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Memo

To: Esther Little, Barlyne

From: Kate Nelson

CC:

Date: 8 Nov 2010

Re: **3D Magnetic Inversion Modelling on EPM 13361**

INTRODUCTION

At the request of Esther Little, 3D magnetic inversion modelling has been completed within EPM 13361 (Elginvale), around 50km south west of Gympie.

The region is covered by the regional Qld government Gympie survey, flown at 400m line spacing and 80m flying height. A VTEM survey was also acquired at Elginvale in 2007. This survey was flown at 200m line spacing (NS) and both electromagnetic and magnetic data was acquired. Whilst the VTEM data does suffer levelling issues and is of poor to average quality, since it has been flown at closer line spacing it does also provide greater detail. This is especially apparent in the region of drilling.

The magnetic modelling was undertaken on both the regional government data (larger region) as well as a smaller region using the magnetic data collected with the Elginvale VTEM survey. Figure 1 displays the Total Magnetic Intensity image with the outline of the modelled regions on the regional magnetic data and Figure 2 displays the outlines of the model regions on a magnetic compilation including the Elginvale VTEM magnetic data. Figure 3 displays the tilt derivative highlighting regional NW trending structures.

There are a number of drill holes within EPM 13361 targeting a coincident discrete magnetic anomaly within a resistive zone (porphyry system). These holes are shown with the Elginvale VTEM data on figures 4 – 6. This moderate anomaly is not apparent in the regional government dataset as it lies between 2 survey lines.

MODELLING

The final gridded data were input into the UBC 3D inversion code (MAG3D), and run as a sampled gridded dataset (sample spacing of 80m for the regional data and 50m for the Elginvale VTEM magnetic data). The output from the inversions include topography and show little surficial noise.

The regional model area of approximately 6km by 6km covering the entire EPM was extracted from the dataset. Model voxels of dimensions 80m x 80m (XY) and 40m thick (Z) was used down to a total depth of 2 km. Topography and flying height was incorporated into the model has had some effect on the final result – as elevations in the vicinity of the anomalies varied by as much as 150m.

The detailed model area of approximately 4.5 km by 4.5 km covering part of the EPM was also extracted from the Elginvale dataset. Model voxels of dimensions 50m x 50m (XY) and 25m thick (Z) was used down to a total depth of 2 km. Topography and flying height was incorporated into the model has had some effect on the final result – as elevations in the vicinity of the anomalies varied by as much as 150m.

The output models were displayed in the UBC viewer and a selection of EW cross sections over each anomaly and representative perspective views were exported (Appendix 1). Depth Slices in MapInfo

Format, 3D dxfs of high magnetic susceptibility are also supplied. The total susceptibility values of the modelled bodies range between 0.00 – 0.05 SI.
A 3D pdf has also been compiled displaying the available drill holes, high magnetic isosurface as well as the mid-time VTEM conductivity surface. It can be seen that the following drill holes do intersect the discrete magnetic target within the resistive zone (PEE-1, PEE-2, PEEN01, PEEN02, PEEN03). Hole PEED01 is located on the southern extend of the magnetic body, and Hole Pee-3 does not intersect the magnetic body but is still within the resistive zone. Magnetic susceptibly measurement of the drill samples should be taken to confirm.

CONCLUSIONS & RECOMMENDATIONS

- The region of interest within EPM 13361 has been modelled in 3D (regional and detailed).
- The available regional magnetic data (400m line spacing) have been sufficient to model the depth to source, depth extent, attitude and dip of causative magnetic bodies in 3D. The openfile company data (200m line spacing) has also provided additional detail where available, but results should be treated with caution due to data quality issues.
- The magnetic modelling indicates the magnetic anomaly has been drill tested - it has around 200m depth extent (appendix 1 and 3D pdf). The tilt derivative is very useful to identify regional structures (mainly NW trending).
- Four areas of anomalous regions have been highlighted in this dataset and marked on Figures 4 – 6.
    - Anomaly 1: Small, discrete magnetic anomaly coincident with broad resistive zone. The resistive signature is typical of porphyry systems. Whilst the magnetic feature does appear to be drill tested, the VTEM does indicate a resistive feature approximately 1km EW by 0.5 km NS so further potential for mineralisation may exist.
    - Anomaly 2: is a moderate magnetic anomaly coincident with an early to mid-time conductive feature tending to resistive at later-time. This feature also lies on a prominent NW trending structure.
    - Anomaly 3: is an intense magnetic anomaly within a NS trending magnetic unit. This feature is more resistive at later times and also lies on a prominent NW trending structure.
    - Anomaly 4: is an intense magnetic anomaly located on a prominent NW trending structure.
- It is recommended that existing geological and geochemical data be reviewed over the geophysical regions of interest and IP data be acquired over the geologically favourable anomalies to ascertain the presence of conductive mineralisation.

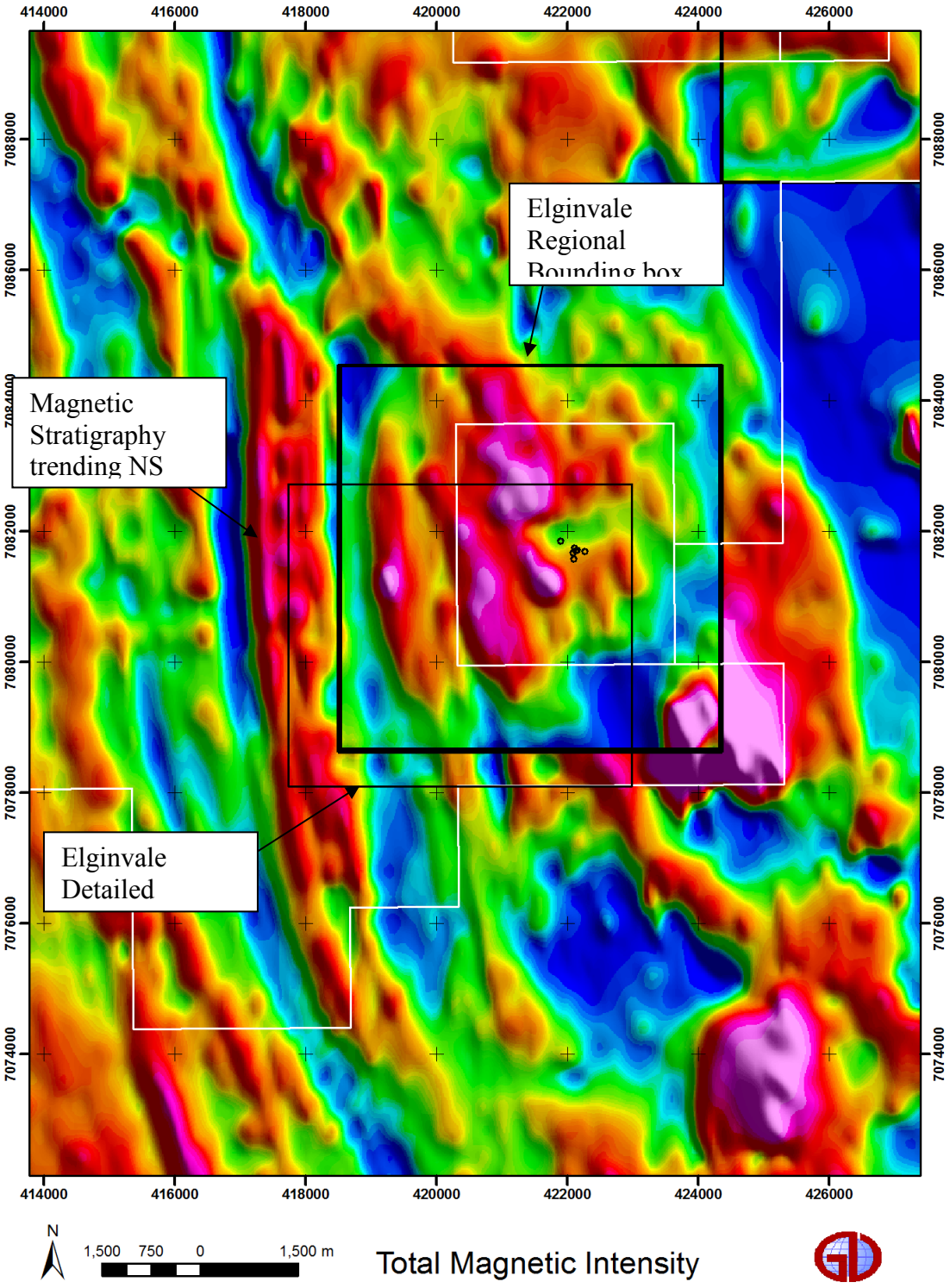

Figure 1. Bounding boxes (black) of the data used for modelling, existing drill holes and Regional Total Magnetic Intensity image.

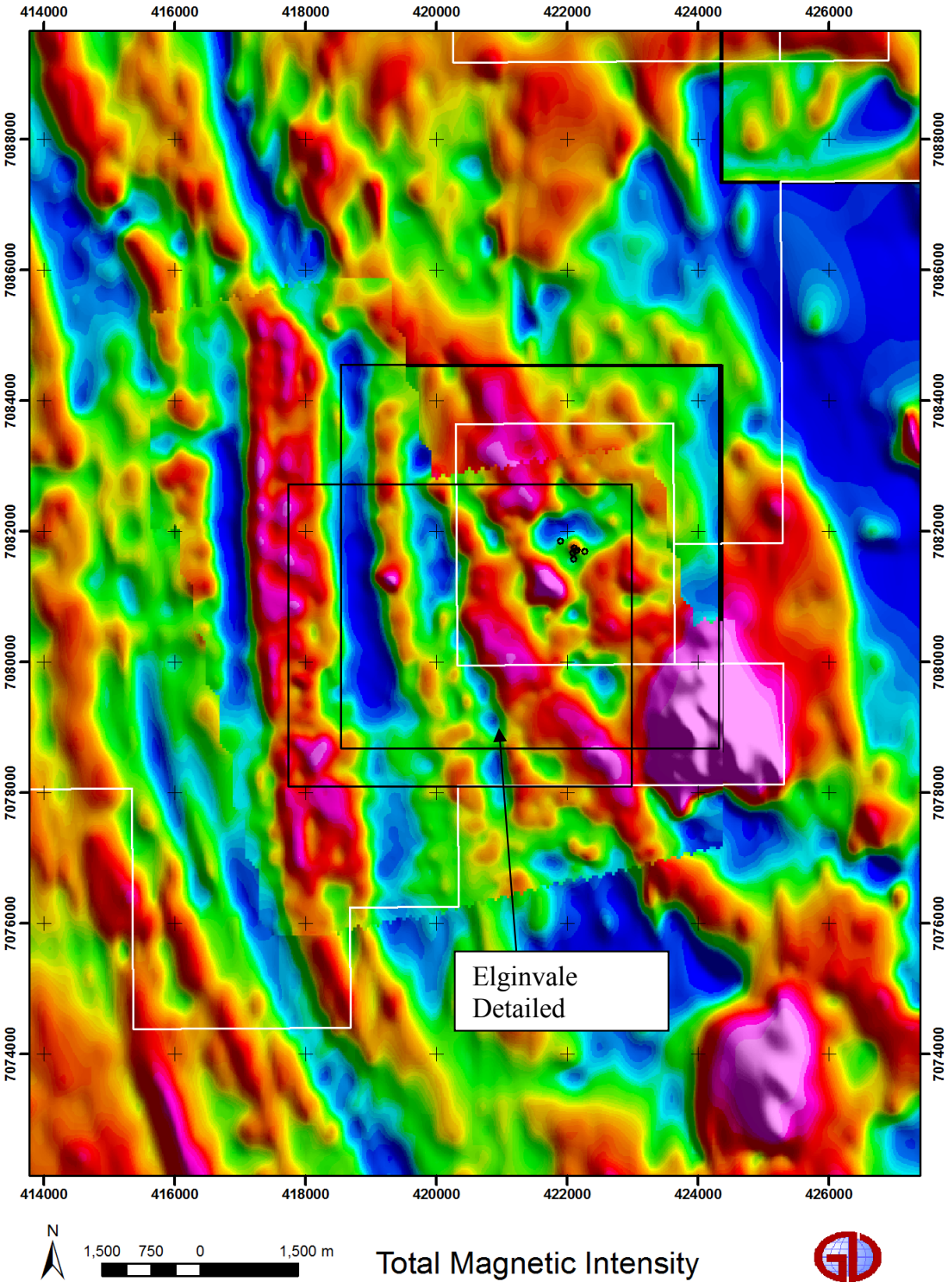

Figure 1. Bounding boxes (black) of the data used for modelling, existing drill holes and Total Magnetic Intensity compilation image (detailed Elginvale VTEM magnetics with regional government data).

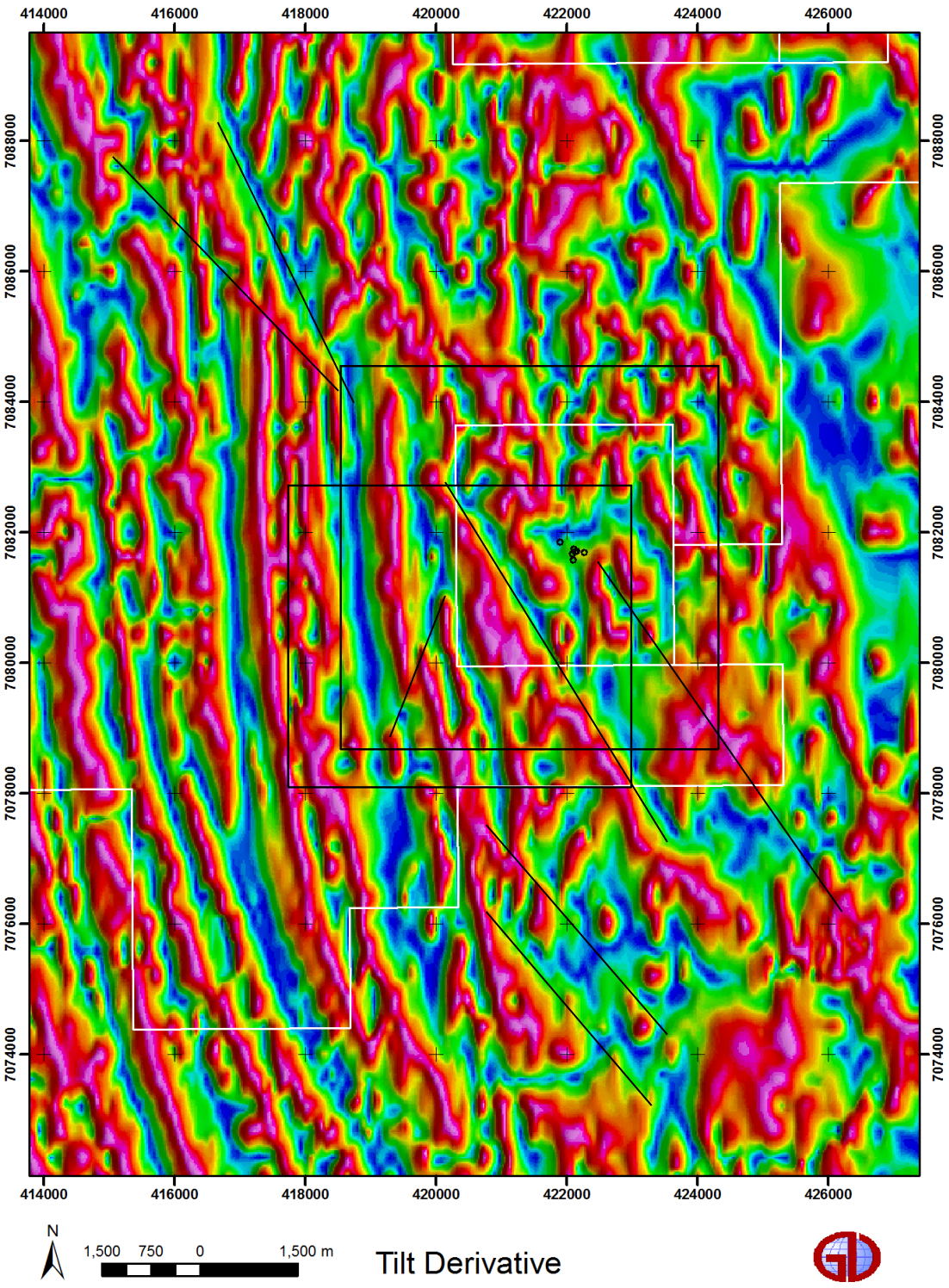

Figure 3. Bounding boxes of the data used for modelling and Tilt Derivative of the TMI image highlighting a number of NW structures and NE structure cross cutting the magnetic NS trending stratigraphy.

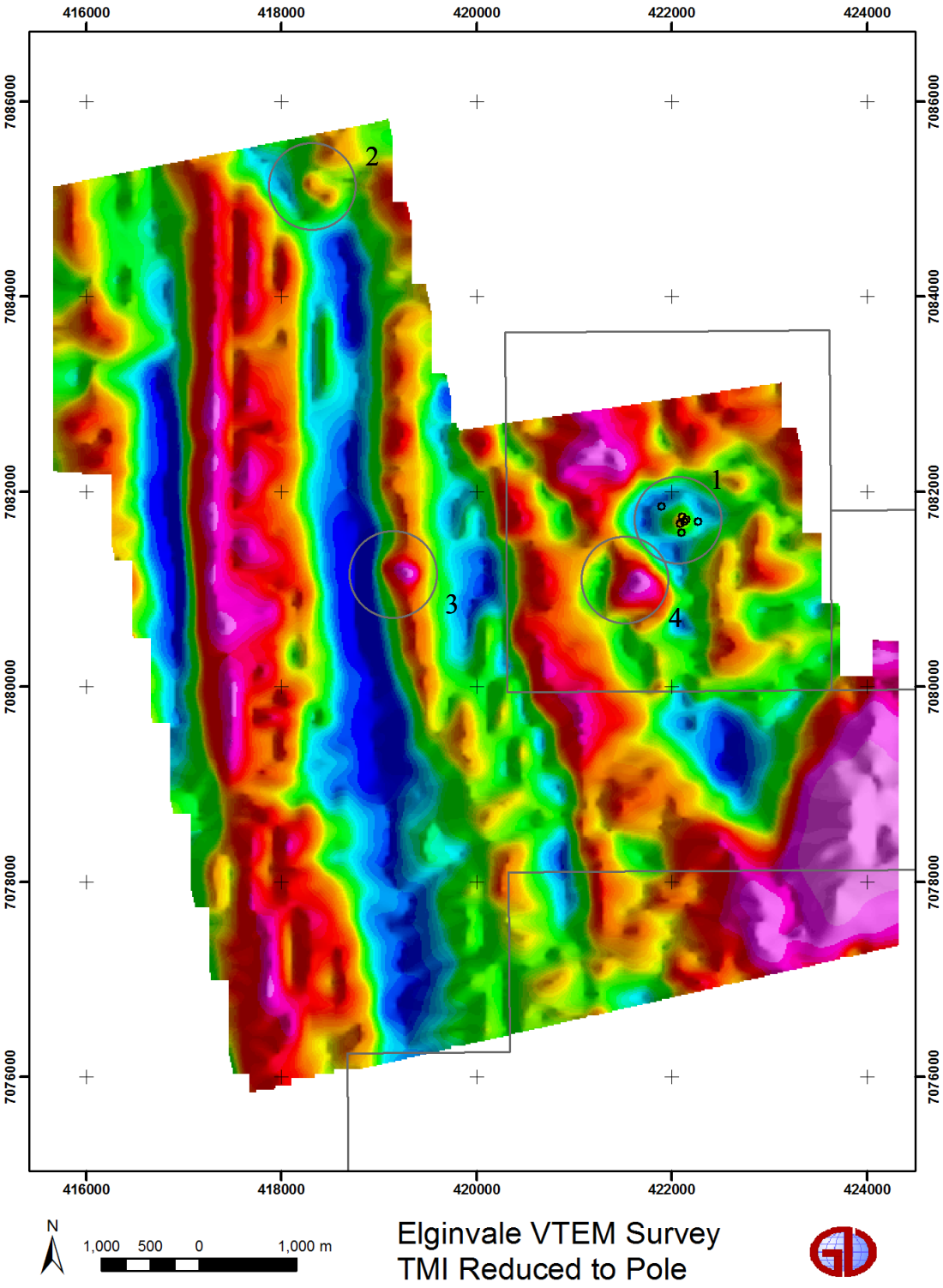

Figure 4. Elginvale VTEM data – Magnetics Reduced to Pole with a number of zones of interest circled.

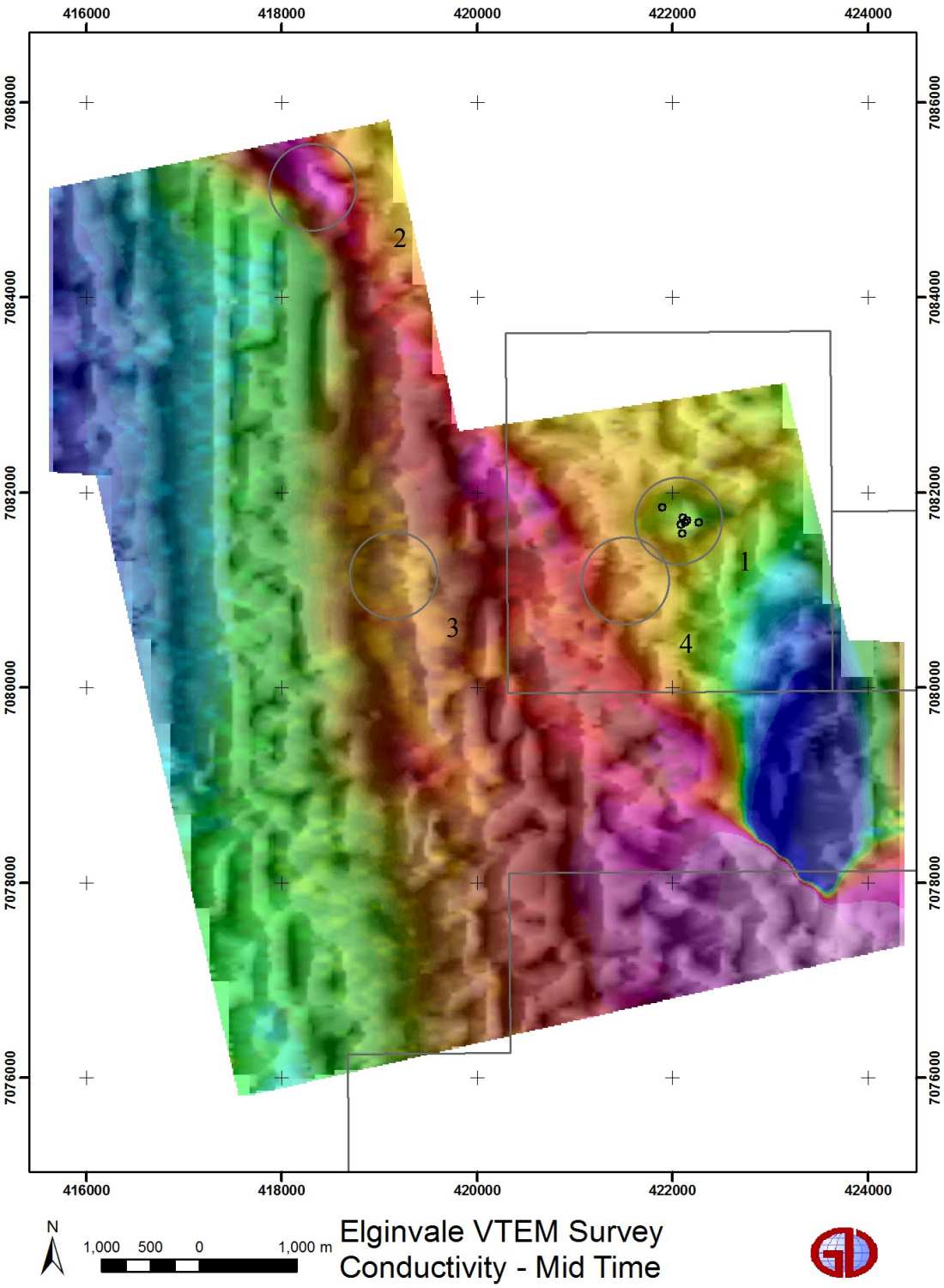

Figure 5. Elginvale VTEM data – mid-time conductivity (resistive zones shown in blue, conductive in red) with a number of zones of interest circled.

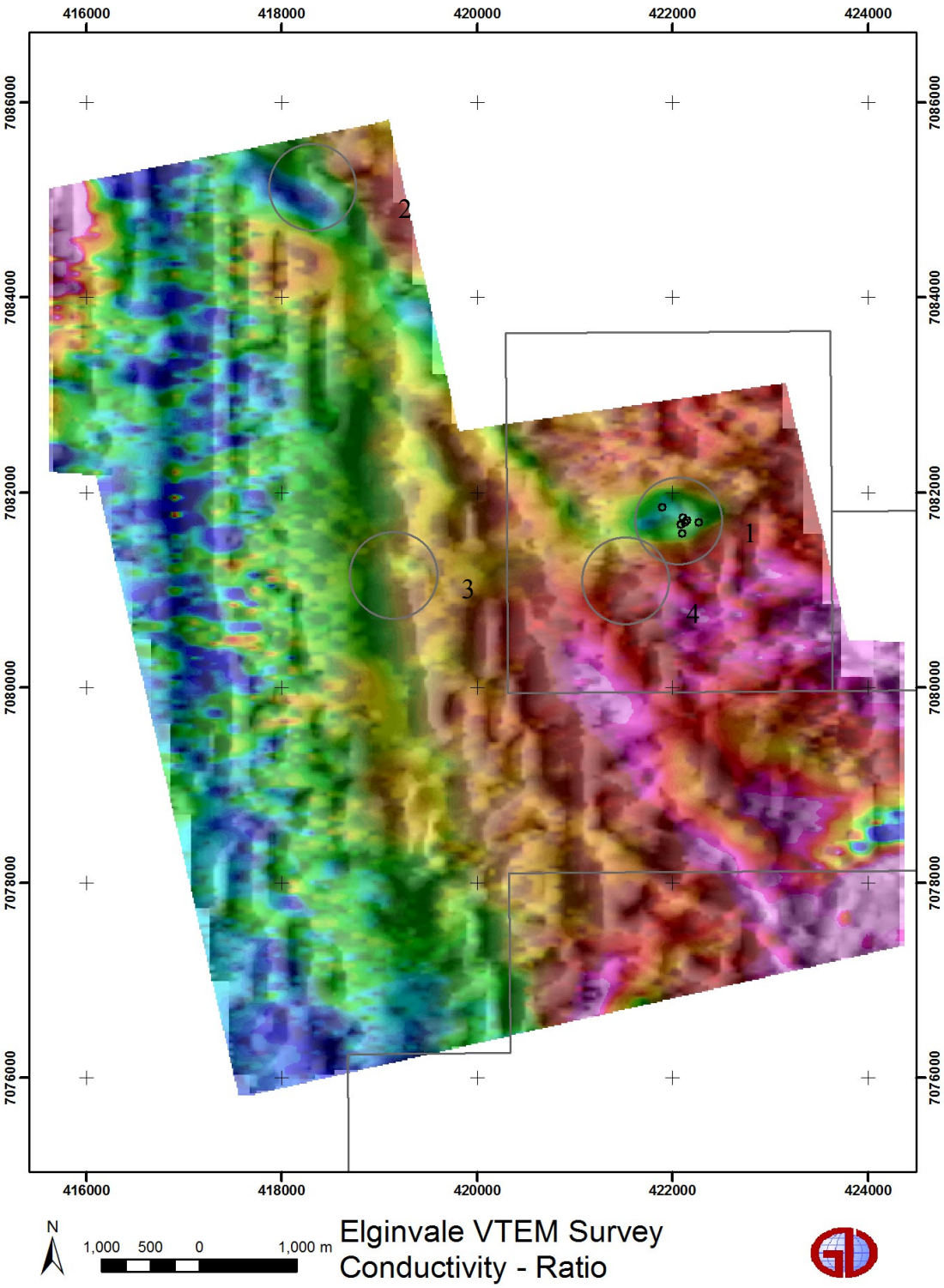

Figure 6. Elginvale VTEM data – Ratio of mid-time conductivity to early time highlighting changes in conductivity between early and mid-time with a number of zones of interest circled.