

Hydrological Insights: Rock Cover Performance in Wanagon Overburden

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Abstract : Following the cessation of mining activities at the Grasberg open-pit mine in Papua, Indonesia, in January 2020, PT Freeport Indonesia (PTFI) has shifted its focus to mine closure operations, including the stabilization of overburden, infrastructure dismantling, and reclamation efforts. The Wanagon overburden stabilization project aims to enhance slope stability and mitigate erosion by re-grading the land to a 2:1 slope and reinforcing it with an Engineered Rock Cover (ERC). This study assesses the effectiveness of the ERC under simulated rainfall conditions. Two test plots, each measuring 75 m by 30 m with a 2H:1V slope, were established near the Lower Wanagon Overburden System. Test Plot #1 utilized Run-of-Mine material, while Test Plot #2 featured a two-meter-thick ERC. Both plots were equipped with collection ditches leading to a Parshall flume for runoff measurement. Rainfall simulations were conducted using seven sprinkler lines and rain gauges placed at the top and bottom of each plot, replicating 100-year return period storm events lasting 15 and 60 minutes. Results from six tests revealed that Test Plot #1 (without ERC) experienced higher peak runoff compared to Test Plot #2 (with ERC). Additionally, Test Plot #2 demonstrated a longer hydrograph recession limb, indicative of greater water retention. Further tests focusing on rainfall application to the upper or lower halves of Test Plot #2 indicated that the majority of runoff originated from the lower half.

Keywords : engineered rock cover, simulated rainfall events, surface runoff, Wanagon overburden stabilization

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