

**EXECUTIVE SUMMARY: FINAL BASIC ASSESSMENT REPORT  
FOR THE PROPOSED REVERSE OSMOSIS PLANT, IRON ORE HANDLING FACILITY,  
PORT OF SALDANHA**

**DEAT REF NO: 12/12/20/958**

**May 2008**

*The Final Basic Assessment (BA) Report has been updated and modified based on comments received during the public comment period on the Draft Basic Assessment Report. Additional or modified text is indicated in the Final BA Report, and this executive summary as underlined and italicised text.*

## **1. BACKGROUND**

Transnet Limited ("Transnet"), a state-owned enterprise under the National Department of Public Enterprises, is responsible for ensuring that South Africa's transport industries operate to world-class standards. Transnet are legally required to suppress iron ore dust generated at the Iron Ore Handling Facility at the Port of Saldanha, in terms of the conditions of approval of the Phase 1B expansion of the facility. Spraying the ore with water at key dust generation points in the handling process is one of the most effective methods of reducing dust. Potable water, which is currently used for dust suppression at the Port, is a scarce resource along the west coast of the Western Cape Province, and Transnet thus proposes to establish a Reverse Osmosis (RO) desalination plant to produce additional water for dust suppression. The proposed RO plant would desalinate sea water in order to supplement the existing municipal water supply available to the Port.

In terms of the Environmental Impact Assessment (EIA) Regulations contained in Government Notices R.385, R.386 and R.387, under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), which came into force on 3 July 2006, a Basic Assessment process is required for the establishment of the proposed RO Plant, prior to a decision regarding the authorisation thereof being taken by the competent authority.

Transnet has appointed SRK Consulting (SRK) and PD Naidoo & Associates (Pty) Ltd (hereafter referred to as the PDNA/SRK Joint Venture) as the independent Environmental Assessment Practitioners (EAP) to undertake the Basic Assessment, as required in terms of NEMA.

## **2. APPROACH TO THE BASIC ASSESSMENT (BA)**

The EIA Regulations contained in GN R.386 list activities which require that a Basic Assessment (BA) process be followed prior to their commencement. The proponent must obtain authorisation for the proposed activity from the designated competent authority. As Transnet is a state-owned enterprise, the competent authority is the national Department of Environmental Affairs and Tourism (DEAT).

The proposed establishment of a RO Plant at the Iron Ore Handling Facility entails the following listed activities<sup>1</sup>:

- 2. *Construction of earthmoving activities in the sea or within 100m inland of the high water mark of the sea, in respect of: (d) embankments; (e) stabilizing walls; (f) buildings\* and (g) infrastructure.\**
- 3. *The prevention of the free movement of sand, including erosion and accretion, by means of planting vegetation, placing synthetic material on dunes and exposed sand surfaces within a distance of 100m inland of the high water mark of the sea.\**
- 5. *The removal or damaging of indigenous vegetation of more than 10m<sup>2</sup> within a distance of 100m inland of the high water mark of the sea.*
- 6. *The excavation, moving, removal, depositing or compacting of soil, sand, rock or rubble covering an area exceeding 10m<sup>2</sup> in the sea or within a distance of 100m inland of the high water mark of the sea.\**
- 12. *The transformation or removal of indigenous vegetation of 3 hectares or more or of any size where the transformation or removal would occur within a critically endangered or an endangered ecosystem listed in terms of section 52 of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004).*
- 25. *The expansion of or changes to existing facilities for any process or activity, which requires an amendment of an existing permit or license or a new permit or license in terms of legislation governing the release of emissions, pollution, effluent.\**

In addition to conducting a Basic Assessment, a Water Use Licence Application (WULA) will also be submitted in terms of Section 21 of the National Water Act (No. 36 of 1998) to the Department of Water Affairs and Forestry (DWAFF) for the proposed discharge of water which contains waste from an industrial process or which has been heated in any industrial process (21h water use). This triggers activity 25, listed above.

The NEMA EIA Regulations were promulgated to put into practice the environmental management principles espoused in the Act. The BA Report provides the competent authority with all relevant information about the proposed activity, as well

<sup>1</sup> This list of activities includes all activities associated with all of the alternatives. Activities marked with an \* are specific to the preferred alternative.

as an assessment of the potential impacts in order to inform the decision as to whether the activity should be approved and, if so, under what conditions. A typical BA process is depicted in Figure 1 below.

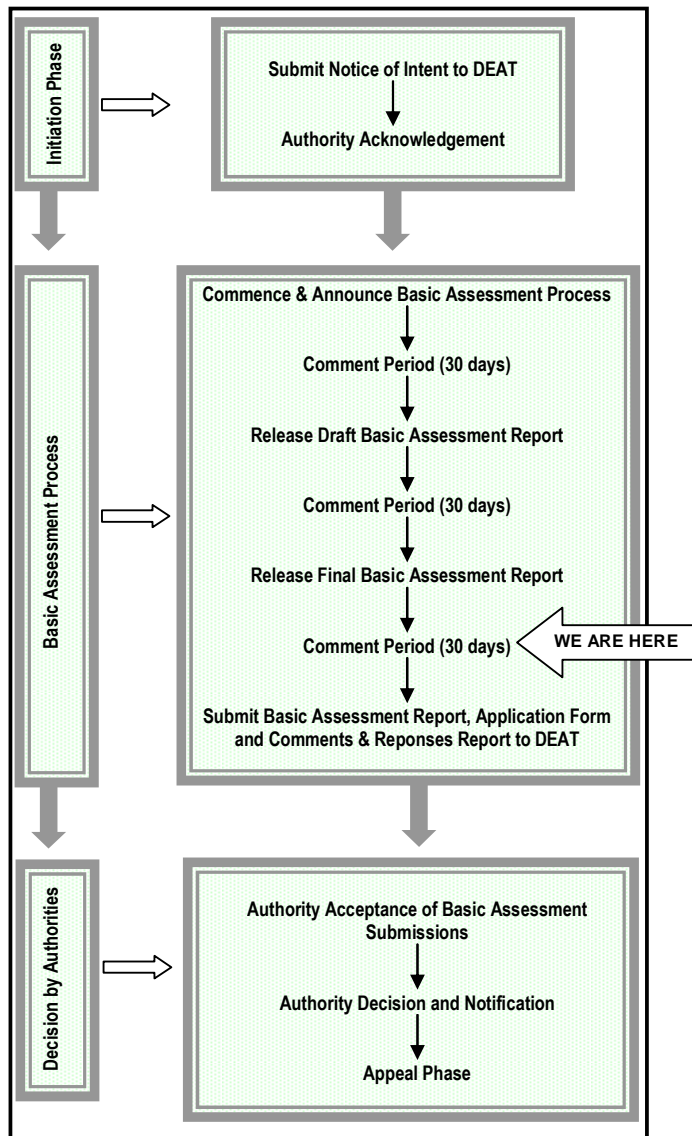


Figure 1: Basic Assessment Process

In May 2007 a *Notice of Intent to Apply* was submitted to DEAT as the first step in the Basic environmental Assessment process for the proposed RO Plant. The application was accepted by DEAT and the public participation process commenced in June, with all Interested & Affected Parties (I&APs) being notified of the proposal, including those on the I&AP database for the proposed Phase 2 upgrade to the Iron Ore Handling Facility.

The second step entails the assessment of the activity and the production of a BA Report for public comment. Issues and concerns raised by the public *informed the Draft BA Report, which was made available for public comment on 18 February 2008.* Additional public comments on the Draft BA Report have informed this Final BA Report which, together with the prescribed Comment and Responses Report, will be submitted to DEAT for a decision after the final 30 day comment period.

### 3. NEED AND DESIRABILITY

Transnet currently has authorisation to export up to 45 million tons per annum (mtpa) of iron ore from the Iron Ore Handling Facility, and studies are currently being undertaken for proposed upgrades to the facility which would allow for an increase in export capacity to 93 mtpa. In terms of the Record of Decision (RoD) for the Phase 1B expansion of the facility (which authorised the upgrade from 38 to 45 mtpa) all ore stockpiles (including new stockpiles) and transfer points in the bulk handling process of the iron ore must be sprayed with water in order to reduce dust generation.

*It is projected that 1200m<sup>3</sup>/day of potable water is required to meet the immediate dust suppression requirements* and a total of 3600m<sup>3</sup>/day potable water is required for future dust suppression needs at the Iron Ore Facility. The Iron Ore Handling Facility is situated within the West Coast District Municipality (WCDM) of the Western Cape which is a **water scarce area** and **municipal water allocations are limited and controlled**. Due to the increased water requirement, and the fact that fresh water is a scarce resource in South Africa (especially within the WCDM), Transnet have identified that an additional water source (other than the current municipal water supply) is required in order to fulfil the present and future dust mitigation requirements at the Iron Ore Handling Facility.

A number of alternatives to seawater have been considered, however desalinated seawater has been identified as the preferred, and most feasible, option. The use of desalinated sea water for dust suppression will also improve the **self-sustainability** of the Iron Ore Facility and will reduce the demand and reliance on the municipal supplies. In addition, desalinated sea water supply has the benefit of **not being affected by drought situations**, as is currently the case with the municipal water supply. Therefore, potable water supplied as a result of the RO Plant will be a **more continuous supply** and will improve dust suppression activities at the Iron Ore Facility, even during times of drought.

If the RO Plant is not approved, alternative water sources for dust control will need to be established. Transnet have identified possible alternatives including obtaining additional potable water from municipal supplies, reclaimed sewage and a number of other sources. However, due to the potential lack of available yields, environmental costs, and to ensure suitable water quality, these alternative water sources were not considered as feasible options.

### 4. PROJECT DESCRIPTION

The proposed activity is to generate potable water<sup>2</sup> to the same quality as the existing municipal supply at the Port of Saldanha using RO technology to desalinate seawater. RO involves forcing water through a semi-permeable membrane under high pressure, leaving the dissolved salts and other solutes behind on the surface of the membrane. The proposed RO desalination plant will consist of up to three RO modules, each capable of producing up to 1 200m<sup>3</sup>/day of potable water (3 modules with a total capacity of 3 600m<sup>3</sup>/day potable water). Approximately 4 400m<sup>3</sup>/day of brine would be produced as a

<sup>2</sup> *This requirement is to safeguard the quality of the exported iron ore and avoid potential contamination of the product by using industrial quality water.*

result of the RO process (at full capacity). It is proposed that brine would be discharged into the sea.

Additional waste water resulting from the cleaning of the RO plant infrastructure will be disposed of via the municipal sewer line (with approval from the municipality), or by a waste management contractor.

The RO Plant, as well as associated infrastructure, includes:

- A 200 kilo litre (kl) sea water buffer tank alongside the RO building,
- A 200kl potable water buffer tank alongside the RO building,
- Potable water storage reservoir(s) with a capacity of up to 5 Mega litres (ML),
- A brine basin (of up to 200m<sup>3</sup>) in which brine will be stored, prior to it being released back into the sea,
- Up to 3 Clean in Place (CIP) backwash tanks each with a capacity of 20m<sup>3</sup> to store the wastewater before being discharged into the municipal sewer line or removed by an appropriate waste management contractor,
- Interconnecting pipelines,
- A RO containment building with room for up to three RO modules, an electrical sub station, a motor control room, a pump house, a store room, office and ablution facilities, and space for parking area,
- Interconnecting infrastructure including electrical and communication wiring for the RO system,
- A small service road (approximately 3 m wide).

Chemicals used in the pre-treatment of seawater (i.e. Dual Media Filters) **will be** contained in and discharged along with the brine. These include:

- Flocculant (Ferric Chloride);
- Non-oxidising biocide; and
- Antiscalants.

The following substances used for the cleaning of the RO membranes, will be contained in waste water disposed of either via the municipal sewer system or at a suitable disposal site, and **will not be** contained in the brine discharged to the sea:

- Citric Acid;
- Ethylenediaminetetraacetic acid (EDTA);
- Sodium tripolyphosphate (STPP);
- Trisodium phosphate (TSP);
- Sodium lauryl sulphate (SLS);
- Calcium hydroxide/Sodium Hydroxide (Caustic soda);
- Hydrochloric acid (HCl);
- Ammonium hydroxide (NH<sub>4</sub>OH); and
- Sodium metabisulphite (SMBS).

## 5. ALTERNATIVES BEING CONSIDERED

Three site locations (within Transnet boundaries) for the positioning of the main RO Plant building, and a number of alternatives for intake of seawater and discharge of brine either via pipeline or beach wells were considered during the BA process (see Figure 2 below). These have been described below:

### Site 1

This site is located to the east of the Iron Ore Handling Facility, adjacent to the reclamation dam. Most of the area proposed for

the RO Plant building and the associated infrastructure is located in the primary dunes which is particularly sensitive from a floral and dune functioning perspective. There is high sand and dune mobility at this site due primarily to low plant cover. Part of the site was disturbed in the past, mainly by earthmoving activities and the construction of the reclamation dam. The vegetation at this site can be described as Langebaan Dune Strandveld which, although being previously disturbed, has recovered to a stable condition. The alternative intake and discharge infrastructure locations at this site include:

- a) Beach well intake and pipeline discharge (Big Bay) (1a);
- b) Pipeline intake and pipeline discharge (Big Bay) (1b);
- c) Beach well intake and beach well discharge (Big Bay) (1c).

### Site 2

This site is located north and northwest of the Iron Ore Handling Facility, and the small beach has been heavily impacted on by the construction of the quay and the activities at the facility. Stockpiles of gravel and construction rubble are evident at this site, and the site is separated from the main dune system to the north by a road and railway line. Only a few pioneer species are found at this site, and the functioning of the primary dune system has been lost as the area is cut off from the parabolic dune system to the north. The alternative intake and discharge infrastructure locations at this site include:

- a) Beach well intake and pipeline discharge (Small Bay) (2a);
- b) Pipeline intake and pipeline discharge (Small Bay) (2b).

### Site 3

This site is located on the southern section of the quay of the Iron Ore Handling Facility, on a gravel area adjacent to the Multi-Purpose Terminal. The beach area at this site is very small, compared to Sites 1 and 2. The "environment" at this site is entirely man-made and there are no indigenous species, or any vegetation found on the site. The alternative intake and discharge infrastructure locations at this site include:

- a) Pipeline intake (Small Bay) and pipeline discharge (Small Bay) (3a);
- b) Pipeline intake (Small Bay) and pipeline discharge (Big Bay) (3b);
- c) Borehole intake on the quay (stockpiles) and pipeline discharge (caisson 3, Big Bay) (3c);
- d) Borehole intake on the quay (Multi-Purpose Terminal) and pipeline discharge (caisson 3, Big Bay) (3d – **preferred alternative**);

At the onset of the BA process, Site 1 was considered the preferred site alternative. However, after consultation with various specialists Site 3 has evolved to be the preferred alternative. Therefore **Site 3 is the preferred site alternative** and the option of borehole intake on the quay (adjacent to the Multi-purpose Terminal) and a pipeline discharge (at caisson 3 into Big Bay) is the preferred layout option (3d).

### **Additional Alternatives Considered and Eliminated**

*A number of alternatives were considered prior to the start of the environmental assessment process - from the inception of the project planning process – and these alternatives helped to "develop" the preferred alternative. The alternatives considered include:*

- **Alternative methods of dust suppression, including enclosing the iron ore stockpiles in**

warehouses, storing the iron ore in silos/bins as well as using chemical surfactants to suppress dust;

- Alternative sources of water for dust suppression, including municipal potable water, reclaimed sewage, groundwater and seawater; and
- Alternative options for the disposal of the brine, including disposing the brine in evaporation ponds, piping the brine to Saltworks, and discharging the brine via an evaporator and crystalliser plant.

In addition to these alternatives a number of external site alternatives were investigated, as well as alternative pipeline discharge sites outside of the immediate Bay area.



Figure 2: Alternative Site Locations

## 6. PUBLIC PARTICIPATION PROCESS

A comprehensive public participation process aimed at allowing the public to participate meaningfully and to be involved at an early phase of the environmental process was followed. The public participation process included:

- Placement of newspaper advertisements in local and regional newspapers;
- Notifying all I&AP's registered on the proposed Phase 2 EIA database of the proposed development;
- Inviting all interested parties to formally register as I&AP's for the RO Plant Basic Assessment process;
- Distribution of a Background Information Document (BID) which provided information of the proposed RO Plant;
- Meetings with various government officials, including representatives from:
  - Department of Environmental Affairs and Tourism (DEAT),
  - Marine and Coastal Management (MCM),
  - Department of Water Affairs and Forestry (DWAF), and
  - West Coast District Municipality (WCDM);

- Distribution of an Update Newsletter;
- Release of a Draft Basic Assessment Report for public review and comment;
- Inviting all interested parties to attend a Public Open Day;
- Holding a focus group meeting with some key I&AP's.

A number of I&AP's including residents from Saldanha Bay and surrounds, and various government representatives submitted comments on the proposed RO Plant, and the Draft BA Report. The main issues that were identified during the 1<sup>st</sup> and 2<sup>nd</sup> round of public participation have been included in the assessment of impacts by a number of specialists and can be broadly summarised into the following categories:

- **Increased salinity in the bay due to brine discharge;**
- **Alternative dust suppression methods;**
- **Use of chemicals in the desalination process;**
- **Alternative uses or methods of disposal of brine;**
- **The ability of the Bay to handle additional "pollutants"**
- **Alternative Sites inside and outside the Port and**
- **Alternative Intake and Discharge points**

## 7. ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

A number of specialist studies were commissioned to assess the potential impacts identified by the environmental team and through the public participation process. These included:

- **Botanical Study** – assessment of the impact of the proposed RO Plant infrastructure on the sensitive dune system at site alternative 1 and the impact on the flora found at each of the site alternatives;
- **Marine Study** – assessment of the impact of sea water intake and brine discharge (4 400m<sup>3</sup>/day brine discharge with a salinity of 63.5 ppt) of each site, intake and discharge alternative on the marine environment. This included 3D hydrodynamic and water quality modelling of the impact of the brine discharge on the marine environment and evaluation of the impact of the proposed RO Plant and associated infrastructure on the beach areas and marine fauna and flora in these areas;
- **Groundwater Resources Study** – assessment of the impact of intake and discharge via beach wells on the groundwater of the area; and
- **Heritage Study** – assessment of the impact of the proposed RO Plant and associated infrastructure on any archaeological features of cultural/heritage importance.

Additional impacts, including noise and energy use were also identified and an assessment has been included in the BA Report. Relevant observations with regard to the overall **impact ratings**, assuming mitigation measures are effectively implemented for the **preferred alternative (3d)** are:

- The predicted *insignificant impact* on vegetation and flora associated with the construction of the RO Plant building and associated infrastructure;
- The predicted *insignificant impact* on groundwater resources;

- The predicted *insignificant impact* on heritage resources associated with the drilling of boreholes and installation of infrastructure;
- The predicted *very low impact* on marine species associated with the construction of the RO Plant building and associated infrastructure;
- The predicted *insignificant noise impact* associated with the operation of the RO Plant;
- The predicted *low impact* on salinity levels in the bay associated with the brine discharge;
- The predicted *low impact* on the marine environment associated with the temperature of the brine discharged;
- The predicted *insignificant visual impact* of the RO Plant;
- The predicted *very low impact* associated with oxygen-scavenging compounds which may be contained in the brine discharge<sup>3</sup>;
- The predicted *low impact* associated with the discharge of brine containing increased oxidising biocides (NaOCl);
- The predicted *very low impact* associated with the discharge of brine containing increased non-oxidising biocides (DBNPA);
- The predicted *insignificant impact* associated with the entrainment of biota;
- The predicted *very low impact* associated with co-discharged constituents (as a result of the use of certain chemicals in the pre-treatment or RO membrane cleaning process);
- The predicted *low impact* on natural flow distortion due to brine discharge; and
- The predicted *insignificant impact* on sediment dynamics in the bay due to brine discharge.

## 8. FINDINGS AND RECOMMENDATIONS

The key findings of the Final BA Report are as follows:

- Transnet Limited are proposing to construct, and install, an RO Plant (and associated infrastructure) at the Iron Ore Handling Facility, Port of Saldanha;
- Additional water supply is required to meet current dust suppression requirements at the Iron Ore Handling Facility;
- It is proposed that the RO Plant be located at the Iron Ore Handling Facility in Saldanha Bay, which is already a built environment;
- Water has been identified as the most viable and appropriate means of dust suppression at the Iron Ore Handling Facility;
- Desalinated sea water, using reverse osmosis has been identified as the most appropriate method of water supply, due to the required standard and quantity of water;
- **No visual impacts of significance** of the proposed RO Plant have been identified at any of the sites;
- **No heritage resources of significance** have been identified at any of the sites;
- **No groundwater impacts of significance** of the proposed intake or discharge for the RO Plant have been identified other than the discharge of brine via beach wells (1c) which makes this alternative non-viable;
- **Site 1** has been disturbed in the past by activities at the Iron Ore Handling Facility, but has recovered well and the

parabolic and primary dune system at this site alternative are of **ecological importance**;

- The flora and vegetation at Site 1 is considered rare and sensitive, and a permanent loss of dune habitat as well as the loss of a number of Red Data floral species is likely if the RO Plant is located at this site;
- The dune system and vegetation at Site 2 has been heavily impacted on by activities at the Iron Ore Handling Facility;
- There are **no indigenous flora or vegetation at Site 3**;
- **Plume footprints** (as modelled by the marine specialist) of **salinity, seawater temperature, biocide and potential co-discharge impacts do not extend as far as any existing or proposed mariculture activities, seawater intakes for fish processing factories, recreational and commercial gill-netting areas, or National Parks and Marine Protected areas at Site 1 and 3**;
- **At Site 2, however, the plume footprints** for salinity, seawater temperature, biocide and potential co-discharged constituents **extend close to the eastern boundary of the area demarcated for seaweed harvesting**; and
- **Site 3 with intake via boreholes on the quay (adjacent to the multi-purpose terminal) and discharge via pipeline at caisson 3 of the quay is considered the preferred alternative, and is considered to have acceptable impacts.**

It is believed that sufficient information is available for a decision regarding the proposed RO plant to be made. If DEAT approves the proposed RO Plant, a condition of approval should be that the recommendations and essential mitigation measures presented below are effectively implemented by Transnet.

### General Recommendations

- Commit to and effectively implement the essential mitigation measures listed in the Basic Assessment Report;
- Consider implementing the optional mitigation measures listed in this Basic Assessment Report; and
- Implement a Construction Phase Environmental Management Plan (CEMP) and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must detail (among others) the water quality monitoring programme.

### Essential mitigation measures (for the preferred alternative)

#### Noise

- House the RO Plant pressurization pumps and the entire plant in a separate building which should be sound proofed and have internal acoustic treatment (if the noise ratings from the equipment in the building exceed 85dBa) *within 1m from the source*.
- Limit internal noise to below 85dBa as measured at the entrance door to the structure.

#### Geohydrological:

- Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during borehole construction.
- Contain the silt-laden water from the boreholes (airlifted during cleaning and development) in the same "mud pits" used for mixing the drilling additive in and once the work is completed backfill and clean the site.

<sup>3</sup> The use of oxygen scavenging compounds and oxidising biocides are not part of the current project description but have, however, been included for completeness purposes.

#### **Marine:**

- Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
- Design pipeline discharge with an optimal diffuser.
- Develop a water quality monitoring programme to monitor the impact of the brine on potentially affected marine communities, and to monitor the brine for heavy metals. This monitoring programme must also include testing for toxicity at the discharge point as well as testing for tainting substances to ensure their absence from the effluent.

#### **General**

- Limit the use of chemicals in the RO process and in the cleaning process to those listed and assessed in the Basic Assessment. If any additional chemicals are proposed for use in the RO process and in the cleaning process DEAT, DEA&DP and DWAF must be informed of these immediately. Transnet must provide assurance that any additional chemicals will not be any more harmful than previous chemicals and the impacts of this must be monitored.
- Store all chemicals used in the RO process appropriately as prescribed in the Occupational Health and Safety Act, 85 of 1993 and obtain all relevant permits from the local authority prior to storage of the chemicals.
- Do not dispose of wastewater associated with the cleaning and backwashing of the RO plant via the municipal sewer system without written confirmation from the relevant authority who would need to be made aware of all the chemicals contained in the wastewater.

## **9. WAY FORWARD**

**The third and final round of public participation commences on the 22<sup>nd</sup> May and concludes on the 23<sup>rd</sup> June 2008.**

The Executive Summary of the Final Basic Assessment Report has been sent to all registered I&APs. Full copies of the Final BA Report are also available for viewing at the following venues:

- Saldanha Public Library;
- Diazville Public Library;
- Langebaan Public Library;
- The Blue Bay Lodge in Blouwaterbaai; and
- The offices of SRK Consulting, Rondebosch.

The Final Basic Assessment Report can also be accessed electronically on SRK's website [www.srk.co.za](http://www.srk.co.za) (via the 'public documents' link) or on Transnet's website [www.transnet.net](http://www.transnet.net) (click on *Business with us – Transnet Capital Projects – Environmental Public Documents*).

The availability of this document for public review has been advertised in the press, and all registered I&APs have been notified via e-mail, fax, or post.

Written comments on the Final BA Report should be submitted by **23 June 2008** to:

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Once I&APs have commented on the information presented in the Final BA Report, the document accompanied by a Comments and Responses Report will be submitted to DEAT for their decision regarding the proposed project. The public is therefore urged to submit comment, as comments will affect the decision taken by DEAT.