

Hempstead Lane Gloucester

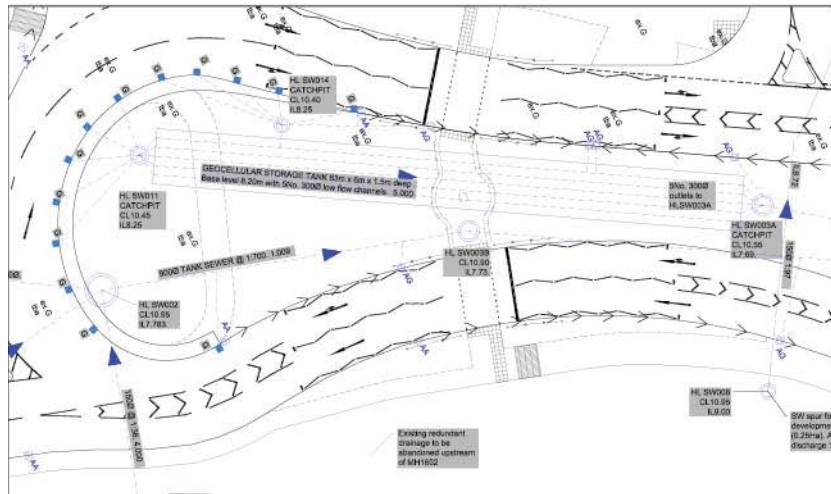
Type of System: Stormwater Attenuation

Date of installation: March 2009

Tank size: 568m³

Site Problem:

A newly implemented road infrastructure on Hempstead Lane in Gloucester had been subjected to frequent flooding problems over the prior three years. A solution was needed to help alleviate flood risks around the local vicinity that would allow traffic to continue moving during heavy storm events and prevent flood damage to surrounding properties.



Project Requirements:

The tank was to be located between the two main carriageways of Hempstead Lane. An existing gas main and sewer pipe were located on the proposed site and a solution had to be found that would accommodate these. This meant that on top of dealing with the usual stormwater requirements, there was also need to consider structural loading from the surrounding road traffic and the need to accommodate a broken site. Furthermore the scheme was to be adopted by both the local authority and the Highways Agency who had specified requirements for inspection and maintenance access points as well as various other requirements for the supply of appropriate test data.



VersaVoid

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ESS Solution:

ESS specified a modular VersaVoid tank with a void ratio of 95%. At 568m³, this provided approximately 540m³ storage capacity for excess stormwater runoff from the surrounding roads.

The 320kN/m² loading strength provided by each module gave the tank the required structural stability to cope with loading from above. The 120kN/m² lateral strength provided the same capability horizontally allowing the tank to cope with any side loading that may be induced from traffic flows either side of the tank.

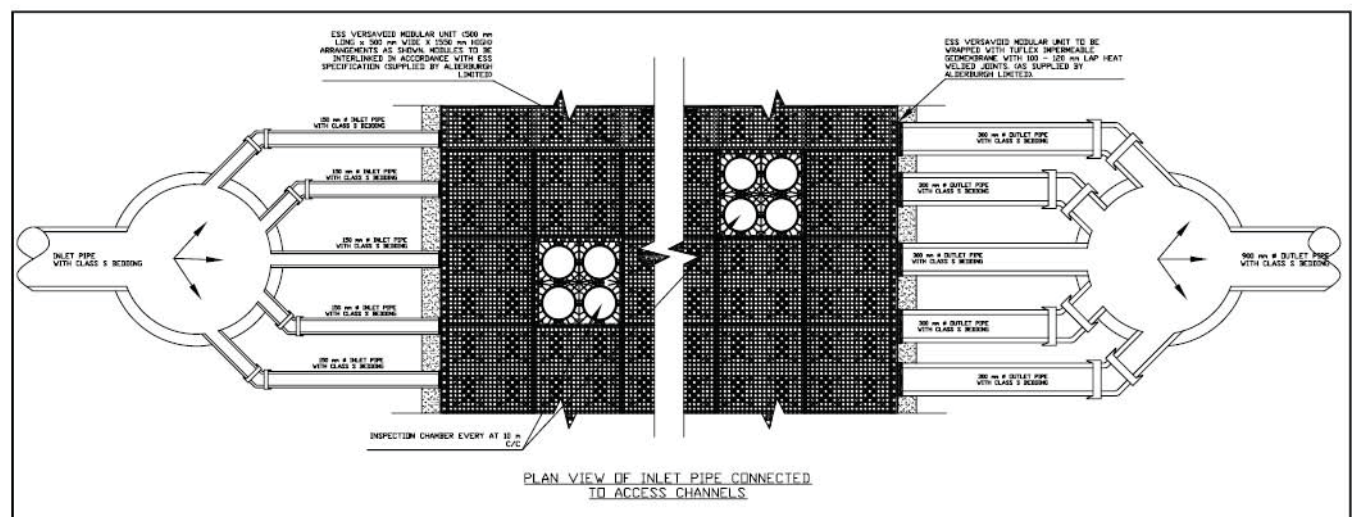
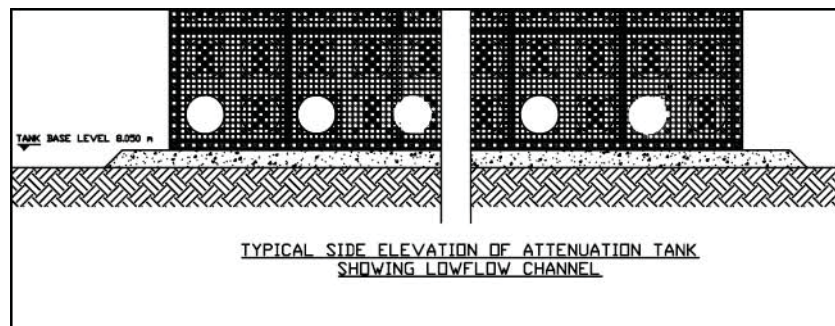
Unlike other proposed crate systems, VersaVoid's modular construction provided the required flexibility to accommodate for the gas main and 150mm sewer pipe that intersected the installation site. VersaVoid's unique clipping configuration meant an unorthodox tank shape could be created which utilised a U-section cut-out for the gas main and sewer pipe to safely pass through without intersecting the tank.

Other additions included 5 low flow channels as well as 600mmØ inspection units above the tank (for maintenance and inspection) at 10m centres.



Once installed, the tank is wrapped in a watertight, heat-welded Tuflex lining which is further protected within a Geotex 300PP Protection Fleece. All inspection chambers and outlets are wrapped in preformed Tuflex cloaks and heat welded to the tank lining.

5 low flow channels connected 5 150mm inlets to 5 300mm outlets.



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Special Considerations: The U-Section

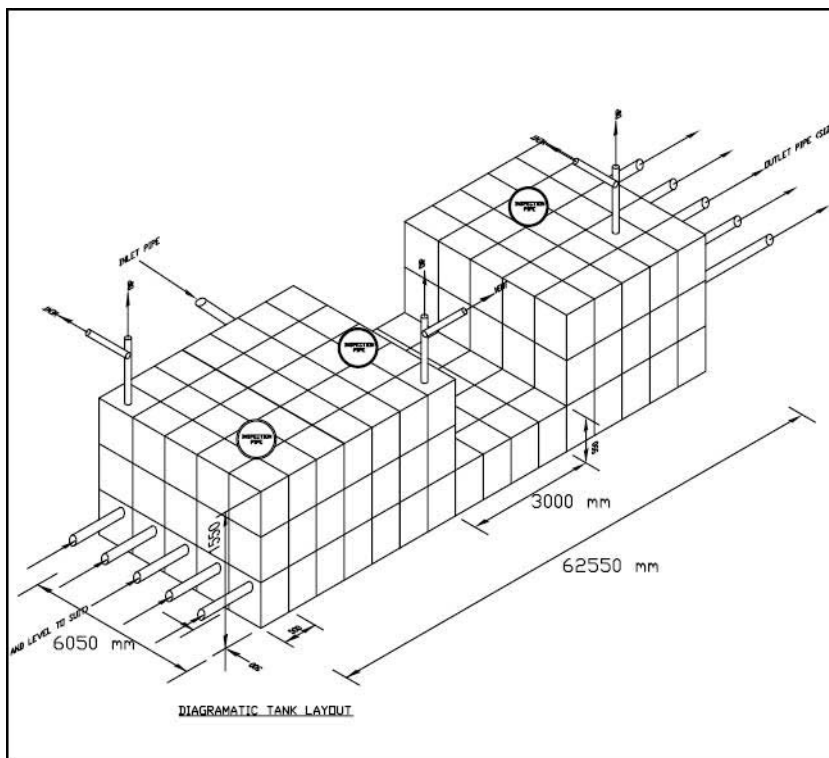
Square Tank

Configuration : 60.55m x 6.05m x 1.55m
: 568m³

Site Configuration : 62.55m x 6.05m x 1.55m
: 586m³

U-Section : 3m x 6.05m x 1m
: 18m³

Total : 568m³



Removing the U-section from the middle of the tank provided the most practical means of dealing with existing gas mains and sewer pipes. The original volume lost to the U-section (above) was easily replaced by extending the length of the tank by just 2m. Due to VersaVoid's unique interlocking structure and inherent modular flexibility this was not a challenge and needed very little extra design work, keeping costs low and pleasing all parties involved.

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Specialist Considerations: Loading Compliance

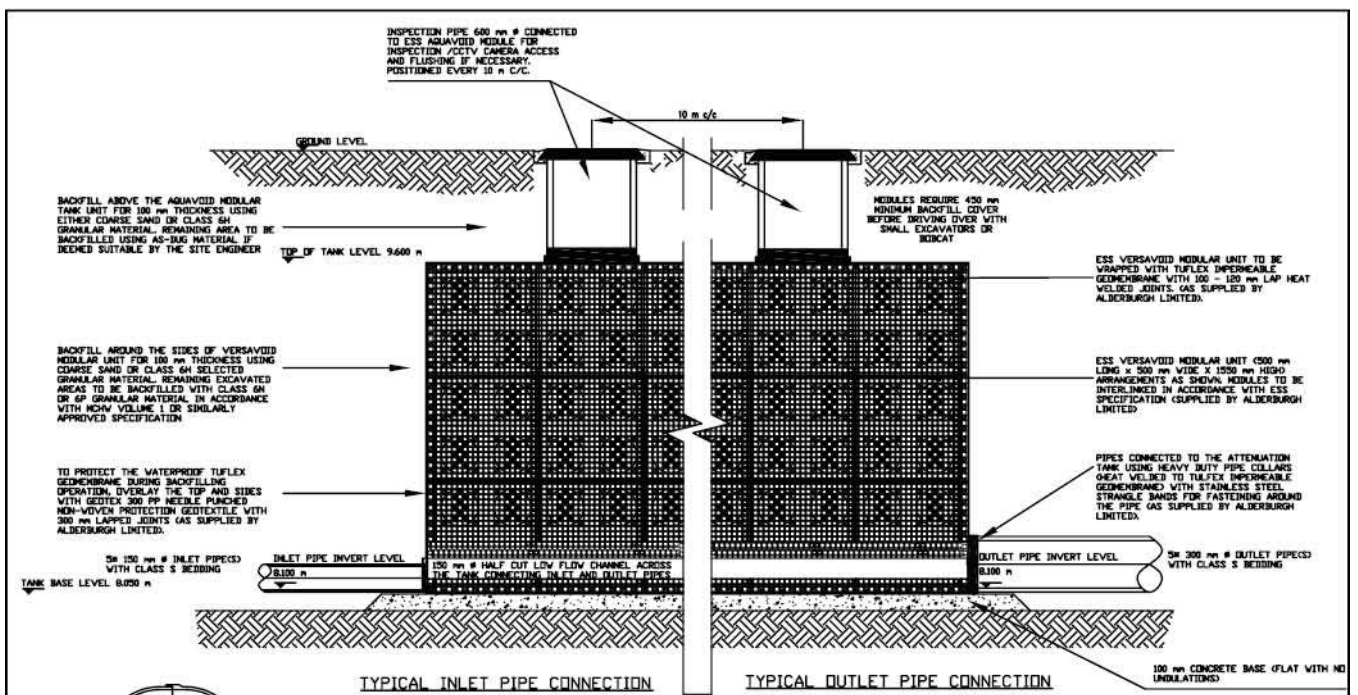
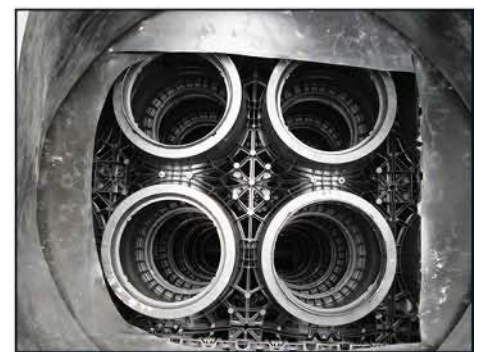
Due to VersaVoid being independently tested according to CIRIA guidelines (and by two separate institutions), ESS were able to provide all of the specified test data. The information provided complied to all the necessary documentation such as CIRIA C680, 609 and 697. All tests (including compressive strength, lateral strength and long term creep tests) complied to CIRIA guidelines as outlined in CIRIA C697 and following defined methodology outlined in C680. On top of this, ESS supplied its own in-house test data.



The installed top cover was just 900mm

Specialist Considerations: Access

The Highways Agency had specified for access as a main priority of the installation. VersaVoid's unique, open and accessible structure was immediately able to provide total access with the addition of a few external access points. For vertical access ESS suggested inspection units



to be installed at 10m centres above the tank, allowing safe access that did not interfere with the heavy traffic flows either side of the traffic island. For horizontal access manholes were installed at either end of the tank above the inlet/outlet chambers (which connected to the low flow channels along the length of the tank). This provided complete access throughout the tank for any future maintenance/inspection to be carried out.



Preformed Tuflex cloaks are heat welded to inspection chamber openings.

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Summary:

- VersaVoid provided a design that met all of the stringent requirements set by the local authority and the Highways Agency including CIRIA requirements for both loading and access.
- Modular configuration allowed for a flexible, ideal site solution that worked with other existing infrastructure both above and below ground level. The modular assembly further reduced installation times allowing a much more economical solution to be found.
- Load bearing capabilities and high void ratios provided the most efficient solution for a restricted site with loading issues.

