

INTISARI

Bendungan Pamukkulu merupakan salah satu infrastruktur Sumber Daya Air yang dibangun oleh Kementerian PUPR di Sulawesi Selatan. Dalam pembangunan infrastruktur bendungan perlu dilakukan karakterisasi geologi teknik untuk menghindari permasalahan geologi yang akan berpengaruh terhadap infrastruktur bendungan. Ketika konstruksi bendungan sedang berjalan, rekayasa lereng bangunan pelimpah Bendungan Pamukkulu mengalami longsor. Penyebab terjadinya longsor pada lereng bangunan pelimpah yang memiliki desain aman tidak diketahui secara pasti. Oleh karena itu, perlu dilakukan penelitian ini guna untuk mengetahui kondisi geologi teknik (geomorfologi, batuan dan tanah, struktur geologi, dan kondisi air tanah), kestabilan lereng bangunan pelimpah, dan penyebab lereng mengalami longsor. Penelitian ini dilakukan pemetaan geologi teknik dengan skala 1:10.000, evaluasi batuan inti, pengujian petrografi batuan, pengujian keteknikan batuan, analisis kestabilan lereng bangunan pelimpah dengan menggunakan metode *Limit Equilibrium Method* (LEM), dan melakukan *back analysis* menggunakan analisis probabilitas terhadap lereng yang mengalami longsor pada lereng bangunan pelimpah. Hasil penelitian ini menunjukkan daerah penelitian dibagi menjadi 3 satuan geomorfologi, yaitu satuan perbukitan sisa gunung api berlereng landai – miring, satuan perbukitan sisa gunung api berlereng agak curam- curam, dan satuan dataran banjir berlereng datar - landai. Litologi daerah penelitian terdiri dari litologi berupa satuan lava basal, satuan breksi piroklastik, dan endapan lepas berukuran lempung – pasir. Berdasarkan tingkat pelapukan batuan, lokasi penelitian tersusun atas satuan breksi piroklastik lapuk sedang, breksi piroklastik lapuk tinggi, lava basal lapuk sedang, dan lava basal lapuk tinggi. Struktur geologi yang ada di daerah penelitian, berupa kekar, sesar geser sinistral, sesar geser dekstral, dan sesar naik diperkirakan. Struktur geologi yang berkembang memiliki arah gaya utama pembentuk yaitu NNW-SSE. Muka air tanah di daerah penelitian berada pada elevasi 75,5 mdpl hingga 123 mdpl. Lereng bangunan pelimpah yang telah didesain dengan nilai kohesi 12,7 kPa dan 9,8 kPa, sudut gesek dalam 21,5° dan 20,1° pada material tanah menunjukkan lereng dalam kondisi aman dengan $FK > 1,5$. Namun hasil *back analysis* menunjukkan tanah memiliki nilai kohesi 3,7 kPa dengan sudut gesek dalam 11,7°. Pengurangan nilai kohesi dan sudut gesek dalam pada tanah penyusun lereng diperkirakan akibat keberadaan mata air berada di Selatan lereng yang mengalir ke lereng bangunan pelimpah.

Kata kunci: Bendungan Pamukkulu, kondisi geologi teknik, kestabilan lereng, *Limit Equilibrium Method* (LEM), *back analysis*.

ABSTRACT

Pamukkulu Dam is one of the water resources infrastructure built by the Ministry of PUPR in South Sulawesi. In the construction of dam infrastructure, it is necessary to characterize the engineering geology to avoid geological problems that will affect the dam infrastructure. During the construction of the dam, the slope of the Pamukkulu Dam spillway failed. The cause of failure the slope that has been designed to be safe is not known for certain. Therefore, it is necessary to conduct this research to determine the engineering geology conditions (geomorphology, rock and soil, geological structure, and groundwater conditions), the stability of the spillway slope, and the cause of the slope design failure. This research is carried out engineering geological mapping with a scale of 1:10,000, core evaluation, petrographic, rock engineering testing, analysis of the stability of the spillway slope using the Limit Equilibrium Method (LEM), and back analysis using probabilistic analysis of slope failures that occur in the spillway slope engineering. The results of this study show that the research area is divided into 3 geomorphological units, namely volcanic remnants hills with gentle slopes hills, volcanic remnants hills with moderately steep slopes, and floodplain with flat - gentle slopes. The lithology of the study area consists of lava basalt units, pyroclastic breccia units, and loose deposits of clay-sand size. Based on the level of rock weathering, the research location is composed of moderately weathered pyroclastic breccia unit, highly weathered pyroclastic breccia, moderately weathered basalt lava, and highly weathered basalt lava. Geological structures in the study area, in the form of joints, left-lateral strike-slip faults, right-lateral strike-slip faults, and ascending faults are estimated. The developed geological structures have a main force direction of NNW-SSE. The groundwater table in the study area is at an elevation of 75.5 meters above sea level to 123 meters above sea level. The designed spillway slope with cohesion values of 12.7 kPa and 9.8 kPa, friction angles of 21.5° and 20.1° in the soil material shows that the slope is in a safe condition with $FK > 1.5$. However, the results of the back analysis showed that the soil had a cohesion value of 3.7 kPa with friction angle of 11.7° . The reduction in the cohesion value and the angle of friction in the soil composing the slope is thought to be due to the presence of springs in the south of the slope that flow into the slope of the spillway building.

Keywords: Pamukkulu Dam, engineering geology, slope stability, Limit Equilibrium Method (LEM), back analysis.