

Southern Water CSOs

186 intermittent discharges to be improved in K3 period

Within the K3 period 186 intermittent discharges have been designated as in need of improvement across the Southern Water region. These discharges are a combination of unsatisfactory CSOs on the sewerage system and storm discharges from existing WTW. Of the 186 sites in need of improvement, 56 are associated with meeting the requirements of the EU Shellfish Water Directive and 130 are associated with meeting River or Bathing Water Quality objectives.



Cockshot Farm – directional drilling (courtesy Southern Water)

The five year cumulative profile of improvements required throughout the K3 period is as follows:

	00/01	01/02	02/03	03/04	04/05
Planned	5	32	70	107	184
Actual	11	38	72		

Projects associated with the improvement of each overflow are varied in terms of scale and complexity.

Year 3 programme

Following the completion of 27 intermittent discharge improvement projects in March '01 to '02, 44 further projects were initially identified as potentially deliverable by 31st of the 3rd '03. The total value of these 44 projects was in the region of £31 million, although 13 of these were WTW improvement schemes, where additional enhancements to the process stream were also required. Following feasibility and outline design work, 34 of the initial 44 projects were confirmed as deliverable by 31/3/03 at a total value of around £20 million. This programme of works comprised work on 12 WTW storm tanks, four pumping stations and eighteen CSOs on the sewerage system. Three of these projects are outlined below.

1. St Helen's Downs and Pilot Field Hastings (£718k)

These two CSOs lie in a residential area of Hastings, East Sussex, and within the Hastings Rock-A-Nore sewerage catchment with the Pilot Field CSO being 60m upstream of the St Helen's Down CSO.

The CSOs are both routed to discharge via a surface water system to the designated bathing water at Denmark Place, Hastings.

They serve a population of 1,260 and were both considered unsatisfactory by the EA in terms of impact on the designated

bathing waters. The CSOs were required to:

- * limit spill frequency to one spill per two bathing seasons;
- * have storm screening to 6mm 2D solid separation standard;
- * be monitored to record storm spill event and duration.

The Pilot Field CSO discharged into an open ditch on the boundary of the town's football field in a residential area, and was in poor structural condition.

The proposed solution comprised sealing both existing CSOs and replacing them with a single new CSO at St Helen's Down, a private road, that would discharge into the adjacent surface water sewer following attenuation in a new storage tank. A storage volume of 15m³ was determined by hydraulic modelling to limit spills to one in two bathing seasons. This storage volume was achieved by the construction of a 675mm diameter on-line tank sewer in St Helen's Down.

Installing a dedicated underground storage tank was considered as an option for the storage. However, due to lack of space, such a tank would need to be deeper than the existing sewer and so would require a pumping station to empty the stored flow once storm overflow conditions have passed. A dedicated tank would also require service diversions for construction and require higher level of maintenance than a tank sewer.

The Pilot Field CSO was sealed and flow passed downstream to the St Helen's Down sewerage system by upgrading the sewer system between the two CSOs. This was achieved by constructing a relief sewer alongside the existing 225mm dia. sewer, using 'No-dig' technology due to the necessary excavation depth (up to 6.5m), its location through private gardens close to buildings and the sandstone ground conditions. A one metre diameter pipe-jack tunnel operating as a relief sewer in storm conditions alongside the existing sewer was therefore constructed.

The solution provided the following benefits:

- * the existing sewer and CSO can be maintained during construction;
- * twin sewers provide ease of diversion for maintenance;
- * the existing smaller sewer deals with general domestic and minor storm flows;
- * the new relief sewer deals with larger storm flows.

2.Cockshot Farm CSOs 1 and 2 (£440k)

A new CSO has been constructed to replace two unsatisfactory CSOs on a farmland site in Hawkhurst, Kent that discharged prematurely to the receiving watercourse and were inadequately screened. Improvements include an increased pass-forward capacity from 16,8 l/s to 27.0 l/s. In addition the scheme has been designed to assist flood alleviation.

Hydraulic analysis showed that although both original CSOs would operate satisfactorily in isolation, the combined situation caused difficulties with Cockshot Farm's No.1 CSO. The continuation flows from No.1 CSO were compromised by flows entering the sewer downstream of the overflow point. This caused reverse flow to occur in the sewer length immediately downstream, resulting in premature operation of the overflow and flooding and pollution problems upstream.

Three main requirements were identified to meet EA improvement criteria:

- * pass Formula A prior to spill;
- * provision of storm screens;
- * provision of overflow monitoring equipment.

The proposed solution involved replacing the two CSOs with a single new CSO at a location where Formula A pass-forward was achieved. To meet flood relief requirements, the sewerage system upstream of the new CSOs was also upgraded.

The solution comprised:

- * construction of new single CSO & screen chamber on existing site;
- * construction of a new outfall at a level not subject to reverse flow;
- * provision of a 6 mm 2D storm screen within the new CSO chamber;
- * provision of CSO monitoring equipment linked to telemetry installed in control kiosk with power supply and telephone line;
- * upgrading 185m of sewer from 300mm dia. to 450mm dia. to the new CSO under the A229;
- * seal existing CSOs on site;
- * abandon existing outfalls to original CSOs.

To facilitate construction of the upgraded section of sewer, the new

450mm sewer was constructed alongside the existing sewer enabling the existing system to be maintained whilst the new sewer was installed. The existing sewer was then retained to operate in normal (dry weather) circumstances and to provide additional flood relief storage whilst the new sewer operates as a relief sewer in storm conditions.

3 Wellow Mill Pumping Station (£718k)

Wellow Mill PS is a large terminal PS serving an upstream population of 4,909 that delivers wastewater flows onto Wellow WTW in Hampshire. The CSO at the PS was considered unsatisfactory by the EA for the following reasons:

- * the existing pumps did not deliver 'Formula A' pass-forward rate;
- * there were no standby pumping arrangements;
- * the PS did not meet emergency overflow criteria in terms of standby power;
- * there was no telemetry to record the time and duration of the spills.

The solution proposed to remedy these deficiencies was as follows:

- * installation of telemetry to record overflow spill frequency & duration;
- * upgrade of the permanent power supply;
- * replacement of standby generator with larger 150kVa 415V static diesel unit;
- * replacement and uprating of the existing transfer pumps with two pairs of duty/standby dry weather flow and storm flow pumps rated at 29.5 l/s & 91 l/s ('Formula A') respectively.

Additional storage was considered as an alternative to the replacement of the standby generator to meet emergency overflow criteria, but this option was dismissed on the basis of higher cost and the flood plain location of the PS adjacent to the River Blackwater. The scale of change required to the pumping plant and pipework necessitated the construction of a temporary pumping station, replicating the operation of the existing station, and thus allowing the complete refitting of the station with the new larger pipework and pumps with minimal difficulty and risk.

Procurement and progress

The programme of 34 intermittent discharge schemes for 31/3/03 were all delivered via Southern Water's Joint Venture teams based at Horsham and Tonbridge. The Western JV comprising *Black & Veatch* and *Costain* handled 11 of the 34 projects, whilst the Eastern JV comprising *Morrison* and *Brown & Root* delivered 23 projects. All projects were successfully delivered against a tight programme with construction taking place primarily between November '02 and March '03. ■

Note: *The editor & publishers thank Southern Water for their cooperation in producing this article.*

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	<p>Coffey Construction Ltd, 141 High Street, Southgate, London, N14 6BX. Tel: 0208 447 9199 Fax: 0208 447 9170 E-mail: info@coffey-construction.co.uk</p>	