

Mile Oak & Goldstone Water Supply Works

£5.7m nitrate reduction plant for two critical supply sources

Mile Oak & Goldstone are two critical water sources supplying the city of Brighton. Over recent years the level of nitrate concentrations in the raw water has been increasing. Southern Water agreed with the Drinking Water Inspectorate that it would provide a £5.7 million nitrate removal plant during the AMP3 period in order to ensure a continued compliance with water quality regulations.



Goldstone WSW - importing nitrate removal vessels (Courtesy Southern Water)

Goldstone WSW is the major source of supply for central Brighton and is situated in a semi-urban area of Hove at the north end of Hove Park. Gravity and pumped discharges are made into the distribution system via two reservoirs at the WSW. The reservoirs operate in parallel with three pump sets drawing from reservoir 1.

Mile Oak WSW is adjacent to the A27 at the entrance to the Southwick Tunnels and is the sole source of supply to Mile Oak reservoir to the north west of Hove. Water gravitates into distribution or is pumped into the adjacent supply zone.

Nitrate removal

Water quality data from 1999 showed that nitrate concentrations in the raw water at **Goldstone** and **Mile Oak WSWs** were increasing. The DWI agreed that the average concentration at the time was below the prescribed concentration or value of 11.3mgNO₃-N/l as N (Nitrate) but was concerned that the trend of increasing concentrations, combined with seasonal peak value, would cause a breach of regulations.

Design criteria for the nitrate removal plant is as follows:

Design flow to nitrate removal columns	12MI/d (500kl/hr);
Design flow after blending back with raw water	19MI/d;
Maximum raw water nitrate level	12.1 mg/l as N;
Nitrate level after blending back	<5.0 mg/l as N
Column arrangement	3 off 50% duty units (2 in service, 1 in regeneration).

The works include a 10MI/day nitrate removal plant at **Goldstone**, along with modifications to the chlorine gas dosing system to ensure compliance with health and safety legislation. There are strict controls on the potential pollutants permitted on site during construction and operation because the nitrate removal plant is to be located above the adits and aquifer that supplies **Goldstone WSW**.

The three nitrate removal columns, supplied by *Heronsgate Engineering* are each about 6m high, weighing just under 12 tonnes. They were lifted into position with a tandem lift on a 200 tonne-all terrain frame.



Route of pipeline next to A27 (Courtesy Southern Water)

To reduce nitrate levels at **Mile Oak reservoir** as well as at **Goldstone**, part of the output from Goldstone has to be pumped to Mile Oak reservoir for blending with water from **Mile Oak WSW**. Inlet and outlet pipelines to the nitrate treatment plant will cross Woodland Drive adjacent to Goldstone WSW, requiring a length of pipeline to be constructed in the pavement. In addition, modifications to the outlet serpentine pipework from **Goldstone** reservoir 1 pumps will require the temporary road closure of Woodland Drive due to the size of crane required and weight of pipework being installed.

Construction

While the outline design for the scheme, including modelling, was prepared by Southern Water, detailed design and construction is being undertaken by the *K3 West integrated team*, led by *Black & Veatch/Costain*. The team is in the process of constructing the ion exchange nitrate treatment plant in an 18m x 14m metal clad steel frame building in the existing unused cooling tank, mostly below ground. The structure features traditional blockwork covered by a specially coated timber cladding and an acoustic roof to ensure noise levels outside the building are kept to a minimum.

Transfer main

As part of the scheme a new transfer main is also in process of being constructed between Mile Oak WSW and Redhill Service Reservoir, a distance of 6 km, to provide more flexibility for the water supply in the Brighton area. The route runs adjacent to the A27 dual carriageway, crossing numerous access tracks, footpaths and bridlepaths. It also crosses an environmentally sensitive area near Benfield Golf Course, and areas of archaeological interest close to Mile Oak and Round Hill. Minor amendments to the route have been made, in particular to avoid a glow-worm colony.

The civil engineering contract was awarded to Sussex based contractor *CJ Thorne & Co Ltd* and construction work started in August 2002. The building's foundation and basement are in place as are the nitrate removal vessels and the majority of the mechanical equipment and MCCs. Electrical installation has now commenced. The scheme is to be completed by 31 July 2003 to enable the nitrate plant and blending arrangement to be operated during the 2003/2004 period of aquifer recharge, when high nitrate concentrations are expected. ■

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