

FAST AND SAFE

Aquaspira supplied prefabricated, multi-leg composite steel reinforce tanks to a housing development in Scotland, saving time on site and ensuring long term performance.

As part of the infrastructure required to enable a major new development for Bellway Homes at Broxden, on the outskirts of Perth, the consulting engineers for the project, Dougal Baillie Associates (DBA) were tasked with providing substantial additional storage capacity within the local Scottish Water sewer network at two separate locations.

The initial concept designs were based on traditional concrete tank structures which, until recently, had been the conventional method of design approved by the water company.

One of the challenges of the project was that both sites are located in areas with significant constraints, in terms of space, shape, access for heavy plant and delivery of materials. The only access to one of the sites is via narrow residential streets. The other is surrounded on all three sides by two active highways, a traffic junction, and an adjacent watercourse.

On reviewing the initial design

concepts with the developer, the civil engineering contractor, Tough Construction identified a series of issues concerning the physical construction of large concrete underground tanks in both locations and the inevitable disruption to local residents and traffic.

The contractor had recently utilised AquaSpira Composite Steel Reinforced (CSR) large diameter pipes in place of conventional concrete pipes on a number of housing developments and approached AquaSpira with a view to assessing the potential for providing an alternative solution that would minimise deliveries, plant requirements, time and disruption to local residents and traffic.

The contractor was aware of the fact that AquaSpira is primary supplier of large diameter pipes and tanks to Scottish Water Capital Projects, and assumed that this would assist in the process of gaining approval for adoption with Scottish Water Development Operations.

The design proposal for Tank 1 at Darnall consisted of seven parallel runs of 1650mm diameter pipes, connected at the downstream end by a single seven



port manifold. The inlet pipe connects into the upstream end of the first pipe only, which effectively converts the first pipe into the primary, combined carrier and storage pipe, with the remaining six pipes functioning as secondary storage pipes at times of peak discharge.

A key criterion was to ensure that once the project commenced, the risk of delays to the programme were minimised. A further complication was the fact that the site investigation report had identified ground water, which meant that tanks with insitu welded joints could not be used.

The manifold and pipes on the AquaSpira system are supplied with spigot and socket, push fit joints with integral ring-seals, enabling them to be installed in trenches where groundwater may be present. Once connected, a high performance, watertight joint is formed with no requirement for internal



welding in confined spaces, or fitting large external couplings.

To maximise long-term performance and durability, particularly at the fabricated weld seams, the manifold was manufactured as a single unit from robust, stainless steel material.

Tough Construction project manager Craig Lavery commented: "On arrival at site, the unit was safely offloaded and placed into position with a standard excavator.

"Once in place, we immediately commenced the systematic process of laying the pipes, working away from the manifold, and progressively backfilling, which in turn kept the size of the excavation, and the arisings from the excavation to a minimum at any given time during the installation."

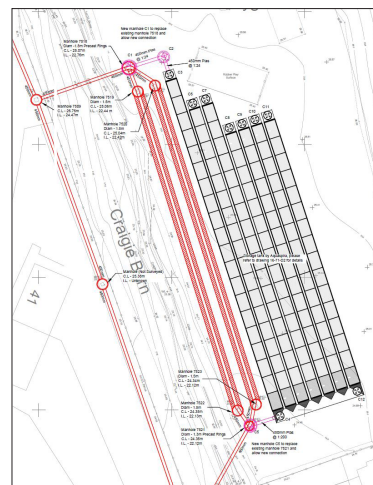
This is the first tank of this type to be approved and adopted by Scottish Water and Martin Faulds, its water and

Above: Pipes safely pushed home with innovative jointing frame

Top right: Robust manifold easily lifted into position

Bottom left: Manifold quickly set to line and level

Bottom right: Simple, concise layout of new storage tank



waste water standards and specifications manager, visited the site when work began to see the tank components first-hand and observe the start of the installation.

"This has to be the way forward," he said, "utilising high quality, prefabricated units, produced off-site in a quality-controlled factory environment, greatly

reduces the risk of problems emanating from concrete chambers constructed on site. The layout is much simpler and more efficient too, with thought given at the design stage towards minimising the risk of blockage, and providing complete, but not excessive, access for future inspection and maintenance."

Work on site for Tank 2 at Cherrybank, Broxden is scheduled to start in January 2019. While still connecting into a single four port manifold at the downstream end, each leg of the tank is different in length, designed to precisely match the tapered shape of the location.

Since completion of the first tank in January 2018, several have been designed and successfully installed for similar applications, clearly marking this as "the way forward" in terms of design optimization, programme reduction and minimising disruption to local residents and traffic.

A key criterion was to ensure that once the project commenced, the risk of delays to the programme were minimise