Ice Pigging™ Wastewater Pipe Flow Improvements

Case Study: Wessex Water

Increasing flow rates in small diameter rising sewers.

The issue

Wessex Water approached SUEZ to carry out Ice Pigging™ at three Sewage Pumping Station (SPS) sites where suspected build-up of deposits in the rising main had been causing low flow rates. Each rising main was small in diameter, at DN50 or below.

Due to the small diameters, very few options are available for cleaning the entire length of the main. At some locations a vacuum tanker had been attached to alternately vacuum and flush a short section of the pipe, but any improvement gained had been temporary.

The solution

Ice Pigging™ was applied at all sites without requiring any permanent enabling works. Ice insertions took place via an existing Bauer connection or by adapting a fitting at the SPS. An Air Valve at the half-way point of Site 2 was utilised as a breakpoint, though it would also have been possible to clean the entire section in a single operation.

The results

Pre and post Ice Pigging™ flow readings were provided by Wessex Waters on site flow meters. Significant improvements were seen at all sites, both in terms of overall max flows and the average Dry Weather Flow (DWF). At Site 3 Ice Pigging™ activities coincided with pump improvements, so it is not possible to say how much of the improvement can be attributed to each task, however at Site 1 and 2 Ice Pigging™ was the only activity undertaken.

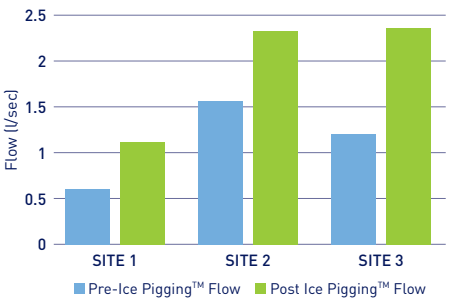
At Site 2 and 3, the in-situ pumps were used to push the ice pigs, therefore the downtime on each pipe was just a few minutes to insert each pig. At Site 1 the wet well pumps were insufficiently rated, so a mobile booster pump was used to boost the sites mains water supply.

Wessex Water
YTL GROUP

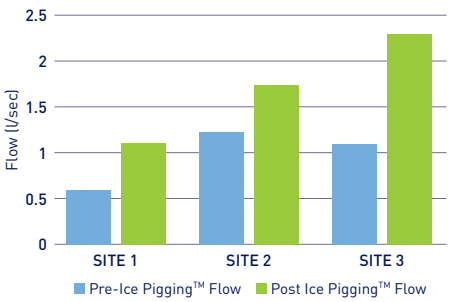
AVERAGE DRY WEATHER FLOW INCREASE POST ICE PIGGING™ OF

80%

Pre and Post Ice Pigging™ (Max Flow)



Pre and Post Ice Pigging™ avg DWF



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How it works

Ice Pigging™ is a pipeline cleaning process utilising a two-phase ice slurry which forms a semi-solid 'pig' within the pipe. The slurry is pumped into the main like a liquid, but when moving through the pipework it behaves like a solid material; detatching contaminants and fouling from the pipe wall and carrying them out of the pipe entrained within the ice pig.

The pig is pushed through the section at the network operating pressure, so the rising main is under no additional stress.

The process can be undertaken on all pipe materials, at diameters of up to 600mm and on sections several kilometers in length. Ice Pigging™ is fast, effective and incredibly low risk – in the unlikely event of the ice pig becoming stuck it can be allowed to melt and flushed out.

Differentiating factors

- Ice Pigging™ has the benefits of conventional pigging, but without any of the associated hazards
- The ice pig is inserted and ejected using exiting existing fittings on the pipework
- The ice pig can flow through complex pipework such as bends, changes in diameter and butterfly valves
- In most cases the wet-well pumps are used to push the ice pig, so the downtime on the pipe is minimal
- In the unlikely event of becoming stuck, the ice can be left to melt.

> **"We were really pleased with the results of these operations; the flow increases at each site means that we no longer need to run tankers from these stations during bad weather. We are sure that this technique will be useful at a number of our other sites.**
>
> – Ashley Pratt, Wessex Water

Results table

Location	DN (mm)	Length (m)	Start Max Flow (l/sec)	End Max Flow (l/sec)	% Improv Max Flow	Start avg DWF (l/sec)	End avg DWF (l/sec)	% Improv avg DWF
Site 1	40	580	0.6	1.13	88%	0.59	1.11	88%
Site 2	50	1400	1.57	2.34	49%	1.23	1.74	41%
Site 3	40	930	1.2	2.37	98%	1.09	2.3	111%

The future

Ice Pigging™ has proven to be very effective at improving flow rates on small diameter rising sewer mains. Because the process generally requires no enabling works, this could be a very useful tool for the operators of rising sewer mains that are struggling to reach their discharge consents.

About Wessex Water

The Wessex Water region has many of the country's finest rivers and streams and the company is focused on partnering with other stakeholders in continuing to protect and improve their condition. Wessex Water is a long-term business that plans, innovates and invests for future resilience.

About SUEZ

A world leader in water and waste management for 160 years. SUEZ operates on five continents, on which SUEZ harnesses all its desire for innovation to achieve a smart and sustainable management of resources throughout the world. SUEZ works with its customers to restore and conserve the planet's fundamental elements: water, air and soil. SUEZ Smart & Environmental Solutions Business Unit aims to accelerate the development and deployment of smart environmental solutions on a global scale.

For more information

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