

## RINGKASAN

Indonesia memiliki kekayaan alam yang melimpah, namun belum semuanya dikelola dan dimanfaatkan. Terdapat potensi komoditas batupasir di kawasan Desa Sawangan, Kecamatan Gringsing, Kabupaten Batang, Provinsi Jawa Tengah. Untuk mendukung rencana kegiatan penambangan di daerah penelitian, harus dilakukan studi hidrogeologi khususnya terhadap kondisi air tanah agar dapat dijadikan acuan dalam perencanaan ke depannya.

Untuk mendapatkan komoditas tambang yang terdapat di daerah tersebut akan dilakukan kegiatan penambangan dengan sistem tambang terbuka. Dalam proses kegiatan penambangan perlu diperhatikan kondisi hidrologi dan hidrogeologi di daerah penelitian, juga mengetahui kondisi air tanah agar dapat memperkirakan dampak yang ditimbulkan setelah adanya proses penambangan. Kemudian mampu memberikan rekomendasi yang sesuai dengan perencanaan kegiatan penambangan yang akan dilakukan di kemudian hari.

Metode yang digunakan dalam penelitian didasarkan pada pengolahan data curah hujan menggunakan distribusi gumble sehingga outputnya dapat menentukan nilai DTH, *Run Off* dan *Recharge*. Kemudian dilanjutkan dengan pemodelan aliran air tanah menggunakan simulasi numerik metode beda hingga (*finite difference method*) dengan bantuan perangkat lunak Visual MODFLOW Licence @copyright Prodi Teknik Pertambangan UPNVYK.

Berdasarkan analisis yang dilakukan dengan data curah hujan 2009-2020 didapatkan nilai curah hujan harian rata-rata maksimum tahunan sebesar 602,55mm/tahun dan curah hujan rata-rata harian sebesar 68,49mm/tahun; *Run Off* DTH 1= 0,92m<sup>3</sup>/detik; DTH 2= 1,05m<sup>3</sup>/detik; DTH 3= 1,16m<sup>3</sup>/detik; DTH 4= 1,03m<sup>3</sup>/detik; DTH 5= 2,8m<sup>3</sup>/detik. Kemudian nilai *Recharge* yang digunakan dalam pemodelan adalah sebagai berikut DTH 1= 21,15mm/jam; DTH 2= 19,03mm/jam; DTH 3= 21,15mm/jam; DTH 4= 19,03mm/jam; DTH 5= 19,30mm/jam. Daerah penelitian merupakan daerah perbukitan yang bergelombang di sebelah selatan dan daerah landai di bagian utara berdekatan dengan pantai. Lapisan akuifer yang terdapat di lapangan merupakan lapisan akuifer bebas karena memiliki susunan perlapisan lanau, batupasir dan lapisan impermeabel berupa breksi di bagian bawah. Dikarenakan daerah penelitian merupakan perbukitan, arah aliran air limpasan dan air tanah berasal dari bukit di sebelah selatan menuju pantai di area utara mengikuti arah aliran sungai. Kedalaman air tanah berkisar antara 300mdpl - 40mdpl sesuai dengan topografi daerah. Dari hasil analisis diharapkan dapat menjadi acuan dalam melakukan perencanaan tambang baik untuk desain geometri tambang, saluran penyaliran tambang, maupun perkiraan dampak yang akan dihadapi karena kedalaman air tanah berada dekat dengan permukaan.

## **ABSTRACT**

*Indonesia has an abundant amount of natural wealth, yet not all of the source has been managed nor utilized. One of them is a sandstone commodity potential in Sawangan, Gringsing, Batang, Central Java. In order to support the plan of mining activity, hydrogeological studies, especially on the condition of the groundwater, should be conducted, so that it can be used as a reference for the future mining activity planning.*

*As a means to get a mining commodity which is available in the area, a surface mining system will be conducted. In the process of mining, hydrology and hydrogeological conditions in the area must be examined as well as groundwater condition should be recognized with the purpose that the aftermath of the mining activity can be thought about. Thus, recommendation which matches the mine plan design and is going to be done in the future can be explained.*

*The method used in this research is based on the precipitation data processing using a gumble distribution, so the output can determine the number of Catchment Area, Run Off, and Recharge. Then, it will be continued with groundwater flow modelling using numeric simulation of finite difference method with the guidance of Visual MODFLOW software Licence @copyright Prodi Teknik Pertambangan UPNVYK.*

*According to the analysis accomplished by using the precipitation data between 2009-2020, it can be concluded that the annual maximum average daily rainfall is as much as 602,55mm/year and the daily average rainfall is as much as 68,49mm/year; Run Offs with Catchment area 1= 0,92m<sup>3</sup>/s; Catchment area 2= 1,05m<sup>3</sup>/s; Catchment area 3= 1,16m<sup>3</sup>/s; Catchment area 4= 1,03m<sup>3</sup>/s; Catchment area 5= 2,8m<sup>3</sup>/s. Next, the Recharges being used in the modelling are Catchment area 1= 21,15mm/h; Catchment area 2= 19,03mm/h; Catchment area 3= 21,15mm/h; Catchment area 4= 19,03mm/h; Catchment area 5= 19,30mm/h. The research took place in a hilly area which is bumpy in the south part and sloping in the north part near the beach. The aquifer layers located in the field are unconfined aquifer layers caused by the layering of silt, sandstone, and impermeable layers with a form of breccia at the bottom. Due to the fact that the research location is hills, the run-off and the groundwater come directly from the hill at the south heading to the beach at the north following the river flow. The depth of the groundwater ranges from 300masl - 40masl in accordance with the topography of the area. Based on the data analysis, it is expected that the result can be useful as a reference for the mine plan design whether for mine geometry design, mine drainage system, or impact estimation which are going to be encountered because of the depth of the groundwater is located closely to the surface.*