

Determining the extent of groundwater interference on the performance of infiltration trenches - DTU Orbit (08/11/2017)

Determining the extent of groundwater interference on the performance of infiltration trenches

Infiltration trenches are widely used in stormwater management, but their capacity decreases when installed in areas with shallow groundwater where infiltration is limited by groundwater drainage. Here the hydrological performance of single infiltration trenches in areas with shallow water tables is quantified in terms of their capability to reduce peak flow, peak volume and annual stormwater runoff volume. To simulate the long term hydrological performance of infiltration trenches two different models are employed. The models continuously simulate infiltration rates from infiltration trenches using a 19 year rainfall time series from Copenhagen as input. The annual and single event stormwater runoff reduction from infiltration trenches was determined for 9 different scenarios that covered different soil conditions and infiltration trench dimensions. Monte Carlo simulations were used in order to quantify the impact of parameter variability for each scenario. Statistical analysis of the continuous long term model simulations was used to quantify the hydrological performance of infiltration trenches. Results show that infiltration trenches are affected by groundwater when there is an unsaturated depth of less than 1.5-3. m in sandy loam, 6.5-8. m in silt loam and 11-12. m in silty clay loam. A correction factor that can be applied for infiltration trench design when there is a shallow groundwater table is presented. The analyses showed that below a certain value of unsaturated depth the dissipation capacity of the mound/groundwater becomes the dominant process determining the infiltration capacity from infiltration trenches. In these cases it is essential to consider the local groundwater conditions in the infiltration trench design process.

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