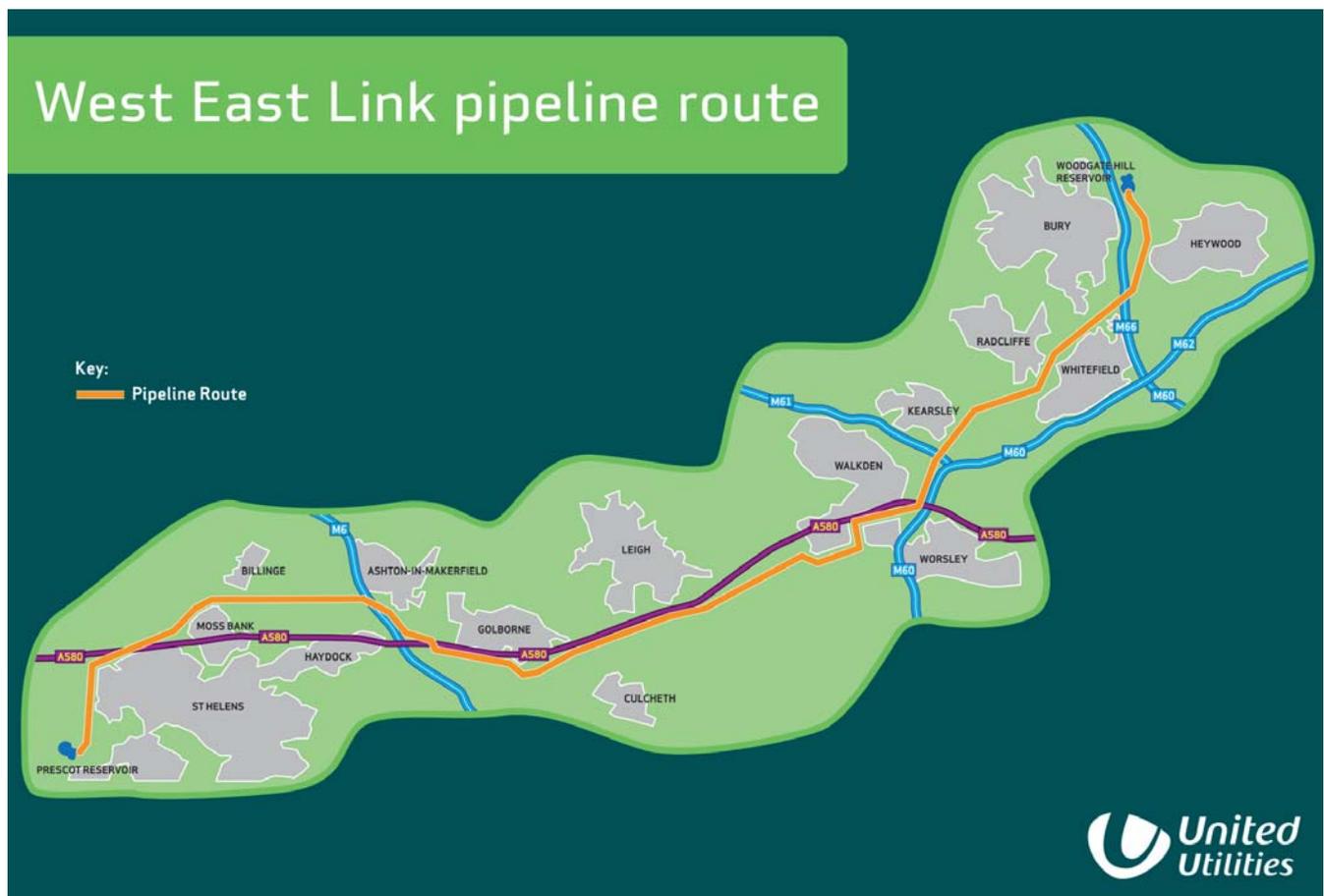


West East Link Main

55km pipeline, carrying 100 million litres, is one of the largest ever undertaken by a water company

by
Jon Higham

The West East Link Main is a £125 million pipeline project that will carry water across the North West of England from Prescott Reservoir near Liverpool to Woodgate Hill Reservoir North of Manchester. The 55km pipeline, capable of carrying up to 100 million litres of water a day, is one of the largest engineering projects ever undertaken by a UK water company.



UU West East Link Route Map

Courtesy of United Utilities

Within the North West there is an integrated network of large diameter trunk mains (LDTM) and aqueducts that carry approximately 70% of the regions water supply. Supplies originate in north Wales and the Lake District and are conveyed many miles, often in single conduits, to the major conurbations of Merseyside and Greater Manchester.

The Haweswater Aqueduct carries 25% of the regional supply and is due to be taken out of service for structural inspection and repair during AMP5. By taking this aqueduct out of its normal operating mode, significant risk of interruption to customers' supplies is introduced. The assessment of this resulted in the need to construct an additional asset, a bi-directional West East Link pipeline. This pipeline will allow flow to be transferred from the Liverpool area to Greater Manchester and facilitate the inspection and maintenance of the Haweswater Aqueduct.

The creation of the West East Link will also reduce customer risk while the Dee Large Diameter trunk Main (LDTM) is taken out of

service for cleaning under the LDTM cleaning programme. The Dee conveys up to 15% of the regional flow and supplies Liverpool and some major towns in the Merseyside area. Without the West East Link transferring flow from Manchester to Liverpool, it would be necessary to construct a 10km pipeline parallel to the existing Dee main at a cost of approximately £20m to maintain customer supplies.

The provision of a new bi-directional West East link is part of United Utilities long-term strategy for maintaining the supply-demand balance. In particular, the new link is an integral part of the long term strategy to deal with risks adversely impacting our supply-demand balance including the Habitats Directive, Water Framework Directive and climate change.

Another significant benefit of constructing the link main is to mitigate the impact on customer supplies in the event of a catastrophic failure of one of the regions aqueducts or LDTM's. The new link will allow potable water to be quickly transferred across the region and help maintain supplies.

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Typical 'Pipeline Spread'

Courtesy of United Utilities



Pipe Store

Courtesy of United Utilities

Following overwhelming support from the DWI, Environment Agency and the Consumer Council for Water, United Utilities teamed up with MWH and Jacobs in autumn 2006 to start the mammoth task of optioneering and route selection. Following an 18 month period of surveying, site investigation, constructability reviews, hydraulic modelling and cost benefit analysis the 55km route was finalised.

The route involves the crossing of three motorways, five railway lines, numerous major roads, canals, rivers and five golf courses. It takes in over 200 land owners and tenants, 8 local planning authorities and significant areas of abandoned mine workings. Only 1km out of the entire 55km is in public highway which is testament to the project teams desire to minimise disruption to the residents and road users of the North West.

As significant as the engineering challenge of the project are the myriad of environmental issues. Such issues include Great Crested Newts, Bats, Badgers and Water Voles to mention just a few. Furthermore, the route encounters areas of industrial and mining archaeology resulting in desktop studies and advanced survey and excavation work. We even have to deal with unexploded ordnance from the 2nd World War! Such issues combined with the impact on residential conurbations culminated in the requirement for a full Environmental Impact Assessment. This was submitted to all 8 local authorities with planning approval for the scheme being granted in January 2009.

A key factor to ensure the success of a project of this scale is effective stakeholder management. In addition to the enormous challenge of negotiating with landowners and tenants other key stakeholders include MPs, Councillors, local community groups, residential customers and numerous statutory bodies. The scheme has been promoted in regional press, local radio, internet and an interactive website is being introduced into schools national curriculum. United Utilities is working with the Groundwork Trust to develop two projects that will leave a lasting benefit to the local communities most severely disrupted by the construction works.

In December 2008 John Murphy & Sons (JMS) were appointed as principal contractor to design and construct 55km of 1200mm welded steel pipeline and a 2 Mega Watt pumping station. JMS was established in 1965 with vast experience in delivering pipelines for oil, water and gas suppliers therefore giving United Utilities comfort that they had chosen the right contractor.

Construction commenced in early spring 2009 with advanced environmental, agricultural and abandoned coal mine mitigation works. This was then followed up with what is considered the most critical and high risk element of the project – tunnelling.

JMS have successfully used all manner of no-dig techniques on the project including tunnelling and auger boring drawing on both in

house resources and experienced sub contractors. To negotiate a wide range of ground conditions a variety of tunnel boring machines have been used including open face, slurry, road header and back-hoe.

During peak construction periods there will be over 400 people working on the pipeline. To witness a pipe laying operation in full swing is an awesome sight as kilometre after kilometre of pipeline is strung out across the countryside. Excavators dig, level, lift, riddle, place, compact and profile to install the pipeline, weighing around a tonne every 3 meters, at depths of up to 5m. When completed, this army of excavators will have shifted around 2 million tonnes of soil, over 90% of which is recycled, and installed over 20,000 tonnes of pipe.

To transfer the water from Prescott to Woodgate Hill two massive pumps some 5m tall and absorbing nearly 2MW of electricity will deliver over 100 million litres of water per day. A new 11 kilovolt substation is being built to help power the huge motors. To minimise cost and avoid the planning issues of a new building to accommodate the pumps the existing Prescott valve house is being reconfigured. To ensure this would work efficiently within such a restricted space a 1/6th scale physical model of the reservoir outlets, suction tank, pipework and pumps was constructed – resulting in a full working see-through Perspex model twice the size of a large static caravan.



Perspex Model of Pumping Station

Courtesy of United Utilities



Pipeline 'Backfill'

Courtesy of United Utilities

The nerve centre of the finished project will be located at Prescott Water Treatment Works where all the pressures, flows, pump controls and valve controls will be monitored and programmed either from within the WTW or remotely from United Utilities central control unit.

By the end of May 2010 27km of pipe had been laid, 18 tunnels completed and the reconfiguration works for the installation of the new pumps had been concluded. It is anticipated that the remainder of the pipeline and tunnels will be finished by late autumn 2010 followed by an intensive period of testing leading up the pipeline

being fully commissioned by spring 2011.

This new pipeline will keep the water flowing for future generations and, like the aqueducts built by our Victorian ancestors it will be a legacy to the North West region for years to come. What a fantastic once in a lifetime project!

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Aerial Photo of spread near M6

Courtesy of United Utilities



Pipeline delivery

Courtesy of United Utilities