

# CHANNEL PERFORMANCE ANALYSIS WITH HEC-RAS SIMULATION (CASE STUDY OF SEI ALAM VILLAGE, BENGKALIS DISTRICT)

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## ABSTRACT

*Sei Alam Village, located in Bengkalis District, is a lowland area that frequently experiences flooding due to the limited capacity of its drainage channels. This study aims to analyze the performance of the channels in accommodating the design flood discharge using a hydraulic simulation approach with HEC-RAS software. The design flood discharge was calculated using the Rational, Weduwen, Haspers, and Nakayasu methods, and then simulated in HEC-RAS using both 1D (steady flow) and 2D (unsteady flow) models. The results indicate that the existing channel cannot accommodate discharges for return periods of 5, 10, and 25 years. Based on the 2D unsteady flow simulation using discharge values from the Rational method, the inundated area reached 1.021 km<sup>2</sup> for Q<sub>5</sub> (44.12 m<sup>3</sup>/s), 1.109 km<sup>2</sup> for Q<sub>10</sub> (51.24 m<sup>3</sup>/s), and 1.177 km<sup>2</sup> for Q<sub>25</sub> (59.31 m<sup>3</sup>/s). The largest inundation occurred in residential areas and local roads, mainly in the middle to downstream sections. The analysis also considered topographic data from DEM, field cross-section surveys, and tidal effects (ROB) to improve model accuracy. Recommended technical measures include channel normalization, construction of additional drains, retention ponds, floodgates, and routine drainage maintenance. The findings are expected to serve as a technical reference for local governments and stakeholders in planning sustainable flood control strategies.*

**Keywords:** HEC-RAS, flood discharge, 2D simulation, steady flow, unsteady flow, inundatio