Evaluation of Road Drainage Channel Capacity and Effectiveness in the Kampung Tengah Area (Case Study: Jl. Gatot Subroto – Jl. Kelurahan Rimbas Sekampung, Bengkalis District)

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ABSTRACT

Inundation issues in Rimbas Sekampung Urban Village, Bengkalis District, are linked to the area's relatively flat topography, varying channel dimensions, suboptimal bed slopes, and sedimentation or blockages that impede flow. This study aims to evaluate the existing drainage network, analyze channel capacity against design runoff discharge, identify flow directions, and formulate management strategies for the drainage system. The research methodology involved field surveys, measurement of dimensions and elevations using a level (waterpass), hydrological analysis via the Rational Method, hydraulic analysis using Manning's equation, and network and flow direction mapping using ArcGIS. The results indicate that the drainage network comprises main channels and local (neighborhood) channels, predominantly constructed of concrete with varying dimensions. The primary channel capacity is 7.66 m³/s and the secondary channel capacity is 5.56 m³/s, resulting in a total drainage capacity of 13.22 m³/s. This capacity exceeds the design discharge for return periods of 2, 5, 10, 25, and 50 years—calculated at 6.21, 8.45, 9.93, 11.62, and 13.17 m³/s, respectively. Mapping results show that the network generally connects to the main channel and outlet, although some sections remain suboptimal. Certain segments exhibit suboptimal elevations and slopes, potential backflow issues, and network limitations at specific points. Therefore, improvements to bed slopes, construction of channels in unserved areas, adjustments to channel dimensions, and regular maintenance are required to enhance the drainage system's effectiveness.

Keywords: *ArcGIS; drainage; hydraulic capacity; Rational Method; Rimbas Sekampung..*