

## INTISARI

Garis pantai yang membentang sepanjang Pantai Glagah hingga Pantai Congot di wilayah pesisir selatan *Yogyakarta International Airport* (YIA) telah mengalami perubahan yang cukup signifikan akibat erosi, dengan rata-rata kemunduran garis pantai lebih dari 3 meter per tahun dalam 20 tahun terakhir. Perubahan ini menimbulkan kebutuhan akan perlindungan pesisir, terutama mengingat pentingnya Pantai Glagah dan Pantai Congot sebagai obyek wisata strategis serta keberadaan landasan bandara yang dekat dengan pantai. Sampai saat ini, belum ada bangunan pelindung pantai yang efektif untuk mencegah kerusakan pantai akibat erosi. Evaluasi ini bertujuan untuk menentukan alternatif bangunan pelindung pantai paling sesuai untuk kondisi di pesisir selatan YIA.

Evaluasi dilakukan menggunakan data angin satelit dari European Centre for Medium-range Weather Forecast (ECMWF) untuk menganalisis karakteristik angin dan melakukan peramalan gelombang di wilayah studi. Metode peramalan gelombang mengikuti pedoman Coastal Engineering Research Center (CERC). Perancangan bangunan pelindung pantai dilakukan menggunakan kala ulang 50 tahun. Analisis gelombang rencana menggunakan analisis grafik dan perangkat lunak SWAN. Analisis transpor sedimen dilakukan berdasarkan data gelombang beserta pendekatan arah datang gelombang terhadap garis pantai. Analisis perubahan garis pantai dilakukan menggunakan perangkat lunak MIKE. Terdapat tiga kondisi yang dimodelkan, yaitu model perubahan garis pantai tanpa bangunan pelindung, dengan groin, dan dengan *detached breakwater*. Ketiga kondisi ini dibuat dalam enam alternatif dengan dimensi dan tata letak bangunan pelindung yang berbeda. Alternatif yang paling sesuai dipilih dengan membandingkan perubahan garis pantai dari hasil pemodelan.

Berdasarkan analisis yang dilakukan, tinggi gelombang di lokasi studi pada kala ulang 50 tahun mencapai ketinggian 6.74 meter dengan periode 11.71 detik. Gelombang pecah setinggi 4.87 meter dengan kedalaman 5.19 meter. Laju transpor sedimen sepanjang pantai sebesar 223,600 meter kubik per tahun. Alternatif terbaik untuk kondisi pesisir selatan YIA adalah pembangunan *detached breakwater* yang berfungsi menahan transpor sedimen dan melindungi pantai dari gelombang. *Detached breakwater* dirancang pada elevasi dasar laut 3 meter, panjang 200 meter, jarak antar bangunan 239 meter, dan tinggi 7.24 meter.

**Kata kunci:** evaluasi, groin, *detached breakwater*, perubahan garis pantai, transpor sedimen.

## ABSTRACT

*The coastline along Glagah Beach to Congot Beach in the southern coastal area of Yogyakarta International Airport (YIA) has undergone significant changes due to erosion, with an average coastline retreat of more than 3 meters per year in the last 20 years. This change raises the need for coastal protection, especially considering the importance of Glagah Beach and Congot Beach as strategic tourism objects and the existence of the airport runway close to the beach. To date, there are no effective coastal protection structures to prevent coastal damage due to erosion. This evaluation aims to determine the most suitable shore protection alternative for the conditions on the south coast of YIA.*

*The evaluation was conducted using satellite wind data from the European Centre for Medium-range Weather Forecast (ECMWF) to analyze wind characteristics and perform wave forecasting in the study area. The wave forecasting method follows the Coastal Engineering Research Centre (CERC) guidelines. The design of coastal protection structures was carried out using a 50-year return period. Wave plan analysis was conducted using graphical analysis and SWAN software. Sediment transport analysis was carried out based on wave data along with the approach of wave incidence direction to the shoreline. Shoreline change analysis was conducted using MIKE software. Three conditions were modelled, namely shoreline change without protective structures, with groynes, and with detached breakwater. These three conditions were modelled in six alternatives with different dimensions and layout. The most suitable alternative was selected by comparing the modelled shoreline changes.*

*Based on the analysis, the wave height at the study site at the 50-year return period reaches a height of 6.74 meters with a period of 11.71 seconds. The breaking wave is 4.87 meters high with a depth of 5.19 meters. The sediment transport rate along the coast was 223,600 cubic meters per year. The best alternative for the condition of the south coast of YIA is the construction of a detached breakwater that functions to resist sediment transport and protect the coast from waves. The detached breakwater is designed at a seabed elevation of 3 meters, length of 200 meters, distance between buildings of 239 meters, and height of 7.24 meters.*

**Keywords:** *evaluation, groynes, detached breakwater, shoreline change, sediment transport.*