

Glencorse WTW

£125m investment to improve water supply to Scotland's capital

by
Roy Dahl

Edinburgh's drinking water is currently sourced from large reservoirs in the Borders and is primarily supplied from four Water Treatment Works - Alnwickhill and Fairmilehead in Edinburgh, Rosebery in Gorebridge and Marchbank in Balerno. Scottish Water is building the new water treatment works at Glencorse in Midlothian as part of the Edinburgh Drinking Water Project, a strategic programme of capital investment which includes work to replace ageing mains and storage tanks providing water to Edinburgh and surrounding areas. The Glencorse Water Treatment Works Project is the largest construction project by value ever undertaken by Scottish Water. It will improve water supplies for approximately 450,000 customers in Edinburgh.



Overview of Glencorse WTW site on the outskirts of Edinburgh

Courtesy of Scottish Water Solutions

The Alnwickhill WTW and Fairmilehead WTW serve by far the largest part of the city and a total population of around 390,000. Alnwickhill was first opened in 1879 and was originally built to alleviate an acute shortage of water to the city. Since then the treatment works have been upgraded and extended a number of times.

Fairmilehead first opened as an operational works in 1909 and initially served the Fairmilehead and the Braid Hills area. As with Alnwickhill, the treatment works have been upgraded and extended a number of times.

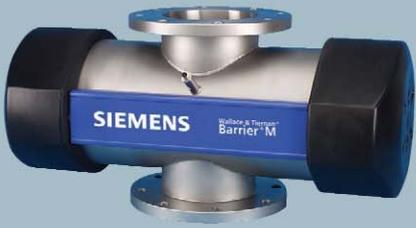
The Glencorse project will be replacing the two existing works with a single, 175MLD water treatment works including a 90ML Clear Water Storage Tank. It also includes the provision of over 15km of large diameter (1200mm) pipelines that will transfer the treated water to Edinburgh.

The site for the new plant was chosen following an extensive consultation and site selection process which carefully considered health and safety alongside planning, programme and reputation issues.

Water Treatment Process

Raw water used at Glencorse will be abstracted from the sources that currently supply Fairmilehead and Alnwickhill. Process calculations were undertaken using sample data from these raw water sources and clarification using dissolved air flotation (DAF) followed by rapid gravity filtration (RGF) was identified as the process treatment solution to be adopted.

As part of the innovative approach taken on the project innovation, counter current dissolved air flotation and filtration (CoCoDAFF), a patented process to Black & Veatch, will be used.



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The process places the DAF process tanks above the RGF stage to help reduce the overall footprint required for the building and the land needed for the project. The solution also requires less construction time which reduces the health & safety risks of the project. The inlet works, DAF plant, RGF plant, backwash water tank and associated mechanical and electrical plant will be housed within new buildings.

Pipeline

The project involves the provision of over 15 km of large diameter (1200mm) pipelines that will transfer the treated water to customers in Edinburgh. A dedicated on site pipe factory was established to produce the large diameter pipes with the aim of reducing capital costs, manufacturing time, CO₂ emissions, pipe deliveries, pipe welds, handling and the associated construction risks.

The mobile pipe manufacture concept was an innovation implemented for the first time in the world by Scottish Water, pipe innovation partner KWH Pipe and construction partner, Black & Veatch. The overall benefit was 1.64million kilometres in road journeys and 1,530 tonnes of CO₂ saved.

The pipe sections were manufactured and delivered to the pipeline route in approximately six months, almost 2.5 times quicker than by traditional road deliveries and off-site pipe production. As the pipe was produced 'on-site', pipe lengths could be greatly increased (ie 22 metres long), which would not be possible by using traditional delivery vehicles. This benefit meant fewer pipe joints and hugely reduced installation costs.

Sustainability

A wide range of environmental measures have been employed in the design and construction of the Glencorse project.

The ability to use gravity, rather than energy-intensive pumps, to drive flows from the Water Treatment Works to Scottish Water's customers was a key factor in the choice of site. An additional environmental benefit of the gravity flow is the ability to generate 25% of the site's electricity by installing a turbine to harness the water's kinetic energy.

The site's location in a popular area for recreation has meant significant effort has been made to minimise the visual impact of the site. Large portions of the major structures are below ground level, to a depth of up to 12m in places. To further conceal the works, the treatment building will have a grass roof and excavated soil will be used to landscape the structures. The green roof will limit surface water run-off and thus minimise the need for off-site sewers and drainage. The use of stone and other natural materials as finishes has been encouraged throughout the site including part of the earth retention system and timber claddings on the buildings.

A design review also led to a reduction in the number of filters required from ten to eight. Together with the use of a counter current dissolved air flotation and filtration (CoCoDAFF) plant this has achieved a 40% reduction in treatment building size.

Timescale

The Glencorse project started on site in August 2008 with construction of the main treatment building beginning in November 2008. Live commissioning of the new works will take place in parallel with the continued operation of the existing assets at Fairmilehead and Alnwickhill. Water into supply is expected in the summer of 2011.

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Aerial photographs of Glencorse WTW showing construction progress between March 2009 and May 2010

Courtesy of Scottish Water Solutions



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