CASE STUDY: Deephams Sewage Treatment Works

SECTOR TYPE: Civil Engineering / Process plant construction
LOCATION: Enfield, London
CLIENT: Thames Water Utilities Limited
PRINCIPAL DESIGNER: AECOM Limited
PRINCIPAL ENGINEER: J. Murphy & Sons Limited
PRINCIPAL CONTRACTOR: J. Murphy & Sons Limited
CONTRACT VALUE: £40 million
CONTRACT DURATION: 2010 – 2012

The Project

The Inlet upgrade project has delivered a Sewage Treatment Works (STW) that has significantly enhanced existing ageing plant through sustainable refurbishment and improvements to the facilities.

The STW was designed to meet the future requirements of a local population equivalent to c.900,000 in 2026 and now delivers an improved 16,000 l/s of flow capacity.

At all stages of the civil and structural designs the ultimate end user was placed at the centre of decision making. In carefully incorporating whole life cycle costs the team has successfully delivered programme efficiencies, total carbon savings c10,000 tonnes, and cost savings of c£2.2million (excluding whole lifecycle costs savings) demonstrating that saving carbon saves cost.

Greener and safer construction methods along with outstanding innovations pushed concrete technology boundaries and value engineered solutions. This resulted in a well-conceived and health and safety conscious design, with 700,000 accident and incident free hours during construction.

The nearby River Lee is now cleaner and healthier for aquatic life and the riverside environment improved for the local community. Project benefits include reduced flood risk and enhanced biodiversity, demonstrating how civil engineering has adapted to meet the challenges faced by a modern society.

The project received a number of industry recognitions including winning the 2012 Concrete Society ‘Civil Engineering Award’ and Thames Water’s ‘Young Person of the Year’ Award won by our Design Coordinator.
The Benefits

Social aspects

The riverside environment has been enhanced as a result of the STW’s improved facilities and future treatment capability. Markfield Park, an important recreational space located downstream of the River Lee will no longer be at risk of flooding.

Excellent Health & Safety performance was achieved with 700,000 accident and incident free hours. A reduction in noise and foul odours has delivered a healthier and better environment to the local community.

Environmental and Economic aspects

- Avoiding waste to landfill and associated vehicle movements was achieved through remediation and re-use of contaminated soils, Japanese Knotweed, gravel and sand materials, saving approx 640 tonnes of CO₂e.
- Re-use of 2,000 tonnes of recycled material for a foambase road foundation proved to be a sustainable and cost-saving success, eliminating 180 tonnes of CO₂e and saving approx £180,000.
- Innovative design techniques focussed on eliminating concrete volume, using void formers, temporary works mass and reuse of excavated material as backfill resulting in 13% less concrete (2,000m³ and 864 tonnes of CO₂e) and associated reduction of 200 tonnes of steel reinforcement (280 tonnes of CO₂e) saving £1.75million.
- Creating a new plastic fibre concrete mix eliminated 50 tonnes of steel (£75,000) and saved 8 weeks on the programme. Using sustainable mix designs as standard with CEMIII blends realised further carbon reductions of almost 50%, saving 8,000 tonnes of CO₂e.
- Whole life cost considerations for consumption of total power / maintenance for a 20-year life has resulted in savings of £1,185,000.
- The team proposed sustainable dewatering proposals where 20l/s was abstracted from local ground rather than some 150l/s initially envisaged, this 87% reduction saved 2.4billion litres of water.

The Process

- Embedding sustainable, greener and safer construction methods – The integrated project team were brought together early to assist with the design and procurement process including focusing on sustainable construction techniques utilising pre-fabricated and pre-formed structures.
- Creating the right environment for the team to succeed – The Murphy senior management team empowered the design and planning teams to question the contract specifications and challenge the project requirements.
- Safety as a core driver to underpin project progress – Successful roll-out of the Murphy Culture Development Programme to project team, suppliers and subcontractors contributed to the 700,000 hours achieved RIDDOR free. The project achieved sustainability and excellence through the site team making safety a core value, not just a priority.
- Sharing of knowledge and ideas – Regular engagement with employees to look at ways to eliminate hazards and risk. A “best suggestion” award for the best hazard-spotter card filled in increased engagement and interaction on safety with employees.
- Safer working methods through innovative techniques – Multiple innovations and industry ‘firsts’ were shared and adopted for use on other Murphy projects, including construction of what is reputedly the UK’s deepest Secant Piled Shaft and the use of mast climbers for safer shaft lining construction which reduced the programme by 7 weeks.

Key Learning Points

Building a culture of constant learning and improvement – Lessons learned seminars where conducted where open and honest communication was encouraged, supported by the operation of “You Said – We Did” message boards. These can now be seen throughout many sites industry-wide.

Some of our lessons learned stem from project integration and information management through design and procurement to handover, incorporating these using BIM ensures that lessons learnt are incorporated at the earliest stages.

Managing innovation and sharing best practice – Technical case studies on project key learning areas were presented and distributed industry-wide, making innovations and best practice available for future use.

End User Feedback

Commenting at contract completion, Nick Fawcett, Thames Water Head of Programme Delivery – Tideway Projects said: “Throughout the scheme, its design, construction and delivery would not have been possible without the co-operation and planning by the Thames Water and Murphy project team. This has enabled the project team to challenge the initial construction method and propose alternative innovative solutions which have saved time and cost as a result, the delivery of this complex scheme with over 700,000 hours worked RIDDOR free is a fantastic achievement.”

Learn more

http://www.murphygroup.co.uk/MarketSectors/Water/default.asp?id=148

For more information on The Green Construction Board visit www.greenconstructionboard.org or email green.board@bis.gsi.gov.uk