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EVALUATION OF DRAINAGE SYSTEM PERFORMANCE IN BANDAR LAMPUNG CITY CASE STUDY IN SUB DISTRICT TANJUNG KARANG PUSAT

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Master of Science Thesis
by

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Summary

As a region targeted to be a comfortable place to live, to work, and to be visited, Sub District Tanjung Karang Pusat is designed as one of the regions which is expected to become an area for dealing with business activities. Therefore, in order to support those business activities, Sub District Tanjung Karang Pusat has always been developed with some infrastructure (such as settlement, shopping centre, hospital, restaurant, hotel, etc). In the name of economy, many people move to this area to both stay and trade. With the area of 6.68 km^2 and a population of 81,120 inhabitants, Sub District Tanjung Karang Pusat became the most densely populated area, compared with the other sub districts in Bandar Lampung City, with a density of 12,150 people per km^2.

Due to the population density, the need of water will increase, and so will the amount of waste water. Therefore, a good drainage is definitely needed to discharge the excess water coming from the urban drainage canals and high intensity of rainfall. Flooding in December 2008 has proven that the capacity of the canals is not able to discharge the excess water. A modelling approach is a methodology to analyze the problem of the drainage system in Bandar Lampung City, especially in Sub District Tanjung Karang Pusat.

Basically, the analyses focused on the main system (consists of 3 rivers) and sub system (urban drainage canals on Kartini Street). Through using the programs such as Arc GIS and DUFLOW, it can be analyzed that flood occurs in the existing condition. On the other hand, in the Scenario 1, changing the Chezy coefficient from 40 $m^{1/2}/s$ to 45 $m^{1/2}/s$ does not solve the problems because the water levels in some sections are still higher than the surface level. Meanwhile, from the Scenario 2, which the bed levels are lowered for 1 m, river cross in sections are widened, flap gates are installed, and dykes are built in some sections, the water level decreased and could be kept below the surface level. In Scenario 3, a new scenario is generated based on Scenario 2 by changing the rainfall with the chance of occurrence of 2% per year. As the result, the modification applied in Scenario 2 is still applicable for Scenario 3.

In sub system analyses, especially for the existing condition, inundation occurs in every canal along Kartini Street. This condition occurs due to the dimension of the main system which is not fixed yet (existing condition for main system). Scenario 1 is generated by making a combination between the existing condition of urban drainage canals and the fixed condition of the main system. There is a significant change from this first scenario, because there is no inundation in the area surrounding the urban drainage canals. Scenario 2 is applied by changing the rainfall intensity, regarding to the chance of occurrence of 2% per year. As the result, it is still applicable for this condition.

In Cost-Benefit analysis, 3 conditions have been compared. Comparison is applied for the existing condition (no structures but with a high damage cost), the proposed condition I (only of a 3 m height dyke and increasing the operation and maintenance cost), and the proposed condition II (applying the main system's Scenario 2 with the highest operation and maintenance cost). It is shown that the proposed condition II is able to be applied to decrease the damage cost, although the operation and maintenance cost is the highest one. If it is compared with the existing and another proposed condition, it has no damage cost, which is considered as the benefit. From economic point of view, it is worthy.

Keywords : *GIS modelling, DUFLOW hydraulic modelling, urban drainage, flood protection, drainage capacity*