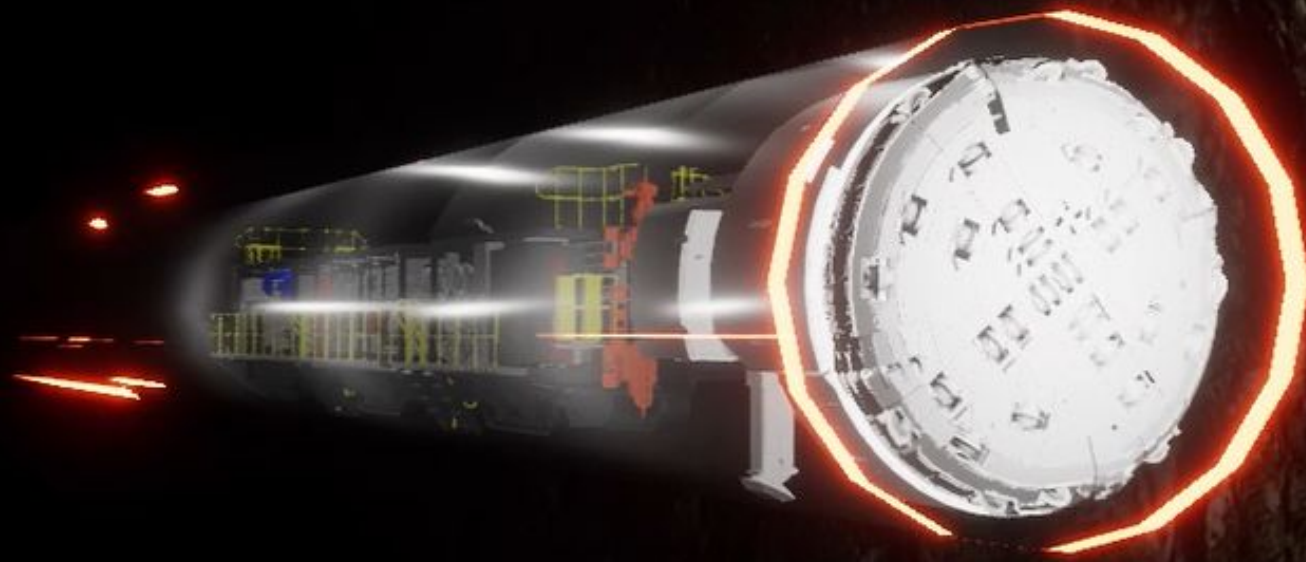
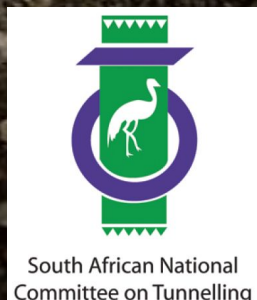


USING THE MOBILE TUNNEL BORER FOR MINING PRIMARY TUNNEL DEVELOPMENT



2026/04/13

Compiled by: Willem
Boothman



INDEX

- MTB Introduction
- Technology Overview
- Application & Technical Integration
- Logistics
- Ground Conditions
- Close Out



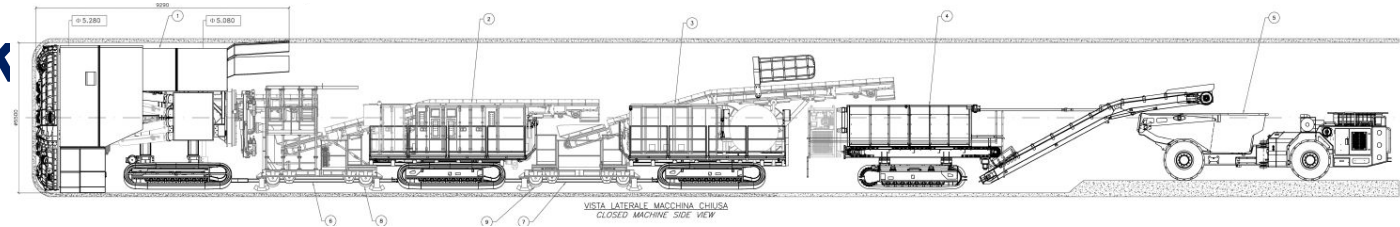
MTB INTRODUCTION: BRIEF MTB HISTORY



2018: MTB Generation 1 – Mark I

I

As designed & built Italy



2019: MTB Generation 1 – Mark II

II

After testing Italy – Shipped to SA with minor modifications



2021: MTB Generation 1 – Mark III

III

After Eland Project – General Modifications

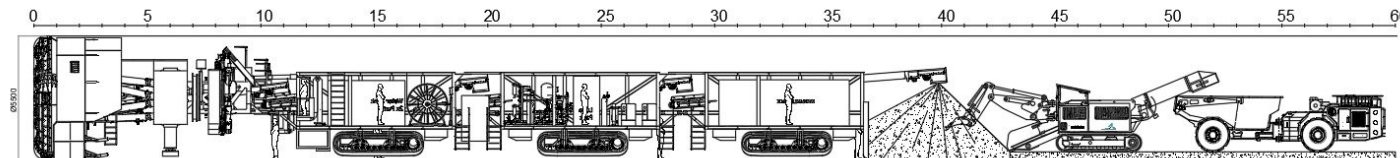


Image 1 & 2: Master Drilling Mobile Tunnel Mar I vs Mark IV

TECHNOLOGY OVERVIEW: MTB TECHNICAL SPECIFICATIONS



TECHNICAL CAPABILITIES

- Ø5,5M Cutting Diameter
- 50m Horizontal turning radius
- 100m Vertical turning radius
- $\pm 9^\circ$ Operational gradient
- Spiral Tunnelling Capability

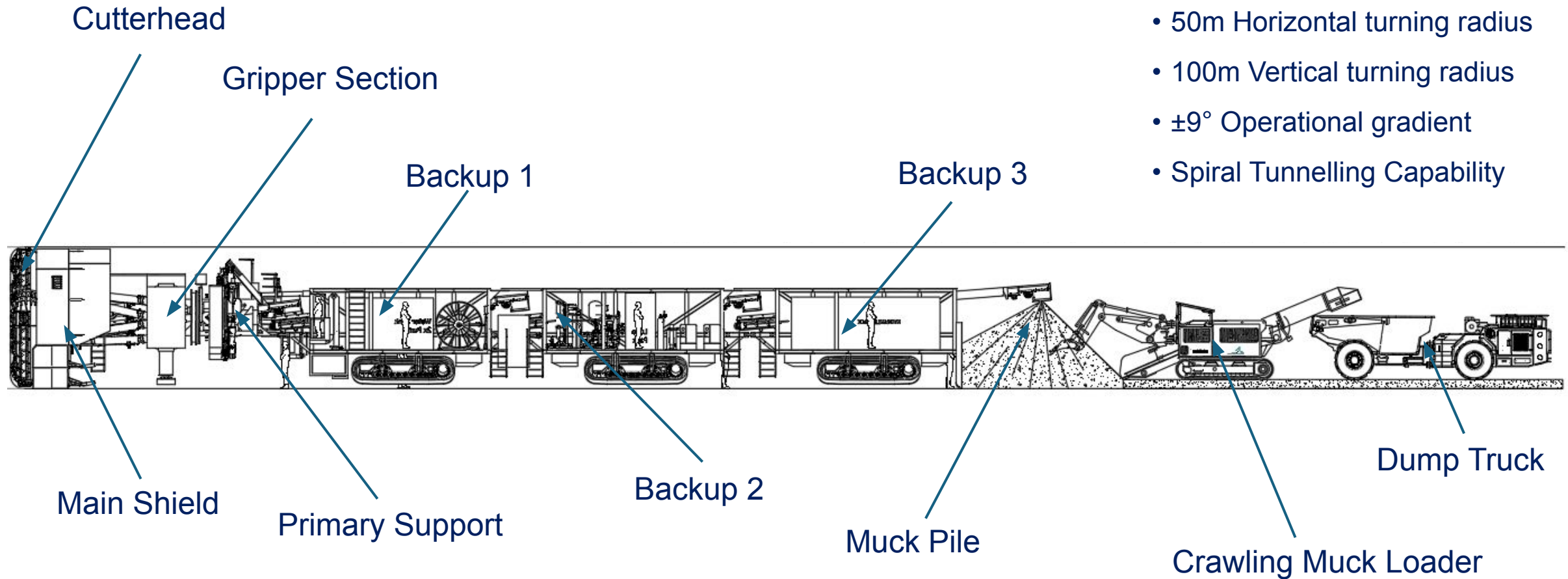


Image 3: Master Drilling Mobile Tunnel Borer General Assembly

APPLICATION & TECHNICAL INTEGRATION: PROJECT DETAIL

Bokoni Platinum Mine (the “Mine”) is located in the Sekhukhune land District of the Limpopo Province of South Africa, approximately 80km South-East of Polokwane. The deposit is situated in the eastern limb of the Bushveld Complex, rich in the Platinum Group of Metals (PGMs) such as Platinum, Palladium and Rhodium exist in the Merensky and the UG2 mineralization veins. These PGMs are often associated with precious metals such as gold, silver, as well as base metals including Chrome, Nickel, Copper and Cobalt. Mining and exploration techniques employed at the Mine are well established in the Bushveld Complex style of mineralization.



Image 4: Bokoni Platinum Mine Site Orientation

APPLICATION & TECHNICAL INTEGRATION: PROJECT DETAIL

Current Scope:

Excavate a decline for underground access of 1239m @ Ø5,5m including the installation of primary support, permanent services (ventilation, power, dewatering columns).

On Reef Development – the TBM tunnel will carry the reef in the “center” of the cross-sectional area.



Image 5: Wintersveldt Site Mining & Infrastructure Layout

APPLICATION & TECHNICAL INTEGRATION: PROJECT DETAIL



Image 7: Wintersveldt Site Surface Infrastructure Layout

APPLICATION & TECHNICAL INTEGRATION: PROJECT SCOPE

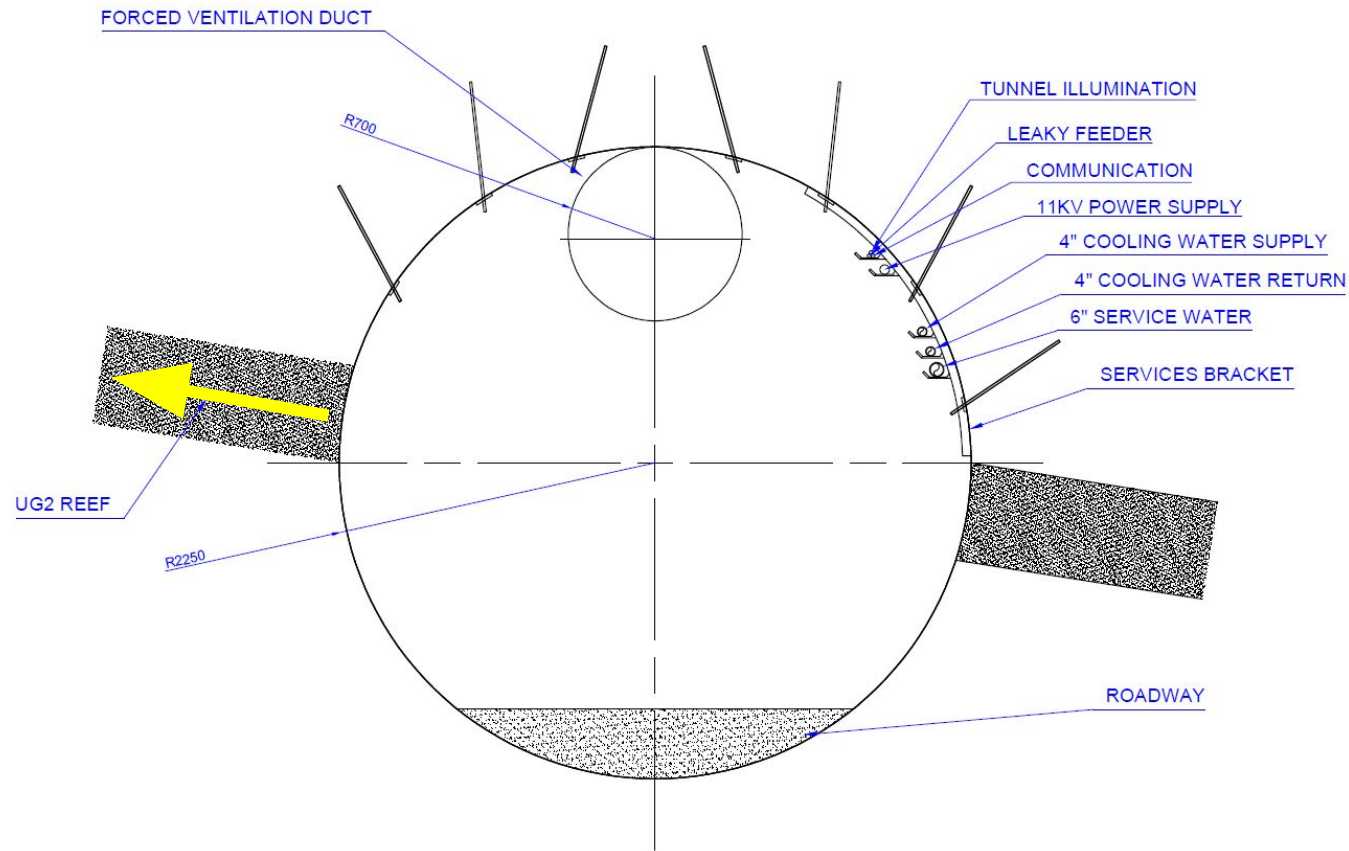


Image 4: TBM Tunnel Excavation General Arrangement



Image 8: MTB Launched on reef

APPLICATION & TECHNICAL INTEGRATION: LOGISTICS



Image 9 & 10: Transportation of MTB to site

APPLICATION & TECHNICAL INTEGRATION: ASSEMBLY & COMMISSIONING



Image 11: MTB launch pad at portal – showing -9° dip

APPLICATION & TECHNICAL INTEGRATION: ASSEMBLY & COMMISSIONING



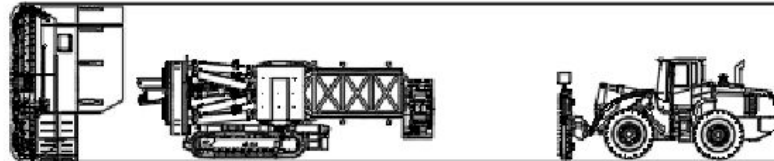
Install cutterhead segments with IT Loader & manipulator attachment.



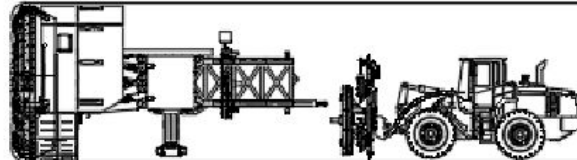
Install shield segments with IT Loader & manipulator attachment.



Drive Backup 1 into position using a remote-controlled diesel hydraulic powerpack called a motivator.



Install mesh erector & bolter ring rive with IT Loader.



Drive Backup 2-4 into position using a remote-controlled diesel hydraulic powerpack called a motivator.



Commission MTB & position haggloader & tunnel dump truck.

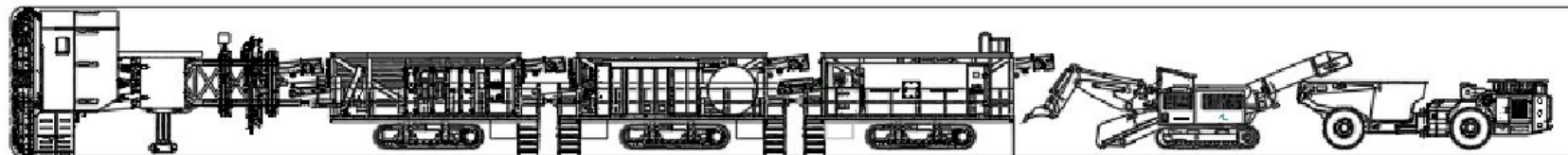


Image 14: MTB Assembly / Disassembly sequence

APPLICATION & TECHNICAL INTEGRATION: ASSEMBLY & COMMISSIONING



Image 12 & 13: MTB Cutterhead & Main Shield assembly

APPLICATION & TECHNICAL INTEGRATION: ASSEMBLY & COMMISSIONING



Image 15: MTB assembled at -9°, ready for launch

APPLICATION & TECHNICAL INTEGRATION: GROUND CONDITIONS



Image 19: MTB collaring, muck in 20-ton dump truck.

APPLICATION & TECHNICAL INTEGRATION: PORTAL ENTRANCE



Image 16 : MTB portal entrance, challenging ground conditions

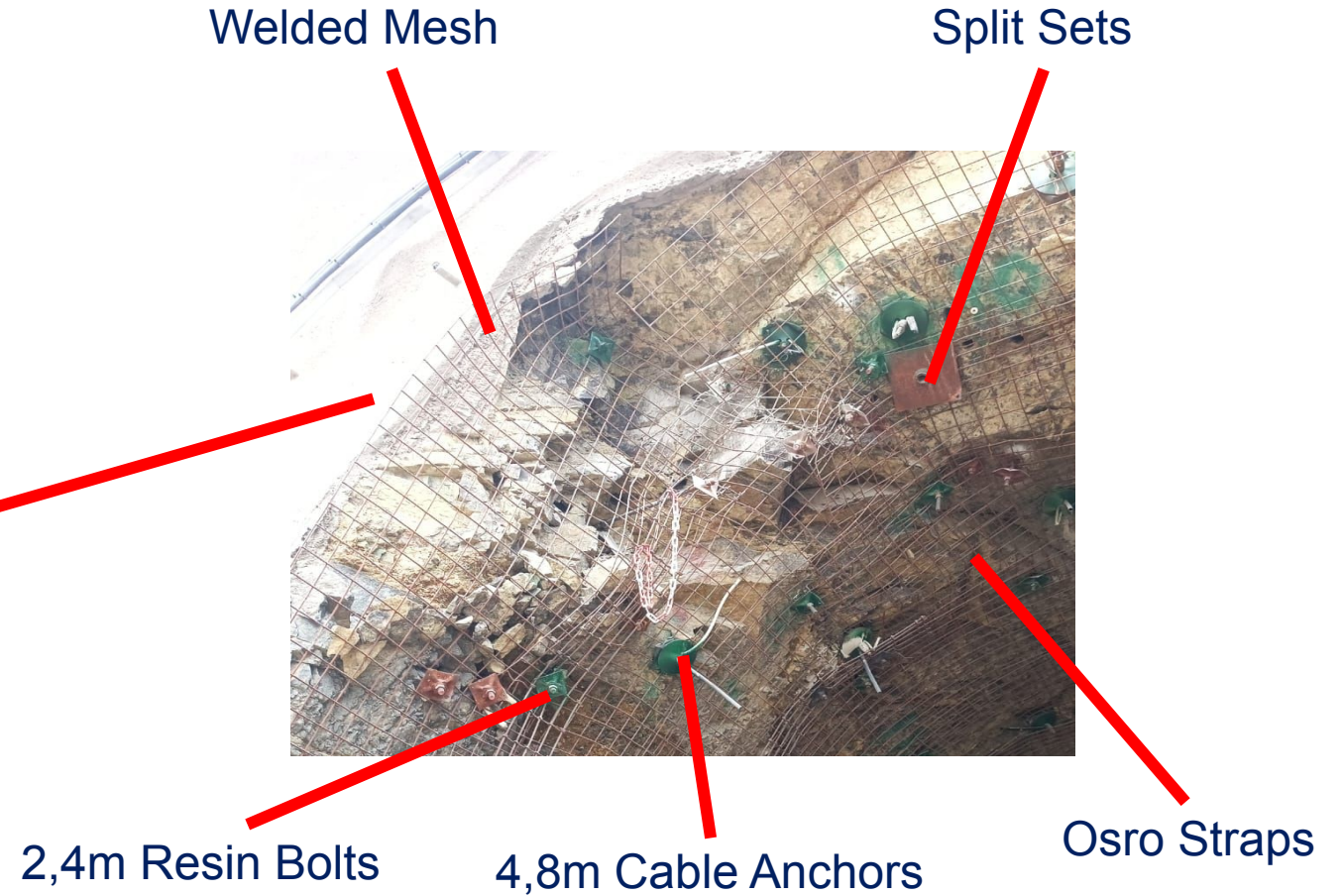


Image 17: MTB portal entrance, rock support installed to adequately support weak brow conditions

APPLICATION & TECHNICAL INTEGRATION: GROUND CONDITIONS



ROCK CHARECTERISTICS

- Pyroxenite top and bottom waste rock
 - 140-180 MPa UCS
 - 10 MPa Tensile
- UG2 Ore rock
 - 80 - 110 MPa UCS
 - 7 MPa Tensile



Image 20: Blocky Upper Reef Contact Zone muck / chips



Image 21: Clay / Mylonite muck / chips



Image 22: Conventional MTB muck / chips

APPLICATION & TECHNICAL INTEGRATION: GROUND CONDITIONS

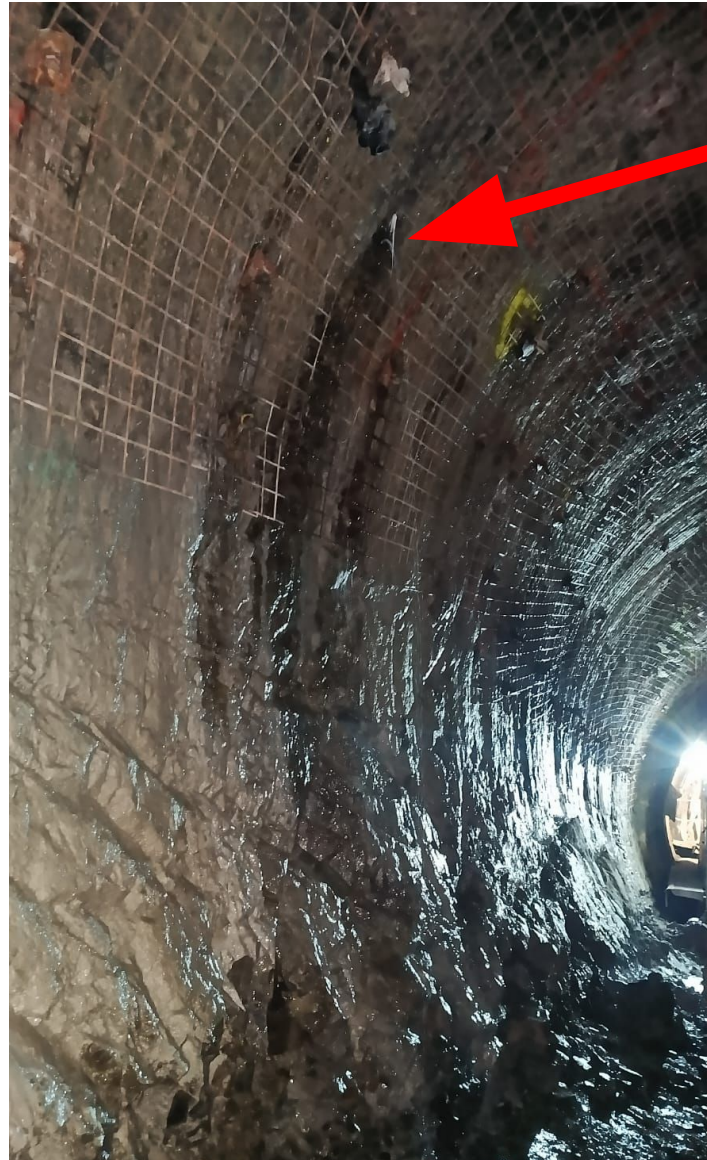


Image 23 & 24: Underground structures encountered & supported

APPLICATION & TECHNICAL INTEGRATION: WATER INGRESS



Image 25 & 26: Underground water encountered



±250L/min water ingress experienced



Image 27: Superabsorbent Polymer used to assist in slurry removal

APPLICATION & TECHNICAL INTEGRATION: GROUND CONDITIONS



Image 29: Current rock conditions improving

MASTER DRILLING

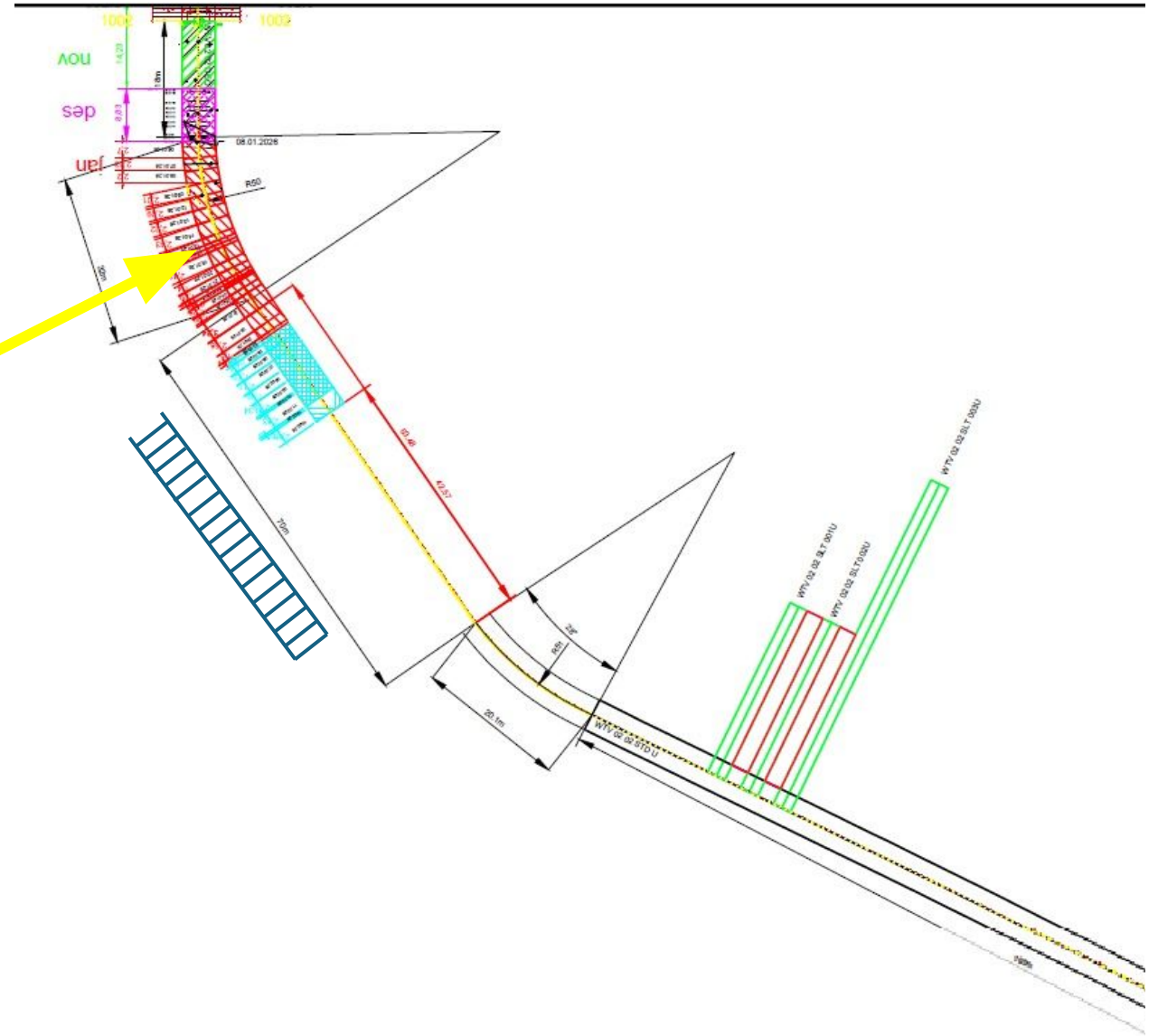


Image 30 & 31: R50m Turn radius excavated @ -9° & MTB excavation progress to date

INDUSTRY FIRSTS

- Complete MRE – Mechanized Rock Excavation (No drill and Blast)
- Designated area for mining method (No cross operations between mining methods)

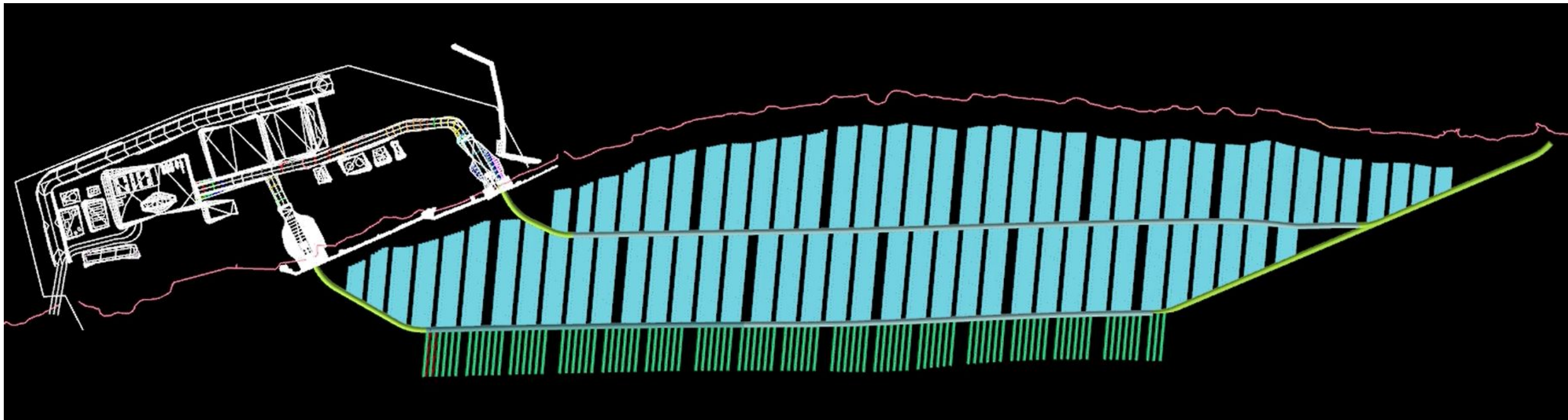


Image 31: Mining method layout using mechanical rock excavation



THANK YOU
QUESTIONS
?

MAKING A DIFFERENCE
IN THE MINING INDUSTRY