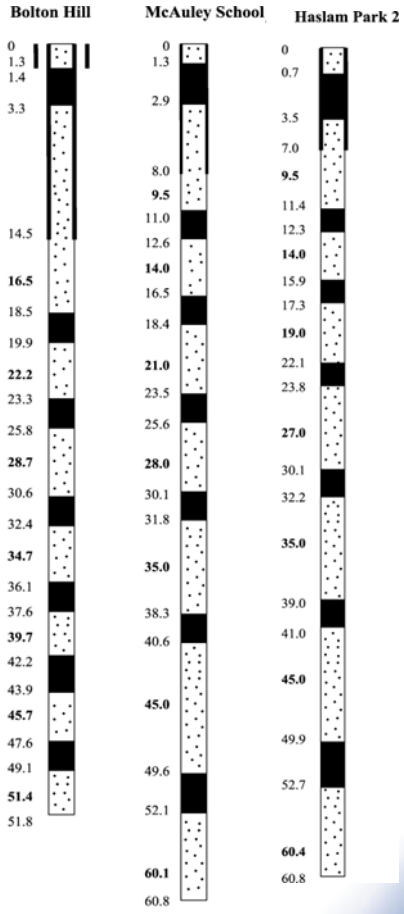
Micro-organic contaminants in urban groundwater systems: preliminary results from a Sandstone aquifer in the UK

Debbie White, Dan Lapworth, Marianne Stuart, Peter Williams

British Geological Survey

Introduction and method:

- Multi-level piezometers installed into urban parks in the Sherwood Sandstone in Doncaster (Yorkshire, UK) were used to investigate the variability of micro-organics and nitrate pollution with depth
- Each Multi-level piezometers is a bundle of hydraulically separated HDPE or PVC tubes with 30cm screens completed to different depths. Three separate multi-level piezometers were sampled
- Samples were collected in February and July 2014 with either a peristaltic or installed inertial pump for screening by the UK Environment Agency NLS multi-residue GCMS method. Inorganic groundwater chemistry was also determined
- Every care was taken to minimize compounds introduced to the sample by either the sampler or the abstraction method
- Previous studies have highlighted heterogeneity in the aquifer material and groundwater flow with depth. Previous evidence of urban contamination has been seen using *E.coli,* fluorescence and inorganic groundwater chemistry



Initial results:

- Groundwater levels were higher in July than in February 2014 due to a wet summer.
- 24 micropollutants including 4 WFD priority substances, 2 (banned) pesticides and 2 pesticide metabolites were found at the 3 sites.
- The graphs to the right highlight the heterogeneity in the compounds and concentrations found at the three sites.
- The graphs also highlight the difference in compounds and concentrations found at each of the multilevels during the two sampling periods.
- There are several sources of MO contaminants, some of which migrate rapidly to depths >30 mbgl. Potenitial sources include piped urban piped leakage, legacy and current industrial sources, and historic amenity pesticide use.
- Multiple complex flow systems operate and legacy contaminants persist >20 years after being banned