

# Summary

This report details the steps taken in the process of producing risk (hazard) maps for chemical parameters listed in the European Commission Directive 98/83/EC on the quality of water intended for human consumption and the national Water Supply (Water Quality) Regulations that implement the requirements of the directive for drinking water in England and Wales. Amendments to 98/83/EC set out in Directive 2015/1787 provide the terms for reduced monitoring requirements by European Member States for drinking water where evidence indicates that water-quality risk is low. On the basis of the Water Safety Plan approach of the World Health Organization, DWI requires mapping of available data on raw-water sources in England and Wales to provide an evaluation of spatial distributions of the listed chemical parameters and their concentration ranges as evidence of risk for drinking water. An evaluation of temporal variability was also required to assess evidence for any trends to aid with decision making on future drinking-water monitoring requirements.

Data for an agreed list of 27 chemical parameters were collated, screened, evaluated and mapped, with surface water and groundwater being treated separately. This report details the data sources and steps taken to collate, evaluate, process and map them.

Risk maps produced for individual parameters include expected values and 95<sup>th</sup> percentiles of measured values relative to the prescribed concentration or value (PCV) at any given location. The methodology employed required prediction of the entire statistical distribution of each parameter at each prediction location so that both expected value and percentile values for each parameter could be determined. This required the use of a statistical model to represent the variation of the data. The produced risk maps are produced for water-quality data analysed over the last three years, in line with the requirements of the 2015/1787 Directive. The correspondence between the two layers is an indication of the spatial data availability and the strength of correlation between measurements from nearby sites. The maps are presented in ArcGIS with additional explanatory layers comprising open-source data for coastline, multiscaled atlases, postcode sectors, place names, simplified geology, Environment Agency region boundaries and local authority boundaries as points of reference. The GIS is presented as a separate mxd file.

The maps have inevitable limitations derived from inability to guarantee complete elimination of errors from the cleaned datasets, paucity of data for some parameters, spatial and temporal variability of available data for others, variable spreads of surface-water drainage or aquifers, variable detection limits for some trace elements, and for groundwaters, variable chemistry with depth, especially for concealed and/or stacked aquifers. Nonetheless, the maps provide an estimate of the current best-available spatial distributions for parameters for surface water and groundwater to aid DWI in assessing drinking-water risks and determining monitoring requirements, in line with Directive 2015/1787. It is anticipated that the maps will be used alongside available site-specific water-quality monitoring data and site risk assessments for decision making in the context of the Directive.

Temporal variability of raw water chemical data have also been assessed. As temporal trends vary significantly spatially for individual parameters and between parameters, recommendations for timescales of map revision are difficult to make. As a pragmatic recommendation, a mapping renewal interval on the order of 10 years is considered appropriate. In the case of amendments to the statutory PCVs in the meantime, remapping is possible using the existing rasters and relating to the revised threshold values.