

Dissertation Release

5.6.2020

Analysis of digital data supports renovation decisions related to water and wastewater networks

Title of the dissertation	Data-driven network asset management – Focus on sewer systems Datalähtöinen verkosto-omaisuuden hallinta – painopisteenä viemäriverkostot
Contents of the dissertation	<p>Water and wastewater networks in Finland are aging and large-scale renovations will be needed at all utilities of the country. The aim of the dissertation was to study, how renovations can be targeted appropriately.</p> <p>Research shows that risk-based asset management can be supported by integration and analysis of data on the networks and their environment. In this study pipe-level failure consequences are estimated for water and wastewater networks and sewer condition and life span are modelled with such data.</p> <p>The predictive ability of machine learning methods applied (<i>random forest</i> and <i>random survival forest</i>) was similar or slightly better than that of the traditional statistical methods (<i>logistic regression</i> and <i>Weibull regression</i>), but the difference was small. Data availability and the purpose of creating the model also affect the choice of the method.</p> <p>The effect of explanatory factors on sewer condition was studied using partial dependence plots, which enable examining the interconnections between different variable values and pipe condition. Results showed that that in order to benefit from life span models, the condition inspections need to be targeted differently than before. Pipes need to be selected randomly for inspections and the selected pipes need to be re-inspected regularly in order to gain reliable estimates.</p>
Field of the dissertation	Water engineering, water and wastewater network asset management
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