



FOFANNY WATER TREATMENT WORKS

VALUE: £17.45million

CLIENT: Department for Regional
Development Water Services Northern
Ireland

LOCATION: Nr Kilcoo, County Down,
Northern Ireland (Now Northern Ireland
Water)

CONTRACT START: NOV 2003
CONTRACT FINISH: NOV 2006

PROBLEM: To design and build water
treatment works in environmentally
sensitive and rural area to EC Drinking
Water Directive

CHALLENGES: The site is located in a
designated Site of Special Scientific
Interest; an area of "Outstanding Natural
Beauty" New works must have minimum
impact on local surroundings

SOLUTION: Upgraded treatment works
was compacted in design, which allowed
the whole works to be "buried" out of sight,
reducing impact on local environment when
finished.



DESCRIPTION & KEY FEATURES

- 3 No. raw water intake pipelines. Turbine on high reservoir source.
- Flash mixing for coagulation (Aluminium Sulphate) and pH adjustment.
- 5 No. parallel streams of flocculation and dissolved air flotation (DAF) cells including saturated water recycle system.
- Chemical dosing to adjust pH.
- 6 No. Main filters for removal of residual Aluminium.
- 4 No. GAC Contactors for removal of taste/odour and THM precursors.
- Chemical dosing with sodium hypochlorite and pH adjustment.
- 4 No. Manganese filters for removal of manganese. Filter dirty washwater collection and settlement via 2 No Lamella Thickeners.
- 3 No return filters for Lamella supernatant (returned back to inlet).
- Dewatering of thickened sludge using a single membrane Plate Press giving a sludge cake dry solids of 22%.
- Chemical storage and dosing facilities for pH correction (Lime), coagulation (Aluminium Sulphate), Disinfection (Bulk Hypochlorite), Sludge thickening (Polyelectrolyte), Plumbosolvency (Orthophosphoric Acid)
- Final water pumping station to Annalong and Kilkeel & gravity outlet connections for treated water to Fofannybane Clear Water Tank.
- 8 MI new clear water tank at Fofannybane.
- Demolition of existing Fofannybane WTW.
- Upgrade of Lough Island Reavv Pumping Station.



Project Background

This contract is to construct a new water treatment works to supply up to 52 MI / day of potable water to the requirements of the EC Drinking Water Directive 80/778/EEC to some 100,000 consumers in southern parts of County Down, Northern Ireland.

At present these consumers receive water from Fofannybane Water Treatment Works, which was constructed in the 1960s and subsequently extended on several occasions. It is located in the lower Mourne area on the side of Butter Mountain overlooking the village of Kilcoo in Co Down, approximately 8 km west of Castlewellan.

Raw water is supplied to the works from three sources, namely Spelga Dam, Fofanny Dam and Lough Island Reavy Reservoir. Spelga and Fofanny waters both gravitate to the works whilst Lough Island Reavy is pumped. The existing works is currently capable of supplying up to 32 MI / day.

In order to meet EC regulations, the existing works would have had to undergo major refurbishment. Also, under Water Service's Water Supply Strategy, it would have required upsizing to provide water to the Annalong and Kilkeel areas. Due to the difficulties of developing the existing works, in 2000 Water Service took the

decision to develop a new site.

Area of Outstanding Natural Beauty

The Mourne area is classed as an Area of Outstanding Natural Beauty, is part of the Countryside Policy Area and is a candidate for National Park status. The local economy is dependent on tourism, and in particular scenic and activity-based tourism. It was therefore very important that the design of the new works had the minimum possible impact on the environment.

Assessment of the criteria showed that the site most suitable for the new works was on previously disturbed land - which was used for tree cultivation - just north of the man made Fofanny Dam. Records indicated that this area showed no evidence of archaeological features and environmental studies suggested that the flora and fauna in the area demanded no special treatment.

In developing the new works, Earth Tech, in association with expert architectural and environmental engineering consultants, considered designs locations for the building of the new works, taking into account environmental, engineering and economic criteria.

Further consideration of environmental aspects led to a decision to fully merge the building into the landscape, making it invisible from as many viewpoints as possible.

In April 2003, Earth Tech Farrans were appointed as the preferred bidder for the project. The tender proposal was based on an earth sheltered design for the new water treatment works.

Caring for the Environment

The site chosen for the new works is a highly environmentally sensitive site lying adjacent to the Shimna River. Throughout the course of construction and thereafter, measures are being taken to protect the local watercourses and the finished works will be landscaped using indigenous vegetation.

The detailed Environmental Statement has addressed many issues such as air quality, noise, flora and fauna, archaeology, visual impact and emissions from the new works.

Environmental specialists are being retained throughout the life of the project to provide expert advice and the contractor is working to a specified Environmental Management Plan as agreed with the Environment and Heritage Service.

For the people of south Down and particularly those who live in the locality, the new Fofanny Water Treatment Works will offer many benefits. Not only will it provide a safe and reliable drinking resource for future generations, but it will also put an end to the visually unacceptable practice of dumping sludge on the catchment of Spelga Reservoir.

In addition, it will allow Water Service to remove the existing Fofannybane works, which is viewed by many as a 'blot on the local landscape' and make this area of the Mourne more attractive.



Nature of Contract

Following appointment of Earth Tech Farrans the tender design went through a detailed design and development stage. This involved all parties and stakeholders working together under a partnering team ethos, for a period of five months.

At the same time, the Fofanny project management team embarked on a two-phase consultation period to inform local councillors, statutory bodies, local interest groups and the general public about plans for the construction of the new works, well in advance of submitting a planning application.

During this consultation phase the design was optimised and developed to take into account, safety, buildability, whole-life costing and operational requirements. This team approach enabled all parties to be involved in the initial development period and to “buy in” to the final solution. This resulted in a more efficient detailed design and procurement phase for the project.

The development process was based upon methodology developed on the earlier Aquarius 3 (Mourne WTW) and Loughmacrory projects.

Following receipt of Planning Permission for the scheme in November 2003, Earth Tech Farrans were awarded the main contract for design and construction of the plant. The Contract is NEC Option C (reimbursable) with a tendered target cost.

Babtie Group successfully project managed the project during the early phase of the Contract before Water Service Procurement took over the role. Key personnel involved on the Aquarius 3 (Mourne WTW) project, both on the client procurement team and contractor sides, have transferred to the Fofanny WTW scheme, which has enabled continuous improvement to be practised and an efficient management process instilled.

Process Design

The new works is designed to produce between 18 and 52 MI / day of potable water. Raw water will be supplied from three sources, namely Spelga Dam, Fofanny Dam and Lough Island Reavy Reservoir.

The Spelga source is a soft moorland water with high colours, particularly in the winter, and moderate turbidity. The levels of iron and aluminium are above the regulatory levels. Manganese levels are variable with increasing incidence of high spikes. Fofanny water is similar in nature but the colours are lower. Lough Island Reavy is much lower in colour but is subject to algal blooms. Cryptosporidium has also been identified as a risk.

The process adopted is a four-stage operation, consisting of DAF, rapid gravity filtration, GAC adsorbers and manganese filtration (see process flow schematic). The location and nature of the design solution will make additions to the process very difficult. Consequently, the process design parameters were agreed to provide a robust solution. Further details are as follows:

- Inlet flash mixing and chemical conditioning by dosing with aluminium sulphate and lime.
- Clarification stage comprising five parallel streams of flocculation and dissolved air flotation.
- Correction of pH with lime followed by six rapid gravity primary filters for removal of residual aluminium. The filters contain dual media comprising sand and anthracite suspended on a plenum floor fitted with CADAR filter nozzles.
- Four granular activated carbon (GAC) adsorbers for removal of taste and odour and reduction in THM precursors.
- pH adjustment with lime and the addition of sodium hypochlorite to oxidise soluble manganese prior to removal by four fast rate sand filters.
- Disinfection of treated water is provided from bulk sodium hypochlorite. A final trim dose is provided downstream of the manganese removal filters prior to water going into supply. Orthophosphoric acid is also dosed before the water leaves for plumbo solvency control.
- Final water leaving the works flows by gravity to the existing clear water tank at Fofannybane. A variable speed pumping station is also to be constructed at the works to deliver up to 8 MI / day to Crocknafeola Service Reservoir which will supply the area of Annalong and Kilkeel.
- Clarification of the process sludges removed by the DAF and filter washings is achieved by lamella separation technology. The sludge produced is then pumped to a membrane filter press. Pressed sludge is removed from site for disposal at a licensed landfill site. The supernatant from the separators is treated to meet a stringent solids specification before returning to the head of the works.

