# MODELLING POST-FIRE EROSION ON NATURAL SLOPE CONTAINING NESOSILICATES MINERAL

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## ABSTRAK

Pasca-kebakaran menyebabkan hakisan dan larian permukaan menjadi semakin meningkat. Kesannya menjadi semakin meningkat apabila melibatkan magnitud intensiti hujan yang tinggi semasa musim hujan yang berpanjangan. Dengan kejadian hujan lebat yang melebihi kapasiti simpanan, kadar hakisan biasanya meningkat dengan ketara disebabkan oleh pemusnahan lapisan tumbuhan, ketersediaan bahan yang mudah hakis dan perubahan dalam sifat fizikal dan hidrologi tanah, menyebabkan peningkatan air larian dan penurunan dalam kekuatan permukaan tanah yang meningkatkan ketertanggalan dan pengangkutan endapan. Dalam kajian ini, pelbagai sifat tanah termasuk graviti tentu, had atterberg, indeks pengembangan dan kandungan bahan organik telah dipelajari. Lengkung ciri tanah-air bagi semua sampel juga ditentukan. Untuk tujuan kajian ini, kandungan lembapan diperolehi untuk sampel tanah yang terbakar dan tidak terbakar dikaji melalui teknik titik embun sejuk cermin. Analisis kestabilan cerun dilakukan dengan menggunakan perisian GeoStudio menggunakan SLOPE / W berdasarkan lengkung ciri tanah-air yang dihasilkan. Parameter kekuatan ricih diperoleh dan digunakan untuk analisis kestabilan dengan perisian SLOPE / W. Keputusan eksperimen menunjukkan bahawa pada suhu 440°C, had cecair, kandungan bahan organik dan lengkung ciri tanah-air berlaku pengurangan dan indeks pengembangan terhapus. Pemanasan tanah pada 800°C dan 1350°C telah menghapuskan had cecair, had plastik, potensi pengembangan dan kandungan organik tanah yang telah diuji. Berdasarkan hasil kajian, FOS berada pada tahap rendah atau kritikal adalah pada tanah terbakar semula jadi dan tanah terbakar 1350 °C berbanding tanah tidak terbakar, terbakar 440°C dan terbakar 800°C. Dari keseluruhan kajian, kajian pemodelan ini mendapati bahawa tanah yang mengandungi mineral kyanit dan mineral kuarza berada pada tahap cerun yang stabil manakala jenis tanah mineral andalusit dan mineral mulit ditunjukkan kestabilan yang kurang stabil. Keputusan membuktikan perlunya mengambil kandungan lembapan untuk menyatakan hakisan pasca-kebakaran apabila memproses analisis kestabilan untuk mencapai cerun yang boleh dipercayai dan selamat.

## ABSTRACT

Post-fire increased hillslopes erosion and surface runoff. The effect increased by several magnitude when subjected to high intensity of precipitation during prolonged rainy season. With large rainfall events that exceed the storage capacity, erosion rates usually increase markedly due to destruction of the vegetation layer, the availability of highly erodible material and any changes in soil physical and hydrological properties, leading to an increase in runoff and a decrease in the strength of the soil surface that increases the detachability and transportation of sediment. In this study, various soil properties including specific gravity, atterberg limit, swell index and organic matter content were studied. The soil-water retention curve (SWCC) of all samples were also determined. For the purpose of this study, the moisture content were obtained for unburned and burned soil through chilled-mirror dew point technique test. The slope stability analysis were conducted by using GeoStudio software by SLOPE/W based on SWCC resulted. Parameters of shear strength were obtained and used for stability analysis with SLOPE/W software. Experimental result demonstrated that temperature 440°C, the liquid limit, organic matter content and SWCC were reduced and the swell index was eliminated. Heating the soil at 800°C and 1350°C completely eliminated the liquid limit, plastic limit, swell potential and organic content of soil tested. Based on the findings study, the lowest FOS or critical failure was natural burned sample. Followed by sample of burned 1350°C which also had a low value of FOS compared to natural unburned, burned 440°C and burned 800°C. From overall study, this modelling study examined that soil containing kyanite and quartz minerals are at a stable slope level whereas andalusite and mullite mineral soil types was shown a stability of less stable. Results proved the necessity of taking moisture content into account to express the post-fire erosion when processing stability analyses in order to achieve reliable and safe slope.