



Network Water Quality

Asset resilience for future generations



wholesome water **customer acceptability**

The primary concern of the water industry is the protection of human health through the supply of water which is safe to drink. It is also important that the water be aesthetically acceptable to the customer. Any stage in the treatment, storage and supply of water may impact on the quality of the water received by the customer.

Our water quality and environmental scientists, process engineers and data science team are regularly called upon to work together to diagnose and recommend solutions to network water quality using a blend of engineering and scientific knowledge and data-driven analytical methods.

**Here we share some recent case studies
demonstrating our expertise.**

Managing Water Quality in Private Networks

The challenge: Our client wanted independent technical advice to bring a large combined residential, commercial and industrial site back into compliance, in the most cost effective manner.

The solution: As a precursor to recommending interventions we assessed data that reflects water quality in measureable terms (sample results, asset data, failure history, customer contacts) as well as understanding demand profiles and supply configuration. Key recommendations included increasing spatial coverage of sampling to improve visibility of network performance; implementation of sample recording system and spatial mapping, and implementation of systematic uni-directional mains flushing.

The outcome: The recommendations developed by WRc have enabled our client to reduce the risk of water quality failure, without increased capital expenditure, by changing operational procedures and improving network monitoring.



“ It has been an excellent piece of work which has provided us with the focus that this project needed in terms of network management. ”

Mitigating water quality risk at water storage reservoirs

The challenge: Poorly maintained potable water storage reservoirs provide an opportunity for bacteriological growth and locally enhanced disinfectant demand. This can lead to a lower than ideal disinfectant residual and hence a higher risk of non-wholesome water downstream at the customers' taps. However, it is not just ingress which may tip the risk balance: poor sampling practice and flawed design or operational factors may also contribute to compliance risk.

The solution: WRc has been working with four UK clients using a multidisciplinary approach to determine the relative importance of asset condition, operation, design and environmental factors in determining the dynamic risk state of each of their potable water storage reservoirs.

The outcome: We have combined our water quality, asset management and data science expertise to provide new insights into leading indicators of bacteriological non-compliance. These offer our clients a way forward to continue to mitigate compliance risk.



Water Safety Plan Advice and Consultancy

The challenge: Prior to the implementation of an IT solution, the client needed an independent review of its current WSP risk assessment process to enable it to be more evidence-driven and to improve the efficiency and sustainability of refreshing and maintaining the Plan.

The solution: Using our expertise in catchment management, treatment processes and distribution network water quality, we provided guidance and advice to stream-line the WSP process and recommend the most appropriate metrics and methods for assessing risks, for each stage of the WSP.

The outcome: We have recommended a consistent approach to eliciting and recording expert opinion, transposing quantitative risk assessment methodologies into the WSP, and redefined metrics for discolouration hazards in distribution systems, including potable water storage. WRc demonstrated the implementation of these key actions in an accessible format suitable for ingestion in the client's preferred IT solution.




**Water Safety Plans ensure
good drinking-water
supply practice is applied
from source to tap.**

Understanding discolouration using data-driven analytics

The challenge: Our client is experiencing a low level but persistent rate of discolouration contacts in some supply zones which are not easily attributed to any cause and not severe enough in any one area to warrant a major investigation. Cumulatively, however, these customer contacts present an ongoing challenge to overall water quality performance. The client needs to understand the reasons for these persistent contact rates such that intervention strategies can be modified to improve aesthetic water quality and thereby reduce the number of customers experiencing discoloured water in these areas.

The solution: New thinking and new techniques for data analytics combined with our understanding of aesthetic water quality in distribution networks has enabled us to take a data-driven engineering approach to identify a number of network features which are more strongly associated with discolouration contacts.

The outcome: Our client will be able to use these new insights to tailor operational interventions in specific areas to help reduce the number of customer contacts.



Despite significant improvements to drinking water quality since privatisation, water utilities are facing a greater challenge than ever before to reduce customer contacts related to discoloured water.

CFD modelling

The challenge: Diagnosing root cause of high profile water quality failures to avoid future recurrence

The solution: The versatility of CFD modelling allows us to diagnose problems with the hydrodynamics and water quality of all kinds of storage facilities. WRc has tackled raw and potable water reservoirs, contact tanks for disinfection, wet wells and combined sewer overflow chambers.

The outcome: Engineering solutions are proposed, modelled and verified for, in many cases, a fraction of the solution cost and with lower investment risk. From relatively simple problems of design, such as re-siting the inlet pipework to improve mixing, to modelling residence time to assess whether the required CT value can be achieved, CFD offers a cost-effective method of enquiry.





Challenges are best addressed when they are looked at from all angles.

Water quality from source to tap remains a challenge – how to remain world class for customers in a changing environmental, economic and regulatory landscape.

Our engineering knowledge and technical expertise in data-driven asset and catchment management analytics makes WRc ideally placed to help you meet your network water quality outcomes.

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