

# PROJECT SHEET

**TRUNKLINE SYSTEM EXPANSION PROJECT**  
DAMPIER, AUSTRALIA

## BOSKALIS OFFSHORE:

### SKILLS, RESOURCES, EXPERIENCE

Boskalis Offshore brings together the offshore skills, resources and experience of Royal Boskalis Westminster nv. The offshore capabilities of Boskalis include seabed rectification works for pipeline/cable and platform installation, construction of pipeline shore approaches and landfalls, offshore mineral mining, offshore supply and support services and decommissioning services. Boskalis provides clients with tailored, project-specific solutions for above dredge related offshore services, as illustrated by the following project summary.

## TRUNKLINE SYSTEM EXPANSION PROJECT (TSEP)

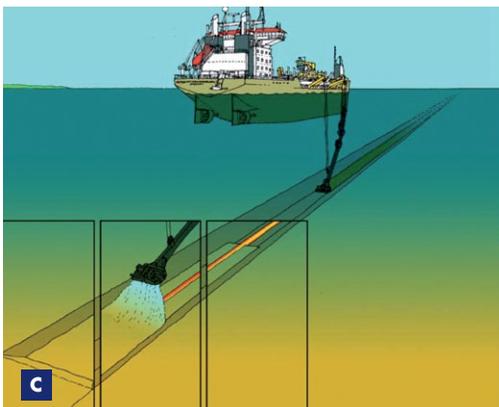
In order to increase the production capacity from the gas condensate fields located off the North West Coast of Western Australia, Woodside Energy Limited, on behalf of the North West Shelf JV Participants, has realized the installation of a multiphase subsea 42 inch pipeline. The new trunkline supplements an existing 40 inch pipeline, which conveys gas/condensate from the North West Shelf fields - North Rankin, Goodwyn and Cossack/Wanaea - to onshore treatment facilities located on the Burrup Peninsula near Dampier, Western Australia.

## FEATURES

Client	Woodside Energy Limited
Location	Dampier, Western Australia
Period	2003
Main contractor	Saipem (Portugal) Comercio Maritimo Sociedade Unipessoal LDA



- A** Location map
- B** Bottom Corer for sampling of hopperloads
- C** Artist's impression of dredging and backfilling works
- D** TSHD "Queen of the Netherlands" alongside the MOF wharf in Dampier



The trunkline, 135 kilometres long, has been installed by Saipem (Portugal) Comercio Maritimo Sociedade Unipessoal LDA. Boskalis Offshore was sub-contracted for the dredging and backfilling works of two trench stretches, in all 25 kilometres long. Work commenced in November 2002 and was completed 11 months later, inclusive of project preparation and interim demobilisation.

## DREDGING WORKS

The 3-metres deep TSEP pipeline trench required the excavation of around



900,000 cubic metres of material in water depths up to 55 metres. Within three weeks, the works were executed by the Trailing Suction Hopper Dredger "Queen of the Netherlands" in challenging conditions of offshore working environment, seabed soils, strict technical specifications and the sensitive underwater environment. This demanded thorough preparation of vessel, crew and clear working procedures to guarantee safe, sound and efficient completion of this part of the job.

The irregular seabed in combination with the pipe(-lay) characteristics and backfill specifications dictated a narrow pipeline alignment. Four trench transition zones were defined as well. This imposed the need for a detailed dredge plan and round-the-clock survey support, both crucial means to ultimately avoid delays to the dredger. DP/DT, the suction pipe positioning measurement and the dredge process control systems were indispensable features on board.

### BACKFILLING WORKS

Trench backfilling, again with Trailing Suction Hopper Dredger "Queen of the Netherlands", was carried out by pumping the material reversely through the suction pipe rather than dumping by

means of opening the bottom doors. The dredge pipe end was positioned about 3 metres above the trench. A controlled backfilling process minimised sand loss and turbidity. It also avoided displacement of the pipeline from its as-laid position, as demonstrated by the interim surveys. To verify the specified quality of the backfill material, samples of each load were taken and tested before depositing. A "Haps Bottom Corer" on a specially designed frame and a custom onboard laboratory provided the means to sample and test the backfill material, to the highest achievable standards, in the very short time frame available.

Trial backfill operations and backfill soil tests were undertaken - already during the pre-lay dredging phase - to explore the range of operational process parameters in view of the specified backfill density: a minimum cone resistance value of 1.25 MPa at a depth of 2 metres below the backfill top level. Based on these trials and tests the operational backfill controls were set to ensure a consistent achievement of the specifications later on. Operational procedures were prepared accordingly.

Intermediate demobilisation and remobilisation of "Queen of the Netherlands" between dredging and backfilling appeared an economic optimal solution. An accurate prediction in advance and the actual observation of the insignificant rate of trench siltation during the intermediate period of more than 4 months justified this.

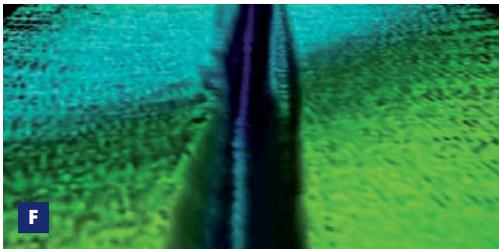
### NEW ACHIEVEMENTS

The TSEP dredging and backfilling project has demonstrated Boskalis Offshore's abilities to:

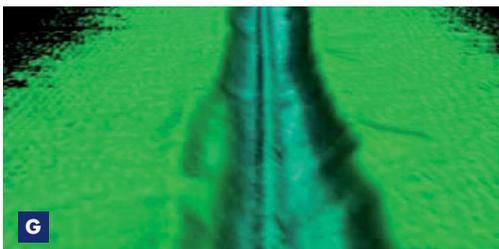
- Accurately pre-lay dredge in unfavourable soils and working conditions in accordance with a strict pipeline alignment.
- Successfully develop and comply with backfill procedures to meet material and installation specifications.
- Satisfactorily define and operate a controlled backfill process to safeguard pipeline integrity and minimise environmental effects.
- Manage the changes in the overall project planning in a flexible and most economic way.



E



F



G



H

- E Round-the-clock survey support
- F Multibeam surveys of pipeline in trench
- G Multibeam surveys of pipeline in trench
- H TSHD "Queen of the Netherlands" in operation on TSEP

Royal Boskalis Westminster N.V.  
PO Box 43  
3350 AA Papendrecht  
The Netherlands

T +31 78 69 69 000  
F +31 78 69 69 555

royal@boskalis.com  
www.boskalis.com