Calver, C.R.
- Turnbull, C. 2007 EL 3/2005, Huskisson Project, Annual Progress Report, 10 August 2006 to
& Bates, S. 9 August 2007. Bass Metals Ltd.

Keywords

Location: South East of Mt Ramsay
Mineralisation environment: Stockwork veins, skarns,
Minerals: Pentlandite, Chalcopyrite, Galena, Sphalerite, Cassiterite
Exploration methods: VTEM, Geochemistry, Drilling
Mine/prospect name: Huskisson River
Stratigraphic name: Oonah Formation, Crimson Creek Formation, Dundas Group
Gordon Group, Eldon Group
Lithologic name: Conglomerate, Sandstone, siltstone, shale, limestone, dolomite, basalt,
volcaniclastic, breccia,
Geological Province: Dundas Trough,
Geological age: Proterozoic, Palaeozoic, Devonian, Tertiary

STELLAR RESOURCES LTD

May 2011

EL 26/2009 Zeehan – Report on 2010 program

APPENDICES

STELLAR RESOURCES LTD

May 2011

EL 26/2009 Zeehan – Report on 2010 program

Appendix 1: VTEM Survey Report

**SURVEY AND LOGISTICS REPORT
ON A HELICOPTER BORNE
VERSATILE TIME DOMAIN
ELECTROMAGNETIC (VTEM)
SURVEY**

on the

**TASMANIA PROJECT AREA
AUSTRALIA**

for

STELLAR RESOURCES LIMITED

by



GEOTECH AIRBORNE PTY LIMITED

Unit 1, 29 Mulgool Road,
Malaga, WA, 6090,
Australia
Tel: +61-8-9249-8814
Fax: +61-8-9249-8894
www.geotechairborne.com
e-mail: info@geotechairborne.com

**Project AA989
April 2011**

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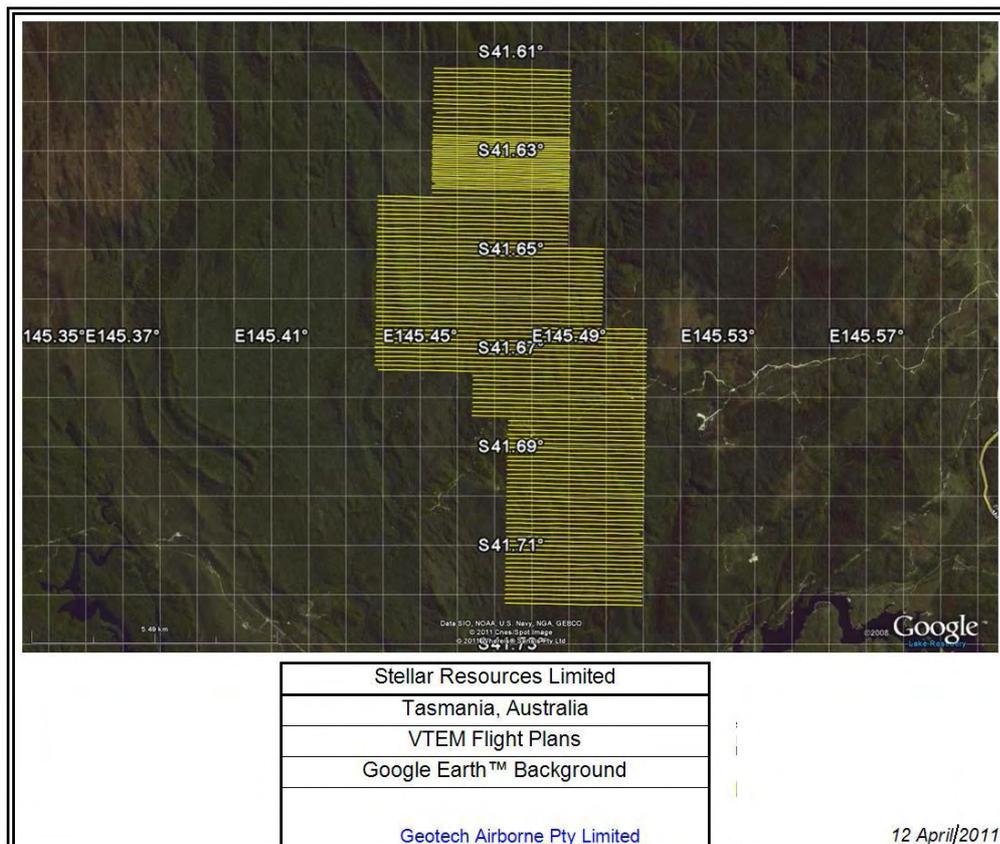
SURVEY AND LOGISTICS REPORT ON A HELICOPTER-BORNE VTEM SURVEY

1. SURVEY SPECIFICATIONS

1.1. General

Job Number	AA989
Client	Stellar Resources Limited.
Project Area	Tasmania Project Area
Location	Australia
Number of Blocks	1
Total line kilometres	499 km
Survey date	6 – 17 March 2011
Client Representative	Tom Whiting Tel: +61 3 9909 7618 Fax: +61 3 9909 7621 Tom.Whiting@stellarresources.co.au
Client address	Level 7 Exchange Tower 530 Little Collins Street Melbourne, VIC 3000, Australia
Client Consultant	NA

1.2. VTEM flight plan on Google EARTH™ Background



1.3. Survey block coordinates.

Easting UTM Z 55S	Northing UTM Z 55S
AA989 Tasmania Project Area	
371200	5391000
374200	5391000
374200	5388000
375000	5388000
375000	5386200
376000	5386200
376000	5383200
373000	5383200
373000	5384200
372200	5384200
372200	5385200
371000	5385200
371000	5386199
370000	5386200
370000	5389100
371200	5389100
371200	5391000
371200	5391000

1.4. Survey block specifications

Survey block	Line spacing (m)	Line-km (contractual)	Line-km (delivered)	Flight direction	Line number
Tasmania Area	100 / 50	596.4	499	090°- 270°	L10010 – L12410

1.5. Survey schedule

Date	Flight #	Block	Nominal Production Km flown	Comments
06-March-10	1 to 2	Main Block	0	Test Flight
07-March-10		N/A		
08-March-10		N/A		
09-March-10	3	Main Block	12.4	Production
10-March-10	4 to 6	Main Block	99.2	Production
11-March-10		N/A		Helicopter Service
12-March-10		N/A		Helicopter Service
13-March-10		N/A		Helicopter Service
14-March-10	7	Main Block	74.7	Production
15-March-10	8 to 11	Main Block	328	Production
16-March-10		N/A		Fixed tree Strike
17-March-10	12	Main Block	0	Test Flight



2. SYSTEM SPECIFICATIONS

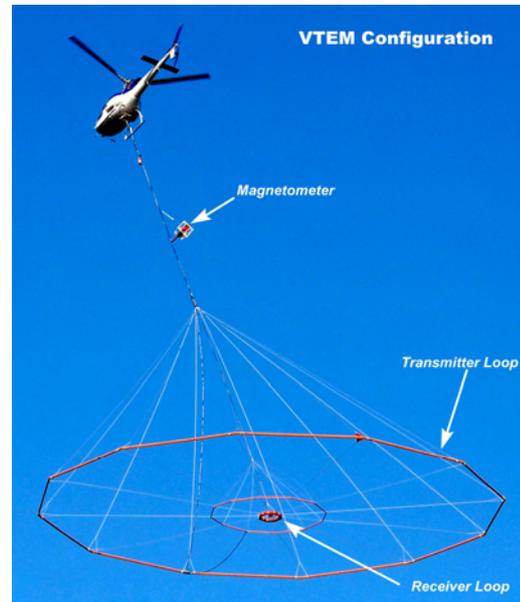
2.1. Instrumentation

Survey Helicopter	
Model	AS 350 B3
Registration	VH-VTX
Operating Company	United Aero
Nominal survey speed	90 km/h
Nominal terrain clearance	110 m
VTEM Transmitter	
Coil diameter	26 m
Number of turns	4
Pulse repetition rate	25 Hz
Peak current	190 Amp
Duty cycle	41.64%
Peak dipole moment	403,670 NIA
Pulse width	8.33 ms
Nominal terrain clearance	78 m
VTEM Receiver	
Coil diameter	1.2 metre
Number of turns	100
Effective area	113.1 m ²
Sampling interval	0.1 s
Nominal terrain clearance	78 m
Magnetometer	
Type	Geometrics
Model	Optically pumped cesium vapour
Sensitivity	0.02 nT
Sampling interval	0.1 s
Cable length	12 m
Nominal terrain clearance	100 m
Radar Altimeter	
Type	Terra TRA 3000/TRI 40
Position	Beneath cockpit
Sampling interval	0.2 s
GPS navigation system	
Type	NovAtel
Model	WAAS enabled OEM4-G2-3151W
Antenna position	Helicopter tail
Sampling interval	0.2 s
Base Station Magnetometer/GPS	
Type	Geometrics
Model	Cesium vapour
Sensitivity	0.001 nT
Sampling interval	1 s



2.2. VTEM Configuration

Configuration	
Cable angle with vertical	40 °
Cable length (EM receiver)	42 m
Cable length (Magnetometer)	13 m

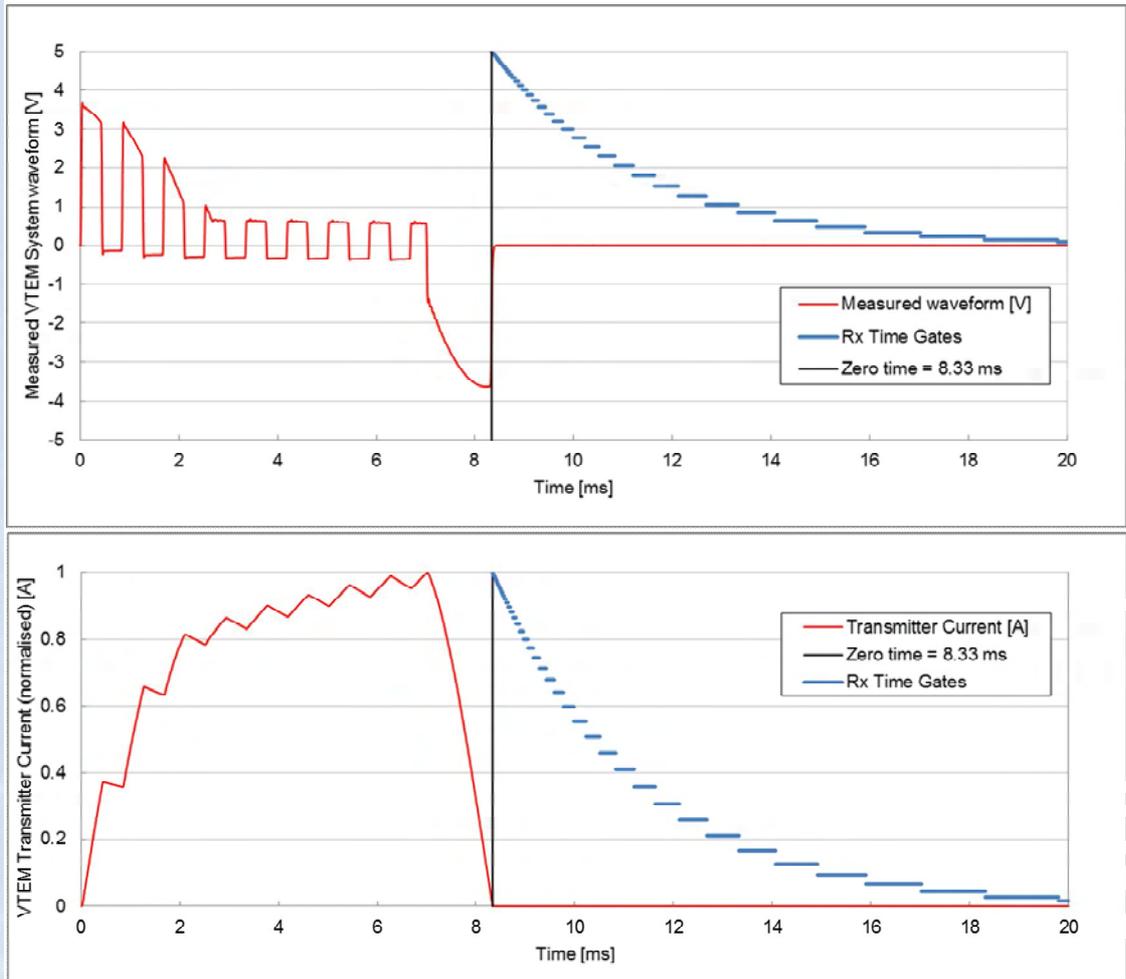


2.3. VTEM decay sampling scheme

B-field VTEM Decay Sampling scheme				
Array	Microseconds			
Index	Middle	Start	End	Width
13	83	78	90	12
14	96	90	103	13
15	110	103	118	15
16	126	118	136	18
17	145	136	156	20
18	167	156	179	23
19	192	179	206	27
20	220	206	236	30
21	253	236	271	35
22	290	271	312	40
23	333	312	358	46
24	383	358	411	53
25	440	411	472	61
26	505	472	543	70
27	580	543	623	81
28	667	623	716	93
29	766	716	823	107
30	880	823	945	122
31	1010	945	1086	141
32	1161	1086	1247	161
33	1333	1247	1432	185
34	1531	1432	1646	214
35	1760	1646	1891	245
36	2021	1891	2172	281
37	2323	2172	2495	323
38	2667	2495	2865	370
39	3063	2865	3292	427
40	3521	3292	3781	490
41	4042	3781	4341	560
42	4641	4341	4987	646
43	5333	4987	5729	742
44	6125	5729	6581	852
45	7036	6581	7560	979
46	8083	7560	8685	1125
47	9286	8685	9977	1292



2.4. VTEM Transmitter Waveform over one half-period (March 2011)



3. PROCESSING

3.1. Processing parameters

Coordinates	
Projection	MAP GRID AUS ZONE 55
Datum	GDA 94
Spherics rejection (EM and Magnetic data)	
Non-linear filter	4 point
Non-linear filter sensitivity	0.0001
Low-pass filter wavelength	15 fids
Lag correction of other sensors to EM receiver position	
GPS	19 m
Radar	29 m
Magnetometer	19 m

3.2. Flight Path

The flight path, recorded by the acquisition program as WGS 84 latitude/longitude, was converted into the MGA coordinate system in Oasis Montaj. The flight path was drawn using linear interpolation between x,y positions from the navigation system. Positions are updated every second and expressed as MGA eastings (x) and MGA northings (y).

3.3. Electromagnetic Data

A three stage digital filtering process was used to reject major spheric events and to reduce system noise. Local spheric activity can produce sharp, large amplitude events that cannot be removed by conventional filtering procedures. Smoothing or stacking will reduce their amplitude but leave a broader residual response that can be confused with geological phenomena. To avoid this possibility, a computer algorithm searches out and rejects the major spheric events.

The signal to noise ratio was further improved by the application of a low pass linear digital filter. This filter has zero phase shift which prevents any lag or peak displacement from occurring, and it suppresses only variations with a wavelength less than the specified filter wavelength.

3.4. Magnetic Data

The processing of the magnetic data involved the correction for diurnal variations by using the digitally recorded ground base station magnetic values. The base station magnetometer data was edited and merged into the Geosoft GDB database on a daily basis. The aeromagnetic data was corrected for diurnal variations by subtracting the observed magnetic base station deviations.

A micro-levelling procedure was then applied. This technique is designed to remove persistent low-amplitude components of flight-line noise remaining after tie line levelling.



The corrected magnetic data was interpolated between survey lines using a random point gridding method to yield x-y grid values for a standard grid cell size of a quarter of the line spacing. The Minimum Curvature algorithm was used to interpolate values onto a rectangular regular spaced grid.

3.5. Digital Terrain Model

Subtracting the radar altimeter data from the GPS elevation data creates a digital elevation model. To correct for minor elevation differences that are evident in this data when gridded, Shuttle Radar Topography Mission (SRTM) data have been used.



4. DELIVERABLES

VTEM Survey and logistics report			
Format	PDF		
Copies	2 x Digital (DVD/CD) 2 x Hard copy		
Database			
Format	Digital Geosoft (.GDB) and ASEG-GDF (.DAT, .DFN and .PRJ)		
Channels	Name	Description	
	X_UTM	X positional data (UTM Z55S / WGS84)	
	Y_UTM	Y positional data (UTM Z55S / WGS84)	
	X_MGA	X positional data (MGA Z55 / GDA94)	
	Y_MGA	Y positional data (MGA Z55 / GDA94)	
	Lon	Longitude data	
	Lat	Latitude data	
	Z	GPS antenna elevation (metres above sea level)	
	Radar	Helicopter terrain clearance from radar altimeter (metres above ground level)	
	RxAlt	EM Receiver and Transmitter terrain clearance (metres above ground level)	
	DTM	Digital terrain model (metres)	
	Gtime	UTC time (seconds of the day)	
	MagTF	Raw Total Magnetic field data (nT)	
	MagBase	Magnetic diurnal variation data (nT)	
	MagDiu	Total Magnetic field diurnal variation and lag corrected data (nT)	
	MagMicL	Microleveled Total Magnetic field data (nT)	
	Tau_dBdt	Decay constant (Tau) for dBdt data (ms)	
	Tau_dBdt_Nchan	Channel number for Tau computation	
	Tau_BField	Decay constant (Tau) for BField data (ms)	
	Tau_BField_Nchan	Channel number for Tau computation	
	dBdt[13] to dBdt[47]	dB/dt, Time Gates 83 μ s to 9286 μ s (pV/A/m ⁴)	
	BField[13] to BField[47]	B-field, Time Gates 83 μ s to 9286 μ s (pV.ms/A/m ⁴)	
	PLM	Power line monitor	
	Grids		
	Format	Digital Geosoft (.GRD and .GI) ¹ and ER Mapper (.ERS)	
	Grids	Name	Description
AA989_ blk ² _Mag		Total Magnetic field (nT)	
AA989_ blk _Tau_dBdt		Decay constant (Tau) for dBdt data (ms)	
AA989_ blk _Tau_BField		Decay constant (Tau) for BField data (ms)	

¹ A Geosoft .GRD file has a .GI metadata file associated with it, containing grid projection information.

² **_blk** indicates the block name



Maps		
Format	Digital Geosoft (.MAP)	
Scale	1:15 000	
Maps	Name	Description
	AA989_ blk _Mag	Total Magnetic field colour contours
	AA989_ blk _dBdt_Log	VTEM dB/dt profiles, Time Gates 0.667 – 9.286 ms in linear - logarithmic scale
	AA989_ blk _Bfield_Log	VTEM B-field profiles, Time Gates 0.667 – 9.286 ms in linear - logarithmic scale

Waveform		
Format	Digital Excel Spreadsheet (AA989_VTEM_Waveform.xls)	
Columns	Name	Description
	Time	Sampling rate interval, 5.208 μ s
	Volt	Output voltage of the receiver coil (volt)
	Current	Transmitter current (normalised to 1A peak)

Google Earth Flight Path file	
Format	Google Earth AA989_FlightPath.kmz
	Free version of Google Earth software can be downloaded from, http://earth.google.com/download-earth.html



5. PERSONNEL

Geotech Airborne Limited Personnel	
Crew chief	John Hilton
Operator	Victor Wijawa
Data Processing (Preliminary)	Peter Holbrook
Data Processing (Final) /Reporting	Gaurav Nailwal
Final data supervision	Malcolm Moreton Data Processing Manager (malcolm@geotechairborne.com)
Overall project management	Keith Fisk Managing Partner and Director (keith@geotechairborne.com)



APPENDIX A

GENERALIZED MODELING RESULTS OF THE VTEM SYSTEM (by Roger Barlow and Alexander Prikhodko)

Introduction

The VTEM system is based on a concentric or central loop design, whereby, the receiver is positioned at the centre of a transmitter loop that produces a primary field. The wave form is a bi-polar, modified square wave with a turn-on and turn-off at each end.

During turn-on and turn-off, a time varying field is produced (dB/dt) and an electromotive force (emf) is created as a finite impulse response. A current ring around the transmitter loop moves outward and downward as time progresses. When conductive rocks and mineralization are encountered, a secondary field is created by mutual induction and measured by the receiver at the centre of the transmitter loop.

Efficient modeling of the results can be carried out on regularly shaped geometries, thus yielding close approximations to the parameters of the measured targets. The following is a description of a series of common models made for the purpose of promoting a general understanding of the measured results.

A set of models has been produced for the Geotech VTEM® system dB/dT Z and X components (see models A-1 to A-16). The Maxwell™ modeling program (EMIT Technology Pty. Ltd. Midland, WA, AU) used to generate the following responses assumes a resistive half-space. The reader is encouraged to review these models, so as to get a general understanding of the responses as they apply to survey results. While these models do not begin to cover all possibilities, they give a general perspective on the simple and most commonly encountered anomalies.

As the plate dips and departs from the vertical position, the peaks become asymmetrical.

As the dip increases, the aspect ratio (Min/Max) decreases and this aspect ratio can be used as an empirical guide to dip angles from near 90° to about 30°. The method is not sensitive enough where dips are less than about 30°.



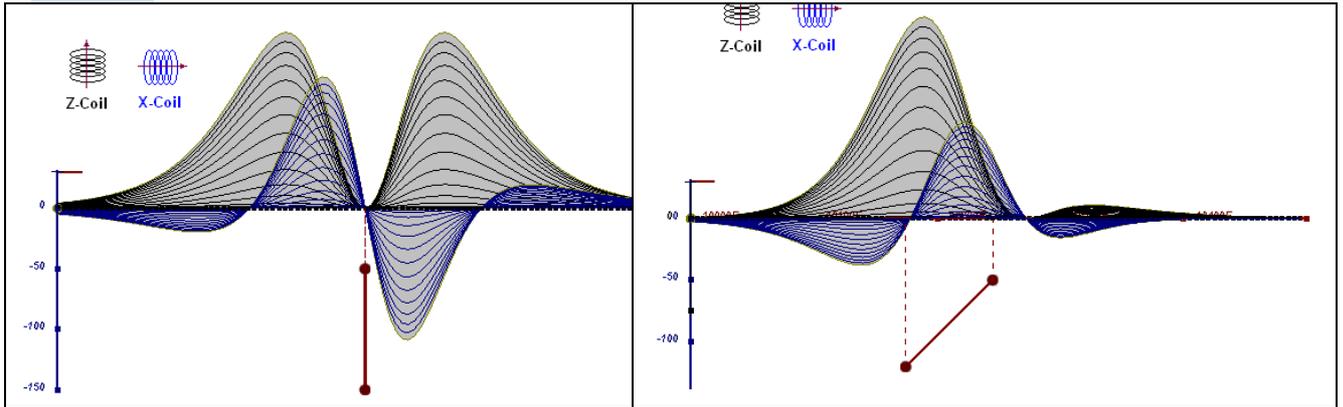


Fig A-1: Vertical thin plate

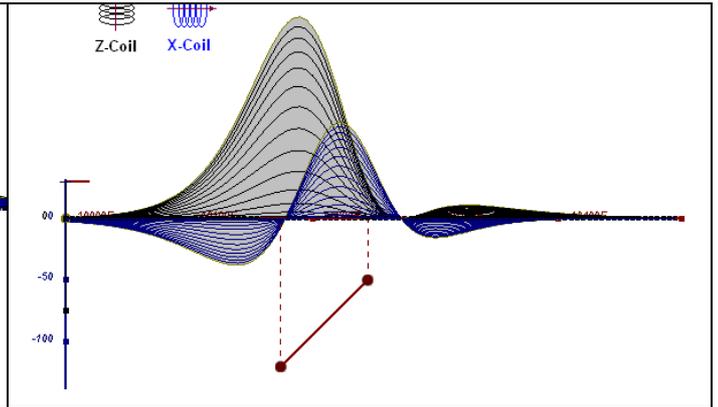


Fig A-2: Inclined thin plate

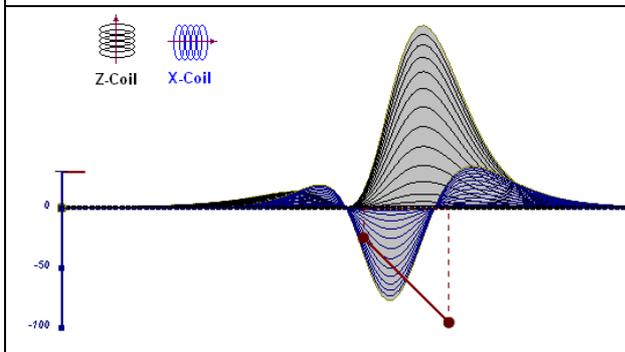


Fig A-3: Inclined thin plate

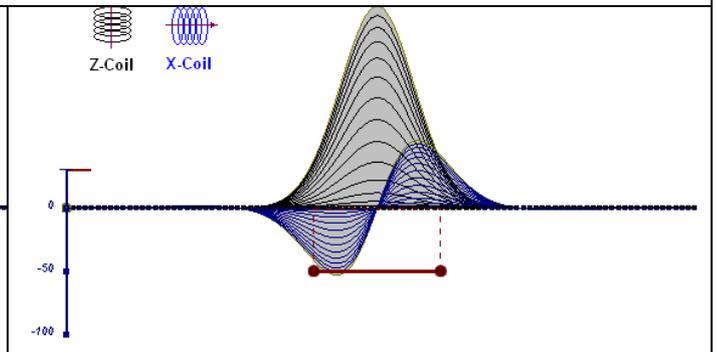


Fig A-4: Horizontal thin plate

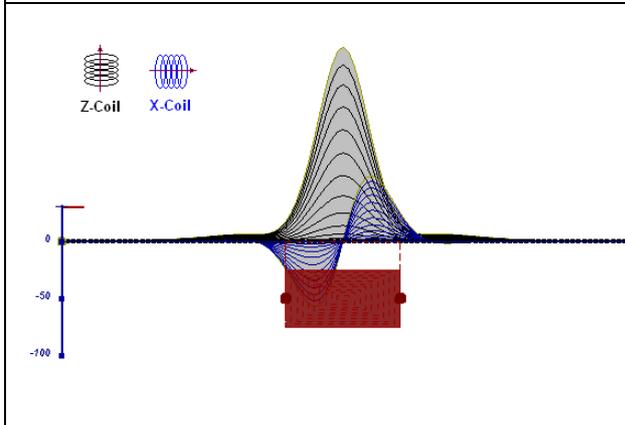


Figure A-5: Horizontal thick plate (linear scale of the response)

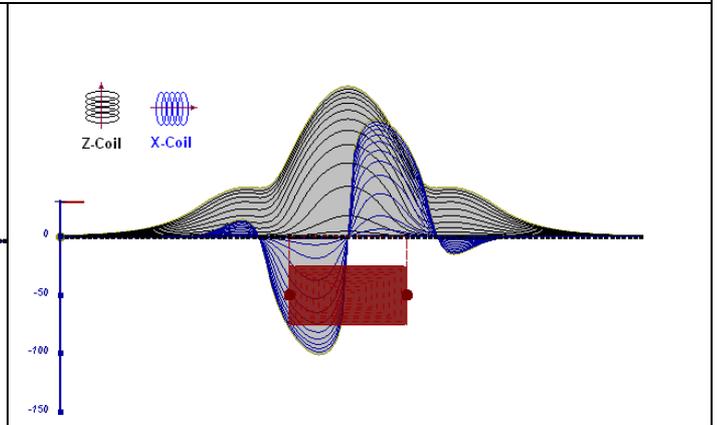


Figure A-6: Horizontal thick plate (log scale of the response)



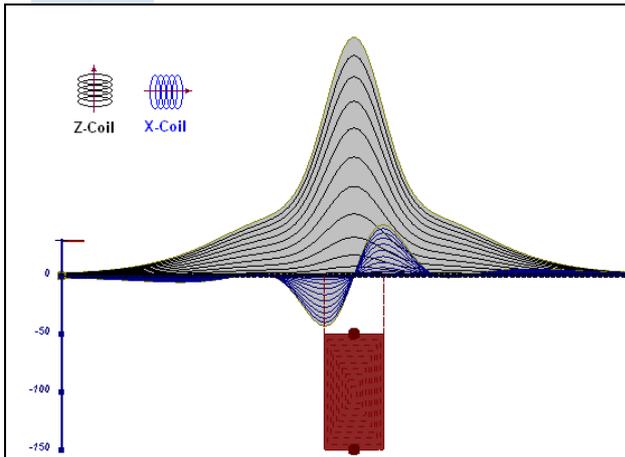


Figure A-7: Vertical thick plate (linear scale of the response). 50 m depth

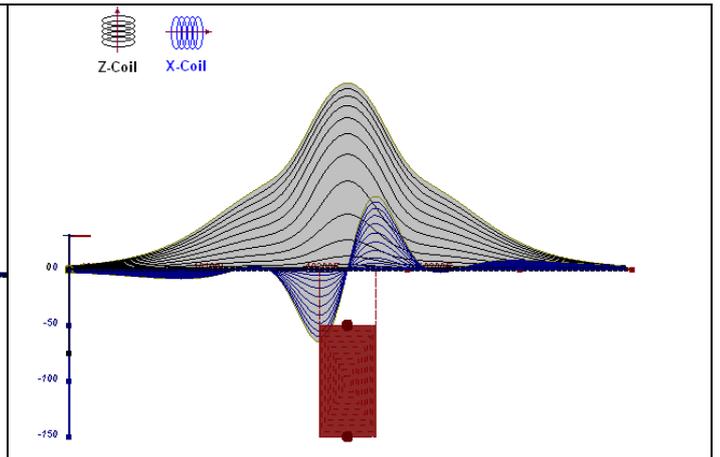


Figure A-8: Vertical thick plate (log scale of the response). 50 m depth

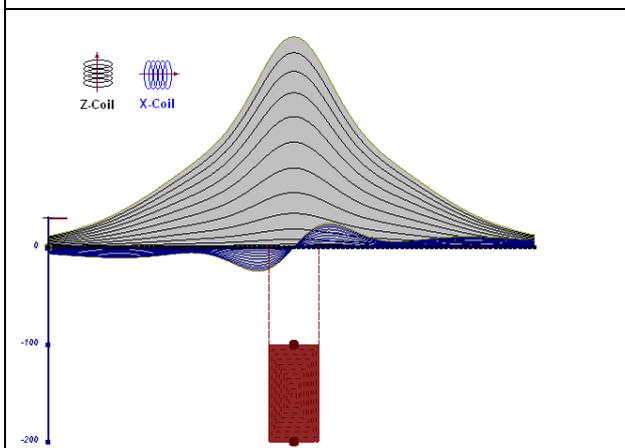


Fig A-9: Vertical thick plate (linear scale of the response). 100 m depth

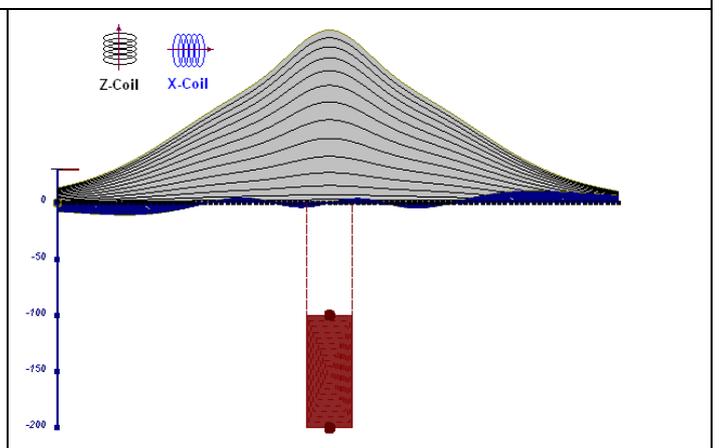


Fig A-10: Vertical thick plate (linear scale of the response). Depth/hor.thickness=2.5

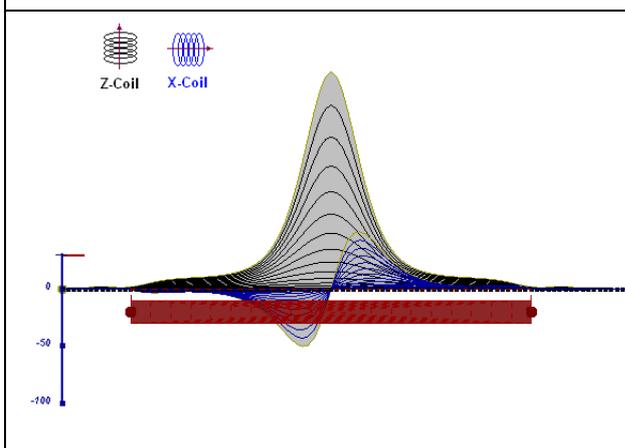


Fig A-10: Horizontal thick plate (linear scale of the response)

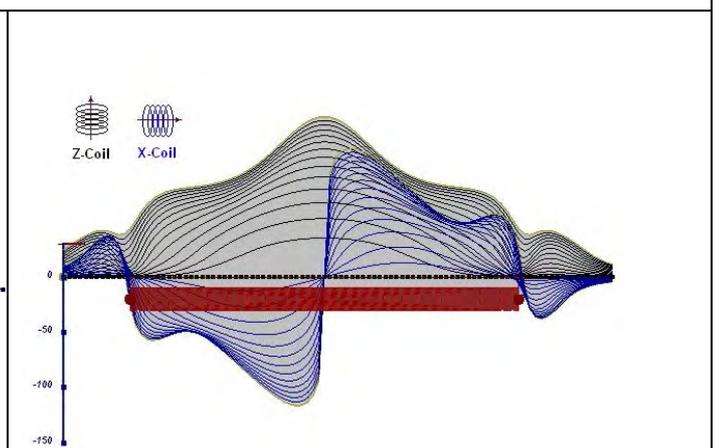


Fig A-11: Horizontal thick plate (log scale of the response)



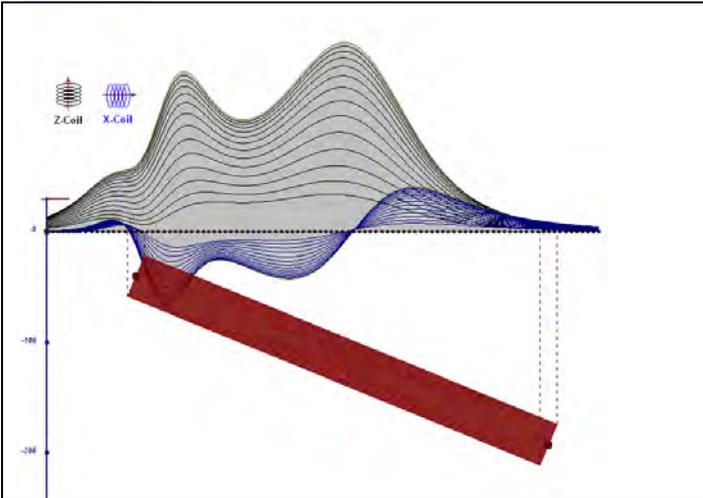


Fig A-12: Inclined long thick plate

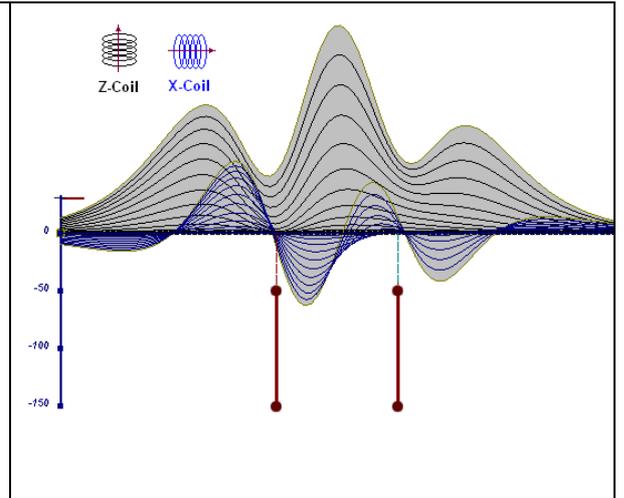


Fig A-13: Two vertical thin plates

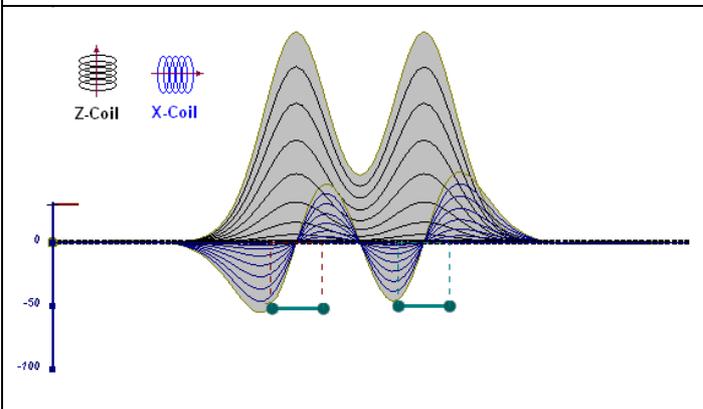


Fig A-14: Two horizontal thin plates

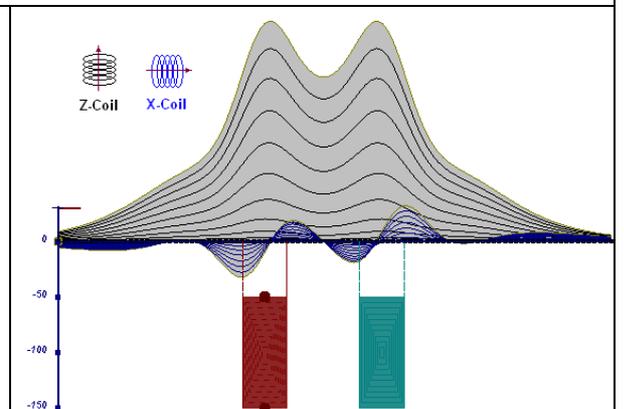


Fig A-15: Two vertical thick plates



The same type of target but with different thickness, for example, creates different form of the response:

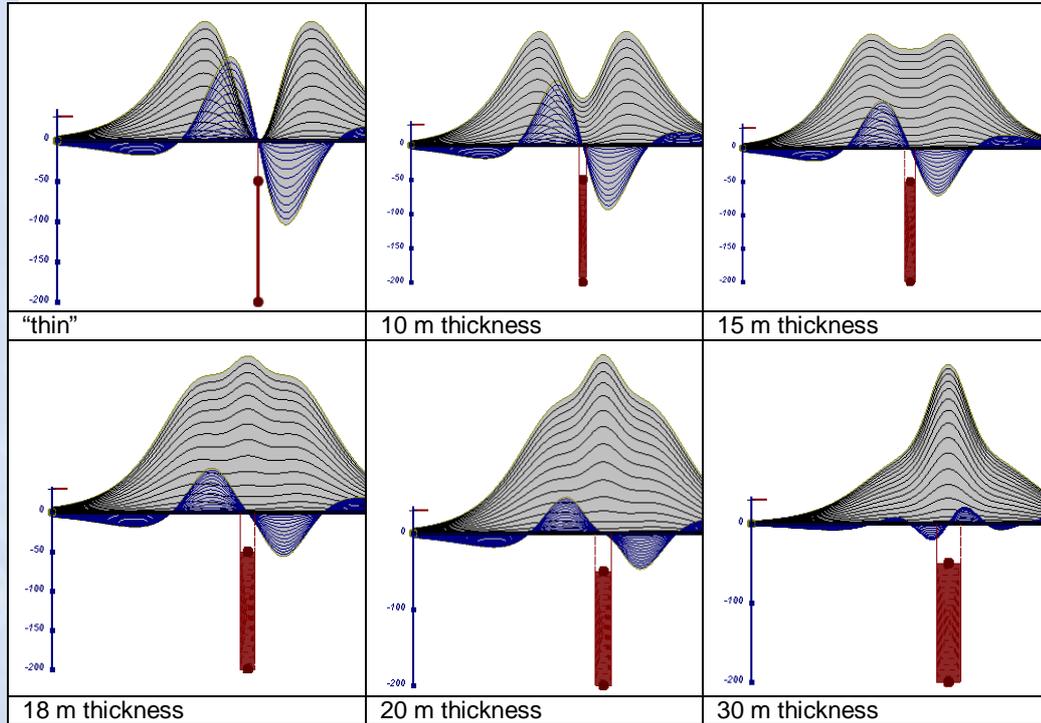


Fig A-16 Conductive vertical plate, depth 50 m, strike length 200 m, depth extend 150 m.

General Interpretation Principals

Magnetics

The total magnetic intensity responses reflect major changes in the magnetite and/or other magnetic minerals content in the underlying rocks and unconsolidated overburden. Precambrian rocks have often been subjected to intense heat and pressure during structural and metamorphic events in their history. Original signatures imprinted on these rocks at the time of formation have, in most cases, been modified, resulting in low magnetic susceptibility values.

The amplitude of magnetic anomalies, relative to the regional background, helps to assist in identifying specific magnetic and non-magnetic rock units (and conductors) related to, for example, mafic flows, mafic to ultramafic intrusives, felsic intrusives, felsic volcanics and/or sediments etc. Obviously, several geological sources can produce the same magnetic response. These ambiguities can be reduced considerably if basic geological information on the area is available to the geophysical interpreter.

In addition to simple amplitude variations, the shape of the response expressed in the wave length and the symmetry or asymmetry, is used to estimate the depth, geometric parameters and magnetization of the anomaly. For example, long narrow magnetic linears usually reflect mafic flows or intrusive dyke features. Large areas with complex magnetic patterns may be produced by intrusive bodies with significant magnetization, flat lying magnetic sills or sedimentary iron formation. Local isolated circular magnetic patterns often represent plug-like igneous intrusives such as kimberlites, pegmatites or volcanic vent areas.



Because the total magnetic intensity (TMI) responses may represent two or more closely spaced bodies within a response, the second derivative of the TMI response may be helpful for distinguishing these complexities. The second derivative is most useful in mapping near surface linears and other subtle magnetic structures that are partially masked by nearby higher amplitude magnetic features. The broad zones of higher magnetic amplitude, however, are severely attenuated in the vertical derivative results. These higher amplitude zones reflect rock units having strong magnetic susceptibility signatures. For this reason, both the TMI and the second derivative maps should be evaluated together.

Theoretically, the second derivative, zero contour or colour delineates the contacts or limits of large sources with near vertical dip and shallow depth to the top. The vertical gradient map also aids in determining contact zones between rocks with a susceptibility contrast, however, different, more complicated rules of thumb apply.

Concentric Loop EM Systems

Concentric systems with horizontal transmitter and receiver antennae produce much larger responses for flat lying conductors as contrasted with vertical plate-like conductors. The amount of current developing on the flat upper surface of targets having a substantial area in this dimension, are the direct result of the effective coupling angle, between the primary magnetic field and the flat surface area. One therefore, must not compare the amplitude/conductance of responses generated from flat lying bodies with those derived from near vertical plates; their ratios will be quite different for similar conductances.

Determining dip angle is very accurate for plates with dip angles greater than 30°. For angles less than 30° to 0°, the sensitivity is low and dips can not be distinguished accurately in the presence of normal survey noise levels.

A plate like body that has near vertical position will display a two shoulder, classic **M** shaped response with a distinctive separation distance between peaks for a given depth to top.

It is sometimes difficult to distinguish between responses associated with the edge effects of flat lying conductors and poorly conductive bedrock conductors. Poorly conductive bedrock conductors having low dip angles will also exhibit responses that may be interpreted as surficial overburden conductors. In some situations, the conductive response has line to line continuity and some magnetic correlation providing possible evidence that the response is related to an actual bedrock source.

The EM interpretation process used, places considerable emphasis on determining an understanding of the general conductive patterns in the area of interest. Each area has different characteristics and these can effectively guide the detailed process used.

The first stage is to determine which time gates are most descriptive of the overall conductance patterns. Maps of the time gates that represent the range of responses can be very informative. Next, stacking the relevant channels as profiles on the flight path together with the second vertical derivative of the TMI is very helpful in revealing correlations between the EM and Magnetics. Key lines can be profiled as single lines to emphasize specific characteristics of a conductor or the relationship of one conductor to another on the same line.

Resistivity Depth sections can be constructed to show the relationship of conductive overburden or conductive bedrock with the conductive anomaly.



APPENDIX B
GEOPHYSICAL MAP IMAGES
(not to scale)



