

Whittle Dene WTW

clarifier refurbishment project to extend the life of this key asset

by Glyn Jenkins RPP MAPM

Whittle Dene Water Treatment Works is Northumbrian Water's fourth largest treatment works with a deployable output of 118ML/d, supplying 228,000 properties. Located in Northumberland, 13 miles west of Newcastle, it is a strategically important works to Newcastle, Gateshead, North Tyneside, South Northumberland and Tyne Valley regions. Raw water at the site comes from adjacent reservoirs supplied by a number of impounding reservoirs in Northumberland and is further supplemented by the River Tyne. The treatment process at the works comprises; (i) clarification, (ii) filtration, (iii) GAC filters and (iv) disinfection and emergency disinfection. An asset need has been identified to address the very poor condition of the internal walls and floors of the clarifier units which have been subject to excessive concrete degradation in the 24 years since their construction in 1992.



Whittle Dene Clarifier No. 6 complete and in operation - Courtesy of NWL

Project need

The clarifiers comprise a large hexagonal footprint containing six separate chambers in an above-ground reinforced concrete structure. A structural survey identified the deterioration had resulted in an estimated 5 to 10 years residual asset life with only 5 years for the structural columns. Beyond this the structure would have a high risk of being irreparable and would require a full replacement at a high capital cost.

The scope proposed by this project comprises refurbishment of the tanks to prolong their asset life and safeguard the treatment process into the future. The agreed scope identified in the Asset Need also includes for replacement of the launder channels which

are in very poor condition and contribute to increased algal growth, causing problems in the downstream process.

Undertakings

Following agreement of a price of £2.5m NWG commissioned Stonbury to deliver the defined solution through an NEC 3 Option B re-measurable three-year contract. This commenced in January 2017 with the release of the first of the 6 (No.) compartments by reducing the works deployable output to 97MLD.

Stonbury then commenced the initial clean down of the residual sludge in the compartment before building a scaffold platform with two working levels for the full height of the 6m high walls.

Whittle Dene WTW Clarifier Refurbishment Designers, contractors & suppliers

Client	Northumbrian Water
Main contractor	Stonbury Limited
Designer	Wood Group LLP
Main supplier	MasterSeal
Wind bracing assessment	The Fluid Group
Climate control for the curing	Polygon

The work required close coordination with Operations due to the connectivity between each compartment to prevent any overtopping of the common outlet channel discharging into the isolated chamber.

Mortar repair

In order to comply with the specification to meet the requirements of the Secretary of State for the Environment under Regulation 31(4) (a) for products used in contact with potable water Stonbury proposed the use of MasterSeal products.

The chosen products were MasterEmaco S420 which is a rapid setting, high strength repair mortar in conjunction with MasterSeal 586 which is a smooth finish waterproof render. This was applied to the floors and walls of the clarifier in climatically controlled conditions to ensure adequate curing conditions were achieved.

Launder channels

In addition to the concrete repair work the existing launder channels were to be replaced due to their inoperability caused by their design which results in algal growth blocking the outlet holes. A new 'V' notch design was agreed which would provide a more even distribution of the clarified water for a more even and consistent discharge of the settled water.

Phased refurbishment

Following completion of Clarifier No. 6, Stonbury was handed No.1 to commence the second phase of the contract. Through a lessons-learned review Stonbury was able to improve their working methods and hence shorten the programme for the next phase.

Wind assessment and bracing

Finally following feedback from Operations on the performance of the clarifiers due to their exposure to prevailing winds The Fluid Group was commissioned to carry out an assessment of the existing wind bracing.

Following their assessment, it was established that the existing mesh panel arrangements were set at the optimum height and they were then replaced like for like due to their deteriorating condition.

Progress to date

At the time of writing (May 2018) the work on the Clarifier No.1 is substantially complete but due to operational constraints work has been suspended since January to allow the works to increase its deployable output to meet network resilience demands. It is envisaged that work will recommence in June 2018 to complete No.1 and move on to the next compartment in due course.

During the outage of each compartment the opportunity was taken to carry out further refurbishment work to the outlet valves and rotors as they were also at the end of their asset life. In addition, non-compliant handrailing is being replaced to allow future public access visits to recommence on site.

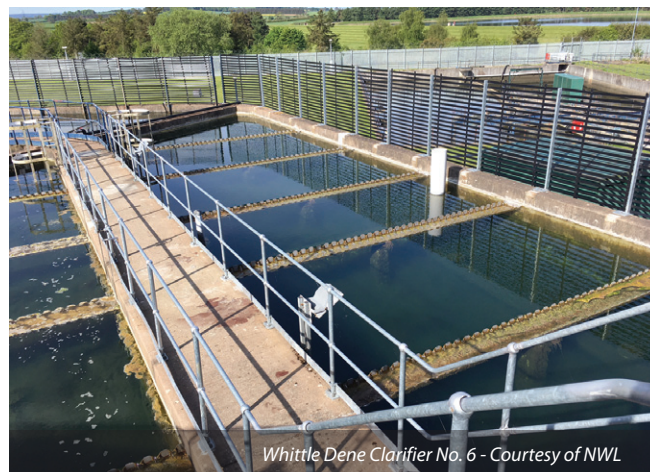
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Whittle Dene clarifier external enclosure - Courtesy of NWL



Clarifier No.6 preparatory works showing Scaffold access and protection
Courtesy of NWL



Whittle Dene Clarifier No. 6 - Courtesy of NWL