

Resilient Geotechnics: Water Management Strategies for Construction – 18 April 2023 – ICE London

To ensure that a civil engineering project is resilient to the many forces that impact on the project, meticulous planning is required to ensure that systems are in place to mitigate against such impacts.

This is particularly the case for projects that are exposed to the impact of water hazards, whether this be surface water flooding, or from the inundation of groundwater so causing slope failure, ground heave or soil liquefaction. Furthermore, because of ever more stringent legislation to safeguard the UK's water resources, the requirements for EA & SEPA Abstraction Licences & Discharge Permits can now cause significant delays to projects if such operations are not planned well ahead of time.

To illustrate the meticulous planning required to provide both technical and legislative resilience for a complex civil engineering project, an exemplar case study is used to illustrate such geo-resilience.

To mitigate flooding in the city of Rochdale, the UK Environment Agency is constructing large attenuation lagoons in the region of Littleborough. The construction of these lagoons required construction of a storm culvert beneath the Network Rail Calder Valley Railway Line, and required a 4-day rail blockade during which the track was removed, ground excavated, culvert installed and the railway line reinstated. A robust and resilient groundwater control system was required to ensure that the hydraulic head in underlying alluvium (clay, sand, gravel) was maintained below excavation formation level in advance of, and during, the 4-day blockade. The design had to consider the highly permeable geology, the conditions of the EA abstraction licence and discharge permit, whilst ensuring that any settlement of the railway line & embankment was within acceptable limits to Network Rail.



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Stephen Thomas is Founder Director of OGI Groundwater Specialists Ltd. Starting his Civil Engineering career in 1976, he has completed over 300 geotechnical, water & groundwater projects over 36 years working in the construction, water and environmental industries. Supported by 10 years of university education in Swansea, Durham and Oxford, Stephen delights in developing innovative solutions to overcome major engineering challenges. After three years working in the United States, then six years at Oxford University, Stephen founded OGI in 1989 to provide specialists services in the field of groundwater engineering and management. His projects have been delivered predominantly in the UK to the infrastructure industry, but he has also worked on many international projects, including his favourite of working for the Native American Navajo Tribe in New Mexico, defending their holy River Jemez from over abstraction of groundwater by industry. When asked what a Civil Engineer does, he replies "Building Civilisations." Outside work activities, Stephen has his hands full with three grandchildren, plus having completed 3 Ironman races, with 9 finishes for Great Britain in World and European Triathlon & Aquathlon Championships.