1. Award winning pilot plant drives sustainable water treatment solutions

Situation

The pilot plant scooped first place in the Institute of Water NI Innovation Awards 2020 and was one of six finalists in the UK-wide Institute of Water Innovation Awards. This innovation has also been recognised with a Green Apple award.

The pilot plant has revolutionised NI Water's approach to addressing raw water challenges and the identification of fit for purpose, innovative treatment technologies. Traditionally, water process analysis is carried out using jar test experiments. This approach doesn't incorporate the constant changes in natural organic matter within the raw water and only provides a very limited snapshot of the full treatment process at a given time. A new approach was essential for NI Water to identify the most sustainable and effective treatment options for abstracted raw water.

Action

NI Water has developed a pilot plant system that offers a robust, all-inclusive testing platform, specially designed to replicate the water process at any of our sites. It works offline of the main works and therefore cannot affect the water treatment process. It allows the rigorous testing of multiple carbon-based products, resins and coagulants simultaneously - using the same raw water source - to reduce Trihalomethanes (THMs) and pesticides (MCPA). Through real-time data collection and analysis, we can measure how effective and sustainable each process is before considering it as a permanent capital investment solution.

The Pilot Plant's forward-thinking flexible and modular design means that it can be easily adapted for any other NI Water site with only set-up costs incurred at each new site.

Results

The pilot plant system developed over several years and was initially established at the Derg water treatment works to investigate potential treatment processes. The picture shows Trevor Cousins (NI Water) and the filter media testing plant.

Through real-time analysis, the pilot plant was instrumental in identifying the most effective solution at Derg to maintain Drinking Water Inspectorate and NI Water Asset Standard compliance. In addition, it informed the design of the £10m capital works project at the WTW and allowed the design and contractor team to hit the ground running. The robust results achieved at Derg have demonstrated the economic, environmental and operational benefits of adopting this pilot plant technology.

In 2021 the pilot plant was moved to Ballinrees WTW and enhanced with the addition of automated testing. This has allowed us to carry out in-depth analysis of multiple treatment processes on a 24 hour, 7 days a week basis to determine the most cost-effective, sustainable solutions. Costs and carbon impacts are able to be reduced through 'right sizing'. Furthermore, the use of artificial intelligence (AI) at the Derg Pilot Plant will facilitate its incorporation in the major capital project and will feed the IOC.