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A case study determining the stability of land affected by shallow under mining for urban development in Old Coronation, Witbank coalfield area

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On behalf of the Department of Mineral Resources (DMR), the Council for Geoscience (CGS) is undertaking multidisciplinary research studies to address issues related to derelict and ownerless mines (D&O) in South Africa. The geotechnical studies component of this programme focuses on assessing the stability of the D&O sites with the aim of providing the best possible methods of rehabilitation.

A study was carried out in Old Coronation which is situated in Witbank coalfields (Mpumalanga Province) with the aim of determining ground stability of this area. The area under investigation covers about 290 hectares. Coal mining tends to make a notable impact on the environment in which it is undertaken [1]. The impacts thereof vary in severity depending on whether the mine is working or abandoned, mining methods used, and geological conditions [1]. The sudden collapse of surface material into old mine workings (or 'outcrop sinkhole') is a common occurrence in Old Coronation and the surrounding areas. Mining in this area was decommissioned in 1965. However, spontaneous combustion within the workings area is still evident to this day. Subsidence has had an impact on groundwater whereby recharge into the old mine workings has increased due to ground surface fractures and crownholes [1] acting as extensive flow paths.

Currently, Old Coronation is an informal settlement and is home to about 8000 households. History of undermining in this area and risks associated with it are known to the Local Authorities. However, convincing the communities, whom some have been living there for over two decades, is a huge challenge. Reasons for people to live in Old Coronation vary and include but are not limited to: access to jobs, lack of suitable land for decent human settlement developments and other complex social challenges. The parcel of land is now characterized as derelict and ownerless. Therefore, the liability lies with the state; hence, the stability or lack thereof had to be established.

This work outlines the methodology and results used to locate subsurface voids or mine workings, characterization of the overlying strata and overall stability of board (room) areas given the geomechanical properties, extraction ratio and pattern of the mine layout. Recommendations on rehabilitation and future land use options are suggested.

References:

- [1] Bell, F.G., Bullock, S.E.T., Hälbich, T.F.J. and Lindsay, P. (2001). *Environ. Geol*, 45 195 –216.

