

Longue Hougue Water Treatment Plant

challenges for 15 MI/d plant on Guernsey

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The site for the Longue Hougue Water Treatment Plant is extremely constricted, being on the edge of the 60m deep quarry which is the raw water storage reservoir for the plant. This reservoir is currently in use as part of the island's water storage management arrangements. The bulk of the process plant is sited within an existing portal framed steel building, which presented access problems. In addition, the ground conditions are poor, this has not only affected the construction of civil engineering structures such as the chlorine contact and treated water storage tank, but has also necessitated extensive works to stabilise the edge of the quarry which provides the only access both for construction traffic and for chemical deliveries.



Longue Hougue treated water pumps with CIP tank in background

courtesy of Enpure Limited

The proximity of the quarry to the works requires very tight environmental controls both during construction and in operation to avoid contamination of the raw water supply by spillages of any description. Housing on the other side of the quarry has necessitated tight control of noise from construction activities and subsequently when the plant is in service.

Enpure Limited is the main contractor for the design, construction and commissioning of the new 15 MI/D water treatment plant at Longue Hougue Reservoir, St Sampsons, Guernsey. Like the earlier plant supplied by Enpure (then Purac) at Guernsey Water's St Saviours WTW, the treatment process is ultrafiltration using membranes supplied by GE Zenon Ltd (but in the case of Longue Hougue, the membrane cassette type is 500d (340sq ft).

This process is particularly suited to the Longue Hougue site where an exceptionally small footprint is required.

These schemes are part of Guernsey Water's strategy to replace and upgrade existing works and build new ones. St Saviours and Longue Hougue will be the two main works serving the west and east parts of the island.

Reservoir

The working range of the level in the reservoir (40m) has necessitated the positioning of the submersible raw water pumps under floating pontoons to avoid fouling the slope of the quarry face. The need to ensure that the full rated output of the works is available across as much of the level range as possible has also affected the selection of the pumps (supplied by ITT Flygt Ltd) and their controls.

Raw water is passed through one or both of two microstrainers supplied by CAP Technology, and is then dosed with coagulant (PACL) and adjusted for pH with sulphuric acid before passing to three parallel trains of membranes supplied by GE Zenon. These



Longue Hougue Microstrainers on inlet of the works

photo courtesy Enpure Limited

operate in a different mode from those supplied earlier at St Saviour's WTW, in which the process tanks continuously overflowed to waste.

At Longue Hougue, the process streams operate on a dead end filtration basis, or batch basis, the tanks being taken off line, drained to waste and refilled with screened raw water at approximately 15 minute intervals. As usual the membranes are cleaned in service by back pulsing with permeate during a tank drain only, but can be cleaned in service more frequently if required. At greater intervals, the membranes are cleaned off line by immersion in chemical solutions to maintain the required permeability.

This cleaning can be done in situ as the process tanks are much smaller, unlike those at St Saviours, which are existing clarifiers. This greatly reduces the operator burden. Chemicals normally used for Cleaning in Place are sodium hypochlorite and phosphoric acid.

Permeate is pumped to the contact tank where it is disinfected and, thence, after final chemical conditioning (dechlorination, and pH adjustment), to the Frie Plaidy service reservoir. Disinfection is by sodium hypochlorite produced by On Site Electro Chlorination (OSEC) process, the plant being supplied by Severn Trent Services. Chemical selection and storage arrangements have been driven by the issues of shipping and economic delivery of other hazardous substances to the Island of Guernsey.

The output of the plant which is unmanned in normal operation is

controlled to meet demand and maintain storage levels at the Frie Plaidy service reservoir.

The waste water is thickened in a lamella thickener supplied by Hydro International. The thickened sludge is discharged to sewer while the supernatant returns to the raw water reservoir.

The scheme has been executed under the IChemE Red Book conditions of contract, although the initial design and costing were undertaken on a cost reimbursable basis involving close cooperation between Guernsey Water, Enpure and key process plant suppliers. Civil design is by Faber Maunsell under contract from Enpure. Civil Engineering works have been carried out by Geomarine Ltd. The scheme has presented a number of challenges to the team which are described in this article.

Major suppliers and sub-contractors in addition to those already named are: Blackburn Starling Limited for the motor control centres; Alpha Plus Limited for mechanical installation services and Menhenitt Prior and Company for the EICA installation service.

The plant is due to go into service in August 2008.

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Longue Hougue Sodium Hypochlorite dosing pump

photo courtesy of Enpure Limited