Tobermory Sewage Treatment Facilities

£6.8m provides new wastewater, collection, transfer & treatment

by
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The town of Tobermory – one of Scotland's most famous tourist destinations - is located on the north east coast of Mull and is the largest settlement on the island, Although the resident population is around 1,300, during the tourist season that figure increases significantly. The existing sewerage network was a combined system with no treatment being provided. Flows were collected along the seafront and discharged through an existing short outfall adjacent to the ferry slipway at the north end of the village. The Tobermory Distillery also discharged its effluent untreated through this short outfall.

Tobermory: Diffuser provides aeration in the facultative primary lagoon *photo Courtesy Scottish Water Solutions*

New facilities required

New wastewater collection, transfer and treatment facilities were required to comply with the Urban Waste Water Treatment Directive (Scotland) Regulations 1994 and to produce a final effluent to meet SEPA's guideline standard for discharges into the designated recreational receiving waters.

In parallel with the development of the Tobermory scheme, Scottish Water was also developing a strategy for the disposal of island wide sludges generated from Scottish Water treatment works and also the many private septic tanks on the island.

Scottish Water was seeking the most appropriate strategy in terms of whole life cost, sustainability in the long term, and in environmental terms. If sludges were not treated and disposed on the island, then the alternatives were to transport large quantities of sludge off the island to Lochgilphead or even to Glasgow for treatment and disposal.

This £6.8m scheme is part of the Q&Sll programme, being delivered for Scottish Water by Scottish Water Solutions (SWS).

Contract

SWS awarded the contract to develop, design and construct the project to one of the Stand Alone Delivery Teams (SADT), Biwater-Leslie Joint Venture, under a Partnering agreement.

As part of the Partnership's review of the Sludge Strategy Report for the Island of Mull, research was undertaken into the suitability of the Aero Fac System Process to provide sewage treatment facilities for Tobermory, and at the same time, provide a long term sustainable disposal route for island wide sludges. The supplier LAS MWH, confirmed that the Aero Fac system could handle the imported sludge within the lagoons.

Collection & transfer system

The proposed system will intercept the municipal discharges at a new pumping station, TPS1, located at the ferry slipway. This incorporates storm storage, and a CSO utilising the existing outfall. The sewage is pumped to TPS2 by 2No 37.5kW dry well pumps and 2 No. 37.5kW wet well pumps across Tobermory Bay, in a 280mm diameter buried pipeline laid in the same trench as the 280mm diameter treatment works outfall.

A second transfer pumping station, TPS2 is located mid-way between TPS1 and the treatment works site. From here 2 No. 70kW pumps transfer the sewage to the treatment works.

Due to the length of the pumping main, 1.5km, and the possibility of sea water infiltration to the gravity network, chemical dosing is installed at the pumping station to prevent the formation of septic conditions in the raw sewage.The distillery discharges have been intercepted at the distillery, and diverted through a dedicated outfall

to an agreed location in Tobermory Bay. This was necessary to prevent the high BOD loading of the distillery effluent overwhelming the biological process in the treatment works.

Treatment works

The treatment works are designed for a capacity of 1864 p.e.. Flows are passed through 6mm inlet screens before discharging into the Aero Fac Facultative Lagoon treatment process.

The Aero Fac System consists of 2 No. lagoons, each with nominal dimensions of 100m x 50m wide. These are the Primary Cell and Secondary Cell. Each lagoon is equipped with floating wind powered aerators and diffusers fed by blowers located within small housings constructed on the edge of the site. Under normal conditions, dissolved oxygen is available naturally and the biological reactions will occur. However, this can be supplemented by the wind powered aerators.

The biology within the primary treatment cell comprises a complete ecosystem that is interdependent for processing. This biology essentially comprises three different zones with differing characteristics and requirements in each:

* aerobic (topmost layer) - the bacteria operate with oxygen from photosynthesis and atmospheric absorption;
* anaerobic (bottom layer) - digestion of organic solids without oxygen;
* facultative - this zone exists between the other two and acts as a protective layer to prevent the exposure of anaerobic bacteria to oxygen.

In addition, imported sludge from across the island is handled by a sludge reception, handling and storage facility, consisting of sludge screening, transfer pumps, 350 cub.m. storage tanks, and dedicated odour control. The sludge is then fed into the facultative lagoon at a controlled rate of up to 6 cu.m. per day (up to 200kg BOD per day).

Sludge "self digestion" is an integral part of the system and provides the benefits of internally digested sludge compared to solids removal and handling off the island.

The process is designed on a combination of digested solids with a controlled rate of a very small amount of solids build up over the design life of the facility. The very small amount of accumulated materials generally never needs to be removed from the system; historical data shows that some plants in America have not been desludged during their 30 year life.

After treatment, the final effluent from the secondary cell is to be discharged by gravity to Tobermory Bay through the outfall pipe, to a point beyond the limit of the designated recreational waters.

During investigation of the proposed route for the pipelines, it was discovered that this possibly crossed the location of a sunken Spanish galleon in Tobermory Bay. After discussions with Scottish National Heritage and the local Tobermory Harbour Association, the route of the pipeline was diverted away from this location.

Work started on the project in January 2006 and was due to be completed in 2007. ■

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