Annex B

Engineering & Planning
Information Requirements
TO: Zoë Day  
FROM: Ellen Campbell

cc: Ken Russell KR HMG JV  
Alan Wijnberg AW PRDW  
Justin Cross JC PRDW  
Kenneth Pederson KP PRDW  
Thys Strydom TS HMG JV  
Nic Strydom NS Transnet Port Terminals  
John Scott JS HMG JV  
Max Clark MC HMG JV  
Bunny Reid EC HMG JV  
Conrad Stark CS HMG JV

Transnet Capital Projects  
Saldanha Port Berthing Alternatives

Engineering & Planning Information Requirements

1. **Berthing Option 1 (Location 1)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of Berth e.g. anticipated Geotechnical conditions (please describe:- to include but is not limited to anticipated sediment size distribution, anticipated level of contamination, need for blasting etc)</td>
<td></td>
</tr>
<tr>
<td>Due to a lack of boreholes in location 1, 3 and 4, it can only be assumed that stratigraphy is similar to location 2, which has been investigated thoroughly.</td>
<td></td>
</tr>
<tr>
<td>Refer to Berthing Option 2 (Location 2) for description of geology for Location 2.</td>
<td></td>
</tr>
<tr>
<td>If the relative amount of rock to be dredged differs from the amount of rock in location 2, dredging duration and costs will not be correctly represented. The biggest uncertainty is the presence of the Cape Granite which appears in pinnacle shapes and needs to be blasted prior to dredging.</td>
<td></td>
</tr>
<tr>
<td>Size of Berth</td>
<td></td>
</tr>
<tr>
<td>L = 380m (for each of the two berths)</td>
<td></td>
</tr>
<tr>
<td>W = 360m (quay face to dredge limit)</td>
<td></td>
</tr>
<tr>
<td>Depth of Berth</td>
<td>-21m CD</td>
</tr>
<tr>
<td>Dredge Volume</td>
<td>Total = 4.1 Mi m³</td>
</tr>
<tr>
<td>1 Berth = 2.9 Mi m³</td>
<td></td>
</tr>
<tr>
<td>Dredge Area</td>
<td>830 000m² (inclusive connection to existing channel)</td>
</tr>
<tr>
<td>Reclamation Volume</td>
<td>Total = 4.9 Mi m³ (inclusive bulking of dredged material).</td>
</tr>
<tr>
<td>1 Berth = 3.5 Mi m³</td>
<td></td>
</tr>
<tr>
<td>Reclamation Area</td>
<td>392,000m²</td>
</tr>
<tr>
<td>Anticipated Duration of Dredging activities</td>
<td>Total = 24 weeks</td>
</tr>
<tr>
<td>1 Berth = 18 weeks (based on assumption that similar type of material is to be dredged with comparable amount of rock with the same UCS strength as in Location 2)</td>
<td></td>
</tr>
<tr>
<td>Increased turning width to -14m</td>
<td>Yes</td>
</tr>
</tbody>
</table>

If you disagree with any information contained herein, please advise immediately.
<table>
<thead>
<tr>
<th>CD (Y/N)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Blasting Requirements</td>
<td>Volume</td>
<td>51,250m³ (inclusive of bulking of the rock the figure increases to 144,600m³)</td>
</tr>
<tr>
<td>Estimated Direct Costs - Capital cost for construction (to include dredging, reclamation, drilling/blasting of rock, berth construction, construction facilities, conveyor costs, relocation of existing facilities)</td>
<td>Cost of Dredging &amp; Reclamation (inc. blasting &amp; removal of rock)</td>
<td>~ R 1.658 Billion</td>
</tr>
<tr>
<td></td>
<td>Cost of Berths</td>
<td>~ R 1.597 Billion</td>
</tr>
<tr>
<td></td>
<td>Cost of OPCS demolition &amp; rebuild</td>
<td>~ R 200 Million</td>
</tr>
<tr>
<td></td>
<td>Cost of conveyors</td>
<td>~ R 360 Million</td>
</tr>
<tr>
<td></td>
<td>Cost of Construction facilities</td>
<td>~ R 11 Million</td>
</tr>
<tr>
<td>Estimated In-direct Costs - (to include Consultants/Transnet’s fees, Contingency and escalation)</td>
<td>Consultant &amp; Transnet fees</td>
<td>~ R 314 Million</td>
</tr>
<tr>
<td></td>
<td>Contingency (30%¹ on Direct Costs &amp; Consultant/Transnet Fees)</td>
<td>~ R 1.242 Billion</td>
</tr>
<tr>
<td></td>
<td>Escalation</td>
<td>~ R 3.727 Billion</td>
</tr>
<tr>
<td>Total Estimated Cost (Direct &amp; In-direct) (+/- 20% accuracy) Revetment</td>
<td>~ R 9.111 Billion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Volume of Revetment</td>
<td>4.9M1 m³</td>
</tr>
<tr>
<td></td>
<td>Volume of Rock Required</td>
<td>285,500m³</td>
</tr>
<tr>
<td></td>
<td>No. of Trucks Required</td>
<td>40,000</td>
</tr>
<tr>
<td></td>
<td>Construction Duration</td>
<td>52 weeks</td>
</tr>
<tr>
<td>Full description of construction activities including dredging and reclamation activities – logistics of pumping/barging requirements etc. High level descriptions required for quay construction activities.</td>
<td><strong>Dredging and Reclamation:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All the dredged material will be disposed of in land reclamation areas located at an average distance of 2km away from the dredge area.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Except for the recent bay deposits, the different formations (Langebaan, Velddrif and Varswater) represent a quite complex stratigraphy with alternating layers of dense to very dense sand, silty sand, silt-sand and gravel, interlayered by very soft to very hard rock and cemented material (powder calcrite, limestone, calcrite and calcarenite).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dredging by means of trailer suction hopper dredger (TSHD) is not considered to be an option for this project because of its requirement to discharge overflow water during dredging, thereby causing fine material to be released during the loading cycle. A cutter suction dredger (CSD) is suitable for dredging mixtures of materials of variable strength and consistency and will be able to pump ashore all the classes of material that will be encountered. It is envisaged that a large</td>
</tr>
</tbody>
</table>

₁ Refer to Appendix C for further explanation.
CSD, with a high power on the cutter head, a good dredging productivity rate in rocks of strength between 30 and 50 MPa, with occasional patches of up to 80 MPa, will be required to successfully carry out this scope of work.

**Reclamation Revetment:**

This contract involves the construction of a rockfill revetment to create a new land reclamation area south of the existing Oyster Dam reclamation in the Port of Saldanha Bay.

The total length of the reclamation bund is approximately 1300 m, with a bottom level, along the centre line of the bund, of approximately -9m CD. The crest level will be +5.5m CD.

The reclamation bund has been designed as a breakwater construction (i.e. a free standing trapezoidal rock rubble mound) and will be placed prior to the dredging and reclamation works (to be conducted under a separate contract). The core of the bund will be constructed with rock in the size range of 10-60 kg. The seaward side and the crest of the core bund will be protected by armour rock in the size range of 1-4 tonne. The landward side of the bund will be covered by a geotextile.

The new reclamation area will be filled with material dredged from the Phase 2 iron ore berth approach channel as part of the dredging and reclamation scope of works.

**Brief description of design of berth sub and superstructure**

Each berth will have a berth depth of -21m Chart Datum (CD), capable of handling Cape size bulk carriers of up to 320m length overall (LoA), corresponding to approximately 220 000 DWT.

The scope of work to be carried out as part of this Contract is as follows:

- Construction of piled quay structure with a steel and concrete superstructure, including vehicle and pedestrian access structures, facilities for ship personnel gangway access and quayside services.
- Construction of landside crane rail support structure
- Construction of rock revetment to quay wall reclamation face
- Earthworks behind rock revetment
- Scour protection at toe of rock revetment.
- Supply and installation of crane rails
- Supply and installation of berthing fender system
- Supply, installation, testing and commissioning of:
  - Quick release mooring hooks
<table>
<thead>
<tr>
<th><strong>Remote release system</strong></th>
<th><strong>Mooring load monitoring system</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vessel docking aid system</strong></td>
<td><strong>Integrated central monitoring system</strong></td>
</tr>
</tbody>
</table>

**Length of Conveyer**
- See drg H500107-2-M-LA-0014
- Conv. Cv-414 & Cv-514 = 1620 meters each (3240 meters total)
- Conv. Cv-128 & Cv129 = 96 meters each (192 meters total)
- Conv. Cv-130 & Cv-530 = 873 meters each (1746 meters total)

**Cost of Conveyer per Metre**
- ~ R 70,000 per metre

**No. of Transfer Points**
- See drg H500107-2-LA-0014
- 10 Transfer Points for berth 3 & 4 (including ship loaders)
- This will be a dedicated feed system for berth 3 & 4 with ship loaders
- The main transfer point needs to be updated to allow for a full flexible flow from all feeds
- The ex(new) sampler cutter bldg needs to be updated to accommodate the 4 dedicated feed streams

**No. of Ship Loaders**
- Phase 2A 1 new
- Phase 2B 1 new

**Disruption of Current Operations during Construction? (Please describe:- to include but is not limited to anticipated costs of disruption during construction)**

- Interruption of cv's 114 and 214, but only after the construction of cv314 this causing limited operational impact

**Port and Regional Planning Principles (Please describe:- Port development drivers and objectives (including the need to expand the MPT), predicted commodity types and volumes for the Western Cape region & Saldanha (including where this demand forecast comes from), integration of Port development Framework with regional and local development frameworks/plans, opportunities and constraints)**

- See report no. 1026/01/01 Rev 02 – Port Zoning and Operational Opportunities and Constraints.

**Operational Opportunities & Constraints of this Berth Location? (Please describe:- to include but is not limited to considerations of potential connectability with existing port infrastructure, maintenance costs etc)**

- See report no. 1026/01/01 Rev 02 – Port Zoning and Operational Opportunities and Constraints.

**Employment (estimate)**

- Local (i.e. Saldanha): 50-70% of an estimated peak workforce of 500
- Other: % remainder from outside of the area should specialist skills not be found locally
2. **Berthing Option 2 (Location 2)**

<table>
<thead>
<tr>
<th>Location of Berth e.g. anticipated Geotechnical conditions (please describe:- to include but is not limited to anticipated sediment size distribution, anticipated level of contamination, need for blasting etc)</th>
</tr>
</thead>
</table>

The geology underlying the area indicated as Location 2 is composed of a thin upper unit of unconsolidated recent bay deposits, underlain by the Aeolian sediments of the Langebaan Formation, which is in turn underlain by the shallow marine sediments of the Velddrif and Varswater formation. The base of the sedimentary succession is made up of the fluvial sediments of the Elandsfontein Formation, which rest unconformably on granites of the Cape Granite Suite. It can be concluded that except for the recent bay deposits, the different formations (Langebaan, Velddrif and Varswater) represent a quite complex stratigraphy with alternating layers of dense to very dense sand, silty sand, silt-sand and gravel, interlayered by very soft to patches of very hard rock and cemented material (powder calcite, limestone, calcite and calcarenite). The recent bay deposits can be defined as loose to dense, silty, very fine to medium grained sands, which are easy to dredge.

Most of the sand, silty sand and gravel material encountered in the different boreholes are identified as dense to very dense, with SPT-N values higher than 30. The unconfined compressive strength (UCS) of some of the rock material encountered in the boreholes in the area to be dredged was determined in the field using a point load test apparatus. Rock strength varies between 10 and 50MPa with patches up to 80MPa.

A total volume of approximately 90 000m$^3$ of Cape Granite needs to be blasted and dredged for location 2.

<table>
<thead>
<tr>
<th>Size of Berth</th>
<th>L = 380m (for each of the two berths)</th>
<th>W = 360m (quay face to dredge limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Berth</td>
<td>-21m CD</td>
<td></td>
</tr>
<tr>
<td>Dredge Volume</td>
<td>6.25 Mi m$^3$</td>
<td></td>
</tr>
<tr>
<td>Dredge Area</td>
<td>650 000m$^2$ (inclusive connection to existing channel)</td>
<td></td>
</tr>
<tr>
<td>Reclamation Volume</td>
<td>7.2 Mi m$^3$ (inclusive bulking of dredged material). Total capacity of reclamation area (Reclamation Dam + New Reclamation Area West) used</td>
<td></td>
</tr>
<tr>
<td>Reclamation Area</td>
<td>550,000m$^2$</td>
<td></td>
</tr>
<tr>
<td>Anticipated Duration of Dredging activities</td>
<td>Total = 40 weeks</td>
<td>1 Berth = 26 weeks</td>
</tr>
<tr>
<td>Increased turning width to -14m CD (Y/N)</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Blasting Requirements</td>
<td>Volume</td>
<td>90,000m$^3$ (inclusive of bulking of the rock the figure increases to 144,600m$^3$)</td>
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<td>Estimated Direct Costs - Capital cost for construction (to include dredging, reclamation, drilling/blasting of rock, berth construction, construction facilities, conveyor costs, relocation of existing facilities)</td>
<td>Cost of Dredging &amp; Reclamation (inc. blasting &amp; removal of rock)</td>
<td>~ R 1.935 Billion</td>
</tr>
<tr>
<td></td>
<td>Cost of Berths</td>
<td>~ R 1.597 Billion</td>
</tr>
<tr>
<td></td>
<td>Cost of OPCSIA demolition and rebuild</td>
<td>R 0</td>
</tr>
<tr>
<td></td>
<td>Cost of conveyors</td>
<td>~ R 496 Million</td>
</tr>
<tr>
<td></td>
<td>Cost of Construction facilities</td>
<td>~ R 11 Million</td>
</tr>
</tbody>
</table>

**Cost of Dredging**

- **Volume**: 90,000m$^3$ (inclusive of bulking of the rock, the figure increases to 144,600m$^3$)
- **Estimated Total Direct Costs (Capital Costs)**: ~ R 4.040 Billion
Consultant &
Transnet fees  ~ R 281 Million

Contingency
(15%² on Direct
Costs &
Consultant/
Transnet Fees)  ~ R 648 Million

Escalation  ~ R 3.889 Billion

Estimated Total
In-Direct Costs -
~ R 4.819 Billion

~ R 8.859 Billion

Volume of Revetment  7.2Mi m³

Volume of Rock
Required  329,000m³

No. of Trucks Required  46,000

Construction Duration  60 weeks

Revetment

Volume of Revetment  7.2Mi m³

Volume of Rock
Required  329,000m³

No. of Trucks Required  46,000

Construction Duration  60 weeks

Dredging and Reclamation:

All the dredged material will be disposed of in land
reclamation areas located at an average distance of 2km
away from the dredge area.

Except for the recent bay deposits, the different formations
(Langebaan, Velddrif and Varswater) represent a quite
complex stratigraphy with alternating layers of dense to very
dense sand, silty sand, silt-sand and gravel, interlayered by
very soft to very hard rock and cemented material (powder
calcrite, limestone, calcrite and calcarenite).

Dredging by means of trailer suction hopper dredger (TSHD)
is not considered to be an option for this project because of
its requirement to discharge overflow water during dredging,
thereby causing fine material to be released during the
loading cycle. A cutter suction dredger (CSD) is suitable for
dredging mixtures of materials of variable strength and
consistency and will be able to pump ashore all the classes of
material that will be encountered. It is envisaged that a large
CSD, with a high power on the cutter head, a good dredging
productivity rate in rocks of strength between 30 and 50
MPa, with occasional patches of up to 80 MPa, will be
required to successfully carry out this scope of work.

Reclamation Revetment:

This contract involves the construction of a rockfill revetment
to create a new land reclamation area south of the existing
Oyster Dam reclamation in the Port of Saldanha Bay.

The total length of the reclamation bund is approximately

² Refer to Appendix C for further explanation.
1500 m, with a bottom level, along the centre line of the bund, of approximately -9m CD. The crest level will be +5.5m CD.

The reclamation bund has been designed as a breakwater construction (i.e. a free standing trapezoidal rock rubble mound) and will be placed prior to the dredging and reclamation works (to be conducted under a separate contract). The core of the bund will be constructed with rock in the size range of 10-60 kg. The seaward side and the crest of the core bund will be protected by armour rock in the size range of 1-4 tonne. The landward side of the bund will be covered by a geotextile.

The new reclamation area will be filled with material dredged from the Phase 2 iron ore berth approach channel as part of the dredging and reclamation scope of works.

<table>
<thead>
<tr>
<th>Brief description of design of berth sub and superstructure</th>
<th>Each berth will have a berth depth of -21m Chart Datum (CD), capable of handling Cape size bulk carriers of up to 320m length overall (LoA), corresponding to approximately 220 000 DWT.</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td></td>
<td>• Construction of piled quay structure with a steel and concrete superstructure, including vehicle and pedestrian access structures, facilities for ship personnel gangway access and quayside services.</td>
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<td></td>
<td>• Construction of landside crane rail support structure</td>
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<td>• Construction of rock revetment to quay wall reclamation face</td>
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<td></td>
<td>• Earthworks behind rock revetment</td>
</tr>
<tr>
<td></td>
<td>• Scour protection at toe of rock revetment.</td>
</tr>
<tr>
<td></td>
<td>• Supply and installation of crane rails</td>
</tr>
<tr>
<td></td>
<td>• Supply and installation of berthing fender system</td>
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<td>o Remote release system</td>
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<td>o Mooring load monitoring system</td>
</tr>
<tr>
<td></td>
<td>o Vessel docking aid system</td>
</tr>
<tr>
<td></td>
<td>o Integrated central monitoring system</td>
</tr>
</tbody>
</table>
| No. of Transfer Points | See drg H500107-2-000-M-LA-0017  
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10 Transfer points for berth 3&amp;4 (including ship loaders)</td>
</tr>
</tbody>
</table>
| No. of Ship Loaders    | Phase 2A 1 new  
|                        | Phase 2B 1 new |
| Disruption of Current Operations during Construction? (Please describe:- to include but is not limited to anticipated costs of disruption during construction) |
|                        | Interruption of cv's 114 and 214, but only after the construction of cv314 this causing limited operational impact |
| Port and Regional Planning Principles (Please describe:- Port development drivers and objectives (including the need to expand the MPT), predicted commodity types and volumes for the Western Cape region & Saldanha (including where this demand forecast comes from), integration of Port development Framework with regional and local development frameworks/plans, opportunities and constraints) |
|                        | See report no. 1026/01/01 Rev 02 – Port Zoning and Operational Opportunities and Constraints. |
| Operational Opportunities & Constraints of this Berth Location? (Please describe:- to include but is not limited to considerations of potential connectability with existing port infrastructure, maintenance costs etc) |
|                        | See report no. 1026/01/01 Rev 02 – Port Zoning and Operational Opportunities and Constraints. |
| Employment (estimate)  | Local (i.e. Saldanha): 50-70% of an estimated peak workforce of 500  
|                        | Other: % remainder from outside of the area should specialist skills not be found locally |
3. **Berthing Option 3 (Location 3)**

<table>
<thead>
<tr>
<th>Location of Berth e.g. anticipated Geotechnical conditions (please describe:- to include but is not limited to anticipated sediment size distribution, anticipated level of contamination, need for blasting etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to a lack of boreholes in location 1, 3 and 4, it can only be assumed that stratigraphy is similar to location 2, which has been investigated thoroughly.</td>
</tr>
</tbody>
</table>

Refer to Berthing Option 2 (Location 2) for description of geology for Location 2.

If the relative amount of rock to be dredged differs from the amount of rock in location 2, dredging duration and costs will not be correctly represented. The biggest uncertainty is the presence of the Cape Granite which appears in pinnacle shapes and needs to be blasted prior to dredging.

<table>
<thead>
<tr>
<th>Size of Berth</th>
<th>L = 380m (for each of the two berths)</th>
<th>W = 360m (quay face to dredge limit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of Berth</td>
<td>-21m CD</td>
<td></td>
</tr>
<tr>
<td>Dredge Volume</td>
<td>Total = 7.7 Mi m³</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Berth = 6.24 Mi m³</td>
<td></td>
</tr>
<tr>
<td>Dredge Area</td>
<td>980 000m² (inclusive access channel 270m wide, 1000m long)</td>
<td></td>
</tr>
<tr>
<td>Reclamation Volume</td>
<td>Total = 9.24 Mi m³ (inclusive bulking of dredged material).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Berth = 7.49 Mi m³</td>
<td></td>
</tr>
<tr>
<td>Reclamation Area</td>
<td>890,000m²</td>
<td></td>
</tr>
<tr>
<td>Anticipated Duration of Dredging activities</td>
<td>Total = 46 weeks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 Berth = 37 weeks (based on assumption that similar type of material is to be dredged with comparable amount of rock with the same UCS strength as in Location 2)</td>
<td></td>
</tr>
<tr>
<td>Increased turning width to -14m CD (Y/N)</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Estimated Direct Costs - Capital cost for construction (to include dredging, reclamation, drilling/blasting of rock, berth construction, construction facilities, conveyor costs, relocation of existing facilities)</td>
<td>Volume</td>
<td></td>
</tr>
<tr>
<td></td>
<td>136,000m³ (inclusive of bulking of the rock the figure increases to 218,500m³)</td>
<td></td>
</tr>
<tr>
<td>Cost of Dredging &amp; Reclamation (inc. blasting &amp; removal of rock)</td>
<td>~ R 2.175 Billion</td>
<td></td>
</tr>
<tr>
<td>Cost of Berths (incl. Relocation of MPT)</td>
<td>~ R 3.284 Billion</td>
<td></td>
</tr>
<tr>
<td>Cost of OPCSIA demolition and rebuild</td>
<td>R 0</td>
<td></td>
</tr>
<tr>
<td>Cost of conveyors</td>
<td>~ R 386 Million</td>
<td></td>
</tr>
<tr>
<td>Cost of Construction facilities</td>
<td>~ R 11 Million</td>
<td></td>
</tr>
<tr>
<td>Estimated In-direct Costs - (to include Consultants/Transnet’s fees, Contingency and escalation)</td>
<td>Consultant &amp; Transnet fees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>~ R 413 Million</td>
<td></td>
</tr>
<tr>
<td>Contingency (30% on Direct Costs &amp; Consultant/</td>
<td>~ R 1.873 Billion</td>
<td></td>
</tr>
<tr>
<td>Estimated Total Direct Costs - (Capital Costs)</td>
<td>~ R 5.857 Billion</td>
<td></td>
</tr>
<tr>
<td>Estimated Total In-Direct Costs</td>
<td>~ R 8.277 Billion</td>
<td></td>
</tr>
</tbody>
</table>

3 Refer to Appendix C for further explanation.
Transnet Fees)

| Escalation | ~ R 5.990 Billion |

Total Estimated Cost (Direct & In-direct) (+/- 20% accuracy) ~ R 13.671 Billion

**Revetment**

| Volume of Revetment | 9.24Mi m³ |
| Volume of Rock Required | 483,000m³ |
| No. of Trucks Required | 67,000 |
| Construction Duration | 87 weeks |

**Full description of construction activities including dredging and reclamation activities – logistics of pumping/barging requirements etc. High level descriptions required for quay construction activities.**

**Dredging and Reclamation:**

All the dredged material will be disposed of in land reclamation areas located at an average distance of 2km away from the dredge area.

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Dredging by means of trailer suction hopper dredger (TSHD) is not considered to be an option for this project because of its requirement to discharge overflow water during dredging, thereby causing fine material to be released during the loading cycle. A cutter suction dredger (CSD) is suitable for dredging mixtures of materials of variable strength and consistency and will be able to pump ashore all the classes of material that will be encountered. It is envisaged that a large CSD, with a high power on the cutter head, a good dredging productivity rate in rocks of strength between 30 and 50 MPa, with occasional patches of up to 80 MPa, will be required to successfully carry out this scope of work.

**Reclamation Revetment:**

This contract involves the construction of a rockfill revetment to create a new land reclamation area south of the existing Oyster Dam reclamation in the Port of Saldanha Bay.

The total length of the reclamation bund is approximately 2200 m, with a bottom level, along the centre line of the bund, of approximately -9m CD. The crest level will be +5.5m CD.

The reclamation bund has been designed as a breakwater construction (i.e. a free standing trapezoidal rock rubble mound) and will be placed prior to the dredging and
reclamation works (to be conducted under a separate contract). The core of the bund will be constructed with rock in the size range of 10-60 kg. The seaward side and the crest of the core bund will be protected by armour rock in the size range of 1-4 tonne. The landward side of the bund will be covered by a geotextile.

The new reclamation area will be filled with material dredged from the Phase 2 iron ore berth approach channel as part of the dredging and reclamation scope of works.

Brief description of design of berth sub and superstructure

Each berth will have a berth depth of -21m Chart Datum (CD), capable of handling Cape size bulk carriers of up to 320m length overall (LoA), corresponding to approximately 220 000 DWT.

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  - Remote release system.
  - Mooring load monitoring system.
  - Vessel docking aid system.
  - Integrated central monitoring system.

Length of Conveyer

- See drg H500107-2-M-LA-0015
- Conv. Cv-414 = 1657 meters
- Conv. Cv-514= 1660 meters
- Conv. Cv-130 = 957 meters
- Conv. CV-230 = 967 meters
- Conv. Cv-128 & Cv- 129= 125 meters each (250 meters total)

Cost of Conveyer per Metre

~ R 70,000 per metre

No. of Transfer Points

- See drawing H500107-2-LA-0015
- 10 Transfer Points for berth 3&4 (including the ship loaders)
- This will be a dedicated feed system.
- For berth 3&4
- The main transfer point e needs to be update to allow for a full flexible flow from all feeds The ex(new) sampler cutter bldg needs to be updated to accommodate the 4 streams.

No. of Ship Loaders

- Phase 2A 1New
- Phase 2B 1New
<table>
<thead>
<tr>
<th>Disruption of Current Operations during Construction? (Please describe:- to include but is not limited to anticipated costs of disruption during construction)</th>
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| Employment (estimate) | Local (i.e. Saldanha): 50-70% of an estimated peak workforce of 500 | Other: % remainder from outside of the area should specialist skills not be found locally |
4. Berthing Option 4

<table>
<thead>
<tr>
<th>Location of Berth e.g. anticipated Geotechnical conditions (please describe:- to include but is not limited to anticipated sediment size distribution, anticipated level of contamination, need for blasting etc)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to a lack of boreholes in location 1, 3 and 4, it can only be assumed that stratigraphy is similar to location 2, which has been investigated thoroughly.</td>
</tr>
<tr>
<td>Refer to Berthing Option 2 (Location 2) for description of geology for Location 2.</td>
</tr>
<tr>
<td>If the relative amount of rock to be dredged differs from the amount of rock in location 2, dredging duration and costs will not be correctly represented. The biggest uncertainty is the presence of the Cape Granite which appears in pinnacle shapes and needs to be blasted prior to dredging.</td>
</tr>
<tr>
<td>Size of Berth</td>
</tr>
<tr>
<td>Depth of Berth</td>
</tr>
<tr>
<td>Dredge Volume</td>
</tr>
<tr>
<td>1 Berth = 9.7 Mi m³</td>
</tr>
<tr>
<td>Dredge Area</td>
</tr>
<tr>
<td>Reclamation Volume</td>
</tr>
<tr>
<td>1 Berth = 11.85 Mi m³ (inclusive bulking of dredged material)</td>
</tr>
<tr>
<td>Reclamation Area</td>
</tr>
<tr>
<td>Anticipated Duration of Dredging activities</td>
</tr>
<tr>
<td>1 Berth = 57 weeks (based on assumption that similar type of material is to be dredged with comparable amount of rock with the same UCS strength as in Location 2)</td>
</tr>
<tr>
<td>Increased turning width to -14m CD (Y/N)</td>
</tr>
<tr>
<td>Blasting requirements Volume</td>
</tr>
<tr>
<td>Estimated Direct Costs - Capital cost for construction (to include dredging, reclamation, drilling/blasting of rock, berth construction, construction facilities, conveyor costs, relocation of existing facilities)</td>
</tr>
<tr>
<td>Cost of Berths (additional width required to bring berths in line with MPT)</td>
</tr>
<tr>
<td>Cost of OPCSA demolition and rebuild</td>
</tr>
<tr>
<td>Cost of conveyors</td>
</tr>
<tr>
<td>Cost of Construction facilities</td>
</tr>
<tr>
<td>Estimated In-direct Costs - (to include Consultants/Transnet's fees)</td>
</tr>
<tr>
<td>Estimated Total Direct Costs (Capital Costs)</td>
</tr>
<tr>
<td>Fees, Contingency and escalation</td>
</tr>
<tr>
<td>-------------------------------</td>
</tr>
<tr>
<td>Escalation</td>
</tr>
<tr>
<td>Total Estimated Cost (Direct &amp; In-direct) (+/- 20% accuracy)</td>
</tr>
<tr>
<td>Revetment</td>
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Full description of construction activities including dredging and reclamation activities – logistics of pumping/barging requirements etc. High level descriptions required for quay construction activities.

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\(^4\) Refer to Appendix C for further explanation.
The reclamation bund has been designed as a breakwater construction (i.e. a free standing trapezoidal rock rubble mound) and will be placed prior to the dredging and reclamation works (to be conducted under a separate contract). The core of the bund will be constructed with rock in the size range of 10-60 kg. The seaward side and the crest of the core bund will be protected by armour rock in the size range of 1-4 tonne. The landward side of the bund will be covered by a geotextile.

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**Length of Conveyer**

See drawing H500107-2-M-LA-0016
Conv. Cv-414 & Cv-514 = 740 meters each (1480 meters total)  
Conv. Cv-128 & Cv-129= 250 meters each (500 meters total)  
Conv. Cv-130 & Cv-230 = 930 meters each (1860 meters total)

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See drawing H500107-2-LA-0016
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Appendix A

Indicative Alternative Berth Locations
INDICATIVE ALTERNATIVE BERTH LOCATIONS
Appendix B
General Arrangement Drawings
Appendix C

Basis of Estimate Explanation
• Accuracy of Capital Cost Estimates

The cost estimate developed for location 2 has been produced as part of a multi-discipline prefeasibility study, concluded by Transnet in May 2008. A study of this nature, which is governed by Transnet’s capital project policies and procedures, returns an estimate accuracy level of up to ±20%.

• Cost Contingency Allocations

In the case of location 2 a cost contingency of 15% was assigned.

For locations 1, 3 and 4 the berth and shipside conveyor costs a layout design and basis of design was produced for each option and quantities estimated from these drawings.

Cost rates were extracted from the location 2 pre feasibility estimate against which average rates were calculated for the marine works and conveyors, being the main differences between the berth location options. It is typical that estimates of this nature attract contingency allocations of between 30% and 50%, in the case of these locations a cost contingency of 30% was assigned.

The increased contingency allocation is to make provision for the reduced level of engineering definition available for these options and the increased risks associated with the construction/operational interface for these options.

• Cost exclusions

Operational/maintenance costs and the associated uncertainties are not catered for in this study. Additional environmental costs (mitigation) required for all berth locations and the associated uncertainties are not catered for in this analysis to provide an even base for comparison.