

Counters Creek Flood Alleviation Scheme

Client: Thames Water

Location: London

Value: £8m

Duration: 15 Months

In Brief...

The Counters Creek Flood Alleviation Scheme (CCFAS) was developed following widespread basement flooding caused by intense rainfalls in the Royal Borough of Kensington and Chelsea and the London Borough of Hammersmith and Fulham. Thames Water appointed Barhale to design and construct the local sewer upgrades. The scope of works, which covered seven local schemes, included the installation of new sewers, the construction of two new pumping stations and sewer networks, and the installation of three FLIP devices utilising Combi approved systems.

The original design raised several challenges, including closure of main roads in a densely populated area, importing approx. 2000t aggregates and removal of 1800t of spoil, and potential settlement issues affecting nearby structures and utilities. Barhale proposed a new, innovative and cost-effective design and safely completed the project by June 2020, in line with Thames Water's commitment.

Martin Hoff, Thames Water's Head of Major Projects, commented: "The fantastic work on our Counters Creek sites clearly demonstrated the challenges we had in carrying out complex street works in the confined streets of London. I think this is a great example and how through good planning and collaboration we can do these things safely and to the satisfaction of our customers and neighbours."



Pursers Cross Road wet well shaft



Pursers Cross Road shaft sinking

Technical Features...

Phase one consisted of three schemes (Tabor Road, Perrymead Street and Castletown Road), where the flooding mechanism was a surcharge of the downstream river, addressed through the installation of attenuation rider sewers with a flap that shuts when the existing sewer surcharges. At Tabor Road, Barhale laid, through open cut, a 4m deep 1050mm dia concrete rider sewer with a dry weather flow channel to improve performance in low flow conditions. At Castletown Road, Barhale laid, through open cut, 37.5m of the new rider sewer at 5.5m depth, comprising ovoid concrete pipes, size 600x900mm. At each scheme, Barhale also built 1no connection manhole and 2no manholes on the rider sewers.

At Perrymead Street, Barhale laid 22m of the new rider sewer at a depth of 4.5m, comprising of ovoid concrete pipes, size 600x900mm, to improve the sedimentation performance during dry weather flows. Barhale also constructed a connection manhole of 1.8m dia and 2no. 1.5m dia manholes on the rider sewer. The connection manhole was located approx 10m away from the end of the rider sewer to avoid a congested area of services, which included a high pressure gas main. The installation of the pipework was conducted with timber heading for the portion under the high-pressure gas main. Barhale found a void under the high pressure gas main, and had to remove the existing protection slab, fill in the void, and replace with new concrete slab on top of gas main. The remainder of the pipework was installed through open-cut.

Enabling works consisted of several utility and main diversions, including a 125 PE water mains close to the line of the proposed rider sewer at Tabor Road, and 2no 125mm and 200mm water mains at Perrymead Street.

Phase 2 consisted of four schemes: Bowerdean Street, Broadbourne Street, Queensdale Place and Pursers Cross.

At Bowerdean Street, Barhale first diverted and removed the existing 300mm sewer, due to limited space. Subsequently, the new 900mm, concrete pipe rider sewer (50m in length) and the diverted 300mm vc pipe main sewer (64m in length) were installed through open cut, and in sections of 7.5m.



Queensdale Road flow meter chamber

Technical Features Cont...

The two sewers were laid in the same trench, approx. 3.7m wide. 5m of 300mm dia vc pipe connection sewer were also installed, through the same method. At Bradbourne Street, Barhale installed 41m of the new concrete rider sewer through open cut and in sections of 7.5m. Barhale installed 41m of the new concrete rider sewer through open cut and in sections of 7.5m. The existing sewer was kept intact, and the connection to the existing sewer was made at a new 1.5m dia manhole constructed close to the lateral connection from a property. The 300mm connection sewer was vc pipe, 3m in length.

A 300mm diameter flap valve was installed to prevent surcharge from the existing sewer backing into the rider. 9no manholes were also built across the two schemes, with dia ranging from 1.2 to 1.5 to 1.8m.

At Queensdale Road, Barhale constructed a 6m deep, 3m dia pumping well that continuously draws down the water level in the sewer upstream of the installation through two submersible pumps that operate on a rotating duty/standby regime. The well was built through excavation up to the formation level with the support of sheeted piles and frames. A concrete base was poured and then the shaft was built on top with caisson rings and protected with a concrete surround. The toe and concrete surround prevent the well flotation.

A 4m deep diversion chamber was also constructed on the existing sewer to divert the flow to the pumping station. A 4m deep, 2.4m dia precast concrete valve chamber was constructed to accommodate the non-return valves and gate valves. Barhale also constructed a 1.8m dia flow meter chamber located downstream of the valve chamber, to accommodate an electromagnetic flow meter, and a Bauer connection next to the flow meter chamber. A 1.8m dia, 4m deep return chamber was constructed to accommodate the main discharging back into the trunk sewer; the trunk sewer was protected with a stainless steel baffle plate at the point of the discharge from the pumping station. The inter joining pipework between chambers was limited to 3m due to keeping all works in close proximity of the new pumping well location.

At Pursers Cross, Barhale constructed a shaft tank pump well, and 2no inlet chambers (IC1 and IC2) in Pursers Cross Road, and a diversion chamber on the existing trunk sewer in Parson's Green Lane, with an attenuation sewer (consisting of different-size manholes and different-size pipes) to direct flow to the shaft tank pump.

This solution was preferred to the previous one, which proposed the installation of a row of box culverts at Pursers Cross Road to provide the attenuation, due to the high ground water level that would impact the culvert installation.

Barhale's solution, instead, lessened the excavation required for the actual storage itself, creating a larger diameter shaft and increasing the depth of the shaft, while also reducing the size of the drainage required to carry the flows into the shaft. The lead in drainage was also reduced in depth. By greatly reducing the need for dewatering, the new solution also addressed the risk of settlement and impact on nearby properties, as the local geology is predominantly gravels.

Barhale's shaft is 5m internal diameter and 14.8m internal depth. Although deeper, the shaft made use of a wet caisson method, to prevent any ground water from being pumped away from the works. The only water in the shaft was carried through the water table (5-6m). Once a seal was achieved, and as the team pushed through the clays present at approx 11m depth, they could then remove the groundwater from the shaft footprint. A 4m deep concrete plug was also installed to prevent shaft flotation.

IC1 on Pursers Cross Road is 3m dia; IC2 is 2.1m dia; both chambers are 4.5m depth and they were built as wet caissons due to limitations of space.

At Parsons Green Lane, Barhale first diverted the flow of a nearby industrial estate away from the pumping station to an existing sewer downstream, via 2no new manholes of 1.2m dia. The diversion was 225mm clay pipe. The diversion chamber in Parsons Green Lane, which has two penstocks to isolate the well, was constructed on the existing brick sewer and is 1.8m dia and 4.5m deep. From the diversion chamber, Barhale installed 15m of 450mm dia concrete pipe with timber heading under high voltage cables and connected it to the IC2. From IC2 to IC1 a 900mm dia, 8.75m long sewer with dry weather flow channel, was installed through open cut. From IC1 to the main shaft 5m of 450mm dia ductile iron pipe was installed through open cut.

Barhale constructed a flow meter chamber of 1.5m dia and installed 12m twin 300mm dia ductile iron pipes from the flow meter chamber to a 1.8m dia reception chamber with a penstock valve, and 5m of 300mm pipe from the reception chamber to a 1.5m dia outfall manhole with a flap valve at the end. All the chambers were built as excavations with sheeted piles and frames.

Barhale then installed 52m of 600mm dia sewer through micro-tunnelling, to direct flows from properties on Swan Mews (street perpendicular to Pursers Cross Road) to IC1 (IC1 acted as the launch pit for the micro-tunnelling TBM). Barhale also constructed 3 manholes in Swan Mews: 1.5m dia reception manhole for the tunnelling, and 2no 1.2m manholes to bring the flows into the reception chamber.