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Remediation and Reuse of Soils

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Links between contaminant remediation and impacts on soil properties have not been explored in a systematic way. Most remediation studies focus on the effectiveness of the remediation process. Contamination and remediation can have significant effects on soil properties and function. Considering that in most remediation cases the soil will be re-used in some way, it is important to understand the effects of the remediation process on soil properties and the post-remediation soil behaviour. This understanding can help to determine the best re-use of the soil and therefore improve post-remediation site development.
Laboratory experiments on coal tar contaminated soil treated with smouldering remediation show that thermal treatments affect a variety of soil properties ranging from mineralogical composition, particle size distribution, and pH. Dynamic responses like permeability and shear strength are impacted as well and these responses are linked to the changes in soil properties. Soil permeability, capillary rise, and contact angle change dramatically after this remediation process, indicating some degree of hydrophobicity and significant implications for water movement through the post-remediation soil. The observed changes in permeability are linked to physical changes to the soil grain surface combined with small amounts (<1ppm) of coal tar and combustion product residue. Decoupling these effects is essential to understanding the extent of impact remediation processes have on long-term soil function. While chemical residue within the pores can be removed through “polishing” remediation steps, physical changes are likely to be permanent. Physical changes and chemical residue also have important implications with respect to the response of the soil under shear.
These observed changes indicate that the remediated soil and its behaviour should be considered by remediation research. Monitoring of soil properties and behaviour during aggressive remediation can improve prediction of changes to infiltration rates and response to loading. These parameters are essential to effective and safe reuse of formerly contaminated brownfield sites.