

Wear Valley Water Treatment Works

engineering excellence in ‘area of outstanding natural beauty’

by

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Northumbrian Water, which can claim official recognition as the best performing water and sewerage company in England and Wales*, is constantly striving to improve the quality and security of supply of drinking water to customers. As part of its ‘Second Wave’ programme of quality improvements, the Company is investing £28 million constructing a new state-of-the-art water treatment works at Wearhead, County Durham, right in the heart of the North Pennines Area of Outstanding Natural Beauty.



Still image from computer generated interactive model of new Wear Valley WTW (courtesy Northumbrian Water)

Meeting the EU Drinking Water Directive

This Directive came into force in December 1998, requiring the quality of drinking water to meet new standards by the end of 2003. Figures from the Drinking Water Inspectorate show that Northumbrian Water supply some of the best quality drinking water in the country, with 99.89% of all drinking water tests meeting British and European Standards.

To ensure that this high standard is maintained and to secure the supply of drinking water to over 200,000 customers in Sunderland, Wearside, Bishop Auckland and the villages in the Upper Wear Valley, **Northumbrian Water is investing £28m in constructing a new water treatment works adjacent to Burnhope Reservoir, at Wearhead, County Durham.**

The new Wear Valley WTW will replace two existing water treatment works, one adjacent at Burnhope Reservoir at Wearhead and the other at Tunstall reservoir, near Wolsingham in County Durham. Both Wearhead WTW and Tunstall WTW are of similar age and design and approaching the end of their working life; and to comply with future quality standards both require replacement.

Wear Valley WTW – process

A Feasibility Study commenced in 1998, investigated single and multiple replacement water treatment works options throughout

the Wearside area and the adopted solution proposed a new Wear Valley WTW adjacent to Burnhope Reservoir at Wearhead.

The new WTW is designed to supply up to 25 million litres per day (Mld) of drinking water by gravity, utilising the existing distribution network, and has the capacity to supply over 35Mld into the network by use of a booster pump arrangement. The works incorporate a turbine on the inlet to utilise renewable energy from the raw water to generate up to 200kW of power. Additionally, the works includes the facility for the stand-by generator to be used to ‘peak-lop’ power requirements enhancing the environmental benefits of the project.

From the inlet area raw water proceeds to the clarification process which utilises lamella settlement technology. This clarification process has been subject to extensive pilot plant trials on the anticipated seasonal fluctuations in raw water quality, to gain confidence and knowledge for use during process commissioning and optimisation.

The clarified water then proceeds to a suite of six rapid gravity sand filters, which incorporate a process of catalytic oxidation in the media. The clarified and filtered water will then be subject to a primary chlorination disinfection before proceeding to the treated water reservoir and into supply.

Filter wash water is clarified using a lamella settlement process and then recirculated. A separate building houses sludge handling plant and equipment to press (de-water) the sludge which is generated by the clarification and washwater sludge removal systems.

Building in an Area of outstanding Natural Beauty

The Feasibility Study investigated a possible 32 locations for the new Wear Valley WTW and the benefits of the chosen location adjacent Burnhope Reservoir. included:

- * the local landscape had already been changed with construction of Burnhope Dam and Reservoir in the 1930s and adjacent land was already being used for a water treatment works (the existing Wearhead WTW which was built in the 1950s).
- * the location minimised requirements for extensive new distribution infrastructure with the associated community and environmental disruption. It also reduced the need to pump water, reducing energy use and greenhouse gas emissions.

The proposed location is situated within the North Pennines Area of Outstanding Natural Beauty (AONB) upon which recent legislation and Planning Policy has conferred the status of National Park. The AONB was established in 1978 and covers 1,983 square kilometres and protects wide empty expanses of one of the country's last wildernesses. The proposal to construct in this location was a major determining factor in Northumbrian Water's decision to voluntarily carry out an extensive Environmental Impact Assessment as part of the Planning and consultation process.

From the outset, Northumbrian Water embarked on this scheme with the view that the construction of a water treatment facility in this AONB should not only demonstrate "good practice" but should be referred to in the future as an example of 'best practice'.

An extensive consultation exercise was undertaken involving Wear Valley District Council, Durham County Council, the Parish Council, local residents and the Countryside Agency. In addition, English Nature and the Environmental Agency and National and Local interest groups were consulted on particular issues.

The new water treatment works has been designed to minimise impact on and blend into the surrounding landscape. The buildings have the appearance of an upper Weardale farmstead and are constructed of natural stone, slate and timber. To further minimise the impact of the new WTW on the adjacent landscape, nearly one third of the water treatment facility is buried into the hillside and the chlorine contact tank and treated water reservoir are also underground structures significantly reducing the visible footprint.

The project gives great importance to landscape design and habitat creation. The trees incorporated into the landscape design scheme have been chosen to favour Black Grouse and generally to encourage a wider range of species, including nesting and foraging birds, to use the site. Approximately two hectares of woodland will be planted, incorporating up to 16,000 trees. Additionally, native trees and shrub species will be used including downy birch, willow, bird cherry, juniper, scots pine, alder, hazel and rowan. Almost 1 km of dry stone walling will be constructed and approximately 2 km of public footpath created around Burnhope Reservoir, including over 300m upgraded to provide disabled access, incorporating

construction of a new footbridge to increase ease of recreational access to Burnhope Reservoir.

New works for old

Once the new Wear Valley WTW is constructed and commissioned, the old Wearhead WTW and Tunstall WTW will be demolished. At the location of the Wearhead WTW a wetland nature reserve is planned to encourage wildlife, especially the local population of an endangered breed of water voles – one of the most threatened mammals in the UK – and a priority species in Northumbrian Water's Biodiversity Action Plans. A pond dipping area will be constructed at the wetland nature reserve for use during educational visits.

ISO 14001 accreditation for construction site

As part of the Environmental Impact Assessment process, NWL made a commitment to ensure mitigation measures would be implemented to address issues highlighted in the Environmental Statement. This included a commitment that the principal contractor and sub-contractors would implement a site Environmental Management System (EMS) in accordance with BS ISO 14001 'Environmental Management Systems – Specification with Guidance For Use' which would cover all construction activities at the site.

Northumbrian Water's Corporate Environmental Policy covers its commitment to continual environmental improvement and the company recognises environmental issues to be of concern to its customers, employees and the community as a whole. The Environmental Policy states that the Company will take account of environmental issues at an early stage in the planning of all new projects and require an environmental review to be prepared in support of all its major development projects. Environmental effects of construction of new projects will be considered and carefully managed with clear responsibility. To comply with this policy, a site specific environmental procedure was developed to facilitate the environmental management of the construction phase of the Wear Valley WTW project. BS ISO 14001 accreditation was conferred on the construction site in 2001 and has been successfully maintained through six monthly external audits.

Working with Northumbrian Water in 'The Wear Valley WTW Project Partnership are: *Entec (UK) Ltd – Lead Feasibility Consultant, Environmental and Construction Management; Montgomery Watson Harza Limited – Lead Design Consultant. Casella Stanger Science & Environment Ltd - Environmental & Landscaping Design Consultant; Faithful & Gould – cost management consultant; Byzak Ltd – main civil engineering & building services contractor & Principal Contractor; Ondeo Degremont Ltd – main process & MEICA contractor.*

Construction commenced on site in March 2001 and is programmed to be complete by September 2003, when functional and full process commissioning will commence. The new Wear Valley WTW is on programme to be supplying water of the highest quality to customers by the end of December 2003.■

Ref: * according to the Regulator OFWAT's levels of service reports for water treatment, sewerage and customer services 2000-2001 and 2002-2002.

Note: The author of this article, John H Robson, is Client Project Manager for The Wear Valley WTW project.
