Tackling drinking water discolouration across Wales

Case Study – Dŵr Cymu Welsh Water

An extensive programme to improve water quality for customers across Wales.

The issue

Dŵr Cymu Welsh Water has a huge network of water pipes, some 27,000 kilometres, which is one of the longest in the industry in proportion to the number of properties it serves. Wales has a dispersed population of 3.1 million people over a predominantly-rural area and as such requires an extensive network of water mains. A combination of soft water, manganese in water sources and a high proportion of iron mains, left the water company vulnerable to customer concerns about discolouration, odour and taste.

In AMP6, Welsh Water assessed the acceptability of water across all of their water distribution zones to evaluate risks in the network that cause discolouration of drinking water. They identified 38 priority zones and hundreds of kilometres of pipework that required cleaning or replacement.

The solution

Commencing in March 2017 and continuing through AMP6 and AMP7 to 2025, SUEZ has been carrying out Ice Pigging™ operations across Wales to help tackle the water discolouration issues. A parallel programme of mains replacement has also been undertaken.

Across the zones, 350km of pipes, including 52km of trunk mains and 298km of distribution mains, were ice pigged during AMP6 covering Anglesey, Pembrokeshire and Herefordshire.

Dŵr Cymru Welsh Water

350km OF PIPE WORK CLEANED

Including

52km OF TRUNK MAINS

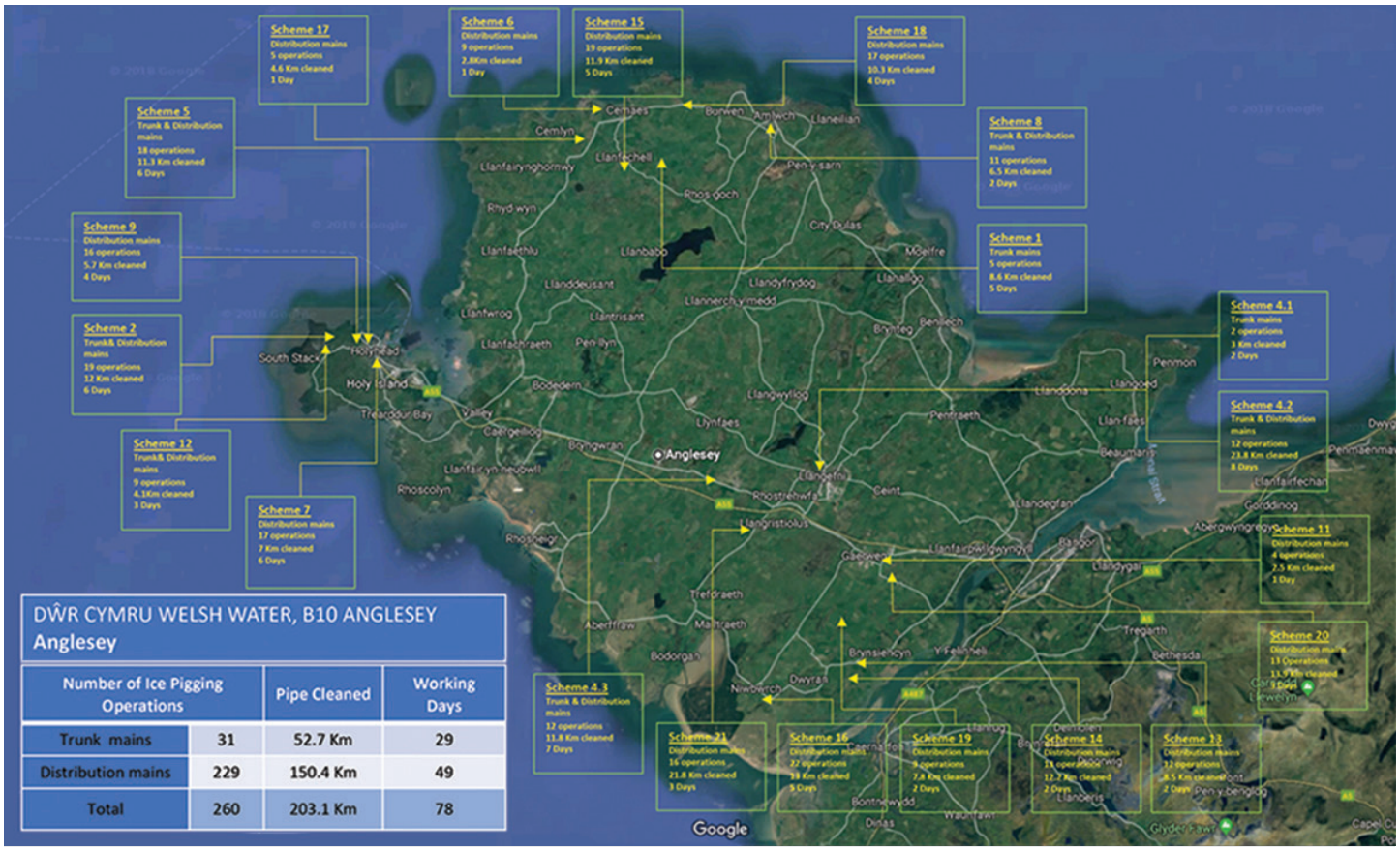
Results table

Measures of success		
✓	**Speed of Operation**	Very Fast: Average cleaning time of 6 mins 50 secs per 100m of pipe cleaned
✓	**Customer Disruption**	Minimal enabling works, reducing customer disruption and operational costs
✓	**Customer Contacts**	Significant decrease in customer contacts regarding water quality
✓	**Turbidity**	Considerable improvements in turbidity between pre and post ice pigging readings
✓	**Sediment Removed**	Average volume of sediment removed from trunk mains was 74.03kg per km
✓	**Distance Cleaned**	350Km, including 52Km of trunk mains and 298Km of distribution mains
✓	**Health & Safety**	High standards of health and safety maintained and confirmed through regular operational audits. No H&S incidents.

suez

Tackling drinking water discolouration across Wales

Case Study – Dŵr Cymu Welsh Water



DŴR CYMRU WELSH WATER, B10 ANGLESEY
Anglesey

Number of Ice Pigging Operations		Pipe Cleaned	Working Days
Trunk mains	31	52.7 Km	29
Distribution mains	229	150.4 Km	49
Total	260	203.1 Km	78

How it works

Ice Pigging™ is a pipeline cleaning process utilising a two-phase ice and liquid slurry which forms a semi-solid plug within the pipe known as the ice pig. The ice slurry, comprised of very small ice crystals, is pushed through the section of pipe under pressure to carry out the cleaning process. The slurry is pumped into a pipe like a liquid but moves through the pipework like a solid plug, detaching contaminants and fouling from the pipe wall and carrying them out of the pipe entrained within the ice pig.

Ice Pigging™ has the benefits of solid conventional pigging, but without any of the associated hazards; the ice pig can flow like a liquid through obstructions such as changes in diameter and valves, and it can be inserted and ejected from the pipe using small diameter fittings. In the unlikely event of an ice pig becoming stuck it can be left to melt and flushed out after a few hours.

The process can be undertaken on all pipe materials, on diameters up to 600mm, and on lengths of several kilometres. Ice Pigging™ cleans in a single pass, so is incredibly fast and water efficient. It does not require any harmful chemicals.

Differentiating factors

The adaptable nature of the ice pig means it is easy to apply to a wide variety of network with minimal effort and very few enabling works.

The quality of clean is significantly higher (up to 1000 times cleaner) than can be achieved by water flushing alone; moreover, the Ice Pigging™ technique carries none of the risks associated with more invasive processes such as swabbing or jetting.

With Ice Pigging™, long and complicated sections of pipe can be cleaned quickly in a single pass, which dramatically reduces both customer disruption and water use. This made it ideal for the requirements of Dŵr Cymu Welsh Water in this project.

Tackling drinking water discolouration across Wales

Case Study – Dŵr Cymu Welsh Water

Implementation

The SUEZ operational experts work closely with the client's designers and network specialists to create a comprehensive cleaning plan. This involves establishing how the networks can be split, advising on the key criteria for Ice Pigging™ and conducting viability surveys before developing the programme methods and timings.

Onsite, there is a five step process

- **Step 1: Isolate the main**
  The main is isolated by closing valves upstream and downstream of the section to be cleaned.
- **Step 2: Insert the ice**
  The ice slurry is pumped into the pipe via a fire hydrant or similar fitting. A 'pig' of ice is formed, with the displaced water discharged at the outlet fitting.
- **Step 3: Open upstream valve**
  The ice is pushed along the pipe using the natural pressure in the network. To do this, the upstream valve is opened and flow at the outlet hydrant is used to control the speed of the ice. As the ice flows through the pipe it passes over every surface and collects sediment or wipes biofilm as it passes.
- **Step 4: Collect ice pig**
  Water in front of the pig is discharged normally. Temperature at the outlet point warns of the arrival of the ice, which allows the sediment laden ice to be collected separately in a tanker if desired.
- **Step 5: Flush and return to service**
  The pipe is then flushed to the appropriate standard and promptly returned to service.

All operations are carefully monitored in real-time by our specialist engineers using our Flow Analysis System.

The future

This programme of mains cleaning with Ice Pigging™, combined with mains replacement where necessary, has been a highly successful and continues through AMP7 in other zones.

About Welsh Water

Dŵr Cymru Welsh Water is a not-for-profit company which supplies drinking water and wastewater services to most of Wales and parts of western England that border Wales.

About SUEZ

Since the end of the 19th century, SUEZ has built expertise aimed at helping people to constantly improve their quality of life by protecting their health and supporting economic growth. With an active presence on five continents, SUEZ and its 90,000 employees strive to preserve our environment's natural capital: water, soil, and air. SUEZ provides innovative and resilient solutions in water management, waste recovery, site remediation and air treatment, optimising municipalities' and industries' resource management through 'smart cities' and improving their environmental and economic performance. The Group delivers sanitation services to 64 million people and produces 7.1 billion m3 of drinking water. SUEZ is also a contributor to economic growth, with more than 200,000 jobs created directly and indirectly on an annual basis, and a provider of new resources, with 4.2 million tons of secondary raw materials produced. By 2030, the Group is targeting 100% sustainable solutions, with a positive impact on our environment, health and climate.

For more information

Please contact: Nick Haskins, Business Development Manager, SUEZ
Email: nick.haskins@suez.com
Mobile: +44 (0) 7767 675295

> **The SUEZ Ice Pigging™ team, in partnership with Dŵr Cymru Welsh Water and Morrison Water Services, were proud to deliver this extensive cleaning programme and achieve such significant customer improvements.**
>
> – Nick Haskins, Business Development Manager, SUEZ

SUEZ Smart & Environmental Solutions Severnside Energy Recovery Centre, Severn Road, Hallen, Bristol, BS10 7SP

Phone: +44 (0) 1454 804040 Twitter: @IcePigging
www.suez.co.uk