

*Chapter 2:*  
**Description of the Proposed  
Project**

## ***Description of the Proposed Project***

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## 2. DESCRIPTION OF THE PROPOSED PROJECT

The Port of Ngqura, located in Algoa Bay approximately 15km north-east of Port Elizabeth (Figure 2.1), is undergoing development into a functioning container and bulk cargo handling facility. The initial development (Phase 1) has seen the construction of breakwaters, navigation channels and quays for container and bulk cargo loading. The current infrastructure at the port is shown in the aerial photograph in Figure 2.2 and includes: breakwaters, entrance channel, turning and shipping basins, quay walls for two container terminal berths, two dry bulk berths and a liquid bulk berth. The port is now entering a further developmental phase (Phase 2) with modifications and extensions outside of the current ROD being addressed in the present EIA process.

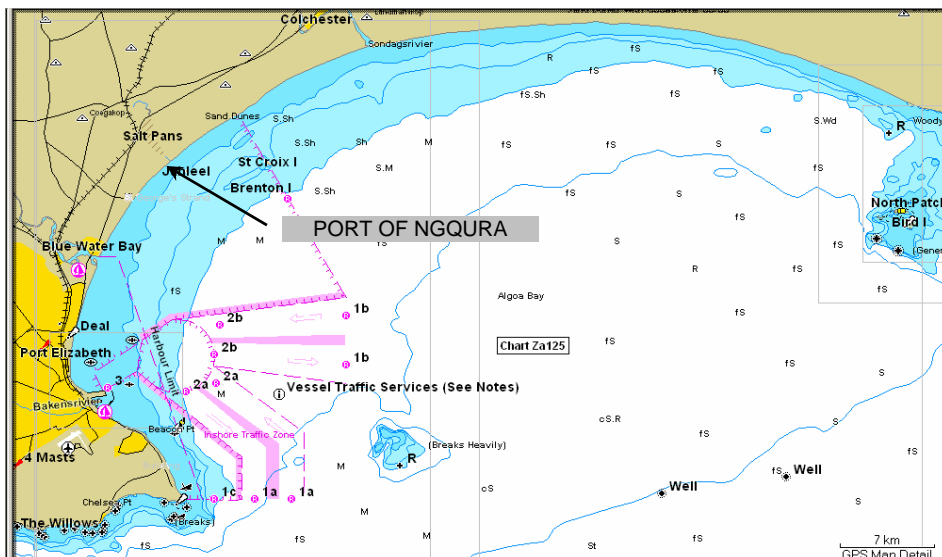


Figure 2.1: Chartlet of Algoa Bay showing the location of the Port of Ngqura

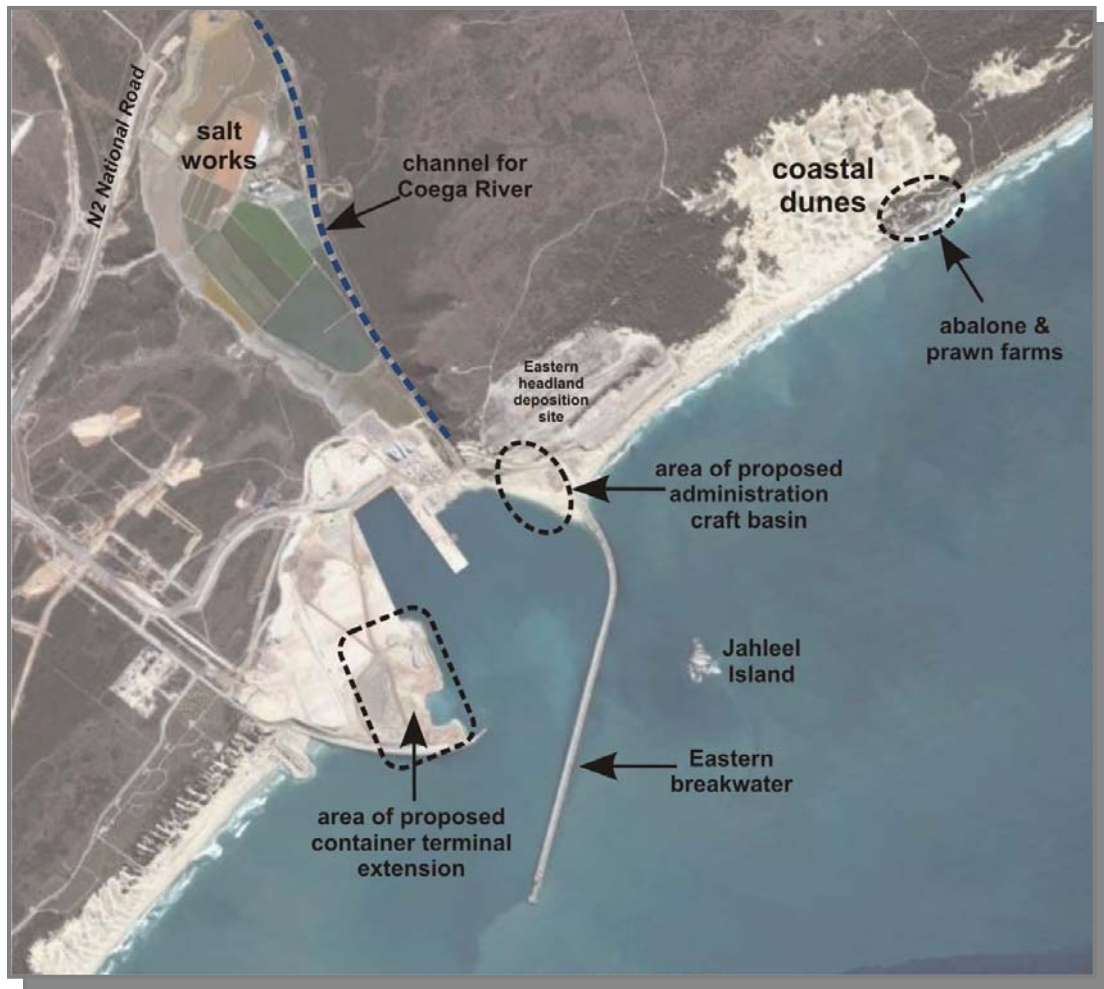


Figure 2.2: Aerial photo of the Port of Ngqura showing the proposed Phase 2 development (i.e. two additional container berths and administration craft basin) within the context of the existing port development and environmental features.

## 2.1 Overview of the proposed project activities

Phase 2 of the port development consists of two main activities, i.e. the extension of the container terminal berth through the construction of two additional berths; and the construction of an administration craft basin at the root of the eastern breakwater. A drawing showing the location of these activities is provided in Figure 2.3, with more detail on the activities provided below.

Proposed extension to the container berth and construction of an administration craft basin at the Port of Ngqura

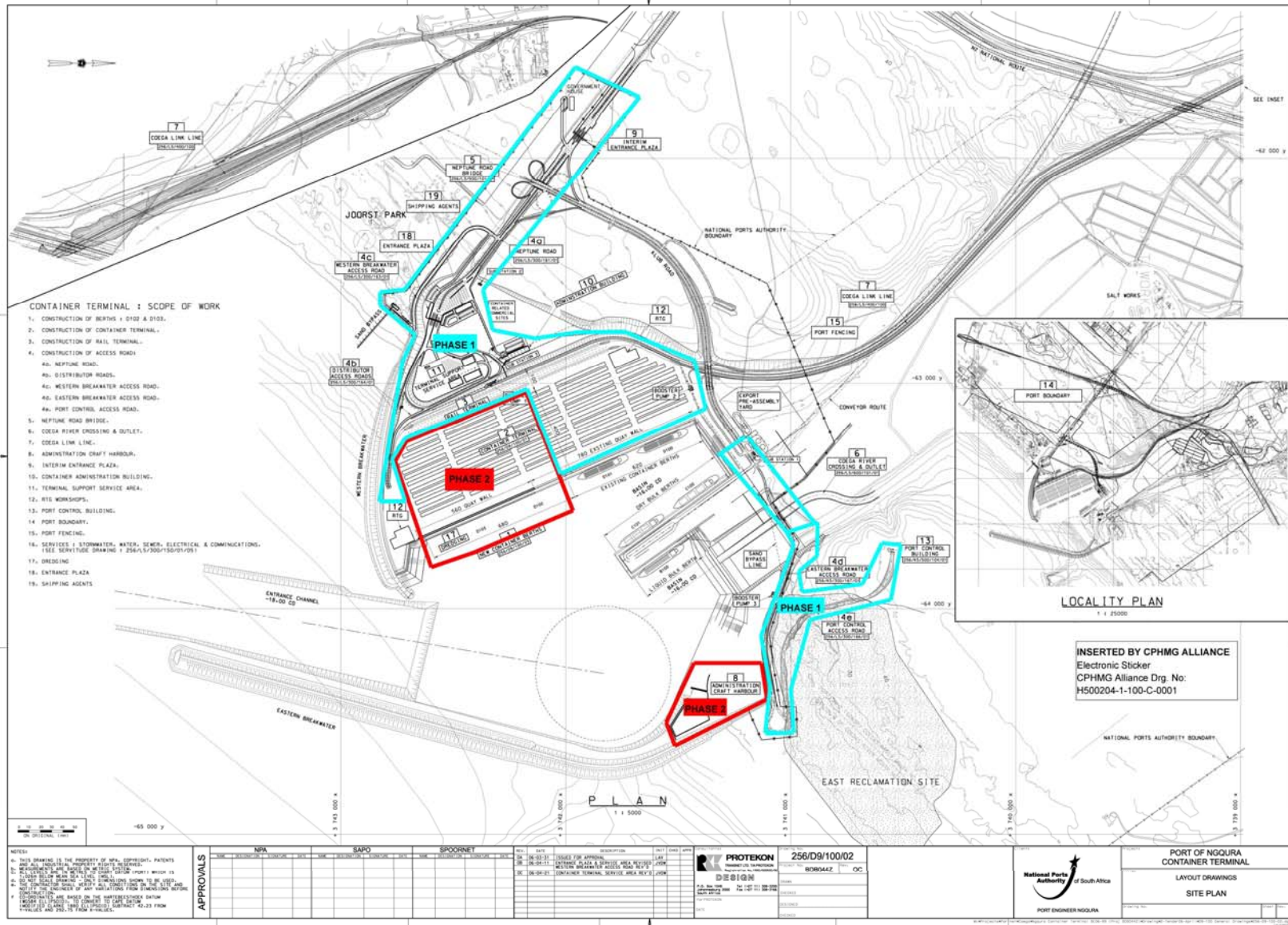


Figure 2.3: Drawing showing the location of the proposed additional two container berths (D102 and D103) and the current design of the administration craft basin within the Port of Ngqura

### **2.1.1 Container terminal**

The construction of the new berths will require an extension to the existing quay wall, which has an existing length of 780m for berths D100 & D101, by a distance of approximately 560m to accommodate the new berths D102 & D103. This will result in a quay wall of approximately 1340m for the container berths, providing a container berthing length of 1300m. A plan showing the layout of the proposed extension to the container terminal is provided in Figure 2.4.

During the construction of the existing quay walls and port breakwaters, a temporary berm was constructed, extending from the existing quay wall to the western breakwater. This berm will facilitate the construction of the new quays in the dry. A slurry seal or similar, together with dewatering equipment, will be required around the perimeter of the quay wall extension to allow it to be built in-situ in the dry in a similar manner to the existing quay wall. The seal would be some 1 700m long and would extend approximately 1 metre down into the underlying cretaceous mudstone, i.e. to a depth assumed to vary between -13m Chart Datum (CD) at the north end to -21m CD at the south end. It would be formed using diaphragm wall techniques and a bentonite/cement mix. This is similar to the technique successfully used in the construction of the phase 1 construction activities. Dewatering of the quay wall construction pits in the original harbour construction contract was carried out using a combination of deep well dewatering, well pointing and pumping from open pits, all behind a cement/bentonite slurry cut-off wall sealed off into the cretaceous bedrock. It is assumed that a similar construction methodology will be adopted.

Excavation will be sufficient to achieve the required formation level, plus over excavation as required if cretaceous mudstone is deeper than is required. The excavation will be terraced with an overall batter of 1 in 2. The backfilling to the rear of the wall will be placed in layers and compacted as construction progresses.

The temporary berm, together with dump-rock in the berm profile, shall be removed on completion of the quay wall extension, after the backfilling of the wall has been completed and the pit has been flooded. In order not to compromise the dredging operation, all rock fill shall be removed before commencing dredging operations. The rock will be removed using a shore based plant, perhaps a dragline. The anticipated volume of material to be dredged is in the order of 1 300 000m<sup>3</sup>. The dredging is planned to be undertaken as rapidly as possible, and is not expected to exceed 8 – 12 months.

Preliminary design has indicated that in the order of 20 000m<sup>3</sup> of suitable dredge material will be used as fill material behind the container terminal quays, whilst the remainder of material will have to be spoiled. This is attributed to the limited requirement for land filling behind the quays. The basis for the feasibility study has provided for the disposal of the spoil at the dredge disposal site as used during the port construction, acknowledging the necessary permits to be obtained from Marine and Coastal Management. All dredging work will be done in accordance with the relevant regulations.

The construction of a heavy duty, in-situ concrete paving behind the new berths D102 and D103, together with the installation of services in the terminal (i.e. storm water drainage, water supplies, sewerage, services tunnels and pipe-and-chamber systems for electrical and communications reticulation), shall complete the container terminal facility.

### ***2.1.2 Administration craft basin***

The proposed administration craft basin will be situated within the eastern portion of the Port of Ngqura at the root of the eastern breakwater. It is to be built with sufficient capacity to allow for long term future berthing demands. Initially there will be 3 tugboats and 1 pilot boat in the basin. However, the basin will be designed to accommodate 6 tugboats and 2 service/pilot boats in the future. The total quay length will measure approximately 360m in length. There will not be a dedicated fuel berth but provision will be made for refuelling facilities at one of the other berths in the port. Figure 2.3 indicates the location of the administration craft basin. It should be noted that refinements to the exact location and design of the administration craft basin may still occur during the detailed design phase, but this will not affect the overall impact assessment.

A hard launching facility or boat ramp will be provided inside the administration craft basin. This facility will have sufficient width to launch one boat at a time. Sufficient parking for vehicles and trailers will be provided close to this launching facility.

The depth of the administration craft basin and entrance is estimated to be -8m CD to accommodate the vessels and other coastal design considerations, with the entrance to be designed to function under all sea-state and weather conditions. The proposed breakwater will provide sufficient protection to create calm mooring and launching conditions. The minimum entrance width at the design depth will be 55m.

Capital dredging will be required in the administration craft basin in order to obtain the required depths. The total dredge volume is anticipated to be in the order of 380 000m<sup>3</sup>. Most of the dredge material is expected to be soft unconsolidated sand with some pebbles and cobbles.

Due to the relatively small volume of dredge material and the potentially restricted areas, it is unlikely to be economical to mobilise a large cutter suction dredger that could handle the cobble layer. A backhoe dredger may be the type of dredger that is used, despite the fact that it is not the most efficient dredger. The dredging activity is scheduled for approximately 46 weeks.

The breakwater will be a rock mound structure, consisting of a rock core and protected on the faces with a layer of selected armour rock. This is a relatively flexible structure founded at the top of the existing slope on the edge of the port basin. The breakwater will be capped with a concrete cap and splash wall. The cap width will be limited to minimum construction and maintenance requirements. An absorption revetment will be constructed at the back edge of the outer basin in order to dissipate wave energy and reduce wave energy entering the inner basin.

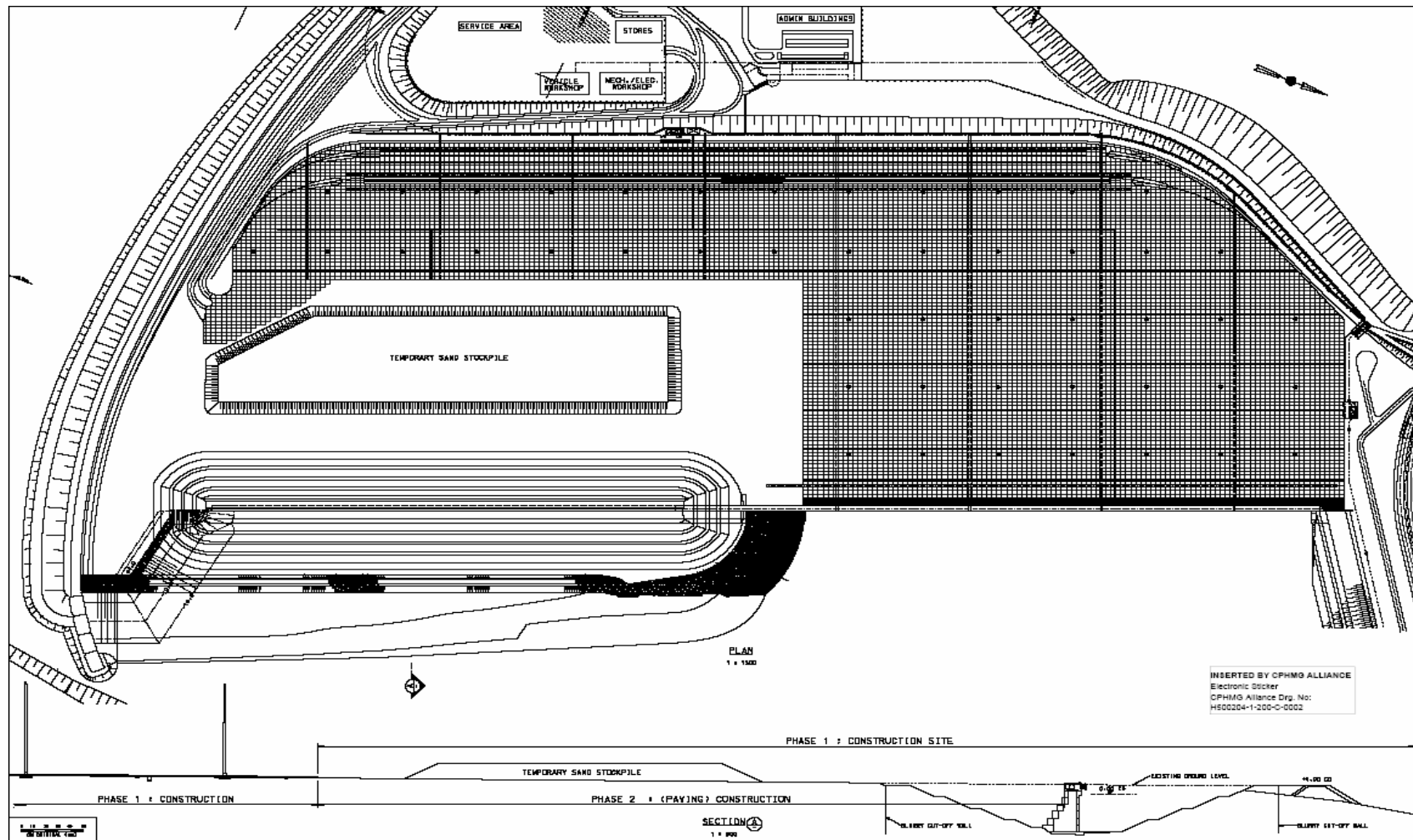


Figure 2.4: Layout plan for the construction of the container terminal, showing the existing two berths on the right and the area for the additional two berths on the left

### **2.1.3 Construction schedule**

The preliminary project schedule for the completion of Phase 1 activities and the planning and implementation of Phase 2 activities (i.e. extension of the container terminal and construction of the administration craft basin) is provided in Table 2.1.

*Table 2.1: Preliminary project schedule*

| <b>Activity</b>   | <b>Start date</b> | <b>End date</b>              | <b>Approximate duration</b> |
|---|-------------------|------------------------------|-----------------------------|
| Phase 1 Construction (completion of construction activities covered by existing RODs) | 4th Quarter 2006  | 4 <sup>th</sup> Quarter 2008 | 27 months                   |
| Environmental studies and approvals for proposed Phase 2 activities                   | June 2006         | April 2007                   | 11 months                   |
| Phase 2 Construction  | Mid 2007          | 4th Quarter 2009             | 30 months                   |

### **2.1.4 Operation and additional facilities**

The container terminal area will be fully equipped with ship to shore cranes and container handling equipment.

The quay extensions to berths D102 and D103 will result in a total berthing length of approximately 1300m that will berth 2 x mother vessels (6 500 to 8 000 TEU) and 2 feeder vessels of approximately 3 500 TEU. Simulations are presently underway with respect to the refining of the terminal operations and the determination of the expected container traffic through the port. For the purposes of the feasibility study the design capacity of 1 250 000 TEU's per annum by 2015 has been adopted, ramping up from 400 000 TEU's after the completion of Phase 1.

### **2.1.5 Job creation and employment**

The civil **construction phase** of the two facilities, namely both the two container berths (and associated landward infrastructure) and the administration craft basin, is anticipated to create in the order of 1.5 million hours of employment opportunities, with a peak labour requirement of 840 to 960 persons during construction. The nature of the work will vary from that of general workers to skilled artisans. The employment of all local staff will be in accordance with the Coega IDZ and Port Zone Labour Agreement.

The manning levels for the **operations phase** of the container terminal are still under development due to the new operations to be adopted at the terminal, with rubber-tyred gantry crane (RTG) operations not yet having been undertaken at any ports within South Africa. The nature of the terminal operations will require highly skilled operators and staff. It is estimated that the manning levels would be in the order of 320 persons for the additional two container berths.

There will be limited further permanent employment creation associated with the operation of the administration craft basin in that the marine operations team would have already been

established during the completion of Phase 1 of the project and operating from temporary facilities within the port or supported from the Port of Port Elizabeth.

## 2.2 Consideration of alternatives

The feasibility study phase of the project has given consideration to three key alternatives. These alternatives were considered in the early planning phases of the project such that feasible and reasonable activities could be proposed for the project. These alternatives included:

- 1) Sourcing of armour rock (for construction)
- 2) Land-based disposal of dredge spoil
- 3) Off-shore disposal of dredge spoil (two alternative sites for disposal of spoil).

### 2.2.1 Sourcing of armour rock

The preliminary estimates of the quantities of core and armour rock required for the construction of the breakwaters and revetments for the administration craft basin is in the order of 105 000m<sup>3</sup>. There are a few options available for the supply of core and armour rock required for the breakwater and revetments. Consideration has been given to the following alternatives for sourcing this rock:

- From the sand bypass temporary works where armour rock between 2 and 4 tonnes has been stockpiled, with an estimated volume of 8 000m<sup>3</sup>.
- From the temporary bund in front of the proposed new container quay, where armour rock (1-4t) and core rock (5-500kg) could be recovered from the temporary bund, with an estimate volume of 12 000m<sup>3</sup> and 37 000m<sup>3</sup> respectively assuming a 70% recovery.
- Stock pile at the root of the eastern breakwater, where core rock (5-500kg) is stockpiled with an estimated volume of 5 000m<sup>3</sup>.

The options associated with the utilization of the sand bypass and eastern breakwater stockpiles are the most practicable. The timing of the construction of the new quay wall for the administration craft basin prohibits using the material in the temporary bund in front of the new container quay for the administration craft basin construction. However, the armour rock from the temporary bund will be used in the revetment for the Coega River channel. The remaining armour rock requirements for the administration craft basin will be sourced from a commercial supply.

The transportation route for the importation of the material will be along the national road network to the port boundary and follow the completed Klub road extension down to the eastern breakwater, necessitating those vehicles to be approved in terms of the national road regulations.

### 2.2.2 Land-based disposal of dredge spoil

The volume of material to be removed by dredging during the proposed construction activities is in the order of 1 300 000 cubic meters. The first option considered by Transnet was to use the surplus material within the port area. The first phase of port construction produced an excess of

material and fully utilized the two land-based deposition sites designated within the port area. No further opportunities for land-based disposal within the port area are available.

Secondly, opportunities for land-based disposal of excess material within the wider IDZ area have been discussed between Transnet and CDC, where it was indicated that CDC also has an excess of material that is currently being stockpiled.

Furthermore, the double-handling of dredge material, in order to dispose of the material on land, entails a significant additional cost that would have a negative impact on the financial viability of the container terminal expansion project.

Therefore, the land-based disposal option was not considered any further by Transnet during the pre-feasibility assessment phase.

### 2.2.3 Offshore disposal of dredge spoil

In the EIA for the Port of Ngqura, the “Specialist report on the environmental impacts and monitoring guidelines for the land excavation and disposal, marine dredging and marine disposal operations at Coega Port” (CES, 2001(b)) identified two candidate sites for receiving the dredge spoil from port construction: site (a) that was used; and site (b) located further offshore (Figure 2.5). Site (a) lies approximately 8km offshore from the Coega River mouth in a depth of 29m to 37m. Site (b) lies approximately 19km offshore in a depth of approximately 46m. In this section, the reasons for the choice of site (a) are reviewed and additional supporting evidence included justifying its use for the proposed dredging programme. This section was prepared by Dr Carter, the marine specialist on the EIA team.

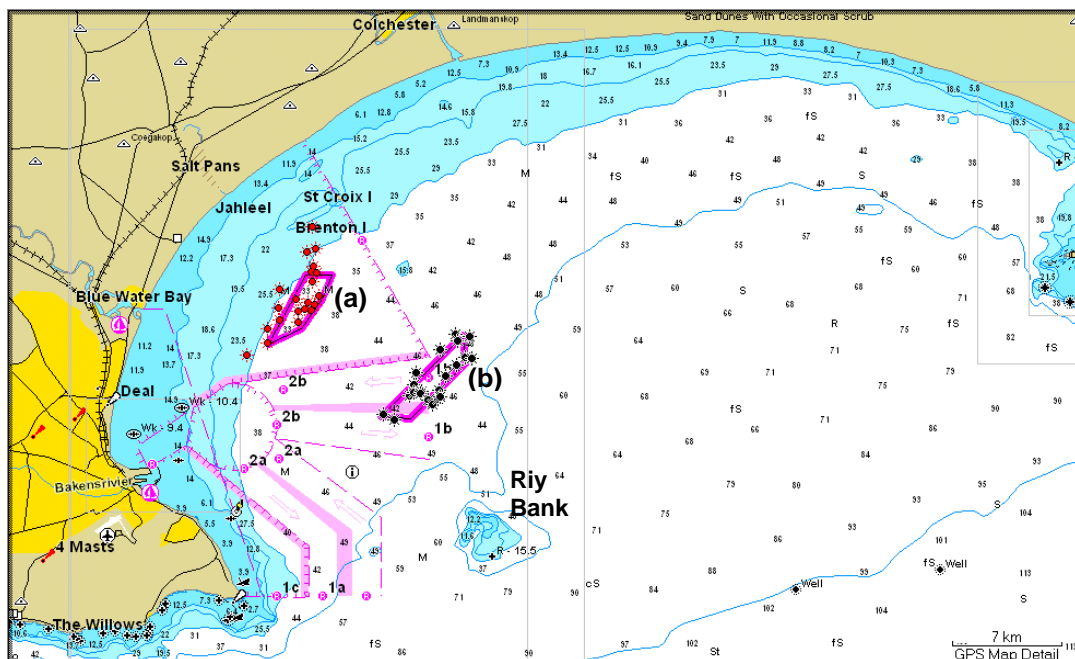


Figure 2.5: Chartlet of Algoa Bay showing the respective locations of dredge spoil dump sites (a) and (b), the benthos sampling locations included in the specialist study completed by CES 2001(b).

CES (2001(b)) advanced the following reasons for employing site (a) as a repository for dredge spoil:

1. Benthic macrofaunal abundance and biomass were lower on site (a) compared to site (b). The mean macrofaunal abundance on the deeper site (b) was 254 individual specimens/standard grab compared to 26 per grab on site (a). A large proportion of this marked difference was due to the high numbers of crustacean amphipods at the deeper site (ANOVA;  $p < 0.001$ )
2. The mean number of benthic macrofaunal taxa recorded at site (b) was significantly greater than that at the shallower site (a) (7.94 vs 4.65, ANOVA;  $p < 0.001$ )
3. The higher abundance and greater range of taxa imply that the benthos community at site (b) may be ecologically more important than that at site (a) in the subtidal marine food chain. Disruption of site (b) could therefore have greater implications for important benthic predators such as various marine fish species and squid than disruption of site (a)
4. Longer traveling distances to site (b) carried higher risks of collisions with whales
5. Given that the northern side of site (a) could be excluded from dumping there was no apparent environmental advantage in using the deeper site (b), and
6. Consequently there was no justification for the project proponents to accept the higher costs and longer dredging durations connected with choosing site (b) as the dredge spoil disposal site.

This choice was ratified in the ROD issued by DEAT in May 2002 for the dredging and construction of the port.

The above reasons still stand and those based on abundance and taxonomic richness would have been reinforced by the fact that site (a) has now been considerably altered by the dredge spoil dumped on it. Inundation depths from this were large (mostly  $>1\text{m}$  of sediment) and therefore the fauna that was on the site would have been mostly obliterated. The area is probably undergoing some level of recolonization by benthic fauna but the status of this is unknown. Research on recovery of dredge spoil deposition areas indicates that 'full' recovery may take many years although the recolonization process begins very soon after deposition (e.g. Newell *et al* 1998, The impact of dredging works in coastal waters: A review of the sensitivity to disturbance and subsequent recovery of biological resources on the sea bed. *Oceanography and Marine Biology: An Annual Review*, 36: 127-178). Therefore, differences between the sites are now probably larger.

Apart from the above, additional reasons for using site (a) for receiving the currently proposed dredging spoil are:

7. The dredge spoil volume is  $\sim 10\%$  of that already dumped on site (a). Adding the additional spoil should not markedly alter the 'new' topography of the site and it is probable that there are depressions in the site that can accommodate all of the new spoil.

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8. The target dredge material has similar properties to that already dumped on site (a). Consequently, although probably extending the recovery time scales, the recovery trajectory should not be significantly affected.
9. Current 'best practice' in marine dredging and dredge spoil disposal indicates that sites already compromised by dredge spoil or other contaminants are more preferable as dredge spoil repositories than are un-impacted virgin sites (Best Practice in Environmental Management: Guidelines for Dredging. EPA, Victoria, Australia. Publication 691. ISBN 0730675785. 2001).
10. Neither of the two sites is below the storm wave base of the region and therefore dumped sediment will be episodically resuspended and redistributed around the dump site, whichever one is used. Given the biological status of the seafloor at site (a) this would seem not to be as important an effect there as at site (b). To avoid this effect would require spoil dumping in excess of 60m (generalized from sediment property measurements off Cape Town, CSIR, in prep). This would require a dump site ~30km offshore and long sailing periods. Other factors such as incursions into outer Algoa Bay by the Agulhas Current would probably act to move dumped sediment around at this depth anyway.
11. Site (b) lies relatively close to Riy Bank, a major rocky feature in western Algoa Bay (Figure 2.6) and turbidity effects associated with dredge spoil dumping may negatively affect this system.
12. Site (b) lies across the northern arm of the Vessel Tracking System (VTS) for the Port of Port Elizabeth (Figure 2.6) and shipping traffic here would be higher than at site (a). There are therefore serious shipping safety concerns associated with using site (b).

For the reasons given by CES (2001(b)) and the additional arguments introduced above, there appear to be no cogent reasons for site (a) not being the preferred repository of the dredge spoil that will need to be disposed of in the proposed dredging should the marine disposal option be adopted. It is therefore this site that is assessed for dredge spoil disposal impacts.

The specialist study on marine ecology conducted for this EIA (Carter, 2006 – Chapter 6 of this Draft Scoping Report) has therefore assessed the possible environmental impacts of dredge spoil disposal at the offshore site used in the previous large-scale dredging programme for the overall port construction.

The **coordinates of this offshore disposal site** (in Spheriod WGS 84 Projection) are given below (R. Sonntag, PRDW, email 10-07-2006):

|                |                  |
|----------------|------------------|
| X = 69170.0000 | Y = 3746625.0000 |
| X = 70850.0000 | Y = 3746625.0000 |
| X = 70220.0000 | Y = 3748150.0000 |
| X = 68900.0000 | Y = 3750000.0000 |
| X = 66730.0000 | Y = 3751000.0000 |

The location of the offshore dredge disposal site used previously and being considered in this EIA, is shown in Figure 2.6.

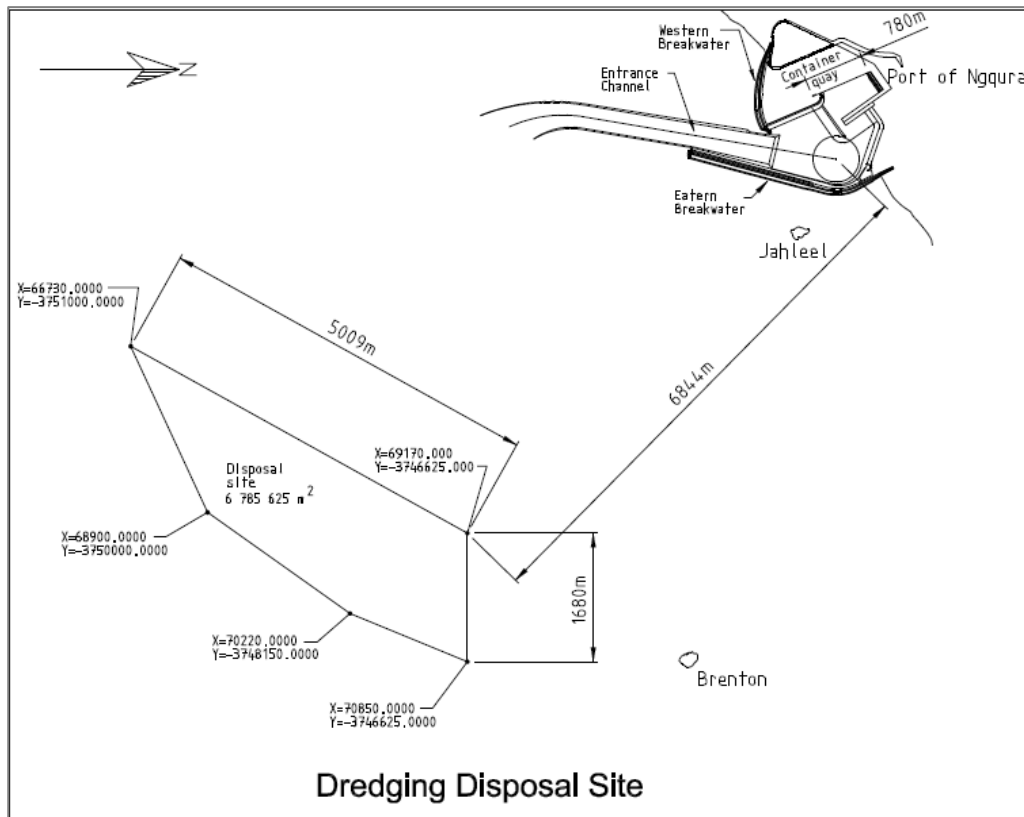


Figure 2.6: Location of offshore dredge disposal used in Phase 1 of the port construction and proposed for use in Phase 2, relative to the Port of Ngqura

#### 2.2.4 Concluding statement on disposal site alternatives

In light of the above, the specialist study investigations and the overall environmental assessment carried out for this study has focused on impacts associated with disposal of dredge spoil at the off-shore site. Due to the screening out of the land based option and site (b) it is therefore recognized that site (a) is the only reasonable and feasible alternative in terms spoil disposal. Additionally, the sourcing of armour rock from available stock piles and thereafter sourcing the remainder commercially, is once again seen as a feasible alternative for sourcing the key raw material required for the proposed construction activities.