# Hirwaun Waste Water Treatment Works Upgrade

## Project Profile

**Client:** Morgan Sindall
for Welsh Water

**Designer:** MMB

**Value:** £2.6m

Under our framework contract with Dwr Cymru Welsh Water (DCWW) Capital Delivery Alliance (CDA) we were engaged by CDA Partner Morgan Sindall to carry out capital improvement works at Hirwaun WwTW (nr Aberdare) that was failing its consent leaving DCWW at risk of prosecution.

In order to meet new consents for discharge, the works required a number of process upgrades including;

- A 10m diameter x 6m deep in-situ reinforced concrete primary settlement tank (PST) with inlet and distribution chambers
- 2 nr 9.0m diameter x 5.0m deep in-situ reinforced concrete Humus settlement tanks (HST) with distribution chamber
- 3 rotating biological contactors (RBC's) with distribution chamber in a 9m long x 7m wide x 2m deep reinforced concrete box which sits on 24nr 370mm diameter rotary cased piles
- New WPD & BT cable diversions and installation of ducting, MCC Kiosk, FE chamber and 2nr Inter-stage pumping stations
- Various other chambers, associated ductile iron pipework, sludge decant pipework and final effluent sampling chamber
- A reed bed with outlet structure (Built by others)
- New concrete access roads to the HST's & RBC's, tarmac access roads for the rest of the site including drainage and kerbs.

The existing works remained fully operational during construction and the new elements were integrated with the existing works to form an enlarged treatment works on completion. Some of the new works structures such as the PST were constructed on the footprint of existing sludge tanks which were demolished to allow the new construction. Elements of the existing works that remained on completion included; inlet works, sludge holding tank and outfall headwall.

Early works involved site clearance, demolition of redundant structures and site investigations. This was followed by additional site investigation (rotary cored boreholes) for pile design, diversion of an existing HV cable and application for a groundwater discharge consent. We provided Early Contractor Involvement to review SI information, assess buildability & technical solutions, investigate alternatives and develop budgets and programmes to achieve value and cost & time certainty for the client.

Site investigations identified sands and gravels with a high water table across the whole site overlying strong rock strata. During ECI we proposed alternative designs for the tanks to reduce the impact the ground conditions would have on temporary works, dewatering requirements and construction. The revised design was based on forming the sumps for the in-situ reinforced concrete tanks in small sheet piled excavations, founded on bedrock and with caisson rings forming the internal sump face, this enabled the tank structures to be designed as cantilevered reinforced concrete bases supported by the sump structure. This replaced large sheet piled excavations for the tanks with imported structural fill to support the tank bases as well as mini-piled foundations. The re-design also resulted in significant cost and programme savings.

# Hirwaun Waste Water Treatment Works Upgrade (Cont'd)

## Project Profile

**Client:** Morgan Sindall
for Welsh Water

**Designer:** SWECO

**Value:** £2.6m

The RBC base slab required 24nr x 305mm dia x 10m long rotary cased piles which we designed and installed using one of our Casgrande M9 dual head piling rigs.

Successful dewatering of the water bearing sand and gravel strata was essential for construction works and a 'Wellpoint Dewatering' system was designed and installed by Stuart Well Services prior to construction works commencement. 56 well points were installed around the perimeter of the HST's and 32 well points were installed around the perimeter of the PST. Due to the difficult ground conditions, cased boreholes were required for well point installation and we provided one of our Klemm KR 904 rotary drilling rigs for this operation. The volumes of groundwater encountered meant that the dewatering system was maintained for the majority of the contract period.

Due to ammonia having been encountered during site investigations all water from excavations (dewatering installation and sump pumping) was required to pass through a Siltbuster water treatment system containing a chemical dosing mix tank, silt trap and clarifier. The control system provided downloadable data which was sent to Natural Resources Wales on a weekly basis including flow rate, pH levels and total suspended solids (TSS). The treated water was discharged back into the existing works under a limiting consent of 6litres/sec.

We worked closely with Morgan Sindall and Welsh Water operations staff to plan and programme the works to ensure full operational capability was maintained during the new works construction as well as the connection/integration with existing works processes.

Collaborative planning was used throughout the project allowing early identification of potential delays or critical actions and resolving these in order to manage risk, maintain programme dates and outturn cost. This included coordination of M & E installation with civils works, key interfaces were identified early and appropriate strategies put in place which was particularly important given the long lead in times for certain items of M & E equipment.

Installation of a new bridge over the watercourse that runs through the centre of the site could not be carried out until all other works were completed. During construction an existing temporary bridge across the watercourse was used for construction traffic and deliveries which had previously been installed to replace the failing existing bridge.