

# Invercannie Water Treatment Cluster

## £38m scheme to improve water supplies in Aberdeen

by  
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**T**aking a holistic approach to three projects to improve quality of water supplies to Scotland's third city is expected to bring significant savings. The Invercannie and Mannofield water treatment works together serve a population of around 300,000 and required major work to meet new drinking water regulations to improve taste, colour and odour. Two aqueducts - one laid in 1866 and the other in 1924 - which are currently used to take treated water from Invercannie to Aberdeen also required upgrading work.



Invercannie: Existing membrane plant will be upgraded in close collaboration with Siemens Memcor

*photo courtesy Scottish Water Solutions*

### Improvements needed

The water treatment works at Mannofield, in Aberdeen City, and Invercannie, 20 miles west of Aberdeen, treat raw water extracted from the River Dee and provide the sole source of potable water to Aberdeen and surrounding areas.

Ongoing water quality analysis identified that both works suffer from failures to meet various permitted concentration values in colour, coliforms, turbidity. The Mannofield works also suffers from manganese levels above PCV and occasional taste and odour problems.

The Drinking Water Quality Regulator has also determined that the level of disinfection control at both works is inadequate to ensure consistent bacteriological compliance and taste.

The older of the two aqueducts transferring treated water from Invercannie WTW to Mannofield WTW has also been identified as

being unfit for purpose; whilst the other requires significant maintenance work. As a result of this, three projects were identified in Scottish Water's Q & SIII (a) investment programme to improve water treatment at the WTWs and improve the serviceability of the aqueducts.

### Single solution

Although the three projects are separate, a single solution tying them together was agreed with Scottish Water.

The solution involves reversing the outputs of 70MLD at Invercannie WTW and 49MLD at Mannofield WTW. This has the direct effect of reducing the scope of work on both Invercannie WTW and the aqueducts, but increases the scope of work and output at Mannofield WTW. However, taken as an integrated solution, the solution produces not only the lowest capital cost but also the lowest whole life cost.

**Mannofield WTW**

Work to expand output at Mannofield will see extension of the existing clarification and rapid gravity sand filters process. The current six clarifiers will be increased to eight and the four sand filters taken up to six. Improvements will be made to the coagulant dosing and chlorine dosing system as well as pH adjustment, carried out at various stages of the treatment process.

At present all wastewater and sludge are discharged to a large sewer that passes through the site for which there is a treatment charge from a PFI wastewater plant. Three new washwater recovery tanks will be added which will reduce water abstraction and wastewater charges. The raw and treated water pumps, which are nearing the end of their economic lives, will be replaced to increase throughput and standby generation capacity will also be increased.

**Invercannie aqueducts**

The two aqueducts both currently carry treated water to Mannofield. The older of the two is of brick construction and, as it is not pressurised there is a risk of ground water seeping in. A decision was taken to remove it from service and instead convert it to carry raw water. That will require a pumping station to be built to lift the raw water to sufficient height to allow it to gravitate through the Mannofield treatments works. A 3km section of 450mm main also needs to be constructed to increase security of supply to Banchory, which is presently fed from the aqueducts.

The 48 inch nominal diameter, 1924 aqueduct requires capital maintenance work on all of its valves to extend its life. Thermal imaging cameras were used to carry out aerial imaging of the aqueduct to assess its condition. Although the pipeline itself was thought to be in good condition, it was suspected that some of its 2,500 lead-run joints were failing and causing leaks. The imaging

work helped establish a series of improvements were needed which will see the uncovering of 100 joints and installation of band joints. Dechlorination chambers will be installed on all 26 scour points along with refurbishment of 16 in-line valves and the replacement of scour and air valves is planned.

**Invercannie WTW**

The current three stage process uses ozone, slow sand filters, and then membranes as a cryptosporidium barrier. The sand filters and ozone process will be decommissioned and the membranes will be upgraded. The existing primary membranes will be replaced with hydrophilic PVdF membranes to remove colour and turbidity from the raw water. The two existing secondary membranes will be replaced with one new primary membrane cell to improve security of membrane plant operation. The project team is working closely with Siemens' Memcor who designed the existing membrane infrastructure.

Sludge thickening and pressing equipment will be added and improvements made to chemical dosing systems.

**Progress**

Detailed design of the scheme is currently being carried out with construction expected to start by the end of 2007. Work at Mannofield will be carried out by *Morrison/Enpure*, and *Alfred McAlpine* will be handling the aqueduct work.

The project at Invercannie WTW is currently (May 07) out to competitive tender. ■

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