

Toplers Hill Water Tower

refurbishment of a 90-year-old potable water storage tank in Bedfordshire without compromising water quality

by Anglian Water's @one Alliance

Anglian Water's Toplers Hill Water Tower is situated just off the A1, south of Biggleswade, Bedfordshire, on a site which includes both the water tower and a water reservoir. The tower was constructed in June 1934 and its condition has started to deteriorate with age. Following Anglian Water's internal inspection of the water tower, areas of concern were identified regarding the roof, internal coatings and some of the access ladders, which would require replacement or refurbishment before the tower could be returned back to service without compromising water quality to customers.



The new water tower roof being lifted into place - Courtesy of @one Alliance

Issues

The deterioration of the water tower was clearly identifiable, with there being several leaks in the roof of the tank and any sampling of the water would be insufficient to pass due to the interior surface corrosion. Also, the instrumentation and roof interface point were not sealed, with a noticeable build-up of debris/silt/carbon and corrosion across the walls. Another issue was the broken ladder which would cause a health and safety access issue moving forward.

The option of replacing the water tower with cellular units was considered, however, due to minimal site spacing, it was discounted and the solution was to modify the existing asset.

Due to the consequence of the tank's condition, there was a risk of low-pressure events. Toplers Hill Water Tower also provides standby storage to the adjacent Toplers Hill Reservoir, which cannot be removed from service until the water tower has been returned back to service; therefore highlighting the importance of the solution being delivered in a timely manner.

It was evident that the roof needed replacing, which required considerations for the crane's lifting ability, the crane's positioning, lay down areas, the weather conditions and teamwork. It was also apparent that there would be the need to reposition a number of telecommunications aerials atop the tower to ensure the site team were not at risk of radiofrequency (RF) radiation whilst working the tower.

Solution and construction

Anglian Water's @one Alliance was tasked with developing a solution to the issues and the construction phase started in 2022.

Scaffolding: The team required safe access up the tower and around and inside the tank, so extensive scaffolding was put in place to allow this. The scaffolding works comprised the following:

- An external scaffold tower supporting an electrically-powered hoist to the top of the water tank.
- Full external access scaffolding surrounding the tank.



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Topplers Hill Water Tower - Courtesy of @one Alliance



New roof ready to be lifted - Courtesy of @one Alliance



The new roof being lifted into place - Courtesy of @one Alliance



Top of the tower - Courtesy of @one Alliance

- Full birdcage scaffolding inside the tank with several boarded levels to the sides of the tank. The birdcage scaffold would need to be altered throughout the installation whilst repairs were taking place to enable safe access to all internal faces of the tank.

Crane pad and lay down area: Whilst the scaffold was being installed, Claret Civil Engineering designed a crane pad to facilitate the old roof removal and new roof installation. A separate levelled roof dismantling/assembly area was created nearby and covered with track matting.

Tank internals: With the scaffolding installed, the internal walls and higher levels of pipework and support brackets were prepared by OnSite Central Ltd. This included lead paint removal by high pressure water jetting, abrasive grit blasting, and re-coating the tank interior with Acothane DW; a DWI approved, solvent free polyurethane coating for potable water tank lining. The new tank coating was tested for integrity and strength as it was installed then cleaned, disinfected and sampled ready for return to service.

Roof replacement: The leaking tank roof was removed by crane by Hayes GFS Ltd and dismantled this on site. This was replaced with a new glass lined steel structure provided by Permastore and installed by Hayes. The top section of the walls had been identified as heavily corroded, so was cut away and prepared to receive the new roof arrangement. Using a crane from Cadman Cranes Ltd, the new tank roof was lifted into position onto the existing structure.

Water tower access: The external tank ladder with two shorter ladder runs and an integral access platform for the existing side access hatch were replaced.

Instrumentation: Whilst the existing level instruments and cabling were re-used where practicable, a new ultrasonic level transducer and associated cable runs were also installed. The old and new instruments were mounted to purpose-made apertures in the replacement roof to monitor the ultrasonic levels within the water storage tank.

Topplers Hill Water Tower: Supply chain - key participants

- **Client:** Anglian Water
- **Design & project delivery:** @one Alliance
- **Refurbishment of tank internals & re-coating:** OnSite Central Ltd
- **Old roof removal/new roof installation:** Hayes GFS Ltd
- **Civils works:** Claret Civil Engineering
- **Glass-lined steel roof:** Permastore Ltd
- **Polyurethane coating:** Acothane UK Ltd
- **Crane hire:** Cadman Cranes Ltd

Project challenges

Due to poor weather conditions, the crane lift date was delayed by several weeks. In addition, a last minute revision to the lifting plan caused delays to the lifting activities.

Having to apply the Acothane DW throughout both the winter and summer months, temperature and humidity extremes were experienced which was challenging during the preparation, application and curing of the coating.

Other challenges included nesting birds, tight site access, and several incidents of theft and on-site vandalism.

Health & Safety

The @one Alliance, prides itself of 'Deliberately Delivering Differently' and with this scheme, several H&S opportunities presented themselves as it developed. Early on it was noted that there was some concrete spalling on the external tower wall, which was a



Works area - Courtesy of @one Alliance



Farmland surrounding the tower - Courtesy of @one Alliance

concern as small clumps of falling concrete could occur at any time. The team decided to carry out some loose concrete removal at the start of the site phase to removed this hazard.

Another anticipated H&S improvement was the use of a remote-controlled robotic paint stripper and shot blaster to prepare the internal walls for the new coating. This meant that operatives did not have to be inside the tank to manually shotblast the exiting coating, but unfortunately, the team discovered that the device could not traverse the bolt heads or tank boiler plate joints well so was ineffective.

The team also found that the internal tank birdcage scaffolding could be rationalised down to one lower level deck for tank wall access and work could be undertaken from mobile tower scaffolds. This not only reduced H&S concerns, it also saved time in having to install and strip additional scaffolding which equated to a saving of approximately £40,000.

Project status

As the date of writing (July 2024), the team are finalising the last activities of the tank refurbishment.

Once the telecommunications aerials are repositioned to their original orientation the scaffolding will be fully removed and the water tower will be handed back to Anglian Water. It will then be returned to service and the year-long warranty period will start.

The editor and publishers would like to thank Anglian Water's @one Alliance for providing the above article for publication.

The @one Alliance is a collaboration of 8 partner companies that each provide specialist knowledge allowing the Alliance to deliver complex delivery projects in the most efficient way, reducing the cost to Anglian Water's customers. The partners are Anglian Water Asset Delivery, Balfour Beatty, Barhale, Binnies, Mott MacDonald Bentley, Sweco, Skanska, and MWH Treatment.



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