Bacteriological Remediation Works

capital investment at service reservoirs in Yorkshire

by
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Yorkshire Water (YW) has suffered recently with an increasing level of e-coli failures relating to service reservoirs. This generated an accelerated capital programme in the order of £17m to inspect, clean, repair or replace 764 water compartments over an eighteen months period, mitigating the failures and maintaining the company's excellent water quality performance. YW has 377 service reservoirs and together with other structures, such as water towers and contact tanks, this gives a total number of water compartments of 764. 327 compartments were identified as not having been inspected in the last three years and, therefore, could have some form of defect which was undetected. In some cases these compartments had a history of previous water quality and structural failures.

Starbotton Reservoir - new build *photo courtesy of Mott McDonald Bentley*

Background

2006 highlighted an increasing problem with water quality failures at service reservoirs with eleven e-coli failures. This trend continued and since the beginning of 2007, there had been a further fifteen e-coli failures recorded that were associated with service reservoir assets in Yorkshire. The fifteen reservoirs that have failed during 2007 had affected over 40,000 properties. Two main factors accounted for these failures - ingress of water due to the structural integrity of the reservoir and incoming contamination from the system. In September 2007, to ensure the company quickly reduced the number of e-coli failures, initial measures were put in place within the business:

* **elevated chlorine levels at specified Water Treatment works (WTWs) across the region, with additional monitoring put in place to identify any customer impact.**
* **increased secondary disinfection at specific service reservoirs identified as 'high risk';**
* **identification of twenty eight key sites that require capital works to be carried out, as soon as possible, to remove the risk of failure;**

To fully understand the mode of failure and the extent of the problem, a company wide strategy was formulated where all service reservoirs and other treated water retaining structures would be taken off line for inspection. Where necessary, remedial work will be undertaken to prevent any further e-coli failures. The strategy consisted of a cleaning and inspection programme, formulated to identify where future risk of failure may exist. To ensure YW inspected on a prioritised basis two key measures were identified:

* whether the compartment had been inspected in the last three years;
* the condition of each compartment taken from site surveys, including stainless steel tanks and clean water tanks, which formed part of the compartment total to be inspected.

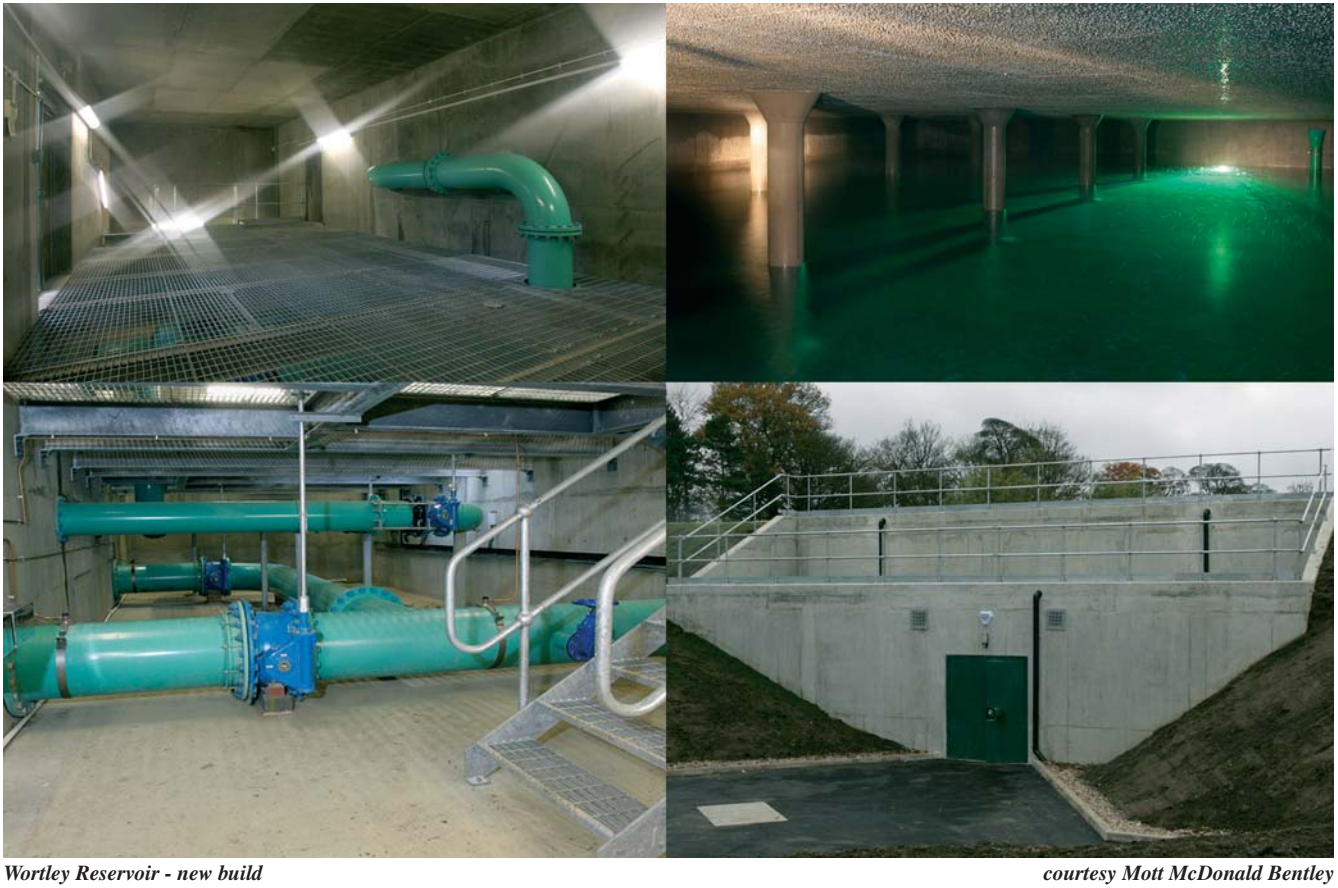
This prioritisation process resulted in a programme of work that commenced in September 2007 and saw 327 compartments inspected, cleaned and repaired before the end of March 2008. This part of the programme was the first of two stages of work, which fully inspects and improves the service reservoir asset base up to April 2009 and identifies the business case for future capital investment in AMP5 and beyond.

Phase two of the programme includes for the inspection of the remaining 437 compartments before the end of March 2009.

Construction work

The project is being delivered utilising the resources of YW's existing 'in house' reservoir cleaning team; *Stonbury,* the specialist framework contractor for reservoir refurbishment work; *Mott McDonald Bentley (MMB)* and *Costain,* the AMP4 capital contract partners.

Work is carried out using a 'fast track' approach where reservoirs are drained down for inspection, cleaned and put back into service at a rate of around fifteen each week. Where minor defects are found, a limited programme of capital refurbishment work is undertaken by *Stonbury* to remove the probability of water ingress.



Wortley Reservoir - new build *courtesy Mott McDonald Bentley*

This remedial work has generally been restricted to a capital expenditure value of less that £20k for each compartment, to deal with minor issues such as concrete repairs.

Where other significant defects are found or where major remedial work to resolve the issue of water ingress is required, then individual projects are promoted to address these shortfalls. This work typically involves overbandaging work, structural defects and in extreme cases reservoir rebuilds.

Other mitigation work includes rationalisation of the water distribution system wherever possible. If a failing reservoir can readily been taken out of the network without exposing customers to any greater level of supply risk, then this also forms part of the overall strategy. All reservoirs cleaned and disinfected have a detailed report produced for any remedial work undertaken. Any outstanding issues are used to support YW's AMP5 process.

Summary

YW has never undertaken such an accelerated programme of inspections on service reservoirs before. However, this approach has been a necessity due to the need to eliminate completely any e-coli failures due to service reservoirs. Understanding the full extent of the problem has proved extremely difficult because the faults are not fully known until the compartments are inspected. Availability of capital funding within AMP4 has also driven the level of remedial work to be undertaken and this sets the remaining level of residual risk the company has where known faults and defects remain.

The detailed reports produced for each compartment are, therefore, crucial to maintaining YW's excellent water quality performance now and in the future.

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