

ANALYSIS OF DRAINAGE CHANNEL PERFORMANCE USING HEC-RAS SIMULATION (Case Study Senggoro Village, Bengkalis District)

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Abstract

This study aims to analyze the performance of the drainage channel in Senggoro Village, Bengkalis District, in handling design flood discharges using HEC-RAS simulation. The main objectives of this research include: determining the magnitude of the design flood discharge for 5-, 10-, and 25-year return periods; assessing the capacity of the existing drainage system to accommodate these discharges; providing flood risk mitigation recommendations; and identifying the distribution of flood-affected areas. The design discharge was calculated using three methods: Rational Method, Weduwen Method, and Haspers Method. The results show a significant increase in discharge values with longer return periods, with the highest value reaching 1,167.754 m³/s at a 5-year return period according to the Weduwen Method. The hydrodynamic simulation using HEC-RAS revealed that the existing drainage system is incapable of handling the design discharge for all return period scenarios, both under normal flood conditions and during tidal flooding (rob), resulting in overflow into surrounding areas. To mitigate flood risks, several measures are recommended, including land use control, regular cleaning and maintenance of the drainage system, the construction of a check dam or automated floodgate at the downstream area, and the elevation of embankments or implementation of closed drainage channels at critical points. These recommendations are expected to serve as a foundation for flood management planning and for enhancing the drainage infrastructure capacity in Senggoro Village.

Keywords: *Design Flood Discharge, Drainage, Flood Mitigation, HEC-RAS, Return Period,*