

# PROJECT SHEET

**GBARAN UBIE, NIGERIA**  
RIVER BED AND SLOPE PROTECTION WORKS PHASE 1

## INTRODUCTION

The Shell Petroleum Development Company of Nigeria Limited (SPDC) has constructed a gas processing facility in the Niger Delta on the outside bank of a bend of the River Nun at Gbaran Ubie, north of Yenagoa. To facilitate the importation of the processing modules, a Materials Offloading Quay was constructed, including a ro-ro ramp, a passenger jetty and a fire water station.

River bed protection in front of the quay wall and slope protection on the north and south sides of the quay wall was required to prevent scour by the flow of the river and propeller wash from vessels using the quay wall.

## DESIGN OF RIVER BED AND SLOPE PROTECTION

The original design of the river bed and slope protection consisted of Reno mattresses placed on a geotextile, which at the time was considered the preferred option with the aim of reducing rock quantities. However, following a design review by Hydronamic, the Boskalis Engineering Department, and given the technical construction considerations recommended by the Boskalis Rock Department, SPDC later agreed to change the design of the bed protection along the quay wall and slope protection below the LWL along the South Bank, and to install protection consisting of rock armor on a granular filter layer rather than Reno mattresses.

The revised design required three types of rock material:

- Rock for general fill and for the fill of the Reno mattresses: 75 – 120 mm
- Filter layer: 40 – 100 mm
- Armor rock: 40 – 200 kg



**A** Location map  
**B** Loading facility at Ogu Base  
**C** Laydown / Stockpile Area Ogu Base

## FEATURES

|                 |   |
|-----------------|---|
| Client          | Shell Petroleum Development Company               |
| Location        | Gbaran Ubie, Bayelsa State, Nigeria               |
| Period          | 2011 - 2012                                       |
| Main contractor | Pelfaco Ltd                                       |
| Sub contractor  | Nigerian Westminster Dredging & Marine Ltd (NWDM) |



## COOPERATION PELFACO LIMITED – NWDM

SPDC awarded the contract for the river bed and slope protection to Pelfaco Ltd. In early January 2011, NWDM was asked to work with Pelfaco as a sub-contractor in order to ensure that the most critical parts of the site at least would be protected before the next rainy season of 2011. Following the successful completion of these emergency works the cooperation was further extended until the whole of the river bed protection along the quay wall and the slope protection on the South Bank was completed.



## EXECUTION PERIOD

Mobilization started in early May 2011. At Ogu Base, just South of Yenagoa, a laydown area was prepared to receive and stockpile the purchased rock materials. A special loading facility was established at the riverside for the loading of the rock transport barges. Actual rock placement started in early June 2011 and the NWDM scope of work was completed at the end of August 2012. By that time, more than 190,000 tonnes of rock had been placed. By means of special measures and work planning, NWDM was able to continue rock placement even during the high-water period of 2011.

#### EQUIPMENT

The main equipment used on the project consisted of:

- Crane Barge Ilajeland equipped with a CAT 385 hydraulic excavator for the rock placement.
- Floating Grab Dredger Swampland for dredging and trimming activities.
- Spud Pontoon Carrier 006 acting as rock loading facility at Ogu Base.
- 2 no. Rock Transport Barges with 2,000 t capacity.
- Various tugs (Hurricane, Integrity, Imo River, and others), a Survey Launch and a Crew Boat.
- A range of land-based equipment such as excavators, wheel loaders, articulated dump trucks, etc.

#### EXECUTION

The rock materials were purchased from a number of Nigerian quarries to ensure a constant rock supply. The rock was delivered by the suppliers by truck to the laydown/stockpile area at Ogu Base, where the rock was loaded onto the rock barges for transport to the project site.

At Gbaran Ubie the rock barges were offloaded by the crane barge Ilajeland and the rock was placed accurately on the river bed or at the river bank. The grab dredger Swampland was deployed to trim the river bed prior to rock placement. High spots had to be removed in some places, while scour holes had to be filled elsewhere.

#### QUALITY CONTROL

Both the crane barge Ilajeland and the grab dredger Swampland were equipped with a special Crane Monitoring System (CMS) to guarantee accurate dredging, levelling and rock placement. A dedicated survey launch and crew conducted regular hydrographic surveys to monitor work progress. Water levels and the river flow were recorded on a daily basis.

#### SAFETY RECORD

We are proud to state, with compliments to the Project Management Team, that the project was completed without any Lost Time Injuries (LTI) during a total of nearly 460,000 man-hours spent on the execution of the work.



- D** Crane barge Ilajeland
- E** Grab dredger Swampland
- F** Tugs Integrity and Hurricane
- G** Rock placing in progress

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