RINGKASAN

Penelitian ini dilaksanakan dengan mengambil data di *Pit* A, *Pit* C, dan *Waste Dump* B *East Site* pada Tujuh Bukit *Operation* PT Bumi Suksesindo, Kabupaten Banyuwangi, Provinsi Jawa Timur. Pada saat penelitian tidak terdapat saluran terbuka di area *pit* A & *pit* C, dan belum memadainya saluran terbuka pada area *waste dump* B *East* sehingga tidak dapat menampung debit air limpasan, serta belum dilakukan evaluasi dimensi ceruk *(sump)* yang dapat menampung debit air di area *pit* A dan *pit* C. Penelitian ini bertujuan untuk menganalisis daerah tangkapan hujan (DTH) guna mengetahui potensi debit air yang masuk ke area penambangan, merancang dan menghitung dimensi saluran terbuka di area *pit* A dan *pit* C, mengkaji dimensi saluran terbuka di area *waste dump* B *East* yang mampu mengalirkan debit air limpasan, mengkaji sistem pemompaan serta merancang dan menghitung dimensi ceruk *(sump)* yang dapat menampung debit air yang masuk ke area *pit* A dan *pit* C.

Perhitungan curah hujan rencana menggunakan empat metode distribusi, yaitu *normal, log normal, log Pearson III*, dan *Gumbel modifikasi*, selama 10 tahun (2014–2023). Keempat metode ini diuji dengan uji *chi-kuadrat* untuk menentukan metode yang paling sesuai. Hasil pengujian menunjukkan bahwa metode distribusi *Gumbel modifikasi* memberikan curah hujan rencana sebesar 322,95 mm dari periode ulang hujan 10 tahun mempertimbangkan masa operasional tambang hingga tahun 2030. Intensitas curah hujan dihitung menggunakan rumus *Mononobe*, menghasilkan nilai sebesar 70,53 mm/jam. Debit air limpasan dihitung menggunakan metode *rasional*. Perhitungan debit air limpasan menggunakan analisis hidrologi dengan metode *rasional* yang kemudian digunakan untuk perhitungan rancangan geometri saluran terbuka dengan metode *Manning*, mempertimbangkan skenario terburuk. Debit air limpasan pada masing-masing DTH secara berurutan adalah DTH I = 58,00 m^3/detik , DTH II = 30,29 m^3/detik, DTH III = 24,17 m^3/detik, DTH IV = 40,39 m^3/detik, DTH V = 31,24 m^3/detik, DTH VI = 20,68 m^3/detik, DTH VII = 68,3 m^3/detik, dan DTH VIII = 28,18 m^3/detik.

Dimensi saluran terbuka dirancang dengan menggunakan rumus *Manning*, didapatkan 8 saluran terbuka dengan masing-masing lebar permukaan saluran 1 = 2,37 m, saluran 2 = 1,33 m, saluran 3 = 1,4 m, saluran 4 = 1,84 m, saluran 5 = 1,84 m, saluran 6 = 2,460 m, saluran 7 = 2,37 m, saluran 8 = 1,81 m. Dimensi ceruk *(sump)* dibutuhkan rancangan volume pada *in pit sump* A sebesar 328.012,3 m^3 dan volume *in pit sump* C 143.452,9 m^3.

Summary

This study was conducted by collecting data from Pit A, Pit C, and Waste Dump B East Site at the Tujuh Bukit Operation of PT Bumi Suksesindo, Banyuwangi Regency, East Java Province. During the research, no open channels were available in the Pit A and Pit C areas, and the existing open channels at Waste Dump B East were inadequate to accommodate runoff water discharge. Additionally, the sump dimensions in Pit A and Pit C had not yet been evaluated for their capacity to hold runoff water. This study aims to analyze the catchment area to determine the potential water inflow into the mining area, design and calculate the dimensions of open channels in pit A and pit C, evaluate the dimensions of open channels in the B East waste dump area capable of accommodating runoff, assess the pumping system, and design and calculate the dimensions of sumps that can contain the water inflow in pit A and pit C.

The rainfall design was calculated using four distribution methods: normal, log-normal, log-Pearson III, and modified Gumbel, over a 10-year period (2014–2023). These methods were tested using the chi-square test to determine the most suitable method. The results showed that the modified Gumbel distribution provided a design rainfall of 322.95 mm for a 10-year return period, considering the mine's operational period until 2030. Rainfall intensity was calculated using the Mononobe formula, yielding a value of 70.53 mm/hour. Runoff discharge was calculated using the rational method. Hydrological analysis with the rational method was used to compute runoff discharge, which then served as the basis for designing the open channel geometry using Manning's method, considering the worst-case scenario.

The runoff discharge for each catchment area (DTH) was calculated as follows: DTH I = 58.00 m³/s, DTH II = 30.29 m³/s, DTH III = 24.17 m³/s, DTH IV = 40.39 m³/s, DTH V = 31.24 m³/s, DTH VI = 20.68 m³/s, DTH VII = 68.30 m³/s, and DTH VIII = 28.18 m³/s. The open channel dimensions, designed using Manning's formula, resulted in eight channels with respective surface widths: channel 1 = 2.37 m, channel 2 = 1.33 m, channel 3 = 1.4 m, channel 4 = 1.84 m, channel 5 = 1.84 m, channel 6 = 2.46 m, channel 7 = 2.37 m, and channel 8 = 1.81 m. The required sump dimensions were determined as 328,012.3 m³ for the in-pit sump in Pit A and 143,452.9 m³ for the in-pit sump in Pit C.