



DIGITAL MAPPING Geotechnical drilling

NORWEGIAN TOTALPLUS - Drilling

Hardness, fractures and water conditions in soil and rock.

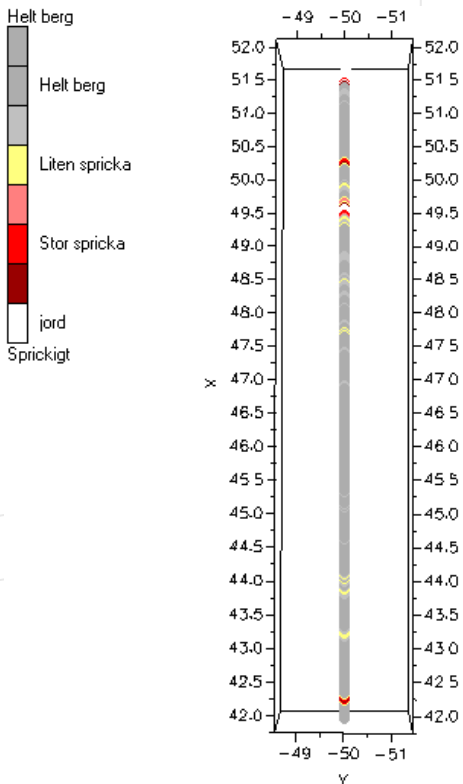
- Software on-board the rig. On-line analysis.
- Office software – graphical presentation in 3D, ACT etc.

-Rock quality classes

-RQD

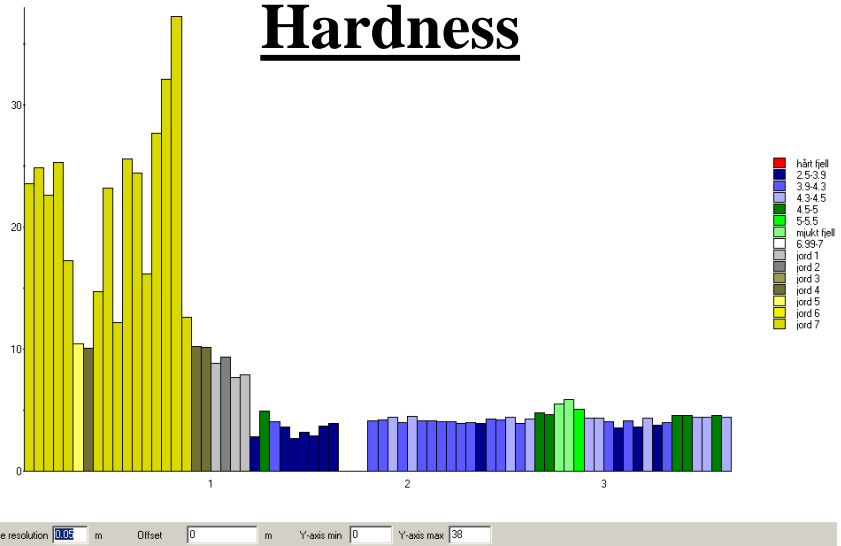
-Injection classes

Etc.

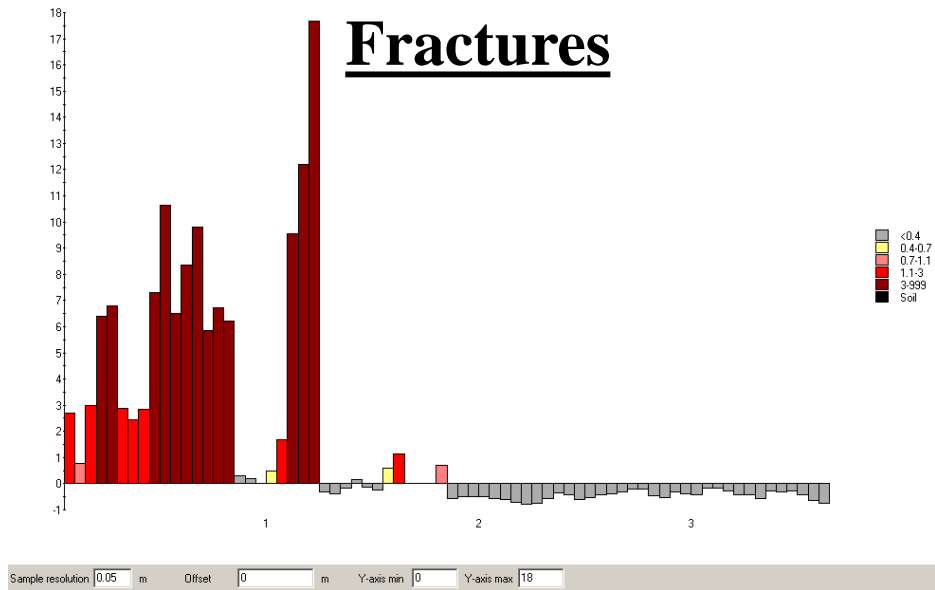




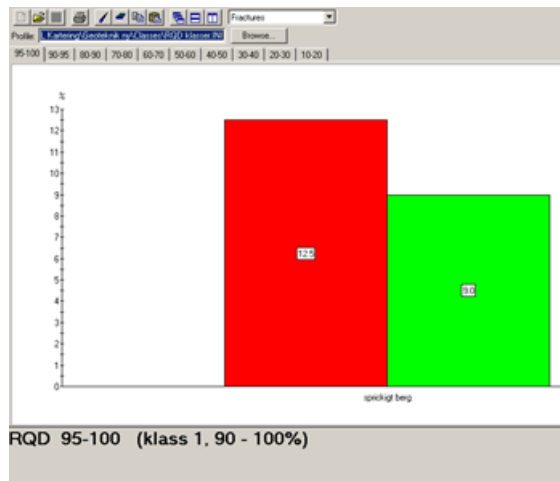
Hardness



Fractures



ACT: rock classification available immediate when finishing the drill hole. Example, RQD





ROCKMA in Sishen, South Africa

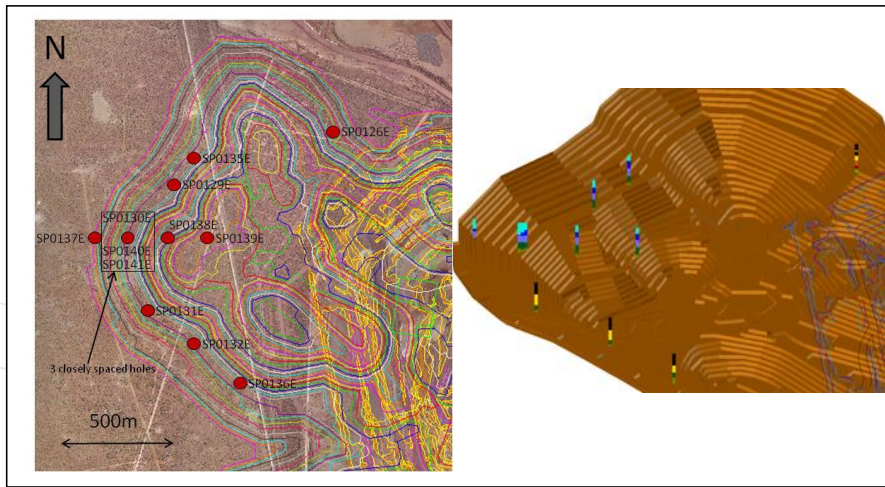


Figure 1:
*Trial drill holes
in relation to
the final pit
design and
current pit*



Figure 2:
*Booyesen Bore
Schramm T 450
percussion drill*

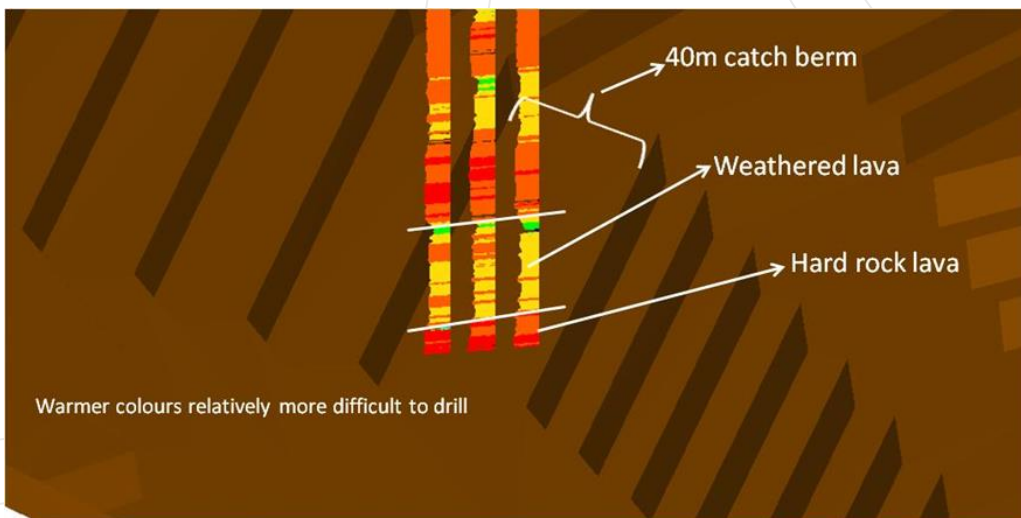


Figure 3:
Rockma data indicating that the catch berm is on the correct elevation

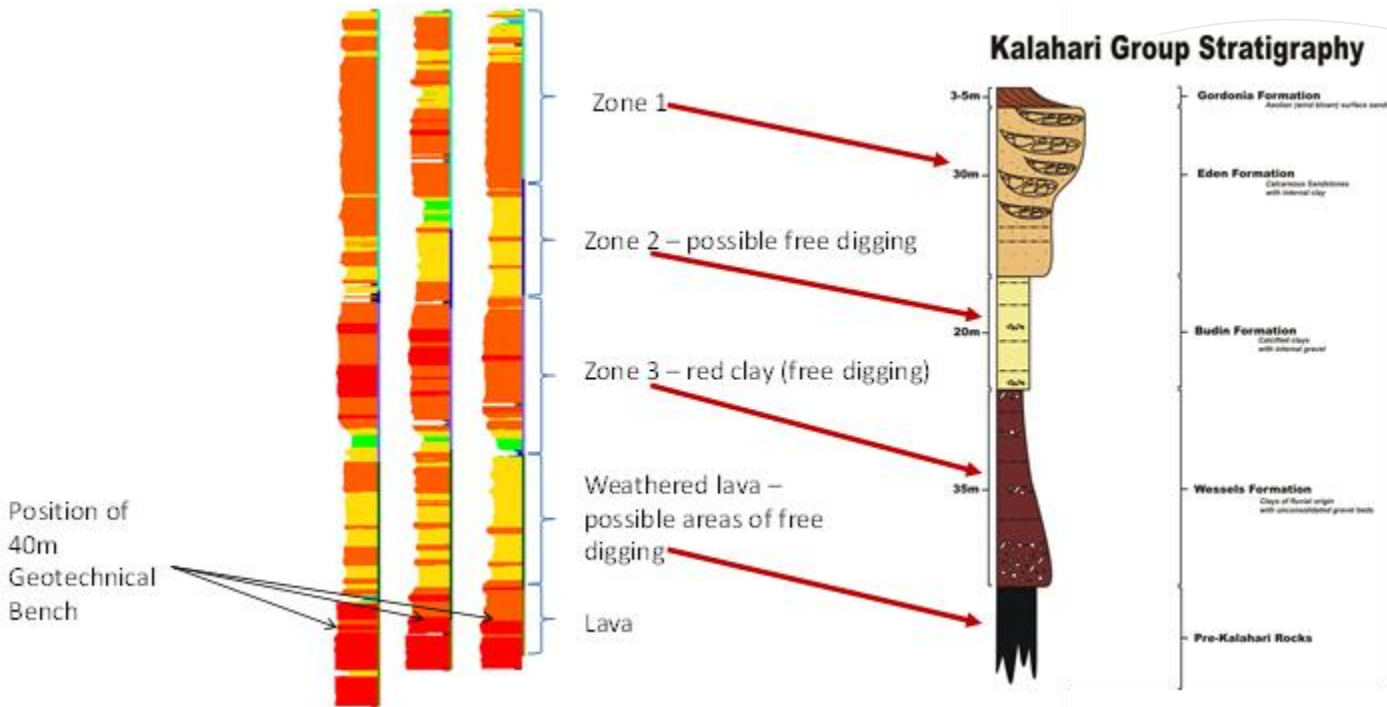


Figure 4:

Rockma data accurately indicates sub-zones as well as differences in individual zones that will facilitate optimised drilling and blasting..

In summary, the Rockma trial provides accurate data to improve the geotechnical data at Sishen mine. The concept that value can be gained through improved geotechnical data is therefore validated.