

# South African Developments

Two of the largest infrastructure projects of Transnet National Ports Authority, South Africa reaching critical milestones



Port general.

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Project in progress

## Editor's Note

Two articles appeared in past IALA Bulletins (Nos. 2003/4 & 2007/4) on two of the largest infrastructure projects ever being undertaken by Transnet National Ports Authority. Both projects, which include the establishment and or relocation of aids to navigation, are nearing important milestones.

## A new South African port, the port of Ngqura to be opened soon

The completion of the new port of Ngqura is at a very critical stage as it is nearing completion. On site it is a hive of activities to complete the final installations, testing and commissioning as the official opening of the port is set for 1st October 2009.

An Industrial Development Zone, known as the Coega IDZ, has been developed over the 12,000 hectare site in the area including the river and port, with a 4,500 hectare core development. The IDZ will serve as a primary location for new industrial development for export driven industries.

The port is of deepwater construction capable of serving post-Panamax dry and liquid bulkers and the new generation of cellular container ships. Whereas Port Elizabeth and East London each have container terminals, they are not regarded as deepwater ports and the existing container terminals at Cape Town, Durban and Port Elizabeth are expected to run out of capacity by the year 2020 even if they undergo major expansion. Several spellings exist for Coega. These include

### The design vessels for the ports are:

#### Dry Bulk Carriers

Deadweight tonnage	80,000
Length OA	250 metres
Beam	36.5 metres
Loaded draught	14.0 metres

#### Cellular Container Vessels

Deadweight tonnage	70,000
TEU	4,500
Length OA	300 metres
Beam	40 metres
Loaded draught	14.0 metres

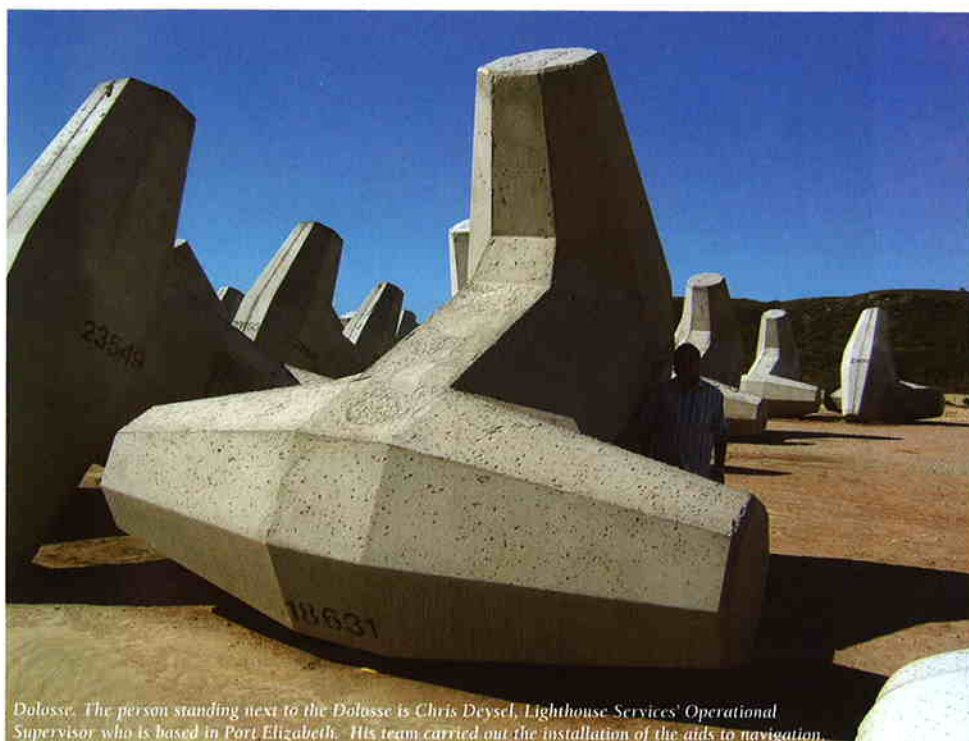
Ngqura, the Xhosa spelling which is used in the port of Ngqura Establishment Act and is the official spelling used by the National Ports Authority; Ngqurha, as has been used on occasion by the Department of Public Enterprises; and Coega which is that used by the Coega Development Corporation, the Industrial Development Zone and most other people. Other spellings include Cougha, Coecha, Koecha and Koega. The name is of Khoekhoen origin for the river of the same name and means "ground water". Coega is pronounced 'koo-gha', with a guttural sound forming the last syllable. To pronounce Ngqura correctly requires an ability to sound the click as used in Koekhoe and Xhosa.

The port of Ngqura is being developed into a fully functioning container and bulk cargo handling facility. The current phase of the project has an approved budget of ZAR 7.86 billion [1 USD (\$) = ZAR 8.1] and includes the extension of the container terminal quay walls to create the potential for a four-berth container terminal – three additional berths for the handling of bulk cargo already exist within the confines of the completed breakwaters.

A sand bypass system, designed to mimic the natural movement of sand along the coastline prior to the construction of the port, is already operational and transporting beach sand between the beaches west and east of the port. The first phase landslide infrastructure is also virtually complete, three tugs are being fabricated at a shipyard in Durban and a pilot boat is already complete and awaiting despatch to Ngqura. The project also includes an upgrade of the rail link-line between Ngqura and Gauteng, the former Witwatersrand, to accommodate the higher volumes of containers that will soon flow to and from the port.

So far, the bulk liquid berth and entrance basin of the port have been dredged to 18 metres in depth, which means that a height of 23 metres of sand has been removed. The container berth and inside basin are currently 16.5 metres in depth, allowing for new generation container vessels to be accommodated comfortably. 14 million cubic metres of material were excavated during the initial port construction phase to allow for the water that now fills the harbour basin.

The current phase of the project will see the container terminal quay walls



*Dolosse. The person standing next to the Dolosse is Chris Deysel, Lighthouse Services' Operational Supervisor who is based in Port Elizabeth. His team carried out the installation of the aids to navigation.*

extended to 1,300 metres, the first 720 metres of which will be equipped with landslide equipment. The container terminal will be operational by the third quarter of 2009 and will give the terminal a capacity of 800,000 TUE (the standard container measurement of 'twenty-foot equivalent units') a year. Phase 2, scheduled to be completed by 2015, will increase this capacity to an impressive two million TUE a year.

The horizontal geometry of the port is such that 150,000dwt bulkers and 6,500 TEU cellular container ships can manoeuvre within the port, although initial dredging is being limited to accommodate the design vessels only.

Some statistics of this huge project:

- The main breakwater is more than double the length of the western breakwater at 2.6km and is the longest "rubble mound" breakwater in Southern Africa. Approximately 2,300,000 m<sup>3</sup> of armour rock, each of 3 to 6 tonnes quarried from the Coega Kop (Head) area 9km inland from the port.
- The 1.96km mass gravity quay walls consist of 270,000m<sup>2</sup> of concrete, 286,000m<sup>2</sup> of formwork and 6,000 tons of reinforcing
- The five caisson units on the points of the two breakwaters consist of 11,000m<sup>2</sup> of concrete, 8,000m<sup>2</sup> of formwork and 14,000 tons of reinforcing.
- Each of the 26,500, thirty-ton dolosse (dolosse was designed by Eric Merrifield,

a South African and is used to protect a breakwater by breaking up wave action) was manufactured on site. Up to 52 of these giant dolosse were manufactured per day.

- The caissons were pre-cast in the dry inner basin ahead of final flooding and floated into position. The caissons are designed in order to be moved when further expansion of the port is required.
- The quay walls are approximately six metres above mean sea level

Funding of the entire port infrastructure is being provided by Transnet, of which the National Ports Authority (landlord) is a division. Funding of the adjacent Industrial Development Zone is being provided by central and provincial government, with detail funding to come from private investors.

An historic moment for Ngqura was the welcomed docking of its first two vessels bringing project cargo in September 2008 – the 162 metre, 11,000 tonne British vessel, *Beluga Indication*, and the 105 metre, 6,575 tonne German vessel, *BBC Langeland*.

The majority of the terminal's infrastructure is in place, final recruitment and training programmes had kicked into high gear and customer engagement is now at an advanced stage.

The most significant progress, as far as world-class equipment is concerned,



*Buoyage after assembly and before establishment*

includes the assembly and commissioning of twelve rubber-tyred gantry cranes (RTGs) and six Megamax ship-to-shore cranes to date.

The terminal would be implementing other high-tech systems including the web-based Navis SPARCS N4 terminal operating system, which Transnet recently introduced in a global first for port operators, running it from a central server across multiple marine and rail sites. Ngqura container terminal would also boast a fully automated gate system.

### Aids to navigation

Lighthouse Services was responsible to provide and install all the aids to navigation. The 16 buoys, a Fairway buoy, a cardinal buoy, nine channel buoys, three turning buoys and two limit buoys were manufactured by Shop 24, the mechanical workshop of the port of Durban, transported by road and assembled on site. All of the buoys are fitted with Vega VLB-44 lights, all of which are synchronised. A Tideland Seabeacon MK6 racon is fitted on the Fairway buoy.

The installation of all fixed aids to navigation was completed at the middle of June

2009, except for the Port Signal Light, which was expected to be in place by August. The fixed aids to navigation consist of the east breakwater light, a Vega VRB-25, an inner east breakwater light and west breakwater light (Vega VLB-44, 2-tier), three quay lights (neon tubes mounted back-to-back in four foot polycarbonate light fittings) and set of leading lights. A Pharos Marine CGI1000 fog signal with an ELU 300/02 omnidirectional emitter, controlled by a Biral type HSS fog detector are also installed at the breakwater light.

The leading lights are in-house designed and assembled and are located on two lattice structures. The front red flashing light is made up of an array of six PAR 56, 200 watt, 30 Volt sealed beam lamps and the rear white flashing light comprises an array of four PAR 56, 200 watt, 30 Volt sealed beam lamps. The front and rear lights are synchronised by using Vega VLF-43 flashers and VSU-29 synch units.

All the major aids to navigation are backed up by standby diesel generating sets (three) whereas all other lights are solarised, resulting in that an electricity failure would

have no negative influence on the availability of any of the aids to navigation.

The Port Signal Light needs to be visible over an area of approximately 180 degrees. This will be achieved by a total of 28 green and 28 red PAR 56, 200 watt, 30 Volt sealed beam lamps. The lamps will be established in arrays of 14 boxes per colour, each containing two lamps, and positioned in a half-moon shape. These will be located at the top of the Port Control tower.

Following the experience gained with the arrival of the first two cargo vessels, a set of approach leading lights will be established as well.

### VTS

The VTS was provided and installed by Marine Data Solutions. It comprises a Kongsberg Norcontrol IT VTSS060 Vessel Traffic System. The real time vessel traffic situation is provided by signals from a Consilium Selesmar 25kW radar and a Seatex AIS Base Station. The radar information is processed via the Kongsberg Norcontrol IT Radar Extractor/Tracker units to a redundant pair of Warning and Integration servers, along with the AIS