

PROJECT SHEET

PORT EXPANSION PROJECT, RAS LAFFAN, QATAR
EPIC FOR DREDGING, LAND RECLAMATION AND BREAKWATER CONSTRUCTION/ DESIGN AND ENGINEERING

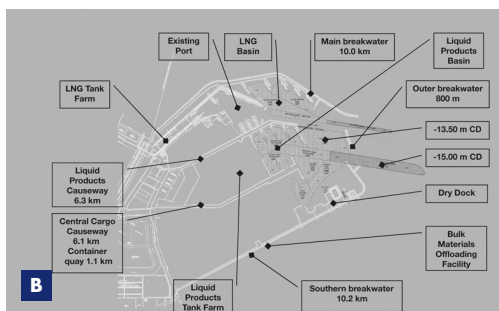
INTRODUCTION

The Ras Laffan project is one of the largest maritime engineering projects in the world. Its sheer size can best be viewed from space. Over a period of three years, more than 3,000 specialists have been working together to create the largest LNG harbor in the world. The total contract value is approximately USD 2 billion, with the Boskalis share amounting to 50%. Qatar has natural gas reserves of roughly 25 trillion cubic meters, 15% of the world total. The gas is transported from the Offshore North Field (26,000 billion m³), 80 kilometers north of Qatar, into Ras Laffan, where it is liquefied and pumped into latest generation tankers. Qatar became the world's top LNG exporter in 2007. Export is expected to increase to 77 million m³ in 2010.

PROJECT CHARACTERISTICS

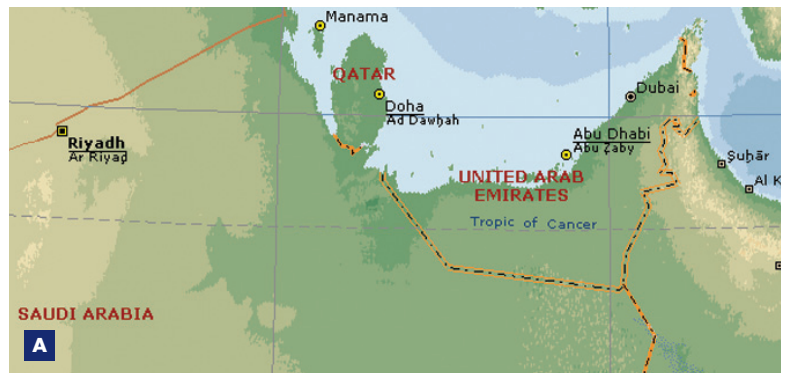
This expansion made it necessary to review the infra-structure of both the petro-chemical installations and the facilities for transportation of the products. The new facilities were to be positioned in a sheltered area. The size of the existing harbor had to be increased from 106 km² to 246 km². Once the harbor is completed, there will be 10 loading facilities. To facilitate LNG berths and many other related activities (cargo, gas-2-liquid products etc.) the following additional works had to be constructed:

- facilities for LNG tankers
- liquid-product berthing facilities
- cargo on- & offloading facilities
- vessel repair / dry-dock facilities



FEATURES

Client	Qatar Petroleum (QP)
Location	Ras Laffan, Qatar
Period	2005 / 2009
Contractor	Boskalis Westminster Middle East Ltd and Jan de Nul Dredging Ltd (joint venture)



- A** Location map
- B** Main characteristics of the Ras Laffan Project
- C** Satellite image of the project, taken in May 2009
- D** Work in progress. The project is carried out within a tight timeframe and subject to strict safety and environmental constraints

As part of this immense expansion the existing port had to be extended from 8km² to 51.2 km². This project was awarded to Boskalis - Jan de Nul JV.

WHAT MAKES THIS PROJECT UNIQUE ?

DESIGN

Not only was the operational scale of the project enormous, the design of the harbor's breakwaters and revetments was also a project in its own right. Boskalis took the lead in this area and eight marine civil experts from Hydronamic, the Boskalis in-house engineering department, were mobilized to Grenoble (France). They managed and supervised the entire design process required for the details of the 20 km of breakwaters and more than 42 km of revetment works. During two years of extensive detailed engineering, an astonishing number of approximately 40 detailed design reports, fifteen 2D-model studies and five 3D-model studies were developed in a challenging environment in partnership with the external engineering consultant and the



client. The project's tight construction schedule meant that the design had to be provided quickly without losing sight of the extreme stringent quality requirements for the design.

COMPLEX LOGISTICS

A complete organization had to be established with different nationalities and facilities in just a few months. The facilities covered campsites, offices, workshops, equipment, materials, procedures and logistics. A round trip by car takes three hours. A wide variety of disciplines (authorities, supervision, dredging and reclamation, dry earthworks, construction of breakwaters, concrete works, transport, quarries etc.) worked closely together in order to achieve the ultimate goal.

PROJECT SPECIFICATION

The main activities under the contract were:

- 24 million m³ dredging of waterways (widening of the existing waterways and additional shelters)
- 29 million m³ reclamation (areas for tank storage, container handling and future dry docks)
- The construction of 33 kilometers of breakwaters, for which the following materials were required:
 - 31 million tons of local rock material
 - 9 million tons of rock from overseas, transported over a distance of 275 n.M.)
 - 2.5 million m³ of concrete
 - 250,000 concrete elements for protection of the structures against wave conditions (Antifers & Accropodes of 3-, 4- and 5 m³ each).

ENVIRONMENTAL RESTRICTIONS

The project was carried out within strict

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environmental and safety limits. The environmental objectives were:

- to prevent environmental incidents and pollution
- to ensure that every individual on the project has a full understanding and awareness of their responsibilities and accountability
- to ensure that all employees are competent and able to perform their tasks with respect for the environment
- to ensure that incidents are properly investigated and appropriate corrective actions are taken.

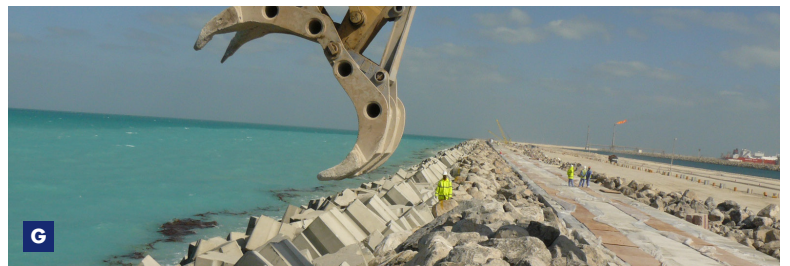
Compliance monitoring was carried out on a daily basis (suspended solids concentration, water temperature, turbidity, salinity), providing information in order to control pollution and organize marine works within the environmental constraints. Environmental effects were monitored on a regular basis in order to provide detailed data about water quality (physical, chemical and bio-chemical) in the course of the project. In addition, sea grass, turtles and relocated oyster beds were monitored every day.

WELL -TRAINED STAFF

Over 3,500 m² of site offices were used, as well as a campsite with accommodation for 1,500 persons. The project was carried out by 350 staff and more than 3,000 employees, working in Ras Laffan and overseas. In order to achieve and maintain the highest environmental and safety levels, almost 10,000 attendees followed one or more of the 28 different types of training.

EQUIPMENT

In order to cope with the enormous dimensions of the project, a vast amount of equipment was needed. An impression of the equipment used: 6 large cutter suction dredgers, 12 large trailer suction hopper dredgers, 8 backhoe dredgers and grabs, 8 self-propelled split barges, 6 non-self-propelled split barges, flat-top barges (approx. 10,000 tons each), (sea-going) tugs, multi-cats, survey vessels, crew- and monitoring vessels, a heavy plough & sweep bar system, a complete workshop for maintenance of cutters and land-based equipment, 2 complete concrete factories, 15 concrete trucks, hundreds of land-based equipment (excavators, pay-loaders, bulldozers, dump trucks, rock drilling & sorting equipment) for the overseas rock, 4 pieces of custom-built off-loading facilities, 350 trailers/trucks for hauling the local rock.



- E** The project was carried out by 350 staff members and more than 3,000 employees, working in Ras Laffan and overseas. Over 3,500 m² of site offices were used, as well as a campsite with accommodation for 1,500 persons
- F** 250,000 concrete elements for protection of the structures against wave conditions (Antifers & Accropodes of 3-, 4- and 5 m³ each).
- G** Construction of one of the breakwaters, which are more than 10 kilometers long.

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