Iterative Site Model Improvement based on Adaptive Integrated Characterisation Strategies and Technologies as Prerequisite for a Successful Design of Site Remediation and Redevelopment

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Brownfield redevelopment is often hampered by an insufficient knowledge on the presence and extent of subsurface contamination. The EU-financed research project TIMBRE (Tailored Improvement of Brownfield Regeneration in Europe) aims to contribute to this topic. Reliable information on the extent and temporal development of subsurface contamination is a prerequisite for successful risk assessment and evaluation of remedial options. Traditionally, site investigation relies on a predefined survey grid with shortcomings in the small number of boreholes and sampling points, therefore hampering a reliable characterization of the subsurface. To overcome these shortcomings, novel strategies using phytoscreening and direct-push (DP) technologies were applied in an adaptive manner at the former Szprotawa air base in Poland to enable both screening and detail subsurface investigations in comparatively short time periods and at low expenses. High resolution site characterization tools and techniques were coupled with dynamic work strategies and a detailed conceptual site model developed at this site contaminated with aromatic and aliphatic hydrocarbons. The potential of tree core sampling was tested for obtaining screening information for different pollutants. Several DP sensing and sampling techniques were applied to obtain either first or complementary information on subsurface contamination. Shallow DP investigation using small sampling devices provided knowledge on subsurface contamination in areas inaccesible for heavy equipment. Analysis of aquired data and uncertainty estimation provided feedbacks to field investigations, by defining parameters to be refined (in space and/or time) and areas of interest where additional information is further required. Dynamic concepts were developed considering stepwise on-site decision and adaptive investigation, assisted by site modelling. Application of the above characterization/visualization/interpretation methodology at the Szprotawa site aims to deliver reliable estimations of 3D spatial extension of the contaminant body still present at the site as valuable input data for integrated planning and assessment of site revitalization options.