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Case study: the geotechnical investigation and support design of a vertical shaft with focus on rock mass classification

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ABSTRACT

This research report focuses on the geotechnical analysis and support design for the construction of the Platreef vertical production shaft 2 for the proposed Platreef Mine. The geotechnical investigation includes the characterisation and analysis of the quality of the subsurface conditions observed in the shaft 2 borehole (GT017) to the final depth of drilling. The nature and quality of the sub-surface ground conditions is derived from data collected from the geotechnical borehole log as well as from laboratory testing results. The analysis of the quality of the subsurface conditions focuses on three rock mass classification systems, viz. Laubscher's (1990) Mining Rock Mass Rating Classification, Hoek's (2013) quantification of GSI and Barton et al's (1974) Norwegian Geotechnical Institute's Q-System. The suitability of sinking the vertical production shaft in the designated position is addressed, together with design recommendations and a risk assessment pertaining to the support of the shaft. As classic rock mass classification systems are utilised in this study, experience is added to the current knowledge base regarding the use of these systems, allowing a reference point for solutions to similar situations. Adjustments that may be made to these systems have also been demonstrated, providing further insight on the appropriate use of these approaches.