MACHEnergy

Mount Pleasant Operation

A JOINT VENTURE WITH JCDA Japan Coal Development Australia

Attachment 6

Geotechnical Considerations

Modification 8

Resource Strategies

Design
for a better
future /

MACH Energy

Mount Pleasant Operation

Landform Geotechnical Assessment in support of MOD 8

6 November, 2025

Public

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WSP is one of the world's leading professional services consulting firms. We are dedicated to our local communities and propelled by international brainpower. We are technical experts and strategic advisors including engineers, technicians, scientists, planners, surveyors, and environmental specialists, as well as other design, program, and construction management professionals. We design lasting solutions in the Transport & Water, Property & Buildings, Earth & Environment, and Mining & Power sector as well as offering strategic Advisory, Engagement & Digital services. With approximately 6,100 talented people in more than 50 offices in Australia and New Zealand, we engineer future ready projects that will help societies grow for lifetimes to come. www.wsp.com/en-au/.

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MEMO

TO:	Chris Lauritzen
FROM:	Marthinus Sonnekus and Lindsay Crutch
SUBJECT:	**Mount Pleasant Operation – Landform Geotechnical Assessment in support of MOD 8**
OUR REF:	**PS206161-MEM-001-Mt Pleasant MOD 8 Landform Geotechnical Assessment**
DATE:	**6 November 2025**

1. Mount Pleasant Operation background

The Mount Pleasant Operation is an open cut coal mine and associated infrastructure located approximately 3 kilometres (km) north-west of Muswellbrook in the Upper Hunter Valley of NSW. MACH Mount Pleasant Operation Pty Ltd (MACH) is the manager of the Mount Pleasant Operation as agent for and on behalf of the unincorporated Mount Pleasant Joint Venture between MACH Energy Australia Pty Ltd (95% owner) and J.C.D. Australia Pty Ltd (5% owner).

The Mount Pleasant Operation is currently operating under two Development Consents, namely DA 92/97 and SSD 10418. MACH is seeking a modification to Development Consent DA 92/97 known as MOD 8.

WSP has been commissioned by MACH to undertake a landform geotechnical assessment of the final landform that is being proposed as a component of MOD 8. This assessment includes developing two slope stability models (2D limit equilibrium method) through the proposed MOD 8 final landform and assessing stability conditions. The geotechnical properties for the slope stability modelling were obtained from previous studies for the Mount Pleasant Operation.

2. Project geology

The Mount Pleasant Operation is situated within the Hunter Coalfield on the western side of the Muswellbrook Anticline. The targeted seams are in the Wittingham Coal Measures of Late Permian age. The site was covered by a layer of topsoil and subsoil, overlying weathered Permian coal measures rock.

Sandstone dominates as the primary rock type, comprising approximately 80% of the total non-coal layers above the Edderton seam. These layers also consist of conglomerate, siltstone, and claystone, originating from geological events associated with the Hunter Bowen Orogeny to the north-east of the coalfield. There are weaker tuff layers, predominantly in the Piercefield and Edderton seams. The stratigraphy gently dips towards the west-northwest at about 2° to 4°. The average weathering profile depth is approximately 20 metres (m).

3. Groundwater levels and geotechnical properties

The groundwater surfaces adopted in the slope stability models were interpreted from the groundwater monitoring data provided by MACH for the Mount Pleasant Operation. Based on the monitoring data, the groundwater level is about 83 m below the ground surface along the western highwall. A groundwater level of 5 m above base of the Edderton seam has been assumed in the spoil material. Based on preliminary analysis by ATC Williams, a final void water level of approximately RL 120 mAHD was adopted. The shear strength parameters adopted in the slope stability analysis is from the *Geotechnical Design – Prescriptive Standard Mount Pleasant Operation* (21 February 2023).

4. Stability model locations and Design Acceptance Criteria

The MOD 8 final landform considered in this landform geotechnical assessment is shown in Figure 1. The two slope stability model locations are also shown in Figure 1.

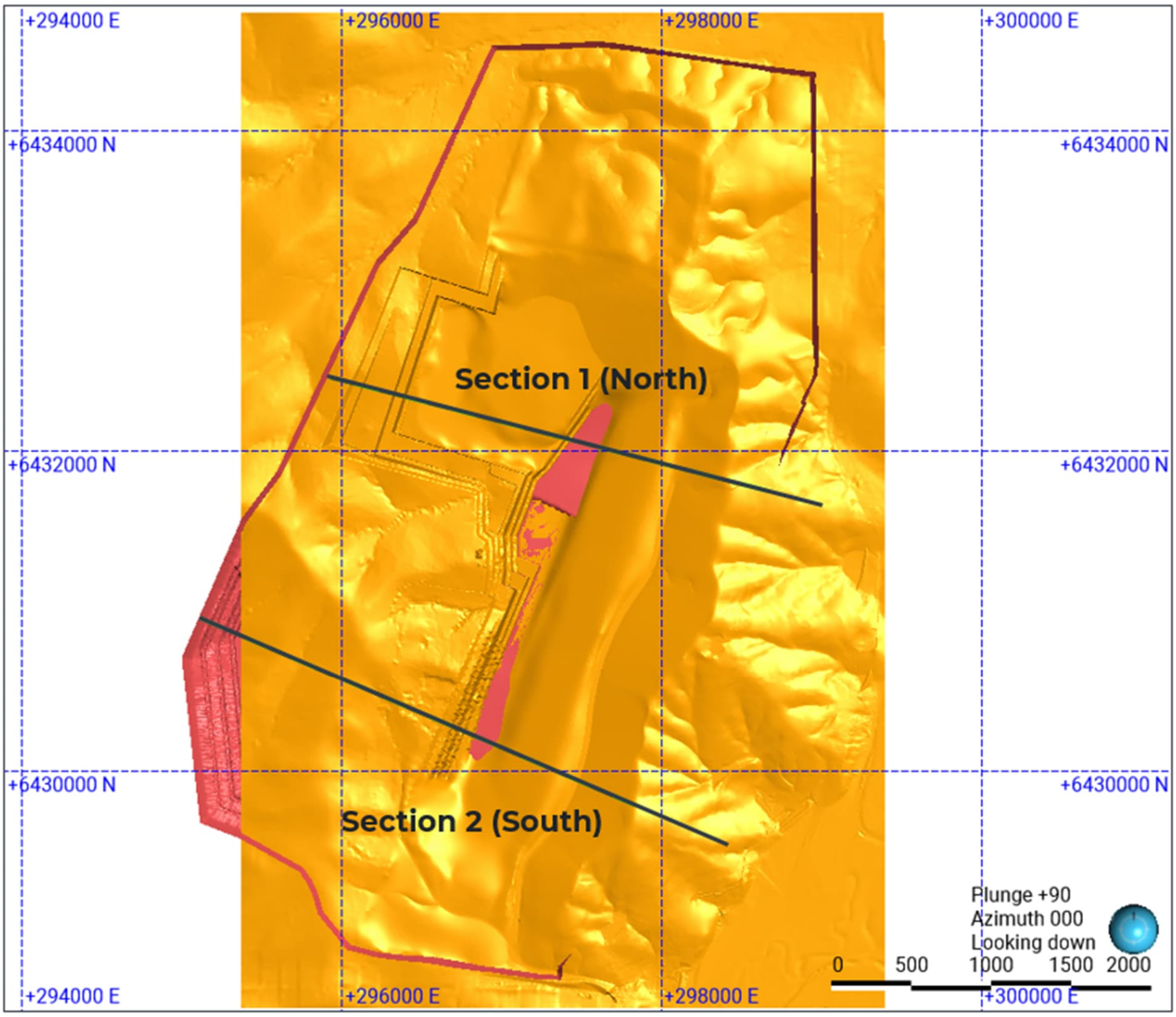

Figure 1 2D Slope stability model locations.

The Design Acceptance Criteria (DAC) was obtained from the *Geotechnical Design – Prescriptive Standard Mount Pleasant Operation* and is summarised in Table 1. A factor of safety (FoS) of at least 1.5 and 2.0 for western highwall and eastern lowwall, respectively, were adopted for this assessment.

Table 1 Design Acceptance Criteria for MOD 8 landform geotechnical assessment.

Wall Class	**Consequence of Failure**	**Design FoS**	**Design PoF**	**Pit Wall Examples**
1	Not Serious	Not Applicable		Minimum FoS of 1.2 on site
2	Moderately Serious	1.2	10%	Walls not carrying major infrastructure
3	Serious	1.5	1%	Walls carrying major mine infrastructure
4	Unacceptable	2.0	0.3%	Permanent pit walls near public infrastructure and adjoining leases

5.Slope stability model results and analysis

The slope stability model results for Section 1 (North) are shown in Figure 2 to Figure 5, with results summarised in Table 2.

Table 2 Slope stability model results for Section 1 (North).

Location		Factor of Safety	Design Acceptance Criteria (DAC)	Comments / Slope Design Parameters
West Highwall	Upper (Figure 2)	1.90	1.50	The batter angle in weathered strata is 18˚, 70˚ in fresh overburden highwall batters, The batter angle beneath the level of the final void water level is 55˚ - 60˚ and the spoil angle is 23˚.
	Middle (Figure 3)	1.88		
	Lower (Figure 4)	2.10	2.00	
East Lowwall (Figure 5)		2.02	2.00	The upper slope angle is 15˚ and the lower slope angle beneath the level of the final void water level is 21˚.

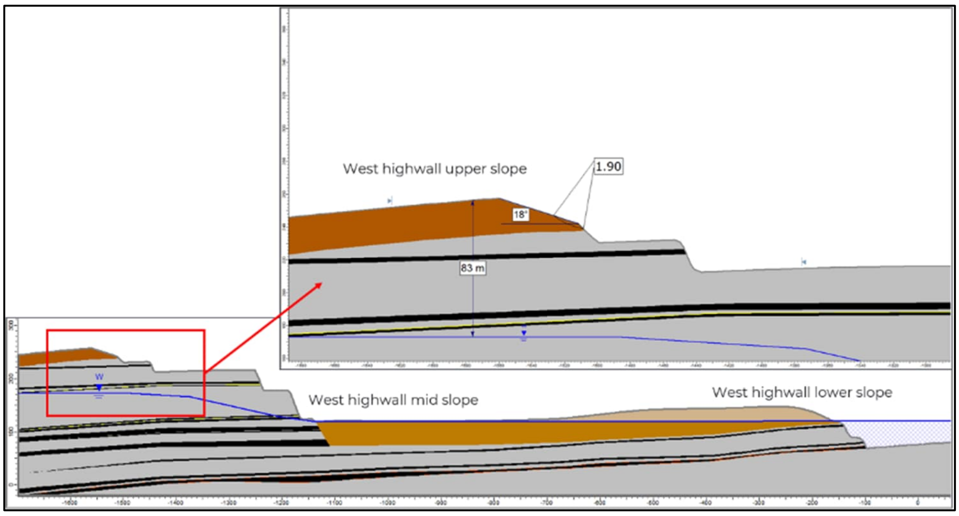

Figure 2 Slope stability model result for Section 1 (North) – West highwall upper slope.

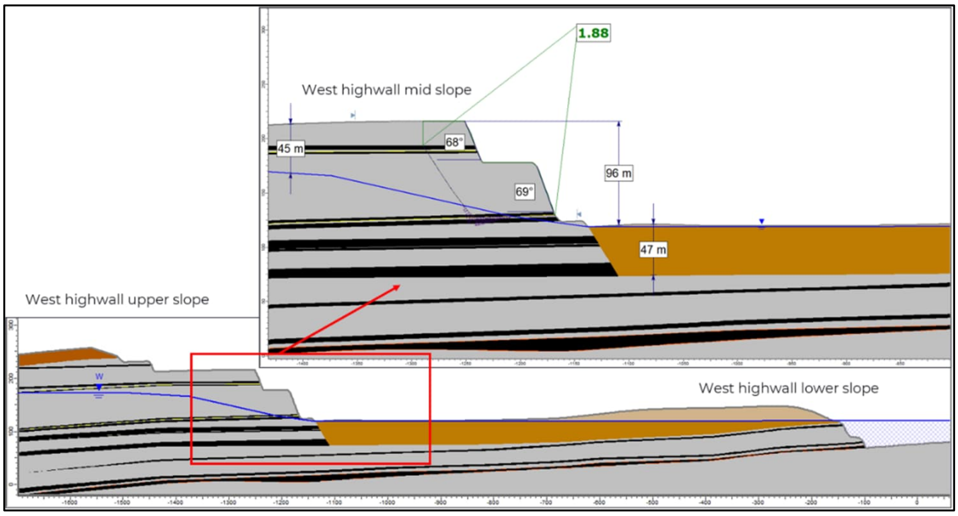

Figure 3 Slope stability model result for Section 1 (North) – West highwall mid slope.

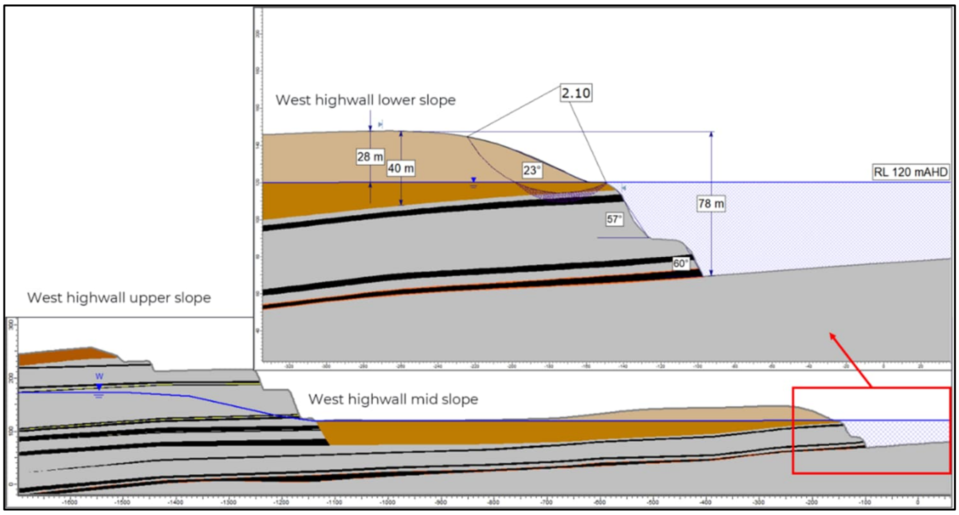

Figure 4 Slope stability model result for Section 1 (North) – West highwall lower slope.

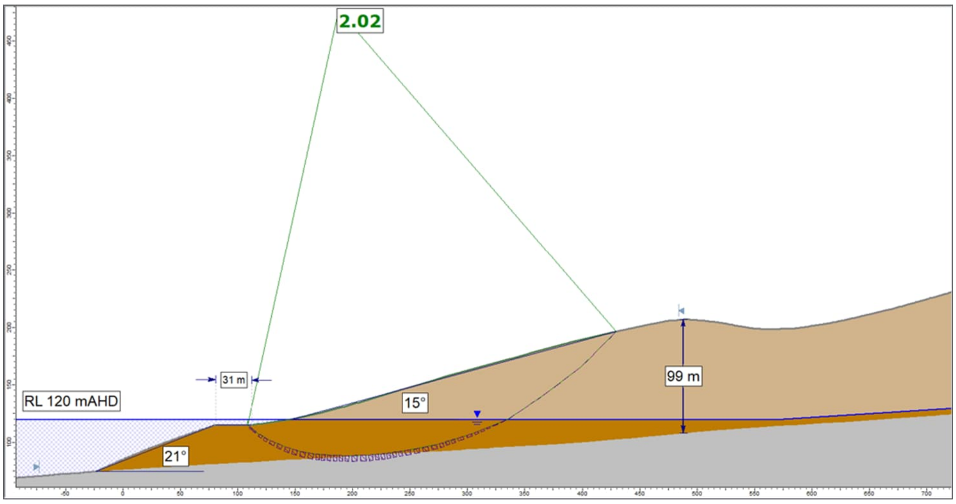

Figure 5 Slope stability model result for Section 1 (North) – East lowwall.

The slope stability model results for Section 2 (South) are shown in Figure 6 and Figure 7 and are summarised in Table 3. The minimum factor of safety (FoS) for the western highwall is 1.56, for potential sliding along the weak tuff layer within the Edderton seam.

Table 3 Slope stability model results for Section 2 (South).

Location	**Factor of Safety**	**Design Acceptance Criteria (DAC)**	**Comments / Slope Design Parameters**
West highwall (Figure 6)	1.56	1.50	The batter angle in weathered strata is 15˚ and the batter angle is 55˚ - 65˚ in fresh overburden highwall batters. The lower part of the highwall will consist of spoil material, placed as a buttress, with approximate dimensions of 30 m width at the top, 61 m height, and a 23˚ slope angle (crest to toe).
East lowwall (Figure 7)	2.05	2.00	The upper slope angle is 15˚ and the lower slope angle beneath the level of the final void water level is 21˚.

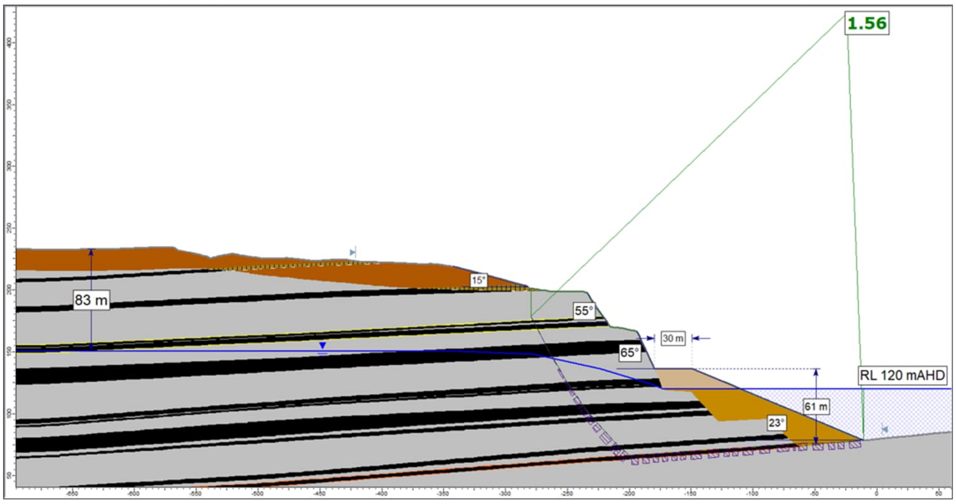

Figure 6 Slope stability model result for Section 2 (South) – West highwall.

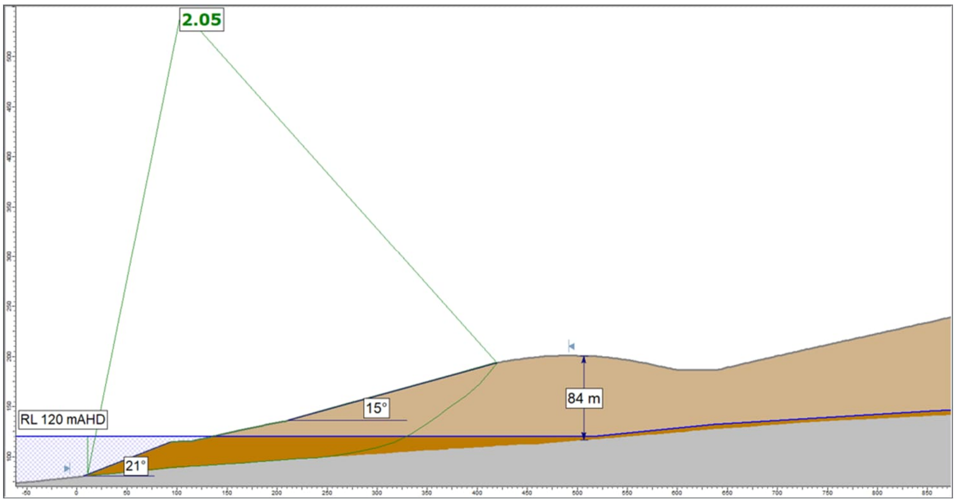

Figure 7 Slope stability model result for Section 2 (South) – East lowwall.

6. Limitations of stability analysis

The following limitations apply to slope stability analysis completed in this study:

- This landform geotechnical assessment is based on the groundwater information available. If the interpreted groundwater surfaces incorporated into the stability modelling are different to actual groundwater conditions, it may impact the slope stability modelling results.
- If weak material is incorrectly placed in the spoil, it can negatively impact the final landform stability.
- If a weak tuff layer is left on the pit floor (particularly at the east lowwall in the South), this will affect the stability and impact the ability of the final landform to meet the DAC.

7. Conclusions

The assessment conclusions are as follows:

- The FoS for the final landform design geometry of the spoil in the east lowwall of both Section 1 (North) and Section 2 (South) and west highwall lower achieve the DAC for a required minimum FoS of 2.0.
- The final landform design geometry of the weathered overburden in the west highwall at a slope angle of 18˚ achieve the DAC for a required minimum FoS of 1.5.
- The final landform design geometry of the fresh overburden in the western highwall for both Section 1 (North) and Section 2 (South) achieve the DAC for a required minimum FoS of 1.5.

8. Recommendations

The study recommendations include:

- The groundwater monitoring program at the Mount Pleasant Operation should be continued, and augmented as required, to inform knowledge of groundwater levels along both the west highwall and east lowwall.
- The landform slope stability models should be reviewed and updated if groundwater monitoring data or other studies indicate a material change to the assumed local groundwater levels and / or final void water level and / or if new geotechnical data becomes available.
- Any potential weak material, such as tuff layers, along the pit floor should be removed before establishing the final landform.

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