

ABSTRAK

HUBUNGAN MODEL MUKA AIR TANAH DENGAN KESTABILAN LERENG *LOWWALL* MENGGUNAKAN *LIMIT EQUILIBRIUM METHOD* KABUPATEN TAPIN, KALIMANTAN SELATAN

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Penelitian ini dilakukan di Pit Cendana, PT Bhumi Rantau Energi, yang secara administratif terletak di Kecamatan Lokpaikat, Kabupaten Tapin, Kalimantan Selatan. Latar belakang penelitian ini didasari oleh pentingnya analisis kestabilan lereng pada tambang terbuka, khususnya pada lereng *lowwall*, guna meminimalkan potensi longsor yang dapat menimbulkan kerugian serta mengoptimalkan perolehan batubara. Salah satu faktor utama yang mempengaruhi kestabilan lereng adalah kondisi muka air tanah yang dapat mengurangi kuat geser material akibat tekanan air pori. Penelitian ini bertujuan untuk menganalisis hubungan antara model muka air tanah terhadap kestabilan lereng *lowwall* pada Seam U-W Blok 34 serta memberikan rekomendasi untuk meningkatkan faktor keamanan lereng. Metode yang digunakan adalah Metode Keseimbangan Batas (*Limit Equilibrium Method*) dengan pendekatan *Morgenstern-Price* untuk menghitung nilai faktor keamanan (FK). Data yang digunakan meliputi data primer berupa litologi, struktur geologi, RQD dan klasifikasi massa batuan (RMR, GSI), serta data sekunder berupa desain lereng, topografi, muka air tanah dari piezometer, dan sifat fisik-mekanik batuan. Hasil penelitian menunjukkan bahwa kondisi muka air tanah sangat berpengaruh terhadap kestabilan lereng. Pada desain awal, lereng memiliki nilai FK sebesar 1,3 yang menunjukkan kondisi stabil. Namun, ketika muka air tanah berada di permukaan, nilai FK menurun menjadi 0,7 (tidak stabil), pada kedalaman 15 meter sebesar 1,1 (kritis), dan pada kedalaman 30 meter kembali stabil dengan FK sebesar 1,3. Selain itu, keberadaan lapisan lemah (*weak layer*) pada *interburden* turut meningkatkan potensi kegagalan lereng. Berdasarkan hasil tersebut, dapat disimpulkan bahwa pengendalian muka air tanah dan evaluasi kondisi geologi teknik merupakan faktor utama dalam menjaga kestabilan lereng.

Kata kunci: kestabilan lereng, model, muka air tanah, faktor keamanan, *Morgenstern-Price*

ABSTRACT

RELATIONSHIP BETWEEN GROUNDWATER LEVEL MODEL AND LOWWALL SLOPE STABILITY USING THE LIMIT EQUILIBRIUM METHOD TAPIN REGENCY, SOUTH KALIMANTAN

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This study was conducted at Pit Cendana, PT Bhumi Rantau Energi, which is administratively located in Lokpaikat District, Tapin Regency, South Kalimantan. The background of this research is based on the importance of slope stability analysis in open-pit mining, particularly on lowwall slopes, in order to minimize the risk of landslides that may cause losses and to optimize coal recovery. One of the main factors affecting slope stability is the groundwater level, which can reduce the shear strength of materials due to pore water pressure. This study aims to analyze the relationship between groundwater level modeling and the stability of lowwall slopes in Seam U–W Block 34, as well as to provide recommendations to improve the slope safety factor. The method used in this research is the Limit Equilibrium Method with the Morgenstern-Price approach to calculate the factor of safety (FS). The data used include primary data such as lithology, geological structures, RQD, and rock mass classification (RMR, GSI), as well as secondary data including slope design, topography, groundwater levels from piezometers, and the physical-mechanical properties of rocks. The results show that groundwater conditions have a significant influence on slope stability. In the initial design, the slope has a factor of safety of 1.3, indicating stable conditions. However, when the groundwater level is at the surface, the factor of safety decreases to 0.7 (unstable); at a depth of 15 meters, it is 1.1 (critical); and at a depth of 30 meters, the slope becomes stable again with a factor of safety of 1.3. In addition, the presence of weak layers within the interburden also increases the potential for slope failure. Based on these results, it can be concluded that groundwater control and geotechnical evaluation are key factors in maintaining slope stability.

Keywords: slope stability, model, groundwater level, factor of safety, Morgenstern-Price