

Swindon STW

network and growth upgrade scheme

by Siobhan Gilley

Swindon Sewage Treatment Works (STW) Network and Growth Upgrade Scheme involved upgrading the inlet works of this STW, including numerous complicated interfaces with existing operational assets, carried while the works was receiving sewage flows of up to 1,423l/s and up to 6,000l/s in storm flows. The project had a requirement to replace the MEICA plant with minimal changes to the existing inlet works sub-structure. The integrated design and build team worked together from the outset of the project to create a scope that: (i) met the functional requirements of the project, (ii) was safe to build, (iii) maintained operational access during construction and (iv) allowed safe demolition.



The new inlet screens - Courtesy of Black & Veatch

Undertakings

The project was delivered by Black & Veatch's design and build team, within Thames Water Utilities Limited's (TWUL) AMP5 programme. The key to the success of the project was the communication and teamwork between all parties. This included the design and build aspects of the Black & Veatch project as well as a very good working relationship with the TWUL local operations team.

There was also an additional external stakeholder that was included in the wider team - Optimise, the infrastructure contractor for TWUL. Optimise carried out the network aspect of the Swindon STW Network & Growth Upgrade Scheme and as such, the design

team needed to work together to create the new hydraulic profile from the inlet pump station out to the network. To facilitate this the team used formal and informal communication with technical reviews, and formal monthly progress meetings with TWUL, Black & Veatch and Optimise to build upon the informal emails and discussions between all parties.

From the outset of the project the end user of the works, TWUL Operations, were included in several scope and design reviews and once the project was into the construction phase there were formal monthly meetings to discuss planned work and daily communication between the two teams.

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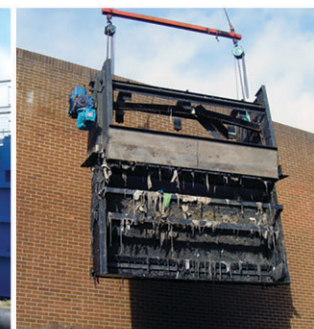
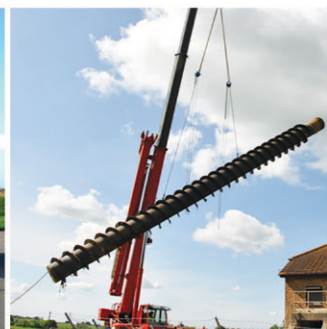
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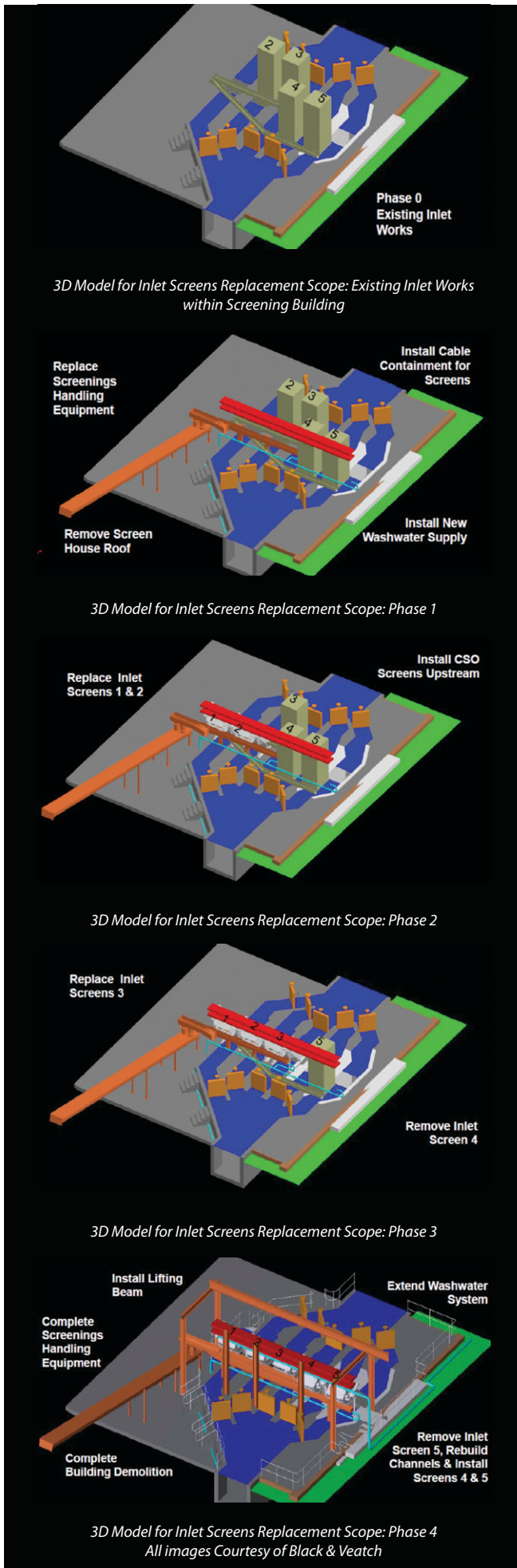


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This relationship between Black & Veatch and TWUL professionals helped with the scope removal of service diversions for the ground works element.

Pipeline installation

Black & Veatch had to install a 1,800mm diameter pipeline from the inlet channel to the storm tank, across 34m of roadway with numerous services running through the area. The tendered design made an allowance for service diversions for the installation of the pipeline. However, after further investigation and trial pits were completed, the integrated team changed their approach.

The new information indicated that many of the services could be grouped together and protected to allow the 1,800mm pipeline to be threaded underneath. The good working relationship with Thames Water Utilities Limited operations led to the TWUL electrical personnel identifying some of the cables, including 4 HV cables, as redundant.

TWUL then carried out the isolation of the cables which allowed Black & Veatch to remove them from the ground. TWUL also temporarily isolated the remaining HV cables during the installation works to further improve the safe installation of the 7 tonne pipe segments.

During this element of works Black & Veatch and Thames Water Utilities Limited worked together to maintain ever changing pedestrian routes for access to operational equipment on the other side of the excavations.

Replacing the MEICA equipment

The critical activity on the project which required significant planning was the replacement of the inlet works MEICA equipment within a building that was being sequentially demolished. From project conception the project management team created a work sequence for this phase that was discussed and agreed by the wider team including the client and end user.

The first stage of construction made the working area as safe as possible which included diverting the cess import facility to a new area in the western side of the STW. This removed all operational vehicular movements in and around the inlet works area for the duration of the construction project limiting access to pedestrians and construction plant.

Although the sequence had been described and noted in formal solution reviews with TWUL the team created a 3D CAD model to demonstrate the stages of construction. This helped with identifying clashes as well as highlighting issues with access to operational plant during installation.

The demolition of the building was necessary for the replacement of the inlet screens. However the walls of the building were the primary support for cable containment and therefore they could not be removed until all existing operational plant had been replaced with new. This led to a two-stage demolition sequence with the walls of the building being propped to ensure stability.

Replacing screenings handling facility

This stage also included replacing the screenings handling facility with a slight modification to the launder channel to suit old and new arrangement of screens. To prevent the inlet work flows backing up, prematurely storming or flooding properties upstream of the sewage treatment works, 3 (No.) screens were required to be operational at all times.

During Phase 1, Screens 1 and 2 were replaced sequentially and then the upstream storm screens were installed to take any flows that had backed up from the inlet channels to prevent flooding of upstream houses.

Phase 3 included the replacement of screen 3 and the removal of screen 4. This was an area where the 3D model identified a clash in the design. The original plan was to replace screen 3 with screen 4 and 5 remaining in position. However the motor position of the new screen 3 and the existing screen 4 overlapped and therefore the plan was changed to leave screen 5 in position while removing existing screens 3 and 4. Then new screen 3 could be installed and commissioned before screen 5 was removed.

Once screen 3 was in position and commissioned the works then had three operational screens to take full flow to treatment. This allowed Screen 5 to be removed and the concrete modifications to be made to channels 4 and 5.

Hydrodemolition

Hydrodemolition was used to cut back the existing channels while keeping the reinforcement in situ and then new reinforced concrete was installed to house the new screens. This hydrodemolition was carried out without damaging any of the newly installed process plant.

Once screens 4 and 5 were installed the remaining building was demolished, the odour control covers and plant was installed and commissioned and lifting equipment installed.

Benefits

During the seven-month construction period in this area, the project team had formal monthly meetings to discuss upcoming works as well as any other issues. They also had a daily end of shift walk-around to ensure that the access provided around the construction area and operational plant was sufficient should the operations team need to access the area overnight.

Black & Veatch also provided out-of-hours contact details; however due to good planning these contacts were never called upon.

The main benefit of the project has been for Thames Water Utilities Limited's customers, by reducing a number of properties on the DG5 list. Another benefit to TWUL has been the lack of disruption to the income generated by cess imports. This was achieved by temporarily relocating the cess import facility within the Swindon STW.

Swindon STW is located adjacent to the boundaries of Severn Trent Water and Wessex Water; therefore if the cess imports had to be stopped for the duration of construction works they may have lost those customers to other water companies.

This integrated delivery team's approach to communication and planning allowed the £9.98m project to be delivered under programme and under budget. See below for programme achievements:

	Planned	Achieved	Gain
Beneficial Use	31/12/2014	10/12/2014	21 days
Programmed Takeover	31/3/2015	6/2/2015	53 days
Contractual Takeover (after which time damages are incurred)	15/6/2015	6/2/2015	129 days

The Black & Veatch professionals who worked on this scheme benefitted from working within a team in the true sense of the word, where each contingent - project management, design, construction and commissioning - felt respected and was engaged with the outputs that would help the team as a whole rather than their individual section.

The editor and publishers would like to thank Siobhan Gilley, Lead Design Engineer with Black & Veatch, for providing the above article for publication.



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