British Geological Survey launch Infiltration SuDS Map

Dr. Rachel Dearden

The 'National Standards for Sustainable Drainage' have been released by DEFRA for consultation and are expected to be implemented in October 2012. They specify guidelines for the design, construction, operation and maintenance of sustainable drainage systems (SuDS), a term which encompasses a number of surface water management techniques, which are distinguished in the *National Standards* by the surface water runoff destination. Two such techniques are discharge to the ground (soakaways, infiltration basins, permeable pavements) and discharge to watercourses (detention basins and ponds). The *National Standards* require that a hierarchical approach to SuDS selection is adopted, with discharge to the ground being prioritised over discharge to surface water bodies, sewers and combined sewers respectively. The prioritisation of infiltration is consistent with current building regulations (Approved Document H) and is often a cost effective means to reduce off-site surface water flow rates to required greenfield rates. The feasibility of implementing infiltration SuDS is however highly dependent on the design of the system and on the compatibility of that design with the geological and hydrogeological properties of the subsurface.

An appreciation of ground conditions is therefore critical at an early stage of planning to determine whether discharge to the ground is appropriate, or whether an alternative drainage destination is justified. The decision is likely to influence the site layout and costs, and hence data providing information on the likely ground conditions will facilitate early planning. A team of scientists from the British Geological Survey, led by Dr. Rachel Dearden, have responded to the need for spatial data on the infiltration potential of the ground by developing a national GIS-based *Infiltration SuDS Map.* The map conveys a wealth of subsurface data that can facilitate preliminary decisions on whether, and what type of, infiltration SuDS are likely to be compatible with the subsurface. The map is intended for use as a preliminary site characterisation tool prior to the ground investigation and is not an alternative to a soakaway test or ground investigation.

Infiltration SuDS come in various shapes and sizes, from traditional soakaways to permeable pavements and infiltration basins. Soakaways are most appropriate in free-draining deposits where they may be used as the primary drainage technique to attenuate surface water. In less permeable deposits, infiltration can still be effective as long as the system is designed to account for the lower rate of infiltration. This can be accomplished by allowing infiltration over wider spatial areas, as can be achieved through the installation of permeable pavements, or by providing the capacity to store water whilst infiltration occurs, as is the case for infiltration basins.

The *Infiltration SuDS Map* comprises of over 20 spatial data sets and is structured to guide the user through a logical decision-making process. The opening data layers present summary information that provides the user with an indication of the overall suitability of the subsurface for infiltration SuDS. These summary layers are intended both for rapid assessment, but more importantly for the assessment of large spatial areas over which the suitability of the subsurface for infiltration may vary. Subsequent data layers inform the user about the subsurface properties, enabling an assessment of the most appropriate type of infiltration system. This data is provided in four thematic sections.

The first section considers whether the installation of infiltration SuDS may result in significant ground instability or possibly flooding. If such a hazard exists, the potential for, and consequences of, that hazard should be assessed and if it is deemed unacceptable, discharge to a receptor other than the ground may be justified. The map highlights the potential for severe constraints associated with ground instability (soluble rocks, non-coal shallow mining and landslide hazards), persistent shallow groundwater, and the presence of made ground, which may represent a ground stability or contamination hazard.

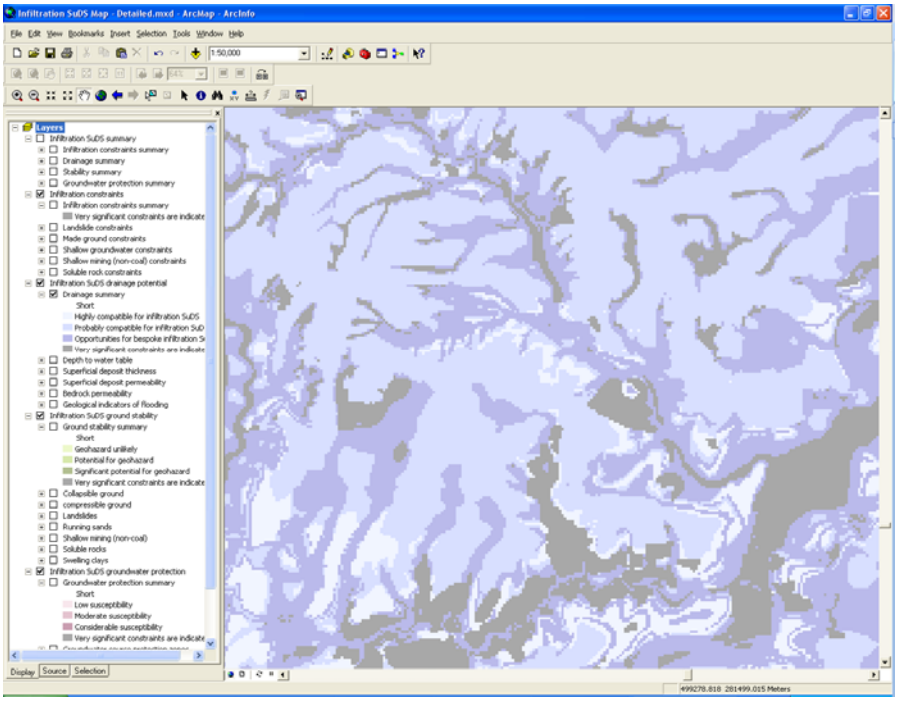
If adverse hazards are not identified either by the map or by a ground investigation, the use of infiltration SuDS should be considered. The most appropriate type depends on the drainage properties of the subsurface. The Infiltration SuDS Map provides preliminary data to indicate those properties. The map includes a data layer indicating the permeability of the uppermost superficial deposits, along with data that assesses the thickness of those deposits, which can be used to determine whether the permeability of the bedrock should also be taken into account. In addition, the map provides an approximate depth to the groundwater table (not including water tables perched on low permeability strata within the unsaturated zone) and indicates the presence or absence of floodplain deposits within which the water table may respond rapidly to changes in river level.

The third section of the Infiltration SuDS Map focuses on the potential for ground instability. It considers ground stability issues that are unlikely to preclude the installation of infiltration SuDS, but that should be taken into account during design. An example is the presence of running sand, which may be associated with subsidence if an excavation (like a soakaway) creates a void into which the surrounding sand may run. In this instance, a soakaway can be installed successfully, but during construction, care should be taken to avoid the collapse of surrounding deposits. Other sources of instability considered include the potential for landslides, soluble rocks, swelling clays, non-coal shallow mining and compressible and collapsible ground. This data is derived from BGS' GeoSure range of products, which have been available in the public domain for a decade and hence have undergone significant scrutiny.

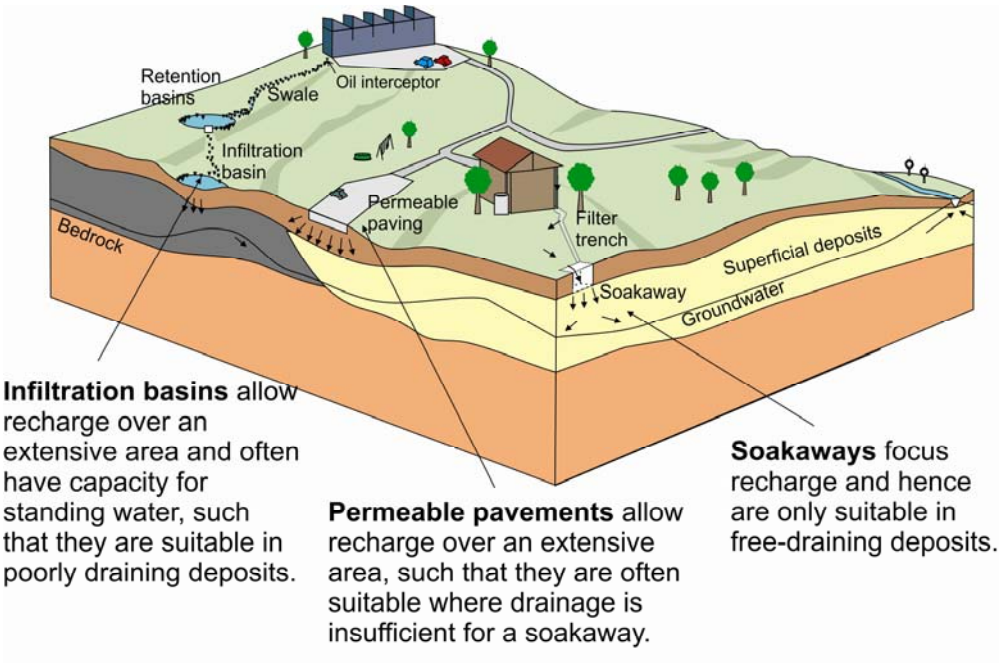
The final section of the map considers the susceptibility of the groundwater to contamination. Although the map does not include data on the presence of contaminated land it does provide information on the presence of made ground (where mapped) that could potentially be contaminated. It also includes the mechanism by which surface water moves through the unsaturated zone, providing an indication of the potential for pollutant removal and it delineates the Environment Agency's source protection zones, which need to be considered when determining the sensitivity of the groundwater to contamination.

It is anticipated that the *Infiltration SuDS Map* will be used as a key resource in desk-studies supporting decision-making for the selection of appropriate infiltration systems. It brings together an unrivalled selection of subsurface data into a single product that facilitates efficient site assessment. The map delivers national coverage of geological and hydrogeological data allowing the evaluation of the subsurface at the local to national-scale. The map is anticipated to be of considerable help to planners, developers, water companies and local authority SuDS Approval Bodies throughout the development process.

For more information about licensing the dataset, contact digitaldata@bgs.ac.uk or visit the SuDS webpages www.bgs.ac.uk/suds, where you can also find out more about our *Infiltration to the Ground GeoReport* (http://shop.bgs.ac.uk/GeoReports/).



The Infiltration SuDS Map in a geographical information system.



A schematic diagram highlighting the importance of ground compatibility when selecting an appropriate infiltration SuDS design