

Gatox (Gatehampton to Oxford) Pipeline

new pipeline to secure supply

In the summer drought of 2003, two Thames Water reservoirs at Blunson in Swindon and Farmoor in Oxford reached critical low levels that raised concern about the long term security of supply. To further exacerbate these concerns, the projected expansion of the Swindon catchment suggested even greater demands of treated water from these reservoirs and hence an alternative secure supply would be needed to service Oxford itself.



Steventon Rail Crossing - South Side Shaft Works

photo courtesy of Gronmij

South Oxford is supplied by Cleve Water Treatment Works. These works were supplied with raw water abstracted from seven boreholes located at Gatehampton. Cleve WTW had a potential peak output of 112MI/d, however, due to hydraulic restrictions at the works and along existing pipelines, this output was limited to 80MI/d.

To overcome this, Cleve WTW has been upgraded and will have a new total capacity of 121.3m MI/d. Thames Water also decided to commission a new cross-country pipeline scheme to fully utilise this potential. The GATOX - Gatehampton To Oxford - main has been designed to transfer a maximum volume of 48MI/d to the Oxford-Swindon link, sufficient to accommodate an additional population and rising demand.

The pipeline was built in two stages. The first stage (GATOX 1) provided a duplication of the pipeline from Cleve WTW to Hagbourne

Hill Reservoir - 17km long and 900mm diameter DI Main. This will provide additional supplies for distribution systems along the route at South Moreton, Blewbury, Beggarsbush reservoir, Culham, Wotton reservoir and Abingdon. This route included one main line rail crossing and a tunnel under the River Thames at Moulsoford.

The second stage (GATOX 2) consisted of a second 17km long 900mm diameter DI main connecting Hagbourne Hill reservoir with the Oxford - Swindon trunk main at Fyfield, enabling the transfer of excess capacity at Cleve to the area west of Oxford.

This section included a new duty, assist, standby 560l/s capacity booster station at Steventon, which will pump water to a new reservoir at Beacon Hill near Oxford. This section included tunnel crossings under the A34 and the main London-Bristol rail line at Steventon.



Steventon Rail Crossing - South Shaft - Interior prior to tunnelling

photo courtesy of Grontmij



Steventon Pumping Station - Pump Set

photo courtesy of Grontmij

A particular challenge to overcome when designing this scheme was how to contain the thrusts from the maximum test pressure of 20 Bar, often in weak ground.

Grontmij were appointed as Designer to complete the detailed design element for J. Murphy & Sons Ltd - the main civils contractor, which included a mainline rail crossing, a river Thames crossing as well as a detailed structural, civils mechanical and electrical design for the Steventon Booster station.

At an early stage it was identified that the proposed crossing of the London to Bristol rail line would be critical to the successful delivery of the project. Previous experience in this field suggested the necessary approvals may cause the project to overrun and thus put at risk the security of supply.

An alternate route was selected that made use of an existing highway underpass that would only require approval from the highway authority, thus reducing the potential delay as well as offering a substantial financial saving.

Grontmij undertook a structural assessment of the bridge along with preparing the specification for additional site investigation necessary to prove ground conditions and to locate existing utilities.

In addition to the main rail and river crossings, there were also a large number of smaller stream crossings that bordered agricultural land. Thames were keen to keep the necessary air valves as close to the river as possible and so to accommodate this, Grontmij developed an innovative design for specially strengthened steel swan-necks for the numerous crossings enabling the reduction in the sizes of trust blocks in weak ground and allowing air valves to be positioned closer to the river away and out of agricultural land.

Working alongside our in-house structural and geotechnical design teams, as well as keeping in close communication with the numerous stakeholders, Grontmij developed an innovative design that met with the approval of the Client.

The pipeline has been commissioned and is taken into service.

Client: Thames Water Utilities Ltd;
Main Contractors: J. Murphy & Sons (pipeline);
Gleasons Ltd (Steventon Booster Station);
Designers: Thames Water Engineering and
Grontmij Group.

Note: The Editor & Publishers wish to thank Grontmij for preparing the above article for publication. ■



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