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THE APPLICATION OF SWMM SOFTWARE FOR THE EVALUATION OF STORMWATER TREATMENT PLANT’S OPERATION

Key words: hydrodynamic modelling, stormwater, SWMM software, total suspended solids

Summary

Due to the stochastic character of precipitation phenomena combined with an accumulation of pollutants in the catchment area and their wash-off, the prediction of stormwater quantity and quality, its sediments is very complex. It is especially important when designing the stormwater treatment plant’s (STP) stages of technological lines, because there can be massive calculation errors at selection and functions of particular objects and equipment.

The preliminary evaluation, of stormwater treatment plant in Witosa St., Kielce shown in the above article, where stormwater runs off mainly from housing estates of single and multi-family houses, is the first stage of researches concerning preparation of the mathematical model of analysed part of a sewer system.

The numerical model STP was made by SWMM software and was based on the working plans of the object and field studies, whereas the hydrodynamic modelling with stormwater drainage system were made according to topographic and basics maps. 33 rainfall events were used to measure the amount of average rainfall intensity. They were registered between 2010 and 2011. During that time the rainfall duration and depth of precipitation changed as follows: $t_d = 12–1244$ min and $P = 1.8–44.6$ mm. The simulations done by STP shown that in case of average rainfall intensity below $10$ dm$^3$∙(ha∙s)$^{-1}$ the reduction of TSS ($\eta$) in a catch basin would change into $0.78–0.98$, for $q = 10–75$ dm$^3$∙(ha∙s)$^{-1}$, the result was $\eta = 0.69–0.88$.

The calculations carried out at work are only approximate, because the model was not calibrated on the basis of the actual value of the stormwater flow, the rainfall amount and total suspended solids concentrations.