Stoke-on-Trent UIDs
a collaborative approach to delivery

by
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The urban conurbation of Stoke-on-Trent and Newcastle-under-Lyme has a population of approximately 325,000 and is situated at the head of the River Trent catchment where river flows and storage are relatively low. The sewerage system is mostly combined and served by a single sewage treatment works. There are 135 known combined sewer overflows (CSOs) in the conurbation and intermittent discharges from the combined sewer system contribute to quality problems in the River Trent and its tributaries in times of storm. The Environment Agency have indicated the need for improvements and confirmed this through the inclusion of 54 'Unsatisfactory Intermittent Discharges' (UIDs) in Severn Trent Water's AMP3 programme.

Stoke-on-Trent UIDs: On-line storage under construction courtesy Severn Trent Water

Important natural amenity

The City of Stoke on Trent is planning to open up some of the watercourses in the city by introducing new river walkways to make better use of this important natural amenity. Aesthetic pollution from CSOs is undesirable, particularly in public amenity areas, and with the increased use of the area's river system this issue reinforces the need for CSO improvement works.

Urban pollution management (UPM) study

The UPM study was a structured method chosen to develop options throughout the catchment to improve performance of the 54 UIDs. It was a complex study that considered the limited dilution factor available in the watercourses, and how the new CSOs and storage would improve both water quality and the aesthetic problems.

Models of the existing sewerage network, treatment works and river system were built and verified using measured flow and quality results. These models have been used to develop outline solutions to the quality problems. Significant savings in terms of storage volume have been identified compared with the traditional empirical approach on an individual UID basis.This has been made possible by taking explicit account of quality parameters of sewage and the natural river flows, moving beyond purely hydraulic models previously used. The result has been a strategy that targets the most effective locations for providing storage to alleviate the need to overflow to water courses.

On behalf of Severn Trent Water, consulting engineers *Charles Haswell & Partners Ltd (Haswell)* carried out the UPM study and prepared outline solutions. The proposals addressed the water quality problems analysed by modelling and the visible aesthetic issues identified by Environment Agency Inspectors.

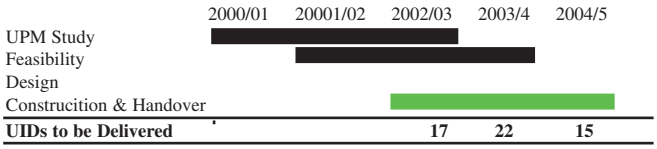
Developing a delivery strategy

Within the AMP3 period, a phased programme for completing the UPM study and delivering improvements to the 54 UIDs was agreed with the Environment Agency.

Stoke-on-Trent: CSOs under construction courtesy Severn Trent Water

Stoke-on-Trent: Example of aesthetic pollution courtesy: Severn Trent Water

This programme is shown in *Table 1.*



Efforts during the early part of the AMP period were concentrated on developing the UPM study to a position whereby solutions to resolve UIDs could be progressed with confidence. In consultation with the Environment Agency, Severn Trent Water and *Haswell* developed a range of acceptable solutions to resolve the pollution problems. Detailed design work was allocated with solutions to 11 UIDs being designed by Severn Trent Water's Engineering & Purchasing Department and solutions to 43 UIDs designed by *Haswell.*

Solutions focused on minimising the disruptions from construction activity, particularly in the busy urban areas. The need to construct at a large number of sites within a short time scale presented considerable programming and logistical difficulties. It was also necessary to phase construction to maintain performance of the sewer network and river system throughout delivery of the programme.

Total expenditure for the Stoke UIDs Strategy is forecast at £22 million. The number of UIDs resolved and construction projects per year of AMP3 are shown in Table 2. (below).

To minimise disruption during delivery, early consideration of design and construction aspects was necessary. Aim of the team was to mitigate the impact of projects on customers, landowners, vehicular and pedestrian traffic and both the natural and built environment.

Table 2.

Solution	**Yr 1 (No.)**	**Yr 2 (No.)**	**Yr 3 (No.)**	**Total (No.)**
Abandon CSO	4	3	4	11
Minor works to CSO	-	2		2
Combine CSO into single, larger, screened CSO	4	4	3	11
Reconstruct & screen CSO	5	8	5	18
Provide storage on sewer network	2	5	1	8
Increase efficiency of storm water storage facilities, cleaning etc.	-	-	2	2
No build solutions	2	-	-	2
Total UIDs	**17**	**22**	**15**	**54**
Total Projects	**10**	**15**	**5**	**30**

Procurement strategy
Severn Trent Water's AMP3 contract strategy is based on 'incentivised' Target Price Cost Reimbursable Contracts. A key aspect of the way in which Severn Trent Water delivers its capital projects is the involvement of all members of the project team from project scoping stage through to construction. This allows contractors and suppliers to have an early input into project requirements in respect of 'buildability', cost and timing. A delivery programme was agreed to ensure that Severn Trent Water's contract and delivery strategy secured the benefits in an efficient manner given the challenging timescales for completion of design and construction work.

Two contracting organisations were chosen in order to provide a pro-active approach to the resolution of Year 3 UIDs in Stoke-on-Trent and Newcastle-under-Lyme, together with a consistent message to local stakeholders, in particular the Local Authority highway teams.

DCT Civil Engineering Ltd (Stoke-on-Trent) and *McNicholas Construction Services Ltd (Newcastle-under-Lyme)* were chosen to deliver the programme of work in Year 3, with projects shared out on a geographical basis to achieve efficient use of labour and plant.

The team working culture developed further during the delivery of Year 3 UIDs. Lessons learned by the team were shared, generating efficiencies in delivery and costs in subsequent years. With much of the Year 4 and 5 work being focused in the Stoke-on-Trent area of the conurbation, rather than Newcastle-under-Lyme, the teams agreed to progress the remainder of this UID programme with a single contractor, *DCT Civil Engineering Ltd. McNicholas Construction Services Ltd* continued to deliver similar work with Severn Trent Water in other areas of the UID programme.

Collaborative approach to solution development
Successful delivery of this programme relied on integration of the whole supply chain. This included Severn Trent Water's operations Team, both design teams (in-house and Haswell), as well as the contractors, suppliers and sub -contractors. Wherever possible the team engaged external stakeholders in planning and programming work to minimise the amount of inconvenience.

For example, at 32 locations new kiosks containing control and telemetry equipment for the asset were an integral part of the solution and planning permission needed to be obtained in order to commence installation. Detailed discussions to establish the most appropriate location for each kiosk were held with local Planning Authorities to ensure timely approval of proposals.

Many road closures and 'Streetworks Notices' have necessarily been served, in order to safely undertake a construction programme of this size, in line with advance noticing requirements. Inclusion of the highway managers throughout delivery and in particular at planning and programming meetings has been crucial to success of the project.

The contractor and construction staff worked closely with the design teams throughout the design phase to ensure 'buildability' and that value driven approaches were taken at all times. They reviewed and commented upon the designer's risk assessments during preparation. The nature of cost reimbursement projects and the incentive mechanism means that it is in the interest of the whole supply chain to minimise costs and work efficiently.

Construction
After completion of the whole programme the infrastructure delivered and construction methods employed will be as follows:

* 9,000m^3 (approx) storage provided;
* over 5,000m sewer laid by open-cut;
* 380m of pipes laid in tunnel;
* 53m of pipes laid by pipejack;
* 84m of pipes lined;
* 37 new CSO chambers constructed;
* 13 mechanically raked screens installed;
* 24 static screens with jet spray cleaning system installed;
* 2 new pumping stations constructed;
* 11 existing storage tanks upgraded with new cleaning systems.

New CSO chambers have all been constructed to WaPUG standards and the project team has explored a number of options for construction. Both pre-cast and in-situ reinforced concrete construction has been explored in the search for the most economical in terms of both cost and time.

Stoke-on-Trent: Fixed screen with cleaning equipment courtesy Severn Trent Water

Stoke-on-Trent : Riverside Walk courtesy: Severn Trent Water

Effective planning and programming of construction activities was essential. In support of this planning activity a proactive team working approach to performance and progress monitoring allowed problems to be identified early and issues to be resolved.

Considerate customer care has been important to the team and to completion of the programme so far. Severn Trent Water's standard literature has been issued to all concerned, providing details for the projects and opportunities for feed-back. The team has maintained regular face to face contact with householders, local councillors and MPs to explain project progress and has been proactive regarding effects of construction activity on the public.

The Rivers of Renewal Partnership has been established between City of Stoke-on-Trent, the Environment Agency and Severn Trent Water to jointly look at improving the amenity value of the River Trent, its tributaries and surrounding flood plains.

Significant construction works have taken place close to the river system and the team has worked closely with Partnership members to incorporate improvements such as riverside footpaths, flood plain compensation and wetland habitat creation into schemes where possible.

Severn Trent Water's AMP3 Stoke UID programme is clearly demonstrating the benefits of a collaborative approach. The programme of works is currently on schedule for a March 2005 completion, with the team committed to quality, safety and customer care as it delivers environmental benefits to the community. ■

Note: *Mike Smith is Senior Engineer and Graham Morris, Engineer both with Severn Trent Water. John Hensman is Business Development Manager, DCT Civil Engineering Ltd. With further information supplied by Charles Haswell & Partners Ltd.*