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Development of a Field-Scale Protocol to Measure the LTAR of Mature Wastewater Drainfields: Preliminary Results

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Abstract:

In the past few years, new technologies have been introduced that can potentially reduce the size of drainfields and therefore open more land up for development. Examples of these technologies include products such as in-trench vaults and gravel-alternative media. These products eliminate the need for gravel in the trench. Without gravel, there is more effluent storage and no masking the soil-effluent interface. Conceptually, less trench surface area is needed to absorb effluent. Thus, many locations have allowed gravel-alternative products to be installed with 20 to 50% trench size reductions as compared to conventional gravel systems. There is anecdotal evidence of increased system failures due to this reduction. The reason for trench reductions has not been quantified and we do not know if the reductions fall into a presumed trench-design safety factor or if alternative systems provide a more efficient means of infiltration. One reason for not quantifying trench size reductions is due to the difficulty of evaluating the hydraulic performance of drainfields. Drainfield trenches are capable of storing a large volume of water and there is no method to quantify the amount of infiltration over time for such a large system. The purpose of this study was to evaluate a falling head method for determining the hydraulic conductivity of drainfield trenches. A HYDRUS 2D model was calibrated with soil hydraulic data from an experimental drainfield prior to wastewater application. We found that we could accurately estimate water infiltration into trench bottoms and sidewalls using the calibration data set. This experiment will be repeated after 18 months of wastewater application in order to evaluate the effect of biomat development on hydraulic conductivity.

Impact Statement:

This preliminary research is essential to developing a working model of our experimental drainfield. We hope to be able to use this model calibration as the starting point for future simulations that will evaluate effluent flow and solute transport from a mature on-site wastewater management system.

Category: Rural Environmental Protection
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