Barnstaple & Bideford CSO's

improving 32 CSOs raises oysters & mussels quality

by

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Barnstaple and Bideford catchments on the north coast of Devon have a combined population of 58,000. The area is predominantly served by combined sewer systems which transfer flows to two sewage treatment works; Ashford STW serves the Barnstaple catchment and the Bideford catchment is pumped to Cornborough STW. There are around 45 CSOs within the catchments all discharging into the Taw and Torridge estuaries which have several shellfish beds containing mussels and oysters which have failed on water and flesh quality in the past - although quality was improved in 2001/2002. Some 32 CSOs within these catchments were identified for improvement during K3 period with a view to improving quality of these shellfish beds in line with the EU Shellfish Waters Directive. In essence, this requires that the agglomeration of all spills from the identified CSOs needs to be less than 10 spills per year in order to meet required standards for the estuary

In order to analyse the performance of CSOs and design necessary improvements, South West Water Limited commissioned sewer models of the catchments. This modelling work was divided between two of SWWL's Framework consultants, *Babtie Group* and *Faber Maunsell.* The whole scheme is being procured under partnering arrangements SWWL have in place for their K3 programme of capital works. *Purac* and *MJ Gleeson* make up the rest of the partnering team as process and civil contracting partners respectively.

Sewer modelling

The sewer modelling work commenced in 2002 with extensive flow, impermeable area, manhole and CCTV surveys. The data supplied supplemented information already held on SWWL's own GIS database to provide the data necessary to build and verify models of the existing systems. The latest version of Infoworks CS modelling software was adopted to build the computer models, each of which extend to some 3,000 nodes.

Fifteen years of historic storm data was run through the verified models to ascertain the current performance of the CSOs in terms of storm frequencies. Because of the size of the models and the extensive storm data required, model runs took up to two weeks to complete making the iterative analysis and design process very protracted. New higher specification computer hardware was procured which allowed run times to be reduced by up to 75%.

Naturally, such complex models produce extensive data that needs to be analysed. All the spill data from the K3 listed CSOs had to be collated and then analysed to ascertain the agglomeration spill frequency, taking account of the definition of a "significant spill" (i.e. one greater than 50m^3 and the 'spill windows'. A computer programme was developed) allowing this analysis to be carried out in minutes rather than days.

To add to the complexities of the modelling, allowance had to be made for follow on storms since there could be occasions where a second storm occurs before the sewerage system has recovered from the first storm, thus reducing the system's capacity to cope with the next storm.

Scope of work

The scope of improvement works at the CSOs ranges from blocking off those that proved to be no longer required, to the provision of large storage volumes and major screening facilities. All the CSOs will need permanent spill logging facilities linked back to a central database via telemetry. Where new screens are required these are supplied by *COPA*, SWWL's framework screen supplier.

The screening generally, comprises 6mm aperture screens, either mechanically raked or of the passive cross-wave type. The selection of screen type is dependant on the frequency and flow rate of spills, the availability of power and any physical constraints. Where there is a need for active screening but a power supply is not readily available, use has been made of *COPA Brush or Cyclone* screens which are powered hydraulically.

Storm tanks

A storm tank of some 6400m^3 will be required at Pottington PS, the terminal pumping station in the Barnstaple catchment. This will reduce the current 30 spills per year from this CSO to around 8. The storage will be provided by an above ground 32m dia circular tank with 8m high *A Consult* precast concrete walls. All flows arriving at the PS in excess of the 474 l/s pumped to the STW will be pumped into the storm tank up to a rate of 2000 l/s.

An additional 850m^3 of storage is to be provided at Victoria Park car park in Bideford, to increase the total available to 2050m^3. This tank is to be constructed using 3m diameter hdpe pipe sections and will be completely buried under the existing car park area adjacent to the River Torridge. The tank location has been selected to minimise the effect on parking during construction in a busy and popular area of Bideford. This will result in a predicted spill frequency of 7 spills per annum.

Two large (1000m^3) off line storage tanks are proposed at Muddlebridge and Fremington. The tanks will be below ground in situ concrete tanks complete with integral tank washing systems and pumped return. The tanks are designed to return flows quickly to the system to minimise the required storage volumes. This element of the scheme will remove two overflow discharges completely.

The scheme is currently on programme for completion by March 2005.■

Note: *Andy Dawe is Programme Leader with South West Water and Nigel Edwards, Technical Director with Babtie Group.*