

PROJECT SHEET

FELIXSTOWE SOUTH RECONFIGURATION
FELIXSTOWE, SUFFOLK, UNITED KINGDOM

BOSKALIS WESTMINSTER: SKILLS, RESOURCES, EXPERIENCE

Boskalis Westminster provides clients with tailored, project-specific solutions for dredge related services, as illustrated by the following project summary.

PROJECT DESCRIPTION

Capital dredging and filling works for new quay development. Phase 1 consisted of 730m new deep water quay and 200,000 m² container handling area, achieved by installing a new quay in front of the old Landguard port structures and redevelopment of the old Landguard terminal.

Work for WDC included dredging approximately 6.1 million cubic metres consisting of:

- Dredging of silts and soft clays within reclamation terminal footprint (approx. 750,000m³)
- Reclamation works to fill the area between the present quay and future quay wall including former Felixstowe Dock Basin (approx. 3,000,000m³ including 500,000m³ re-use material from channel widening).
- Dredging/widening of western section of the approach channel (2,000,000m³ including 500,000m³ re-use material).
- Dredging of deep water berth pocket in front of the new quay wall (345,000m³).
- Dredging of future tug berth pockets (50,000m³).

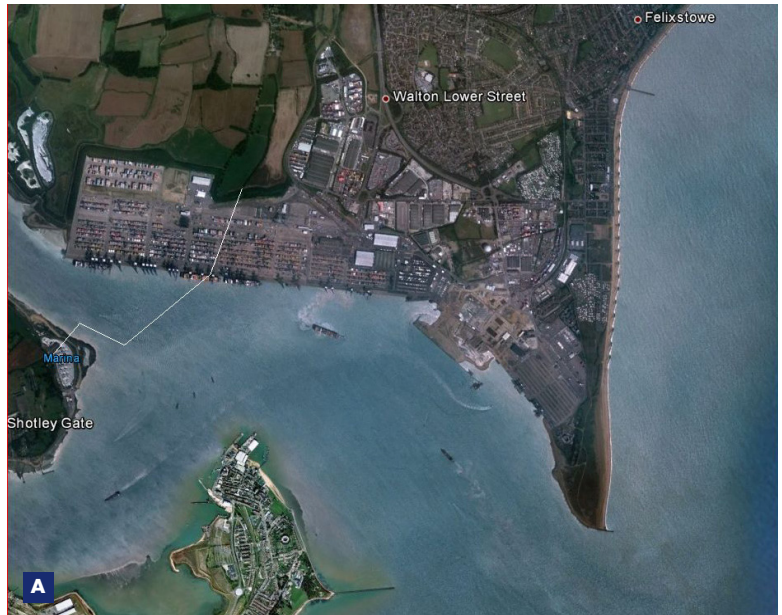
All unsuitable materials had to be removed from the reclamation footprint prior to placement of any fill material. This was undertaken by trailer dredgers Sospan, Medway II, Cornelia and Barent Zanen.

After the bulk dredging, the water injection vessel Norma removed the final layer of unsuitable material and maintained the footprint clear of silt until the first layer of imported material placement.

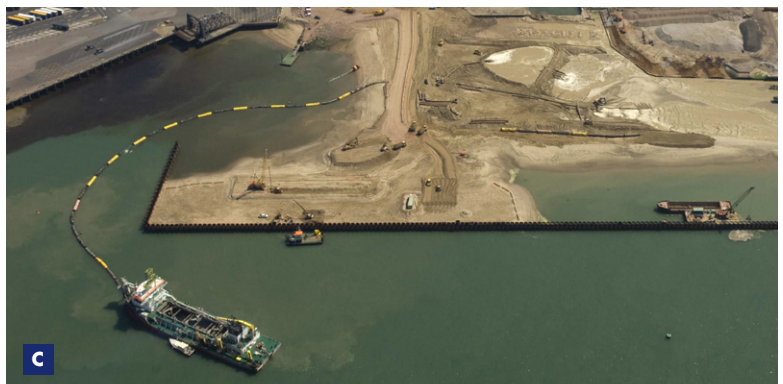
The majority of the bunds were placed by the trailer dredgers Crestway and Barent Zanen, discharging material through a spreader pontoon. In this way material was placed in thin layers to an accurate design profile. When the reclamation level reached the low water tide level, the spreader pontoon was placed by shore pipelines and dry plant to continue the reclamation process.

FEATURES

Project Name	Felixstowe South Reconfiguration
Client	Felixstowe Dock & Railway Company
Contractor	Costain Ltd - Costain awarded subcontract to Westminster Dredging Company Ltd
Location	Felixstowe, Suffolk, United Kingdom
Execution period	May 2008 – September 2010



A Location map
B Survey
C Aerial View of Works



Careful consideration of the design, in conjunction with the programming, particularly with respect to dredging, reclamation and quay wall installation ensured stability of the works in the temporary situation and efficient delivery of the project. Flexibility in the adoption of differing dredging techniques and innovative use of the Westminster fleet ensured that the optimum solution was achieved. Our access to a large selection of in-house dredging and pumping equipment, including: a range of trailing suction hopper dredgers, water injection equipment and backhoes also added value.

A proportion of material such as stiff clay and boulders, normally only removable by backhoe dredgers, was successfully dredged by trailing suction hopper dredgers. This more cost effective solution was a result of special dragheads designed and engineered specifically for this contract by the Boskalis in-house technical team.

The design solution at Felixstowe South Reconfiguration, promoted by the contractor and their designers, involved a continuous tubular pile wall, which pushed the boundaries of conventional retaining wall design and construction at that time. Recognising this, the contractor engaged Mott MacDonald to independently review and challenge the design the contractor had prepared with their designers to ensure full functionality, compliance with the Employers Requirements and economy of design.

PROBLEM SOLVING

A number of technical issues emerged through this process and included:

- Introduction of ground improvement measures to consolidate the reclaimed material placed behind the retaining wall. This was necessary owing to the extreme depth of back fill material on the existing sea bed and the need to control long term settlement.
- The design of a bespoke clutch system to connect the continuous tubular pile retaining wall which would accommodate the articulation of the wall under load and also ensure that there would be no loss of fine back fill material through the clutch
- The design and positioning of strengthening plates to enhance the capacity of the tubular piles at locations of high stress. This resulted in the selection of the optimum wall thickness for the pile and local strengthening only where necessary
- Development of an onshore static pile testing programme that replicated offshore conditions and resulted in cost savings.

LESSONS LEARNED

- Importance of peer review on designs of this complex and challenging nature
- Use of ground improvement measures to address short and long term settlement
- Design of a clutch system to connect tubes on a continuous tubular pile wall
- Economy in pile weight through plating in areas of high loads
- Savings afforded by carrying out preliminary pile tests.

SUSTAINABILITY AND THE ENVIRONMENT

Part of the reclamation works involved sustainable re-use of material from the channel widening. Continued and regular testing of this dredged material ensured that decisions were made rapidly with respect to the suitability for reclamation.

- E** Panorama
- F** Two dredgers working together
- G** Earthworks in progress



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