

An Investigation into the Possible Use of Groundwater Resources to Augment the Water Supply to the Mangaung Metro Municipality

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INTRODUCTION

- The study area is located in the Mangaung Metro Municipality, Free State Province (Fig.1, enclosed in red).
- Water shortages are often experienced in the municipality.
- The provincial government spends large amounts of money to buy water from Lesotho.
- The current study focuses on the possible augmentation of the municipal water supply from aquifers associated with ring dykes and other intrusive dolerite structures.

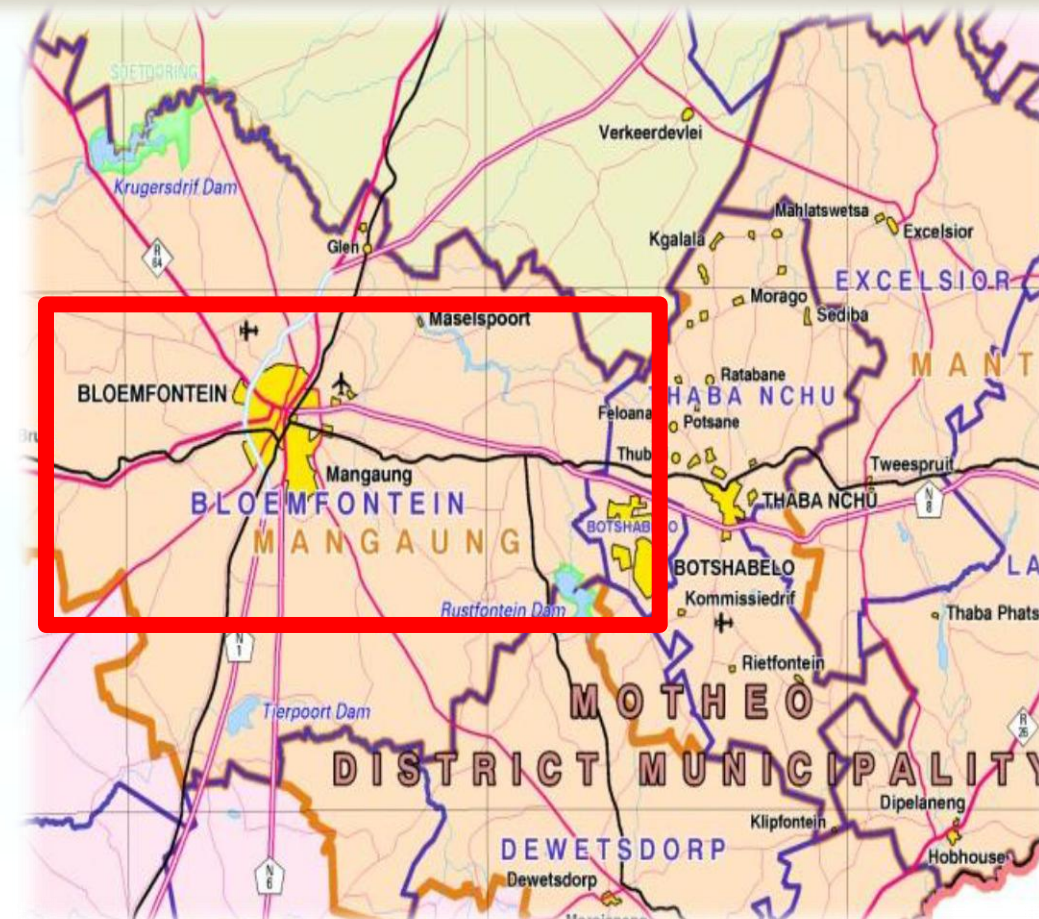


Fig. 1 The study area, enclosed in red

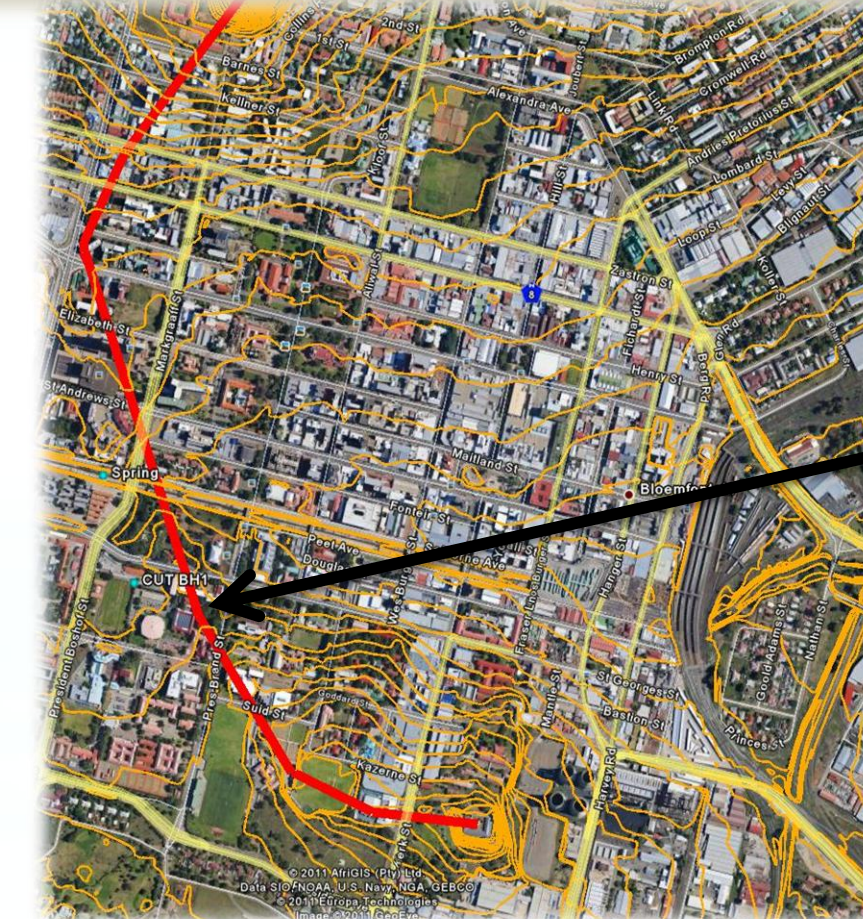


Fig. 2 Approximate position of a ring dyke in the study area



Fig. 3 A dolerite outcrop within the study area

OBJECTIVES

- Locating intrusive geological structures within the municipal boundaries through geophysical surveys.
- Conducting a hydrocensus to obtain information on existing boreholes.
- Drilling investigative and production boreholes at positions as determined from the geophysical surveys.
- Conducting pumping tests on new and existing boreholes to determine the hydrological parameters of the aquifer systems.
- Calculating sustainable abstraction rates for the production boreholes.
- Groundwater sampling and chemical analyses to determine the suitability of the groundwater for human consumption.

PRELIMINARY RESULTS

Geophysical surveys - Magnetic and resistivity methods were used to detect and delineate intrusive dolerite structures.

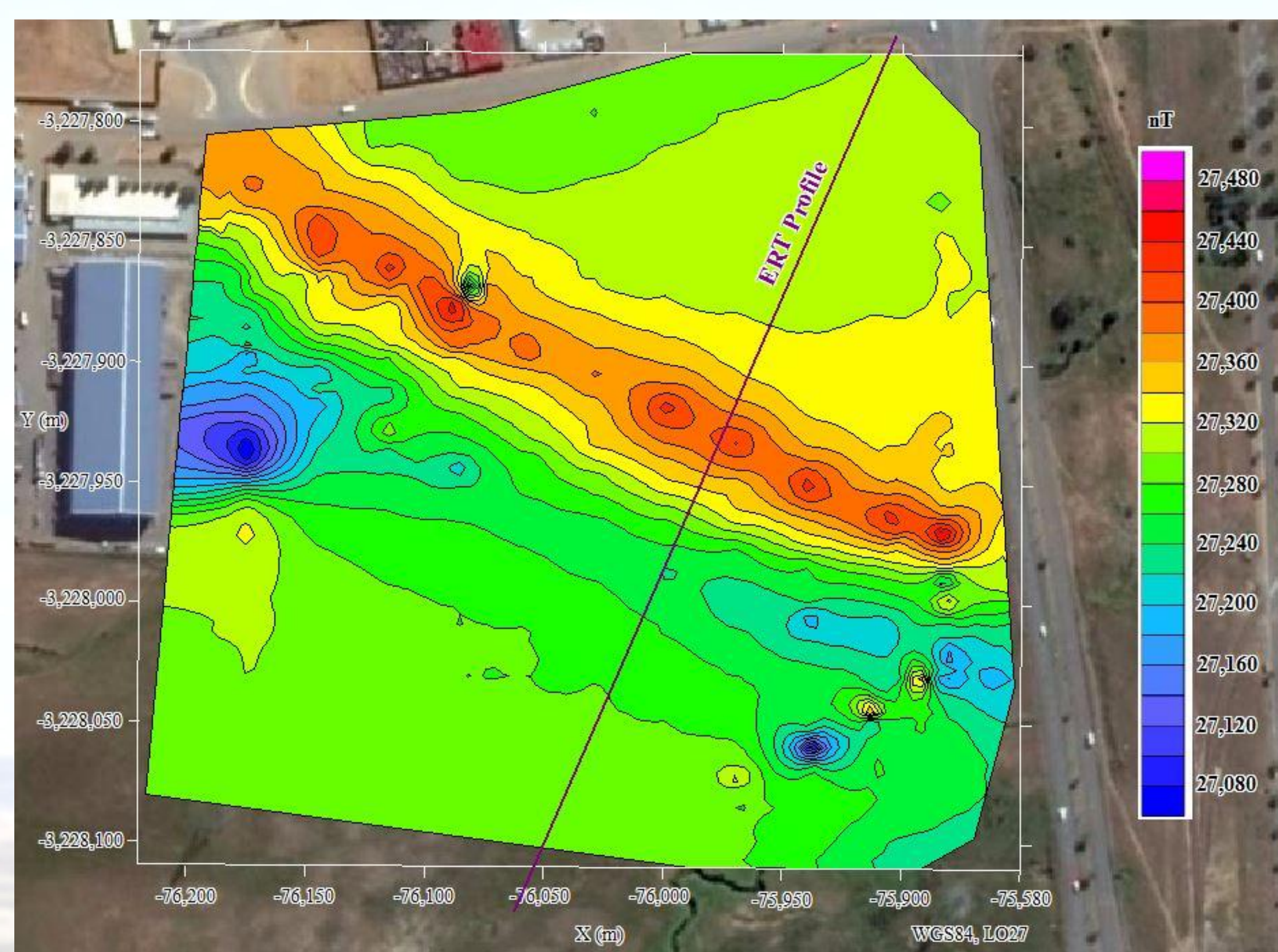


Fig. 4 Contour map of the total magnetic field recorded across the edge of a suspected ring-dyke. Also shown are the position and orientation of an Electrical Resistivity Tomography (ERT) profile across the linear magnetic anomaly

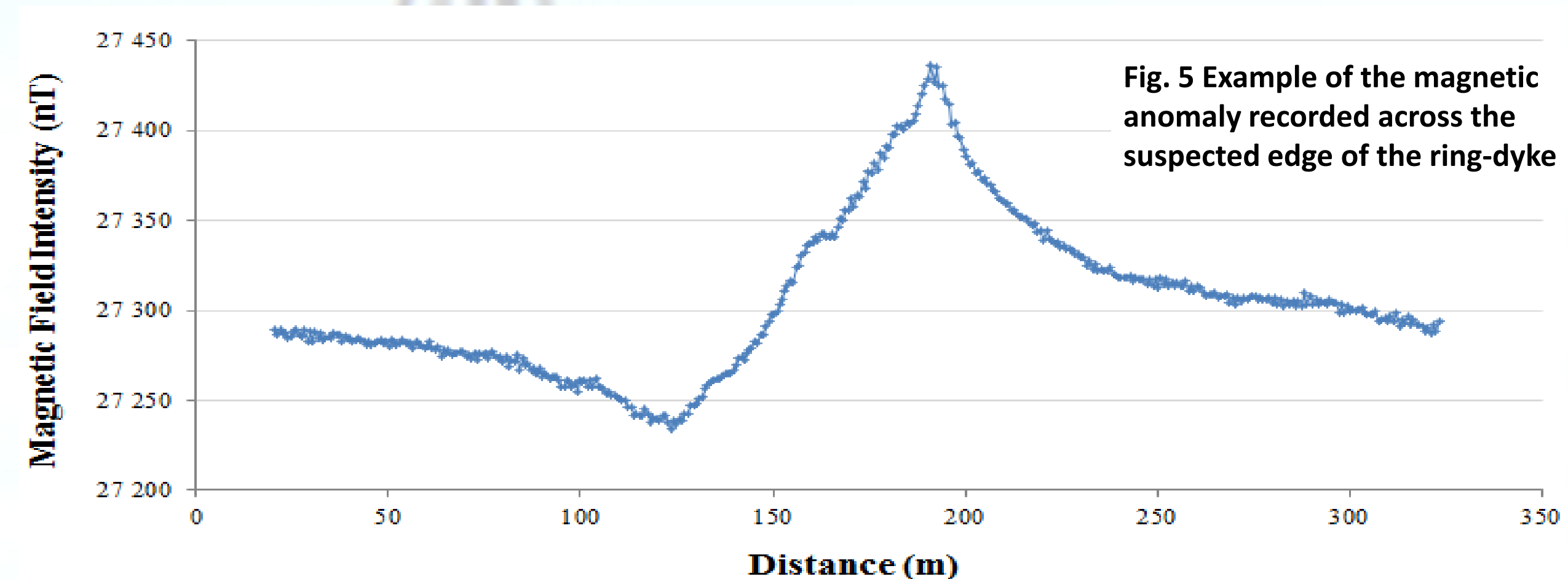


Fig. 5 Example of the magnetic anomaly recorded across the suspected edge of the ring-dyke

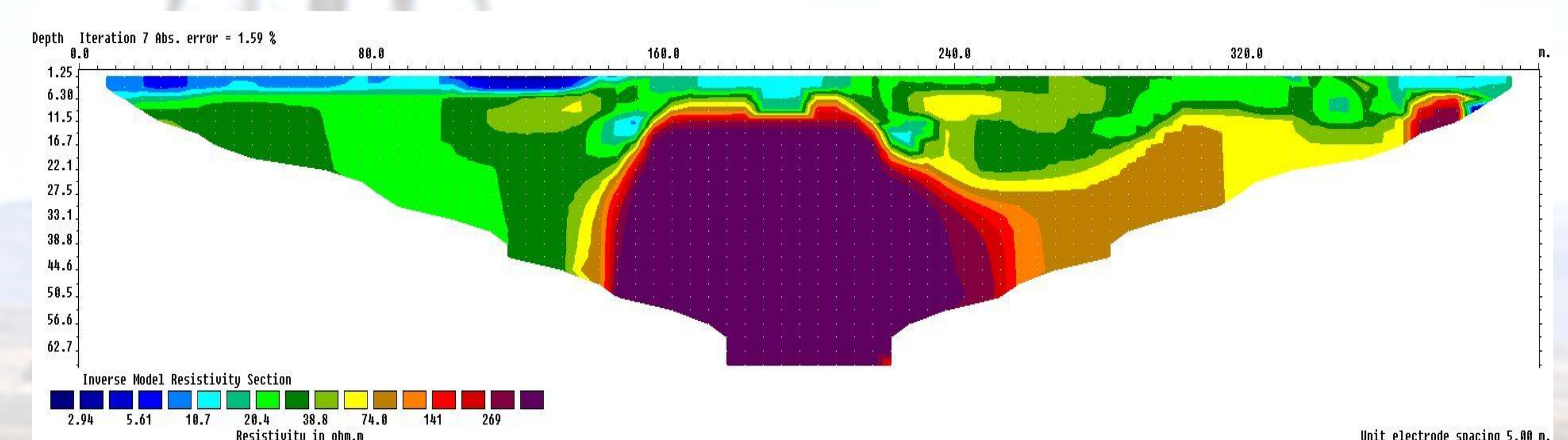


Fig. 6 Modelled resistivity section along profile across the prominent magnetic anomaly showing broad resistive structure thought to be the edge of a ring-dyke.

CONCLUSIONS

- Hydrocensus data from existing boreholes reflect a high yield of groundwater associated with intrusive dolerite structures.
- The ERT profile and magnetic data indicate the presence of intrusive structures that will be further investigated to determine their groundwater potential.

REFERENCE

Fig. 2: Google Earth, Digital Globe 2013.
<http://www.earth.google.com>
Accessed: 24 May 2014
Bloemfontein, Free State
29° 10' 20.46"S 25° 55' 13.32" E
Eye altitude: 942.97 km

ACKNOWLEDGEMENTS

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