

INTISARI

Pembangunan Jalan Tol Trans Sumatera Ruas (JTTS) Betung-Jambi melintasi wilayah kabupaten Musi Banyuasin yang memiliki sebaran lahan gambut seluas ± 374.360 ha. Keberadaan lahan gambut menjadi salah satu tantangan dalam perencanaan teknis jalan tol karena karakteristiknya yang memiliki daya dukung rendah, rentan mengalami penurunan tanah, serta memerlukan penanganan konstruksi berbeda dibandingkan tanah lain. Informasi mengenai persebaran gambut dan ketebalan tanah umumnya diperoleh melalui kegiatan pengeboran dan analisis geoteknik. Namun metode tersebut membutuhkan biaya dan waktu yang panjang serta menghasilkan data yang terbatas secara spasial karena hanya merepresentasikan kondisi pada titik pengamatan. Di sisi lain, pemanfaatan teknologi penginderaan jauh untuk penyelidikan tanah masih terbatas, tetapi penerapannya dalam perencanaan konstruksi dapat digunakan sebagai alternatif. Proyek akhir ini bertujuan untuk memetakan potensi persebaran lahan gambut guna mendukung perencanaan teknis JTTS Ruas Betung-Jambi khususnya Seksi 2A STA 67+000 – 78+000.

Proyek akhir ini memanfaatkan data Citra Satelit Resolusi Tinggi (CSRT) Jilin, citra radar ALOS PALSAR-2, DEM Nasional, dan data *bore log*. Analisis dilakukan untuk menggambarkan karakteristik permukaan dan bawah permukaan tanah sebagai informasi pendukung dalam kajian kondisi lahan pada wilayah yang berpotensi memiliki lahan gambut. Karakteristik permukaan dianalisis melalui pemetaan potensi persebaran lahan gambut menggunakan metode *Support Vector Machine* (SVM) dengan parameter *Normalized Difference Vegetation Index* (NDVI), *Soil Moisture Index* (SMI), dan DEM yang merepresentasikan karakteristik vegetasi, kelembaban permukaan, serta kondisi topografi. Karakteristik bawah permukaan dikaji melalui hubungan parameter hidrotopografi, yaitu *Topographic Wetness Index* (TWI), *catchment slope*, dan *DEMNAS filled*, dengan ketebalan lapisan permukaan tanah (*top soil*) berdasarkan data *bore log*.

Berdasarkan hasil analisis, luas potensi lahan gambut di sepanjang trase jalan tol yang dikaji sebesar 435.716 m^2 atau sekitar 11,59% dari total luas wilayah trase jalan tol. Hasil klasifikasi menggunakan metode SVM diperoleh nilai *Overall Accuracy* sebesar 85,19%. Hasil regresi digunakan sebagai kajian awal hubungan parameter hidrotopografi dengan karakteristik lapisan permukaan tanah pada wilayah penelitian. Analisis regresi linear menghasilkan nilai koefisien determinasi (R^2) sebesar 0,340 dan *Root Mean Square Error* (RMSE) sebesar 0,4049 m. Peta yang dihasilkan diposisikan sebagai indikasi awal (*preliminary indication*) potensi persebaran lahan gambut yang dapat digunakan sebagai dasar penentuan prioritas lokasi investigasi geoteknik pada tahap survei lapangan berikutnya.

Kata Kunci: Lahan Gambut; Potensi Persebaran Lahan Gambut; *Support Vector Machine* (SVM); Regresi Linear; Penginderaan jauh.

ABSTRACT

The construction of the Trans-Sumatra Toll Road (JTTS), Betung–Jambi Section, traverses Musi Banyuasin Regency, an area with approximately 374,360 ha of peatland. The presence of peatland presents a major challenge in toll road engineering planning due to its low bearing capacity, susceptibility to land subsidence, and the need for construction treatments that differ from those required for other soil types. Information on peat distribution and soil thickness is generally obtained through drilling and geotechnical investigations. However, these methods are costly, time-consuming, and spatially limited because they only represent conditions at observation points. Meanwhile, the application of remote sensing technology for soil investigation remains limited, although it may provide an alternative source of information to support construction planning. This final project aims to map the potential distribution of peatland to support the technical planning of the Betung–Jambi Section of the JTTS, particularly Section 2A from STA 67+000 to STA 78+000.

This final project utilized high-resolution satellite imagery from Jilin, ALOS PALSAR-2 radar imagery, the National Digital Elevation Model (DEMNAS), and bore log data. The analyses were conducted to characterize surface and subsurface conditions as supporting information for assessing land conditions in areas with potential peatland occurrence. Surface characteristics were analyzed by mapping the potential distribution of peatland using the Support Vector Machine (SVM) method based on the Normalized Difference Vegetation Index (NDVI), Soil Moisture Index (SMI), and DEM, which represent vegetation characteristics, surface moisture, and topographic conditions, respectively. Subsurface characteristics were assessed by examining the relationship between hydrotopographic parameters, including the Topographic Wetness Index (TWI), catchment slope, and filled DEMNAS, and the thickness of the surface soil layer (topsoil) derived from bore log data.

The results indicate that the potential peatland area along the studied toll road alignment covers 435,716 m², representing approximately 11.59% of the total study area. The SVM classification achieved an Overall Accuracy of 85.19%. The regression analysis was used as a preliminary assessment of the relationship between hydrotopographic parameters and the characteristics of the surface soil layer within the study area. The linear regression model produced a coefficient of determination (R^2) of 0.340 and a Root Mean Square Error (RMSE) of 0.4049 m. The resulting map is positioned as a preliminary indication of potential peatland distribution and may serve as a basis for prioritizing locations for geotechnical investigations during subsequent field survey stages.

Keywords: Peatland; Potential Peatland Distribution; Support Vector Machine (SVM); Linear Regression; Remote Sensing.