PENERAPAN STORM WATER MANAGEMENT MODEL (SWMM) UNTUK EVALUASI SALURAN DRAINASE DI DAERAH TANGKAPAN AIR SIDOMUKTI, KOTA SALATIGA

Oleh Fiqi Ilham Santoso
21/478214/GE/09615

INTISARI

Perkembangan urbanisasi dan konversi lahan memicu adanya potensi bencana banjir. Sistem drainase berperan penting untuk manajemen sumber daya air perkotaan, seperti di Daerah Tangkapan Air (DTA) Sidomukti, Kota Salatiga sebagai daerah pusat kegiatan dan didominasi oleh lahan terbangun. Upaya manajemen sumber daya air perkotaan dapat dilakukan dengan menerapkan suatu pemodelan hidrologi, yakni *Storm Water Management Model* (SWMM). Fokus tujuan penelitian ini, antara lain 1) menganalisis besar debit banjir rencana hasil *Storm Water Management Model* (SWMM) berdasarkan karakteristik penggunaan lahan dan intensitas curah hujan dan 2) menganalisis kapasitas saluran drainase terhadap nilai besar debit puncak limpasan hasil *Storm Water Management Model* (SWMM). Analisis distribusi frekuensi curah hujan dilakukan pada kala ulang hujan 2, 5, 10, dan 25 tahun. Analisis distribusi hujan jam-jaman dihitung berdasarkan metode *Tadashi Tanimoto*. Pemodelan sistem drainase dengan SWMM menggunakan metode *Curve Number* (CN) untuk analisis limpasan dan metode *dynamic wave* untuk analisis hidraulika, terkait penelusuran aliran (*flow routing*). Perhitungan debit kapasitas saluran drainase menggunakan metode *slope-area* dengan persamaan *Manning*. Hasil simulasi SWMM dengan persentase lahan kedap air (*impervious*) yang dominan, menunjukkan nilai *total infiltration* yang semakin rendah, sedangkan nilai *total runoff*, *peak runoff*, dan *runoff coefficient* akan semakin tinggi. Kondisi sistem drainase pada titik percabangan (*junction*) di Jalan Jenderal Sudirman, Jalan Osamaliki, dan Jalan Ahmad Yani terjadi luapan (*node flooding*). Evaluasi kapasitas saluran drainase dari nilai *link capacity* hasil pemodelan SWMM dan kapasitas saluran hasil perhitungan metode *slope-area*, menunjukkan kondisi yang sama, yakni sejumlah 83 saluran masih mampu mengalirkan debit puncak limpasan.

Kata kunci: *Storm Water Management Model* (SWMM), drainase perkotaan, debit banjir, limpasan permukaan

STORM WATER MANAGEMENT MODEL (SWMM) APPLICATION FOR THE DRAINAGE CHANNELS EVALUATION IN THE SIDOMUKTI CATCHMENT AREA, SALATIGA CITY

By Fiqi Ilham Santoso
21/478214/GE/09615

ABSTRACT

The development of urbanization and land conversion triggers the potential for flood disasters. An essential component of managing urban water resources is the drainage system, such as in Salatiga City's Sidomukti Catchment Area, a central activity area where built-up land predominates. Efforts in urban water resource management can be carried out by applying a hydrological modeling, namely the Storm Water Management Model (SWMM). The focus of this research includes 1) analyzing the magnitude of planned flood discharge results from the Storm Water Management Model (SWMM) based on land use characteristics and rainfall intensity, and 2) analyzing the capacity of drainage channels with the peak runoff discharge values from the Storm Water Management Model (SWMM). The frequency distribution of rainfall was analysed for return periods of 2, 5, 10, and 25 years. The hourly rainfall distribution analysis is calculated based on the Tadashi Tanimoto method. Drainage system modelling with SWMM uses the Curve Number (CN) method for runoff analysis and the dynamic wave method for hydraulic analysis, which is related to flow routing. The calculation of the drainage channel capacity discharge uses the slope-area method with the Manning equation. The results of the SWMM simulation with a dominant percentage of impervious land show decreasing total infiltration values, while total runoff, peak runoff, and runoff coefficient values will increase. The condition of the drainage system at the junction points in Jenderal Sudirman Street, Osamaliki Street, and Ahmad Yani Street experienced flooding (node flooding). Evaluation of the drainage channel capacity from the link capacity values obtained from the SWMM modelling and the channel capacity calculated using the slope-area method shows the same condition, which shows that 83 channels are still capable of conveying peak runoff discharge.

Keywords: *Storm Water Management Model* (SWMM), *urban drainage*, *flood discharge*, *surface runoff*