

GEOLOGI DAN ANALISIS KESTABILAN LERENG TAMBANG GALIAN C MENGGUNAKAN METODE KLASIFIKASI MASSA BATUAN DAERAH MANYARAN, KECAMATAN BANYAKAN, KABUPATEN KEDIRI, JAWA TIMUR

SARI

Daerah Manyaran, Kecamatan Banyakan, Kabupaten Kediri, Jawa Timur berada di antara Gunung Wilis dan Gunung Klotok yang tersusun oleh material vulkanik Kuartar dan memiliki potensi Galian C, namun kegiatan penambangan masih dalam tahap perencanaan sehingga diperlukan kajian geologi serta analisis kestabilan lereng untuk menjamin keamanan tambang. Penelitian dilakukan melalui pemetaan geologi serta metode klasifikasi massa batuan berupa *Rock Mass Rating* (RMR) dan *Slope Mass Rating* (SMR) guna menilai kualitas massa batuan dan jenjang. Secara geomorfologi, daerah penelitian termasuk dalam bentuk asal gunungapi dengan tiga satuan bentuk lahan menurut Van Zuidam (1989), yaitu Satuan Lereng Kaki Gunungapi Wilis, Satuan Kerucut Gunungapi Klotok, Satuan Aliran Lava Klotok dan Satuan Dataran Fluvio Vulkanik Wilis Klotok. Sedangkan satuan geologi daerah penelitian terdiri atas Satuan Lava Andesit, Breksi Piroklastik, dan Breksi Laharik yang menunjukkan lingkungan gunungapi transisi proksimal-medial. Analisis geologi teknik melalui data set diskontinuitas dan kinematik menunjukkan potensi longsoran terbesar berupa *oblique toppling* sebesar 36,02%. Hasil klasifikasi massa batuan menunjukkan nilai RMR sebesar 71 (kelas II, kategori baik menurut Bieniawski, 1989) dan nilai SMR yaitu 67,5 (kelas baik menurut Romana, 1985) menunjukkan lereng relatif stabil meskipun masih terdapat potensi longsoran pada beberapa blok dengan rekomendasi perkuatan lereng berupa pembuatan parit kaki lereng, jaring kawat baja, serta pemasangan baut batu lokal maupun sistematis. Arah ekskavasi yang direkomendasikan adalah N85°E dengan rata-rata potensi longsoran 0,59%, sedangkan arah N270°E tidak disarankan karena memiliki potensi longsoran hingga 24%. Analisis faktor keamanan (FK) lereng aktual bernilai 0,489 yang termasuk kondisi tidak aman, sehingga diperlukan perancangan jenjang dengan kemiringan 35° yang menghasilkan FK=1,259 dan menunjukkan kondisi lereng yang aman untuk aktivitas penambangan.

Kata Kunci: Galian C, Geologi, Kestabilan Lereng, Analisis Kinematika, RMR, SMR, Arah ekskavasi, Faktor Keamanan, Manyaran.

**GEOLOGY AND SLOPE STABILITY ANALYSIS OF C-QUARRY MINING
USING ROCK MASS CLASSIFICATION METHOD IN MANYARAN AREA,
BANYAKAN DISTRICT, KEDIRI REGENCY, EAST JAVA**

ABSTRACT

The Manyaran area, located in Banyakan District, Kediri Regency, East Java, lies between Mount Wilis and Mount Klotok and is composed of Quaternary volcanic materials with potential for C-grade mining. However, since mining operations are still in the planning stage, geological studies and slope stability analyses are required to ensure mining safety. The research was conducted through geological mapping and rock mass classification using the Rock Mass Rating (RMR) and Slope Mass Rating (SMR) methods to evaluate rock mass quality and bench stability. Geomorphologically, the study area is part of a volcanic landform with four geomorphic units according to Van Zuidam (1989), namely the Wilis Volcanic Footslope Unit, the Klotok Volcanic Cone Unit, the Klotok Lava Flow Unit, and the Wilis–Klotok Fluvio-volcanic Plain Unit. The geological units consist of Andesite Lava, Pyroclastic Breccia, and Laharic Breccia, indicating a volcanic environment transitioning from proximal to medial. Engineering geological analysis based on discontinuity data and kinematic assessment shows that the dominant failure potential is oblique toppling, reaching 36.02%. Rock mass classification results indicate an RMR value of 71 (Class II – Good, according to Bieniawski, 1989) and an SMR value of 67.5 (Good class according to Romana, 1985), suggesting that the slope is relatively stable, although localized failure may still occur. Recommended reinforcement measures include the construction of toe ditches, installation of wire-mesh nets, and the application of local or systematic rock bolting. The recommended excavation direction is N85°E, with an average failure potential of only 0.59%, whereas the N270°E direction is not advised due to its significantly higher failure potential of up to 24%. The actual slope Factor of Safety (FoS) of 0.489 indicates an unsafe condition; therefore, a re-design with a bench slope angle of 35° was proposed, producing an FoS of 1.259 and ensuring a safe condition for mining activities.

Keywords: C-Quarry, Geology, Slope Stability, Kinematic Analysis, RMR, SMR, Excavation Direction, Factor of Safety, Manyaran.