Sustainable Drainage in Source Protection Zones

Guidance to protect drinking water quality

Source Protection Zones (SPZ) are created by the Environment Agency for licensed groundwater abstractions that warrant additional protection as they provide public drinking water supply. It is important to keep drinking water standards in mind when protecting SPZ. These are more stringent than the environmental standards more often referred to in guidance for the protection of groundwater from sustainable urban drainage systems (SuDS).

The principle rule of groundwater protection is preventing or avoiding potentially contaminating activities from occurring in the first place within groundwater catchments used for drinking water. Although groundwater is treated before feeding into supply, planned treatment processes cannot react to every change in water quality. Were an SPZ to become contaminated, this could result in loss of public water supply. It is therefore critical to protect water quality in source protection zones.

There are 3 main source protection zones which are divided into different groundwater travel times for how long it is predicted for a contaminant to reach a groundwater abstraction. The SPZ1 area has a 50 day or less travel time to the groundwater abstraction, the SPZ2 has a 400 day or less travel time to the groundwater abstraction and SPZ3 represents the total catchment for the groundwater abstraction.

In general terms, the closer contamination is to the abstraction the greater the risk to drinking water quality. However, in dual porosity aquifers such as the Chalk, water moves via discrete fractures in the rock. This means that contaminants can travel much greater distances in very short periods of time with reduced contaminant attenuation/degradation potential. This means much higher risks to the quality of groundwater abstraction source used for public drinking water supply. Southern Water's groundwater abstractions are predominantly found in the Chalk aquifer.

The SuDS manual (CIRIA 2015) is often referenced within drainage design and drainage strategy. This document does not provide technical groundwater guidance for hydrogeologically sensitive locations. This is highlighted by the lack of guidance with regard to SuDS located in Source Protection Zones or SuDS located in dual porosity Chalk aquifers.

Southern will review each proposed SuDS design on a case-by-case basis and the outcome of our review will be based on the hydrogeological sensitivity of the area and the treatment proposed prior to discharge. The hydrogeological sensitivity will be dictated by site geology, depth to groundwater/ unsaturated zone thickness, our own updated modelled transient groundwater catchment zones, the presence of karst features, etc. Southern Water expect treatment systems to be reflective of the hydrogeological sensitivity of the proposed SuDS. In general, SuDS within an SPZ1 are opposed unless the treatment systems can provide betterment of water quality.

We therefore strongly recommend that a full hydrogeological risk assessment inform the design of all SuDS proposed in an SPZ1 and SPZ2, in addition to a contamination risk assessment, particularly where infiltration components are proposed. Hydrogeological risk assessments provide the information necessary to fully understand infiltration pathways to the SPZ and the hydrogeological sensitivity of the site location. Only with this information can the areas suitable for infiltration measures be identified. This information should therefore be considered in addition to guidance provided by the Environment Agency.

SuDS are not limited to infiltration. Green roofs, rainwater harvesting, wetlands and detention basins are examples of non-infiltration techniques. Often referred to as attenuation techniques, these may help in areas where infiltration techniques cannot be used. Off-site infiltration components might also be considered, and water efficiency savings from existing and new housing can also ease the pressure on the drainage network, thereby increasing the capacity of existing infrastructure to cope with additional runoff from newly developed land.