

Irby Reservoir to Caistor Top Reservoir a Strategic Supply/Demand Scheme

by
Godfrey Muswere MSc Eng and Andy Barnes

The Irby Reservoir to Caistor Top Reservoir is a £3.4 million link main project located in North Lincolnshire. The main purpose for the construction of the 10km pipeline and associated booster pumping station is to provide security of potable water supply for the Caistor Top supply zone. Irby Reservoir is the main service reservoir for Grimsby and the surrounding areas. The Caistor Top Reservoir serves the town of Caistor and surrounding villages with a population of approximately 9,000. The scheme is located between the towns of Caistor and Laceby in Lincolnshire, approximately 6.5km west from the centre of Grimsby. The area is largely rural in nature and comprises predominantly arable farmland.



Part of pipeline route now installed by trenching machine

Photo courtesy of @one Alliance

Project Background

Caistor Top Reservoir is currently supplied from Barnoldby Water Treatment Works (WTW) via an intermediate service reservoir at Beelsby. There is currently no alternative means of supplying Caistor Top Reservoir. The borehole yield from Barnoldby is reducing and the projected population growth figures for the Caistor Supply Zone identifies that more water will be required in the Beelsby and Caistor supply areas. One of the two existing supply mains between Barnoldby WTW and Beelsby Reservoir has historically had a high burst frequency rate which is as a result of the increased pumping head during high demand periods. When coupled with the limited storage at Beelsby Reservoir there is a high risk of water supplies into the local distribution network being disrupted in the event of a failure at Barnoldby WTW. The installation of the pipeline from Irby to Caistor Top will ensure sufficient potable water is available for

the Beelsby and Caistor supply areas. The project addressed the supply resilience issues for the transfer of water (1.0MI/d average and 1.8MI/d peak demand to meet future growth/headroom) from the Grimsby PWSZ (PZ07) to alleviate supply deficits in the Barnoldby planning zone (PZ06). Supply restrictions are based on forecast supply deficits, deployable output, and property and population data.

Undertakings

The work was 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 Water's 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 best value for 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

The scheme was designed to provide an alternative source of potable water for Beelsby and Caistor supply areas in the event of works failure at Barnoldby.

The scheme comprised the following key elements:

- Construction of 7km of continuously welded 355mm OD HPPE SDR21 and 3km OD HPPE SDR11 water main by open cut, trenching and directional drilling.
- Construction of 0.4km of continuously welded 280mm OD HPPE SDR21 by-pass at Caistor Top reservoir.
- Installation of booster pumps; two Vertical Shaft Driven (VSD) close coupled pump sets rated 50l/s @ 108mhd duty/standby and 70l/s @ 115mhd duty/assist in the existing valve chamber at Irby Reservoir
- Provision of Telemetry link between Irby Reservoir and Caistor Top Reservoir



Trencher in action

Photo courtesy of @one Alliance

Construction

The project commenced on site in June 2008 and was commissioned in March 2009. The 36-week construction period allowed for the establishment of temporary site offices at Irby Reservoir, erection of temporary easement fencing, topsoil stripping and reinstatement (under an archaeological watching brief), installation of VSD booster pumps, directional drilling of critical road crossings and mains commissioning.

Effective communication and co-ordination between Mechanical and Electrical (M&E) Team and Mainlaying Team on site was essential to minimise disruption to the mains commissioning process which was entirely dependent on the availability of the booster pumps. This was achieved by the utilisation of the Alliance programming tool, EPM.

Advance Site Investigation had identified that once the top soil had been removed the remainder of the trench excavation would be through a chalk layer. To ensure pipelaying productivity and a suitable back fill material, a trencher was the design solution.

Environmental Management

A detailed Environmental Statement was prepared well in advance

of the construction phase and addressed many issues such as ecology, noise, flora and fauna, archaeology, visual impact, cultural heritage and emissions from the new works. The environmental specialists were retained throughout the life of the project to provide expert advice and the contractor worked to the specified Construction and Environmental Management Plan.

Sustainability

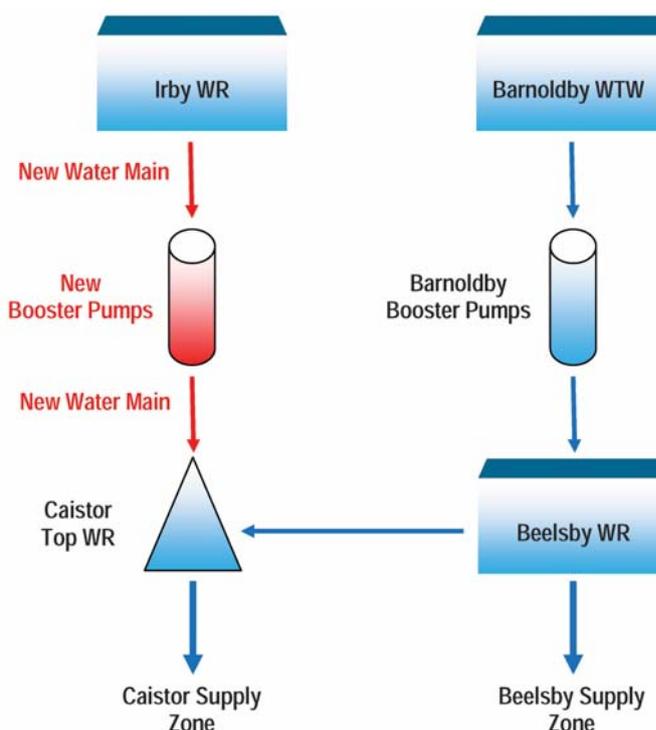
The scheme was constructed using sustainable construction techniques. The underlying geology is predominantly chalk and the whole area is classed as a Major Aquifer which meant use of trenching machines was suitable. All as-dug material was re-used, resulting in no spoil having to be taken off site. This not only meant that the area was restored with native material but it also resulted in the volume of site traffic being greatly reduced.

Public Relations

From the outset of the design, Alliance Partners embarked on a comprehensive public relations campaign through Savills (Land Agent) to inform the affected landowners and key stakeholders about the scheme and what it involved. This paid off during the construction phase where the project proceeded without land issues and the local community was kept informed during the life of the project via scheme notice board and letter drops.

Key Learning Points

- Excellent teamwork between @one Alliance partners, Team Manager Construction and Anglian Water Operations staff.
- Upfront Environmental Impact Assessment enabled any ecological, archaeological and geo-environmental issues to be identified early and mitigation work to be undertaken before construction start.
- Cost efficiencies demonstrated against the target cost and the solution cost.
- A high level of health and safety performance was maintained throughout the project life cycle.
- Key personnel attendance at Site Progress Meetings enabled prompt resolution of any project issues.
- The team used production boards and Punchlists from the outset.



Project Schematic: Irby to Caistor Top Water Main

Conclusion

The project is considered to be a successful part of the Anglian Water AMP4 strategic/demand programme and was delivered under authorised scheme budget. The scheme has been undertaken in a positive and collaborative manner with all @one Alliance partners contributing to an effective core team.

When the project was nominated for the Alliance's Project of the Month award (in March, 2009) Jason Tucker, Alliance Operations Director said:

"This project has been recognised for its efforts in meeting the needs of the Anglian Water business and for encompassing the principles of how we want to work across the Alliance – the early involvement of the Enabling Team and the careful consideration of not just the permanent works, but also the selection of construction techniques. This, allied with the integrated team principles, the inclusion of framework suppliers in the solution development and the careful planning throughout, has led to an affordable solution being delivered successfully."

Note: The Editor and Publishers wish to thank the author Godfrey Muswere and Andy Barnes of the @one Alliance, for preparing the above article. ■



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