# Dilution Rating System (DRS)

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## ABSTRACT

Unplanned dilution directly adds cost to production from mining, milling, tailings disposal and administration. Additionally, unplanned dilution decreases the productivity, profitability and may affect the planned life of mine. Identifying and quantifying the potential for unplanned dilution allows optimisation of the mining plan and mining practices to minimise the adverse impact on productivity and the cost of production.

The Dilution Rating System (DRS) has been developed to more accurately predict dilution thickness and the variable potential for dilution, from individual stope to minescale.

The DRS utilises the methodology developed for the Mining Rock Mass Model to generate a three-dimensional dilution model, which is then calibrated against stoping performance. Dilution can be predicted more accurately and the parameters affecting dilution can be determined and minimised through improved mining techniques, for example blasting and ground support design. Potential high dilution areas can be identified in the planning stages of the mine and systems put in place to mitigate the risk of excessive dilution.

The DRS is based on a ranking method that takes cognisance of the rock mass properties, structure and stope orientation, thereby enabling a relationship between rock mass characterisation, stope behaviour and dilution potential to be established. The geotechnical properties that affect dilution are unique to each mine site. These parameters are derived from the Mining Rock Mass Model and include: Rock strength, Joint orientation, Shear strength, Fracture frequency, Joint roughness, Joint infill, RQD and In-situ Stress. The DRS model is calculated and calibrated for the individual mine site to develop a design chart that is then used to predict dilution volume and thickness.

This paper presents the methodology used to develop the DRS and then successfully predict dilution for both the hangingwall and footwall of stopes at the Gara Gold Mine in Mali, West Africa. This has enabled the expected dilution to be more accurately predicted, and mitigated where possible whilst reducing unplanned dilution.