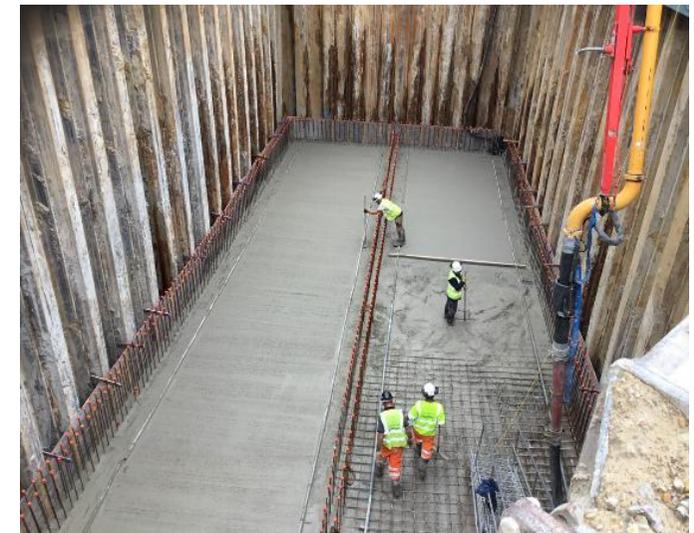


Case Study – Complex Foul and Surface Water Drainage Solutions



Global Pharmaceutical Company Worldwide Headquarters

SKANSKA

'Complex civil engineering solutions delivered within challenging site conditions'



Spotlight on Drainage

This world-class global pharmaceutical headquarters, research & development centre is located in the heart of the Cambridge Biomedical Campus.

Following a comprehensive, competitive tender process, MPH exceeded the client's expectations and provided assurance by offering a wide range of expertise to cover the **external civils works packages** and implementing proven solutions to deliver this exceptionally challenging and complex project.

Included within the main external civils scope were several specialist activities:

- Foul Pumping Station
- Several Rainwater Harvesting Tanks
- Site Wide Storm Water Attenuation Tanks
- Interconnecting drainage pipelines and drainage collection infrastructure



Our Approach

Forming part of the wider civils works packages, we constructed a foul water storage and pumping station with associated turrets, M&E piping and pumps.

The Challenges:

- The pumping station was an underground facility constructed inside a sheet piled retaining wall protecting an excavation chamber 9m deep x 10m wide x 32m long. The two GRP tanks were 26m long, each with a capacity of 250,000 litres.
- We were instrumental in working closely with the client and engineers to overcome constructability issues. We successfully maintained the integrity of the fragile GRP tanks, which are often at risk of collapse, through staged and balanced backfilling techniques. Careful backfilling also mitigated the risk of tank buoyancy. Additionally, we could not use support struts which is very uncommon on retained excavations of this size and loading profile. Groundwater management below the water table in sand was also a huge challenge.

Our Solutions:

- The geometry of the excavation and the size of the tanks prevented the use of cross bracing; therefore, we utilised a Mabey Supershaft System to push the boundaries of the application – the sheet piles were continuously surveyed to record any movement. Meticulous planning to situate the excavators was needed to avoid unnecessary surcharging of the excavation perimeter.
- Due to the size of the tanks, we used 50t of steel reinforcement to strengthen and tie together phased concreting of the backfill ballast, and we expertly planned and executed the method to avoid any collapse. This mitigated significant risks to time and cost. In addition, this construction process helped to alleviate other potential issues, such as temperature gradients leading to thermal cracking.



Challenges & Solutions

The Challenge:

- The site was based on the border of the Fens, an area notorious for lowland flooding. A highwater table at the site required design changes and remedial work.

Our Solution:

- The excavation was undertaken in sand and gravel and considerable groundwater had to be drained 24/7. We introduced a revolutionary pumping system, in conjunction with a perimeter cut off collection regime, to filter silt laden groundwater prior to returning to the local watercourses. The system monitored water quality continuously and included pre-determined alarm parameter settings.



The Challenges:

- Installation of three separate rainwater harvesting storage tanks. The location, geometry and restricted access, including overhanging structures, and adjacencies to buried services and foundations presented many challenges and required alternative methods of construction.
- Traditional piling techniques were not permitted due to the proximity of the building envelope.
- Cranage required vertical access, however, the restricted headroom also presented challenges.

Our Solutions:

- From lessons learned on similar large-scale projects, we introduced phased construction methods to ensure works could be carried out safely.
- Working collaboratively with our delivery partners, we implemented a silent and vibration free method of sheet piling installation, using a **Giken Press**. This technique utilises auxiliary methods, including 'water jetting' and 'pre-augering' the ground, reducing resistance during the sheet pile installation.
- Using alternate side entry lifting techniques, we mitigated risk and ensured the restrictions, risk and ensured the cranage methods took place effectively and safely.

