Beacon Hill Reservoir extension

by
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Beacon Hill Reservoir in Oxfordshire is an underground service reservoir for storage of treated drinking water. It serves customers in Swindon, Oxford and Banbury. This £12.2m project to construct 2 (No.) 22.5Ml reservoirs will ensure that Thames Water meet the increased demands, and allow for future maintenance work without disruption to the service.

View from outside the reservoirs, during construction *Courtesy of Thames Water*

The existing Beacon Hill Reservoir - a single cell reservoir with a capacity of 45 Ml - acts as a strategic balancing tank for supplies from Farmoor and Swinford WTW. However, its single cell construction offers very limited flexibility for inspection and remedial works. In the past, temporary removal of the reservoir for a few days to enable periodic inspection and cleaning has caused severe operational difficulties. Removal for a period of weeks or months for remedial works would have involved a significant risk of supply failure.

In addition, a number of changes in the network supply area have increased demand on the reservoir. This includes the increased output from Swinford, decommissioning of Worsham WTW and major network enhancement (Swinford to North Leigh and Farmoor to Blunsdon). Extensive network modelling of the Oxford and Swindon area was carried out, which also looked at various operating scenarios. The recommendation of the network modelling was for two new reservoirs with a capacity of 22.5 Ml each to be provided at Farmoor. Both cells would provide sufficient water storage capacity to meet expected population growth and rising demand until 2020. The expansion has enabled the reservoir complex to supply in total up to 90 Ml of water per day to 150,000 customers within a 30mile radius.

The reservoirs are adjacent to each other but designed as independent reservoirs. The walls are 700mm thick and the tapered walls vary in thickness from 350mm at the top to 850mm at the bottom. The wall internal height is 9m and it is designed as a propped cantilever. A 250mm thick flat slab roof is supported on the external walls and 600mm diameter columns at 4.1 to 5.4m centres. A common valve chamber is provided for both reservoirs with under floor and perimeter drains provided to monitor leakage in operation.

An extensive geotechnical survey was carried out, as the ground in this area has been prone to slippage and heave. As a result the reservoir is founded below the plane of slippage. The reservoirs are designed to withstand the predicted heave.

Reservoir Columns *Courtesy of Thames Water*

View from outside the reservoirs, during construction *Courtesy of Thames Water*

Bulk excavation for the construction of the reservoirs started in Aug 2007 and construction of the reinforced concrete reservoirs began in October 2007.

Reservoir walls were poured using proprietary steel faced shutters, which were assembled on site. Each 9m wall panel (43m^3) was completed in one pour from kicker level. The roof slab was constructed using a proprietary decking system which once assembled could be moved from one pour to the next. Both reservoirs were filled at a slow rate and passed their water tests within 14 days.

The reservoirs use two new 900mm diameter coated steel inlet and outlet mains, which were installed through concrete pipe jacks approximately 100m in length.

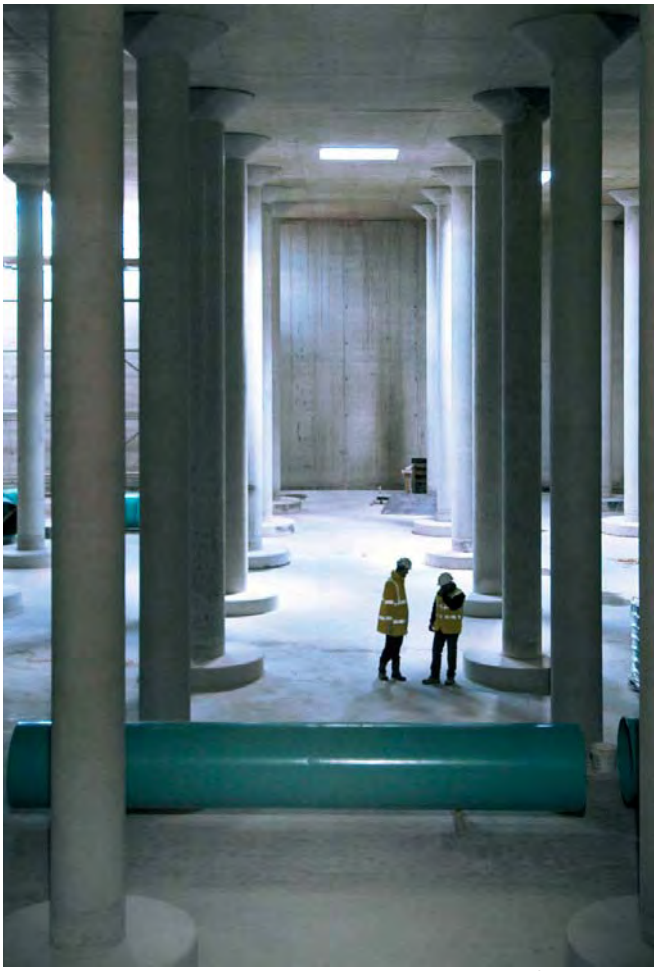
Once the new reservoirs go into supply the old Beacon Hill reservoir can be taken out for inspection and remedial work.

To mimimise disruption and avoid the need for 57,000 cubic metres of surplus soil to be removed to landfill, arrangements were made for it to be spread across nearby fields. This took the equivalent of 5,000 lorry movements off local roads. The remaining material has been used on site for backfilling and re-profiling the side of the hill.

During an environmental survey, badger setts were found in the area, which resulted in redesigning and repositioning the reservoirs. Throughout the construction period badger movement has been monitored and in November 2008 new badger setts were discovered close to the construction area, which had to be closed off under licence.

The new reservoirs were put into supply in July 2009 at a contract value of £12.2m.

Note: ***The Editor & Publishers thanks Probal Majumder, Senior Project Manager with Thames Water.***■



Inside one of the two new reservoir cells at Beacon Hill in Oxfordshire *Courtesy of Thames Water*

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