

A428 Black Cat Roundabout Mains Diversions

implementation of a strategic and meticulously planned solution to divert eight water mains to enable the construction of a new dual carriageway

by Anglian Water's @one Alliance

The existing A428 route had long been known for its congestion, resulting in unreliable travel times and compromised safety to the daily road users. To address these challenges, Skanska was tasked to construct a new dual carriageway to bypass the existing route; enhancing connectivity and boosting economic growth. However, this ambitious infrastructure development intersected with several key water mains essential for maintaining uninterrupted water supply to local communities and businesses. The water mains spanned multiple locations, including Black Cat Roundabout, Chawston, Wyboston, Barford Road, and Potton Road near the Potton Road Reservoir. Given the critical nature of these water mains, the construction of the new A428 demanded a carefully orchestrated diversion strategy to ensure minimal disruption to the water supply network. This case study explores the challenges faced by the Anglian Water @one Alliance, the innovative solution that was implemented, and the benefits that the project delivered to the community and the region's future growth.



Potton Road diversion pipes - Courtesy of Anglian Water's @one Alliance

Background

The A428 corridor is a vital route connecting key regions in Bedfordshire and Cambridgeshire. Stretching between the Black Cat Roundabout at the junction of the A1 and the A421 in Roxton, Bedfordshire, and Caxton Gibbet at the junction of the A428 and the A1198 in Cambridgeshire, this stretch serves as a critical link for commuters, local communities, and businesses in the area. The area is made up of a mix of residents, agricultural land, and growing commercial hubs, highlighting its importance as a dynamic economic region.

Introduction to the issue

The construction of the new A428 dual carriageway presented a significant infrastructure challenge, with several existing water mains needing to be diverted to facilitate the road's development. These water mains are integral to the region's water distribution network, supplying water to residential, commercial, and agricultural users along the A428 corridor.

Specifically, the project involved diverting eight water mains of varying sizes, as well as replacing an outfall pipeline from the Potton Road Reservoir. The impacted areas included:

- **AW01 at Black Cat Roundabout:** An existing 5" ductile iron (DI) water main centrally located within the A1.
- **AW02 at Barford Road:** A 5" asbestos cement (AC) water main along the eastern verge of Barford Road.
- **AW03 to AW08 at Potton Road:** A complex network of water mains including overflow, inlet, and outlet pipelines connected to Potton Road Reservoir.
- **AW09 at The Lane:** A 6" AC water main affected by a new road junction.
- **AWF01 Eltisley:** 4" PVC rising foul main from the existing A428 to the new proposed A428.

These diversions were critical to allow for the construction of the new A428 without compromising water supply reliability or

impacting the hydraulic performance of the network. The challenge lay not only in the physical relocation of these pipelines but also in ensuring that water flow rates and pressure levels remained consistent throughout the transition.

Also, the design criteria for this project required a 50-year design horizon, necessitating robust engineering solutions to accommodate future demand growth and operational resilience. The project also navigated complex geographical and environmental constraints, including road crossings and land ownership boundaries.

Black Cat Roundabout Mains Diversions: Supply chain

- **Project funding:** National Highways
- **Project delivery:** @one Alliance
- **Directional drilling:** O'Connor Utilities Ltd (OCU)
- **PE pipe:** Radius Systems
- **PE pipe:** Aliaxis - GPS Pipe Systems
- **DI pipe:** Saint Gobain PAM UK
- **Pipe fittings:** Wolseley
- **Valves:** AVK UK Ltd
- **Outfall headwall:** Stanton Precast (now Tracey Concrete)
- **Plant hire:** Flannery Plant Hire (Oval) Ltd
- **Plant hire:** L Lynch Plant Hire & Haulage Ltd
- **Aggregates:** Drummond Aggregates Ltd

The solution

To address these challenges, Anglian Water's @one Alliance was tasked with implementing a strategic and meticulously planned solution. Funded by National Highways, the project required the diversion of eight water mains; each carefully designed to meet the required flow rates and maintain system integrity. The construction approach included directional drilling to minimise environmental impact, reduce excavation requirements, and limit disruption to local communities and traffic. The works included:

- **AW01 at Black Cat Roundabout:** The existing 5" DI water main was diverted over approximately 2300m and replaced with a 180mm PE100 pipe. This new pipeline followed a more accessible route outside the central A1 corridor, minimising traffic disruptions during construction.
- **AW02 at Barford Road:** A 5" AC water main located along the eastern side of Barford Road was diverted into adjacent fields, with a section drilled and dualled beneath the new A428. The diverted main spanned approximately 1000m and was upgraded to a 180mm PE100 pipe, enhancing durability and hydraulic performance.
- **AW03 - Potton Road Outfall Pipeline:** The overflow pipeline from Potton Road Reservoir was replaced with a shorter, more efficient route to a newly constructed ditch east of the A428. A new headwall at the outfall enhanced flood management and environmental protection.
- **AW04 to AW08 - Potton Road Diversions:** These diversions involved multiple water mains connected to Potton Road Reservoir, including inlet, outlet, and boosted supply lines. The existing pipelines were replaced with PE100 pipes of various sizes, dualled where necessary under the new A428 road. Notably, the reservoir outlets (AW04 and AW05) were consolidated into a single 355mm PE100 pipeline to enhance operational efficiency.
- **AW09 - The Lane:** Relocating a 6" AC water main to the north of The Lane. The new 130m section of 180mm PE100 pipe enhanced accessibility for future maintenance.
- **AWF01 - A428 Eltisley:** This diversion relocated a 4"PVC rising foul main, replacing 1070m of pipe (including a total of 150m of dualling - in two sections of 45m and 105m) of 125mm HPPE SDR17 and connections to the existing 4"PVC rising main in the A428 at Eltisley and the B1040 to the north of Eltisley.



All new pipelines were designed as 'like for like' replacements, ensuring that water flow rates and pressures were maintained across the network. To future-proof the solution, the design horizon was set at 50 years; ensuring the new infrastructure met long-term demands.

Benefits of the solution

The successful diversion of water mains ensured an uninterrupted water supply for local communities and businesses throughout the construction period. By maintaining consistent flow rates and pressures, the project safeguarded the reliability of water services, allowing daily activities to continue without disruption. This seamless transition was crucial in maintaining public confidence and supporting local economies during the infrastructure upgrade.

In addition to maintaining continuity of service, the project significantly enhanced infrastructure resilience. The newly installed pipelines, made from PE100 materials, offer superior durability and resistance to corrosion compared to the previous cast iron and PVC systems. This upgrade reduces the risk of leaks or failures, enhancing the long-term reliability of the water network. The robust design ensures a stable water supply, minimizing the need for emergency repairs and contributing to overall operational efficiency.

Environmental and safety considerations were central to the project's planning and execution. By employing trenchless construction techniques, the project minimised ground disturbance, preserving environmentally sensitive areas and reducing the ecological impact.

Additionally, the implementation of dualled pipelines beneath the new A428 increased safety and reliability, ensuring the security of water supply even in the event of unexpected issues with one of the pipelines. This strategic design choice highlights the project's commitment to both environmental stewardship and public safety.

Beyond technical achievements, the water main diversions were essential for the construction of the new A428 dual carriageway. The new route will significantly reduce congestion, cut travel times and boost economic growth across Bedfordshire and Cambridgeshire. By facilitating better transport links, the project supporting is local businesses, encouraging investment, and contributing to the prosperity of the surrounding communities.

Looking to the future, the new water mains have been designed with a 50-year horizon, ensuring they can accommodate projected population growth and increased water demand. This future-proofed approach guarantees a sustainable and reliable water supply for generations to come. By anticipating future needs, the project demonstrates a forward-looking vision, laying a strong foundation for continued community and economic development.

This comprehensive infrastructure upgrade showcases a successful blend of innovation, environmental responsibility, and strategic planning, delivering long-term benefits to both local communities and the broader region.

Conclusion

This project exemplified how strategic infrastructure planning and innovative engineering can harmoniously integrate essential utility services with large-scale development projects. By delivering these water main diversions efficiently and effectively, the Anglian Water @one Alliance not only supported the construction of a vital new road but also safeguarded the water supply network for the future.

This collaborative effort showcased the commitment to sustainable infrastructure solutions that balanced community needs, environmental stewardship, and economic growth. The successful completion of the new A428 symbolizes progress, connectivity, and a brighter future for the region.

The success of this project is a testament to the power of strategic planning, technical excellence, and a commitment to delivering long-term value to the communities served by Anglian Water. The @one Alliance is proud to have played a key role in shaping a resilient, connected, and stronger future for the region.

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The @one Alliance is a collaboration of eight partner companies that each provide specialist knowledge allowing the Alliance to deliver complex delivery projects in the most efficient way, reducing the cost to Anglian Water's customers. The partners are Anglian Water Asset Delivery, Balfour Beatty, Barhale, Binnies, Mott MacDonald Bentley, Sweco, Skanska, and MWH Treatment.



Potton Road flow controls and DI pipe - Courtesy of Anglian Water's @one Alliance