As part of a £58 million investment programme to enhance United Utilities' Fleetwood wastewater treatment plant on the Fylde coast, an adjacent brownfield site was purchased to extend the existing works.

However, the bearing capacity of this former landfill site was so low that contractors KMI+ turned to iron technology leader Saint-Gobain PAM UK to provide an anchorage solution for the pipes which avoided the use of massive thrust blocks and concrete piles.

All pressure pipelines are subject to thrust forces whenever they change direction and particularly at bends, tees, blank ends and valves. It is at these points that some form of restraint is essential.

Traditionally, for socket and spigot pipelines, this anchorage has been provided by concrete thrust blocks. This can be challenging in areas where space is limited, the underground environment is busy or, as in the case of the Fleetwood site, the surrounding soil is unstable.

The Fleetwood plant is designed to treat almost 200 million litres of waste water per day, so large pipes up to 1600mm diameter were required to transport the flows. Pipes of this size are subject to huge operating pressures. For example, a 1600mm diameter pipe operating at 1 bar (10m head) would exert a static thrust of 309kN at a 90° bend.

According to Simon Meredith, sub-agent from KMI+, a thrust block large enough to resist forces such as this would require concrete piles to hold it into position, otherwise it would sink and potentially damage the pipeline. "Because all structures at the new site would have required 20m long concrete continuous flight auger (CFA) pile foundations to reach adequate bearing strata, we approached Saint-Gobain PAM UK to provide a self-anchoring system."

Lorraine Parrott of Saint-Gobain PAM UK explained: "We used a specially designed software package to determine which joints required anchoring based on factors such as diameter, fitting type, proposed operating pressure and depth of cover. The result was an innovative, high performance anchoring system, comprising a range of Saint-Gobain PAM anchor gaskets, mechanical anchors and PAMLOCK joints, which was quick and easy to install. In addition we

carried out a soil resistivity test to ascertain the level of outer protection required on the pipework. This enabled the pipes to be delivered pre-wrapped to reduce work on site."

For further information visit www.saint-gobain-pam.co.uk/water-press.