Never give up, Maramarua K1 Pit Geotech performance – a mine operators perspective

Maramarua Coal Mine

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August 2023

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Agenda

- Location, geology and geotechnical setting
- Timeline of the progression of our eastern highwall failure:
  - Designs
  - Geotechnical analysis
- Obstacles.
- Technical and operational controls utilised.

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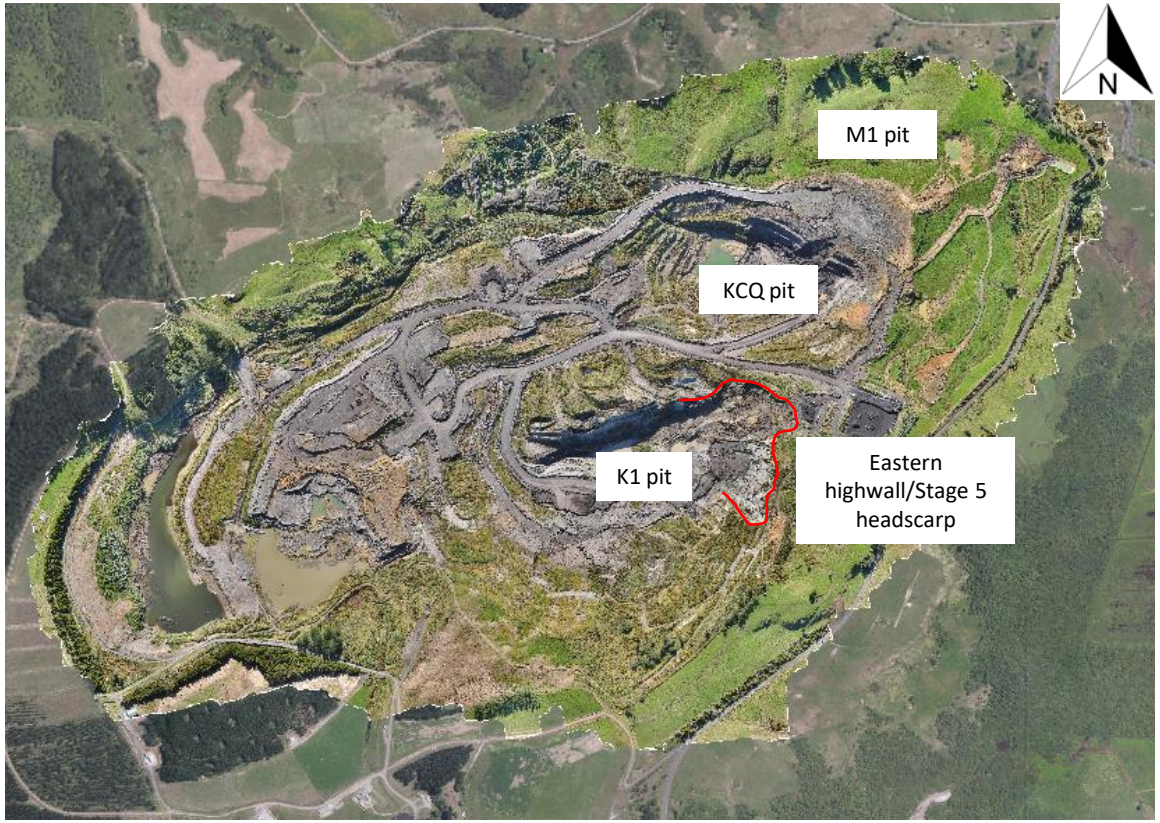
Maramarua Opencast Mine

- Located 35 km North of Huntly, Waikato, NZ
- Subbituminous thermal coal for domestic market



- Currently mining coal from the KCQ and K1 pits with overburden stripping currently underway in the K1 and M1 pits.

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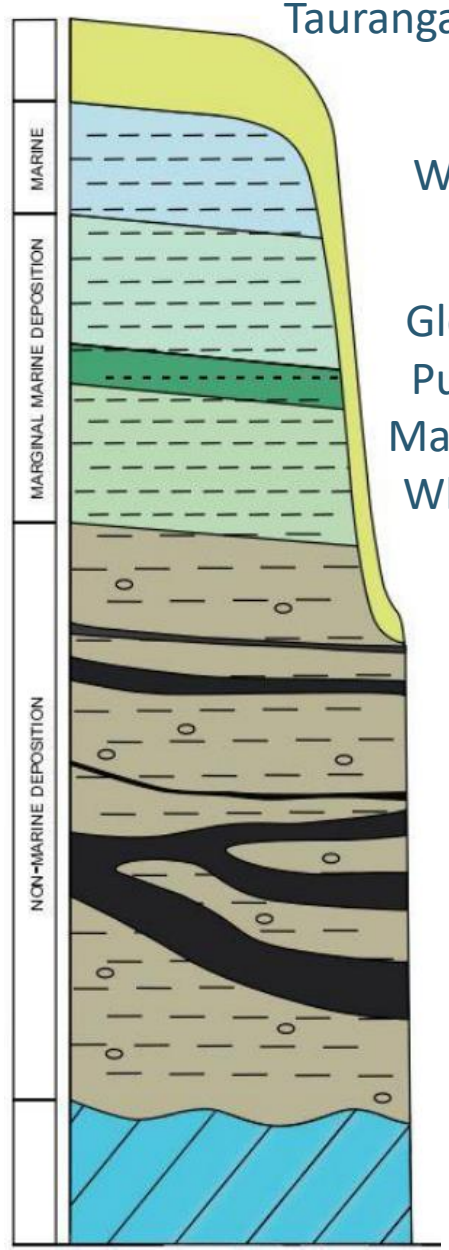
Geology of the Maramarua Opencast Mine

- Waikato Coal Measures (WCM) comprises:
  - Mudstone
  - Siltstone
  - Coal

} "Fireclay"

- Mine the Kupakupa and Kupakupa lower coal seams



Tauranga Group Quaternary Deposits

Waitemata Group

Glen Afton Claystone
Pukemiro Sandstone
Mangakotuku Siltstone
Whaingaroa Siltstone

Waikato Coal Measures

Mania Hill Basement

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Geotechnical setting

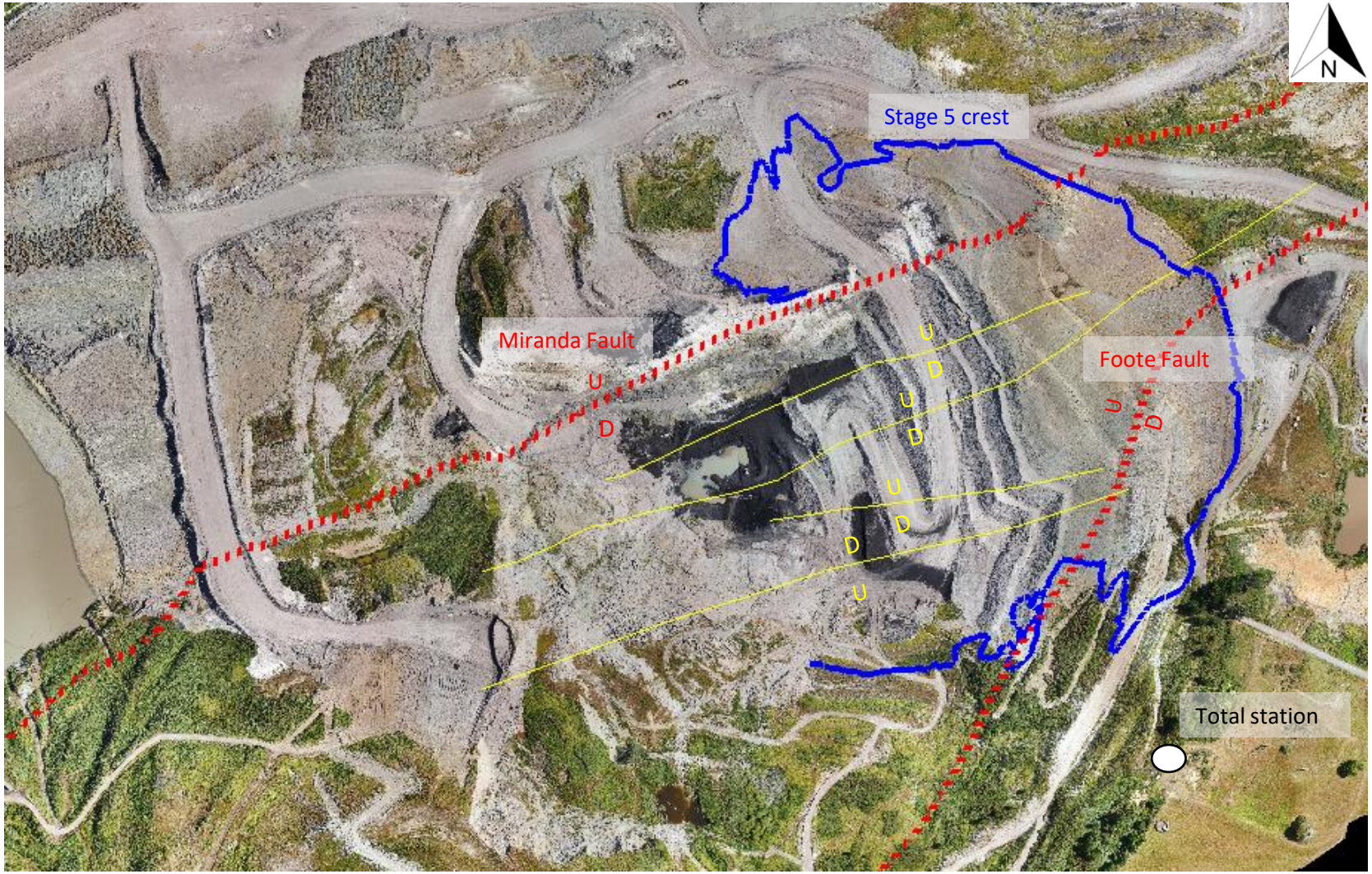
- The K1 pit is hosted in a complex wedge structure bound by two major fault structures:

Miranda Fault:

- Normal sense of displacement
- ~10 m Deformation zone.
- Coal downthrown ~60m

Foote Fault:

- Normal sense of displacement
- ~100 m Deformation zone.
- Coal downthrown ~150m



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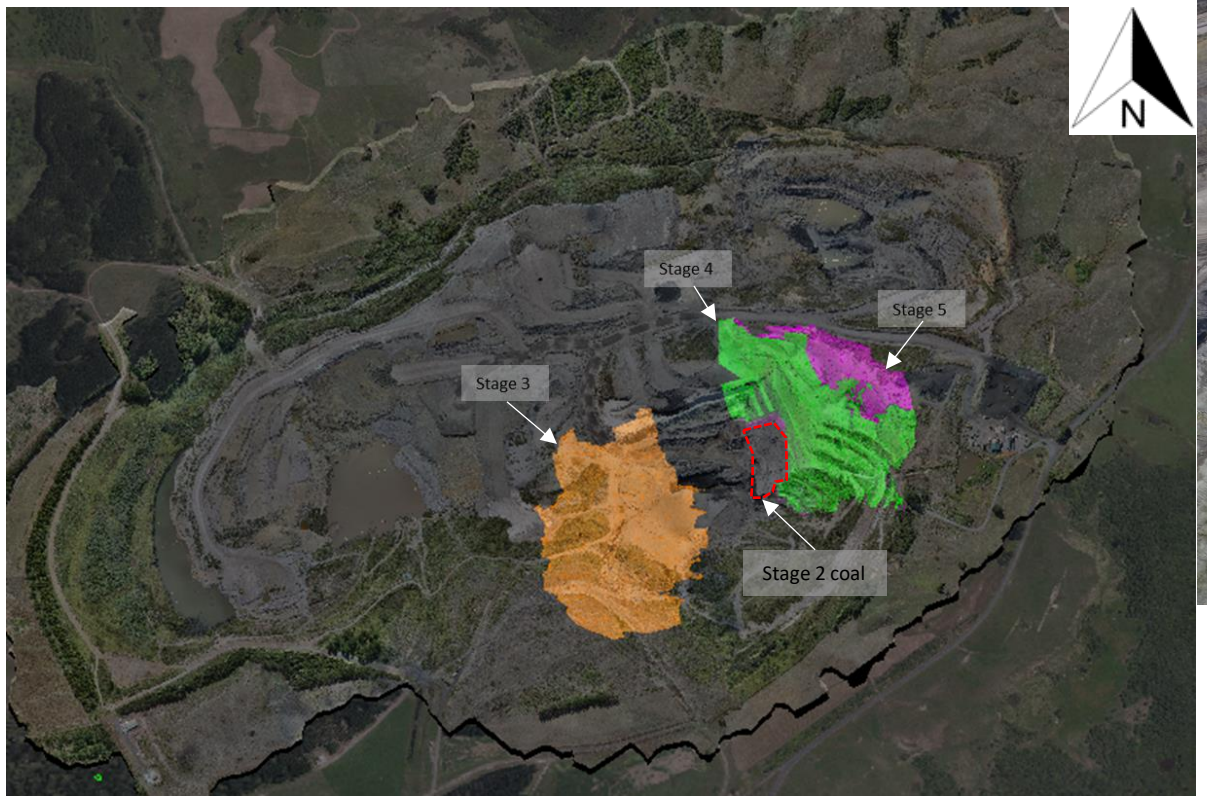
First signs of movement

- Initial movement was picked up by the total station monitoring system in early February 2020.
- K1 pit stages resequenced to unload instability
- Failure debris was dozed down to stabilize the slope and allowed the unloading of stage 4.



October 2020

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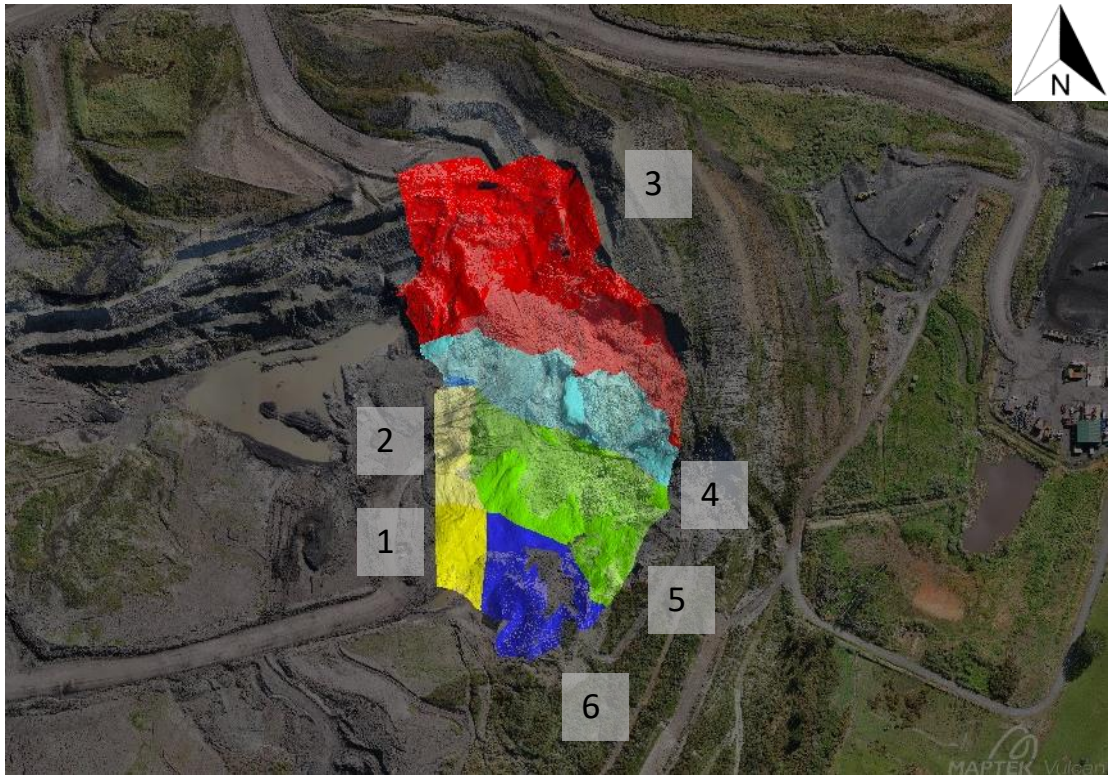
Instability along final highwall

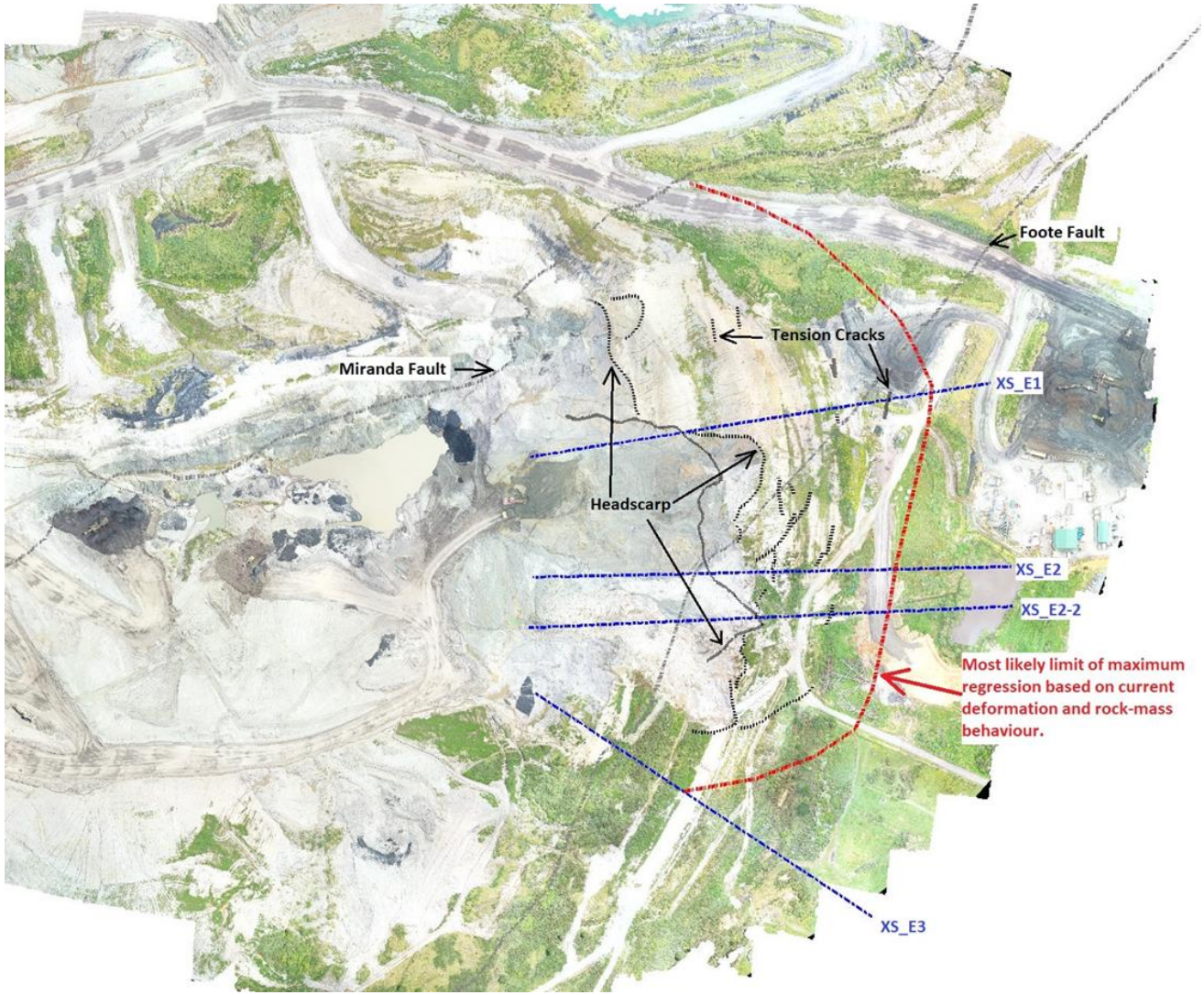
- Minor movement on faults in the cut face.
- December 2021 slumping had occurred in the southern section along the hanging wall of the Foote fault.
- By June 2022 the failure had progressed further to the north. Covering the stage 5 b coal.

June 2022

Geotechnical analysis following instability

- K1 East Wall has been undergoing progressive failure and ‘loosening’ of the rock mass.
- Design was split into smaller stages, backfilling as we retreat from the north





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Recovering coal under failed mass

- Further progression of the failure to the north and regression in the south.
- Repeated remobilisation due to saturation from rain events, ground water interaction, and removing material from the toe of the slope.

Cyclone Gabrielle

- 85mm of rain over 48hours
- Large scale Remobilisation and regression

February 2023

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Re-sequenced stage 5 plan

- Headscarp regression was concentrated along the northern limits.
- Resequenced plan mid 2023.

July 2023

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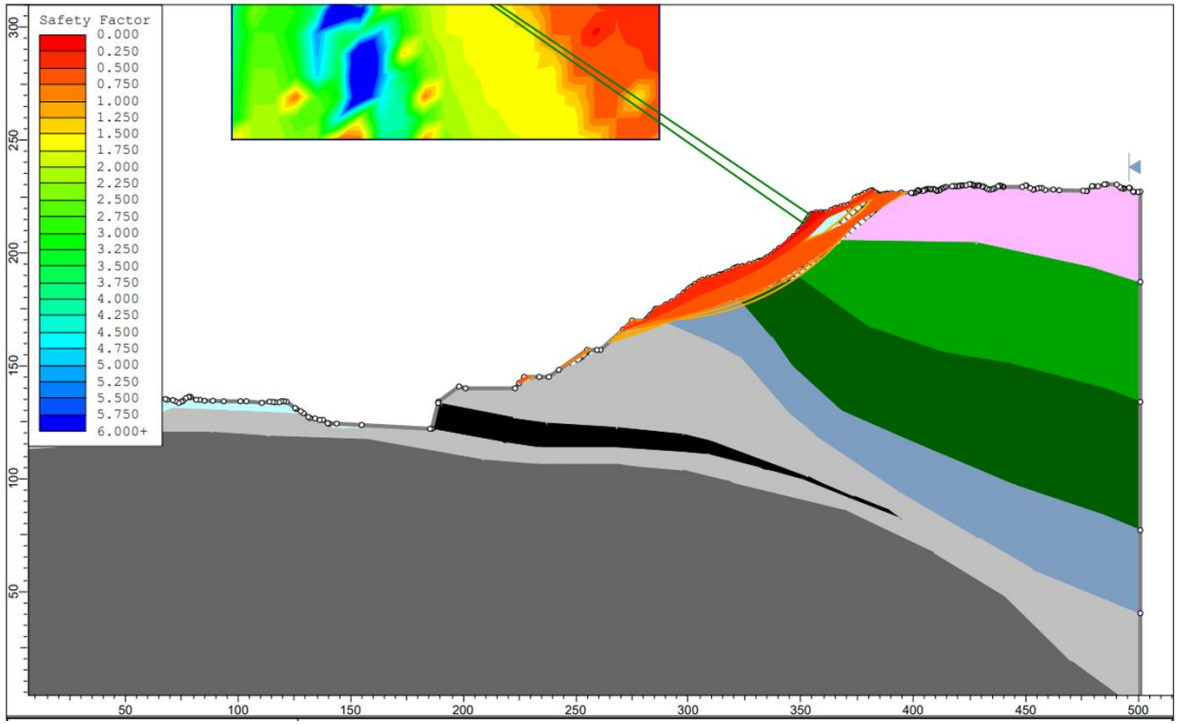
Geotechnical review

- Similar regression limits to original geotechnical assessment
- Geological units starting to roll over influenced by the Foote fault
- Series of small-scale failures
- Circular Failure in Mangakotoku Formation is likely



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Last chance Summer 2023

- A 3–4 month stretch of favorable summer weather to win the remaining coal.
- Remobilisation of failed material as we excavate out at the toe and as the material saturates.

December 2023

Stage 5 cutback

- With the performance of the wall over the last few months a cutback was proposed.
- The geotechnical assessment concluded that:
  - A Circular Failure In the Marine's Formation is likely at the contact with WCM.
  - Regression limits stayed the same as previous analysis

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Obstacles

- Unfavorably dipping geology
- Soft conditions
- Ground/surface water control
- Low weathering resistance in the marine units

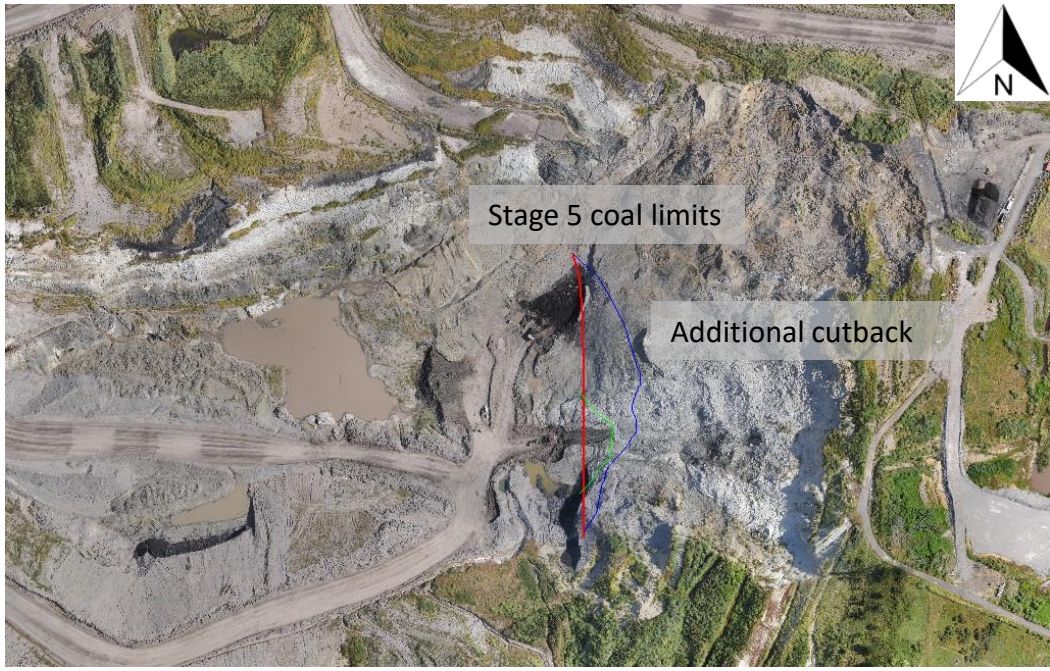
Operational and Technical controls

- Risk assessments determined whether we could safety remove the overburden and win the coal. These risks were managed through operational and technical controls that included:
- Robotic Total station
  - Alarms based on prism displacement thresholds
  - Alarms tied in with the TARP levels
- Water management
- Daily visual inspections
- Geotechnical awareness training

June 2024 – Current state of the eastern highwall

July 2024

- With the success/learnings we have seen previously another cutback is currently underway.



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Thank you