

Dukinfield (Wharf Street) UIDs

United Utilities network scheme provides screening to storm flows to the River Tame in East Manchester

by Stewart King

As part of the Dukinfield UID cluster, Wharf Street represents the largest of the Combined Sewer Overflows (CSOs). An Unsatisfactory Intermittent Discharge (UID) study was undertaken for the Dukinfield WwTW catchment area with the purpose of evaluating the performance of the existing CSOs. The Wharf Street CSO was identified as a UID on aesthetic grounds and a solution was formulated to provide improvements by upgrading the existing CSO and constructing an additional CSO. As a result, the treated water entering the River Tame will be cleaner and greener providing aesthetic improvements and ensuring it meets strict European Standards for water quality. The project, which, due to its geographical location provided major challenges, is part of the £3.6 billion being invested by United Utilities (UU) in AMP5 across the North West to improve water quality and the environment by 2015.



Under construction adjacent to Peak Forest Canal - Courtesy of GCA JV

The catchment

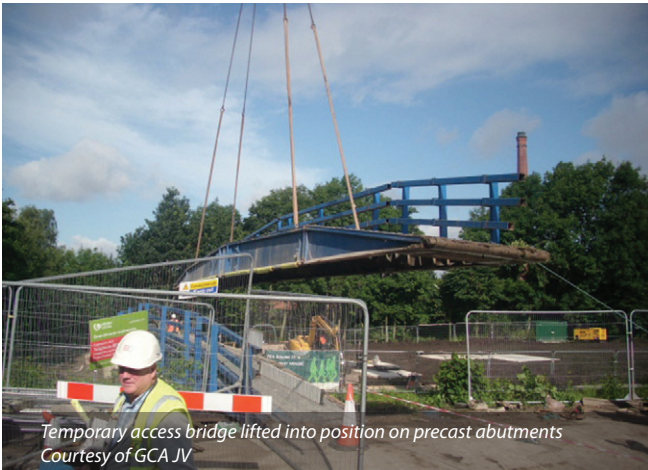
The drainage area of Dukinfield and Stalybridge lies to the east of Manchester city centre within the boundary of Tameside Metropolitan Borough Council. The total area served by Tameside MBC, covers 1,449 hectares, and serves a population of approximately 45,000.

The project solution and its unique location

The existing unscreened CSO is located in a tightly constrained area in open land, off Wharf Street, Dukinfield and is bounded by the Peak Forest Canal to the West, the River Tame to the East and the Manchester-Stalybridge railway line to the North.

Access to the site was limited to a narrow canal towpath to the south of the CSO, with the location made all the more inaccessible due to the CSO being elevated on top of a steep escarpment 7m above the River Tame. The CSO had double high level side weirs, each 7m long with the incoming and continuation pipes both 2,200mm diameter. The overflow was a 1,500mm diameter pipe discharging directly to the River Tame.

The original solution proposal was to modify the existing CSO and construct another similar CSO arrangement. Both the new and existing CSO chambers were to be fitted with powered CSO screens, supplied, installed and commissioned by Longwood



Temporary access bridge lifted into position on precast abutments
Courtesy of GCA JV



6mm screen lifted in to place
Courtesy of GCA JV



Under construction adjacent to Peak Forest Canal
Courtesy of GCA JV



CSO structure ready to receive screen
Courtesy of GCA JV

Engineering. The new CSO chamber was to be constructed in sections immediately downstream of the existing chamber.

Undertakings

The Concept and Definition Phase was carried out by MWH and ultimately delivered successfully by the Process Alliance, a partnership arrangement between United Utilities and construction partners GallifordTry-Costain-Atkins Joint Venture (GCA JV).

Construction and access challenges

Due to information pertaining to existing retaining walls and the escarpment becoming available only late in the pre-construction phase, the sole point of access along the canal towpath was latterly deemed unsuitable for site construction traffic.

Upgrading the proposed means of access would have resulted in a delay to the on-site start date and to construction activities, which in turn would delay achieving the regulatory Project In Use (PIU) date by approximately 20 weeks. The project team were therefore tasked with reviewing alternative solutions to the proposed scheme together with possible solutions to the access issue to recover the start on site date.

COBRA ('Cabinet Office Briefing Room A') Team

As the above construction and access challenges presented a significant risk to the regulatory date, an innovative 'issue management' approach was developed by setting up a high performance COBRA team. The COBRA team was made up of representatives from GCA JV, United Utilities and the project team, and had the aim of ensuring that the key decision makers and key stakeholders were involved in maintaining the accelerated schedule. COBRA met as and when required to expediently consider alternative designs and proposals put forward by the project team.

The COBRA team was then responsible for producing a workable solution to both the design of the CSO and access issues with the appropriate governance provided to enable the regulatory dates to be met. The COBRA team approach dramatically cut down the design revision and approval process ensuring that the project progressed as necessary.

The solution selected by the COBRA team was a hydraulically modified version of the previously proposed permanent solution and an alternative means of site access.

The hydraulic design change involved reviewing the need for the additional relief weir on the new CSO structure. Once it was established that this was not required, the new structure could be constructed without the need for excavating in rock below the existing 2m diameter continuation pipe. Consequently, the excavation and construction of the new structure could be built much quicker without potentially compromising the existing continuation pipe. The omission of the relief weir successfully saved 4 weeks on the construction schedule.

The alternative access route was designed utilising a temporary military (Mitchell) bridge sat on a modular precast abutment allowing construction traffic to access the works safely and efficiently.

Key to the timely installation of the site access bridge was the close liaison between UU's third party coordinator and British Waterways to understand their requirements to maintain a navigable canal and demonstrating that the temporary bridge was designed to prevent any risk of construction debris falling in the canal.

The towpath access was maintained in accordance with British Waterways' requirements which involved providing a dedicated diversion of the tow path around the site perimeter. The alternative bridge access required the temporary use of land owned by a car

service centre. Alternative parking and storage space was sourced for the garage for the duration of the construction works.

Together, these solutions enabled the start on site date to be brought back to within 4 weeks of the base-line schedule.

Construction highlights

The stratum in which the structure was to be built was assumed from geotechnical information as weathered rock which would likely support the lower level excavation. As the excavation proceeded it became apparent that the rock was a highly weathered mudstone that was susceptible to rain.

The decision was made to provide additional stability to the rock face by driving H piles within the pans of the shorter sheet piles to ensure stability of the lower areas of excavation, giving the ability to board up between the H piles if required.

The existing sewer was known to be a segmental tunnelled construction and it was decided that this would remain intact for the majority of the works and cut out when ready to accept the screen. The screen was designed to fix to the exposed pipe faces which were determined to be acceptable following some trial cores. Following successful installation of the screen, the pipe was cut out using a combination of wire sawing and circular sawing techniques.

Following the best efforts of the Project Team and COBRA, a new CSO structure that could cope with the spill flows was successfully in place 4 days in advance of the regulatory Project In Use date.

The structure was designed and built so that the lower half was successfully completed with construction joints allowing the upper half to be built from temporary decking with the remainder of the structure completed safely after the regulatory PIU date. Because the structure had to be completed in a live environment during low

flows, the site team instigated a register of personnel working in the chamber that could be checked in the event of evacuation. This also required co-ordination with United Utilities operational staff who advised of potential storm surges within the catchment area.

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Summary

This was a challenging project for the team working with United Utilities, which overcame the unique access difficulties working within the constraints of the canal, river and rail. The project involved working closely with British Waterways, local businesses and the general public who use the tow paths on a daily basis.

With the introduction of the high performance COBRA team, the alternative means of access established for the construction team and the challenges on the hydraulic design of the scheme, the team were able to take a project that was in danger of running several months over programme and turning it around to deliver for United Utilities and its customers to programme

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