The Influence of Stormwater Infiltration on Groundwater Pollutant Transport

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With urbanisation, much of the once-permeable soil surfaces are replaced with impervious areas, resulting in reduced groundwater recharge and increased surface runoff. Together, these are a primary cause of degradation of receiving waters. There have been massive efforts in Australia and internationally to mitigate detrimental impacts of urbanisation, using a range of technologies such as wetlands, rain gardens and infiltration basins. Infiltration basins are among the most widely applied stormwater control measures worldwide, in part for their assumed ability to intercept stormwater runoff and permit it to infiltrate, recharging groundwater and restoring baseflow to urban streams. Although significant research has already been undertaken into likely transfer of pollutants from stormwater infiltration basins into groundwater, very little has been published about the potential for infiltrated and residual pollutants to be mobilised in urban/peri-urban soils and groundwater. In this study, nitrate and zinc were selected as representative tracers, representing a wide range of mobility and adsorption characteristics. Adsorption/desorption behaviours of selected tracers onto natural clay-rich soil sampled from the Dobsons Creek catchment (East of Melbourne, Victoria) and by a range of synthetic soils with varying clay content and minerology were studied using laboratory batch and column experiments. For the batch runs, sorption isothermal data will be fitted to achieve the capacity of tested soils to adsorb selective tracers. Also, the kinetic modelling of the experimental data will be carried out to better understand adsorption mechanism onto tested soils. Leachability of the tested soils saturated with selected tracers will be then investigated using column experiments. The results will be helpful in the design and location of stormwater infiltration systems to minimise the risk of pollutant mobilisation.