

# Budds Farm WwTW

## reducing the risk of emergency releases of wastewater into Langstone Harbour by increasing the performance of the existing assets

by Steve Gray

**B**udds Farm WwTW treats flows of around 2,400l/s from almost 400,000 people in and around Portsmouth, including Waterlooville, Havant and Hayling Island. Emergency overflows (EMO) into the nearby Brockhampton Creek are regulated by a consent licence held by Southern Water. Under the existing stormwater control system at Budds Farm, EMOs (of unscreened wastewater) could be activated by the failure or inadequate operation of the adjacent storm pumping station, and the storm pumping station. Southern Water has identified a number of operational issues that impair the performance of these assets. In addition there was a need to improve the screening of both the flows to full treatment and the storm flows. The project requirement was for the development of the detailed design and implementation of the necessary improvements works to the existing inlet pumping and screening facilities.



Budds Farm - New storm screenings handling - Courtesy of Trant Engineering

### Background

Flow to treatment at Budds Farm is from two principal sources:

- 1,000l/s of the flow is received from the Waterlooville and Hayling Island sub-catchments.
- 1,400l/s is pumped from the Portsmouth sub-catchment via the Eastney Pumping Station.

Flow arriving from Eastney is screened and follows a separate treatment stream than that from the remainder of the catchment.

### Undertakings

Following a feasibility study, in January 2013 Trant Engineering was appointed by Southern Water Tier 1 Contractor BTU, to undertake the preparation of a detailed quotation for the development of the

detailed design of the improvement works. In September 2013 the contract was awarded by Southern Water Trant Engineering, who appointed Grontmij for the development of the necessary detailed civil and hydraulic design.

### Existing inlet pumping station PS3

The existing main inlet pumping station dry well submersible pumps lift a total of approximately 2,400l/s via twin pipelines to the elevated inlet works distribution channel. Of this, 1,000l/s is directed to full treatment and 1,400l/s weirs to the existing storm drum screens and gravitates to the storm tank inlet channels.

Excess flows entering the pumping station (PS3) weir to a dedicated storm pumping station, with wet well submersible pumps having a maximum combined capacity of 1,500l/s.



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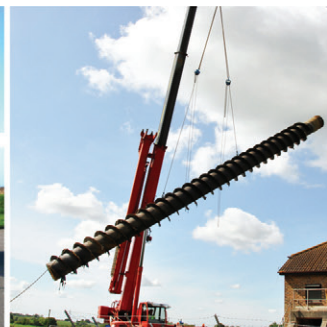


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Under the improvement works the existing inlet pumping operation is to be reconfigured as follows:

- A design maximum flow of 1,100l/s will be pumped direct from PS3 to the elevated inlet works of which 983l/s will be screened prior to full treatment and the balance will overflow directly to the upgraded storm screen structure for screening via a new DN1000 rising main.
- A design maximum flow of 1,800l/s will be pumped direct from PS3 to the upgraded storm bandscreens for screening via a new DN800 rising main.
- The design maximum flow of 2,100l/s will be pumped from the existing upgraded storm pumping station to the existing storm bandscreens for screening.

In order to implement the above improvements, the following modifications and upgrades are to be undertaken:

- The existing 2 (No.) dry well submersible base load pumps and the existing 2 (No.) shaft-driven dry well submersible 'max load' pumps are to be replaced with 4 (No.) Flygt NP3400 125kW dry well pumps to provide a total of five identical pumps installed within PS3. Two pumps are to be configured to pump to the elevated inlet works and two pumps are to be configured to pump to the upgraded storm screen structure and the remaining pump acting as common standby.
- Reconfiguration of the existing pipework and valves within PS3 is required to provide the necessary pump isolation and control.
- The existing PS3 pump delivery mains to be modified to provide a new DN800 connection to the upgraded storm bandscreens.
- Modification of the existing LV power distribution switchboard (in an adjacent building) to upgrade the power

supply to PS3 from 2000A to 2500A. Also, replacement of existing power, signal and control cabling together with the necessary instrumentation and cable containment systems.

- Modifications to the retained section of the existing MCC within PS3 to provide the necessary power and control for the additional storm screens.
- Installation of addition level and control instrumentation.

The modifications of the existing MCC and the design and manufacture of the new MCC complete with PLC/HMI is being undertaken by TSE, which is also developing the required functional design specification and process software.

#### Existing storm bandscreens & storm pumping station

Under the improvement works the existing storm bandscreens are to be reconfigured as follows:

- Install 2 (No.) new storm 6mm – 2D bandscreens each rated for a maximum design flow of 1,000l/s.
- Installation of 2 (No.) new actuated storm channel isolation penstocks, removal and disposal of existing isolation penstocks together with the removal of a section of the existing channel dividing wall and making good.
- Installation of 2 (No.) additional Bracket Green CF200 storm band screens together with the necessary upstream and downstream isolation penstocks.
- Modification and extension of the existing screenings handling launder system to serve the additional storm band screens.
- Installation of an additional Kuhn KWP 400/1200 dewaterer/compactor unit together with modifications to the existing Kuhn unit.
- Modification and extension of the existing wash water supply pipework and odour control ducting serving the



Budds Farm - Extended storm screen structure - Courtesy of Trant Engineering

additional storm band screening equipment.

- Installation of power, signal and control cabling together with the necessary containment systems for the additional storm screening equipment.
- Installation of addition level and control instrumentation.
- Upgrade the existing wet well storm pumps in order to achieve a combined duty/assist/assist output of 2,100l/s.
- Replacement of the existing MCC sections within PS3 with a new MCC serving the inlet and storm pumping in order to provide the necessary power and VSD control of the larger capacity inlet and storm pumping equipment.

### Programme

The construction programme involves two very distinct phases of work as follows:

- Phase 1: Construction of the new storm screening structure, storm overflow diversion pipework, installation and commissioning of additional storm screens and the increased capacity wet well storm pumps.
- Phase 2: Improvements to the main inlet pumping station (PS3) carried out offline by the diversion of all normal and storm flows via the new higher capacity storm screening facilities using an additional temporary over pumping system.

### Temporary works

In order to undertake the extensive phase 2 works within PS3, it is necessary to provide temporary overpumping systems to ensure that all potential incoming flows to the site can be safely handled. Each system will comprise duty/standby pumps together with the associated temporary power and control for an anticipated period.

Both careful planning and a close working relationship between Trant Engineering, Southern Water and Exsel (a supplier of the



Budds Farm - New MCC in Pumping Station PS3  
Courtesy of Trant Engineering

temporary overpumping systems), is essential due to the critical nature and duration of these temporary works.

### Completion

Work commenced on the site in October 2013 with ground investigation, soil testing and various other enabling works.

At the time of writing this article (April 2014) the extension to the existing storm screening structure was completed and the additional band screens were installed together with the modified screenings handling system. The modification work to the existing MCC for the Phase 1 works was complete and delivery of the replacement storm pumps was imminent.

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