Model-based evaluation of a full-scale wastewater treatment plant for future influent and operational scenarios

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Abstract: With urbanization and increasingly stricter effluent limits, wastewater treatment plants undergo major extensions. Several important questions in terms of the operation of the future wastewater treatment plant cannot be answered using a steady-state design model, e.g. changes in infiltration rates, impervious area, rainfall patterns, operational strategies. This paper presents a model-based toolbox to generate various dynamic influent scenarios (using an influent generator model) that are further used to evaluate the performance of the wastewater treatment plant (using a dynamic process model). The approach is demonstrated for the Henriksdal wastewater treatment plant in Stockholm, Sweden. Three future scenarios (decreased imperviou area, decreased infiltration and modified aeration control strategy) are evaluated using the toolbox. While simple examples are used in this paper, numerous other more complex influent and operational scenarios can be studied using the model.

Keywords: influent generator; future scenario analysis; dynamic modelling; wastewater treatment plant