PROTECTING PORTSMOUTH

Rob McTaggart, technical lead at MWH explains how collaboration with the community, and other stakeholders in Portsmouth, made it possible for 4D with Southern Water to design and implement a solution that separated surface water to provide resilience, significantly boost flood protection and benefit the environment with the minimum of new infrastructure

Channel and Swale

Building the Swale

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As part of the 4Delivery Consortium working for Southern Water (SW), Portsmouth City Council and the Environment Agency, MWH designed an innovative solution to significantly boost flood protection in Portsmouth. This was the first ever scheme in which a water company developed and utilised assets owned and operated by other agencies. Thirty-four hectares of paved area (equivalent to 70 football pitches), was diverted away from the combined sewer network, enhanced tidal pumping capacity installed and tidal inflows were removed. These achievements, along with other works at Eastney Wastewater Pumping Station (WPS) have resulted in a level of protection against catastrophic failure of one-in-76-year Level of Service Protection.

All of this was achieved without major new infrastructure and with minimum disruption to the community or environment and has produced significant benefits for all parties. It has been recognised with awards ranging from CIWEM Considerate Constructor; ICE South East England Engineering Excellence – Special Awards for Community Benefit, to 4D project of the year. Importantly, this project attained 95 per cent customer satisfaction, the highest for any 4D project, and way above industry norms especially when you consider that this was such an invasive project.

IN THE BEGINNING... A FLOOD

Portsmouth is the UK's only island city, and the most densely populated outside of central London. It is a flat, low lying area that is home to 200,000 people. Portsmouth was one of the first UK cities to have a dedicated sewage system but like all Victorian sewerage systems it combined foul and surface water systems. Capacity of the system is limited by the Eastney WPS site first commissioned in 1865. Over the years a complex mix of foul drainage and surface water drainage was created, which largely managed the city's waste water and protected the city. However, on 15 September 2000, a one-in-108-year event occurred. An extreme weather event caused the WPS to be overwhelmed within two hours and flooded around 750 properties.

Subsequently it took many months to fully re-commission the pumping station. Over the succeeding AMPs, Southern Water invested substantially to increase the resilience of the system.

LARGEST EVER SEPARATION PROGRAMME ATTEMPTED IN THE UK

Part of SW's future strategy was to remove surface water from the combined sewerage system. Work started in spring 2013 to divert up to six cubic metres per second (an Olympic swimming pool every seven minutes) of peak flow from the combined system. It was completed ahead of schedule in early 2015 and is one of the largest separation programmes ever attempted. This was a highly visible and public project involving a great deal of street works, shaft sinking techniques and deep excavations requiring a variety of temporary works.

Disruption to the travelling public was minimised with no dig techniques and finding innovative solutions through green spaces. For example, in addition to new surface water pipes along Tangier Road across the golf course to the new outfall, we installed a new open channel parallel to Great Salterns Drain. The existing channel was retained as the primary watercourse for first flows, ensuring the wetland area with the trees would be maintained. Also, as our surveys and modelling showed the golf course will flood on a regular basis, excess surface water will now be conveyed through the golf course via swales and channels sympathetic to the features of the golf course.

It was still necessary to use conventional open cut techniques, up to six metres deep across some of the city's busiest highways. Close to one kilometre of the new surface water sewer had to be laid along Tangier Road, a strategic East-West route through the city, and Quartremaine Road, the main artery of the city's industrial area. These works presented many demanding logistical issues, including interface with high volumes of traffic and pedestrians. It required careful planning and co-ordination between 4Delivery, Portsmouth City Council and their PFI Maintenance Contractor. Additionally, as the works were in close proximity to residential and business properties, we liaised closely with owners conducting condition surveys, vibration and noise monitoring to ensure our activities had as little impact on the local environment as possible.

One of the new 12.5 metre diameter, ten metre deep shafts we had to install, is located in Stamshaw Park, home to an adventure playground and the Harbour School. 4Delivery engaged with the school and its pupils who contributed positively to the scheme and their local environment by decorating the hoarding at the site. In return 4Delivery carried out some enhancements to their garden and outside spaces to make it a more usable learning space.

COMMUNITY AND COMMUNICATION WERE KEY

Another 'first' we achieved was that it received the quickest planning approvals of any 4D project. This is testament to the high level of engineering and design

Copnor Road PS and storage tank

IN FIGURES

34 Hectares of paved area from which flow has been diverted

95 Per cent customer satisfaction in surveys taken post-construction

750 Number of properties flooded in Portsmouth on 15 September 2000

8,000 Tonnes of material excavated to create swales that was then reused as part of the project

Copner Road site

but more importantly the involvement and engagement we achieved among the community. Collaboration was vital to managing the needs of many different stakeholders from schools, the public, property owners, city councillors to members and management of sports clubs and Golf Courses.

Good communication was essential and included giving talks and running competitions in schools, sending 19,023 letters and 5,782 FAQs (Frequently Asked Questions) pages to customers plus holding eight local resident evening drop-in events. These were held where works were planned and were specific to a local element in the scheme. These sessions received 100 per cent positive feedback from attendees. We also placed 12 advertorials in city wide magazines reaching 100,000 homes per edition. Overall, we achieved an unheard of 95 per cent customer satisfaction grade in surveys carried out post construction.

The commitment of the team to contribute to the sustainability of the project resulted in four Flood Defence Consents, one Marine Licence, Water Quality Sampling and an Environmental Screening Opinion being produced. Over 34,000 tonnes of waste, much of it excavated material, was produced by the project, 99.9 per cent of which was diverted from landfill for re-use.

Additionally, over 8,000 tonnes of material excavated to create swales (overflow flood channels) at the Great Salterns Golf Course was retained and re-used on site in landscape bunds to improve the screening between holes.

GREEN AND BLUE

Civil engineering has long been viewed as having to be 'grey' and utilitarian to deliver results. But this project shows how 'green and blue' engineering is changing perceptions. Done in complete sympathy with the community and environment, highly sustainable and using far less carbon, this project demonstrates a real social and environmental perspective and alternatives to just 'banging in great big boxes' or other infrastructure.

It was finished ahead of time, in part because of the collaborative approach with all stakeholders including the public and Portsmouth City Council. They were really instrumental and interested in making it the success it is.

John Spence, head of water quality and environmental policy, Southern Water, concludes: 'The essence of this project was that it had to perform a functional duty in terms of enhancing resilience but at the same it has delivered increased amenity value for the local community. A year on, the project is looking great, the works have matured into the fabric of the environment brilliantly.'