

Old River Tees Pumping Station

Contract Value	£2.9M	Commenced	Aug 2006
Contract Period	58 Weeks	Completed	Oct 2007

Features

- New construction and upgrade to existing sewage pumping station
- Civil, mechanical, electrical, ICA and commissioning
- New pumping set installations
- Major temporary sewage pumping works
- 3D modelling of pipework installations
- Framework Partnering, Option A

Brief Description

The Old River Tees Pumping Station in Middlesbrough is situated adjacent to an old loop of the River Tees south of the main river, downstream of the Tees Barrage and west of A19 Tees Flyover. It receives the majority of sewage flows from the town as two main streams (Mandale and Burlam Road) before transferring them across the river via rising mains located in a 700 metre long tunnel.

The purpose of the contract is a major upgrade of the pumping station, its first since construction in the 1960s. This includes reconstruction of the overflow chamber to accommodate new screens required for meeting Environmental Agency consents. In addition, new pumps are being provided in the dry well and various modifications being made to the two main wet wells. A new launder pumping station is being constructed and the control room upgraded. Other improvements are being made to various chambers, the transfer tunnel and to site infrastructure. Major temporary overpumping arrangements and careful programming of works ensure uninterrupted operation of the station.

Byzak is Framework Contractor for implementing Northumbrian Water's AMP4 Capital Delivery Programme. The contract is being undertaken under partnering principles and involves a teamwork approach with staff from the Client's Asset Investment and Operations divisions and framework consultant designer MWH. Close liaison is being maintained during the Design Development and construction stages to ensure the uninterrupted operation of the station and that existing discharge consents are maintained.

Design development also included use of 3D modelling of the pumping installation to check the configuration and optimisation of pumps, valves, pipework and cabling layout. This innovative design aid is a first time application for Northumbrian Water for such situations. The ability to freely rotate and view the work outputs highlights potential conflicts between new works and existing features and has helped reduce down time and construction costs.

Dry Well

Works in the Dry Well include complete new pumping installations comprising pumps with associated valves and pipe work, new cabling, cable trays etc as follows

- The Mandale system - 4 No pumps - Flygt CT3531, 160 kW, capacity of each 949 l/sec, operating on duty/assist/assist/standby
- Burlam Road - 2 No Flygt NT3202, 37kW, capacity of each 219 l/sec, operating duty/assist.
- Dry well sump pump 1 No Flygt CT3127, 4kW, capable of handling 10 l/sec

Other pumps are the Mandale storm pumps - 2 No Flygt CP3501, 60 kW, each with capacity of 782 l/sec operating duty/assist.

Overflow Screen Chamber,

The existing chamber has been demolished and rebuilt to a larger footprint approximately 6 metres wide and 4 metres deep to incorporate 3 No. powered screens and associated cabling and pipe lines. The heavily reinforced concrete structure required more than 20 tonnes of reinforcement and approximately 80m³ of concrete.



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Launder Pumping Station,
The launder Pumping station which will house a suction pump for providing screen washwater is constructed as a 2.5m diameter precast chamber. The pumping installation comprises 1 No Flygt NP3085, 2 kW, capable of handling 20 litres /sec

Burlam Road Wet Well,
Modifications to the benching, new metalwork and general refurbishment will be made at the same time as the dry well pumps are being replaced. 24 hour over pumping is being provided to cope with dry weather and storm flow up to 6m³/sec.

Flows are intercepted in a temporary pit constructed over the inlet pipe line. These works consist of reducing the ground level of the area to allow for siting 12 No diesel suction pumps to operate within their tolerances. The existing inlet chamber has the cover slab removed to allow access for the pump suction lines. The pumps operate automatically. Only the minimum number operate on flow demand thereby reducing environmental impact

Mandale Wet Well,
Works in the wet well comprise installation of a new deflector wall, new flow straightening vanes, storm plinths, a new weir wall and general repairs to the concrete and metal work. During the same period the Mandale pumps will be replaced as part of the Dry Well works.

The overpumping operation requires the construction of a temporary 3.0m dia chamber. 2 No electric submersible pumps are sited in this, with a third on the surface as a standby in the event of a duty pump failure. A temporary penstock ensures complete isolation of the wet well to allow safe man access. High level audible and visual warning systems are fitted to warn of rising flows to the site, at which time the

workforce is evacuated from the wet well and the penstock opened to allow free flows to the well. This arrangement ensures no build up of levels which could otherwise cause upstream flooding of low lying areas.

Control Room,
Work in the control room consists of replacing the outdated single MCC with 2 No new MCCs. The Mandale MCC accepts twin feeds from the two on-site 1000kVA transformers and then provides twin feeds to the Burlam Road MCC. The MCCs are fitted with interlocked bus couplers to allow flexibility in powering of the units including acceptance of temporary generation.

The MCC's are PLC controlled and linked by a fibre optic system. A regional radio telemetry system is also employed for site monitoring.

Repairs and improvements to the building structure are to be carried out (brickwork, cladding and roof). Building services include new lighting, heating, small power and installation of suction fans and discharge fans.

Miscellaneous works
Works within the three isolated chambers (P1, P2 P3) consist of new air valves, fans, louvres, and security doors, along with new metal work ladders, handrailing and flooring throughout. P3 is to be rebuilt with a new pre cast cover slab.

Works in the 700 metre long tunnel beneath the Tees include replacement of the lighting system, and general repairs. General improvements to site access arrangements to the Pumping Station will be made.



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