Severn Trent Water

27km link main Meriden to Highters Heath

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Water to supply the city of Birmingham is transported over 80 miles via a major aqueduct from reservoirs in Wales. The aqueduct feeds raw water into a single large treatment works on the western edge of the conurbation. A major strategic study carried out in the mid 1990's identified the need for Severn Trent to have an alternative source of supply available in the event of an emergency occurring with either the aqueduct or the treatment works. After investigating a number of options the final proposal involved the construction of a major new link main which will provide the ability to move bulk quantities of water from east to west should an emergency situation arise in Birmingham and also provide additional operational flexibility – the capability to transfer water in times of normal operation from west to east. The project, with an overall cost of £20m, included one of the largest pipelines within any of the UK water companies AMP3 investment programmes.

1200mm Ductile iron pipes ready to be laid *(courtesy Severn Trent Water)*

Detailed design works began in 1997. Since then many consultations have taken place with landowners, occupiers, local councils and other nature and environmental bodies to ensure the work has been well planned to result in the minimum amount of disruption.

Route of the main passes through farmland, golf courses, residential areas and main streets whilst also entailing thirteen tunnel crossings of railways, canals, rivers and motorways. In addition work was required to be carried out in close proximity to high pressure gas and fuel pipelines within a very narrow 'services' corridor.

Pipeline design

Various steel and ductile iron options were considered during the design stages. Ground conditions were known to be aggressive in certain areas, in addition the main had to be laid close to the route of existing overhead power lines and cathodically protected steel oil and gas pipelines at a number of 'pinch' points.

The cost balance between steel, ductile iron, corrosion protection and thrust restraint was reviewed in detail by designers, contractors and suppliers before the final choices were made.

Construction
Preparation works by the main contractor, *Birse Pipelines,* began in January 2001 with the first pipes being laid in April. Initial work in fields included the erection of temporary fencing, the stripping of topsoil and the coppicing of hedgerows. All topsoil has been stored at the side of the working areas for reuse after the pipeline construction and ground reinstatement is finished..

A combination of ductile iron and steel pipes are being used to form the pipeline ranging in size from 600mm to 1200 mm diameter. These were delivered to site and strung out along the length of the main, approximately 27km. Deliveries of the pipes and construction sequences had to be modified and be continuously flexible as the effects of foot and mouth disease, early in 2001, closed almost 75% of the route.

The pipeline was constructed in new tunnels at major crossing points to avoid massive disruption and at other locations to reduce the environmental effects.

Special construction issues
On top of the usual issues which had to be overcome during the construction phase other more unusual problems arose. These included the occurrence of foot and mouth disease early in 2001 and the presence of Japanese Knotweed in locations along the route of the main. This is classified as an 'invasive' plant under the Wildlife and Countryside Act 1981. The 1990 Environmental Protection Act resulted in discarded Japanese Knotweed waste and soil contaminated with rhizome being a 'controlled waste' which must be disposed of at a suitably licensed landfill site and buried to a depth of at least 5m.

Pump stations
Pumping stations have been constructed along the route to move water, collected from Derbyshire in the north and Strensham to the south, into the Birmingham area. These will enable up to 160 megalitres (approximately 35 million gallons) of water a day to be pumped from the site near Coventry.

200mm pipes laid in fields *(courtesy Severn Trent Water)*

Two major installations are being constructed - at Meriden and Highters Heath, with a further pump station planned in the Birmingham area in the near future. Detailed consultation took place with the local planning authorities to finalise pump station finishes.

Environment
Parts of the pipe route pass close to archaeological sites and areas of scientific interest. At various stages through the construction, archaeologists have inspected the ground to identify and record signs of archaeological interest and rescue any artefacts.

Environmental bodies such as English Nature were widely consulted throughout the early planning stages and an environmental consultant was retained during the construction phase to offer advice on all appropriate matters. This included establishing the likelihood of nesting lapwings, a detailed tree and plant survey at a a coppice site and the production of a method statement to deal with the removal of Japanese Knotweed.

Key environmental facts
Trees and hedges

* all affected hedges were surveyed and assessed for the location of mature trees, bird nesting and bat roost sites;
* over 190 hedgerows were coppiced at crossing points and will need to be reinstated;
* hedge removal work took place outside the bird nesting season;
* compensation planting has been offered to landowners affected by the work;
* where trees or saplings had to be removed in woodland areas deadwood wood-piles have been created to encourage woodland invertebrates into the community;
* a felled willow tree was used to construct a log pile otter holt.

Wildlife
*1400m of 'capture fencing' was erected through a golf course to prevent harm coming to Great Crested Newts at three pond locations along the route. Additional local enhancements will be carried out near to some newt ponds to improve their overall habitats;
* the route of the main was realigned to minimise the effect of construction where active badger setts had been identified;
: the services of a specialist badger consultant have been retained for the duration of pipelaying activities.

Fields
* 13 fields with semi-improved grassland will be reinstated to the satisfaction of English Nature and the local wildlife trusts. Precise grass seed mixtures were identified and specified before the contract was awarded.
* areas of ridge and furrow fieldwork were identified and will be reinstated.

Conservation organisations
Archaeological assessments were made during the top soil stripping process to identify sites of interest for further archaeological work during construction. English Nature, English Heritage, Council Planners and Ecologists, Environment Agency are some of the many bodies contacted for discussions and agreement of proposals during both the design and construction phases. Members of each party were invited to inspect the works in progress at any time.

Specialist consultants
An environmental consultant was retained during the construction phase to offer advice on all appropriate environmental matters. Crossings of the River Blythe (Site of Special Scientific Interest) and canals were carried out by tunnelling methods, allowing the watercourses to remain unaffected by the work.

Noise
Noise level surveys have been carried out at pumping station sites to ensure that the existing noise balances will be maintained when the scheme is commissioned.

Roadworks
Major lengths of mainlaying in public highways were carried out during school holidays to reduce the affect on traffic. Other work in public highways was wherever possible undertaken outside rush hour periods.

Leisure
Construction through golf courses was carried out at times to suit the individual clubs for competitions and for optimum reinstatement of fairways and tees.

Key customer issues
Despite the fact that part of the 27km route passed close to high profile residential areas there was negligible disturbance to customers' water supplies. Key connections into the existing distribution systems were undertaken at night and were the subject of some detailed planning to ensure that supplies to over 30,000 customers were not affected.

Communications with customers was given a high priority and a regular (quarterly) news update consisting of direct mail shots to over 5000 properties and media releases was planned to keep customers informed of key dates, progress and contact personnel.

Technical details
Link Main
* length 27km
* sizes 1200mm – 600mm
* material ductile iron and steel;
* flows 10 to 160Ml/d;

Pipejacks/mini tunnels
* number 14
* diameter 1500mm – 1050mm internal dia.
* length ranges 28m – 152m;

Major pumping stations
Meriden PS
* to feed water into Birmingham/Solihull;
* pumping range up to 40ML/d per pump;
* type of pumps 4 x centrifugal.

Highters Heath PS
* to feed water from Meriden Reservoirs into Northfield zone;
* pumping range up to 30 ML/d per pump;
* type of pumps 2 x centrifugal.

Mode of operation
* day to day 10ML/d from Birmingham to Meriden;
* in emergency circumstances 160ML/d from Meriden to Birmingham.

Scheme costs
* overall cost of the project will be in the region of £20m:
* value of the main contract was £14m.

Programme
Work commenced in January 2001 and is expected to be complete in summer 2002. ■

Note: *The author of this article, John Foster, is Principal Engineer with Severn Trent Water.*