Manton Lane Reservoir

Anglian's new service reservoir for Bedford

by Simon Judd

The new 45,000m³ Manton Lane service reservoir – part of Anglian Water's £120 million capital investment programme for 2002, will store treated drinking water, providing 130,000 residents of Bedford and surrounding area with a secure water supply. Built in 1930 as open asphalt lined storage reservoirs and converted in 1949 to a covered service, the existing reservoir is nearing the end of its useful life and needed replacing to ensure the continued supply of wholesome water.

Bedford: Construction of new reservoir at Manton Lane *(courtesy Laing Construction)*

The new concrete reservoir is founded on 12m of glacial till overlying at least 35m of Oxford clay. After an initial geotechnical assessment, differential settlements of up to 60mm between the perimeter and the centre of the structure, were predicted. Various options were considered to reduce this settlement but following additional geotechnical and structural analysis the roof columns and floor were strengthened to accommodate this differential movement. Extensive level points were provided to monitor the settlement, both during and after completion

.

Procurement

The project has been designed and project managed by the Technology Group of Anglian Water Services, responsible for delivering the overall budget for Anglian Water's capital investment. *Laing Utilities,* one of Anglian Water's framework partners for the third asset management plan (AMP3) has contracted to build the reservoir under the NEC conditions of contract, option C.

Target cost for the project is £4.35 million, which, includes the construction of 110m long x 72m wide x 6.3m high concrete reservoir, complete with new ductile iron pipework, electrical control and telemetry equipment, flow control valves and meters as well as new access road, fencing and landscaping.

Adding value

Although the detailed design of the water retaining structure, pipelines and control systems together with associated drawings were prepared by *Technology Group, Laing Utilities* were involved during the pre-construction and construction period and used their expertise to comment and propose alternatives to improve constructability and offer cost savings.

Risk management led to greater understanding of the potential problems that can occur in any construction project and the particular risks to this project. Once the risks are analysed and assessed this then enabled the risks to be placed with the party best able to control and mitigate them.

This process led to several changes to the original concept and challenged some of the traditional approaches to reservoir design. Examples of cost savings implemented were the construction of reservoir columns without using the column heads or separate column bases, and the absence of a superstructure to the large control valve chamber. *Computational Fluid Dynamic* modelling of the water circulation inside the reservoir enabled expensive inlet distribution pipework within the reservoir to be deleted while still maintaining water quality.

A proposed 800mm diameter overflow pipe, designed to take water safely away from the site in the event of reservoir control valve failure was also managed out of the scheme in favour of a shorter length overflow/ditch arrangement. Following a risk management exercise, a risk control measure was identified for standby power generation for the control valves and telemetry in the event of power failure.

Improvements in materials and construction systems continued through the construction phase, another example is the use of epoxy coated steel pipework within the valve chamber instead of the traditional ductile iron pipework.

Once the construction work is complete, the reservoir has to be tested to ensure that it can both retain treated water and keep out external contamination from rain or ground water. The completed roof first has to be water tested and then the reservoir is filled for its testing suite. Unusually, the structural testing has been carried out at the same time as the 'materials in contact' (potable water) sampling was taken.

The control philosophy to integrate the reservoir into the water supply system and provide sufficient safeguards in the event of malfunction was an important feature of the project. Laing Utilities in-house electrical engineering activity designed and supplied the electrical and control systems for the new works, which interfaces with existing telemetry.

All materials incorporated into the works had to meet stringent water quality regulations and be approved for contact with drinking water. This includes pipework, valves, joint sealants, formwork release oils etc. This helps to ensure that water quality standards are met and adds to Anglian Water's database of materials used in contact with potable water.

Test results on the north cell of the reservoir have been very positive. The cell has passed both its structural and 'materials in contact' tests first time.

The relationship between commissioning body and contractor have been excellent. The project has been delivered as a joint effort, utilising the most appropriately qualified resource regardless of their parent company, focussing on solution rather than liability, and with all participants actively involved in striving for completion and proud to take the lessons learnt to other areas of the Alliance.. ■

Note: *The author of this article Simon Judd, is Project Manager with Laing Utilities.*

Bedford: New 45,000m^3 reservoir *(courtesy Laing Construction)*