

# Mullion & Lizard Sewage Treatment Scheme

## £5.65m project provides first time sewage treatment

by Steve Cross & Dominic Lovell BEng (Hons), CEng, MICE

**T**he villages of Mullion and Lizard are located on Britain's most southerly point, the Lizard Peninsula, Cornwall. The Peninsula is designated an Area of Outstanding Natural Beauty and Heritage Coast, it also has many areas designated as Sites of Special Scientific Interest (SSSI) and candidate Special Areas of Conservation. (cSAC). The villages are located approximately 7km apart. Mullion has a resident population of 1825 and Lizard a resident population of 1450. The Lizard Peninsula is extremely popular with tourists due to the diversity of attractions including renowned beaches at Kynance Cove, Kennack Sands and Polurrian Cove. The South West Coast Path, Britain's longest footpath also passes through both villages.



Church Cove, Lizard showing work ongoing (bottom right)

*courtesy: SW Water*

Both Mullion and Lizard currently discharges crude, macerated sewage to coastal waters through two dedicated outfalls. The outfall at Mullion terminates at the base of the cliffs some 100m north of a designated Bathing Water. The outfall at Lizard terminates 460m offshore from Church Cove approximately 20m below mean high water springs.

The original scope, under the National Environment Programme, was to construct two sewage treatment works, one for each village. The diversity and sensitivity of the Lizard Peninsula was carefully considered throughout the design and construction phases. Many options were investigated including single schemes in both villages. However, to meet a number of constraints including environmental,

ecological, archaeological and financial, the two sewage treatment works were combined. The operation of one STW had long term sustainability benefits compared with operating two.

The £5.65m combined scheme comprised a STW located remotely from both communities and a total of 14km of transfer pipelines. Flows from Lizard are transferred by a main pumping station and two ancillary pumping stations, in Mullion a main transfer pumping station and one ancillary pumping station was required.

**Sewage treatment**

The new activated process plant has a design capacity of 4743pe. Flow to full treatment (6DWF) is 54 l/s. The effluent will be treated to meet a consent of 40mg/l BOD; 60mg/l SS.

The process consists of an inlet screen supplied by *Haigh*, anoxic tank, compact plant (aeration lane and final settlement tank combined), odour control and final effluent pumping station. Activated odour treatment, supplied by *OCS*, is incorporated into the scheme to meet the strict planning conditions. Sludge will be stored in a 105m<sup>3</sup> tank and provides a total of 5 days storage. Sludge produced at the works will be transported to South West Water's existing sludge treatment facility at Hayle STW.

**Transfer of flows from Mullion**

The main driver for Mullion was to comply with the Bathing Water Regulations. Hyder Consulting constructed *Infoworks* models for both the Mullion and Lizard catchments. The verified models were submitted to the Environment Agency for approval. To meet the 3 spills per bathing season requirement at Mullion, 100m<sup>3</sup> of storm attenuation was required. This was achieved by constructing a 74m long oversized sewer which terminated at the wet well of the Mullion Transfer Pumping Station. A small package pumping

station was also constructed to collect flows from a smaller sub catchment.

The existing outfall at Mullion was retained as the combined sewer overflow/emergency overflow (CSO/EO) discharge location for both pumping stations and negated the need to discharge to a fluvial watercourse. All CSO/EOs were screened to 6mm in both directions. Flows will be transferred from Mullion to the STW at a rate of 25l/s (6DWF). High lift dry well pumps, supplied by *Pioneer*, will be used to pump flows 7.1km, with a static head of 45m and friction head of 51m. The pumps are variable speed to reduce surge pressures within the pipeline.

**Transfer of flows from Lizard**

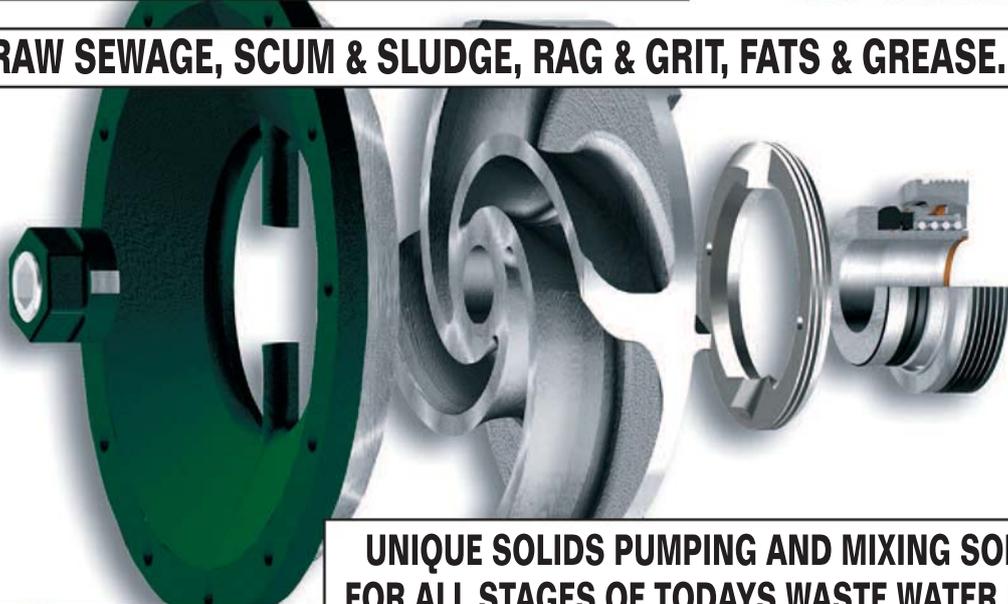
The proposed transfer pumping station at Lizard was located in a particularly sensitive area adjacent to SSSI/cSAC and was located in a copse of local importance adjacent to a protected species of Babington Leek. Design of the pumping station specified prefabricated *Weholite* tanks supplied by *Asset International* for both the storm attenuation tanks (100m<sup>3</sup>) and also the pumping station. Using this product enabled the contractor to construct the pumping station much more quickly than using conventional methods whilst minimising disruption.

Two satellite pumping stations were also constructed to collect flows in low-lying areas. These are located in SSSI/cSAC in the beautiful Church Cove area of Lizard, The existing sewerage was located in the middle of the only access road to Church Cove. To construct the proposed final effluent sewer in this road would have caused major disruption to local residents and visitors alike. To avoid this, the team decided that a better option would be to lay the pipeline through the SSSI/cSAC. This proposal was accepted and agreed with English Nature.

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The Lizard catchment also included an existing pumping station located at Ruan Minor, which collected flows from Ruan Minor and Cadgwith. The pumping station would form an integral part of the new scheme and would continue to transfer flows to Church Cove. However, instead of discharging flows through the outfall they would be collected at the new Church Cove pumping station and passed forward to the STW. Due to the length of transfer from Ruan Minor PS to the STW, calcium nitrate will be dosed at Ruan Minor Pumping Station to prevent the occurrence of septicity and combat existing odorous sewage at Church Cove.

**Church Cove outfall**

Making use of the existing assets was a high priority for the team members. The topography of the Lizard peninsula is very flat and there are no rivers or streams with the capability of accommodating the treated effluent. The existing outfall at Church Cove (Lizard), constructed in the late 1960s was utilised to discharge treated effluent and also the CSO/EO from the Church Cove Transfer pumping station. The outfall is a 200mm aluminium pipe, which terminates 460m offshore, 20m below mean high water springs and is an ideal location to discharge the final effluent.

**Design & sustainability**

To minimise the transfer of waste spoil from the pipelines the design incorporated a bund around the STW which had a capacity of 5800m<sup>3</sup>. The bund also acted as a screen around the works and significantly reduced construction traffic movements and waste tipping fees. Similarly, at the main transfer pumping station in Mullion a bund was incorporated for aesthetic and sustainability reasons.

To reduce the footprint of the STW a ‘compact plant’ was utilised. The compact plant consisted of an outer annulus (24m diameter) aeration zone with a central final settlement tank (16m diameter)



Discreet Treatment Works for area of natural beauty courtesy: SW Water

The structure was built using pre-cast post tensioned concrete panels supplied by *A-Consult*. These panels were used for the construction of both the compact plant and sludge holding tank.

To speed up construction of the transfer pipelines and to reduce friction headloss 200 OD MoPVC 12.5 bar *Monial* pipework was procured from *Uponor*. These pipes are lightweight spigot/socket pipes and avoided the use of heavy machinery for installation.

**Project status**

The planning application was submitted to Cornwall County Council in June 2003 and approved in mid February 2004. Due to the sensitive location of the scheme the Planning Authority determined that the scheme was a Schedule 2 development under the Town and Country Planning (Environmental Impact Assessment) England and Wales) Regulations 1999. Construction started in early April 2004. Progress of the scheme has been delayed at Church Cove (Lizard) due to local protesters. The project is expected to be commissioned, fully operational and complying with consent by June 2005.

The scheme will provide first time sewage treatment for Mullion, Lizard, Cadgwith and Ruan Minor and will result in cessation of crude discharges at both Mullion and Lizard and bring the long awaited environmental benefits to these coastal communities which rely heavily on the tourist industry. ■

The partnering team consisted of: **Client:** *South West Water Ltd*; **Civil Contractor:** *Alfred McAlpine Capital Projects*; **Process Contractor:** *Biwater Treatment Ltd*; **Civil Designer:** *Hyder Consulting (UK) Ltd*.

Note on the authors: *Steve Cross* is Project Leader for *South West Water Ltd*; *Dominic Lovell* is Design Manager for *Hyder Consulting (UK) Ltd*.

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ENVIRONMENTAL PLANNERS • LANDSCAPE ARCHITECTS • ECOLOGISTS

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Mullion/Lizard Sewage Treatment Scheme



We are pleased to have prepared the Environmental Statement for the successful approval of Mullion/Lizard Sewage Treatment Scheme for South West Water.

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