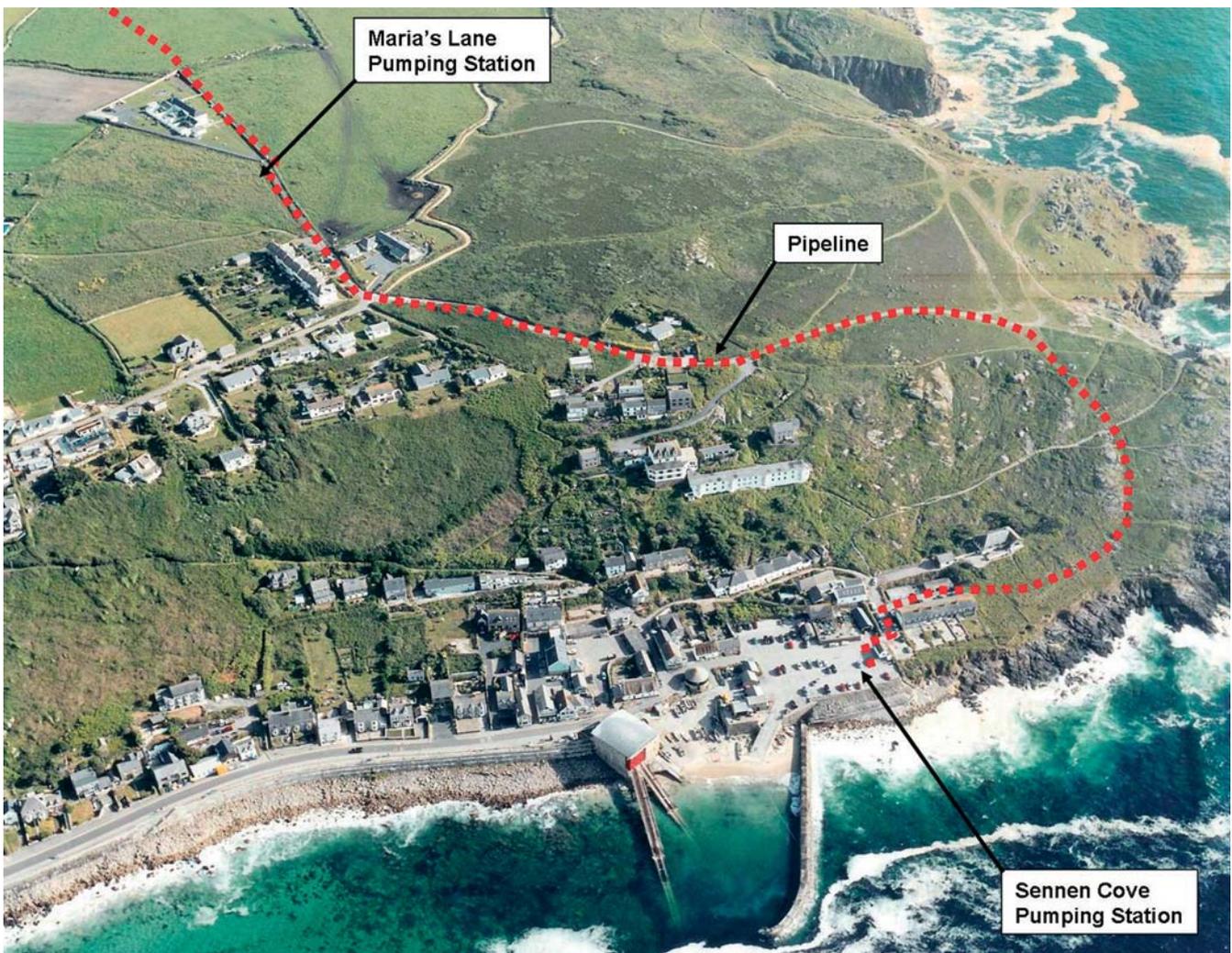


Sennen & Porthcurno

SW Water 'clean sweep' with £5.7 million sewage scheme

by
Steve Cross & Matt Coombs

Situated at Britain's most westerly point, the picturesque villages of Sennen and Porthcurno lie in an area of Outstanding Natural Beauty. They benefit from a mild climate due to the Gulf Stream, dramatic coastal scenery and a rich diversity of flora and fauna. Consequently there are large areas of National Trust land, County Wildlife Sites and Sites of Special Scientific Interest (SSSI). The sandy beaches are a haven for holidaymakers and sports enthusiasts all year. Recently areas of the western Cornwall Peninsula have been awarded World Heritage status in recognition of the traditions of fishing and historic mining of tin and copper. South West Water has developed plans to provide Sennen and Porthcurno with a comprehensive sewage treatment system as one of the final projects of its 'clean sweep' scheme.



Sennen Cove

courtesy South West Water

Scheme drivers

The scheme is required to meet the European Urban Waste Water Treatment Directive, as implemented by the Urban Waste Water Treatment Regulations 1994, and the National Environment Programme.

As typical Cornish communities both villages are located directly on the coast within steep sided valleys adjacent to the Atlantic Ocean. The existing sewerage systems follow the topography of the land resulting in crude sewage discharging via sea outfalls to the west of Sennen Cove and to the south of Porthcurno. The villages have a combined summertime population equivalent of 3150.

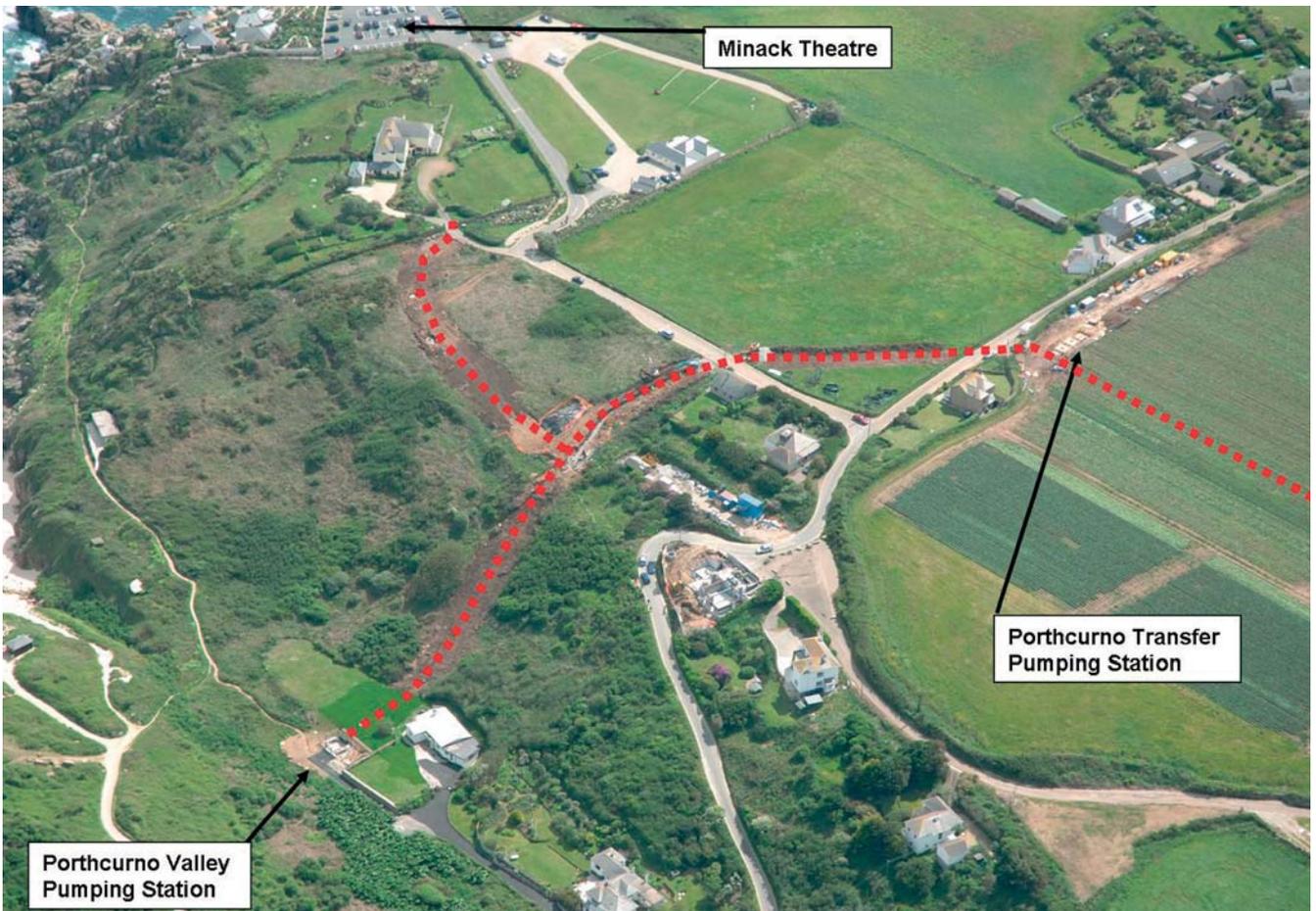
Due to the topography of steep narrow valleys, coastal cliffs and narrow valley floors, space for a new treatment works was at a premium. A large amount of surrounding land is also designated SSSI and under National Trust ownership. As such, the location of any treatment works will always be a sensitive issue requiring a careful balance between engineering requirements, risks, land availability particularly the landscape and visual impact.

Following consultation with local residents and other key stakeholders a scheme was developed for the combined treatment for Sennen and Porthcurno. This involved designing a single sewage treatment works (STW) located near Sennen with a discharge into



Sennen Cove Beach

courtesy of South West Water - May Gurney



Porthcurno Valley

courtesy of South West Water - May Gurney

the sea at Sennen Cove. Four pumping stations will be required to transfer the sewage to the new treatment works, two at Sennen and two at Porthcurno, together with 5.6km of rising mains and gravity sewers.

The programme has been scheduled over 12 months to enable sewage to be treated from 31st March 2008.

Public consultation

In total the scheme involves construction on land owned by over 40 different individuals or bodies including; Sennen Harbour Commissioners, National Trust, Parish Councils, St Aubyn Estates, Lord Falmouth and many others. With such a large number, consultation has been a major factor for success of the project. A public exhibition was held, prior to the planning application being submitted, allowing local residents and affected groups the opportunity to see the proposals, ask questions and provide comments. During construction a forum has been used to discuss the programme of works and specific local issues or concerns.

Sennen Cove & Maria's Lane Pumping Station

The Sennen sewerage system serves a population equivalent of approximately 2600 (summer) and gravitates down the hillside and along the valley floor before discharging into the sea.

The scheme intercepts sewage at Sennen Cove and transfers it to the new STW via two pumping stations, the second located at Maria's Lane. To minimise the carbon footprint, Maria's Lane has been located so that it can intercept sewage from the higher area of Sennen, and receive sewage from Sennen Cove before pumping on to the STW. As the sewerage system is combined, the volume of sewage and storm water could exceed the capacity of the STW. A 106m³ storm water tank is therefore being provided beneath the car park, to store water for treatment after the storm subsides. If the storm event

exceeds storage capacity storm water will overflow, into the coastal water, via a 6mm cyclone screen as agreed with the Environment Agency and embodied in the Discharge Consent. The transfer pipeline will be 1.3km in length and will raise the sewage approximately 100m vertical between the Sennen Cove pumping station and the STW.

Porthcurno Valley & Transfer Pumping Station

The Porthcurno sewerage system is similar to Sennen but serves a population equivalent of approximately 550. The scheme intercepts sewage at Porthcurno Valley and transfers it to the STW via a second pumping station (Porthcurno Transfer). Storm storage is provided by a 38m³ storm water tank containing a 6mm cyclone screen and overflow into the coastal water. The storage volume also allows for a new connection sewer, to enable the nearby Minack Theatre to connect to the public sewerage system. The transfer pipeline from Porthcurno to the STW will be 4.3km in length and will raise the sewage to approximately 75m vertical distance.

Septicity

With long distance rising mains there is a risk of generating septic sewage due to long retention times. This would be both detrimental to the treatment process and potentially lead to odour problems. In order to minimise this, calcium nitrate is being dosed at both Porthcurno Transfer and Sennen Cove pumping stations prior to pumping.

Sewage Treatment Works (STW)

A number of sites were considered for the location of the Sewage Treatment Works (STW). The agreed location Parkas Moor, is a greenfield site approximately 0.5km east of Sennen. The site is a grassed field surrounded by hedges with a 4.5m fall across the site from the north west to the south east corner.

- * the treatment works is surrounded by farmland with the nearest property approximately 520m away at Sennen;
- * the site offers good hydraulics allowing sewage to gravitate through the works to the sea outfall without the need for extra pumping, thus providing a more robust and lower energy consumption solution;
- * the site is outside the Area of Outstanding Natural Beauty & designated nature conservation sites;
- * The site is bounded by hedgerows to the north, mobile phone masts to the east and agricultural fields to the south and west allowing visual impacts to be minimised.

The design of the works ensures that the discharge meets the consent standard issued by the Environment Agency of 40mg/l BOD and 60 mg/l SS. The works is designed for a capacity of 3150 population equivalent in 2021, with a water usage of 153 l/h/d and a flow of 5.7 l/s DWF and 28.1 l/s FFT (6DWF).

Sewage will be treated using 6mm inlet screens, a grit trap, two 7m dia conical settlement tanks, two 17m dia filter beds with 2m depth of granite media and two 7m dia conical Humus tanks before gravitating to a sea outfall at Sennen Cove. Humus sludge will be transferred via the site drainage pumping station for co-settlement in the primary settlement tanks. It will then be thickened on site and stored in a 55m³ holding tank before transport by tankers to a SWW sludge treatment centre.

Planning & the Environment

A planning application submitted in August 2006 was approved by Cornwall County Council in October 2006. An environmental report formed part of the planning application with a number of assessments being undertaken, with proposed mitigation measures.

- * **ecological** -active badger setts were found along the proposed access road to the treatment works This led to repositioning the road;

NICHOLAS PEARSON ASSOCIATES

ENVIRONMENTAL PLANNERS • LANDSCAPE ARCHITECTS • ECOLOGISTS

Sennen & Porthcurno Sewage Treatment Scheme



We are pleased to have prepared the Environmental Report and planning application for the successful approval of the Sennen & Porthcurno Sewage Treatment Scheme for South West Water.

our services include :

- Environmental Impact Assessment
- Preparation and Review of Environmental Statements
- Planning Appeals and Expert Witness
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Porthcurno Valley Pumping Station

courtesy of South West Water - May Gurney

- * **Archaeological** - a watching brief was placed on certain areas with trial holes undertaken prior to construction commencement;
- * **noise & vibration** - in areas perceived to be particularly sensitive, sealed covers were installed to chambers containing mechanical equipment;
- * **Odour** - passive odour units and dosing of calcium nitrate were incorporated at two pumping station locations. Also the treatment works inlet was covered and vented to an odour control unit;
- * **Flooding** - a flood assessment was undertaken. It was agreed with the Environment Agency to relocate the construction compound within Porthcurno Valley to minimise flood risks.

Procurement

Following tender submissions the contract was let using an IChemE green book target cost arrangement with *South West Water, May Gurney and Hyder Consulting* signing up to a gainshare/painshare mechanism providing a suitable incentive for innovation and added value throughout the life of the project.

Programme restrictions

The programme had to respond to seasonal constraints associated with local wildlife - particularly along the pipelines. Scrub clearing was undertaken prior to the bird breeding season. Cornish hedges, a prime habitat for lizards have been removed outside the hibernation period. Planting & reseeded have also been programmed at times to allow greatest opportunity for growth and restoration of habitats

Another factor is the local economy. The majority of local businesses are tourist driven and rely on summertime trade for their livelihood. Therefore, work in Porthcurno Valley and Sennen Cove was undertaken outside the regular holiday season.

Construction

The construction activities can be split into 4 key elements

- * Porthcurno Valley & Transfer Pumping Stations;

- * pipelines to the STW;
- * the STW;
- * Sennen Cove & Maria's Lane Pumping Stations

Construction of Porthcurno PS's started in January 2007 and work at the STW location (May 2007). The pipeline construction began in February 2007 and will continue through the summer months, making the best use of the weather and minimising impact on the tourist season. Work will commence at Sennen Cove in October, following the end of the busy tourist season.

Archaeology

During the initial pipeline construction works, the Historic Environment Service, the supervising archaeological consultant on the scheme, discovered a Beaker structure in the vicinity of Sennen Village. The term Beaker is based on the distinctive pottery drinking vessels of a culture within Western Europe that started in the late Neolithic (stone age), subsequently running into the early Bronze Age ca. 2800 - 1900 BC. Radiocarbon dating supports the introduction of Beakers into Cornwall around 2100 cal BC. The find consists of a scooped structure measuring approx 3m x 4m with defined stake holes, and a hearth at the western end. Further details are due for public release once all the major excavation works are completed.

A cleaner future

The works at Sennen and Porthcurno are both challenging and demanding, requiring the best from a design & construction partnership, whilst working together with the local environment and residents. The cleaner bathing waters that will result will improve the marine environment and be of benefit to residents and tourists alike. ■

Note: *The Editor & Publishers wish to thank Steve Cross, Project Leader, South West Water and Matt Coombes, BEng (Hons), CEng, MICE, Design Manager for Hyder Consulting (UK) Ltd for submitting the above, lightly edited article, for publication.*