ANALISIS KINERJA SALURAN DENGAN SIMULASI HAC–RAS
(Studi Kasus Desa Air Putih, Kecamatan Bengkalis)

Nama	: Ilham Ardiyansyah
NIM:	: 4204211371
Dosen Pembimbing	: Zulkarnain, ST,.MT

ABSTRAK

Desa Air Putih di Kecamatan Bengkalis merupakan wilayah dataran rendah yang kerap mengalami banjir, terutama di sekitar Jalan Poros Sungai Alam. Banjir terjadi akibat kapasitas saluran drainase yang tidak memadai saat curah hujan tinggi, diperparah oleh pengaruh pasang surut (ROB) dari laut. Kondisi ini mengganggu aktivitas masyarakat dan menimbulkan potensi kerugian. Penelitian ini bertujuan menganalisis kinerja saluran drainase dalam menampung debit banjir rencana melalui simulasi hidraulik menggunakan perangkat lunak HEC-RAS. Debit banjir rencana dihitung dengan metode Rational, Weduwen, Haspers, dan Nakayasu untuk kala ulang 5 dan 10 tahun. Hasil perhitungan disimulasikan pada model HEC-RAS 1D (steady flow) dan 2D (unsteady flow) dengan skenario kombinasi debit banjir dan ROB. Data yang digunakan meliputi curah hujan historis, topografi Digital Elevation Model (DEM), dan geometri saluran eksisting hasil survei. Hasil menunjukkan saluran eksisting tidak mampu menampung debit Q10. Pada simulasi 1D, luas genangan maksimum 0,16310 km² (Q5) dan 0,17743 km² (Q10). Pada simulasi 2D kombinasi ROB, luas genangan meningkat menjadi 0,3392 km² (Q5) dan 0,3841 km² (Q10). Genangan terluas terjadi pada Q10 dengan ROB, menggenangi permukiman dan jalan lingkungan. Rekomendasi penanganan meliputi normalisasi saluran, saluran tambahan, kolam retensi, pintu air, dan perencanaan sistem drainase terintegrasi.

Kata Kunci : *Banjir, Drainase, Debit Rencana, HEC-RAS, Simulasi 1D, Simulasi 2D, Stedy Flow, Unstedy Flow, Desa Air Putih*

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

Name	*: Ilham Ardiyansyah*
Student Number	*: 4204211371*
Advisors	*: Zulkarnain, ST,.MT*

ABSTRAK

Air Putih Village in Bengkalis District is a lowland area that frequently experiences flooding, particularly around the Poros Sungai Alam Road. Flooding occurs due to the inadequate capacity of the drainage channels to accommodate high rainfall, compounded by tidal influences (ROB) from the sea. This condition disrupts community activities and poses significant potential losses. This study aims to analyze the performance of the drainage channels in accommodating the design flood discharge through hydraulic simulation using HEC-RAS software. The design flood discharge was calculated using the Rational, Weduwen, Haspers, and Nakayasu methods for 5-year and 10-year return periods. The calculated discharge was then simulated in HEC-RAS 1D (steady flow) and 2D (unsteady flow) models, including a scenario combining flood discharge and tidal influence (ROB). The data used include historical rainfall records, topography from the Digital Elevation Model (DEM), and the geometry of the existing channels obtained from field surveys. The results show that the existing drainage channels are unable to accommodate the 10-year return period discharge. In the 1D simulation, the maximum inundation area reached 0.16310 km² (Q5) and 0.17743 km² (Q10). In the 2D simulation with ROB, the inundation area increased to 0.3392 km² (Q5) and 0.3841 km² (Q10). The largest inundation occurred at Q10 with ROB, affecting residential areas and local roads. Recommended measures include channel normalization, additional drainage channels, retention ponds, floodgates, and an integrated drainage system plan.

Keywords: *Flood, Drainage, Design Discharge, HEC-RAS, 1D Simulation, 2D Simulation, Steady Flow, Unsteady Flow, Air Putih Village*