

Douglas Water Treatment Works

improving water quality for the population of the Isle of Man

by
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The new £23 million Douglas WTW forms part of the “Crystal Project” procured by the Isle of Man Water Authority (IoMWA) to provide wholesome water for the Island’s population. Obtaining planning permission for the new works, which is located on the outskirts of the town itself, was a lengthy process with the Water Authority and the main contractor, Earth Tech Engineering, working closely together. Construction started in June 2005 and the works entered supply in January 2008. This new plant replaces the existing pressure filter plant and provides high quality water to meet EU Drinking Water Directive requirements.



Douglas IOM WTW: Treated water pump gallery (with backwash & interstage pumps in background)

courtesy Earth Tech Engineering

Background

The Isle of Man Water Authority (IoMWA) faced with an increasing population and flourishing economy recognised that their existing treatment works could not meet modern day demands. The Island’s population is over 80,000 and is projected to rise to 90,000. The population peaks annually to around 120,000 during the TT race fortnight in June. Two new treatment works were planned to supply the population replacing a number of older works, some of which were over fifty years old. Although they were built to high standards at the time, they were at the end of their useful lives.

The first new 21 Ml/d treatment works was constructed under a design/build contract awarded to Earth Tech Engineering and supplies the North and West of the Island. The new plant was built alongside the existing works at Sulby and successfully went into supply in 2005, replacing the old treatment works at Ballure and Sulby.

The new Douglas WTW replaces the existing Glencrutchery, Glen Maye and Ballagawne WTW. The new works will treat up to 37 Ml/d

to supply water to Onchan, Douglas, Middle and South of the Island serving 70% of the Island’s population.

Contract

The Contract to Design and Build the new works was awarded to Earth Tech Engineering under an NEC Option C Target Cost Contract in May 2005. Earth Tech and the main civil subcontractor, Lagan Construction (Isle of Man) Ltd, began excavation on site in July 2005 with the works ready to go into supply in late 2007. The formal Take-over Tests were undertaken shortly after Christmas with the Works put into supply on the 14th January 2008. Following a successful testing period the Works was taken over by IoMWA on 14th February and has been putting ‘crystal clear’ water into supply ever since.

The Target Price at Completion was £23.7m with the Final Construction Cost anticipated to be slightly under the value. Delivered on time and budget, the use of the NEC Target Cost Contract is being flagged as the potential way ahead for further engineering projects on the Island.



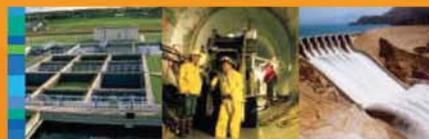
Water is the driving force of all Nature.

Leonardo da Vinci

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Douglas Water Treatment Works under construction

courtesy Earth Tech Engineering

Treatment

- * Raw water is supplied from three reservoirs and has moderate colour (typically 25 Hazen), low turbidity (typically 2 NTU), elevated aluminium and manganese levels and very low alkalinity (typically <5 mg/l as a calcium carbonate).
- * Carbon dioxide and lime are dosed at the inlet to remineralise the water and to aid flocculation. Ferric sulphate is dosed at two flash mixers. Automatic Coagulation Control (ACC) is installed to optimise the coagulation process.
- * The coagulated water is clarified in 4 No. Dissolved Air Flotation (DAF) streams. The floated sludge is removed periodically by hydraulic decanting. The clarified water has a typical turbidity of 2.0 NTU.
- * Lime is dosed prior to 6 No. dual media (sand/anthracite) filters to raise the pH to 6.7 to precipitate soluble aluminium. A slab and nozzle floor enables combined air water washing.
- * Lime and sodium hypochlorite are dosed to aid manganese removal in 4 No. manganese contactors after an interstage pumping station.
- * A further dose of sodium hypochlorite for disinfection is added prior to parallel contact tanks.

- * Orthophosphate is dosed prior to pumping into supply via three separate high lift pumping installations.
- * Filter washwater and DAF sludge are blended in 2 holding tanks and is then pumped to a new design of combined lamella thickeners (SEPTER™). These new units, designed by Earth Tech, produce a high quality supernatant which is returned to the works inlet. Sludge withdrawal is automatically adjusted to give a consistent dry solids concentration in the thickened sludge which benefits the operation of the membrane press used for dewatering. The cake is removed offsite by skip.

Quality of water

The water quality meets or exceeds all current UK, European Union and World Health Organisation standards and will cater for any anticipated changes well into the future.

Note: *The authors Adam Bateman, Project Manager for Earth Tech Engineering Ltd on the Douglas WTW project and Fiona Shaw, Senior Process Engineer, also with Earth Tech Engineering wish to thank Isle of Man Authority for their assistance and permission in publishing this article. ■*