

ABSTRAK

RANCANGAN SISTEM PENYALIRAN TAMBANG PADA TRIWULAN II TAHUN 2025 DI *PIT* UTARA PT. MADHANI TALATAH NUSANTARA

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Permasalahan masuknya air ke area tambang dapat menghambat kelancaran aktivitas penambangan batubara serta memengaruhi pencapaian target produksi. PT Madhani Talatah Nusantara berencana memperluas bukaan tambang di pit Utara pada triwulan II tahun 2025, sehingga luas daerah tangkapan hujan meningkat dan diperlukan rancangan sistem penyaliran tambang terutama saluran terbuka dan ceruk. Air yang terkumpul di ceruk pit Utara berpotensi meluap akibat penggunaan pompa yang belum efisien. Penelitian ini bertujuan untuk merancang sistem penyaliran tambang khususnya saluran terbuka dan ceruk sekaligus melakukan simulasi alternatif pada sistem pemompaan melalui perhitungan neraca.

Rancangan sistem penyaliran tambang disusun menggunakan data historikal curah hujan harian dan klimatologi 10 tahun terakhir (2015 – 2024). Perhitungan evapotranspirasi menggunakan metode Thornthwaite dengan mempertimbangkan kecepatan angin rata-rata. Estimasi debit limpasan dihitung menggunakan metode Rasional. Perhitungan curah hujan rencana pada periode ulang hujan selama 2 tahun dipilih menggunakan distribusi Gumbel melalui analisis uji Chi-Square dan Smirnov-Kolmogorov. Selanjutnya perancangan dimensi saluran terbuka dilakukan menggunakan metode *Trial and Error* dengan perhitungan debit saluran menggunakan metode Manning. Desain ceruk dilakukan dengan pendekatan grafik volume dan kebutuhan pompa ditetapkan berdasarkan perhitungan neraca air dengan beberapa alternatif skenario yang disimulasikan.

Diperoleh hasil penelitian distribusi Gumbel terpilih dengan curah hujan rencana 146,77 mm/hari dan intensitas 16,93 mm/jam. Volume limpasan maksimum mencapai 890.869 m³/bulan, sedangkan rancangan saluran terbuka sebelas unit dinyatakan aman berdasarkan simulasi HEC-RAS. Sump dirancang berkapasitas 507.121 m³, dan kebutuhan pompa di pit utara direkomendasikan dua unit Multiflo 420 EXHV berkapasitas 770 m³/jam agar pengeringan berlangsung aman tanpa risiko luapan. Hasil perhitungan neraca air menunjukkan rasio neraca air pada bulan April $P_{DTH} : P_{ceruk} : E_{to} : I_{nf} : R_{unoff} = 100\% : 4,99\% : 8,96\% : 0,14\% : 85,89\%$.

Kata kunci: Curah hujan, Volume Limpasan, Sistem Penyaliran Tambang

ABSTRACT

MINE DRAINAGE SYSTEM DESIGN FOR THE SECOND QUARTER OF 2025 IN THE NORTH PIT PT MADHANI TALATAH NUSANTARA

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The problem of water ingress into the mining area can hamper the smooth operation of coal mining activities and affect the achievement of production targets. PT Madhani Talatah Nusantara plans to expand the mine opening in the North pit in the second quarter of 2025, thereby increasing the rain catchment area and requiring the design of a mine drainage system, especially open channels and inlets. Water collected in the North pit inlets has the potential to overflow due to the use of inefficient pumps. This study aims to design a mine drainage system, especially open channels and inlets, while simultaneously simulating alternative pumping systems through balance calculations.

The mine drainage system design was prepared using historical daily rainfall data and climatology for the last 10 years (2015 – 2024). Evapotranspiration calculations used the Thornthwaite method by considering the average wind speed. Runoff discharge estimation was calculated using the Rational method. The calculation of planned rainfall for a 2-year return period was selected using the Gumbel distribution through Chi-Square and Smirnov-Kolmogorov test analysis. Furthermore, the open channel dimension design was carried out using the Trial and Error method with channel discharge calculations using the Manning method. The design of the inlet was carried out using a volume graph approach and pump requirements were determined based on water balance calculations with several simulated alternative scenarios.

The results of the study obtained the selected Gumbel distribution with a planned rainfall of 146,77 mm/day and an intensity of 16,93 mm/hour. The maximum runoff volume reached 890.869 m³/month, while the design of eleven open channels was declared safe based on the HEC-RAS simulation. The sump was designed with a capacity of 507.121 m³, and the pump requirement in the north pit was recommended to be two Multiflo 420 EXHV units with a capacity of 770 m³/hour so that drying could take place safely without the risk of overflow. The results of the water balance calculation showed the water balance ratio PDTH :Pceruk : Eto : Inf :Runoff = 100% : 4,99% : 8,96% : 0,14% : 85,89%.

Keywords: Rainfall, Runoff Volume, Mine Drainage System