

Storage and transport of microplastics in groundwater

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Micro- and nanoplastics are widely present in the natural environment and significant effort continues to be devoted to monitoring and characterising their transport and storage in rivers and oceans. Groundwater stored in underground aquifers is an important source of freshwater for drinking and irrigation, and is recharged by surface water which is known to contain micro- and nanoplastics. Consequently, there is a flux of micro- and nanoplastics into underground aquifers and sampling has shown that they are present in groundwater in numerous locations around the world, including the UK. However, the data are scarce and the prevalence and types of plastic present in groundwater remain highly uncertain. Moreover, very little is known about how micro- and nanoplastics are stored and transported within porous aquifer rocks.

The aim of the project is to deliver improved understanding of the prevalence of micro- and nanoplastics within groundwater, with a particular focus on UK aquifers, and on how micro- and nanoplastics are stored and transported within aquifers. The project will combine three elements: (i) field sampling of groundwater from aquifer locations across the UK, and analysis of the prevalence and types of plastic present; (ii) laboratory experiments using samples of aquifer rocks and groundwater, and different types and size distributions of plastic, to determine pore-scale controls on the transport of micro- and nanoplastics through aquifers, and (iii) numerical modelling, informed by the results of the laboratory experiments, and leveraging recent and ongoing work in aquifer characterisation and groundwater flow modelling, to determine controls on the transport of micro- and nanoplastics at the metres to 100's meters scale.

The project is hosted by the Novel Reservoir Monitoring, Modelling and Simulation ([NORMS](#)) group in the Department of Earth Science and Engineering (ESE), and will make use of the experimental facilities in the NORMS Laboratory for Reservoir Physics, along with the group's leading edge code [IC-FERST](#) for modelling groundwater flow in heterogeneous aquifers. The project also leverages expertise in the Department of Materials and the Department of Civil and Environmental Engineering, and will make use of facilities in the [Agilent Measurement Suite](#) at Imperial's White City Campus to map the chemistry and size distribution of microplastics.

Applicants should hold a degree in a related subject such as geoscience, physics, materials, chemistry or engineering and, ideally, have some experience in reservoir or aquifer modelling, or plastic chemistry. Training will be provided as required in specific aspects of the project. The research will deliver fundamental new understanding of the storage and transport of microplastics in aquifers with significant implications for groundwater quality in the UK and elsewhere.

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