

Bristol Redland Combined Sewer Overflows

part of Wessex Water's programme to address 526 UIDs

by

Rob Fear BSc, MICE, FCIWEM

During the first three years of AMP3, a large number of small and medium sized combined sewer overflows (CSOs) in Bristol, which were unsatisfactory due to visual impact on receiving water bodies, were addressed by fitting either static or powered screens to improve the quality of receiving water bodies. This article describes major overflows in the Redlands catchment of Bristol that were dealt with through the AMP3 programme.



Bristol: First Arch Section removed at Cotham Hill

courtesy: Wessex Water

Existing overflows

These overflows are in the Clifton sub-catchment of Redland, which lies to the north of central Bristol and is a busy shopping area close to the university. Sewerage in the area is totally combined and with the ground being fairly steep there are significant peaks during storms. The CSOs which are located at Cotham Hill, Clifton Down Station, Hampton Road and Alma Road, were built in the 1960s. The Northern Storm Water Interceptor (NSWI) runs 60m deep east/west under the centre of the catchment with an outfall into the River Avon at Black Rocks. The Environment Agency has designated this stretch of the River Avon as moderate amenity. All four CSOs spill into a 30m deep side tunnel of the NSWI via shafts and drop pipes.

The overflows in Clifton Down Station and Alma Road were of the central spill vortex type with 900mm diameter incoming sewers and 225mm diameter outlets. The other two were side overflows within restricted chambers.

Chosen solution

The solution chosen at all four CSOs was the provision of COPA 6mm mechanically raked powered screens, which were required to handle flows ranging from 1443 l/s at the Clifton Down overflow to 2644 l/s at Hampton Road CSO.

The constraints imposed by the existing sewerage system and the lack of space in the heavily built up area meant that constructing new screening chambers was not possible and there was no alternative to modifying the existing chambers to accommodate the necessary screens. The configuration of the existing overflows also meant that major modification was required internally to enable screens to be fitted.

Procurement & construction

Construction work involved demolition and civil construction together with mechanical and electrical installation. The contract was awarded to T J Brent who provided detailed design and management of both Civils and M & E, thus ensuring a smooth interface between the two disciplines.

The existing chambers were not all at ground level and comprehensive sheet and frame ground support up to 6m deep, was installed to gain safe access to the working areas.

Much of the work involved confined space entries where both gas and dramatic changes in flow level were experienced. It was key to the success of the construction that these entries and their inherent risk were properly managed.



Open CSO at Alma Road

courtesy: Wessex Water

In-house temporary works design and some innovative input from the concrete cutting specialist enabled much of the demolition works to be carried out with minimal entry to the confined spaces in their enclosed state. By declassifying the chambers early the requirement to have a rescue team in attendance was dramatically reduced, which in turn enabled the site team to be much more flexible in programming work and deploying resources from site to site as necessary.

A feature common to all four sites was the removal of all or part of the existing cover slab to create an access for screens. By using a proprietary framework to support the concrete slabs fixed with tested resin anchor tie-bars, the slabs were removed without the need for classified confined space entry. Much of the concrete removal was done using the latest track and wire sawing technique. After these were successfully used to remove the existing chamber cover slabs and roofs, it was decided to use the same method for much of the internal demolition. This reduced the need for labour intensive air breaking within the confined spaces and all the associated health and safety issues that are associated with such works.

Highways specified loading meant that a whole new cover slab was necessary for the circular vortex overflow in Alma Road. To reduce the risk of confined space works and with space restrictions on site as a whole, a 5.5 metre diameter slab was pre-cast off site and placed with a 250 tonne crane.

Public relations and liaison

With the CSOs located in or near the highway in one of Bristol's major retail and leisure areas, additional risks associated with the public and

traffic management needed to be considered. It was also essential to minimise the impact that construction work would have on the public, local shops and businesses. One of the chambers was immediately adjacent to the entrance to a multi-storey car park serving the Whiteladies Road Shopping Centre, another was in the car park of a busy public house, with a third in the service/delivery and parking area of a block of shops adjacent to a local railway station.

There was early consultation with Bristol City Council's highways department and with local property owners and businesses. All parties were kept fully informed of the proposed work both before and during construction. This approach worked well and we maintained good relationships with the public and business community throughout the project.

Achievements

Construction works was started in October 2003 and was completed in March 2004 with all four CSOs operating satisfactorily. Although there were complex land entry issues to deal with the contract was completed on time and within budget. The major construction work involved was carried out with minimal disturbance to the public and businesses in the heavily built up area.

Bristol Redland Combined Sewer Overflows (CSOs) are part of Wessex Water's programme to address 526 Unsatisfactory Intermittent Discharges (UIDs) during the AMP3 period. ■

Note: The author of this article, Rob Fear, is Project Manager, Wessex Engineering Services, Wessex Water .