Geologi dan Evaluasi Kestabilan Lereng Berdasarkan Karakteristik Geologi dan Sifat Fisik Mekanik Tanah Untuk Mitigasi Bencana Daerah Menoreh dan Sekitarnya, Kecamatan Salaman, Kabupaten Magelang, Jawa Tengah

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ABSTRAK

Lokasi penelitian berada di Desa Menoreh dan sekitarnya, Kecamatan Salaman, Kabupaten Magelang, Provinsi Jawa Tengah. Secara geomorfologi, daerah penelitian dibagi menjadi 5 satuan bentuklahan, yakni satuan bentuklahan perbukitan denudasional (D1), dataran denudasional (D2), bukit denudasional (D3), tubuh sungai (F1), dan dataran aluvial (F2). Terdapat empat jenis pola pengaliran yang berkembang pada daerah penelitian, yaitu pola pengaliran paralel (PRL), dendritik (DND), subdendritik (SDND), dan radial (RDL). Secara stratigrafi, daerah penelitian disusun oleh enam satuan batuan, mulai dari yang termuda yaitu satuan endapan aluvial, batugamping Jonggrangan, intrusi dasit, intrusi andesit, lava andesit Kaligesing, dan breksi andesit Kaligesing. Struktur geologi yang berkembang yaitu sesar mendatar kanan turun berarah Timur Laut- Barat Daya, dan struktur kekar dengan arah tegasan utama relatif Tenggara – Barat Laut. Analisa kestabilan lereng dilakukan lebih mendalam pada enam buah lereng, yaitu Lereng 1 di Desa Paripurno merupakan lereng stabil dengan nilai FK 1.308, Lereng 2 di Desa Paripurno merupakan lereng stabil dengan nilai FK 1.41, Lereng 3 di Desa Ngadiharjo merupakan lereng kritis dengan nilai FK 1.137, Lereng 4 dan 5 di Desa Kalirejo merupakan lereng labil dengan nilai FK masing-masing 0.841 dan 0.105, serta Lereng 6 di Desa Kalirejo merupakan lereng stabil dengan nilai FK 1.371. Karakteristik geologi yakni satuan batuan, tinggi lereng dan *slope*, sifat fisik tanah yakni kadar air dan berat isi tanah, dan sifat mekanik tanah yaitu nilai kohesi dan sudut geser dalam menjadi faktor penyebab gerakan tanah. Penentuan zona kerawanan gerakan tanah menggunakan indikator kemiringan lereng, jenis batuan, curah hujan, struktur geologi, penggunaan lahan, tata air lereng, kegempaan, dan kondisi tanah melalui evaluasi kestabilan lereng berdasarkan karakteristik geologi, sifat fisik dan mekanik tanah, sehingga dihasilkan tiga zona, yaitu zona kerawanan gerakan tanah tingkat tinggi, zona kerawanan gerakan tanah tingkat sedang, dan zona kerawanan gerakan tanah tingkat rendah. Mitigasi yang dapat dilakukan untuk mengurangi dampak ataupun kerugian dari gerakan tanah adalah membuat dinding penahan dengan memperhatikan sistem drainase yang baik, mengubah geometri lereng menjadi lebih landai dan menggunakan *geotextile* dan *geomembrane*.

Kata kunci : geologi, kestabilan lereng, sifat fisik mekanik tanah

Geology and Slope Stability Evaluation Based on Geological Characteristics and Physical Mechanical Properties of Soil for Disaster Mitigation in Menoreh and Surrounding Areas, Salaman District, Magelang Regency, Central Java

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ABSTRACT

The research location is in Menoreh Village and its surroundings, Salaman District, Magelang Regency, Central Java Province. Geomorphologically, the research area is divided into 5 landform units, namely denudational hills (D1), denudational hills (D2), denudational hills (D3), river bodies (F1), and alluvial plains (F2). There are four types of drainage patterns that developed in the study area, namely parallel (PRL), dendritic (DND), subdendritic (SDND) and radial (RDL) drainage patterns. Stratigraphically, the study area is composed of six rock units, starting from the youngest, namely alluvial deposits, Jonggrangan limestones, dacite intrusions, andesite intrusions, Kaligesing andesite lava, and Kaligesing andesite breccias. The geological structures that have developed are right-hand horizontal faults with a trending Northeast-Southwest, and joint structures with a relative main stress direction of Southeast-Northwest. Slope stability analysis was carried out more deeply on six slopes, namely Slope 1 in Paripurno Village is a stable slope with an FS value of 1.308, Slope 2 in Paripurno Village is a stable slope with an FS value of 1.41, Slope 3 in Ngadiharjo Village is a critical slope with an FS value of 1.137 , Slopes 4 and 5 in Kalirejo Village are unstable slopes with FS values of 0.841 and 0.105, respectively, and Slope 6 in Kalirejo Village is stable slopes with FS values of 1.371. Geological characteristics, namely rock units, slope height and slope, soil physical properties, namely water content and bulk density, and soil mechanical properties, namely cohesion values and internal shear angles, are factors that cause soil movements. Determination of soil movement susceptibility zones using indicators of slope, rock type, rainfall, geological structure, land use, slope water management, and seismicity, and soil conditions through evaluation of slope stability based on geological characteristics, physical and mechanical properties of the soil, resulting in three zones, namely the zone of high-level ground motion susceptibility, moderate-level ground movement vulnerability zone, and low-level ground movement vulnerability zone. Mitigation that can be done to reduce the impact or loss of soil movement is to make retaining walls by paying attention to a good drainage system, changing the geometry of the slopes to be more gentle and using geotextiles and geomembranes.

Keywords : geology, slope stability, physical mechanical properties of soil