

Scarborough Revised Bathing Water Directive (rBWD)

investment to achieve 'excellent' bathing water standards to help Yorkshire's beaches be amongst the best in Europe

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The aim of the rBWD is to protect public health and improve the environment by limiting faecal contamination. Water quality will be based on a four year data set for each category of results, with sampling against the new standards starting with the 2012 bathing season. The first bathing water results will be announced in late 2015 with performance measured against four new standards: Poor, Sufficient, Good and Excellent. The EU Directive requires that all beaches must meet the 'Sufficient' standard by 2015. However, Yorkshire Water is investing to achieve the higher Excellent standard, this being the future requirement in order for the beach to be considered for the prestigious 'Blue Flag' award. Yorkshire Water is undertaking major capital works at Bridlington and Scarborough and this paper concentrates on the progress being made on the Scarborough Scheme, following on from the paper published in UK Water Projects 2012.



Storm tanks being constructed at the WwTW - Courtesy of Peter Smith Photography

Outline of the Scarborough Scheme

The scheme has been developed using a marine impact model (MIM) undertaken by Intertek to assess the consequence of storm discharges into the coastal waters. The rBWD uses two parameters to measure water quality; *Intestinal Enterococci* and *Escherichia Coli*.

The MIM predicts the levels of the indicator organisms in the bathing water and hence its performance against the new standards.

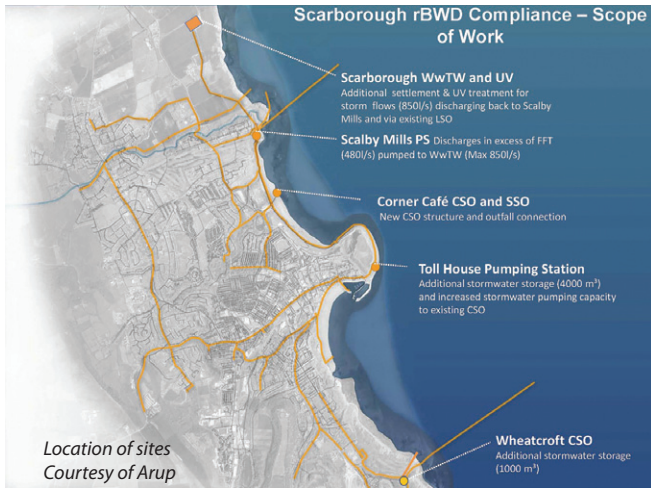
The use of the MIM has allowed YW to develop a scheme which targets the discharges with the greatest impact rather than the conventional surrogate approach which is based on limiting spill frequency at each location.

Public liaison

Scarborough is a popular and busy coastal resort. It relies on its tourist industry throughout the year and as such mitigating the

Project summary

Component/Site	Requirement	Component/Site	Requirement
Wheatcroft CSO	1,000m ³ of storm storage	Scalby Mills Pumping Station	New 1.35m ³ /s WwTW flow transfer pumps
Toll House Pumping Station	New CSO, 4000m ³ storage tank and 6.9m ³ /s storm pumping station	Transfer Pipeline	3km of new 800mm rising main and return effluent main
Corner Café CSO	New 7m ³ /s CSO	Scarborough WwTW	3 hours storm settlement and UV disinfection system



impact of the works was important. To help with this process a Liaison Group including officers and elected members of Scarborough BC as well as the general public and representatives of traders and trade organisations was formed early in the project. This has proved to be extremely effective

To assist with this, both Yorkshire Water and the contractor (the Morgan Sindall/Grontmij JV) have dedicated PR staff employed on the scheme. The development of relationships with the traders and their representatives has resulted in good positive experiences on site.

The Team have worked closely with the highways teams at both Scarborough BC and North Yorkshire CC. There was the potential to cause major disruption in the tourist areas. Careful planning and the use of different traffic management arrangements at different times of the year has kept traffic flowing and minimised delays.

Detailed design and construction

Toll House Detention Tank: The 4,000m³ storm tank and integrated 6.9m³/s pumping station is being constructed in a confined site on the Marine Drive. Careful consideration of the site layout and an innovative tunnelling design allowed the Marine Drive which is the major link between the North and South Bays to stay open throughout the winter and minimise disruption during the summer.

3D models have been produced for the complex shaft storage tank and storm pumping station enabling walk through visualisations to be created for use in Hazop & Hazcon meetings to identify areas where the design and detailing can be improved with respect to operational health and safety and buildability.

This exercise has helped identify and eliminate 'snags' and clashes that may otherwise have been missed using a conventional 2D approach.



The shaft is approximately 30m deep and has a diameter of 20m. It was constructed as a cast in situ caisson with 800mm thick walls. A bespoke shutter was used for the walls and this allowed each 2m lift to be achieved faster than the programmed 2 week cycle. Extensive grouting was undertaken before the shaft sinking started to mitigate groundwater effects.

The Toll House CSO chamber was constructed directly on to the existing live inlet tunnel sewer within a contiguous piled cofferdam. The piles were 1,200mm diameter and approximately 20m deep. Extensive temporary works were still required to allow the chamber to be constructed and the structural design was complex.

Corner Café/Peasholm Gap: The existing overflow chamber had to be abandoned and replaced with a new 7m³/s capacity structure constructed in a new location. The new location was the only available space to allow the relevant design parameters to be achieved but it was under a popular tourist attraction and in front of a prestigious residential development. The construction was undertaken as far as possible during the winter months to mitigate the impact on the tourists and the tourist attraction will be reinstated.

Scalby Mills Pumping Station: 3D Modelling and site laser surveys have been employed to develop precise models of the existing assets in complex confined spaces to minimise man access in these high risk areas. This exercise has identified a number of anomalies in existing as-built information and helped ensure that the design of both permanent and temporary works is right first time enabling the complex construction phase to proceed without interruption. This approach has proved particularly valuable when considering pump replacement in an operational wet well delivering flows to treatment and storm streams.

WwTW and Transfer Pipelines: The construction of the blind and storm tanks for the UV system has been completed as has the cross country flow transfer pipeline. The remaining pipeline connections and the UV system will be installed over the coming months.

UV treatment system

This scheme is the first time that Ultra Violet disinfection has been used to help achieve the 'excellent' bathing water standard. The UV system has now been designed following close collaboration between the project team and the selected supplier Trojan Technologies. The design will treat settled storm water flows of up to 850l/s with a UVT (ultra violet transmissivity) of 15%. The level of treatment was determined following pilot testing during storm events in 2012.

The final design consists of a blind tank and two storm tanks with a combined retention time of 3 hours. The UV system will consist of four UV cells configured as duty/assist/assist/standby. The design is such that the system will operate within the capacity of the existing power supply thereby avoiding any changes to the existing arrangements.

Undertakings & progress

The key participants on this Yorkshire Water project are MGJV, a joint venture between Morgan Sindall and Grontmij (design & build partner), Arup (technical consultants) and Turner & Townsend (commercial consultants). The scheme is progressing on both programme and budget and it is expected that the land based works will be completed in advance of the April 2014 compliance date.

The Editor & Publishers would like to thank Ben Shearer, Yorkshire Water Batch Manager, Nathan Crossley, MGJV Operations Manager and Phil Press, Associate with Arup, all of whom are members of Yorkshire Water's Asset Solutions Team, for providing the above article for publication.



Toll House CSO - Courtesy of Arup



Corner Café January 2013 - Courtesy of Arup



Corner Café April 2013 - Courtesy of Arup



Storm tanks at Scarborough WwTW - Courtesy of Arup