

Hempsted Lane,
Gloucester

Type of System: Stormwater Attenuation

Date of installation: March 2009

Tank size: 567.81m³

Site Problem:

A newly implemented road infrastructure in Gloucestershire had been subject to many flooding problems in the previous three years, so a solution to alleviate the flood risk from the surrounding areas needed to be found.

Furthermore, a gas main and a 150mm sewer pipe ran across the site so an irregular shaped tank would be needed in order to avoid these.

Project Requirements:

The engineer required that the attenuation tank be of a significant enough size to reduce the flood risk in the area. The tank was to be placed in between the two carriageways on Hempsted Lane, which meant the attenuation system needed a high load bearing capacity to cope with the surrounding road traffic.

The project was adopted by the local authority and the Highways Agency, who specified requirements for inspection and maintenance points.



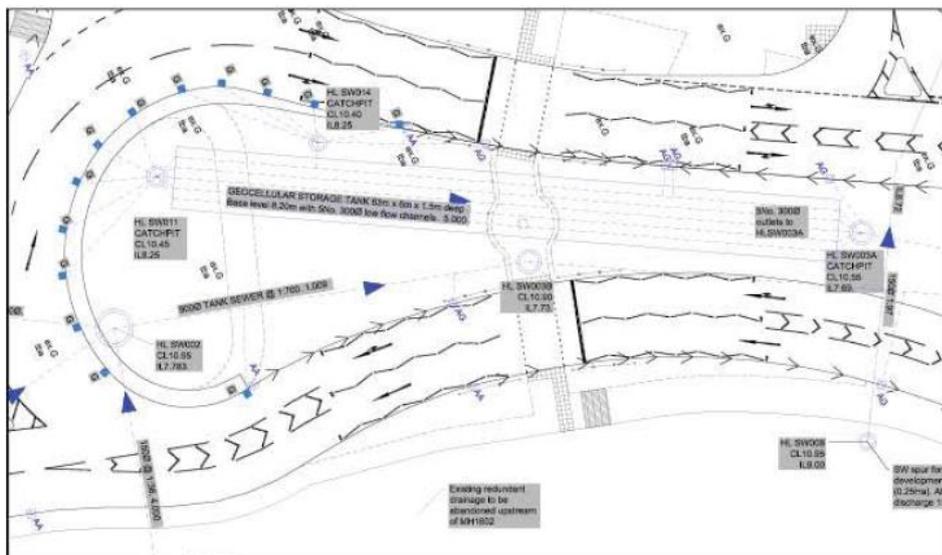
VERSAVOID

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ESS Solution:

ESS proposed a modular VersaVoid tank with a void ratio of 96%. At 567.81m³, this provided approximately 545.1m³ of water storage for excess stormwater runoff from the surrounding roads.

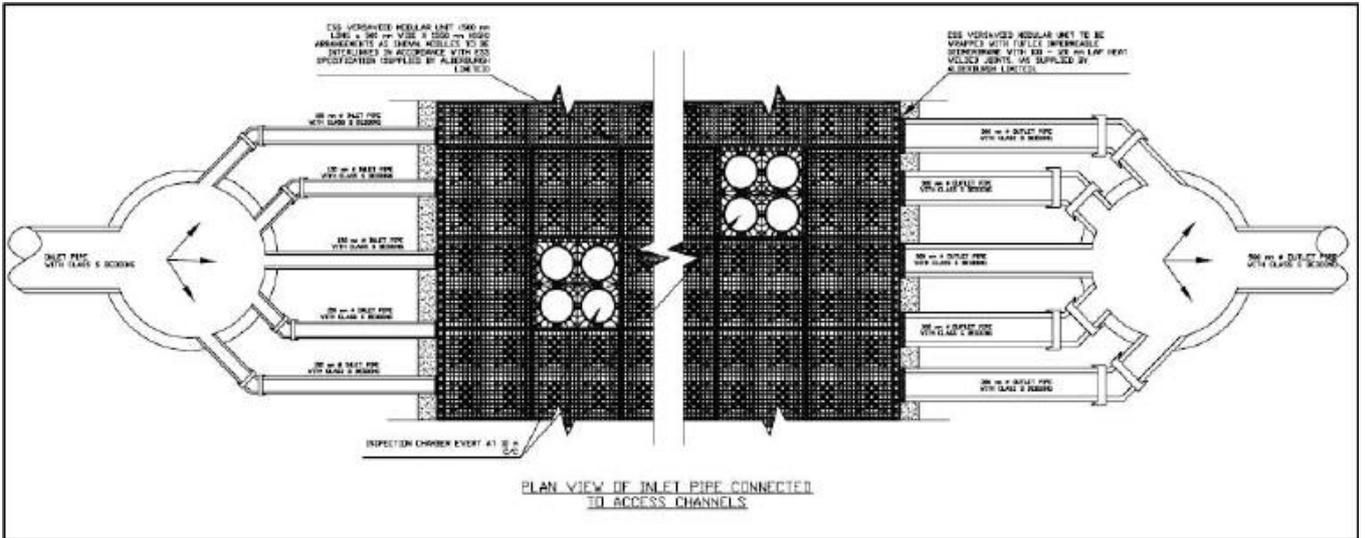
VersaVoid was specified by ESS because of the superb compressive strength they have as a unit. The loading strength of 320kN/m² provided by each module gave the tank the required structural stability to cope comfortably with loading from above. The lateral strength of 120kN/m² provided the same capability horizontally allowing the tank to cope with any side loading. Tuflex waterproof liner and a Geotex 300PP protection mat were also supplied by ESS to ensure a full and correct installation of the modules.

Another advantage to using VersaVoid was that its modular construction meant an irregular tank shape could be formed in order to avoid the gas main and 150mm sewer pipe that ran through the site. The unique clipping configuration of the VersaVoid system meant a U-section was formed by the tank, so the gas main and sewer pipe could safely pass through.

600mm diameter inspection units were provided on top of the tank in line with the requirements of the local authority and Highways Agency. Five low flow channels were also provided through the tank to connect five 150mm inlets to five 300m outlets.



Five low flow channels connecting 150mm inlets to 300m outlets





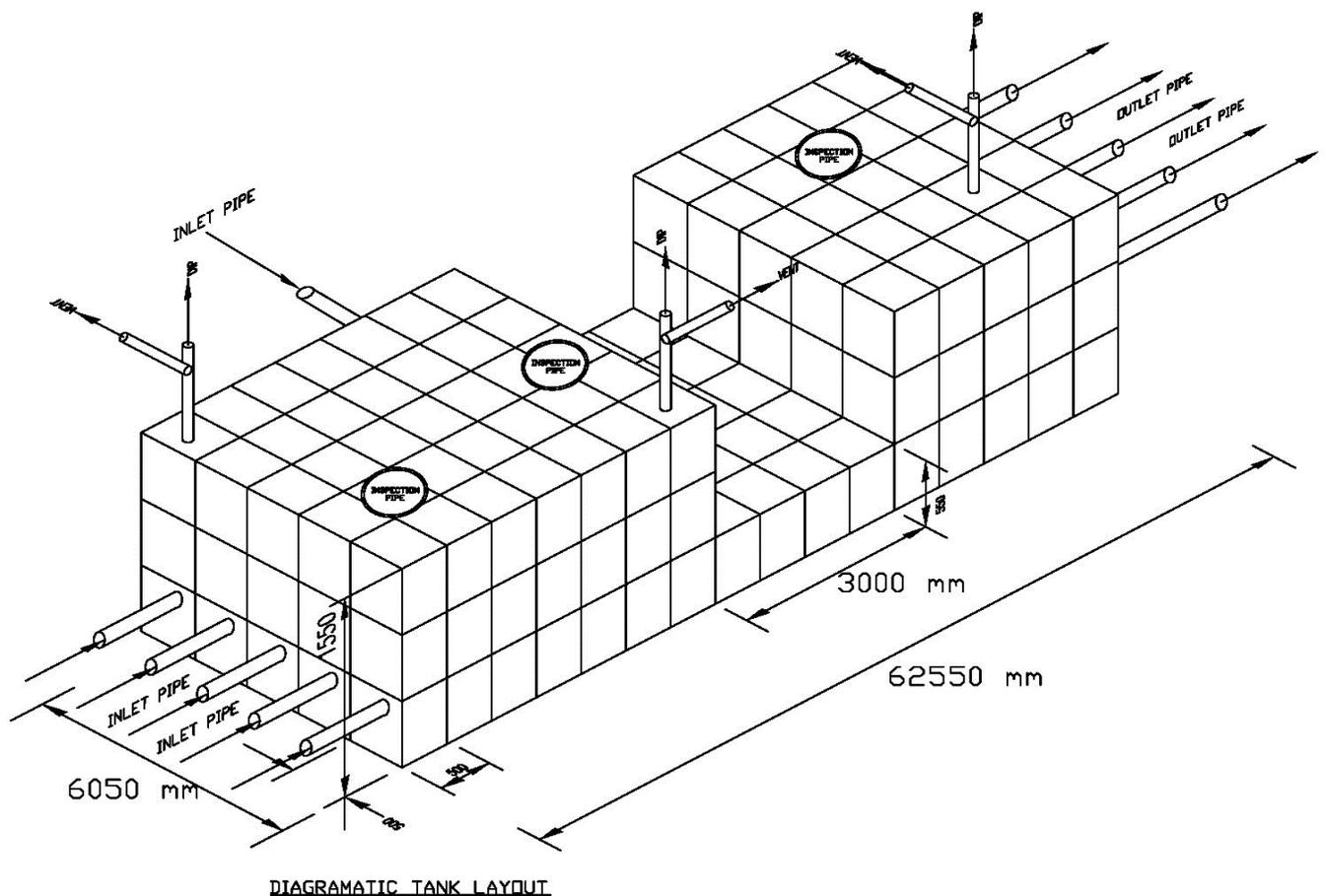
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Special Considerations: Tank

Tank Configuration: 60.55m x 6.05m x 1.55m
= **567.81m³**

Site Configuration: 62.55m x 6.05m x 1.55m
= **586.56m³**

U-Section: 3m x 6.05m x 1m
= **18.15m³**



VersaVoid's modular construction enabled a U-section to be formed in the tank, allowing the gas main and sewer pipe to pass through safely



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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 with all the necessary documentation such as CIRIA C680, 609 and 697. All tests (including compressive strength, lateral strength and long term creep tests) complied with 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.



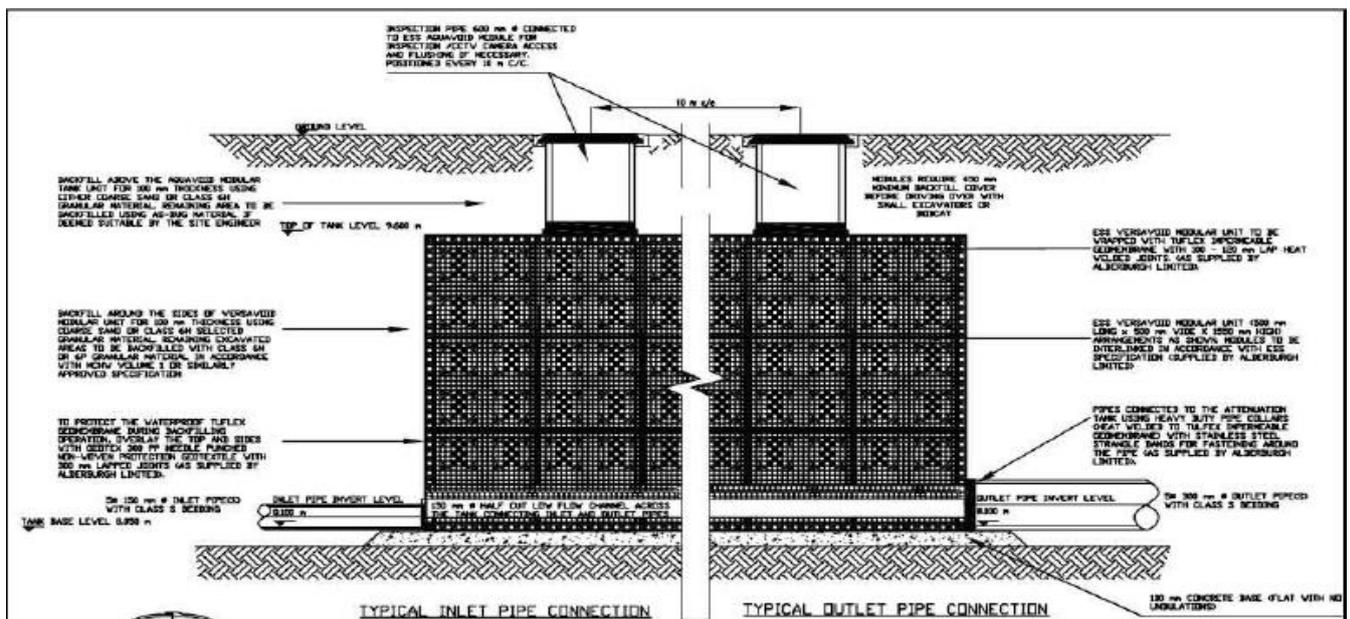
Only 900mm of cover on top

Specialist Considerations: Access

The local authority and Highways Agency specified that access to the tank was the main priority. VersaVoid's total accessibility meant that there was access to all parts of the tank for inspection and maintenance. 600mm diameter inspection units were fitted at 10m centres to the top of the tank to enable vertical access. Horizontal access was achieved by installing manifold manholes at either end of the tank above the inlet and outlet tanks, which connected the low flow channels along the length of the tank.



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 around an existing gas main and sewer pipe to ensure they were unaffected. The modular assembly further reduced installation times allowing a much more economical solution to be found.
- The high void ratio of VersaVoid provided an ideal solution to the many flooding problems in the area over recent years.
- The load bearing capabilities of the VersaVoid meant the Highways Agency were happy to approve the product due to both the vertical and horizontal loading capabilities.

