

Portbury Wharf STW

maintaining operational stability during planned refurbishment programme at Portbury Wharf STW

by Alistair McFarlane

Situated 2 miles from the coastal town of Portishead on the Severn Estuary, Portbury Wharf STW was granted its first consent to operate in 1987. The site underwent a refurbishment in late 2015 and currently services Portishead and the surrounding area, equating to a population in the region of 32,000. Portbury Wharf is comfortably equipped to handle flow rates of 550l/s and treats wastewater flows from five pumping stations located in Clapton-In-Gordano, Portishead, Portbury Dock and Portbury Drove. Historically a heavily industrialised area, Portishead now acts as a dormitory town for Bristol and the surrounding area and features a stunning residential marina development where power and chemical plants had previously dominated the landscape.



Screenings removal plant with direct piping to redirect additional flow if required - Courtesy of M&N Electrical & Mechanical Services Ltd

Background

As part of a planned refurbishment programme at Portbury Wharf STW, Wessex Water appointed Nomenca to undertake the removal and replacement of old screening and screenings handling equipment at the inlet works. To enable the inlet works to maintain operational capacity over the duration of the planned works, Nomenca partnered with the hire division of M&N Electrical & Mechanical Services Ltd to provide a packaged plant solution, enabling the work to be carried out on site with no disruption to operational stability during the installation of the new screens.

Challenges

The following were among the challenges faced by the team:

- Minimise impact of hire equipment installation and operation on refurbishment programme.

- Provide equipment capable of comfortably handling potential flow rates of 550l/s.
- No unscreened sewage discharge was allowable.
- Operating costs and environmental responsibilities had to be considered.

Implementation

To manage the flow rates imposed by the sewage treatment works, address the zero unscreened discharge specifications and minimise the impact of temporary equipment on Nomenca's site activities, M&N put a series of options through their SolidWorks modelling platform prior to making their selection. Following rigorous simulation tests and the inclusion of additional bolt-ons to meet the screening criteria, M&N put forward their flexible screenings removal plant (SRP) unit with additional modifications for consideration.



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Manual handrake tanks provide further level of protection
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Telemetry linked control panels
Courtesy of M&N Electrical & Mechanical Services Ltd

M&N's dedicated SRP packaged plant units were designed and manufactured in-house to provide a flexible wastewater screening solution that can be rapidly deployed to site, providing operational stability, with minimal disruption to site infrastructure.

The SRP unit selected for the task comprised a main inlet tank housing an FSM Frankengerger 6mm perforated band screen (the market leading screenings capture ratio escalator screen), spray bar and self adjusting brush head alongside a Kuhn KWP 400/1200 HD wash press. To ensure Wessex Water's zero discharge specifications against maximum wastewater flows of 550l/s, M&N's hire team designated two (No.) SRP 450 units to work in conjunction with each other.

To remove the need for pumps to feed the screening equipment, 2 (No.) 450mm exit channels were core drilled at the main inlet chamber. Using gravity to feed the equipment saved Wessex Water money both in terms of additional equipment hire and the need for stand alone power supplies on site.

Each exit channel fed the individual SRP units via dedicated pipework. Manual valves were incorporated at this early stage of the installation infrastructure to enable the on-site team to quickly isolate the flows in the unlikely event of either SRP unit failing.

With both exit channels open throughout the period of the installation the subsequent individual screenings handling created less of a burden on each SRP, significantly reducing energy consumption whilst maximising the quality of handled materials and subsequent liquid passed to the outlet point.

To ensure that Wessex Water's discharge policy was met M&N designed the installation to incorporate the following bespoke additions:

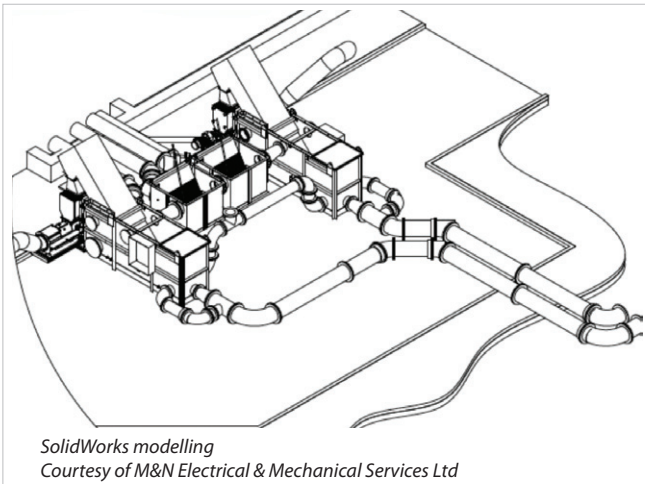
- The SRP 450's standard bypass flows were capped off.
- The SRP 450 units were connected via a direct piping link to allow each unit to take up additional flow capacity from the other if required.
- Each control panel was designed by M&N with telemetry links to immediately alert M&N, Nomenca & Wessex Water personnel by mobile phone in the event of any equipment failures.
- Pipes connected each SRP 450 to a dedicated handrake tank, acting as a manual backup resource further ensuring no wastewater was bypassed.

To remove the need for generators to be brought to site a power supply was from the existing motor control centre. This was deemed a more environmentally conscious option over the course of the refurbishment programme.

All elements of the functionality of the SRP units were monitored round-the-clock via telemetry by M&N's expert engineers at the company's Portland headquarters. Each control panel was created specifically for the Portbury assignment, constantly monitoring flow & level rates alongside intricate functionality mechanics.

The set up was designed to offer easy access to all elements of the hire equipment, including specially created platforms for the handrake tanks. Nomenca core drilled a 300mm entry channel to the outlet point so that the SRP 450 outlet pipes could be conveniently sited, ensuring minimal space was taken up by the installation from the main inlet chamber to the outlet point.

From approval of hire equipment specifications by both Wessex Water and Nomenca, M&N engineers were able to have the site installation completed in just 5 days. All equipment was delivered to Portbury using M&N's own transport and lifting equipment and working in collaboration with Nomenca, both parties were able to



deliver Wessex Water's requirements without negatively impacting on the operational effectiveness of the Portbury STW.

Results

The following key points were achieved:

- Minimal disruption to site refurbishment programme by collaborative approach between M&N and Nomenca.
- Zero discharge throughout hire period.
- No diesel consumption required to power M&N's hire equipment.
- Portbury STW wastewater screening effectiveness unaffected by refurbishment programme.

The editor and publishers would like to thank Alistair McFarlane, Hire Fleet Manager with M&N Electrical and Mechanical Services Ltd, for providing the above article for publication.

"Two SRP450 elevator screens have been installed at Portbury STW to enable the existing screens to be replaced as part of a capital works scheme for Wessex Water. M&N Electrical and Mechanical Services Ltd carried out the supply, installation and commissioning of these temporary screens on behalf of Nomenca.

The professionalism and excellent health & safety culture of M&N's installation team could not be faulted. The reliability of the units also could not be faulted and callouts over the recent 2-month period have been zero.

I would certainly recommend the use of M&N's screening removal plant units without hesitation on any future schemes"

Dave Shuttleworth, Project Engineer at Nomenca

