

# Warwick Tunnel Inspections

<b>Client:</b>	eight <sub>2</sub> O (SMB JV)
<b>Location:</b>	Coppermills, Walthamstow
<b>Value:</b>	£1.17m
<b>Duration:</b>	5 Months

## In Brief...

As part of eight<sub>2</sub>O's Tunnels and Aqueducts Programme, Barhale conducted the enabling works for tunnel inspections by Thames Water engineers. This included:

- Structural integrity surveys of specified tunnels
- Designing, supplying and installing secondary isolation
- Tunnels drainage and cleaning;
- Primary inspection of tunnels.

After Thames Water engineers inspected the tunnels, Barhale also carried out the required repairs.



Accessing tunnel via A Frame and tirak winch



Inflatable bung and bracings

## Technical Features...

The scope of work covered 4 tunnels of which significant sections had been built in the 1800s. The tunnels were accessed via 5no shafts (3m ID, and depths ranging from 16 to 25m), which were located inside the reservoirs. The reservoirs themselves are situated on land that is open to public access via the Wetlands project. In total, the team carried out work on over 750m of tunnels (ID ranging from 1200mm to 2550mm).

Primary surveys revealed that some of the existing valves did not work to the required standards. Due to location and access, the team devised two separate methods for installing "double isolation" on the valves. Specifically, the team utilised specialist divers to install isolation plates at three locations. These plates needed to be light-weight, but also sturdy enough to withstand the water pressure behind them (15 tonnes per square meter). To address this, the isolation plates were made of a plywood core (to improve buoyancy), laminated with aircraft grade aluminium to strengthen them. An inflatable silicone sock surrounded the plates to create the final seal. The support brackets were designed to be installed manually.

In order to double-isolate a valve that was particularly difficult to access, the Barhale team installed a 2.2m diameter inflatable bung. This was further reinforced with 4 no. 150mm mild steel "C Channel" beams, which were fitted into suitable support brackets. The latter were welded by divers to the inside of the tunnel, and will remain there for future use after the beams and bung have been removed.

The primary surveys also revealed that a Thames Water ring main surge vessel was connected to one of the tunnels and therefore fell under the scope of works. The connection had to be isolated and a separate route created for any surge flows. This required core drilling the surge vessel, carrying out additional pipework to a local discharge point and installing an additional valve. Barhale carried out the entire procedure under potable water conditions.

After the tunnels were fully isolated and customised, ventilation systems were installed, Barhale staff were able to drain and clean the tunnels in safe conditions. Over 600 tonnes of marine waste was safely removed from the tunnels. This was done manually due to space restrictions. This ensured optimal conditions for Thames Water engineers to carry out their inspections afterwards, and for Barhale's own staff to undertake the ensuing repairs.

## Customer Benefits...

The team were faced with significant constraints on site (confined spaces, at height, over water, in proximity to members of the public). Moreover, initial surveys revealed a number of challenges to the scope of work, which required both fast thinking and customised, durable solutions. To address this, Barhale deployed specialist plant and techniques (for example, using divers to access confined spaces, carry out the required surveys, and install bespoke secondary installations). Throughout the project, Barhale also engaged with other stakeholders to minimise potential risks to members of the public. This, coupled with Barhale's in-depth knowledge of Thames Water's system and distribution network, ensured that Barhale was able to deliver the work successfully, with minimal disruption, and to the specified quality and health and safety standards.