

Tamerton Foliot, Devon, Wastewater Storage Hayesend Farm project: removal of a DG5

by

James Pearce, BEng, MEng, CEng, MICE & Helen Bali, BEng, CEng, MICE

Hayesend Farm, situated on the South coast of Devon and to the North of the city of Plymouth nestles in a small valley in the Plymouth green belt zone. The farm straddles the main incoming sewer to Ernesettle wastewater treatment works (population served 43,000) – a sewer which was frequently flooding property, to the extent of causing a major nuisance and an entry on the DG5 register. To resolve this problem a scheme was generated under South West Water’s Strategic Investment Programme.



Tamerton Foliot, Devon: Removal of a DG5 flooding problem at Hayesend Farm

courtesy: South West Water

DG5 Register

The DG5 register is a requirement by the Director General of Ofwat that relates to the flooding of property. Any complaints received where flooding has occurred inside of a property are logged on the register and the local water company has a legal obligation to remove an agreed number of properties from the list each year. Although the problems at Hayesend Farm was not affecting a great number of properties, those affected were suffering significant problems on a regular basis.. The flooding problem also extended to land used for grazing. This would not show up on the DG5 register, but had significant impact on compensation discussions held with the landowner.

Options investigated

Under a previous scheme extensive sewer modelling had been completed of this catchment to determine storage requirements for compliance with the Shellfish Waters Regulations. This same computer model was then used to evaluate the best solution for the Hayesend Farm problem. The model identified that the problem with this sewer was NOT a local problem, but was caused by lack of capacity in the whole length of the trunk main. This was due to both the diameter and the gradient of the existing twin pipes forming

the main. Options considered include both a local solution, of storage and balancing and a catchment related solution of providing a parallel system to the sewage works.

Initially, the team considered whether storage could be provided to balance all of the flows during a storm, however this required an excessive volume, The team then considered the option of providing a new overflow to alleviate some of the problem. This new overflow needed to be compliant with the Shellfish Waters Regulations, so the team, therefore, undertook further modelling of the catchment to establish the storage volumes required prior to discharge.

Two other options were also considered. Laying a parallel sewer to the treatment works was looked at, however, as the route to the treatment works was extremely flat, this new line would need to be very large to avoid the same problems as the existing sewer. It would need to be in the region of 4km long, relatively deep in some locations and would have to include a crossing over a tidal creek. The route for the new pipe would have to mirror the existing pipe, which includes sections through a housing estate and a footpath adjacent to a creek, making space for construction very tight.



Removal of a DG5 flooding problem at Hayesend Farm

courtesy: South West Water

The final option considered involved the installation of an intermediate storm pumping station, which would force the flows to be passed forward. This was discounted as it increased the risk of the lower section of the trunk main flooding.

Design & construction

The preferred option of online storage and a new CSO was developed in partnering between *Hyder Consulting* and *McAlpine Capital Projects*, as part of their ongoing partnering commitment with South West Water.

The final option consisted of 700m³ of storage, a new Combined Sewer Overflow and a new outfall pipe into an adjacent stream. Storage was provided by means of twin Weholite HDPE pipes both 73m long and 2.5m diameter, operating as an on-line tank. Keeping the tanks on-line avoided any need for pumping and the associated large control kiosks.

The overflow chamber was constructed in reinforced concrete, with an integral 6mm aperture screen. The tanks and overflow were constructed in a sloping field upstream of the historical flooding location, with an orifice plate included on the tank outlet to restrict ongoing flows.

Use of HDPE was proposed on the basis of tank cleaning, speed of construction and minimising of surface features. Access to the site is through a narrow country lane and the field within which the site was located was steeply sloping, so use of the HDPE tanks also had advantages on the basis of safety for both transportation and lifting purposes. The choice of material was also influenced by the fact that although the proposed site was a field within the green belt, it proved to contain major water and electrical supplies for the city of Plymouth. The design was, therefore, restricted in length, hence the use of twin tanks, but it needed to be versatile enough to deal with the network of services on the site.

To avoid any planning and land difficulties, all works were constructed below ground with the exception of the control kiosk. The land being returned to grazing use again on completion of the scheme. The works was constructed completely off-line to avoid interference with the existing system.

Detailed design and construction commenced in October 2003, with operational use achieved in February 2004. ■

Note on the authors: *James Pearce is Project Leader for South West Water; Helen Bali is Design Manager for Hyder Consulting.*