

Case Study

Meadowhead, Ayrshire

Weholite attenuation system improves the quality of local rivers' bathing water



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SDS Systems

Weholite Attenuation System.

Client

MBV
(Morrison Construction and Black & Veatch Joint Venture).

End Customer

Scottish Water.

Project

Meadowhead and Stevenston Stormwater Transfer.

Purpose

To improve the quality of rivers and bathing water in Kilmarnock and Irvine.

Brief to SDS

To address CSO sources of pollutants entering the watercourses and coastal waters.

Timing

The Irvine phase of the scheme completed commissioning and entered into service in October 2012, and the rest of the project in July 2013.

Project Background Information

Within the towns of Irvine and Kilmarnock, poor water quality and aesthetic failings had been identified in inland and coastal watercourses, specifically Kilmarnock Water, the River Irvine and the bathing waters of Irvine Bay. During heavy rainfall, stormwater from several combined sewer overflows (CSOs) spilled into these water bodies. These Unsatisfactory Intermittent Discharges (UIDs) became the subject of a programme of investigation and analysis to determine the best solution to reduce these overflows and improve the water quality for more than 80,000 people living in the area.

Project Objectives

To arrest the spillages of Combined Sewer Overflows (CSOs) into local river systems.

Project Requirements

To increase the capacity of foul water storage and attenuation.

SDS Product Features

An extensive Value Management process was utilised by Scottish Water in assessing the range of solutions proposed to resolve the water quality and aesthetic failings. A key component of the chosen scheme is the Irvine Valley Transfer Sewer, from which a new 'North Lodge' Pumping Station pumps up to 900 litres/second directly via a new 1,000mm external diameter PE pumping main/pressurised gravity sewer to a new screening facility at Meadowhead Wastewater Treatment Works (WwTW).

Flows in excess of 900l/s are discharged via a 6mm mechanical screening chamber into a new storm tank which, together with the pumping station wet well and associated pipework, provides a stormwater storage capacity of 10 million litres. The storm tank comprises of sixteen 2.6 metre internal diameter Weholite HDPE pipes, each 96 metres in length, laid in a grid or 'radiator' pattern and connected by manifolds at each end. In storm events of greater than a 1 in 5 year return period and if the tank capacity is exceeded, twin 1,350mm overflow pipes carry the flow to a new outfall spilling to the River Irvine. Once the storm has abated, the stored stormwater is pumped forward to Meadowhead WwTW for screening.

Issues Overcome

Design and construction of the stormwater attenuation tank presented a particular problem. The site selected had several constraints, including the hydraulic operation of the system and the site's location within a designated flood plain. The original design of a rectangular, reinforced concrete, open topped storage tank located on higher ground was changed, therefore, to the Weholite solution of below ground plastic pipes. This solution has left very little visual impact and allowed the land above to be returned to agricultural use; furthermore, it did not require planning permission nor does it take up any of the flood plain capacity.



The engineering challenges of the scheme were matched by those of stakeholder management. The development and delivery of the project has, at each step, taken into consideration the concerns of residents, landowners and businesses; indeed, the initial site investigation was the largest ever undertaken by Scottish Water. Close collaboration with the Scottish Environmental Protection Agency (SEPA) and the Ayrshire Rivers Trust was maintained throughout the development and construction phases of the project.

Results

In the Irvine Valley element of the scheme, nine UIDs have been addressed as well as the construction of two new stormwater interceptor sewers, collecting storm flows and transferring them by gravity to two new pumping stations.

From initial excavation to completion of backfilling took only three months, compared to fourteen months for the construction of the alternative concrete tank solution. At the time of installation this storage tank is the largest of its type worldwide.

Scottish Water's delivery partner, MBV, has been recognised with two RoSPA Gold Awards and one Gold and three Silver awards from the Considerate Constructors scheme. The project also gained the Galliford Try Infrastructure Excellence Award for 2011 and the site was chosen as runner-up to Most Considerate Site in 2013.

Summary

The Meadowhead and Stevenston project represents Scottish Water's largest ever stormwater transfer scheme. Introduced over a period of some 33 months, the construction of 12 miles of pipeline, three substantial new pumping stations, a 10,000m³ Weholite storage tank and several new CSO structures has brought significant environmental improvement to rivers in Kilmarnock and Irvine and to the coastal waters of Irvine Bay.

