C Barhale

Market Street Flood Alleviation

| Client: | Yorkshire Water |
|-----------|-----------------------|
| Location: | Mexborough, Yorkshire |
| Value: | £800k |
| Duration: | 26 Months |



In Brief...

Remedial measures were required in Mexborough, Yorkshire, where a number of properties were experiencing 1 in 10 year flood events due to hydraulically overloaded sewers. Flooding had not only caused damage to properties, but also nearby infrastructure such as manholes.

The sewers in Market Street are a combined system receiving foul and surface water flows from an extensive upstream catchment. Historic construction works in the area associated with the canal had affected the sewers and led to issues with the network performance during periods of adverse weather. During significant storm events overloading of the sewer network could lead to overland flows affecting local properties, due to the topography.

The outline solution was to construct a 700m3 storage tank to capture the excess flows and pump the flows back into the sewer network when the storm event subsided.

Technical Features...

Initial investigation and hydraulic modelling was undertaken to replicate the previous incidents. From this, original plans were to replace the existing chamber with a new screening chamber and weir overflow into a new 700m3 capacity tank.

The hydraulic modelling was further improved by additional site surveys. These enabled a new solution to be developed; allowing the attenuation tank to be drained by gravity rather than a pumped main. Barhale installed:

- Improvements to a nearby sewer overflow
- New sewers
- New storage tank

Instead of the original plans, Barhale provided modifications to the existing combined sewer overflow (CSO) chamber and connected to a new 391m3 storage tank. This then had a controlled, gravity return to the existing sewer network.

The new tank was formed of 106 secant piles, 8.5m and 9.5m in length. It was then finished internally with a 150mm cast in-situ concrete lining. The piles used in the construction of the chamber acted as temporary works for the construction of the tank and permanent works as an element to resist floatation. The piles were auger bored to avoid known High Voltage cables. Two internal reinforced concrete props were installed just beneath the roof slab, providing lateral support.

The tank design was changed from circular to rectangular to suit a revised area of land as the landowner provided a development plan for the adjacent area.

The weir overflow chamber that was reconstructed was located in a steep highway embankment, but provided a hydraulic relief point. The team also installed a gabion basket retaining wall to accommodate unforeseen ground levels where records had been inaccurate.

Initial ground investigation had revealed variable strata; the construction technique was modified to safely manage the conditions.



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Customer Benefits/Feedback...

- To reduce time spent on site by delivery vehicles, the team set up an efficient concrete batching system on-site
- The revised tank design was 45% smaller than the original plan, providing cost savings of circa £400k for the client
- The installation of a gravity system in place of a pumped system saved the client a further ~£250k on M&E
- This also mitigated maintenance and operation costs associated with a pumped system
- The reduction in size and volume of the tank and use of gravitational system also created a reduction in embodied carbon
- The location of the CSO tank required a number of trees to be removed. For every tree removed, Barhale replanted three on completion of the project
- Barhale ensured to liaise closely with the local Highways Authority to programme the works to minimise disruption to the surrounding area and residents/motorists
- Work in Market Street itself was held off until the summer months to reduce the impact locally
- Some private foul drainage was diverted and upgraded to current standards as part of the works. Further to this, the team stabilised and reconstructed the boundary walls of the adjacent property to build customer relations
- The installation of a gravity system minimised over ground structures, reducing visual impact for local residents

The final solution will provide a minimum 30 year return period standard, protecting the local residents, environment and highways infrastructure from flooding.



