Maximising the value of a drilling program:   
Case study in a challenging environment

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# ABSTRACT

Increasing orebody complexity, restrictions in ground access, longer lead times for disturbance approvals, has generated the need for the Resource Development Team within Rio Tinto Iron Ore (RTIO), to explore optimised drill design techniques that deliver resource conversion value while maximising program budgets. In response to this challenge, the Team initiated a case study to produce a drill program using a computer based optimisation algorithm.

The case study involved the implementation of the drilling optimisation tool at one of the iron ore deposits, located in the Hamersley Province of Western Australia. Mining is planned to commence in 2024, however the Mineral Resource is currently classified as 100% Inferred. Access restrictions have prevented adequate drilling coverage, resulting in lower resource confidence and definition of the orebody extents and geometry. The drill campaign, planned in Q1 2023, needs to consider those access constraints and the limitations related to additional ground clearance, while addressing the requirement of improving orebody knowledge.

The drilling plan had to address two objectives. The first one was to refine the orebody extents and geometry definition. For this objective, the input to the drilling optimiser was a volumetric representation (blocks) of the areas of high uncertainty in the mineralisation/waste boundary, which were defined using an Indicator Conditional Simulation technique. The second objective was to upgrade the Resource Classification. The input for this objective was a volumetric representation of the areas currently not meeting pre-defined quantitative Resource Classification upgrade criteria.

The output from the drilling optimiser was a range of possible drilling plans. A set of KPIs based on economic and orebody knowledge criteria were used to assess the plans and to select the most optimal one which will be utilized for the execution of the drill campaign.