

Avon WTW Support Scheme

£8.8m pipeline scheme to improve South West Water's security in supplying water to the South Hams and Plymouth area

by

Caroline Nickson MEng CEng MICE, Nol Vincent BSc (Hons)
and Peter Bromley BSc CEng MICE ACGI

The South Hams and north Plymouth district is set to see a dramatic increase in its demand for water over the forthcoming decade due to major development work proposed for the area including the new £450m Llangage Power Station, plans for the construction of the second largest business park in the south west and potentially up to 5500 new homes as part of a new town proposed on the outskirts of east Plymouth.



Construction within Newnham Park

Courtesy of May Gurney Limited

To meet the demands of tomorrow head on, South West Water, along with designers, Hyder Consulting and Principal Contractor, May Gurney, have just completed the construction of a new 13km long, 700mm diameter trunk main through woodland, parkland and agricultural land in rural South Devon. As part of a £9.5m investment to increase the security of supply, this scheme, along with the construction of a new pumping station at Belliver service reservoir was constructed to transfer flows from Dousland and Crownhill Water Treatment Works to Houndall service reservoir near Ivybridge.

The scheme was not without its challenges with the team having to pay careful consideration to the impact on two successful local businesses, two major watercourse crossings (set within mature woodland valleys) and a number of major utility crossings including high pressure gas mains and high voltage overhead cables. The following article focuses on some of the major challenges that faced

the team for this project and their approach to overcome them.

Programme & procurement

The scheme commenced in October 2007 to be commissioned and operational by March 2010, within South West Water's K4 investment period. Key activities and timescales included;

Oct 2007 – Feb 2008	Initial route selection
Mar – Oct 2008	Site surveys and identification of key issues
Mar – Oct 2008	Ecological and habitat surveys
Jul – Feb 2009	Detailed design
Oct – Dec 2008	Tender period and contractor selection
Jan – Mar 2009	Early works – hedge and vegetation clearance
Apr – Oct 2009	Construction period
Dec 2009	Commissioning and handover

The tender was let under the NEC3 Option C (Target Cost with Activity Schedules) to May Gurney, the successful Tenderer. All parties, Client, Contractor and Designer fully embraced the teamworking ethos of the NEC type of contract which included co-location of the South West Water project manager to the local May Gurney office.

Landowner/ Estates Issues

One of the major challenges for the scheme was the impact the pipeline construction would have on two major commercial businesses, namely Dartmoor Zoological Park and Newnham Park which includes a Premier clay shooting establishment which also holds regular festivals and charity events. Achieving the programme and ensuring all health and safety measures were in place were key to reducing the impact on these businesses.

• Newnham Park

The design team reviewed alternative routes to avoid passing through this 1500 acre country estate but with a proposed re-opening of the Tungsten mine to the east and proposals for future housing to the south, the only real option was to cross through the park, through the steep oak lined valley and the watercourse lying at its base.

The major challenge faced by the team within Newnham Park was planning how and when to access, and construct the pipeline without causing major disruption to this successful business. Careful negotiations with the park owner allowed for the clay shooting business to be closed for up to three months while the construction works took place as the Health and Safety issues associated with constructing the pipeline through an active clay

shooting ground posed too great a risk. To avoid further disruption to the Park, the team worked closely with the owner and manager of the park to allow the remaining activities proceed as normal throughout the construction period. As a result of careful planning, close liaison between all parties, focused working practices and regular discussions plus a spirit of cooperation, the works within the park were completed within a two month window allowing the shooting business to be reopened one month early.

• Dartmoor Zoological Park

Following major refurbishment, Dartmoor Zoological Park was reopened in July 2007. This successful family run business is home to a range of animals from tigers, lions and bears to insects and reptiles. Not only did the route selection have to consider minimising the impact of construction on the business, consideration also had to be given to minimising disturbance to the animals. A partial closure of the upper car park and a narrow corridor within the tapir compound allowed the zoo to stay open with only minimal disruption throughout the duration of construction.

Pressures, pipes and bends

The selected pipe material was ductile iron generally operating within a 16 bar pressure rating. However, the two lowest points on the system, the River Plym and the Tory Brook crossing in Newnham Park, were required to have a test pressure of 25 bar.

The route was carefully designed to reduce the number of bends required by utilising the allowable tolerances of deflection on the pipe joints. Where it was not possible to remove the bends, an assessment was made whether to use thrust blocks or anchored pipes (Saint Gobain's Universal Rapid Locked for pipes above 600mm diameter) dependent upon access, proximity to existing services and terrain.

River Plym Crossing

The River Plym is one of the major rivers in the South Hams, running south from Dartmoor to Plymouth. At the route crossing point, the river reaches up to 20m wide in places. The initial proposal to cross the river using open cut construction was reconsidered by the team following site investigation which identified mudstone slate at shallow depth. The shallow depth to the mudstone would have been a challenge to dewater during construction within the river. After careful discussions with the Environment Agency it was agreed that the River Crossing would be carried out utilising thrust bore technique. With a cofferdam up to 6m deep and a 30m drive length, this was no small task was completed successfully along with three additional thrust bore sections along the route.

Service Crossings

Throughout the length of the pipeline route, major service crossings were required including high pressure gas mains in three locations, water trunk mains in six locations (including one in the steep narrow corridor within the oak valley at Newnham Park) and two crossings beneath National Grid's 400kv overhead cables. Perhaps the most challenging location was adjacent to the Ministry of Defences base for 42 Commando, Bickleigh Barracks, not because of security issues associated with working adjacent to MOD property but because the pipeline had to be laid within 6m of a high pressure gas main to the south and within 2-3m of a major water trunk main to the north. Alternative routes were prohibited with Bickleigh Barracks to the south of the gas main and a woodland with badger activity to the north of the trunk main. The pipeline was anchored at the bends in this location to reduce the excavation width required and careful liaison with Wales and West (the gas main utility company) to agree excavation so close to a critical pipeline.

Archaeology

With the site skirting the south west corner of Dartmoor and Boringdon Camp (an Iron Age and Roman earthwork) to the west of



Pipeline construction

Courtesy of May Gurney Limited



Archaeologists at work

Courtesy of May Gurney Limited

Newnham Park, it was anticipated that this area would be of archaeological importance. Based on an initial desk top study and geophysical mapping, it was agreed with the County Archaeologist that fifty percent of the route would have an archaeological watching brief for the topsoil strip. A number of interesting areas were identified by the archaeologists including evidence of historical buildings and a smelting works to the west of Newnham Park. Although there were up to twelve archaeologists on site recording the findings, flexibility in the programme allowed the Principal Contractor to work around these findings to avoid construction delays.

Sustainability

Not only is a reduction in waste generation beneficial to the environment, it achieves large cost savings to minimise the volume of waste being removed from site to landfill. In the design and development stages, a soil assessment survey confirmed that the use of Saint Gobain's ductile iron pipe with PAM natural coating would allow for selected as-dug material to be used as backfill. Not only did this minimise the material being removed from site to virtually zero (with the exception of crossings within the public highway), it also reduced the material imports and hence traffic impact on site. Also, the extensive use of anchored joints enabled a large reduction in the volume of concrete which would have been required for thrust blocks.

Awards

The scheme has won a number of awards for its achievements including;

- Finalists in the Carbon Reduction Category of the 2009 DEBI Awards
- South West Water Pure Service Award for the Customer Liaison Officer role within Newnham Park
- Special Commendation in the 2009 Pennon Group Environmental Awards
- Highly Commended in the CIWEM World of Difference Award 2010
- Finalist in the Water Industry Achievement Awards

Summary

The scheme was delivered ahead of schedule and within budget and the success of the project was down to the commitment and partnering approach shown by the whole team.

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