# Executive Summary

Local Authorities (LAs) in England and Wales have a legal requirement to monitor Private Water Supplies (PrWS) to protect public health. In 2016 LA records contained details of 36,565 PrWS in England, and 14,981 in Wales (DWI, 2017a, 2017b). From 2017, amendments to the Drinking Water Directive have provided LAs an opportunity to monitor drinking water parameters in PrWS using a more flexible risk-based approach. This project seeks to develop these approaches further.

The objective of this project was to investigate whether it is feasible to group PrWS together to reduce monitoring by sampling from a source which is representative of the water quality across a defined area. Limitations and risks of this approach along with potential cost savings have also been identified as part of this project.

Grouping criteria for PrWS were developed separately for surface and groundwater sources using delineations such as Water Framework Directive water bodies, bedrock geology and aquifer vulnerability. Criteria were grouped in two different ways, one simpler and the other more complex. The homogeneity of water quality within these zones, and differences between them, were then assessed using historical water quality data from PrWS in two trial LAs: Conwy and West Dorset.

Historical water quality data were interrogated using a number of methods to determine whether the source water quality was consistent for the conceptual zones. Summary statistics for the conceptual zones and determinands were produced but were not very useful in proving or disproving the hypothesis that the zones were consistent. Kruskal-Wallis tests for differences were used to determine whether the results from sample points within conceptual zones came from different distributions, however, it was found that there were not enough data per determinand per sample point to complete enough analyses over the LAs in order validate the conceptual zoning method.

For a limited number of conceptual zones and determinands evidence of homogeneity was found. These zones and determinands were taken forward to assess whether sampling rates could be reduced. If all the results for a conceptual zone and determinands were below 60% of the Prescribed Concentration or Value (PCV) then the number of sample points and the annual sampling rate was analysed. Based on this statistical approach, and taking account of risk, the annual cost savings by reducing sampling and/or individual analyses were found to be are negligible. Results indicated that savings would only be achieved in the laboratory as the sample points would still need to be visited to collect samples for other determinands.

While it would be possible to either modify the existing method to increase potential savings or even to develop a different method, it is unlikely that a statistically robust method could be developed that will make significant savings across the two trial LAs.

If further investigation of conceptual zoning approaches is to be followed up, it is recommended:

- The feasibility of defining zones is reassessed in 4 or 5 years' time when more data are available.
- That LAs with a higher density of PrWS are investigated to ensure that lack of data is less of an issue and that there is a greater probability of identifying potential savings.
- The method applied here excludes some of the historical water quality data for reasons including quality assurance and uncertainty over the source of the water. Undertaking some further work in liaison with the LA could resolve some of these issues and would allow more data to be used in the assessment.
- Consideration is given to alternative methods for PrWS zone definition; in particular, datadriven approaches as opposed to the conceptually driven approach that was the brief for this project.