Stoke Ferry to Downham Market
& Beck Row to High Fliers 18" reinforcement

by
Stewart Evans

The Stoke Ferry to Downham Market Link project was an Anglian Water Business Plan submission scheme to alleviate supply deficits in the Wisbech planning zone. The Beck Row to High Fliers 18" Reinforcement project is an intra zonal supply demand scheme to resolve current and forecast headroom deficits in the Ely Distribution Zone.

Pipe strung out along the easement *photo courtesy of the @one Alliance*

Options considered

The Business Plan submission for the Stoke Ferry Scheme consisted of a booster pumping station sited at Stoke Ferry Water Treatment Works WTW and 10km of 500mm ID main between Stoke Ferry and Bexwell Reservoir. This option was rationalised during the design process when it was noted that the level at Bexwell Reservoir was similar to Middleton Reservoir which is fed from Stoke Ferry via a 600mm diameter trunk main. Modelling indicated that by taking a feed off the trunk main, the existing Stoke Ferry pumps would be able to feed both Middleton and Bexwell Reservoirs. This option provided a significant cost saving has alleviated the need for a booster pumping station and reduced the length of the main from 10km to 7.2km.

Beck Row WTW currently pumps water from Codson Hill Reservoir and the on-site boreholes to Isleham WTW where it is blended with high nitrate water prior to onward transmission. The original option for the scheme was to construct 4.6km of 450mm ID main and upgrade a pumping station to allow flows to by-pass Isleham. Although this option satisfied the mandated requirements it did not fully utilise the residual head in the flow from Codson Hill and it also relied upon the existing main between Codson Hill and Beck Row that was subject to frequent bursts. A second scheme to replace the final 3.5km of the Codson Hill to Beck Row main was mandated and an alternative design was promoted that combined the two projects. This involved intercepting the Codson Hill to Beck Row main and laying a 6.1km main to allow flows to gravitate to Isleham WTW. The existing Beck Row forwarding pumps were converted to variable speed drive (VSD) and this together with a flow control valve on the new Isleham main, allowed for full operator flexibility in controlling flows.

Undertakings

The works is being undertaken by the @one Alliance, a collaborative organisation comprising Anglian Water Engineering, Balfour Beatty Utility Solutions, Barhale, Biwater Treatment Ltd, Black & Veatch, Grontmij and Skanska-Aker Solutions, which was set up in 2005 to deliver a large part of Anglian Waters AMP4 capital investment programme.

The union of these companies brings together a wealth of experience which is being used to enhance and increase Anglian Water's assets and infrastructure, providing innovative and sustainable solutions and the best value to customers. By doing so, the @one Alliance is helping Anglian Water fulfil its current supply and treatment obligations as well as make provisions for the increase in demand expected in the future.

Design

Both schemes were designed to provide operational flexibility in the control of flows and the key components in achieving this were:

Stoke Ferry

* Installation of 7.2km of continuously welded 560mm OD HPPE SDR 21 Water main, by open cut/directional drilling methods.
* Installation of flow control valves.
* Provision of radio control links to Stoke Ferry WTW.

Beck Row

* Installation of 6.1km of continuously welded 560mm OD HPPE SDR21 water main, by open cut/directional drilling methods.
* Installation of VSD drives to the 2 existing forwarding pumps at Beck Row.

On-site butt fusion welding *courtesy the @one Alliance*

* Installation of VSD drives to 2 borehole pumps at Beck Row.
* Rewriting the existing control philosophy for the VSD drives to mimic the existing control systems.

Construction

Commencing on site in December 2006, the Stoke Ferry scheme was commissioned in June 2007. The six month construction period allowed for the erection of temporary fencing, topsoil stripping, over 700 butt fusion welds, and the ditching, testing and commissioning of the main.

The Stoke Ferry project was subject to an @one Alliance Board review. These reviews, headed by a member of the @one Alliance Board, are designed to capture and publicise best practices across all the programme areas, Best practice captured as part of the Stoke Ferry review included:

* Butt fused towing heads that are reusable as part of directional drilling operations.
* Blank plate drilling head utilised to ensure no ingress of debris during directional drilling operations.
* Integration of supply chain in design - Glynwed.
* Good integration of project team.
* Daily Safety Hazard Boards.

The Beck Row scheme started in July 2007 and was commissioned in April 2008.

Environmental/planning issues

A detailed environmental statement was prepared for both projects to ensure that all construction activities would take due regard for the environmental sensitivities of the area. The statements considered many aspects including ecology, air quality, noise, flora and fauna, traffic issues, water quality, drainage, archaeology, cultural heritage and visual impact.

The philosophy for both schemes was to mitigate environmental risks. Examples of this included the directional drilling of multiple river/ditch crossing and the re-use of all excavated material.

It was identified early on in the projects that both would require extensive archaeological investigation. This ranged from a watching brief during topsoil strip through to extensive slit trench excavations that extended over the width of the easement. Excavations undertaken as part of the Stoke Ferry scheme revealed a Saxon burial place, although this was of limited archaeological interest. Early liaisons with the County Archaeologists and archaeological contractors ensured that all mitigation work was complete in advance of the construction start.

Land liaison & communications

The schemes had minimal impact on the public and all road crossings were directionally drilled to avoid any disruption and delays. As the pipeline routes were cross country, this caused disruption to landowners, although extensive liaison between the site team and the Land Agents ensured this was kept to a minimum. During the course of the projects close liaison with the local community was maintained via scheme notice boards and letter drops.

Commissioning

Commissioning of both projects was a challenge as there was limited scope within the area for discharging large volumes of water. Deviations to the standard Anglian Water commissioning sequence and procedures were agreed with Anglian Water's Planned Works Approvals Panel prior to being implemented.

Directional drilling at Lea Brook *courtesy of the @one Alliance*

The Stoke Ferry main was swabbed and chlorinated in a single 7.2km length, with the Bexwell Reservoir overflow being utilised for the discharge of de-chlorinated water. The commissioning sequence at Beck Row was drafted to account for the fact that chlorinated water could not be discharged at Isleham without risking borehole contamination.

Key learning points

* **Upfront** Environmental, Geotechnical and Archaeological work enabled issues to be identified early and mitigation to be undertaken.
* **Liaison** with the local Anglian Water Operations Team throughout the design phase of the projects ensured that the correct solutions were constructed.
* **Integration** of the supply chain in the design phase of the projects realised efficiencies.
* **Commissioning** procedures and enabling works need to be agreed and completed early to avoid delays to the programme.

Note: ***The Editor & Publishers wish to thank Stewart Evans of the @one Alliance for preparing the above article for publication.***■