

ABSTRAK

OPTIMALISASI SISTEM PENYALIRAN TAMBANG TERHADAP POTENSI GENANGAN AIR PADA LANTAI PENAMBANGAN DI PT AAB JOBSITE GBR

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Pengelolaan air tambang di PT Adidaya Alam Borneo (AAB) masih belum optimal akibat tidak tersedianya estimasi debit air *mine inflow* yang akurat. Hal ini menyebabkan sistem *drainage* dan *dewatering* tidak mampu mengantisipasi genangan secara efektif. Dampaknya, aktivitas operasional tambang menjadi terganggu dan dapat berisiko menurunkan produktivitas produksi. Oleh karena itu, diperlukan pendekatan ilmiah untuk merancang strategi pengelolaan air tambang yang optimal dan berkelanjutan.

Penelitian ini bertujuan mengestimasi debit air masuk ke area tambang dan menyusun strategi optimalisasi sistem drainase dan *dewatering*. Estimasi limpasan air permukaan akibat hujan dilakukan dengan menggunakan Metode Rasional dengan mempertimbangkan distribusi hujan dan karakteristik daerah tangkapan hujan. Debit rembesan air tanah dihitung menggunakan pendekatan Hukum Darcy berbasis pemodelan sistem akuifer yang dibangun secara 3D. Strategi *mine drainage* dilakukan dengan simulasi saluran terbuka aktual dan rekomendasi menggunakan HEC-RAS. Strategi *mine dewatering* dengan mencakup analisis kinerja pompa, kapasitas *sump*, elevasi optimal muka air ceruk, dan waktu optimal pemompaan harian.

Diperoleh hasil penelitian berupa potensi maksimal debit total *mine inflow* sebesar $0,97 \text{ m}^3/\text{s}$, yang terdiri dari limpasan air permukaan sebesar $0,81 \text{ m}^3/\text{s}$ dan rembesan air tanah sebesar $0,16 \text{ m}^3/\text{s}$. Strategi *mine drainage* dilakukan dengan merancang saluran terbuka rekomendasi pada lantai penambangan dengan dimensi lebar sisi atas sebesar 1,825 m, lebar sisi bawah 0,912 m, kedalaman 0,79 m, dan panjang sisi miring trapesium sebesar 0,912 m yang terbukti dapat mengurangi potensi genangan air. Hasil strategi *mine dewatering* menunjukkan bahwa jenis dan jumlah unit pompa yang tersedia di lokasi sudah memadai, sehingga tidak diperlukan penambahan atau penggantian pompa. Volume ceruk aktual juga telah mencukupi sehingga tidak dibutuhkan modifikasi penambahan volume tambahan. Elevasi kritis muka air ceruk ditetapkan pada 0 mdpl di kompartemen II. Diperoleh 2 skema pemompaan harian, yaitu 18 jam per hari saat elevasi air berada di bawah 0 mdpl dan 22 jam per hari saat elevasi air melebihi 0 mdpl.

Kata kunci: drainase tambang, *mine inflow*, sistem pemompaan

ABSTRACT

OPTIMISATION OF MINE DRAINAGE SYSTEM FOR POTENTIAL WATERLOGGING ON THE MINING FLOOR AT PT AAB JOBSITE GBR

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The management of mine water at PT Adidaya Alam Borneo (AAB) remains suboptimal due to the unavailability of precise estimates of mine inflow water discharge. This phenomenon impedes the capacity of the drainage and dewatering systems to effectively anticipate inundation. Consequently, the operational activities of the mine have been disrupted, which may result in a reduction of production productivity. Consequently, a scientific approach is imperative for the development of an optimal and sustainable mine water management strategy.

This study estimates mine inflow and optimizes drainage and dewatering systems. Surface runoff was calculated using the Rational Method, while groundwater seepage was estimated with Darcy's Law and 3D aquifer modeling. Drainage strategies were developed using HEC-RAS hydraulic simulations, and dewatering optimization considered sump capacity, pump performance, critical water elevation, and optimal daily pumping duration.

The findings of the study indicated a maximum potential total mine inflow discharge of 0,97 m³/s, comprising surface water runoff of 0,81 m³/s and groundwater seepage of 0,16 m³/s. The mine drainage strategy was executed through the implementation of a recommended open channel configuration on the mining floor. This configuration encompassed dimensions of 1,825 meters in upper side width, 0,912 m in lower side width, a depth of 0,79 m, and a trapezoidal sloping side length of 0,912 meters. This design has been shown to effectively mitigate the risk of waterlogging, thereby enhancing operational safety and efficiency. The findings of the mine dewatering strategy demonstrated that the type and quantity of pumping units present at the site were sufficient, thereby eliminating the necessity for any additional or replacement pumps. The niche volume was found to be adequate, thereby eliminating the necessity for additional volume modifications. The critical elevation of the water table was set at 0 meters above sea level in compartment II. Two daily pumping schemes were obtained 18 hours per day when the water level was below 0 masl and 22 hours per day when the water level exceeded 0 masl.

Keywords: mine drainage, mine inflow, pumping system