

ANALYSIS OF CHANNEL PERFORMANCE USING HEC-RAS SIMULATION (Case Study Desa Air Putih, Kecamatan Bengkalis)

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ABSTRAK

Flood inundation is a recurring issue in Air Putih Village, Bengkalis District, Bengkalis Regency, driven by the area's relatively low elevation, limited drainage system capacity, and tidal influences. This study aims to analyze the drainage channel's capacity to convey design flood discharge and to determine the patterns and extent of flood inundation in the study area. Hydrological analysis was conducted to determine design flood discharge using several methods—Rational, Weduwen, Haspers, and Nakayasu—for 5-year and 10-year return periods. Subsequently, hydraulic analysis was performed using HEC-RAS software through 1D steady flow and 2D unsteady flow modeling. Based on the analysis, the design flood discharge calculated via the Rational method for 5-year and 10-year return periods was 89.34 m³/s and 104.9 m³/s, respectively. HEC-RAS 2D simulation results evaluating the design flood discharge in the Air Putih Village drainage system showed 48.83 m³/s (compared to 69.43 m³/s under existing conditions) for the 5-year return period, and 77.97 m³/s (compared to 80.64 m³/s under existing conditions) for the 10-year return period. The inundation area changed from 0.16310 km² to 0.13367 km² for the 5-year return period, and from 0.17743 km² to 0.15124 km² for the 10-year return period.

Keywords: *Flood Inundation, Drainage, Design Flood Discharge, HEC-RAS, Unsteady Flow, Air Putih Village.*