

The Use of Multi-electrode Resistivity Tomography to Map Shallow Old Gold Mine Workings in the Primrose Area, Boksburg

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ABSTRACT

The shallow old mine workings along the Main Reef road, in Johannesburg pose a serious hazard to the growing squatter settlements in the area. Recently, there has been documented loss of life and property through subsidence of the ground, in particular, in the Primrose area. In the interest of ensuring public safety, the Department of Mineral Resources and the Ekurhuleni Municipality commissioned the Council for Geoscience to investigate the spatial and depth distribution of the old mine workings in the squatter settlement areas. The idea being to fill the shallow workings (less than 60m), if possible, and certify for settlement (town development) where they are deeper and meet South African civil engineering standards. A survey was carried using multi – electrode resistivity method at Maraisburg along Main Reef road where there are known south dipping shafts, as well as in the Primrose area. The dipole – dipole and Wenner – Schlumberger arrays were used with 10m dipoles. The Res2DINV program was used to model the collected resistivity data. Interpretation of the resulting models show what appears to be locations of old mine shafts, a long tunnel along the strike of the reef and other mine workings. The anomalies are identified at typical first mining level one (approximately 30 m) and some slightly above or below. One can conclude from these results that the method used showed the existence of systematic ‘voids’ in the area, whose geophysical signature can not be associated with naturally occurring geological phenomena.

Key words: tomography, old mine workings, resistivity, Main Reef, public safety