

Case Study

Hookstone Road

CSO spill prevention system



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SDS Systems

Weholite Storage Pipes, Manholes and Jointing Systems.

Client

Mott MacDonald Bentley.

End Customer

Yorkshire Water.

Project

Hookstone Road.

Purpose

To protect the local environment from pollution.

Brief to SDS

To reduce the risk of sewage spills into local watercourses.

Timing

The main works commenced in the winter of 2019/20 with final pipes installed in summer 2020.

Project Background Information

Hookstone Road CSO in Harrogate, North Yorkshire, is a CSO chamber with upstream and downstream online storage provided by large diameter pipes. During storm events, restrictive pipe diameters and routing caused the pass forward flow to partially fill the storage pipes before excess flows were screened at the CSO chamber and discharged to the adjacent watercourse. This often led to blockages of the outlet sewer.

Project Objectives

To prevent blockages to the outlet sewer and thereby reduce storm event discharges in the catchment to the receiving watercourse.

Project Requirements

To upgrade the existing CSO system with both upstream and downstream online storage.

SDS Product Features

In order to comply with the existing Environment Agency Discharge Consent for the asset, the pass forward flow and storage volume provided at the point of spill of the CSO were key in developing the solution which maximises the use of gravity return storage and avoids the use of small orifices which had resulted in problems with the system in the past.

The final design includes 184m³ of additional sewer storage within large diameter Weholite pipes positioned upstream of the CSO, 360 metres of sewer upsized to 450mm diameter, and replacement of the existing restrictions downstream of the CSO. Online storage with a capacity of 730m³ is provided by 4 legs of 1400mm diameter, 120 metre long Weholite pipes, which were delivered to the site in units up to 10 metres long and internally welded together in situ.

Weholite manhole chambers were also selected for a number of reasons, including their light weight for the benefit of handling and installation, integral baseplate to help counteract flotation, no requirement for the additional stability that would normally demand a concrete surround, and the provision of inlet and outlet stubs at the required angle and gradient.

Issues Overcome

The catchment was particularly challenging due to the large number of other CSOs in the vicinity, which could not experience detriment as a result of this solution, and the requisite position of the storage pipes beneath a busy parking area for the Great Yorkshire Show.

Heavy clay soils with groundwater fissures meant that the excavation required constant dewatering during the very wet winter months. Silt management was also required and constantly maintained throughout the works to prevent any detriment to the adjacent watercourse.

A hydraulic model was used in the process of design optioneering, as any modifications to the system had the potential to cause issues elsewhere in the network.

Results

Making use of off-site fabricated products wherever possible was important in minimising the construction programme and maximising the quality of installation, thereby reducing the risk of re-work. The pre-slung manholes were safe and easy to transport, minimised work in deep excavations, and reduced the amount of waste and the need to transport materials around the site during challenging winter working conditions. Installation of each prefabricated manhole reduced the construction duration by 4 days compared to traditional in situ construction for a 6 metre deep chamber. Furthermore, SDS's solution reduced the total carbon impact by 66%.

The use of a long-reach excavator further improved the construction methodology since its 22 metre reach meant that all construction activities could be carried out from one side of the excavation, thereby reducing the working area and the amount of plant required.

Flora Keen, Technical Lead, MMB, said:

"New, off-line manhole chambers were identified as an opportunity to utilise off-site fabrication and a variety of products were considered. Weholite high density polyethylene (HDPE) chambers were chosen for the scheme as they provided a number of significant unique benefits."



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