

# Carlisle Flood Alleviation Project

by  
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**F**ollowing the extreme weather conditions in the north of England during January 2005, nearly 3000 properties in Carlisle experienced severe flooding due to the River Eden bursting its banks. Later in the year, in October 2005, another extreme rainstorm caused further foul flooding to at least 65 properties in the Warwick Road and Willow Holme areas of the city due to a lack of capacity in the existing sewer network. United Utilities undertook all the sewer network modelling and initial solution identification before MWH was appointed to undertake the detail design in March 2007. The brief was to eliminate the foul flooding from the sewer network up to the 1:30 year design storm.



Construction work underway at Lismore Place

*Courtesy of United Utilities*

The Willow Holme area is approximately 1km to the north west of Carlisle City Centre and is predominately an industrial area in which Carlisle WwTW is located. The catchment covers 22km<sup>2</sup> with a population of 13,039 and the existing sewer network contains a substantial number of industrial and trade flows. High flow volumes arriving at the WwTW together with a lack of capacity in the existing trunk mains and sewers serving the industrial estate were combining to cause excessive surcharge levels and flooding during storm conditions. As a result it was decided that a new trunk sewer would be constructed to pass flows forward to the WwTW. In addition a number of local sewers within the industrial estate would be upsized.

A preliminary environmental constraints desk study was carried out for the Willow Holme area by United Utilities which highlighted the requirement for a further detailed ecological survey (DEC). The

survey highlighted the presence of Himalayan Balsam and Japanese Knotweed in the immediate vicinity of the works and was included in the Information for Tenderer's package.

In March 2008 Daniel Contractors Ltd was appointed as the main contractor for the Willow Holme project. The scope of works included the construction in open cut of 600m of new combined sewers ranging in diameter from 375mm to 1600mm and laid at depths from 2m to 4m, inclusive of 16 new manholes, ranging in diameter from 1.5m to 4m. Construction work was mainly undertaken along a rural route to minimise the disruption to Willow Holme Industrial Estate.

The construction of the Willowholme project was successfully completed over a seven month period between May and November 2008.

The design of the second phase of the project was completed by MWH in June 2008, and its aim was to ensure the elimination of foul flooding in the Warwick Road area of the city.

Warwick Road itself is one of the main routes into the city from the M6 Motorway to the east. The surrounding area is mainly comprised of Victorian housing and also provides the location for Carlisle United Football Club and three schools. The catchment upstream from Strand Road CSO which serves the area covers almost 2km<sup>2</sup> with a population of 34,024 and consists of a patchwork of combined sewers with many bifurcations/interconnections. The sewers serving the area were hydraulically inadequate during storm conditions, resulting in a heavily surcharged system and flooding. As a result it was decided that a substantial network of local sewers would be upsized and in some cases re-routed in order to protect against foul flooding up to a 1 in 30 year storm event. In addition the performance of the Strand Road CSO would be improved in order to screen all spills up to a 1 in 5 year storm event to meet current EA regulations

A preliminary environmental constraints desk study was carried out for the Warwick Road area by United Utilities which highlighted the requirement for a further detailed ecological survey (DEC). The survey indicated that work on the outfall structure at the River Eden would have to be restricted to a three month period from June to September 2009 due to the salmon spawning season.

In August 2008 DCT was appointed as the main contractor for the Warwick Road scheme, the scope of the works includes the construction in open cut of 3.1km of new combined sewers ranging in diameter from 450mm to 1600mm and laid at depths from 2 to 5m, mainly in residential roads. In addition it will be necessary to build a new CSO chamber capable of screening flows up to 2970l/s, together with a new 1800mm diameter overflow pipe to the River Eden.

The construction of the Warwick Road project, including the new CSO chamber at Strand Road and the new overflow pipe to the River Eden was commenced in November 2008 and is due for completion October 2009.

The combined capital value of the Carlisle Flood Alleviation Project is £9.4 million, and each of the flooding schemes outlined above has been carried out under the United Utilities 5 year AMP4 Programme which will see £140M invested in tackling sewer flooding across the North West by 2010.

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