Lynmouth, Devon STW

£2m upgrade benefits ecology & water based recreation

by Andy Dawe & John Harding

Further improvements to the existing sewage treatment works at Lynmouth, Devon, will improve water quality within Lynmouth Bay, bringing benefits to the ecology and water based recreation in the area. Changes in the legislation required improvements from the previous mandatory, to guideline standards and this project ensures that discharges will comply with current water quality standards for Bathing Waters and Urban Waste Water Treatment.

Lynmouth STW; The site is a walled garden showing proximity to public access areas and size of site. *(Copyright: Still Imaging, Chudleigh, Devon; courtesy SW Water).*

At present, sewage from the communities of Lynton, Lynmouth and Barbrook (population 6000) enters the existing treatment building where it is passed through fine screens and stored in large tanks beneath the building. This is then discharged into Lynmouth Bay via a 600mm long outfall pipe at certain states of tide to allow its dispersal away from the bathing waters. During storms, however, the tanks may not cope and sewage discharge takes place regardless of the tide. The new works will significantly improve the existing system by treating the sewage to such a high standard that it can be continuously discharged into the bay.

Within walled garden

Since the existing STW is already within the former walled garden of the Manor House, there are overriding environmental, technical and economic reasons why the succeeding phase of the STW should be accommodated within the same site. The alternative would be to identify a new site and construct extensive re-sewerage works, re-routing gravity sewers and existing sewage pumping mains to the new site, with an accompanying return pipe for treated effluent flows back to the existing Manor Gardens outfall. This option was rejected early in the project for the following reasons.

(i) The existing STW site had been selected following consideration of alternative sites and their potential environmental effects. The search for an appropriate site for a STW in Lynmouth began in 1992, and included the identification and assessment of eight potential sites. Following extensive public consultations in 1993, the Manor House garden site was given planning approval for the first phase development.

(ii) The resewerage works, which would be necessary if an alternative site were developed, would create significant disruption of roads, footways and amenity areas within Lynmouth.

When planning was received for the original works, the planning authority, Exmoor National Park, had removed subsequent permitted development rights. Therefore, a full planning application was required along with an Environmental Impact Assessment. Exmoor National Park gave planning approval in February 2002. There were a number of conditions, but one in particular impacted on the programme.

Delay

During the previous year the tourist industry had been particularly hit by the Foot and Mouth outbreak. It was also the 50th anniversary of the Lynmouth flood disaster on the 15th August and many events were planned close to the site. The conditions delayed construction by 8 months to October 2002. This put pressure on the construction period to have the works complete by the start of the bathing water season in 2003. In the event this was achieved with takeover taking place on 21 April.

Project team

The team appointed to deliver the project consisted of *Babtie Group (Civil Designer); MJ Gleeson Group (Civils Construction); Biwater Treatment (Process Design and Construction).* It was the intention of all partners involved with the project to provide the minimum of disruption to the town and its visitors. To this aim the project joined the considerate contractors scheme. The scheme independently monitors the attitude and performance of the staff. Should there be any complaint or grievances, the site staff could be contacted directly rather than through a freephone telephone number.

There are three main methods of secondary sewage treatment which would ensure that sewage discharge complied with standards set down in the EC Bathing Water Directive.
These are:

* conventional activated sludge;
* sequencing batch reactors;
* membrane bioreactors.

Preliminary layout designs were examined for each of these options being accommodated within the remaining areas of the walled gardens. It was concluded that neither the conventional activated sludge nor the sequence batch reactor method could be accommodated in the space available without compromising efficiency of the process. The **membrane bioreactor** could, however, be accommodated successfully within the confines of the site walls.

The membrane plant was provide by *Aquator Ltd* and the works also include a membrane sludge thickening unit, a sludge holding tank, odour control system and various associated small works.

Process

The new process will treat and disinfect effluent by use of a submerged flat sheet membrane bioreactor plant. Surplus activated sludge produced by the process will be thickened in the works through a membrane sludge thickening unit, to reduce its bulk, then stored in an underground tank prior to removal from site by small tankers to a larger treatment works where it will be treated prior to disposal.

Another advantage of the membrane process is that volumes of sludge and therefore, tanker movements (along pedestrianised walkways) are reduced when compared to other processes. All structures involved in the treatment process will be covered and vented via an odour control plant.

900 installations

The membrane bioreactor treatment system is in operation at over 900 installations worldwide, including at the nearby Porlock Sewage Treatment Works where the process has consistently demonstrated its compliance with required discharge standards,

The system uses membrane panels which are submerged within an enhanced activated sludge process. The membrane panels are manufactured with a pore size in the range of 0.1 to 0.4 microns. During operation, these become covered by a dynamic layer of protein and cellular material. This further enhances the effectiveness of the filtration process by providing an effective pore size of less than 0.01 microns which is in the ultrafiltration range. The membrane bioreactor treatment, therefore, produces a high quality disinfected effluent. The process requires no primary or secondary settlement stages and no additional tertiary treatment or UV stages to achieve this very high disinfection quality, typically better than 5:5:5 BOD: Suspended Solids and Ammonia.

Cost of the project is £2 million. ■

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