

Licznar, P. Stormwater Reservoir Dimensioning Based on Synthetic Rainfall Time Series. *Ochrona Srodowiska* 2013, Vol. 35, No. 2, pp. 27–32.

Abstract: Current progress in hydrodynamic modeling of urban drainage systems enables better modeling and dimensioning of stormwater reservoirs. According to new German DWA-A 117 guidelines, hydrodynamic simulations based on local, long-lasting rainfall time series are obligatory for dimensioning of stormwater reservoirs installed on drainage systems with area in excess of 200 ha. Results of stormwater outflow simulation series allow for probabilistic dimensioning of necessary reservoir volume. This is fully in line with the overall probabilistic philosophy of drainage system functioning introduced by the European Standard PN-EN 752. This methodology is not applied in Poland due to the lack of local, long-lasting rainfall time series with time resolution of individual minutes. The paper proposes replacing the missing data with the synthetic one, originating from daily rainfall totals disaggregation. This strategy was tested in the example of a hydrodynamic model of a small drainage system located in Wroclaw. The system had a single underground tank installed and its maximum outflow was limited. The system performance was analyzed against 250 real rainfalls (derived from a 38-year local record) and 2554 synthetic rainfall scenarios derived from 10 independent rainfall time series (38 years each) that had previously been generated by microcanonical cascade model. Complex hydrodynamic simulations based on real and synthetic rainfall time series led to generation of system overtopping volume plots against their return periods. Overtopping volume plots for real and synthetic time series were observed to correlate very well. In addition, a common single overtopping volume versus return period plot was developed for all 2554 synthetic rainfall scenarios. This plot may serve as a probabilistic assessment of necessary retention volumes for long return periods of up to 380 years.

Keywords: Stormwater drainage, hydrodynamic model, probabilistic sizing, rainfall disaggregation.