Boskalis

PROJECT SHEET

CONSTRUCTION OF GREENFIELD PORT AND BREAKWATER FOR DANGOTE QUAYS LEKKI, NIGERIA

BOSKALIS

Royal Boskalis Westminster is a leading global marine contractor and services provider. With safety as our core value, we offer a wide variety of specialist activities to the oil & gas and renewables sectors. These activities include marine installation and decommissioning, seabed intervention, marine transport and services, subsea services and marine survey. In addition, Boskalis is a global dredging contractor, provides towage and terminal services across the globe and delivers marine salvage solutions.
By understanding what drives our clients we are able to provide the solutions that enable them to meet their specific business goals. For this reason we are constantly looking for new ways to broaden and optimize our offering and are committed to expanding our proposition, supported by our financial strength.
With our committed professionals in engineering, project management and operations, 900 specialized vessels and an unprecedented breadth of activities in 90 countries across six continents we help our clients in the offshore industry push boundaries and create new horizons.

INTRODUCTION

The Dangote Group, owned by Aliko Dangote, is building Africa's largest oil refinery and fertilizer plant in Lekki, 60 kilometers east of Lagos, Nigeria.

To facilitate the import of out-of-gauge components and other materials required for construction activities, a port was constructed

PROJECT DESCRIPTION

In October 2017, Boskalis was awarded the contract for the dredging of an access channel, a turning circle and a port basin. In addition, Boskalis carried out work to reclaim an innovative sandbar, constructed the sandbar groin and north groin, as well as lee-side and basin revetments. In anticipation of future erosion of the beach to the east of the port, a geo-tubes sleeping defense system and sand engine were built.

FEATURES

Client	Dangote Oil Refining Company Limited, Dangote Petroleum Refinery and Petrochemicals FZE
Location	Ibeju Lekki, Lagos State, Nigeria
Period	2017 - 2018
Contractor	Boskalis Westminster Contracting Limited

A Construction of the geo-tubes sleeping defense system.
B Overview of the port basin, turning circle and sandbar breakwater during construction.
C Trailing suction hopper dredgers Shoalway, Shoreway and Argonaut rainbowing at the sandbar.

In total, Boskalis dredged and reclaimed approximately five million cubic meters of sand and installed close to 300,000 tons of rock and 1,050 concrete elements (Eko-podes).

DREDGING AND RECLAMATION

For the dredging and reclamation works, Boskalis deployed three of its trailing suction hopper dredgers: Argonaut, Shoalway and Shoreway. Dredging of the

harbor basin and turning circle was carried out by the cutter suction dredger Martina, owned and operated by Boskalis' Nigerian entity Nigerian Westminster Dredging and Marine Limited (NWDM).

The reclamation works were supported by the multicats BKM 100 and Nun River, both owned and operated by NWDM. The onshore reclamation spread consisted of four Caterpillar D6 LGP bulldozers, three Caterpillar 966 wheel loaders and two Caterpillar 336 hydraulic excavators.

A start was made with the reclamation of the sandbar, which required dredging and reclamation of four million cubic meters of sand. Subsequently, the reclamation of the sand engine was carried out to allow for the installation of the stacked geo-tubes sleeping defense system.

ROCK WORKS

Rock was delivered by the client in a stockpile on site. Boskalis was responsible for stockpile management, including the construction and operation of a weigh bridge.

Two existing rock spurs had to be removed. Rock material from these spurs was segregated and stockpiled for re-use in the revetments.

For the construction of the sandbar groin, some 210,000 tons of rock and nearly 1,050 Eko-podes were used. The design of the groin required precise placement of various layers. For this purpose, the installation spread was equipped with GPS-based positioning and crane monitoring systems.

At the leeside of the sandbar, 55,000 tons of rock and 20,000 m² of geotextile were used for the construction of the leeside revetment.

On the eastside of the harbor basin, the north groin and basin revetment were installed, using 30,000 tons of rock and 4,000 m² of geotextile.

The installation spread for the rock works consisted of: a Caterpillar 385 triple and 390 quattro boom excavator, Caterpillar 385, 349 and 345 excavators, a Kobelco 7070 crawler crane, eight Caterpillar 740 articulated dump trucks and two Caterpillar 980 wheel loaders.

Regular progress surveys were undertaken using NWDM's survey vessel Integrity, equipped with a multibeam survey system.

Special attention was given to the construction of the sleeping defense system along the original shoreline. This was done by installing 1,100 linear meters of stacked geo-tubes. This sleeping defense had to be constructed below the surface of the sand engine (at times below sea level), therefore requiring the deployment of a Caterpillar 330 long boom excavator.

CORPORATE SOCIAL RESPONSIBILITY

As part of our commitment to CSR, we donated a solar power system to a primary local school. This was done in collaboration with the NGO Development Africa. In addition, a SHOC card reward program was implemented. The proceeds of this program were donated to an orphanage in Lekki.

BUILDING WITH NATURE

The innovative design of the sandbar applied on this project was a first worldwide. In order to reduce the quantities of rock, typically required under traditional designs, the natural flow of sand along the Nigerian coast is used to strengthen the sandbar over time. After reclamation of an initial sandbar and the construction of the sandbar groin, nature will supplement the sandbar until a new equilibrium - in this case a new shoreline perpendicular to the governing wave direction - is formed. Already, during construction of the initial sandbar, natural supplementation took place.

Since the interruption of the natural sand flow at one side will inevitably cause erosion on the downstream side, an innovative concept for a so-called 'sand engine' was put in place. It is expected that with periodic replenishments of the sand engine, the original shoreline can be maintained.

The project was completed in August 2018 to the full satisfaction of our client.

D Dredging of the turning circle by cutter suction dredger Martina.

E Rock works at the sandbar groin.

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