

Bath Combined Sewer Overflow Project

£28m scheme to remove flooding & pollution risks

by

Phil Brown, IEng, BEng (Hons), AMICE & Drummond Modley, FICE, MCIWEM

Wessex Water started its Bath Pollution Prevention project under AMP2 to reduce the incidence of sewage related debris and reduce the average spill frequency of unsatisfactory overflows across the city. The “Bath CSO Project” supersedes this earlier project and is Wessex Water’s ‘flagship’ project during the AMP3 regulatory period. Construction work on the £28 million project is anticipated to take 21 months, completing in January 2005, in time to meet the regulatory obligation to deliver a fully operational Bath CSO project by March 2005.



Bath Pultney Bridge (courtesy Wessex Water).

History

The River Avon runs along the bottom of a valley, through the City of Bath, a World Heritage City, surrounded by green belt countryside in the Cotswold Area of Outstanding Natural Beauty. Historically, storm and foul drainage for the city’s residents was via culverts and pipes discharging directly to the river.

In the early 1900s, the then Bath Corporation engaged W.H. Radford, a Nottingham consulting engineer, to improve drainage provision for the city. Radford’s solution included for the wide scale provision of riverside intercepting sewers, associated local sewerage, a terminal pumping station located on the then outskirts of the city, and a sewage treatment works located approximately 8km west of Bath, just outside the village of Saltford.

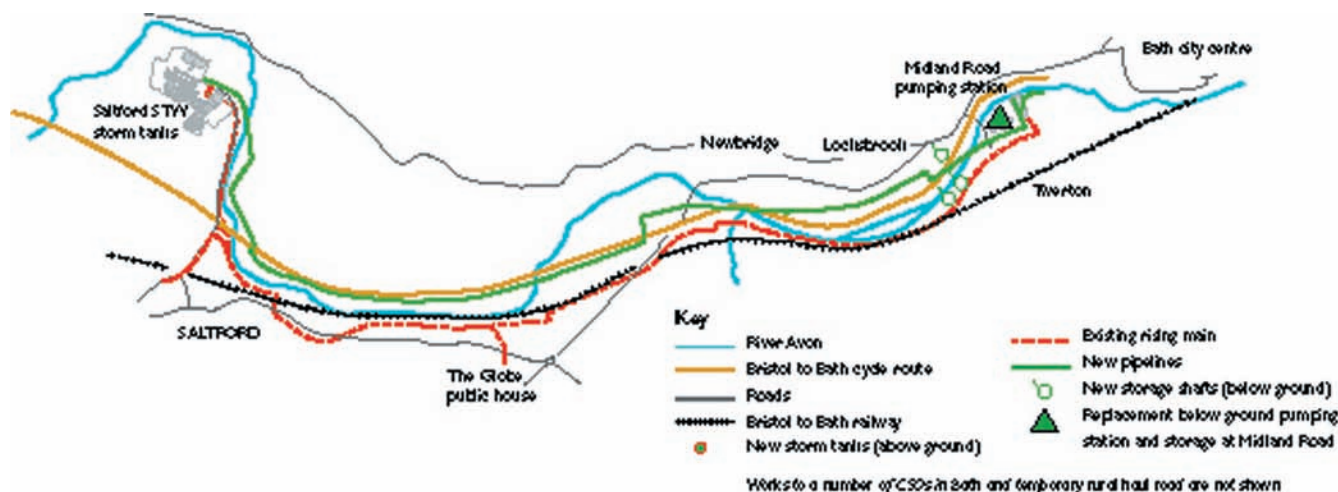
Construction of riverside interceptors also included for the provision of simple overflows, consisting of either simple high level orifices or single weirs outfalls to the river. These overflows, over 100 in

number, relieve the sewerage system during times of heavy storm flows and reduce the risk of sewer flooding to low lying properties in the bottom of the valley. These improvements were finished in 1914 at a cost to the corporation of £253,000!

As time has progressed, the City of Bath has expanded and, consequently impermeable areas and personal water use have increased. With no significant improvement in the sewerage system, capacity and greater volumes of flow entering the sewerage system, an increase in frequency and volume of storm sewage spill to the river is now a problem for 21st century engineers to resolve. For a number of overflows, sewage related debris is carried with the spill into the river environment and can be seen to be caught in riverbank flora and fauna leading to an aesthetic pollution problem.

Pollution prevention project

These overflows were defined under AMP2 guidelines as being



Bath: Overview of CSO project (courtesy Wessex Water).

unsatisfactory. Consequently, Wessex Water started its Bath Pollution Prevention project in 1995, consisting of five phases of work, at separate locations throughout the city. Proposals for phases 1 to 4 involved the provision of local underground storm attenuation tanks and overflow structures with improved solids separation performance. Phase 5 involved local weir raising and the provision of screens at specific overflows. Phases 1 and 5 were completed between 1996 -1999.

Opposition

Phases 2 & 3 proposals met with strong public opposition to the siting of attenuation tanks in residential areas. Wessex Water became aware that if further funding was secured under the AMP3 regulation period, a catchment wide solution could be promoted, providing a performance that exceeded the AMP2 requirement. Consequently Phases 2- 4 of the Bath Pollution Prevention project were deferred and a new project, the Bath Combined Sewer Overflow (CSO) was included in the company’s final determination for the AMP3 period.

Bath CSO Project

In August 2000, Wessex Water issued a feasibility study specification to three consortia of contractors and consultants. The study required the consortia to assess and present proposals based on either providing a large diameter storage tunnel, new terminal pumping station and pumped main to Salford sewage treatment works; or provision of local storm attenuation tanks, refurbishment of the existing terminal pumping station and provision of a new pumped main; or an alternative option to meet the performance specification.

Proposals submitted by the consortia were assessed by Wessex Water against engineering, geotechnical, hydrogeological, environmental impacts, cost, programme, capital risk and operational risk.

£28 million project

As a result of this evaluation, a Costain led consortium was appointed as the preferred partner during the summer of 2001 to allow further proposal development for their storm attenuation tank and pumping station design. Development of this proposal continued until April 2002 when the board of Wessex Water approved the £28 million Bath CSO project consisting of the following elements to reduce storm spill frequency from the unsatisfactory overflows:

- * relief to an existing section of riverside interceptor sewer by means of 350m of 1.5m diameter micro-tunnel beneath the River Avon and prime development land in Bath;
- * construction of a new combined pumping station at the existing PS site doubling the pass forward rate to 1050 l/s to Salford STW;

- * construction of three separate below ground storm attenuation tanks (7.5 - 15 metre dia. and up to 15 metres deep) at separate locations in the west of the city;
- * construction of 7.6km 700mm internal diameter pumping main through heavily urban and rural environments to operate in conjunction with the existing 1914 cast iron pumped main;
- * construction of two partially buried storm tanks (45m dia. and up to seven metres deep) at Salford STW site.

Environmental Impact Assessment

Due to the sensitivity of working in a World Heritage setting Wessex Water agreed to submit the project for consideration under the Town & Country Planning Act 1990. This required that a formal Environmental Impact Assessment (EIA) be carried out, and that the planning application be accompanied by an Environmental Statement (ES). Opinion was sought from the Local Planning Authority for the scope of the EIA which was targeted on the following areas.

- * **Rivers & Watercourses** – proposals directly affect the River Avon and minor tributary watercourses with a significant length of the pumping main being constructed within the flood plain;
- * **Hydrogeology** – Bath is renowned for its thermal springs and Roman Baths. It was imperative that the project proposals posed no risk to these significant tourist attractions. It was on this point that the option not to progress the large diameter tunnel was taken beyond the feasibility study stage of the project;
- * **Recreation & Amenity** – The City of Bath and surrounding areas are a major tourist attraction and welcomes visitors from around the world to view its Roman Heritage and Georgian Architecture;
- * **Landscape & Visual Amenity** – it was critical that the Wessex Water proposals did not detract from the aesthetic beauty of the city and surrounding countryside, some of which is located within the Cotswold Area of Outstanding Natural Beauty.
- * **Archaeological & Cultural Heritage** – Bath is rich in both archaeology and cultural heritage and it was essential that neither were subject to the long term effects of the proposals;
- * **Ecology & Nature Conservation** – an assessment of the impacts of the temporary and permanent works on plant communities, hedgerows, insects and wildlife. The rural River Avon corridor was found to support a wide range of habitats and protected species;
- * **Geological Consideration** – the project is to be carried out in the vicinity of two earth heritage Sites of Special Scientific Interest (SSSI) with mammoth fossils and gravels from the Pleistocene period having been recorded in the only known exposure of these features along the River Avon;
- * **Agriculture & Soils** – an assessment was required of the short and long term impacts on agricultural holdings and lands.

Wastewater Treatment & Sewerage

* **Contaminated Land** – the outskirts of Bath has an industrial heritage and areas close to the river are known to have been raised to reduce the impact of River flooding. The City of Bath was also subject to bombing raids during the Second World War.

* **Traffic Impact** - traffic congestion in the city with its relatively narrow Georgian street layout is of considerable concern to the population. Less than five per cent of the project is actually carried out in public highway.

* **Odour** - concern expressed about the development of the sewerage system incorporating storage tanks leading to odour complaints.

* **Air Quality** – concern over the increased pollution due to the construction activity.

The EIA, including the relevant surveys and ES were started in June 2002 and completed for a planning application that was made in November 2002. The project was successfully granted planning consent, subject to conditions by the Local Authority in January 2003.

Current status

The project team is currently working with *Costain* and its team

of consultants and sub-consultants to finalise the commercial arrangement for the construction stage of the work, commence the construction mobilisation and implementation of early season environmental works.

Consultants & sub-Consultant working with *Costain* on this project include: *CarlBrto, Bristol (Engineering Design); Nicholas Pearson Associates (Environmental Consultants); Zenith International (Hydrogeology & Bath's Hot Springs); AC Archaeology (Archaeological & Cultural Heritage); Black & Veatch (Feasibility Study).*

Construction work is anticipated to commence in April 2003 and last for 21 months, completing in January 2005 to allow Wessex Water to meet its regulatory obligations to deliver a fully operational Bath CSO Project by March 2005. ■

Note on the authors: *Phil Brown was Project Manager from July 2002; Drummond Modley was Project Manager April 2000 – July 2002.*
