# CASE STUDY

**Project:** Flemings WTW
**Location:** Dover, Kent
**Client:** Principal Contractor – CMDP JV (Costain/MWH Delivery Partnership) Client – Southern Water

COLEMAN CONSTRUCTION & UTILITIES

**Project Introduction**

Coleman Construction & Utilities Limited has received high praise during the completion of a major 60-week civil engineering freshwater sub-contract for Principal Contractor CMDP JV, on behalf of Southern Water in Dover.

As part of the Thanet Nitrates scheme, Southern Water had identified the need for a Nitrate Removal Plant (Ion Exchange Plant) at Flemings WSW. The objective of the scheme was to enable the resilient supply of wholesome water to the Thanet Area under forecast Nitrate groundwater conditions for the 2030 dry year critical period demand scenario. The raw water nitrate concentration forecast has been based on an AMEC study and confirmed by extrapolation of historical water quality trends.

The works comprised of a new Ion Exchange Building and was secured off the back of Coleman Construction & Utilities Limited's previous contract delivery at Martin Gorse, company progression, safety performance, as well as the quality of their workmanship.

Coleman Construction & Utilities Limited's contracted civil engineering scope comprised bulk excavation, new chambers, pipework, drainage and manholes, extension of a roadway and provision of hardstanding's, site wide ducting, draw pits and new reinforced concrete structures.

These works were in support of Southern Water's freshwater directive to reduce Nitrate concentrations to 10mg/l N-NO3 for a total water volume of 61.2MLd, from which 5MLd constitute resilience headroom. The supply and demand scenarios were based on SW Revised draft Water Resources Management Plan 2019 (WRMP2019).

The contract was underpinned throughout by a collaborative approach with CMDP JV and Southern Water, as well as other project stakeholders, providing the basis for proactive communication and highly coordinated activities, resulting in the safe and successful completion of this Freshwater civil engineering project.

**Project Deliverables - Civil Engineering Scope**

*Ion Exchange Building:*

- The Ion Building was constructed in 3 sections.
- Excavation for the Ion Building and MCC was 30m x 20m at a depth of 1.5m. The MCC at the end of the building was a depth of 2m which was stepped and battered.
- The MCC cable trough has 1.3 tonnes rebar and is constructed in 2 parts; base and walls; and has 82 ducts.
- The ducting was then laid in 2 layers, each layer was surrounded with C28 concrete.
- The Ion base was then constructed; the steel work and shuttering was put in place and the base was poured in 2 sections, the base

contains 10 tonnes of steel.
- The block work was then constructed.

*Caustic Dosing Area:*

- Consists of 3 reinforced concrete bases, 1 spill tank, waste diversion chamber, emergency shower and eye bath with associated pipe work and duct work.
- Chemical Storage Kiosk reinforced concrete base is 3.4m x 2.8m x 300mm with top and bottom layers of A393 mesh.
- Chemical Dosing Kiosk reinforced concrete base is 11.3m x 4.21m x 300mm with top and bottom layers of A393 mesh.
- Emergency Shower reinforced concrete base is 1.9m x 1.9m x 250mm with top and bottom layers of A393 mesh.
- Waste Diversion Chamber has a 300mm reinforced concrete base and a 1.5m precast ring with concrete surround.
- Spill tank is a Spel 200 Series Tankstor underground tank (Capacity= 5000 Liters). This was done with temporary works sheet and frame 6.9m x 3.5m x 3.2m, the tank sits on a 150mm concrete slab with 1 layer of A393 mesh and has a 150 mm concrete surround.

*Wash Water Area:*

- Consists of 1 reinforced concrete base with associated pipe work and duct work.
- Wash Water Booster Kiosk reinforced concrete base is 5.6m x 3.1m x 300mm with top and bottom layers of A393 mesh and associated pipe work.

*Salt Saturator and Waste Buffer Tank Bund:*

- This area was piled to give ground support for the Tank Bund. The area was excavated to a depth of 1.3m and backfilled with Type 1 road stone for the pile mat, the piles were 6m and 9m deep.
- Once we had cropped the pile tops the area was blinded for the base slab. The shutters and steel work were put in place and the reinforced concrete base is 14.7m x 8.6m x 400mm with a kicker. The concrete base was poured and is sloped to the sump unit. The wall shutters were put in place as there was restricted space because of the Ion Building. Pery shutters were used as they are light weight and can be lifted into place by hand. Once the walls were poured the tank plinths were marked out and the steelwork and shutters were placed.
- Salt Saturator Tank Plinth is octagonal measuring at 4.5m across.
- Waste Buffer Tank Plinth is octagonal measuring at 11.050m across.
- The Tank Bund and Salt Saturator Tank Plinth were then painted with Aquron 2000 paint and the Waste Buffer Tank Plinth with Flexcrete Cemprotec E942.

*Waste Pumping Station:*

- The Pump Station was built in 2 parts. The cover slab was constructed on site next to the Pump Station and has 216Kg of rebar, 4 lifting points, 1 Davit socket and a Techno cover. It is 2.5m square and 350mm thick and has a mass of 4 tonne.
- The Pump Station was a 2.5m square excavation which was done using a 2.5m manhole box.
- Once excavated the first ring was bedded in to the 300mm concrete base by 50mm. When this had cured the second ring was placed on top and surrounded with 150mm of concrete then benched and painted with Sika 62; a chemical resistant paint; then the cover slab was lifted into place.

*Stand-By Generator Area:*

- Consists of 1 reinforced concrete slab, 1 3-way valve Diversion Chamber and a Fuel Blind Tank with associated pipe work and duct work.
- Generator Base reinforced concrete slab is 4m x 1.9m x 300mm with top and bottom layers of A393 mesh.
- 3-way valve Diversion Chamber has a 300mm reinforced concrete base and a 1.5m precast ring with concrete surround.
- Fuel Blind Tank is a Spel 200 Series Tankstor underground tank (Capacity= 2000 Liters). This was done with temporary works sheet and frame 4m x 3.225m x 3.2m. The tank sits on a 150mm concrete slab with 1 layer of A393 mesh and has a 150 mm concrete surround.

*Change Over Kiosk:*

- Is a reinforced concrete base slab 6.3m x 3.350m x 250mm with a concrete cable trough in at 1.2m deep, the trough has 250mm reinforced concrete base and walls with associated duct work.

*Soakaway Manhole:*

- Excavation was done with 2.5m x 2.5m x 2m manhole boxes. The excavation was 4m deep with a concrete base that the first perforated ring was bedded into by 50mm. A hole was formed in the middle; another 3 rings were placed on top and surrounded in Geotextile Membrane which is then surrounded with

shingle. The concrete brisket, concrete risers and lid were placed with a concrete surround.

*Static Mixer Chamber:*

- For this we had a Line Stop installed so that there was a secondary point of isolation.
- The excavation was done with temporary works sheet and frame 7m x 4.9m x 3.1m.
- The reinforced concrete base was installed and then the pipework. The Line Stop was removed and then the walls were concreted and finally the cover slab.
- It was done in this way because the pipeline is the out feed for the site and could not be off-line for long.

*Pipe Work and Connections:*

- The Transfer Pipework is in 350mm ductile iron pipe and is in 2 lengths of approximately 200m each and has wash out chambers on each line at the lowest point.
- The connection was done under SCO. We removed a chamber and a section of pipework and replaced it with a diversion connection to the Ion Building.

*Site Wide Ducting and Draw Pits:*

- On site there are 13 Draw pits: 3 at 1.5m, 10 at 1.2m
- 10 lighting columns at 0.8m x 0.8m x 0.8m
- 6 CCTV Bases 1m x 1m x 1m
- 1750m of 150mm duct; not including the Ion Building

*Site Wide Roads and Hardstanding's:*

- There approximately 630m$^2$.
- Site Roads consist of 13 Road Bays of which 2 Bays are bunded areas with 3 road humps.
- The entrance to Site Road Bay 13 was an extra on top.

*Spoil:*

- We kept as much of the spoil on site as we could for back fill and subsoil.
- A lot of the excavated spoil was shingle based and was taken for recycling; as little as possible was sent to landfill.

**Challenges and Solutions**

Several challenges have been met throughout the project by Coleman Construction & Utilities Limited, which are detailed below:

- Excavation for changeover kiosk was done in restricted area because of site main feed cable in the excavation; and the base was fitted between an existing sampling kiosk and main feed cable.
- Deep excavations were solved with a 2-part manhole box system of temporary works design and installation.
- Pipes and manholes within the temporary works were designed and installed using two systems of manhole boxes and trench boxes.
- Deliveries were part of a co-ordinated plan of plant and equipment logistics to ensure works kept on track.
- Interface with other contractors/stakeholders included collaborative early engagement meetings, regular planning, and liaison through weekly project meetings.

**Benefits**

- Coleman Construction & Utilities Limited provided a non-confrontational approach to commercial and contractual matters, preferring to work collaboratively in the interests of the project. As a result, working relationships with the client at all levels and across all disciplines are at an all-time high.
- Collaborative working has become a daily norm for Coleman Construction & Utilities staff. We always offer a solution-based approach.
- We are always striving for best practice working especially where health, safety and wellbeing are concerned - we aim for zero harm every day.
- We take pride in our work and aim to leave our sites snag free. Our attention to detail is second to none.