Loch Ewe East Wastewater Treatment Scheme

£15.4m scheme to provide first time sewerage in Scottish Highlands

by
Stewart Samson

A £15m waste water treatment works and public network of sewers and pumping stations is being installed to stop private discharges of raw and poorly treated sewage into the sensitive waters of Loch Ewe, on the west coast of the Ross and Cromarty district. The Loch Ewe East Bank FTP project will provide first time sewerage provision with the objective of improving the quality of the waters to Shellfish Directive standards. The project, Scottish Water's largest first time provision scheme, is due for completion next year and is being carried out by main contractors ROK Civil Engineering Ltd.

PS8 Site Location *Courtesy of Scottish Water Solutions*

Background

There are a number of settlements around Loch Ewe with houses with private septic tanks, some of which have soakaways. One of the settlements has a septic tank based public sewerage system owned and operated by Scottish Water. The existing septic tank at Pier Road, Aultbea is theoretically undersized for the population served.

The provision of First Time Sewerage is driven by the Scottish Environment Protection Agency's (SEPA) desire to improve the quality of shellfish coastal waters, other watercourses and remove unsatisfactory discharges from properties served by private drainage systems. Owners of properties where unsatisfactory discharges have been identified are directed to Scottish Water for connection to the proposed public sewer network, or to improve their existing systems themselves. There are some 300 properties scattered around the eastern shore of Loch Ewe in the vicinity of Aultbea and sign-up for the new scheme with local property owners is close to 100%.

The land around Loch Ewe is of significant environmental importance. The freshwater catchment for Loch Ewe includes Loch Maree which is a site of many designated conservation areas. Loch Maree is classed as an area of wetlands of international importance and a SSSI site and the islands within the loch are a National Nature Reserve. Loch Ewe and the entire land around it are part of the Wester Ross National Scenic Area.

Project scope

After evaluation of a number of options for the scheme, a final solution comprises augmentation of the existing sewers with a first time collection system for Mellon Charles, Ormiscaig, Buailnaluib, Aultbea and Drumchork. All communities drain to appropriately located pump stations running in series on a pumping main, with septic tank treatment and subsequent discharge, via a long sea outfall, to a location out with the shellfish waters. Allowance has been made for storm storage for the required associated roof run-off.

PS4 Construction *Courtesy of Scottish Water Solutions*

Placing concrete surround to WWTW tanks *Courtesy of Scottish Water Solutions*

To achieve the project outputs, construction of 16.3km of gravity sewers, 4.7km of rising main, eight sewage pumping stations, four septic tanks and a 3km marine outfall extending beyond the shellfish water boundary are required. In total 284 property connections will be made.

Construction of the eight pumping stations and the treatment works will be followed by a phased commissioning/acceptance period whereby initially the treatment works and last four pumping stations will be commissioned. Thereafter, the first properties will then be connected to the system during late summer this year, with the remaining pumping stations, and associated property connections following towards the end of the year.

Design Parameters
The design parameters of the sewerage system and the wastewater treatment works are as follows:

Sewerage System

- Prevent surcharging (backflow) within all new sewers for storm events up to and including the 2 year critical storm.
- Prevent significant flooding (defined as a surface flooding greater than 25m³) within all new sewers for storm events up to and including the 30 year critical storm.
- Prevent an increase in flooding within the existing sewer network and, if possible ease existing network flooding.
- Limit number of significant spills (volume greater than 25m³) at each CSO to a maximum of 10 per annum based on 10 years Time Series Rainfall.
- Ensure minimum 2 hours emergency storage at Dry Weather Flow (DWF)
- Ensure 6mm (in all directions) screening retention for all storm events up to and including the 5 year critical storm.
- Top of outfall pipe is located below Mean Low Water Springs (MLWS).

WasteWater Treatment Works (WwTW)

- Achieve initial dilution at discharge location of 50 times (95 percentile) for septic tank effluent.
- Achieve microbiological standards at discharge location of 500/100ml Total Coliforms (89.6% of the time), 100/100ml Faecal Coliforms (89.6% of the time) and100/100ml Faecal Streps (89.6% of the time).

Key Issues
Construction: The sequence of construction has been dictated by planning, land purchase and programme constraints. Currently the 5th and 8th pumping stations are being completed first, with 6 and 7 following close behind. The Treatment works will be constructed concurrently with 6 and 7. Once the above is completed work will be completed on PS1-4. The sequence of construction is critical to overall commissioning and making sections available for tie-ins.

Commissioning: Each individual PS can be tested and set up as a single unit including the pumping station, pumping main to the next PS and all gravity mains feeding that PS. It is envisaged that the PS will be filled with potable water. This will be used to commission the PS and will be pumped forward to the next PS in the network. The water will then be used for following PSs commissioning. This way the same water can be used over and over until it reaches the treatment works. The current plan is to break the network in to two manageable phases. Phase 1 is PS 5-8 and Treatment works and Phase 2 (PS 1-4). Once a phase is completely commissioned flows can be turned into those Pump stations.

Customer tie-ins: As part of the First Time Provision project Solutions require to empty, clean and demolish all existing private septic tanks on completion of final connections. This has, and will continue to, require a significant degree of liaison with customers as timescales and routes through private gardens are agreed. Due to the nature of this project and it is unlikely that 100% of connections will be made in the programmed time for commissioning. It has therefore been agreed that Solutions apply for sectional acceptance once 60% of connections are made to a phase, a figure which represents about two thirds of the flow and will therefore keep the sewers and pump stations sweet until full connection can be achieved.

Note: ***The Editor & Publishers thank Stewart Samson, Project Manager with Scottish Water Solutions, for providing the above article.***■

Pipeline Construction ***Courtesy of Scottish Water Solutions***