

Nutwell Water Treatment Works and Doncaster area strategy

by
Alan Bennett

Nutwell Water Treatment Works is a key part of the Yorkshire Water Services network in the Doncaster area of the region. Constructed in 1983, the works is fed entirely by groundwater from boreholes on the site and from three other boreholes at Armthorpe, Thornham and Boston Park. The works currently carries out Nitrate blending and Rapid Gravity filtration to remove iron and manganese from the borehole waters. The overall treatment and blending capacity of the site is 39 MI/d. Treated water from the works is supplied to the Doncaster area, north towards Hatfield Service Reservoir and South towards Cantley Tower. A number of other borehole sites, including Hatfield, Finningley and Rossington Bridge also feed water into supply. Treatment at these sites is limited to simple disinfection and plumbosolvency. As a result of diffuse agricultural pollution there has been a deterioration of groundwater quality within the Sherwood sandstone aquifer and there have been exceedences of the Prescribed Concentration Value (PCV) for Pesticides and nitrates in several of the boreholes in the wellfield. Levels of these parameters are predicted to continue to increase in the future. There are also significant levels of iron and manganese in several boreholes.



Nutwell WTW Aerial photo pre-construction work

courtesy: Yorkshire Water

Regulatory compliance

A scheme to resolve the Pesticide and Nitrate issues was supported by the Drinking Water Inspectorate (DWI) for inclusion in the Company's Final Business Plan. The DWI also supports remedial

measures for iron and Manganese in supply. The DWI undertaking includes for the reduction of nitrate and pesticide levels as part of a scheme to secure compliance in water supply zones supplied from Nutwell, Rossington Bridge, Finningley and Hatfield.



New pesticide removal plant under construction

courtesy: Yorkshire Water

Project Rationalisation Strategy

The project, classed as a Water Treatment Works rationalisation, strategy, is being carried out by Laing O'Rourke/Halcrow, in association with Arup, and will be completed by 31st December 2007, in order to meet the DWI regulatory compliance date.

The preferred solution option optimises the potential yield from the borehole sources and makes best use of the lower nitrate water from Finningley and Thornham for blending purposes.

Key elements of the solution are:

- * discontinuation of disinfection and plumbosolvency treatment at Finningley, Rossington Bridge and Hatfield borehole sites;
- * construction of 18km of new pipelines to transfer raw water from those sites to Nutwell WTW to allow treatment and blending, in combination with the existing boreholes at Nutwell, Armthorpe, Thornham and Boston Park;
- * increasing the capacity of the existing Nitrate Blending system at Nutwell WTW to provide a capacity of 60MI/d;
- * increasing the capacity of the existing iron and manganese removal system at Nutwell WTW to provide capacity of 60MI/d;
- * provision of a new Granular Activated Carbon plant for pesticide removal at Nutwell WTW with a capacity of 60MI/d
- * provision of increased high lift pumping capacity at Nutwell WTW, and 10km of treated water mains in the Cantley and Hatfield areas to allow additional water to be distributed from Nutwell WTW;
- * increase standby generator capacity.

The overrun cost of the project is currently forecast at £18m

Improvement in water quality

The enlarged Nutwell WTW will secure compliance with a consequent improvement in overall water quality. The project will give long term resolution to the nitrate and pesticide problems in the area, together with a degree of future proofing against any other water quality deterioration.

Security of supply

The scheme is designed to meet the YWS specified peak demand and produce a nitrate compliant blend under an outage scenario where one of the key high capacity, low nitrate sites is out of service. Peak demand and nitrate compliance is also maintained under outage scenarios when two of the lower capacity sites are out of service. Any supply deficit will be met by Grid import but the aim is to minimise import as far as possible.

The scheme will maximise the potential yield from the borehole sources within the constraints of the current abstraction licence.

Criticality of site

The project will result in 60MI/d being supplied to the Doncaster area from one WTW, compared with four works at present. As extended outage of the enlarged Nutwell WTW would have a significant effect on supply, the new WTW has been progressed based on a robust design of established processes to ensure reliable operation.

A key factor in project delivery has been the close working relationship of the project core team consisting of YWS as client, *Laing O'Rourke/Halcrow* as Principal Contractor and *Arup & Turner Townsend* as Framework Consultant. All parties have worked collaboratively throughout feasibility, design and construction to ensure the delivery of a value for money project at minimal risk.

Full co-operation of YWS operational staff has also been necessary to ensure that water supply from the existing works has been maintained throughout the construction period.

Construction works commenced in March 2006 and commissioning works will be completed by 31 December 2007 to meet regulatory requirements. ■

Note: The Editor & Publishers wish to thank the author, Alan Bennett, Capital Solutions Manager with Yorkshire Water Services, for producing the above article for publication.