FINAL BASIC ENVIRONMENTAL ASSESSMENT
VOLUME 1
(DEAT APPLICATION NO 12/12/20/958)

for the proposed
REVERSE OSMOSIS DESALINATION PLANT,
AT THE TRANSNET IRON ORE HANDLING FACILITY, SALDANHA BAY,

WESTERN CAPE

DATE: May 2008
Transnet Contract No. H500107-CPS006

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Abbreviations

BA	Basic Assessment
BID	Background Information Document
CIP	Clean in Process
DEA&DP	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DMF	Dual Media Filters
DWAF	Department of Water Affairs and Forestry
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
HWM	High Water Mark
I&APs	Interested and Affected Parties
kl	Kilolitre
MCM	Marine & Coastal Management (DEAT)
Ml	Megalitre
MPA	Marine protected areas
mtpa	Million tons per annum
NEMA	National Environmental Management Act No. 107 of 1998
NID	Notice of Intent to Develop
PDNA/SRK JV	PD Naidoo & Associates (Pty) Ltd and SRK Consulting Joint Venture
psu	Practical salinity units (same as parts per thousand)
RO	Reverse Osmosis
RoD	Record of Decision
SAHRA	South African National Heritage Resources Agency
SOE	State-owned Enterprise
TNPA	Transnet National Ports Authority
TPT	Transnet Port Terminals
WCDM	West Coast District Municipality

Glossary

TERM	DESCRIPTION / EXPLANATION
Basic Assessment	Basic Assessment is the level of environmental assessment applied to activities listed in GN R.386 identified in terms of Sections 24 and 24D of NEMA. The process is informed by Section 22, 23, 24, 25 and 26 of the Regulations (GN R. 385) in terms of Chapter 5 of NEMA. The activities identified in GN R.386 are smaller scale activities: the impacts of these activities are generally known and can be easily managed.
Benthic	Organisms living in or on the sediments of aquatic habitats (lakes, rivers, ponds, etc).
Bioregion	A territory defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems.
Competent Authority	The competent authority is the environmental authority responsible for making an informed decision on environmental applications submitted for a proposed activity. The competent authority for this application is the DEAT.
Desalination	A chemical process of removing salt from water (in this case sea water).
Ecosystem	A community of plants, animals and organisms interacting with each other and with the non-living (physical and chemical) components of their environment.
Endemic	Having localised occurrence or distribution.
Environment	All of the biotic and abiotic factors that act on an organism, population, or ecological community and influence its survival and development.
Environmental Impact Assessment	A method of analysis which attempts to predict the likely repercussions of a proposed development on the social and physical environment of the surrounding area.
Environmental Management Plan	An action plan or system which addresses the how, when, who, where and what of integrating environmental mitigation and monitoring measures throughout an existing or proposed operation or activity.
Listed Activities	Activities identified by the Minister of Environmental Affairs and Tourism in terms of Section 24 and Section 24D of the NEMA which may have a detrimental effect on the environment and which may not be commenced without prior written authorisation from the competent authority. These activities are listed in the Schedules contained in Government Notice R386 and R387.
Mariculture	Cultivation of marine plants and animals in natural and artificial environments.

TERM	DESCRIPTION / EXPLANATION
Parabolic Dune System	Inland dunes generally in the shape of a hairpin, and with trailing arms running parallel to the wind direction. Generally stable and well-vegetated.
Permeate	The potable water produced as a result of the RO process.
Pigging	A system often employed on marine pipelines for regular maintenance cleaning, in which a “pig” (bullet-shaped device with bristles) is introduced into the pipeline to mechanically clean out the structure.
Potable water	Water that is safe to drink, free from pollution, harmful organisms and impurities.
Primary (embryo) dune	Unstable, mobile dunes usually found just above the high water mark of the sea.
Quay	A platform that runs along the edge of a port or harbour, where vessels are loaded and unloaded.
Reverse Osmosis (RO)	A method of producing pure water by forcing saline or impure water through a semi permeable membrane through which salts or impurities cannot pass.
Sustainable development	Development that meets the needs and aspirations of the current generation without compromising the ability to meet those of future generations.

Section 1: Project Description and Legal Requirements

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

1 Project Overview

1.1 Introduction

Transnet Limited ("Transnet") is a State-owned Enterprise under the National Department of Public Enterprises. As the holding company behind some of South Africa's largest national transport businesses, Transnet is responsible for ensuring that the country's transport industries operate to world-class standards and form an integral part of the overall economy.

Transnet are legally required to suppress iron ore dust generated at the Iron Ore Handling Facility in terms of the conditions of approval of the previous expansion of the facility (Phase 1B). Increased export volumes of iron ore, being the key component of terminal operations at the Iron Ore Handling Facility at the Port of Saldanha (refer to Locality Map in Appendix A), have resulted in the need for the identification of measures to suppress dust generated as a result of the storage and handling of the ore. 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 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 GN R 385, GN R 386 and GN R 387, which came into force on 3 July 2006 under the National Environmental Management Act No. 107, 1998 (NEMA), the proposed development of an RO Plant would be subject to a Basic Assessment process, prior to a decision regarding the authorisation thereof being taken by the competent authority. As Transnet is a state-owned enterprise, the *EIA Regulations prescribe that the* competent authority in this case would be the *(national)* Department of Environmental Affairs and Tourism (DEAT).

Transnet has jointly appointed SRK Consulting (SRK) and PD Naidoo & Associates (Pty) Ltd (hereby 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.

1.2 Purpose and Structure of the Basic Assessment Report

The NEMA EIA Regulations were promulgated to give effect to the environmental management principles espoused in the Act. The Basic Assessment (BA) Report provides the competent authority (in this case DEAT) with all relevant information about the proposed activity, as well as an assessment of the potential impacts in order to inform the decision as to whether the activity should be ***authorised*** and, if so, under what conditions.

This report comprises five sections, two of which – Sections 2 and 3 - are mandatory in terms of the legislative requirements for a BA. Remaining sections are intended to provide additional contextual information which would help the Interested and Affected Parties (I&APs) better understand the proposed development and anticipated impacts, and help the competent authority make an informed decision. Note, therefore, that the report is a collation of sections and not a sequential compilation of report chapters. The report contains the following sections:

Section 1: Project ***Description*** and Legislative and Administrative Requirements

Section 1 provides an introduction to the project, the approach to the Basic Assessment process, an overview of the legislation which governs the proposed activity, as well as the administrative requirements of the Basic Assessment process under the NEMA EIA regulations. In addition, this section provides a description of the proposed activity and the concept alternatives considered, its context, the public consultation process undertaken during the process, the key findings and recommendations and the way forward.

Section 2: Completed Basic Assessment Application Form

Section 2 contains the completed Basic Assessment Application form, as prescribed by DEAT, which is submitted in application for environmental authorisation under the NEMA EIA Regulations[1].

Section 3: Completed ***Final*** Basic Assessment Report Form

Section 3 contains the completed *Final* Basic Assessment Report form, as prescribed by DEAT, submitted in support of the application for the environmental authorisation of the activity under the NEMA EIA regulations.

[1] Note that although this application is submitted to DEAT for a decision after consultation with a DEAT representative it was decided that the Western Cape provincial Department of Environmental Affairs and Development Planning (DEA&DP) forms were to be used as the proposed activity is located in the Western Cape and these forms request additional, more relevant information to the area in concern.

Section 4: References

Section 4 lists the relevant literature and studies consulted during the completion of this BA.

Section 5: Appendices

Section 5 contains supplementary information in support of the report, such as site plans, specialist studies undertaken and *specific* details of the public participation process during the Basic Assessment process.

2 Legal and Administrative Requirements

There are a number of regulatory requirements at local, provincial and national level with which the proposed RO Plant at the Transnet Iron Ore Handling Facility will have to conform. Some of the key environmental legal requirements and relevant legislation, as understood by PDNA/SRK JV, are listed in the table below.

Table 2-1: Summary of key legal requirements

Project aspect	Requirement	Legislation	Authority
Environmental impacts	Obtain authorisation and ensure all listed activities are included in application and assessment	National Environmental Management Act (Act No. 107 of 1998) Section 24, GN 385 – 387 of 2006	DEAT
Location near sensitive dune system	Permit if construction of the RO Plant extends into/ disturbs dune system	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)	DEAT
Impact on cultural heritage	Notice of Intent to Develop	National Heritage Resources Act (Act No. 25 of 1999) Section 38 (1)	SAHRA
Release of effluent from an industrial process / Storage of water	Water use licence	National Water Act (Act No. 36 of 1998)	DWAF
Supplying water for an industrial process / Water abstraction and use	Apply to be a Water Services Provider	Water Services Act (Act No. 108 of 1997)	Water Services Authority
Public involvement & access to information in the BA process	Access to environmental information and protection of whistleblowers	National Environmental Management Act (Act No. 107 of 1998) Section 31 (1) and (2)	DEAT
	Public access to information and right to comment with regards to the environmental assessment process and findings	Promotion of Access to Information Act (Act No. 2 of 2000) / Promotion of Administrative Justice Act (Act No. 3 of 2000)	DEAT
Location near RAMSAR site and/or Marine Protected Area (MPA)	Notice to RAMSAR convention if project activities affect RAMSAR site	1971 RAMSAR Convention on Wetlands	DEAT: South African Administrative Authority (Biodiversity & Heritage)
	Permit if project activities affect MPA	Marine Living Resources Act (Act No. 18 of 1998) Section 43	DEAT: *Marine and Coastal Management* (MCM)

A brief summary of these key requirements is provided below. Note that other legislative requirements may pertain to the proposed development, but identification and interpretation of these is beyond the brief of this study. As such, the summary provided below is not intended to be definitive or exhaustive and serves to highlight key environmental legislation and obligations only.

2.1 National Environmental Management Act (Act No. 107, 1998)

The primary purpose of the National Environmental Management Act No. 107, 1998 (NEMA) is to provide for co-operative environmental governance by establishing principles for decision-making on all matters affecting the environment. These include the following:

- Development must be socially, environmentally and economically sustainable;
- Pollution must be avoided or minimised and remedied;
- Waste must be avoided or minimised, reused or recycled;
- Negative impacts must be minimised; and
- Responsibility for the environmental consequences of a policy, project, product or service applied throughout its life cycle.

NEMA gives effect to Section 24 of the Constitution and in this respect, of particular importance is NEMA's injunction that the interpretation of any law concerned with the protection and management of the environment must be guided by its principles. At the heart of these is the principle of 'sustainable development'. Section 2 of NEMA states that:

(3) Development must be socially, environmentally and economically sustainable.

Subsequent sections elaborate further on sustainable development:

(4) (a) Sustainable development requires the consideration of all relevant factors including the following:

- that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;

- that waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
- that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- that a risk averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

The importance of considering social and economic aspects is also highlighted:

(4)(i) The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment."

Section 28(1) states that "every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such degradation/pollution cannot be prevented, then appropriate measures must be taken to minimise or rectify such pollution. These measures may include:

- Assessing the impact on the environment;
- Informing and educating employees about the environmental risks of their work and ways of minimising these risks;
- Ceasing, modifying or controlling actions which cause pollution/degradation;
- Containing pollutants or preventing movement of pollutants;
- Eliminating the source of pollution; and
- Remedying the effects of the pollution.

Legal requirements for this project

Transnet has a responsibility to ensure that the proposed activities and the BA process conform to the principles of NEMA. The proponent is obliged to take into consideration the potential impacts of the proposed activity and take actions to

prevent, minimise and mitigate potential pollution or degradation of the environment in terms of Section 28 of NEMA.

2.1.1 NEMA EIA Regulations

Sections 24 and 44 of NEMA make provision for the promulgation of regulations that identify activities which may not commence without an environmental authorisation or existing activities in respect of which an application for environmental authorisation is required. In this context, EIA Regulations contained in three Government Notices in terms of NEMA (GN R 385, 386 and 387) came into force on 3 July 2006.

GN R 385 lays out two alternative authorisation processes. Depending on the type of activity that is proposed, either a Basic Assessment process or a Scoping and EIA process is required to obtain environmental authorisation. GN R 386 lists activities that require Basic Assessment, while GN R 387 lists activities that require Scoping and EIA. The regulations for both alternative processes stipulate that:

- public participation must be undertaken at various stages of the assessment process;
- the assessment must be conducted by an independent Environmental Assessment Practitioner;
- the relevant authorities respond to applications and submissions within stipulated time frames; and
- decisions taken by the authorities can be appealed by the proponent or any other interested and affected party.

The listed activities identified in GN R 386 which are relevant to the proposed RO Plant include[2]:

2 (d), (e), (f) & (g)*: Construction or earthmoving activities in the sea or within 100 metres inland of the high water mark of the sea, in respect of: (d) embankments; (e) stabilising 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 100 metres inland of the high water mark of the sea.**

5*: The removal or damaging of indigenous vegetation of more than 10 square metres within a distance of 100 metres inland of the high water mark of the sea.*

[2] This list of activities includes all activities associated with all of the alternatives. Activities marked with an * are specific to the preferred alternative.

***6**: The excavation, moving, removal, depositing or compacting of soil, sand, rock or rubble covering an area exceeding 10 square metres in the sea or within a distance of 100 metres 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).*

***13**: The abstraction of groundwater at a volume where any general authorisation issued in terms of the National Water Act, 2004 (Act No. 36 of 1998) will be exceeded.*

***25**: The expansion of or changes to existing facilities for any process or activity, which requires an amendment of an existing permit or licence or a new permit or license in terms of legislation governing the release of emissions, pollution, effluent.**

No listed activities identified in GN R 387 are applicable to the proposed project.

GN R 385 Section 25 makes provision for the competent authority to request that a Scoping and EIA process be undertaken *if* they decide, upon review of the Basic Assessment Report, that the process was insufficient to *permit a decision to be taken*. Further, Sections 60-68 of GN R 385 make provision for appeal against any decision issued by the competent authority. In terms of the Regulations, a notice of intention to appeal has to be lodged with the competent authority in writing within ten days of the notification of the issue of the Record of Decision. The appeal must be lodged within 30 days of the submission of the notice of intention to appeal.

Legal requirements for this project

The proposed RO Plant includes listed activities in terms of GN R 386. As such, Transnet is obliged to conduct a Basic Assessment for the proposed activity in accordance with the procedure stipulated in GN R 385. Following the submission of the Notice of Intent to Submit an Application on 25 May 2007, DEAT accepted the Notice of Intent and confirmed that a Basic Assessment process may proceed in terms of the EIA Regulations, hence this *Final* BA Report forms part of this process (Refer to Appendix H4 for the acceptance of the Notice of Intent to complete a BA received from DEAT).

2.2 Marine Living Resources Act (Act No. 18 of 1998)

The Marine Living Resources Act 18 of 1998 governs Marine Protected Areas (MPAs) and states in Section 43 that:

(2) No person shall in any marine protected area, without permission in terms of subsection (3)—

> (b) take or destroy any fauna and flora other than fish;
>
> (c) dredge, extract sand or gravel, discharge or deposit waste or any other polluting matter, or in any way disturb, alter or destroy the natural environment;
>
> (e) carry on any activity which may adversely impact on the ecosystems of that area.

There are a number of MPAs declared under the Marine Living Resources Act 18 of 1998. The relevant MPAs in the region include:

- Langebaan Lagoon MPA;
- Sixteen Mile Beach MPA;
- Malgas Island MPA;
- Jutten Island MPA; and
- Marcus Island MPA.

Legal requirements for this project

A number of MPAs have been declared in close vicinity of the Port of Saldanha, and care must be taken to avoid any possible impact on the areas. The potential adverse impacts on the MPAs of the proposed construction and operation of the RO Plant will need to be investigated (refer to the Marine Impact Assessment available in Appendix G3).

2.3 National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

The purpose of the National Environmental Management: Biodiversity Act 10 of 2004 is to provide for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection.

Legal requirements for this project

The proposed RO Plant may be located (Site 1) in close proximity to, and may impact on, sensitive dune systems supporting possible red data species. The impact of the

proposed construction of the RO Plant on the biodiversity of the area will need to be assessed (refer to the Botanical Impact Assessment available in Appendix G1).

2.4 National Heritage Resources Act (Act No. 25 of 1999)

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act 25 of 1999. The enforcing authority for this act is the South African National Heritage Resources Agency (SAHRA). In the Western Cape, SAHRA has delegated this authority to Heritage Western Cape (HWC).

In terms of the Act, historically important features such as graves, trees, archaeological artefacts/sites and fossil beds are protected. Similarly, culturally significant symbols, spaces and landscapes are also afforded protection. In terms of Section 38 of the National Heritage Resources Act, SAHRA and/or HWC can call for a Heritage Impact Assessment (HIA) where certain categories of development are proposed. The Act also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is deemed adequate, a separate HIA is not required.

The activity identified in the Act as requiring an HIA, and which is applicable to the proposed RO Plant is:

- Section 38 (1) (a): The construction of a road, wall, powerline, **pipeline**, canal or other similar form of linear development or barrier exceeding 300m in length.

Heritage Western Cape has designed a Notification of Intent to Develop (NID) to assist the proponent in providing the necessary information to enable HWC to decide whether a Heritage Impact Assessment will be required.

In terms of Section 38 (8) of the National Heritage Resources Act (Act No 25 of 1999) and, as stated on the Notification of Intent to Develop Form, the requirement for the completion of a NID and undertaking of a full Heritage Impact Assessment in terms of the National Heritage Resources Act, is NOT applicable to developments for which an Environmental Impact Assessment (EIA) is being undertaken in terms of the applicable EIA Regulations.

There is however the requirement in terms of Section 38 (8) for the *competent (authorising)* authority (in this case DEAT) to ensure that the evaluation of impacts on the heritage resources fulfils the requirements of the relevant heritage resources authority (HWC), and that the comments and recommendations of the heritage resources authority are taken into account prior to granting *authorisation*.

Legal requirements for this project

The construction of the associated infrastructure of the RO Plant (roads and pipelines), constitutes a listed activity in terms of the National Heritage Resources Act *(NHRA)*. Although the submission of an NID, and a formal HIA in terms of the NHRA is thus not required due to the fact that an EIA (Basic Assessment) process is being undertaken in terms of the EIA Regulations, both a NID and a HIA have in this case been submitted to HWC to inform them of the proposed RO Plant, and facilitate their input regarding possible impacts on heritage resources (refer to Appendix G4a and G4b). *A Record of Decision has been received from HWC for the Proposed RO Plant (refer to Appendix E5).*

2.5 National Water Act (Act No. 36 of 1998)

Water use in South Africa is controlled by the National Water Act 36 of 1998. The enforcing authority is the Department of Water Affairs and Forestry (DWAF).

The National Water Act recognises that water is a scarce resource in South Africa and its provisions are aimed at achieving sustainable use of water to the benefit of all users. The provisions of the Act are thus aimed at discouraging pollution and waste of water resources.

In terms of the Act, a land user, occupier or owner on whose land an activity occurs which causes or has the potential to cause pollution of a water resource, has a duty to prevent pollution from occurring. Any person who owns, controls, occupies or uses land is deemed responsible for taking measures to prevent pollution of water resources. If these measures are not taken, the responsible authority may do whatever is necessary to prevent the pollution or remedy its effects and to recover all reasonable costs from the responsible person. Non-compliance with this provision constitutes a criminal offence.

In addition, in terms of the Act, water use has been specifically defined and can be broadly summarised as the abstraction, consumption and discharge of water. Use of water also includes disposing of water in any manner which contains waste from, or which has been heated in, any industrial or power generation process (Section 21h of the National Water Act). Additionally, if groundwater is abstracted within 750m from the high water mark of the sea a licence will be required to use the water. This is regardless of the amount of groundwater to be abstracted.

Legal requirements for this project

In the proposed RO Plant sea water will be desalinated (i.e. the seawater will go through an “industrial process”) and the brine will be discharged back into the ocean. Therefore a Water Use Licence Application (WULA) is required in terms of Section 21(h) of the National Water Act and must be submitted to DWAF. A WULA is being

completed in parallel to the Basic Assessment. DWAF will take a decision on the WULA only once a Record of Decision for the proposed development has been issued by DEAT.

2.6 Water Services Act (Act No. 108 of 1997)

In terms of Section 7 of the Water Services Act 108 of 1997, no person may "obtain water for industrial use from any other source other than the distribution of Water Services Provider nominated by a Water Services Authority having jurisdiction over the area in question, without the approval of that Water Services Authority" (Industrial use is defined as the use of water for mining, manufacturing……construction or any related purpose).

The briefing document on the application and implications of Sections 6, 7 and 8 of the Water Services Act (issued by DWAF) is also very clear in that the policy principle that informs Sections 6 and 7 of the Act states "where a person wishes to secure water services from a source other than a Water Services Provider nominated by the Water Services Authority, that person *must* apply to the Water Services Provider for approval to secure water services from such other resource".

Legal requirements for this project

Saldanha Bay Local Municipality, as the Water Services Authority, also acts as a Water Services Provider for the distribution of water within the municipal area. In addition, Saldanha Bay Municipality has an agreement with the West Coast District Municipality, as a Water Services Provider within the Saldanha Bay municipal area, for the supply and distribution of bulk water. One of these connections from the West Coast District Municipality is to the Iron Ore Handling Facility.

As the RO Plant will provide water to the Iron Ore Handling Facility (for industrial use), Transnet will need to obtain approval from the Saldanha Bay Local Municipality (as the Water Services Authority in the area) to secure water services from a source other than a Water Services Provider nominated by the Water Services Authority.

2.7 Promotion of Access to Information Act (Act No. 2 of 2000)

The Promotion of Access to Information Act 2 of 2000 (PAIA) gives effect to the constitutional right of access to information held by the state and any information that is held by another person that is required for the exercise or protection of any rights. This right is important because many decisions of government have a direct and indirect impact on the environment, and therefore access to information regarding the proposed impact is vital to people who are likely to be affected.

The right to specific information under NEMA and PAIA help to safeguard the publics' right to information that will enable them to protect their environmental rights.

Legal requirements for this project

Transnet is required to make all information of regarding the proposed activity, which could influence the outcome of the Basic Assessment, available to the public to allow the public insight into the potential impacts from the activity, and to allow the public the opportunity to comment on the proposed activity during the BA process.

2.8 Promotion of Administrative Justice Act (Act No. 3 of 2000)

The Promotion of Administrative Justice Act 3 of 2000 (PAJA) aims to promote an efficient administration and good governance and to create a culture of accountability, openness and transparency in the public administration or in the exercise of a public power.

In terms of Section 3(2) of PAJA, an administrative action which adversely affects a person is only fair if the administrator has given that person:

a) adequate notice of the nature and purpose of the proposed administrative action;

b) a reasonable opportunity to make representations;

c) a clear statement of the administrative action;

d) adequate notice of any right of review or internal appeal, where applicable; and

e) adequate notice of the right to request reasons in terms of section 5.

PAJA codifies the rules relating to judicial review of administrative actions and lists the relief that the court may grant to a person asking for judicial review of an administrative action. Under the Act all decisions of every administration at every level of government will have to comply with the rules that are in the Act, which include that all decisions made by government officials and departments have to be lawfully, procedurally fair and reasonable.

Legal requirements for this project

To ensure that the administrative action related to a decision with respect to the proposed activity is fair, the authority, in this case DEAT, has to ensure that the public is informed and given opportunity to respond to the decision regarding the project. The decision-making authority (DEAT) will also have to ensure that any decision made on the proposed application is lawfully and procedurally fair and reasonable in terms of the required BA process.

2.9 Ramsar Convention on Wetlands

The 1971 Ramsar Convention on Wetlands is an international treaty providing a framework for national action and international cooperation for the conservation and sustainable use of wetlands and their resources to stem the progressive encroachment on, and loss of, wetlands due to their fundamental ecological functions and their economic, cultural, scientific and recreational value.

Participating governments undertake to include wetland conservation considerations in their national land-use planning and to formulate and implement this planning so as to promote, as far as possible, "the wise use of wetlands in their territory" (Article 3.1 of the treaty), which has been interpreted as being synonymous with "sustainable use" (Ramsar Convention).

Legal requirements for this project

South Africa is a contracting party to the Ramsar Convention. The Langebaan Lagoon, located to the south of the Port of Saldanha, was recognised as a wetland of international importance under the Ramsar Convention on 25 April 1988 (Wetlands International Site Number: 1ZA007). The Ramsar site measures 6 000 ha and encompasses:

- Malgas, Jutten, Marcus and Schaapen islands;
- Precincts of the lagoon;
- The lagoon up to the high-water mark, including the marshlands and Geelbek annex;
- A section of Sixteen-Mile Beach bordering the farm Stofbergsfontein; and
- An area of 10.8 km^2 on Sixteen-Mile Beach between the high- and low-water marks and parallel to the farms Schrywershoek and Stofbergsfontein.

Although the Port of Saldanha does not extend into the RAMSAR site, any activities within the Port that may have potential off-site impacts have to take account of the sensitive nature and international importance of the Langebaan Lagoon and surrounding protected areas.

The possibility of impacts of the proposed RO plant extending to and impacting on the Ramsar site thus need to be determined and taken into consideration.

3 Approach to the Basic Assessment

Government Notice R.386 lists activities identified in terms of Section 24 and 24D of the National Environmental Management Act No. 107, 1998 (NEMA) which require that a Basic Assessment process be followed prior to their commencement. The proponent must obtain authorisation for the proposed activity from the designated competent authority (DEAT).

The development of a Reverse Osmosis Plant entails the following listed activities requiring a Basic Assessment[3]:

2 (d), (e), (f) & (g)*: Construction or earthmoving activities in the sea or within 100 metres inland of the high water mark of the sea, in respect of: (d) embankments; (e) stabilising 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 100 metres inland of the high water mark of the sea.**

5*: The removal or damaging of indigenous vegetation of more than 10 square metres within a distance of 100 metres 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 10 square metres in the sea or within a distance of 100 metres 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).*

13*: The abstraction of groundwater at a volume where any general authorisation issued in terms of the National Water Act, 2004 (Act No. 36 of 1998) will be exceeded.*

25*: The expansion of or changes to existing facilities for any process or activity, which requires an amendment of an existing permit or licence or a new permit or license in terms of legislation governing the release of emissions, pollution, effluent.**

[3] This list of activities includes all activities associated with all of the alternatives. Activities marked with an * are specific to the preferred alternative.

The proposed development of an RO Plant and associated infrastructure requires that a Basic Assessment process is followed.

The first step in the process was the submission of a Notice of Intent to Submit an Application for the proposed activity. The Notice was submitted to DEAT on 25 May 2007 and accepted on 12 June 2007. On 14 June 2007 the first round of public participation commenced with a thirty day period which allowed any member of the public to register as an I&AP on the project and to be kept informed of the status of the environmental assessment process.

The second step entails the assessment of the activity and the production of a Basic Assessment Report (see Sections 3 and 4) for public comment. Issues and concerns raised by the public have informed the Final Basic Assessment Report which, together with the prescribed Comment and Reponses Report, will be submitted to DEAT for a decision.

A typical Basic Assessment process is depicted in Figure 3-1.

3.1 Prescribed Requirements for the Basic Assessment

The Basic Assessment process culminates in the submission of the Final Basic Assessment Report to DEAT, for their decision. The report must provide information about the proposed activity, a description of the affected environment (including ecological, land use and socio-economic aspects), a description of the process undertaken in order to consult the public on the activity, as well as a basic assessment of the potential impacts of the activity on the receiving environment.

Several appendices to the Basic Assessment Report are required as supporting documentation. These include:

- A Comments and Responses Table from the public consultation process;
- Data such as a location map, site plans and relevant photographs;
- Any necessary permits or licences, including the landowners consent for the activity, should the applicants not own the proposed site; and
- Specialist reports which were undertaken during the basic impact assessment process. For this BA process, specialist studies undertaken include:
    - A Botanical Impact Assessment;
    - A Groundwater Resources Impact Assessment;
    - A Specialist Marine Impact Assessment;
    - A Heritage Impact Assessment; and
    - A Notice of Intent to Develop.

In addition, a WULA will also be submitted in terms of Section 21 of the National Water Act (Act No. 36 of 1998) to the Department of Water Affairs and Forestry (DWAF) for the proposed discharge of water which contains waste from an industrial process or which has been heated in any industrial process (*Section* 21(h) water use).

This information is contained in Section 5 of this report.

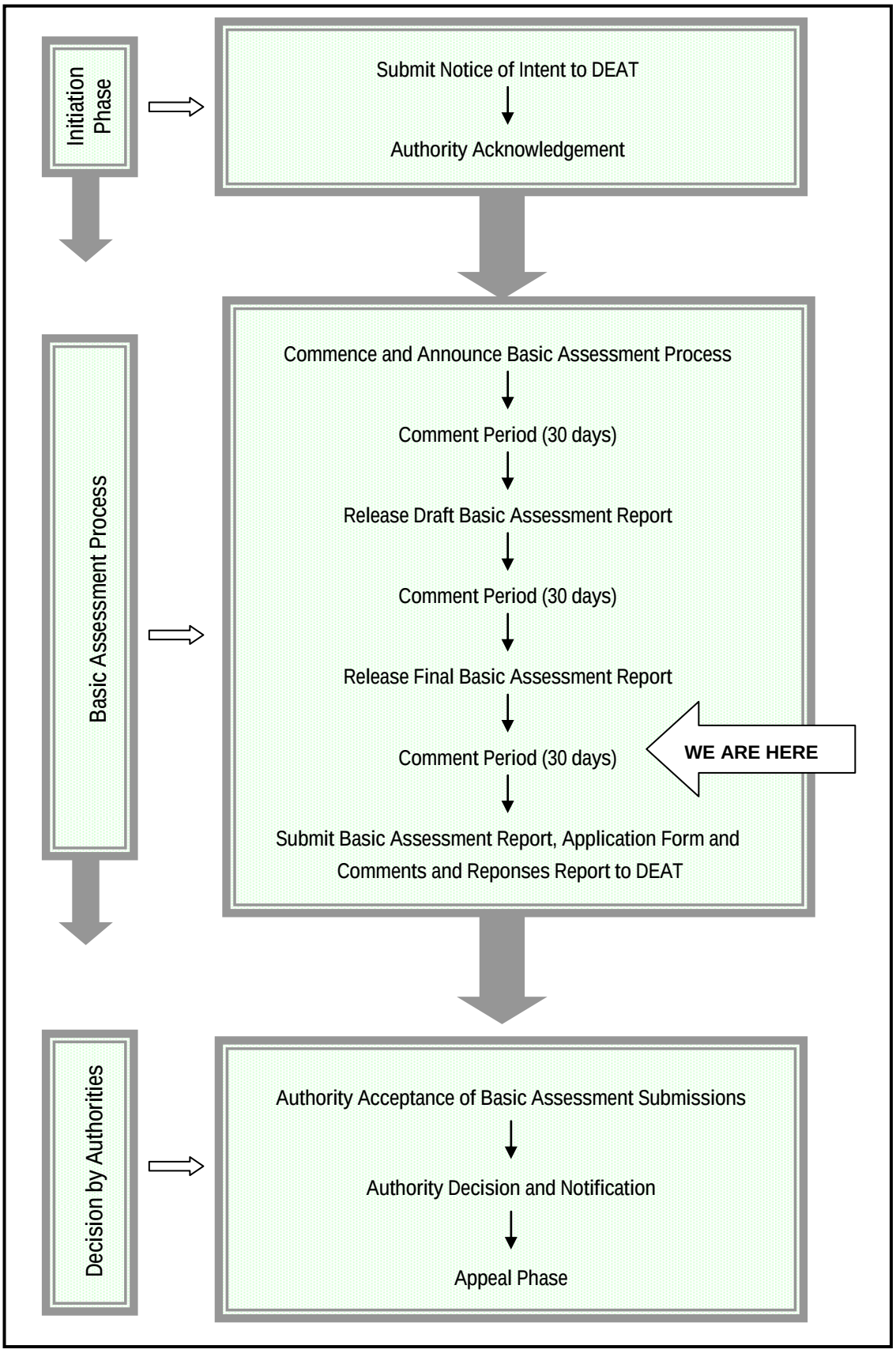

Figure 3-1: The Basic Assessment Process

4 The Proposed Activity

4.1 Desalination and Reverse Osmosis Technology

Desalination refers to a water treatment process whereby salts are removed from saline water to produce fresh water. Osmosis is the natural movement of solvent from an area of low solute concentration through a membrane to an area of high solute concentration when no external pressure is applied. RO is a separation process used to purify concentrated solutions of dissolved minerals and salts, and is used in desalination plants. 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 basic RO process (assuming the use of beach/intake wells for intake of seawater) is shown in Appendix B15.

4.2 Proposed RO Plant

It is proposed that the RO Plant will generate potable water [4] to the same quality of the existing municipal supply to the iron ore handling facility. Immediate water requirements at the iron ore handling facility, in addition to the current municipal allocation, is approximately 1 200m³/day (1 RO module) although in the long-term it is planned that the RO Plant will be able to produce a total capacity of 3 600m³/day potable water (up to 3 RO modules). All infrastructure associated with the RO plant will be installed during the initial construction phase, although it is anticipated that only one of the three RO modules would initially be installed, with subsequent modules being installed as required, based on the water demands of the iron ore terminal.[5]

The RO process proposed for this project will use a pump to draw sea water, either via a borehole/beachwell or pipeline and this water will be pumped to a sea water buffer tank situated adjacent to the RO Plant building with a capacity of 200kl. *(Intake via beach wells / boreholes on the quay is the preferred intake method; however intake via a pipeline is a viable alternative and has been included in the assessment.)* A high pressure pump will then force the sea water through a semi-permeable membrane (within the RO modules) to remove the dissolved minerals and salts. This process results in a high salinity solution (brine) and a very low salinity solution (fresh water). The brine passes through an energy recovery turbine before being discharged back into the sea and the potable water is diverted to the storage reservoir(s), with a capacity of 5 megalitres (Ml), for use (dust mitigation). Chemicals will be used in the process to treat the intake sea water before it goes through the RO

[4] *This requirement is to safeguard the quality of the exported iron ore and avoid contamination of the product by industrial quality water.*

[5] Note that the basic assessment and all associated specialist studies have been based on the full capacity of the plant (3 modules) in order to ensure that a holistic impact assessment process is followed.

Plant, and these chemicals will be blended and discharged, after going through the RO process, with the brine to a brine basin. It will then be released back into the sea. Other chemicals will be used for the cleaning of the RO membranes and will not be contained in the brine discharged to the sea. CIP wastewater will be stored in up to 3 backwash tanks and will then be discharged into the municipal sewer line or removed by an appropriate waste management contractor.

The following infrastructure is proposed in addition to the RO Plant (refer to Appendix B14 – RO Plant building layout):

- A 200kl sea water buffer tank alongside the RO building to store sea water prior to it going through the RO process. This buffer tank will *accumulate* sediment over time which will be removed manually during periodic shut downs of the plant. It is anticipated that this sediment will mainly consist of sand and will be disposed of as municipal waste;
- A 200 kilolitre (kl) potable water buffer tank alongside the RO building which will store the permeate (potable water produced as a result of the RO process) before it is pumped to the storage reservoir;
- Potable water storage reservoir(s) with a capacity of 5 Ml, situated either next to the existing potable water reservoir just north of the iron ore stockpiles (Preferred location – Appendix B11), *next to the stockpiles and conveyors where iron ore is stockpiled (2nd Preferred location – Appendix B12) or north-west of the iron ore handling facility outside of the immediate Port area on TNPA land (3rd Preferred location – Appendix B13)*;
- A brine basin (up to 200m³) in which brine and dual media filter backwash waters will be stored prior to it being released back into the sea;
- Up to 3 CIP backwash tanks/sumps each with a capacity of 20m³ to store the wastewater before being discharged into the municipal sewer line or removed by an appropriate waste management contractor;
- Interconnecting pipelines between intake points and the sea water buffer tank, between the sea water buffer tank and the RO building, between RO building and the potable water buffer tank, between the potable water buffer tank and the potable water storage reservoir and between the brine basin and the discharge location;
- A RO containment building with room for up to three RO modules, an electrical sub station, a motor control room, a pumphouse, a store room, office and ablution facilities, and space for parking area (refer to figure in Appendix B14);
- Interconnecting infrastructure including electrical and communication wiring for the RO system; and
- A small service road (approximately 3 m wide).

It is proposed that ablution facilities be available in the RO building and the sewage from this will either be disposed and treated via a septic tank at the chosen site, or will be routed to the existing Port sewer system (Sites 2 and 3). It is anticipated that annual throughput will not exceed 2 000m³.

The installation of pipelines for the intake of seawater and/or discharge of brine will require an on-land construction site for pipeline laying activities and possible other activities such as trenching through the surf-zone and/or associated activities below the high water mark.

Three alternative sites (Site Alternatives 1-3) are being considered for the location of the RO Plant (refer to Appendix B1) and various site specific alternatives with regards to intake and discharge location and infrastructure are being considered. These are discussed in further detail in Section 7: Project Alternatives.

The proposed activity will produce approximately 4 400m³/day brine (water of approximately *1.8* times the salinity of the intake sea water [63.5 parts per thousand - ppt]) as a result of the RO process and wastewater effluent as a result of the backwashing of the DMF. In the DMFs the first filtration (removes large particles) that incoming sea water goes through consisting of a layer of sand and a layer of carbon inside the filter housing). The brine and dual media filter backwash water will be discharged back into the ocean while the water containing the sediment from the waste as a result of the intermittent cleaning of the RO membranes (which will contain a number of chemicals listed overleaf) will either be disposed of via the municipal sewer system or removed by a private contractor to a suitable, approved site.

Chemicals used in the cleaning of the DMFs and throughout the RO process, which **will be** discharged back into the ocean with the brine include[6]:

- Flocculant (Ferric Chloride), which is injected before the DMFs and improves filtration;
- Non-oxidising biocide[7], which is injected before the DMFs and dosed before the RO membranes to clear any organic growth from the filters and RO membranes; and
- Antiscalant, which is dosed before the RO membranes to help prevent scale build up.

The following chemicals will be used for the cleaning of the RO membranes (CIP) and the wash water containing these chemicals will be disposed of either via the

[6] The Specialist Marine Impact Assessment has included the above-mentioned chemicals in the modelling and assessment of the impact of the brine and backwash discharge on the marine environment.
[7] Note that the discharge of brine containing oxidizing biocides has also been assessed for completeness.

municipal sewer system (with approval from the municipality) or at a suitable disposal site, and **will not be** contained in the brine discharged back into the ocean:

- Citric Acid, which is used for the cleaning of the RO membranes;
- Ethylenediaminetetraacetic acid (EDTA), which is an aminopolycarboxylic salt that is used as a chelating agent to bind or capture trace amounts of iron, copper, manganese, calcium and other metals. It is biodegradable under ambient environmental conditions;
- Sodium tripolyphosphate (STPP)[8], is the sodium salt of triphosphoric acid and is a typical ingredient of household cleaning products and is thus present in domestic waters. STPP will be used for cleaning the Reverse Osmosis membranes;
- Trisodium phosphate (TSP)[9] which is a highly water-soluble cleaning agent and is not classified as acutely toxic to aquatic organisms;
- Sodium lauryl sulphate (SLS) which is an anionic surfactant which is *one of* a class of chemicals used for their detergent properties. It is biodegradable in surface waters and is classified as a substance of low environmental toxicity;
- Calcium hydroxide/Sodium Hydroxide (Caustic soda) will be used for cleaning the RO membranes;
- *Hydrochloric acid (HCI) will be used for pH modification;*
- *Ammonium hydroxide (NH_4OH) used for pH modification; and*
- *Sodium metabisulphite (SMBS) will be used for membrane preservation. Preservation of the RO membranes is required when an RO module is shut down for extended periods, typically more than 30 days. The aim of the procedure is to store the membranes in the preservation solution in order to avoid biological growth on the membranes.*

The approximate location and detailed design of the intake pipelines (and associated intake structures) are provided for each alternative in the site plans contained in Appendix B.

The installation/drilling of beach wells will require access for a drilling rig and support vehicles to possibly provide drilling media, fuel etc. The drilling activities

[8] *After discussions with the Saldanha Bay Municipality it has been agreed that Sodium tripolyphosphate (STPP) will not be used as the Saldanha Sewage Works has requested that the discharge to the sewerage system have lower phosphate levels. The chemical has been included in all the assessments and has therefore been included in the list. Should phosphate levels at the Saldanha Sewage Works reduce in the future there is a possibility that this chemical may be used.*

[9] *After discussions with the Saldanha Bay Municipality it has been agreed that Trisodium phosphate (TSP) will not be used as the Saldanha Sewage Works has requested that the discharge to the sewerage system have lower phosphate levels. The chemical has been included in all the assessments and has therefore been included in the list. Should phosphate levels at the Saldanha Sewage Works reduce in the future there is a possibility that this chemical may be used.*

involved will be similar to those employed to sink the test wells as described in the Groundwater Resources Impact Assessment (refer to Appendix G2).

A construction laydown area will be required at the site. At Site 1 it is proposed that the laydown area be adjacent to the stacker reclaimer slabs currently being constructed as part of Phase 1B upgrades *of the iron ore terminal*. At Site 2 it is proposed that the construction laydown area be adjacent to tippler 1 on a patch of land currently used to store construction rubble. At Site 3 it is proposed that the laydown area be next to the Multi-Purpose Terminal facility. The lay down area will house approximately 5 containers (each 12m long) for 3 offices and 2 storage facilities.

Construction activities would be undertaken in accordance with Transnet's standard construction phase Environmental Management Plan, which will be submitted to DEAT for approval along with the Basic Assessment report.

6 Activity Need and Desirability[10]

Transnet have obtained authorisation (DEAT Ref: 12/12/20/237, 4 August 2006) for the handling and export of up to 45 million tons per annum (mtpa) of iron ore at the iron ore handling facility, and studies are currently being undertaken for proposed (Phase 2) upgrades to the facility which would allow for an increase 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 future/new stockpiles) must be sprayed with water in order to suppress dust. Additionally, transfer points in the bulk handling process of the iron ore also require water to be sprayed to reduce dust generation.

Currently the municipal water supply allocates approximately 34Ml/month for Port activities (including dust suppression), and usage at the iron ore handling facility has in a number of instances exceeded this allocation. *It is projected that* 1200m³/day of potable water (1 RO module) is required to meet the immediate dust suppression requirements and a total of 3600m³/day potable water (3 RO modules) is required for future dust suppression needs at the iron ore handling 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 municipal water supply currently providing the iron ore handling facility) is required in order to fulfil the present and future dust mitigation requirements at the iron ore handling facility.

Currently a number of other methods of dust suppression, (thus reducing the amount of water required) are in place and include:

- Conveyor covers to shield ore dust from wind;
- Road surfacing *to allow* for sweeping and cleaning to reduce dust agitation by vehicles;
- Adding dust suppressing surfactant at tippler buildings; and

[10] *Section 32 (2) (f) of the NEMA EIA Regulations states that an environmental impact assessment report must include "a description of the need and desirability of the proposed activity and identified potential alternatives…" However, judgment in a recent case (Fuel Retailers Association of South Africa, June 2007), essentially highlights the need to separate town planning criteria from those relevant to environmental decision-making and requires that:*

- *The concept of need and desirability has to be considered from a town planning perspective; and*
- *The concept of sustainable development has to be considered from the perspective of the environmental authorities (Smith, Ndlovu, Summers, undated case note).*

The motivation in this section is based on information provided by the proponent and the project planning consultants and is deemed to constitute a discussion of the need and desirability of the project.

- Vacuum and sweeper trucks to sweep and vacuum dust from roads and from difficult areas.

In addition, dust monitors in stacks monitor dust exiting dust plant stacks.

A number of alternatives to seawater have been considered (discussed in the following sections); 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 handling 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 conditions, 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 enable dust suppression activities to continue at the iron ore handling 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 and reclaimed sewage. However, due to the potential lack of available yields, potential environmental costs, and to ensure suitable water quality, these alternative water sources were not considered as feasible or viable options (refer to Section 7 Project Alternatives below).

7 Project Alternatives

In terms of the NEMA EIA Regulations, alternatives (e.g. site, technological, process, design, operating conditions etc) must be considered during the Basic Assessment process where appropriate. These alternatives must be feasible, and the environmental implications of each must be summarised in the environmental assessment report. A number of alternatives were considered from the onset of the planning process for the proposed RO Plant, and after initial consultation with a number of specialists as well as pre-feasibility studies, a preferred alternative was developed. The following list provides a summary of the alternatives considered *in the BA*:

- Site alternatives;
- Infrastructure alternatives;
- Alternative dust suppression methods;
- Alternative sources of water for dust suppressions;
- Alternative options of brine disposal;
- The no-go alternative.

These are discussed in more detail in the following sections.

7.1 Alternative Sites

It is important that the RO Plant be located in close proximity to the iron ore handling facility as well as the sea in order to reduce pipeline lengths and pumping costs, and make it viable from an engineering and *financial* perspective. Three site locations within Transnet boundaries were identified for the positioning of the main RO Plant building and various infrastructure alternatives at each of the sites were also included in the pre-feasibility assessment (discussed below). Therefore this application *for authorisation proposes* three alternative sites for the location of the RO Plant and additional alternatives at each site for the associated infrastructure. At the onset of this BA process Site 1 was the preferred site alternative. However, after consultation with various specialists regarding environmental impacts and engineering feasibility, Site 3 has evolved as the preferred site alternative[11].

7.1.1 Site 1

This site is located to the east of the iron ore handling facility, adjacent to the reclamation dam (refer to Appendix B1). Most of the area proposed for the RO Plant building and the associated infrastructure is located in the primary dunes which are

[11] To maintain consistency throughout the process (as well as in the Specialist Studies) the numbering of the sites has remained the same and therefore Site 3 is the preferred site alternative.

particularly sensitive from a floral and dune functioning perspective. There is much greater sand- and dune-mobility at this site, compared to the other site alternatives, 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 *is classified* as Langebaan Dune Strandveld which, in spite of being previously disturbed, has recovered to a stable condition (refer to Appendix D for photographs of this site).

7.1.2 Site 2

This site is located north and northwest of the iron ore handling facility. The small beach forming part of this site has been heavily impacted by the construction of the quay and the activities at the facility (refer to Appendix B1). 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 (refer to Appendix D for photographs of this site).

7.1.3 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 *(to the south of the Multi-Purpose Terminal). The reclamation/beach* area at this site is very small, compared to Sites 1 and 2 (refer to Appendix B1). The environment at this site is entirely *transformed* and there is no indigenous vegetation found on the site (refer to Appendix D for photographs of this site).

7.2 Alternative Infrastructure

There are a number of key infrastructure alternatives which can be accommodated at each of the three sites, and thus this application *for authorisation proposes* nine (9) alternatives (excluding the "no-go" alternative) mainly related to the infrastructure used for intake and discharge at the three alternative sites.

Infrastructure alternatives which have been considered include:

- Intake of seawater via beach/intake wells, or via pipeline;
- Discharge of brine via discharge wells or via pipeline; and
- Alternative positions of discharge infrastructure, where applicable, allowing for discharge into either Small or Big Bay.

The Port Master Plan of 2005 (medium term development up to 10 years and long term development beyond 2020) has been reviewed in terms of the location of the RO Plant building and associated infrastructure. It is important to consider the Port Master Plan in its broader context. It is a plan that reflects potential demand trends for

various commodity types at the time the plan was compiled. The location of the RO plant building can be accommodated in all three proposed locations.

The infrastructure alternatives are "grouped" *per* site and discussed below.

7.2.1 Site alternative 1 Infrastructure

The alternative intake and discharge infrastructure locations at this site include[12]:

a) Beach well intake and pipeline discharge (Big Bay) (**1a**) (refer to figure in Appendix B2)

b) Pipeline intake and pipeline discharge (Big Bay) (**1b**) (refer to figure in Appendix B3)

c) Beach well intake and beach well discharge (Big Bay) (**1c**) (refer to figure in Appendix B4) [groundwater investigations have indicated that this alternative is not feasible]

Pipeline intake at this site (from Big Bay) will be a single point intake located in the surf-zone or just beyond. Beach well intake at this site will require up to 10 beach wells at 50m spacing above the High Water Mark (HWM) along the beach. A pipeline discharge at this site (into Big Bay) will be below the sea surface along a 30m length of the revetment of the reclamation dam at a location approximately 80m from the low water mark of the adjacent shoreline with an adjacent water depth of approximately 1.5m. Modelling conducted by a geohydrological specialist has indicated that beach well discharge at this location is not viable as the soil profile in the area where the beach wells are proposed will not allow sufficient quantities of the brine to permeate, and thus the brine would overflow out of the beach wells.

7.2.2 Site alternative 2 Infrastructure

The alternative intake and discharge infrastructure locations at this site include:

a) Beach well intake and pipeline discharge (Small Bay) (**2a**) (refer to figure in Appendix B5)

b) Pipeline intake and pipeline discharge (Small Bay) (**2b**) (refer to figure in Appendix B6)

Pipeline intake at this site (Small Bay) will be a single point intake located up to 75m offshore. Beach well intake at this site will require up to 10 beach wells at 50m spacing above the High Water Mark (HWM) along the beach. Pipeline discharge at this site (Small Bay) will be either a surf-zone discharge (most likely due to depth of

[12] Note that all text in **bold** in brackets (including 1a, 1b, etc) refer to the specific site (number) and the specific layout (letter) of each alternative.

water at this site) or a pipeline discharge through a single port diffuser in an approximate -0.5 to-1m CD water depth.

7.2.3 Site alternative 3 Infrastructure

The alternative intake and discharge infrastructure locations at this site include:

a) Pipeline intake (Small Bay) and pipeline discharge (Small Bay) (**3a**) (refer to figure in Appendix B7)

b) Pipeline intake (Small Bay) and pipeline discharge (Big Bay) (**3b**) (refer to figure in Appendix B8)

c) Borehole intake on the quay (stockpiles) and pipeline discharge (caisson 3, Big Bay) (**3c**) (refer to figure in Appendix B9)

d) Borehole intake on the quay (Multi-Purpose Terminal) and pipeline discharge (caisson 3, Big Bay) (**3d**) (refer to figure in Appendix B10)

Pipeline intake at this site (Small Bay) will be along the quay wall adjacent to the Multi-Purpose Terminal (3a & 3b). Borehole intake at this site will require up to 6 boreholes located on the causeway, either alongside the iron-ore stockpiles (3c) or alongside the Multi-Purpose Terminal (3d). Pipeline discharge into Small Bay (3a) will consist of a single port diffuser in an approximate -8m Chart Datum (CD) water depth. Pipeline discharge into Big Bay (3b) will consist of a single port diffuser in an approximate -4m CD water depth. Pipeline discharge at Caisson 3[13] (3c & 3d) will consist of a single port diffuser in an approximate -16 to -18m CD water depth.

7.2.4 Alternative Reservoir Locations

Three alternative sites have been investigated for the location of the potable water storage reservoir(s), *situated* next to the existing potable water reservoir just north of the iron ore stockpiles (*Preferred location -* Appendix B11), *next to the stockpiles and conveyors where iron ore is stockpiled (2nd Preferred location – Appendix B12)*, and north-west of the iron ore handling facility *outside of the immediate Port area on TNPA land (3rd Preferred location – Appendix B13).*

The background to the determination of the various alternatives assessed (i.e. pre-EIA alternatives which informed the current alternatives) by the specialists and included in this Basic Assessment is provided in Section 7.4 below.

7.2.1 Preferred Alternative

This application is for the RO Plant to be located south of the Multi-purpose terminal (at Site 3) with intake of seawater being via boreholes situated on the quay adjacent

[13] Caisson 3 is the third caisson along the quay, from the land side (refer to Appendix B9 and B10).

to the Multi-purpose Terminal and discharge of brine into the sea via a pipeline, towards the end of the quay (at caisson 3 – i.e. ***Alternative 3d****). Discharge would thus essentially be into Big Bay.*

7.3 No-Go Alternative

Transnet are required to suppress dust at the iron ore handling facility and if the RO Plant is not approved alternative water sources for dust control will still need to be established (i.e. the "no-go" alternative does not mean that current status quo can continue. Additional water is needed immediately to suppress dust generated from current activities and future, already authorised expansions, i.e. Phase 1B). Transnet have identified possible alternatives including obtaining additional potable water from municipal supplies and reclaimed sewage. 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 or viable options. *If additional water for the suppression of dust is not obtained it is likely that alternative water sources would have to be re-sought to reduce dust levels omitted from the Port.*

7.4 Additional Alternatives Considered *and Eliminated* (pre-EIA)

This section discusses all the alternatives considered by the project team, from the inception of the project planning process, and thus shows the "development" of the preferred alternative discussed above (Section 7.2.1). The alternatives are discussed in order to provide some insight into all alternatives considered in both the pre-feasibility stage of the project – leading up to, and informing the alternatives in the BA process. These alternatives were not taken to the final design stage for reasons that will be set out in more detail below. Alternatives considered prior to the initiation of the BA process include alternative dust suppression methods, alternative water sources for dust suppression and alternative options for disposing of the brine by-product.

7.4.1 Alternative methods of Dust Suppression

Transnet has undertaken a number of prefeasibility investigations, and considered a number of alternative methods of dust suppression (i.e. alternatives to the use of water) as part of the studies related with the previous and proposed future expansions to the iron ore terminal. Alternative dust suppression methods considered include:

- **Enclosing the iron ore stockpiles in warehouses**

The point sources of dust within the iron ore handling facility include the stockpiles and the transfer points (i.e. from conveyors to stockpiles, shiploaders etc). The option of enclosing the entire iron ore stockpile area and transfer points in a warehouse building at the iron ore handling facility would allow for dust to be managed *as a*

point source in a contained area, potentially reducing the need for large amounts of water.

Methodologies for initial studies were based on a materials handling capacity of conveyors, stacker reclaimers and ship loaders of 10,000 tonnes per hour. This is a requirement to meet Port *throughput* capacity. The initial studies proposed that the building required to cover each of the stockpiles would be approximately 135m wide and 700m long, and approximately 57.5m high at the apex. This height is effectively more than twice the height of the office and control tower buildings in the iron ore terminal. Covering each stockyard would be equivalent to covering 12 rugby fields.

Additional infrastructure would also be required within the building, including internal lighting, building ventilation as well as dust extraction systems (in terms of the Occupational Health and Safety Act, 85 of 1993).

The order of magnitude estimated capital cost for enclosing future stockpiles of iron ore is ~R4 billion (excluding VAT and escalation, to an accuracy of 35%).

Under the present scenario, storm water falls directly onto the stockyard area and is absorbed predominantly by the stockpile itself with very little run-off. With the entire area roofed the storm water that would need to be managed would amount to 100% of the area (due to the rain falling on the warehouses). This creates additional environmental issues including providing large storm water storage facilities such as evaporation ponds.

This alternative was therefore not considered feasible due to the size of the structure which would be required to enclose the entire area, and associated costs, and visual impacts. In addition, water would still be required to suppress dust on the conveyors for the stacking operations, as well as at conveyor transfer points. Thus, additional water supply will still be required even if this option was feasible.

- **Storing iron ore in silos / bins**

The constraints of this option are very similar to those mentioned above. Approximately four bins would be required to store iron ore currently stored in one stockpile, the length of each bin being 450m long. Each bin would be 15m wide and 34m high, and transferring the iron ore to, between and from each of these bins would require ~45MW additional power for future stockpiles of iron ore.

The conveyor configuration to feed the bins would be two conveyors to elevate the iron ore to the top of the bins. To cater for the elevation of the conveyors to the top of the bins plus the height necessary for the installation of the diverter chutes and tripper conveyors, the height of the gantry covering the conveyors would be ~55m above ground level.

This option greatly increases the number of conveyors required and multiplies the number of transfer points. This increase will be a bigger problem than a conventional stockpile with respect to dust control in that the iron ore has to be elevated and then discharged into the bins from a height. The arrangement is mechanically complex and very energy intensive in that the iron ore has to be elevated before being deposited in the bins.

The alternative of taking the bins below ground level has been disregarded because of the high water table in the stockyard area. The water table is on average at sea level while the existing stockyard level is ~ 2m above sea level.

The option is impractical in terms of construction and has major operational implications during construction as well as during operational phases. Due to these technical considerations this option has been discarded in favour of the conventional stockyard layout currently in use at the iron ore terminal.

- **Using chemical surfactants**

Investigations into the use of chemical surfactants to suppress dust at the Iron Ore Handling Facility have been carried out. A scientifically based wetting philosophy has been developed for the use of the chemical surfactant in dust suppression measures.

Dust suppression chemicals are diluted with water and their use does not eliminate the need for water. They do, however, make the use of water more efficient.

7.4.2 Alternative Sources of Water for Dust Suppression

The West Coast District Municipality (WCDM) currently supplies the Port of Saldanha with a maximum monthly volume of 34 000m³ of water. This is conditional on water saving restrictions which could reduce supply by up to 20% in periods of drought.

A number of alternative water sources for additional dust suppression at the Iron Ore Handling Facility were considered prior to starting the Basic Assessment process. Various studies have been undertaken by Transnet to assess water requirements and usage at the Facility, which included the identification and an assessment of the feasibility of various water sources currently available.

The following potential water sources were considered as options for dust suppression:

- **Municipal Potable Water**

Additional potable water from the municipality is limited due to the scarcity of water in the area and, like the present allocation, is susceptible to restrictions during time of drought. Taking into account the sustainability and reliance on the use of municipal

supplies, this alternative is thus not viable particularly in view of the large present and future water requirements.

- **Reclaimed Sewage (Treated Effluent)**

Although treated sewage effluent is available as an alternative to the use of potable water, the volume of treated effluent current available has already been allocated for other uses (pers. Comm. Mr. Pierre Maritz, Saldanha Municipality), with Mittal Steel being the primary user. Should treated effluent become available in the future it is doubtful whether the allocation would be sufficient to meet the water demands of the iron ore handling facility. Additional concerns associated with this as a possible source of water include the fact that, as in the case with municipal water, treated effluent is also susceptible to limitation in drought situations, as well as the high costs of infrastructure associated with the storage and transport of treated effluent from Saldanha and Vredenburg (10km and 13km away from the Iron Ore Terminal respectively). Treated effluent is thus not considered a viable option to supply the present and future water requirements of the Iron Ore Terminal.

- **Ground Water**

Groundwater of a good quality is a limited resource in the area. The Saldanha Port is located in the Berg Water Management Area, and there are no rivers located at, or near, the Port. According to the Groundwater Resources Impact Assessment (Appendix G2) there is no evidence of groundwater contamination at the Port; however groundwater in the area is saline (due to its proximity to the ocean). The salinity of the groundwater poses a high corrosion risk to the equipment at the iron ore handling facility. If groundwater were to be used for dust suppression at the Port, RO technology would still need to be employed to desalinate the water, and the brine would still need to be disposed of. In addition, there is insufficient groundwater resources in the vicinity of the iron ore handling facility, and thus additional water supply would still need to be sourced.

- **Seawater**

The use of untreated sea water, or ship ballast water in dust suppression will cause elevated corrosion rates on the equipment at the terminal and also significantly affect the iron ore quality by chloride contamination. These inevitabilities disqualify the use of sea water as an alternative water source.

In view of the above Transnet concluded that desalinated sea water, using Reverse Osmosis, is the most sufficient, reliable and viable alternative to supply the present and future water requirements for the Iron Ore Handling Facility.

7.4.3 Alternative Options for Disposal of Brine by-product

The following alternatives to discharging the brine back into the Bay have been identified and considered by the project team. *These primarily consider options for disposing of the brine by-product via land based alternatives*:

- **Evaporation Ponds**

The use of evaporation ponds for disposal of brine would allow for the water to evaporate from the brine, leaving salt, which could potentially be harvested. In order to deal with the volume of brine resulting from the RO plant (estimated at 4 400m³/day) initial calculations have indicated that an area of land approximately 2km by 2km in size will be required for the location of an evaporation pond of a suitable size. Additional infrastructure associated with the transfer of brine to the evaporation ponds would include pipelines, linings for ponds, pumps, roads, power, earth works, and buildings.

The use of sprinklers to assist with evaporation may help to reduce this size requirement; however this would increase operational costs, require additional water and would need to be managed very carefully (e.g. to eliminate the potential effect of brine spray on adjoining properties during windy conditions). The volumes of salt generated would require some form of disposal or a buyer would need to be found. This option is likely to have a higher (negative) impact on the groundwater in the area should the brine leak through the evaporation pond into the groundwater table. In addition, there is insufficient land area in close proximity to the iron ore handling facility that can be used to locate the evaporation ponds, and additional land would need to be purchased, which is likely to make this alternative very costly. If land were to be purchased it is likely that it would need to be rezoned for the purposes of an evaporator pond resulting in timeframes which are not aligned with the immediate need. Therefore, this option was not considered either reasonable or viable and was eliminated from the alternatives to be assessed in the BA process.

- **Piping brine to Saltworks**

The possibility of pumping brine to an existing saltworks in the area (e.g. Veldrif, *Cerebos*), thus allowing for the beneficial use of the brine was identified as an option. This would require agreement with a registered saltworks, as well as confirmation of sufficient capacity within the salt works to deal with the volumes of brine that would be produced.

It was assumed for this option that the RO Plant would be situated inside the port and the intake would be via intake wells. The discharge pipeline route would follow local roads in the area to avoid disruption to residential infrastructure as far as possible and to discharge the brine at (either) the Velddrif or Cerebos Salt Works. A municipal servitude may also be available for the laying of the pipeline in this alternative but would be subject to an agreement being reached between Transnet

and Saldanha Bay Municipality. Due to the long pipeline distance, up to six pumpstations would be needed, and it was assumed that the electrical supply for the pump stations would be available from the nearby residential development. Transnet would need to reach an agreement with the Velddrif or Cerebos Salt Works in order to discharge the brine to their works. The anticipated costs of building the discharge pipline to Velddrif for example is R23.2 million, which does not include land acquisition and legal costs.

During discussions with Cerebos Salt Works, they indicated that they have an excess capacity at the works for brine production and their bottle neck is in the salt refinery thus they would not be interested in purchasing the brine by-product from the RO Plant unless they were to upgrade their production. Their daily production is approximately 140 tons per day of raw salt, which is far lower than the potential 280 tons of salt that the RO Plant could deliver. The economic value of the brine is relatively low because of the concentration of the brine (6.3%) is fairly low (crystallisation of salt starts at 25%).

Brine discharge to Velddrif or Cerebos is very costly from a capital cost and an operational cost point of view due to the distances involved. The requirement to acquire servitudes outside of Transnet National Port Authority land could have long lead times and also be very costly. In addition, the length of the pipeline that will be required to supply the brine to the salt works, as well as the purchase of land for the pipeline servitude would be excessively high. Possible pipe leakages could affect the receiving environment, as well as the groundwater systems in the area. The energy requirement for pumping the brine such a long distance would contribute to the environmental impact of the project.

For these reasons the option of piping the brine to a salt works was not further investigated. These additional project related risks are not conducive with the immediate need for additional water supplies for use in dust suppression measures for current operations.

- **Evaporator and Crystalliser Plant**

In such a plant, an evaporator boils the brine at a low pressure, and the water evaporates resulting in a brine concentrate product. A crystalliser plant extracts the remaining water from the concentrated brine and produces salt crystals. Evaporator and crystalliser plants use large quantities of electricity to heat the brine, and are thus very energy intensive. Such a plant is susceptible to corrosion, and the cost of maintaining such a plant would be very high. The remaining salt which would result from this process would need to be stockpiled on the site and would either need to be disposed of or managed in some other manner.

The option of installing an evaporator and crystalliser plant was investigated by Transnet. However, the costs associated with the installation of such a plant

(approximately R70 million), as well as the high operating costs (mainly due to increased power supply needs) make this option unfeasible.

- **Discharging brine into Reclamation Dam**

The option of discharging brine into the existing reclamation dam, rather than directly into Small or Big Bay is an option that was identified during the BA process. This would however only be an interim arrangement as long term proposals for the Port indicate that the reclamation dam is likely to be fully reclaimed in the future. In addition, initial commentary by the marine specialist has indicated that discharge of the brine into the reclamation dam would also need to take the following factors into consideration:

1. The flushing ability of the reclamation dam is proportional to its surface area and will be affected by the existing inlet pipe which provides water exchange between the dam and Big Bay. The present exchange of seawater is fairly limited and this is likely to lead to a significant accumulation of salt in the reclamation dam, possibly resulting in the salt accumulating to an extent that would be untenable for any species (apart from a few specialised organisms) to survive in the dam.

2. The brine water would still be discharged into Big Bay via the inlet pipe which links the reclamation dam and the Bay, and thus would in effect be similar, if not the same as, discharging directly into Big Bay.

The option of discharging the brine into the dam was thus not considered viable based on future plans for the reclamation of the dam as well as the likelihood of rendering the dam largely uninhabitable if brine is discharged into this enclosed area.

7.4.4 Alternative *Discharge Pipeline* Locations *(outside immediate Bay)*

An **off site location (outside Saldanha Bay)** for the RO Plant was considered by Transnet. There would be many risks with locating an RO installation outside of the site where *it is more difficult to control and maintain*, and therefore it was assumed that only the RO supply and discharge pipes would be installed to an external location, either Jacobs Bay or to Veldrif, further north along the coast. *In both alternative sites* intake and discharge sites were chosen to avoid disruption to residential infrastructure as well as minimising distance. *Additional alternatives for the discharge of the brine outside the Bay have also been considered including laying a discharge pipe on the sea floor to beyond the breakwater, burying the discharge pipe in the sea bed to the breakwater, and directional drilling of the pipeline to the breakwater.*

- ***Discharge pipeline to Jacobs Bay***

The RO installation would be situated within the Port, *and the sea water intake would be from intake wells.*

The discharge pipeline material would be PVC and it would be buried in a trench approximately one metre deep along the proposed pipe route which follows the local roads in the area. A municipal servitude may be available for laying the pipeline; this would be subject to an agreement being reached between Transnet and Saldanha Bay Municipality. A sea water pump station at the intake would be required and a booster pump stations to boost the RO supply water over the long pipe distance. Similarly the brine discharge pipe would need *up to three* booster pump stations over the long pipe distance. Electrical supply for the pump station was assumed from the nearby residential development (this assumption would need further investigation as it may be problematic to secure power from a residential supply. *For example, there may not be sufficient capacity to supply a pump station or there may not be a 400 volt supply near to the pump station*). *Pipe jacking would also be necessary in order for the pipeline to cross roads where traffic disruption would be problematic.*

According to Transnet studies, locating the RO Plant intake and discharge infrastructure *at Jacobs Bay* would be very costly relative to the more local Port locations (*estimated cost of building a discharge pipe to Jacobs Bay is R13.3 million excluding land acquisition and legal costs)*.

The time required to secure the necessary pipe line servitudes, including negotiating the use of existing Municipal servitudes could lead to a considerable delay in the project completion.

- ***Discharge pipeline laid on sea floor to beyond the breakwater***

This option would require the installation of a 1.6km long pipeline on the sea bed from the end of the reclaimed quay to the breakwater at Hoetjiespunt. The discharge pipeline would be routed over the breakwater and would be extended to discharge the brine in deeper water. Discharge structures at the breakwater would need to withstand rough seas, and the location of the discharge point would need to be specifically planned in order to minimise possible impacts on the sensitive area surrounding Marcus Island.

Although there should be no ships anchoring in this area, according to Transnet, geotechnical surveys done on the sea floor of the bay show evidence of anchor drag marks in the area that the pipe would be laid (directly between the quay and the breakwater). If the pipe was damaged as a result of ships dragging anchors then the RO Plant would need to be shut down while repairs are done. This outage of the plant may lead to water shortages in the Port for dust mitigation.

The pipe material would be high density polyethylene and it would be installed by floating the assembled pipe out to sea and using controlled submergence. The pipe would then be flooded with sea water and the air in the pipe released to decrease buoyancy – allowing the pipe to be lowered into position on the seabed. The pipe would be anchored to the sea floor using concrete collars. The installation and securing of the pipe would require extensive work by divers to be conducted within the operational shipping lanes.

A pipeline laid on the sea floor is influenced by hydrodynamic forces caused by currents. These hydrodynamic forces cause erosion and accretion of the seabed and can lead to scours developing under the pipe and its supports. This can result in a large free span of the pipeline which can lead to failure of the pipe.

Maintenance of pipelines under the bay would increase maintenance costs and difficulty due to the need for specialised divers to carry out any work on the pipe within the operational shipping lanes. Maintenance dredging activities in the operational shipping channel may also result in damage to the pipe line.

- ***Discharge pipeline buried in the sea bed***

This alternative was in response to the above-discussed alternative in the attempt to reduce the possibility of the discharge pipe being damaged by anchors in the bay. In this alternative the pipe would be buried at least 5 metres deep to avoid being caught by the anchors of the ships mooring in the bay. According to Transnet, the pipe would be approximately 1,6km long and would require approximately 20 000 m^3 of dredging in order to bury the pipe. This dredging would be in the shipping lanes and may cause disruption to operations if dredging activities are not scheduled to avoid incoming and outgoing vessels.

The largest single cost for the dredging would be the mobilisation and demobilisation costs for a backhoe dredger which would cost approximately R40 million. A backhoe dredger operates from a barge and has a long backhoe arm that can reach the sea floor. It operates by scooping material up onto another floating barge which then removes the material for temporary storage (on land). Once the trench has been dug the pipe would be installed by floating the pipe into position and using the controlled submergence to lower it into the trench. The trench would then be backfilled using the material that was temporarily stored. Blasting in shipping lanes may be required if rock outcrops are encountered.

There may also be a time delay to dredge and lay these pipes due to the time taken to mobilize a suitable dredger.

- ***Directional drilling of discharge pipeline***

Directional drilling and pipe jacking was also considered to install a pipeline from Site 3 to outside the Bay, underneath the shipping lanes. *The directional drilling would need to be through rock strata that have sufficient strength to keep the hole open during drilling and pipe installation. A full geotechnical study would be needed in order to determine the geology of the bay floor before any drilling can begin.*

Drilling is first done with a pilot hole of small diameter. The direction of the drilling is controlled in order to ensure that the pipe follows the correct route and exits the ground at the correct position. The hole is then reamed to the required diameter. A pullback pipe is then inserted and the new pipeline is installed by pulling it back through the drill hole from the drill exit hole. The entire pipe (1.6km long) is assembled and carefully supported in order to guide it into the drilled hole. In order to do this a jack up platform would be installed at the end of the iron ore quay. The jack up platform must be braced in order to withstand the forces required for drilling and pulling the pipe back through the hole. The drilling rig and ancillary equipment is installed on the jack up platform. Once drilling and pipe pullback is complete the equipment is removed and the pipe intake and outlet structures for the pipeline are installed.

The length of the pipe to the breakwater would be 1.6km, and the pipe would weigh approximately 80 tons. According to Transnet, this job is beyond the capability of drilling rigs currently in South Africa and a large enough drilling rig would need to be imported in order to do this job. The time required to secure a drilling rig from overseas could lead to substantial delays in completion of the project.

A budget price of R30 Million (only for the drilling) has been suggested.

The latter three options for discharge of brine outside of the Bay all have significant additional project related risks and would increase the cost per unit volume of water produced which would make the RO Plant financially unviable.

Taking into account that development in conjunction with engineering feasibility must consider social, environmental and economic costs and impacts, the various off-site alternatives considered for locating the RO Plant infrastructure external to TNPA land were considered unreasonable, not viable and hence were not further investigated by Transnet.

8 Description of the Affected Environment

The proposed RO Plant is located at Transnet's Iron Ore Handling Facility at the Port of Saldanha. The Port of Saldanha is located approximately 120 kilometres north of Cape Town (33°S, 18°E) in the Western Cape Province (refer to Appendix A) and the Iron Ore Handling Facility is located to the north of Saldanha Bay. The industrial activities at the Iron Ore Handling Facility have *affected the environment of* the proposed sites and their immediate surrounds and thus the preferred *RO Plant* site is not pristine. The environment of the general vicinity is described in more detail below.

8.1 Climate

The Saldanha Bay area is characterised by a semi-arid Mediterranean climate which is strongly influenced by the cold Benguela Current that moves up the west coast of Southern Africa. The dry summer months occur from October to April while the majority of precipitation occurs during the winter months. Maximum temperatures range from 20 - 30ºC and minimum temperatures range from 5 - 15ºC. Rainfall averages from 260 – 280 mm per year (South African Weather Service, 2007).

There is a strong seasonality in the winds of Saldanha Bay, and prevailing winds are predominantly from the south-west during summer and from the north and south west during winter. Summer winds can exceed 30km/hr for more than 20% of the time, but winter *winds* are not as strong.

8.2 Topography

The Port is situated on the northern shore of Saldanha Bay and the surrounding area is characterised by gently undulating coastal plains with low hills. The highest points in the area include Malgaskop (173m above mean sea level) to the west, Karringberg (175m above mean sea level) to the east, and Postberg on the Langebaan Peninsula (192.8m above mean sea level) to the south. Several smaller hills and outcrops of granite boulders are also evident in the surrounding area.

Site 1 is located adjacent to the reclamation dam in the beach area in Big Bay. The topography at this site consists predominantly of parabolic sand dunes and flat beach (below the High Water Mark). Site 2 is located on the shoreline in Small Bay adjacent to the Iron Ore Handling Facility, and the topography in the area has been altered by the Port and associated activities. Site 3 is on the quay and *comprises* reclaimed land and a concrete structure.

8.3 Vegetation

The description of the vegetation in the area surrounding the Port and at the alternative sites has been based on the Botanical Assessment, attached as (Appendix G1).

The vegetation of the area surrounding the Iron Ore Handling Facility is characterised by the Langebaan Dune Strandveld and the Saldanha Flats Strandveld vegetation types, dominated by calcrete flats *flora* and parabolic dune thicket. The Langebaan Dune Strandveld vegetation type is considered *Vulnerable* as 34% of its area has been transformed, while the Saldanha Flats Strandveld vegetation type is *Endangered* with some 55% of its habitat lost. There are four broad plant communities within the vicinity, namely:

- Dune Thicket pioneer vegetation and embryo and foredunes;
- Dune Thicket on stable fore- and back dunes;
- Dwarf Dune Thicket on calcrete hills; and
- Dwarf Dune Thicket on calcrete flats.

The primary dune systems found in the bay are of conservation importance and are vegetated by low, creeping pioneer species which are able to tolerate sand movement, wind and salt spray.

Of the 281 plant species recorded from 21 dune sites on the Saldanha Peninsula, 20 (7.1%) are on the Red Data List. A total of 177 plant species have been recorded from the calcrete flats flora with approximately 12 – 6.8% of these being Red Data species. A number of species are endemic to West Coast calcareous systems in both these vegetation types. A north/north-west-trending parabolic dune system is unique to this stretch of coastline which overlies an older, Late Pliocene (3.8 million years ago and younger) marine platform *at an elevation of 12m above sea level*.

Most of Site 1 is located in the primary dunes which are vegetated by low, creeping pioneer species able to tolerate sand movement, wind and salt spray. The dunes at Site 1 and in the near vicinity of the site are infested with woody aliens including several populations of *Acacia Cyclops* (Rooikrans). This invasion by alien vegetation is largely due to previous activities in the area. This site has, however, naturally recovered and is considered sensitive from a botanical perspective as there are a number of indigenous plant species at this site. Site 2 is located at the interface between the quay and the north-east corner of Small Bay and has been separated from the main dune system to the north by a road and railway line which has resulted in the loss of dune system functionality. The vegetation at this site has been severely impacted and only a few pioneer species remain. There is no vegetation found at Site 3. No endemic floral species are found at any of the sites; however one species *Helichrysum cochleariforme* (Duineteebossie kusduinevygie), found at Site 1 is on the current Red Data list.

8.4 Marine and Benthic environment

This section provides a summary of the marine environment based on the Specialist Marine Impact Assessment, attached as Appendix G3.

Saldanha Bay is linked to the Benguela System to the west and the large shallow Langebaan Lagoon *to the south*, which is listed as a Ramsar site of international importance (listed since 25 April 1988). The Saldanha Bay/Langebaan Lagoon complex represents a significant regional source of shelter from wave action along the highly exposed South African west coast. As such, it represents an important calm zone for many marine fish and invertebrate species (Day, 1959; Clark, 1997).

Saldanha Bay is the largest bay on the west coast of Southern Africa with an area of 57 km² (Siegfried, 1977). There are no significant rivers *discharging* into Saldanha Bay or Langebaan Lagoon and thus the Saldanha Bay-Langebaan Lagoon is a marine system. The inner bay is divided into a Small Bay and a Big Bay by a 4km long quay which was built in 1975. This quay significantly impacts the water circulation in Saldanha Bay. To the east of the quay is a man-made seawater dam (known as the "reclamation dam") which was built *during* construction of an oil pipeline from the iron ore quay. There is one inlet that lets sea water into and out of the dam, but the resultant tidal fluctuation is less than 10cm.

The tides along the west coast of southern Africa are semi-diurnal (two high and two low tides per tidal day). Saldanha Bay thus experiences similar tidal variations. The tidal characteristics for Saldanha Bay are typical of a micro tidal regime and indicate an approximate 2m tidal range during spring tides. The wave conditions inside the bay are sheltered compared to those outside the bay. This is due to the narrow channel between Marcus Island and Elandspunt which slows the velocity at which the waves move towards the land.

The salinity of the inshore waters along the west coast typically varies between 34.6 - 34.9 psu (practical salinity units – same as parts per thousand) and the salinity values for Saldanha Bay generally fall within this range. During summer months wind-driven coastal upwellings bring cooler, less saline water into Saldanha Bay. The result is that the salinity within the bay is slightly lower in summer than in winter. In terms of dissolved oxygen levels in the Bay, Small Bay experiences a fairly regular oxygen deficit during the late summer and winter months, whilst Big Bay experiences less frequent and lower magnitude oxygen deficits. The oxygen deficit in Small Bay can be largely attributed to anthropogenic causes, namely reduced flushing rates (due to the causeway and construction of the quay) and discharges of organic-rich effluents from fish processing factories (Sea Harvest, Southern Seas Fishing, SA Lobster Exporters & Live Fish Tanks). Saldanha Bay, although considered by many to be an "enclosed system" is better described as a less-flushed ecosystem as the flow of water in the Bay is limited compared to the outside the Bay.

The waters of Saldanha Bay support an abundant and diverse fish fauna. Dominant species in Saldanha Bay and Langebaan Lagoon are harders (*Liza richardsonii*), silversides (*Antherina breviceps*) and gobies (*Caffrogobius* sp.). Other fish species in the bay include the white stumpnose (*Rhadosargus globiceps*), West Coast steenbras (*Lithognathus aureti*), steentjie (*Spondyliosoma emarginatum*), gurnard (*Cheilidonichtyes capensis*), Cape sole (*Heteromyctus capensis*), super klipvis (*Clinus superciliosus*), and sand shark (*Rhinobatos annulatus*).

Occasional sightings of five whale species have been recorded within Saldanha Bay, namely the Killer whale (*Orcinus orca*), Humpback whale (*Megaptera novaeangliae*), Southern Right whale (*Balaena glacialis*), while the Minke (*Balaenoptera acutorostrata*) and Bryde's (*B. edeni*) whales have been recorded in the outer bay between Malgas, Jutten and Marcus Islands. Dusky dolphins (*Lagenorhynchus obscurus*) and Heaviside's dolphin (*Cephalorhynchus heavisidii*) have been observed along the seaward side of the Marcus Island causeway.

Saldanha Bay and the associated islands within the bay provide important shelter, feeding and breeding habitat for at least 53 species of seabirds and Langebaan Lagoon provides an important habitat for 67 species of waterbirds, half of which are waders.

Most of the commercial marine activities in Saldanha Bay are concentrated in Small Bay or just outside Small Bay, while Langebaan Lagoon remains largely pristine. The Transnet National Ports Authority has set aside a total of 395ha (3 950 000m²) of sea area within Saldanha Bay for mariculture activities, of which 200ha are situated in Big Bay, 130ha are located in Small Bay and a further 65ha lie adjacent to the breakwater and Small Craft Harbour. Mussel farming, oyster farming and commercial harvesting of seaweed are some of the marine aquaculture operations currently undertaken in Saldanha Bay.

There are a number of MPAs in the Saldanha Bay region, including:

- Langebaan Lagoon MPA
- Sixteen Mile Beach MPA
- Malgas Island MPA
- Jutten Island MPA
- Marcus Island MPA

Currents and wave action in Saldanha Bay have been impacted by the construction of the quay which divides the bay into Big Bay and Small Bay. This man-made construction has resulted in Small Bay being more sheltered and therefore calmer and less dispersive than Big Bay which is a much more dispersive environment. The beach area at Site 1 experiences heavier wave action (although wave action at this site is low to moderate in general) than Site 2 which is located on the shore of Small Bay.

The current and wave action at Site 3 (located on the quay between Small Bay and Big Bay) is also impacted on by ship movement.

8.5 Geohydrology

The geology of the area is dominated by three different geological units, namely the Malmesbury Group, the Cape Granite Suite and the unconsolidated Cenozoic coastal deposits. The Cenozoic coastal deposits are recognised as a major aquifer system in excess of 10m thick. Two aquifers occur in the vicinity of the site, namely a natural aquifer in the rock formations on land and a man-made aquifer in the fill material of the reclaimed land from previous port expansions. Groundwater in these aquifers is of a very poor quality and is unfit for domestic, irrigation, certain agricultural and most industrial uses. Borehole yields in the area are generally low. Groundwater at Site 1 and Site 2 consists of a mixture of groundwater and sea water, and the salinity of the groundwater is likely to vary according to the tides (i.e. more saline at high tide than at low tide due to water ingress). Site 3 is on reclaimed land underlain by fill material saturated with seawater below the water level.

8.6 Socio-Economic Environment

The Port of Saldanha falls within Saldanha Bay Local Municipality, in the West Coast District Municipality. The local municipality encompasses the towns of Saldanha, Langebaan and Vredenburg.

The Saldanha Bay Local Municipality covers an area of 1 767km² and has a population of 88 000. More than 75% of the municipality's population live in Vredenburg, Saldanha or Langebaan. Unemployment is a big problem in the area, especially for people who do not have suitable qualifications. According to the Socio-Economic Impact Assessment conducted in 2000 (Van Zyl & Malan, 2000) the social environment affected by Transnet Port Terminals (TPT) and Transnet National Ports Authority (TNPA) has experienced radical changes since the establishment of Mittal Steel.

Until the construction of the R27 provincial road in the 1970's, Saldanha Bay was a relatively isolated area only accessible by road via a long drive from Cape Town via the towns of Malmesbury and Darling. The construction of the road and the establishment of the deep water harbour has seen massive development take place. Despite the growth in the area there is still areas that retain the sense of wilderness that until recently characterised the area.

Water is a scarce resource in the region, and municipal water allocations are limited and controlled. Thus, water supply is under pressure for all users in Saldanha Bay, especially users of water for industrial processes.

The sheltered harbour of Saldanha Bay hosts many industries, including mariculture and tourism in addition to the Saldanha iron ore project. Mariculture in Saldanha Bay

mainly occurs in Small Bay, and thus brine discharge into Small Bay may impact on these industries more than discharge into Big Bay.

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9 Public Participation Process

Public participation is an integral aspect of any environmental impact assessment process and should aim to engage stakeholders meaningfully at all levels throughout the project, to ensure that the views of the public on the project are taken into consideration by decision-makers. Public participation therefore involves consultation with, amongst others, the general public, nearby communities, relevant authorities and community-based and non-governmental organisations.

The aim of the public participation process undertaken as part of this BA process is to:

- Promote a responsible and transparent approach to the proposed project; and
- Ensure the consideration of I&APs input in the decision-making process.

The public participation process commenced in June 2007, when PDNA/SRK JV released a Background Information Document (BID) (Appendix E2) and placed print advertisements in the media (Appendix E4). These informed the public of the Basic Assessment process to be undertaken. As required by the EIA Regulations, all property owners within 100m of the site were notified of the proposed development in writing and notices of the proposed development were placed on the site (Appendix E1).

The BID (and other relevant documentation) invited the public to register as I&APs. A list of registered I&APs has been included as Appendix E3.

A 30-day comment period followed, during which I&APs could submit comments and raise issues and concerns regarding the proposed development. The comments and issues raised were addressed in the various specialist studies which were undertaken *for the* Draft Basic Assessment Report (see Appendix E and G).

In December 2007 an Update Newsletter (see Appendix E7) was released to all I&APs to provide an update for I&APs on the BA process for the proposed RO Plant. This is not a requirement in terms of the EIA Regulations, but was requested by Transnet in an attempt to improve communication between the EIA project team and I&APs. Comments received on the Update Newsletter are available in Appendix E8.

The Draft Basic Assessment Report was released for public review and comment on 18 February 2008. All registered I&APs were notified of the release of the document by post, email or fax and a copy of the Executive Summary of the Draft BA Report was circulated to these I&APs. The release of the report was also advertised in the Cape Times, Cape Argus, Die Burger, Swartland & Weskus Herald and Weslander. Hard copies of the Draft BA Report were placed 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 report was also accessible electronically on SRK's website www.srk.co.za, *as well as on Transnet's website* www.transnet.co.za.

Stakeholders were provided with a 30-day comment period which commenced on 18 February 2008 and ended on 19 March 2008. Comments received have been included in this Final BA Report.

A Public Open Day was held on 5 March 2008 and members of the project team were available to discuss the information in the Draft BA Report. All registered I&APs were invited to attend the open day.

Focus group meetings were held with key I&APs to discuss the information in the Draft BA Report. Representatives from (among others) the Saldanha Bay Water Quality Forum Trust and the Cape West Coast Biosphere Reserve were consulted with.

The public consultation process is summarised in the table below. Those aspects of the public participation process which have already occurred have been shaded.

Table 9-1: Public Consultation Process

Activity	Date
Advertisements (in Cape Times, Cape Argus, Die Burger, Swartland & Weskus Herald and Weslander) to announce commencement of BA and register I&APs	14 June 2007
Distribution of BID	14 June 2007
1st Public Comment Period	14 June to 14 July 2007
Release of Update Newsletter	14 December 2007
Release of Draft BA Report for public review	19 February 2008
2nd Public Comment Period	19 February to 19 March 2008
Public Open Day & Focus Group Meeting's	1st - 2nd week of March 2008
Release of Final BA Report for public review	22 May 2008
3rd Public Comment Period	22 May to 23 June 2008
Submit Final BA Report to DEAT	Late July 2008

A number of I&AP's including residents from Saldanha Bay and surrounds, and various government representatives submitted initial comments on the proposed activity. Meetings were held with a number of government departments including

meetings Department of Water Affairs and Forestry (DWAF), MCM, DEAT and WCDM, as well as key I&APs who submitted comments.

The main issues that were identified during the 1st *and 2nd* round of public participation (refer to the Comments and Responses in Appendix E6) were addressed in the impact assessments of a number of specialists. The key concerns related to:

- 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.

9 Findings and Recommendations

9.1 Principal Findings and Key Decision-Making Factors

A number of specialist impact assessment studies have been completed and this section is largely based on the findings of these assessments. The specialist reports include:

- *Groundwater Resources Impact Assessment;*
- *Heritage Impact Assessment;*
- *Marine Impact Assessment; and*
- *Botanical Assessment.*

These specialist reports are availably in Appendix G.

The proposed development of a RO Plant at the Iron Ore Handling Facility at the Port of Saldanha will entail the so-called triple bottom line costs (i.e. social, environmental and economic costs). The challenge for the decision-maker (DEAT, in consultation with other relevant Departments) is to take a decision which is sustainable in the long term and which will probably entail tradeoffs between social, environmental and economic costs and impacts. The BA process has taken the principles of NEMA into consideration, and these principles have informed the proposed RO Plant location and layout. These principles include (among others) that development must be socially, environmentally and economically sustainable, pollution must be avoided or minimised and remedied, and negative impacts must be minimised.

It will be useful to reduce the decision factors presented in this report to the key points which DEAT should consider. These points – social, environmental and economic – constitute the principal findings of the Basic Assessment, assuming that the recommended mitigation measures will be effectively implemented, and are as follows:

- Transnet Limited are proposing to construct, and install, an RO Plant (and associated infrastructure) at the Iron Ore Handling Facility at the Port of Saldanha;
- Transnet are legally required to suppress iron ore dust generated at the Iron Ore Handling Facility, in terms of conditions of approval of the previous expansion of the facility (Phase 1B);
- Additional water supply is required to meet immediate dust suppression requirements at the Iron Ore Handling Facility. In addition, the proposed upgrade of the Port to increased export of iron ore will require additional water for dust suppression;

- A number of alternatives for dust suppression measures and water supply were considered prior to the start of the Basic Assessment process, *but were not viable and were excluded as alternatives mainly due to engineering constraints and prohibitive financial costs*, while some also had potential additional environmental concerns;
- Water is a scarce resource along the west coast of the Western Cape Province, and in the absence of a more suitable alternative, it is proposed that water be supplied to the port through the desalination of seawater, making use of Reverse Osmosis technology;
- The proposed RO would produce 3 600m³/day potable water once all three modules have been installed, although it is proposed that only one module be installed initially. All infrastructure will make allowance for the full capacity of the plant. The Basic Assessment and associated specialist studies have all considered impacts associated with the plant operating at full capacity;
- RO is the process whereby seawater will be forced through semi-permeable membranes under pressure, resulting in the production of fresh water, and producing a high salinity brine as a waste product;
- Brine produced as a result of the RO process (approximately 4 400m³/day brine once operating at full capacity) containing certain biocides will be discharged into Saldanha bay, while wastewater from the cleaning process containing potentially harmful chemicals will be disposed of either via the municipal sewer system, or at a waste disposal site;
- It is proposed that the RO Plant be located at the Iron Ore Handling Facility in Saldanha Bay, and three site alternatives within the Port boundaries have been identified and assessed;
- The three sites proposed for the RO Plant are *on Transnet's property*, and the area is already heavily impacted on by industrial activities;
- For each of the site alternatives, various infrastructure alternatives have been identified, relating mainly to the methods of seawater intake and discharge (beach/quay wells vs pipelines) and the positions of the intake and discharge infrastructure;
- Site 1 (with beachwell intake and beachwell discharge) was originally the preferred alternative; however following initial consultation with numerous specialists a number of additional alternatives were developed and assessed, and the preferred alternative evolved - Site 3 (with intake wells along the quay, and discharge via a pipeline situated towards the end of the quay);
- The construction footprint of the RO Plant and associated infrastructure varies from 11 000m² to 23 000m² (1.1 – 2.3 ha), depending on the site, intake infrastructure and discharge infrastructure;

- 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 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 at least one 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, while there is no flora at Site 3;
- No heritage resources of significance have been identified at any of the alternative sites;
- No groundwater impacts associated with the proposed intake or discharge for the RO Plant of significance have been identified, although geohydrological studies have indicated that the initial proposal for discharge via beachwells at Site 1 would not be viable due to the nature of the sediments in the area;
- Discharge of brine will result in the creation of plumes of brine, which are of a higher salinity, contain biocides or co-discharged water and have a potentially slightly higher temperature than the receiving water, before the brine is dispersed and mixed with the surrounding seawater;
- Chemicals used for cleaning the RO membranes (CIP chemicals) will not be discharged with the brine but will be disposed of via the municipal sewer system or a waste disposal site;
- Modelling of the brine discharge plumes (by the marine specialist, refer to Appendix G3) for each of the following factors:
    - Increased salinity;
    - Increased seawater temperature;
    - Increased biocide *concentrations*; and
    - Potential co-discharge impacts (as a result of the use of certain chemicals in the pre-treatment or RO membrane cleaning process)

  indicate that these plumes do not extend as far as any existing or proposed mariculture activities, seawater intakes for fish processing factories, recreational and commercial gill-netting areas, National Parks, MPAs, or the Langebaan Lagoon if the RO plant is positioned at Sites 1 or 3;
- At Site 2, however, the plumes for increased salinity, increased seawater temperature, increased biocide *concentrations* and potential co-discharged constituents extend close to the eastern boundary of the area demarcated for seaweed harvesting.

Relevant observations with regard to the overall **impact ratings**, assuming mitigation measures are effectively implemented, are:

- The predicted *high to very high botanical impacts* associated with the construction of the RO Plant building and associated infrastructure at Site 1;
- The predicted *medium impact* on local floral biodiversity and Red Data flora species associated with the construction of the RO Plant building and associated infrastructure at Site 1;
- The predicted *high impact* of loss of dune function associated with the construction of the RO Plant building and associated infrastructure at Site 1;
- The predicted *insignificant impact* on vegetation and flora associated with the construction of the RO Plant building and associated infrastructure at Sites 2 and 3;
- The predicted *insignificant impact* on groundwater resources at all of the sites;
- The predicted *very low to insignificant impact* on heritage resources associated with the drilling of beach wells / boreholes at all of the sites;
- The predicted *medium impact* on marine species associated with the construction of the RO Plant building and associated infrastructure at Site 1 and 2;
- The predicted *very low impact* on marine species associated with the construction of the RO Plant building and associated infrastructure at Site 3;
- The predicted *insignificant noise impact* associated with the operation of the RO Plant;
- The predicted *insignificant impact* associated with the contamination of the groundwater system as a result of accidental spillage and leakage of chemicals at the RO Plant;
- The predicted *low impact* on salinity levels associated with the brine discharge via pipeline at either of the three sites;
- The predicted *low impact* associated with the temperature of the brine discharged via pipeline at Site 1 and 3;
- The predicted *low to medium impact* associated with the temperature of the brine discharged via pipeline at Site 2;
- The predicted *very low impact* associated with the addition of oxygen-scavenging compounds (such as heavy metals, carbon, organic matter etc) in the brine discharge;
- The predicted *low impact* associated with the addition of oxidising biocides (NaOCl) in the brine discharge;
- The predicted *low impact* associated with the addition of non-oxidising biocides (DBNPA) in the brine discharge at Site 1 and 2;

- The predicted *very low impact* associated with the addition of non-oxidising biocides (DBNPA) in the brine discharge at Site 3;
- 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 biota as a result of entrainment due to pipeline intake;
- The predicted *insignificant impact* on biota as a result of entrainment due to beach well/pipeline intake; and
- The predicted *insignificant impact* on sediment dynamics due to brine discharge.

Cumulative impacts associated with the proposed construction and operation of the RO Plant include:

- The potential *low negative impact* on the marine environment and the quality of water in Saldanha Bay. There are a number of existing activities that potentially have a negative impact on the quality of the marine environment in Saldanha Bay including discharges from seafood processing industries, sewage entering the marine environment, storm water runoff entering the marine environment, port activities and associated ship traffic as well as activities associated with smaller harbours. The main pollutants in the discharges from the seafood industries are inorganic nitrogen, organic nitrogen and carbon, suspended solids and microbiological contaminants. The brine discharge from the proposed RO Plant *will be a minor addition* to these existing impacts in the Bay (i.e. cumulative impact).
- The potential *negative impact* on the sensitive coastal dune habitat (Site 1 only). Development along the coastline within the Bay has impacted on the natural habitats and ecosystem the parabolic dunes provide. Additional development in the dune system as envisaged at Site 1 will result in a significant loss of 2ha of natural habitat.
- *The potential low negative visual impact resulting from increased development at the Port of Saldanha. It is anticipated that, with the current and proposed development at the Port the RO Plant would result in a minor addition to this cumulative impact.*
- While *water supplied by the RO Plant will* make a *positive contribution* in terms of dust mitigation, this will not, strictly speaking, be considered a positive impact, as dust mitigation is a requirement of the authorisation of the Iron Ore Handling Facility. However, the benefits of the RO Plant in providing a sustainable and reliable water supply to ensure that suitable dust mitigation can take place, without placing additional pressure on the scarce water resources in the area, need to be recognised.

The evaluation and the basis for the discussion on the "preferred alternative" are represented concisely in Table 10-1 below.

Table 9-1: Impact Rating Summary for the proposed RO Plant, Assuming Mitigation

Key Impacts	Impact Rating of Alternatives, with Mitigation									Environmental Suitability Ranking[1]		
	1a	1b	1c	2a	2b	3a	3b	3c	3d	Site 1	Site 2	Site 3
BOTANICAL IMPACTS												
Loss of & impact on dune vegetation	VH	H	H	L	L	-	-	-	-	3	2	1
Impact on local biodiversity & Red Data Species	M	M	M	-	-	-	-	-	-	2	1	1
Impact on system connectivity	M	L	L	-	-	-	-	-	-	2	1	1
Loss of dune function	H	H	H	-	-	-	-	-	-	3	1	1
Impact on conservation status of vegetation types	M	M	M	-	-	-	-	-	-	2	1	1
GEOHYDROLOGICAL IMPACTS												
Impact on local groundwater	I	I	I	I	I	I	I	I	I	1	1	1
Increased salinity of near shore groundwater system	I	I	I	I	-	-	-	-	-	1	1	1
Disturbance of natural groundwater system conditions	-	-	I	I	-	-	-	-	-	1	1	1
Contamination of groundwater system	I	I	H	I	I	I	I	I	I	2	1	1
HERITAGE IMPACTS												
Impact on cultural heritage resources	VL	VL	VL	I	I	I	I	I	I	1	1	1
MARINE IMPACTS												
Impact on marine environment due to construction of intake infrastructure	M	M	M	M	M	VL	VL	VL	VL	2	2	1
Impact on marine environment due to construction of discharge infrastructure	VL	VL	VL	M	M	M	M	VL	VL	1	2	1
Impact of brine discharge on increased salinity levels	L	L	-	L	L	L	L	L	L	1	1	1
Impact of brine discharge on temperature	L	L	-	L-M	L-M	L	L	L	L	1	2	1
Impact of the addition of oxygen-scavenging compounds in the brine discharge	VL	VL	-	VL	VL	VL	VL	VL	VL	1	1	1
Impact of brine discharge with increased Oxidising Biocides (NaOCl)	L	VL	L	VL	-	-	-	L	L	1	1	1
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA).	L	L	L	L	L	VL	VL	VL	VL	1	1	1
Impact of co-discharged constituents	VL	-	-	VL	VL	VL	VL	VL	VL	1	1	1
Impact of entrainment of biota	I	L	I	I	L	L	L	I	I	1	1	1
Impact of flow distortion	L	L	-	L	L	L	L	L	L	1	1	1
Impact of sediment dynamics due to brine discharge	I	I	-	L	L	L	L	I	I	1	1	1

Note: This concise table necessarily "averages" impacts in an attempt to facilitate comparison between the range of impacts.

Ranking is from most preferred (1) to least preferred (3), or unacceptable ⦸ = environmentally unacceptable

Legend: I = Insignificant, VL = Very Low, L = Low, M= Medium, H = High, VH = Very High, - = Not Applicable

10.2 Conclusion - Preferred Alternative

From the outcomes of the specialist studies it can be demonstrated that the predicted effects of discharging brine and backwash waters into the sea (together with the implementation of recommended monitoring plans) does not *have unacceptable impacts.*

Site 3 is the preferred site from a botanical perspective, although Site 2 is preferred over Site 1 due to past disturbance at this site and the isolation of the primary dunes from the parabolic dunes. In addition Sites 2 and 3 do not support any rare nor endemic species. Site 1 is not recommended because of the major impacts on a highly sensitive and fragile primary dune system and the intensive management and maintenance requirements of constructing and operating an RO Plant in this unstable environment.

All three sites are considered environmentally suitable for the location of the RO Plant from a heritage perspective, provided mitigation measures are effectively implemented. **Sites 2 and 3** are preferred from a heritage perspective, while Site 1 is marginally less favoured as there is a slight chance that impacts of low consequence may result in fossil bearing sediments being penetrated during beach well construction.

There is no natural groundwater at Site 3, and thus from a groundwater contamination perspective **Site 3** is the preferred site. From a feasibility perspective of a beach well abstraction, Site 1 and 2 have the same impact on the groundwater.

Site 3 (with a discharge at Caisson 3) is the option with the least potential impacts on the marine environment, and is therefore the preferred alternative, followed by Site 3 (with a discharge into Small Bay or Big Bay), and then Site 1. The least preferred option from a marine perspective is Site 2. Provided that intake beach wells are installed at Site 1 and that these beach wells result in significantly lowered use of biocides and reduced co-discharge of cleaning chemicals, Site 1 is preferred over Site 3 with a discharge into Small Bay. It should be noted that, despite the fact that Site 3 with a discharge into Small Bay is assessed as not having significant impacts, the discharge will be into Small Bay, which is perceived to be relatively poorly flushed, and is also perceived to be susceptible to poor water quality due to existing discharges. Although Site 2 with its discharge into the north east corner of Small Bay results in the largest effluent plumes, it could be deemed to be acceptable for the present project description. It is, however, not recommended due to the higher risks associated with a discharge into a relatively quiescent region of the relatively poorly flushed Small Bay.

Site 3 is the preferred alternative as it will have the least impact on the vegetation, groundwater, (possible) heritage resources, and marine system as it is already a disturbed area. The preferred layout at Site 3 is borehole intake on the quay (next to

the Multi-purpose Terminal) and brine discharge at the end of the quay at Caisson 3 (**3d**). Intake boreholes will help to reduce chemical pretreatment which will reduce the impact of these chemicals on the environment. Discharge at Caisson 3 will also have the potential mitigating effects of propeller wash[14] which will help disperse the brine.

PDNA/SRK JV believes that sufficient information is available for DEAT to take a decision. PDNA/SRK JV believes that, with the implementation of the recommended mitigation measures, the proposed RO Plant (**3d – preferred alternative**) would be environmentally acceptable.

*It is important that the additional costs and significant additional project related risks associated with the discharging of brine **outside** of Saldanha Bay be considered and balanced in conjunction with the outcomes of the marine and other specialist studies which assigns impact ratings to the potential environmental impacts associated with discharging brine **within** Saldanha Bay.*

10.3 Recommendations

10.3.1 General Recommendations

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.

The general recommendations are to:

- Commit to and effectively implement the **essential** mitigation measures listed in this Basic Assessment Report and in the Basic Assessment Form;
- 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) water quality monitoring, on site storage of chemicals as well as waste management on site.

10.3.2 Specific Recommendations and Mitigation Measures

It is assumed that the following **essential mitigation measures**, designed to manage impacts associated with the proposed RO Plant will be implemented if the proposed project is approved. The specific recommendations and mitigation measures provided

[14] This is not a constant and has thus not been considered in the specialist assessments.

in this section are based on the preferred alternative (**3d)**. Should one of the other alternatives assessed as part of this BA process be approved, additional mitigation measures, as detailed in the specialist studies (refer to Appendix G) and the Basic Assessment Form (Section 2 of this report) will need to be implemented. It should be noted that many of the mitigation measures specific for alternative 3d have already been incorporated into the proposal, but have been included here to ensure that they would become conditions of approval of the proposed development.

Essential mitigation measures for Botanical impacts:

1. Locate the reservoir (preferred reservoir) at the greatest distance from the dunes.

Essential mitigation measures for Noise impacts:

1. House the RO Plant, including pressurization pumps in a sound proofed building with internal acoustic treatment, to ensure that noise from the plant does not exceed 85dBa *within 1m from the source*.
2. Internal noise must also be limited to below 85dBa as measured from 1m from the source as per the Occupational Health and Safety Act requirements.
3. *Limit construction activities to normal working hours (i.e. 07:00 – 17:00).*

Essential mitigation measures for Geohydrological impacts:

1. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during borehole construction.
2. 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.

Essential mitigation measures for Marine impacts:

1. Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
2. Use sub-surface intakes (i.e. beach wells/boreholes).
3. Design pipeline discharge with an optimal diffuser.
4. *Control dosing of biocides based on feedback from monitoring systems.*
5. Develop a monitoring programme (as discussed in the Marine Specialist Assessment) to monitor the impact of the brine on potentially affected communities, particularly the subtidal benthic communities. The following must be included in the monitoring programme:
    a) *Monitoring of dissolved oxygen in the near bottom waters in the immediate vicinity of the discharge and at a nearby reference site to confirm that backwash material does not affect the dissolved oxygen concentrations;*

b) Monitoring of the RO Plant effluent for heavy metals after commissioning of the RO Plant;

c) Toxicity testing of the RO Plant effluent at the discharge point for a full range of operational scenarios (i.e. shock-dosing);

d) Monitoring to ensure that tainting substances are absent from the RO Plant effluent; and

e) Monitoring to confirm performance of the discharge system and the numerical model predictions.

General essential mitigation measures:

1. Limit the usage of chemicals in the RO process and in the cleaning process to those listed and assessed in this report. If any additional chemicals proposed for use in the RO process and in the cleaning process are proposed DEAT, DWAF and DEA&DP 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.*
2. 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.
3. Formulate and implement a CEMP and *additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project* that includes specifications to address the following:

   Construction Phase:

   a) Management of accidental spills of chemicals, fuel, oil and / or grease;

   b) Vehicle maintenance and refuelling; and

   c) Concrete works.

   Operational Phase:

   a) Develop a monitoring programme to monitor the discharge of brine; and

   b) Storage of chemicals on site.
4. Do not dispose of wastewater associated with the cleaning and backwashing of the RO membranes via the municipal sewer system without written confirmation from the relevant authority, who must be made aware of all the chemicals contained in the wastewater.

Optional mitigation measures, which would further assist in reducing the environmental impacts associated with the proposed RO Plant, but the implementation of which cannot be guaranteed (and have thus not been considered in the assessment of the significance of environmental impacts) have also been listed in

the specialist studies. These mitigation measures should be considered by Transnet, who should have suitable motivation if not implemented.

11 Way Forward

The *Final* Basic Assessment Report is currently available **from the *22nd of May to the 23rd of June 2008*** for public comment, following which the Final Basic Assessment Report will be *submitted to DEAT for a decision. The Executive Summary of the Final Basic Assessment Report was sent to all registered I&APs.*

Full copies of the report are available for review 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** (via the 'public documents' link) or on Transnet's website **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* Basic Assessment Report should be submitted by ***23 June 2008*** to:

Sharon Jones

SRK Consulting	Tel: 021 – 659 3060
Postnet Suite #206	Fax: 021 – 685 7105
Private Bag X18	Email: sjones@srk.co.za
Rondebosch 7701	

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.

Section 2: Basic Assessment Application Form

Section 3: Basic Assessment Report Form

Section 4: References

References

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Section 5: Appendices

Appendix A: Locality Map

Appendix B: Site Plans & Additional Figures

Appendix B1: Site Alternatives

Appendix B2: Site Alternative 1a Site Plan

Appendix B3: Site Alternative 1b Site Plan

Appendix B4: Site Alternative 1c Site Plan

Appendix B5: Site Alternative 2a Site Plan

Appendix B6: Site Alternative 2b Site Plan

Appendix B7: Site Alternative 3a Site Plan

Appendix B8: Site Alternative 3b Site Plan

Appendix B9: Site Alternative 3c Site Plan

Appendix B10: Site Alternative 3d Site Plan

Appendix B11: Preferred Main Storage Reservoir Location

Appendix B12: 2nd Preferred Main Storage Reservoir Location

Appendix B13: 3rd Preferred Main Storage Reservoir Location

Appendix B14: RO Plant Building Layout

Appendix B15: RO Process Diagram

Appendix C: Owner(s) Consent(s)

(NOT APPLICABLE)

Appendix D: Site Photographs

Appendix E: Public Participation Information

Appendix E1: Photograph of notice board at the 3 sites

Appendix E2: Copy of BID sent to identified I&APs

Appendix E3: List of Registered I&APs

Appendix E4: Proof of Advertisement

Appendix E5: Comments Received

Appendix E6: Comments and Responses Report

Appendix E7: Update Newsletter

Appendix E8: Comments received on Update Newsletter

Appendix F: Relevant Permits and Licenses from Other Organs of State

Appendix G: Specialist Reports

Appendix G1: Botanical Impact Assessment

Appendix G2: Groundwater Resources Impact Assessment

Appendix G3: Specialist Marine Impact Assessment

Appendix G4a: Heritage Impact Assessment

Appendix G4b: Heritage Application: Notice of Intent to Develop

Appendix H: Additional Documents

Appendix H1: Recommendations from Mackenzie Hoy and Associates Consulting Acoustic Engineers

Appendix H2: PDNA/SRK JV Terms of Reference

Appendix H3: Notice of Intent to complete a BA

Appendix H4: DEAT acceptance of Notice of Intent to complete a BA

Appendix H5: Letter of confirmation for water allocation

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