



## **COST Action TU1206 "SUB-URBAN - A European network to improve understanding and use of the ground beneath our cities"**

Diarmad Campbell (1), Johannes de Beer (2), David Lawrence (1), Michiel van der Meulen (3), Susie Mielby (4), David Hay (5), Ray Scanlon (6), Ignace Campenhout (7), Renate Taugš (8), and Ingelov Eriksson (9)

(1) British Geological Survey, (2) Geological Survey of Norway, (3) Geological Survey of the Netherlands, (4) Geological Survey of Denmark and Greenland, (5) Glasgow City Council, (6) Geological Survey of Ireland, (7) Municipality of Rotterdam, (8) Geological Survey of Hamburg, (9) City of Oslo

Sustainable urbanisation is the focus of SUB-URBAN, a European Cooperation in Science and Technology (COST) Action TU1206 - A European network to improve understanding and use of the ground beneath our cities. This aims to transform relationships between experts who develop urban subsurface geoscience knowledge - principally national Geological Survey Organisations (GSOs), and those who can most benefit from it - urban decision makers, planners, practitioners and the wider research community.

Under COST's Transport and Urban Development Domain, SUB-URBAN has established a network of GSOs and other researchers in over 20 countries, to draw together and evaluate collective urban geoscience research in 3D/4D characterisation, prediction and visualisation. Knowledge exchange between researchers and City-partners within 'SUB-URBAN' is already facilitating new city-scale subsurface projects, and is developing a tool-box of good-practice guidance, decision-support tools, and cost-effective methodologies that are appropriate to local needs and circumstances. These are intended to act as catalysts in the transformation of relationships between geoscientists and urban decision-makers more generally. As a result, the importance of the urban sub-surface in the sustainable development of our cities will be better appreciated, and the conflicting demands currently placed on it will be acknowledged, and resolved appropriately.

Existing city-scale 3D/4D model exemplars are being developed by partners in the UK (Glasgow, London), Germany (Hamburg) and France (Paris). These draw on extensive ground investigation (10s-100s of thousands of boreholes) and other data. Model linkage enables prediction of groundwater, heat, SuDS, and engineering properties. Combined subsurface and above-ground (CityGML, BIMs) models are in preparation. These models will provide valuable tools for more holistic urban planning; identifying subsurface opportunities and saving costs by reducing uncertainty in ground conditions.

A key area of interest, and one of potential collaboration with COST Action TU1208, is in characterising and parameterising the very near urban subsurface, and especially the anthropogenic deposits, to assist decision-making by civil engineers, and others. Anthropogenic deposits may be many metres thick, are typically very heterogeneous, have complex histories of accumulation, and may including important archaeological assets. They display complex stratigraphies which are difficult to resolve using traditional methodologies, even with extensive invasive ground investigation. Ground Penetrating Radar, and other non-destructive methods of ground investigation hold considerable promise in greatly improving the resolution, understanding, and modelling, of these and other near-surface deposits in particular.

This work is a contribution both to COST Action TU1208 "Civil Engineering Applications of Ground Penetrating Radar" and to COST Action TU1206 "SUB-URBAN - A European network to improve understanding and use of the ground beneath our cities"