

WESTERN CAPE DEPARTMENT OF ENVIRONMENTAL AFFAIRS AND DEVELOPMENT PLANNING



Basic Assessment Report in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2006

JULY 2006*

Kindly note that:

1. This **Basic Assessment Report** is the standard report required by DEA&DP in terms of the EIA Regulations, 2006 and must be completed for all Basic Assessment applications and submitted together with the application form.
2. This report is current as of 1 July 2006. It is the responsibility of the Applicant / EAP to ascertain whether subsequent versions of the report have been published or produced by the competent authority.
3. The required information must be typed within the spaces provided in the report. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. It is in the form of a table that can extend itself as each space is filled with typing.
4. Incomplete reports may be rejected or returned to the applicant for amendment.
5. The use of "not applicable" in the report must be done with circumspection. Where it is used in respect of material information that is required by the competent authority for assessing the application, this may result in the rejection of the report as provided for in the regulations.
6. No faxed or e-mailed reports will be accepted.
7. The report must be compiled by an independent environmental assessment practitioner.
8. Unless protected by law all information contained in, and attached to this report, will become public information on receipt by the competent authority. Upon request, any interested and affected party should be provided with the information contained in and attached to this report. During any stage of the application process, the information contained in and attached to it must be provided by the applicant / EAP.
9. This report must be submitted to the Department at the postal address given below or by delivery thereof to the Registry Office of the Department. Should the report and attached information not be submitted to the addresses given below it will be rejected.

DEPARTMENTAL DETAILS

CAPE TOWN OFFICE REGION A (Breede River/ Winelands, City of Cape Town: Tygerberg and Oostenberg Administrations)	CAPE TOWN OFFICE REGION B (West Coast, Overberg, City of Cape Town: Helderberg, South Peninsula, Cape Town and Blaauwberg Administrations)	GEORGE OFFICE (Eden and Central Karoo)
Department of Environmental Affairs and Development Planning Attention: Directorate: Integrated Environmental Management (Region A2) Private Bag X 9086 Cape Town, 8000 Registry Office 1 st Floor Utilitas Building 1 Dorp Street, Cape Town Queries should be directed to the Directorate: Integrated Environmental Management (Region A2) at: Tel: (021) 483-4793 Fax (021) 483-3633	Department of Environmental Affairs and Development Planning Attention: Directorate: Integrated Environmental Management (Region B) Private Bag X 9086 Cape Town, 8000 Registry Office 1 st Floor Utilitas Building 1 Dorp Street, Cape Town Queries should be directed to the Directorate: Integrated Environmental Management (Region B) at: Tel: (021) 483-4094 Fax (021) 483-4372	Department of Environmental Affairs and Development Planning Attention: Directorate: Integrated Environmental Management (Region A1) Private Bag X 6509 George, 6530 Registry Office 4 th Floor, York Park Building 93 York Street George Queries should be directed to the Directorate: Integrated Environmental Management (Region A1) at: Tel: (044) 874-2160 Fax (021) 874-2423

View website the Department's website on <http://www.westerncape.gov.za/eadp> for the latest version of the documents

* DEA&DP have confirmed that this is the latest form for use.

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.

SECTION A: ACTIVITY INFORMATION

1. ACTIVITY DESCRIPTION

(a) Is the project a new development or an upgrade of an existing development?	✓ YES, the project is a new development	NO
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(b) Clearly describe the activity and associated infrastructure for which you are applying.

The proposed activity is to generate potable water[†] to the same quality of the existing municipal supply at the Saldanha Bay iron ore handling facility using Reverse Osmosis (RO) technology to desalinate seawater. 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 is shown in **Appendix B15**.

The proposed RO desalination plant will consist of up to three RO modules, each with a capacity to produce 1 200m³/day of potable water (3 modules with a total capacity of 3 600m³/day potable water). Approximately 4 400m³/day of high salinity solution (brine) will be produced once the plant is operating at full capacity and will be discharged into the sea. The RO Plant, as well as associated infrastructure, includes:

- A 200 kilo litre (kl) *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 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 megalitres (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 the 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 of up to 200m³ capacity in which brine will be stored in prior to being released back into the sea,
- Up to 3 CIP (Clean In Place) Backwash tanks each with a capacity of 20m³ to store 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,
- Seawater intake and brine discharge structures,
- A RO containment building with room for up to three RO modules, an electrical substation, a motor control room, a pump house, a store room, office and ablution facilities, and space for a parking area (refer to figure in **Appendix B14**),
- Interconnecting infrastructure including electrical and communication wiring for the RO system,
- A small service road (approximately 3 m wide).

The 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 to the Multi-purpose Terminal and discharge of brine into the sea via a pipeline, towards the end of the quay (at caisson 3). Discharge would thus essentially be into Big Bay. Note that this proposal is the preferred alternative (alternative 3d) discussed below, although three site alternatives, with various infrastructure alternatives for each site have been considered.

(c) Please provide details of all components of the proposed project and attach diagrams (e.g. architectural drawings or perspectives, engineering drawings, process flow charts etc.).

Buildings	✓ YES	NO
Provide brief description:		
A containment building for the RO Plant is needed with room for up to three RO modules, an electrical substation, a motor control room, a pump house, a store room, offices and ablution facilities. The footprint of the building will be approximately 60m x 40m (2400m ²). Refer to figure in Appendix B14 for an illustration of the building layout. The building will be approximately 5-10m high.		
Infrastructure (e.g. roads, power and water supply/ storage)	✓ YES	NO
Provide brief description:		

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

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<p>A small service road 3m wide will be required to connect the RO building to the nearest road infrastructure. Sites 2 and 3 have existing tarred road access; Site 1 has an existing gravel road access which would need to be upgraded.</p> <p>Interconnecting pipelines will be required between the water tanks, reservoirs, RO modules, sea water intake and sea water discharge pipelines. All pipe work will be located below ground where possible and will not exceed 360mm internal diameter (refer to site plan figures in Appendix B).</p> <p>Interconnecting infrastructure including electrical and communication wiring and water supply between the port terminal and the RO building and its associated infrastructure will be required. The RO Plant would feed into the current electrical, communication and water <u>connections</u> at the Port. At Site 1 these connections would need to be extended, however at Site 2 and Site 3 it would be easier to link up to the Port infrastructure.</p>		
Processing activities (e.g. manufacturing, storage, distribution)	✓ YES	NO
<p>Provide brief description:</p> <p>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 200kl sea water buffer tank situated adjacent to the RO Plant building. 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 MI, for use (dust mitigation). Chemicals will be used in the process to treat the intake sea water before it goes through the RO 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. It will be stored in up to 3 backwash tanks/CIP sumps and will then be discharged into the municipal sewer line or removed by an appropriate waste management contractor. Refer to the RO process diagram / layout in Appendix B14 and B15.</p> <p>The following chemicals are proposed for use in the process to treat either the intake sea water or potable water and will either be discharged with the brine, discharged into the sewerage system or removed from site and taken to an appropriate waste disposal site.</p> <p>Chemicals used in the pre-treatment process of seawater (i.e. Dual Media Filters) will be blended and discharged along with the brine. These include:</p> <ul style="list-style-type: none"> • Flocculant (Ferric Chloride), used as part of the pre-treatment process and will be injected before the Dual Media Filters (DMFs); • Biocide (non-oxidising although oxidising has also been assessed for completeness), injected before the DMFs and dosed before the RO membranes; and • Antiscalant, dosed before the RO membranes and for treating the permeate after the RO membranes. <p>The following substances used for the cleaning of the RO membranes. CIP (Clean In Place) substances will be contained in waste disposed of either via the municipal sewer system (with approval from the municipality) or at a suitable disposal site, and will not be contained in the brine discharged to the sea:</p> <ul style="list-style-type: none"> • <u>Citric Acid</u>, 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)[‡], 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 RO membranes; • Trisodium phosphate (TSP)[§] which is a highly water-soluble cleaning agent and is not limiting in marine environments as it is classified as not acutely toxic to aquatic organisms; and • Sodium lauryl sulphate (SLS) which is an anionic surfactant which is 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. • <u>Calcium hydroxide/Sodium Hydroxide (Caustic soda) will be used for cleaning the RO membranes.</u> • <u>Hydrochloric acid (HCl) will be used for pH modification.</u> • <u>Ammonium hydroxide (NH4OH) used for pH modification, and</u> • <u>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.</u> 		
Storage facilities for raw materials and products (e.g. volume and substances to be stored)	✓ YES	NO
<p>Provide brief description</p> <p>A 200 kl seawater buffer tank will be required alongside the RO building for intake water to be stored before it goes through the RO process.</p> <p>A 200kl potable water buffer tank is required alongside the RO building where potable water will be stored before it is piped to the potable water storage reservoir. It is proposed that the potable water buffer tank be 8m in diameter and 4m high with a surface footprint of approximately 50m².</p> <p>A brine basin with a total capacity of up to 200m³ will be required to store brine prior to it being released back into the sea. CIP Backwash tanks/sumps (up to 3, 1 per RO module) each with a capacity of 20m³ will be required to store the wastewater before being</p>		

[‡] 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.

[§] 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.

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discharged into the municipal sewer line or removed by an appropriate waste management contractor.

A potable water storage reservoir (s) with a total capacity of 5MI will be required. It is proposed that the reservoir be approximately 35m in diameter, and 5m high. There is also the option of having two smaller reservoirs each with a smaller capacity but with a combined capacity of 5MI to reduce the footprint impact of the reservoir(s) on the dune system to the north of the site. Three site alternatives have been identified for the location of this potable water storage reservoir. The first alternative is to locate the reservoir(s) adjacent to the current reservoir, just north of the iron ore stockpiles (Preferred location - Appendix B11). The second alternative is to locate the reservoir(s) next to the stockpiles and conveyors where iron ore is stockpiled (2nd Preferred location – Appendix B12) and the third alternative is to locate the reservoir west of the Iron Ore Handling Facility in an already disturbed area (3rd Preferred location - Appendix B13).

Storage and treatment facilities for solid waste and effluent generated by the project

✓ Yes

~~No~~

It is proposed that a small office be provided within the RO building, and a small quantity of domestic waste is likely to be produced from this office. This solid waste will be disposed through the existing solid waste management system in place at the port. It is anticipated that the quantity of domestic solid waste will be negligible as it will be in addition to the current domestic waste at the Iron Ore Handling Facility. It is also proposed that ablution facilities be available within the RO building and the sewage from this facility will either be disposed and treated via a septic tank at the selected site, or will be routed to the existing sewer system (at sites 2 and 3). Annual throughput from the ablution facility will not exceed 2 000m³.

The sea water 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.

Wastewater resulting from the intermittent cleaning of the RO membranes (CIP – Clean in Process), which is likely to contain a number of chemicals, will be stored in up to three separate backwash tanks/CIP sumps (for the three separate modules). Each tank will have a capacity of approximately 20m³. The waste water which will contain these chemicals will be disposed of either via the municipal sewer system (with approval from the municipality) or at a suitable disposal site, and will not be discharged back into the sea along with the brine. The chemicals likely to be contained in the backwash water include:

- Citric Acid
- Ethylenediaminetetraacetic acid (EDTA)
- Sodium tripolyphosphate (STPP)**
- Trisodium phosphate (TSP)^{††}
- Sodium lauryl sulphate (SLS)
- Calcium hydroxide/Sodium Hydroxide (Caustic soda)
- Hydrochloric acid (HCl)
- Ammonium hydroxide (NH₄OH)
- Sodium metabisulphite (SMBS)

The RO process will also result in high salinity water (brine) that will be discharged via pipeline back into the sea. Wastewater resulting from the cleaning of the DMFs are likely to be blended and discharged with the brine. This water is likely to contain :

- Flocculant (Ferric Chloride),
- Biocide (non-oxidising, although oxidising has also been assessed for completeness)
- Antiscalant

Note that the presence of these chemicals in the brine and their relevant quantities have been taken into consideration in assessing the impacts on the marine environment (refer to the Specialist Marine Impact Assessment in **Appendix G3**).

Other activities (e.g. water abstraction activities, crop planting activities)

✓ Yes

~~No~~

Provide brief description

8000m³/day of sea water will be abstracted via intake wells or pipeline for desalination purposes.

The preferred alternative (at Site 3) is to abstract seawater through boreholes located on the quay next to the Multi-purpose Terminal. The number and depth of boreholes required will depend on the diameter of the boreholes (e.g. boreholes with an internal diameter of 178mm will need to be up to 25m deep). Refer to the Report on the Drilling and Testing of a test borehole on the quay available in **Appendix G2**.

** 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.

†† 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.

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The alternative water abstraction and discharge options that are being considered include^{††}:

- At **Site 1**: a) Beach well intake (approximately 10 beach wells 50m apart) and pipeline discharge (both in Big Bay) (**1a**)
b) Pipeline intake and pipeline discharge (both in Big Bay) (**1b**)
c) Beach well intake (approximately 10 beach wells 50m apart) and beach well discharge (both in Big Bay) [groundwater assessments and investigations have indicated that this alternative is not feasible] (**1c**)
- At **Site 2**: a) Beach well intake (approximately 10 beach wells 50m apart) and pipeline discharge (both in Small Bay) (**2a**)
b) Pipeline intake and pipeline discharge (both in Small Bay) (**2b**)
- At **Site 3**: a) Pipeline intake (Small Bay) and pipeline discharge (Small Bay) (**3a**)
b) Pipeline intake (Small Bay) and pipeline discharge (Big Bay) (**3b**)
c) Borehole intake on the quay (adjacent to the Stockpiles) and pipeline discharge (at caisson 3, Big Bay) (**3c**)
d) Borehole intake on the quay (adjacent to the Multi-purpose Terminal) and pipeline discharge (at caisson 3, Big Bay) [**preferred alternative**] (**3d**)

A construction laydown area housing approximately 5 containers (12m each) for 3 offices and 2 storage facilities will be required, and it is envisaged that their locations at each site would be as follows:

Site 1: adjacent to the stacker reclaimers currently being constructed

Site 2: adjacent to the tippler 1 on land currently used to store construction rubble

Site 3: adjacent to the Multi Purpose Terminal (MPT) facility.

2. ACTIVITY NEED AND DESIRABILITY^{§§}

(a) Describe the need and desirability of the activity:

Transnet have obtained authorisation 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.

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

In addition dust monitors in stacks monitor dust exiting the Tippler buildings.

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, environmental costs, and to ensure suitable water quality, these alternative water sources were not considered as feasible or viable options (refer to Section 7 of the Main BA Report for further discussion).

^{††} 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.

^{§§} 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.

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- (b) Indicate the benefits that the activity will have for society in general and also indicate the benefits that the activity will have for the local communities where the activity will be located:

The West Coast District Municipality (WCDM) of the Western Cape is a water scarce area. Dust from the Iron Ore Handling Facility has a negative effect on the residents in the near vicinity of the facility contributing to the discoloration of structures including houses, walls etc. This dust needs to be suppressed and suppression by water is seen as the most feasible method of dust mitigation.

The use of desalinated water for dust mitigation reduces the demand and need for using the municipal potable water supply for dust mitigation.

The reduction in reliance on municipal water use by the facility means that water use for dust mitigation can continue in drought periods with no negative effect on the municipal water supply and the ability to control dust events. Ultimately, the cumulative benefit is a significant saving of a scarce natural resource for the entire municipality, given the volumes required.

The construction of the proposed RO Plant facility will also provide numerous short-term jobs to locals in the area, and a limited amount of work will also be generated as a result of the operational phase of the plant.

3. ALTERNATIVES

Describe alternatives that are considered in this application.

► **Note:** Alternatives that were not assessed in detail, but that were identified and eliminated during the pre-BA stage are included in Section 7.4 of the Main BA Report.

Please Note:

1. This report only provides space for 3 alternatives. The required information must however be provided for all alternatives being considered. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of all alternatives are assessed.
2. After receipt of this report the competent authority may also request the applicant to assess additional alternatives that could possibly accomplish the purpose and need of the proposed activity if it is clear that realistic alternatives have not been considered to a reasonable extent.
3. Consult the Department's Guideline on Alternatives prior to completing this section.

3(a) Site alternatives:

► **Note:** At the onset of this BA process Site 1 was the preferred site alternative. However, after consultation with various specialists Site 3 has evolved as the preferred alternative. To maintain consistency throughout the process (as well as in Specialist Studies) the numbering of the sites has remained the same. Therefore **Site 3 is the preferred site alternative** and the option of borehole intake on the quay (adjacent to the Multi-purpose Terminal) and a pipeline discharge (at caisson 3 into Big Bay) is the preferred layout option (3d).

Please indicate the number of site alternatives assessed

Describe site alternative 1 (S1), for the activity described above, or for any other activity alternative:

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 is 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 earth moving 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).

Describe site alternative 2 (S2), if any, for the activity described above, or for any other activity alternative:

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 on 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 has been 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).

Describe site alternative 3 (S3) (**preferred site alternative**), if any, for the activity described above, or for any other activity alternative:

This site is located on the southern section of the quay of the iron ore handling facility, on a gravel area *south of* the Multi-Purpose Terminal. *The gravel and 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 are no indigenous species, or any vegetation found on the site (refer to **Appendix D** for photographs of this site).

Describe site alternative 4 (S4), if any, for the activity described above, or for any other activity alternative:

Reservoir Site 1 (*Preferred location*):

The preferred location of the potable water storage reservoir(s) at this site is next to the existing potable water reservoir just north of the iron ore stockpiles (refer to **Appendix B11**).

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Describe site alternative 5 (S5), if any, for the activity described above, or for any other activity alternative:

Reservoir Site 2 (2nd Preferred location):

*The location of the potable water storage reservoir(s) are next to the stockpiles and conveyors where iron ore is stockpiled (refer to **Appendix B12**).*

Describe site alternative 6 (S6), if any, for the activity described above, or for any other activity alternative:

Reservoir Site 3 (3rd Preferred location):

*The location of the potable water storage reservoir(s) at this site is north-west of the iron ore handling facility outside of the immediate port area on TNPA land (refer to **Appendix B13**).*

3(b) Activity alternatives:

Describe activity alternative 1 (A1), if any, for any or all of the site alternatives as appropriate:

Reverse Osmosis is the process that will be used for all alternatives to desalinate sea water and provide potable water to supplement municipal supplies.

Describe activity alternative 2 (A2), if any, for any or all of the site alternatives as appropriate:

None

Describe activity alternative 3 (A3), if any, for any or all of the site alternatives as appropriate:

None

3(c) Other alternatives (e.g. layout, technological, timing, process etc):

Describe the alternative

In alternative options of seawater intake and brine discharge via pipeline, beach wells and/or boreholes, is being considered at all of the site alternatives. The following intake and discharge alternatives have been assessed at the three site alternatives.

The alternative intake and discharge infrastructure locations at **Site alternative 1** include:

- 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**) [through ground investigations this alternative is no longer 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.

The alternative intake and discharge infrastructure locations at **Site alternative 2** 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 water at this site) or a pipeline discharge through a single port diffuser in an approximate -0.5 to -1m CD water depth.

The alternative intake and discharge infrastructure locations at **Site alternative 3** 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) (**preferred alternative**) (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.

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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^{***} (3c & 3d) will consist of a single port diffuser in an approximate -16 to -18m CD water depth.

4. ACTIVITY LOCATION

Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates must be in degrees, minutes and seconds. The minutes should be given to at least three decimals to ensure adequate accuracy. The projection that must be used in all cases is the WGS84 spheroid in a national or local projection.

Alternative:	Latitude (S):			Longitude (E):		
Alternative S1	33°	00'	27"	18°	00'	30"
Alternative S2	32°	59'	58"	17°	59'	48"
Alternative S3 (preferred)	33°	01'	10"	17°	59'	20"
Reservoir 1 (preferred)	33°	00'	02"	18°	00'	02"
Reservoir 2	32°	59'	23"	17°	59'	14"

or, for linear activities: **N/A**

Alternative:	Latitude (S):			Longitude (E):		
Alternative S1 (preferred or only route alternative)						
• Starting point of the activity	°	'	"	°	'	"
• Middle point of the activity	°	'	"	°	'	"
• End point of the activity	°	'	"	°	'	"
Alternative S2 (if any)						
• Starting point of the activity	°	'	"	°	'	"
• Middle point of the activity	°	'	"	°	'	"
• End point of the activity	°	'	"	°	'	"
Alternative S3 (if any)						
• Starting point of the activity	°	'	"	°	'	"
• Middle point of the activity	°	'	"	°	'	"
• End point of the activity	°	'	"	°	'	"

Please Note: For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 100 meters along the route for each alternative.

5. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical size of the preferred activity as well as alternative activities and its associated infrastructure (footprints):

Alternative:	Size of the activity (approx.):
Alternative S1a	9,014 m ²
Alternative S1b	9,063 m ²
Alternative S1c	9,109 m ²
Alternative S2a	5,195 m ²
Alternative S2b	5,125 m ²
Alternative S3a	6,913 m ²
Alternative S3b	6,973 m ²
Alternative S3c	9,299 m ²
Alternative S3d (preferred alternative)	7,774 m ²

Note: The physical size presented in the above table is the approximate size of the proposed activity during the operational phase of the activity. The physical size of the various alternatives varies due to the location of the RO building away from the main storage reservoirs which results in the length of the pipelines differing. Beach wells and / or boreholes will also have a larger footprint as compared to pipelines.

or, for linear activities: **N/A**

Alternative:	Length of the activity:
Alternative A1 (preferred activity alternative)	m
Alternative A2 (if any)	m
Alternative A3 (if any)	m

*** Caisson 3 is the third caisson along the quay from the shoreline (refer to Appendix B9 and B10).

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Indicate the size of the alternative sites or servitudes (within which the above footprints will occur):

Alternative:	Size of the site/servitude (approx.):
Alternative S1a	17,745 m ²
Alternative S1b	17,260 m ²
Alternative S1c	18,178 m ²
Alternative S2a	11,802 m ²
Alternative S2b	11,627 m ²
Alternative S3a	16,097 m ²
Alternative S3b	16,247 m ²
Alternative S3c	22,830 m ²
Alternative S3d (preferred alternative)	19,017 m ²

► **Note:** The physical size presented in the above table is the **approximate** size of the proposed activity during the **construction phase** of the activity.

Associated Infrastructure:

Indicate the size of the alternative sites or servitudes (within which the above associated infrastructure footprints will occur):

► **Note:** the size of the associated infrastructure has been included in the total size of the site for each alternative (i.e. total disturbed area during construction) and figures stated below are thus the same as above.

Alternative:	Size of the site/servitude (approx.):
Alternative S1a	17,745 m ²
Alternative S1b	17,260 m ²
Alternative S1c	18,178 m ²
Alternative S2a	11,802 m ²
Alternative S2b	11,627 m ²
Alternative S3a	16,097 m ²
Alternative S3b	16,247 m ²
Alternative S3c	22,830 m ²
Alternative S3d (preferred alternative)	19,017 m ²

6. SITE ACCESS

Is there an existing access road?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
If NO, what is the distance over which a new access road will be built?	m	

Describe the type of access road planned:

Access to Site Alternative 1 will be via an existing gravel road along the Reclamation Dam wall which will be upgraded.
Site Alternatives 2 and 3 both have tar road access to the sites from the internal roads associated with the Iron Ore Handling Facility.

Please Note: indicate the position of the proposed access road on the site plan (See Section 7 below)

7. SITE PHOTOGRAPHS

Colour photographs of the site and its surroundings (taken of the site and from the site) with a description of each photograph. The vantage points from which the photographs were taken must be indicated on the site plan, or locality plan as applicable. If available, please also provide a recent aerial photograph. Photographs must be attached under Appendix D to this form. It should be supplemented with additional photographs of relevant features on the site. Date of photographs must be included. Please note that the above requirements must be duplicated for all alternative sites.

► **Note:** Site photographs are attached in **Appendix D**.

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8. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

Please list all legislation, policies and/or guidelines that have or will be considered in the preparation of this application.

LEGISLATION	ADMINISTERING AUTHORITY	TYPE Permit/ license/ authorization/comment	DATE (if already obtained):
National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) and the NEMA Environmental Impact Assessment (EIA) Regulations (2006)	Department of Environmental Affairs and Tourism (DEAT)	Environmental Authorisation (Basic Assessment)	Process underway
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	Department of Environmental Affairs and Tourism (DEAT)	None	N/A
Sea-shore Act (Act No.21 of 1935)	Department of Environmental Affairs and Tourism (DEAT)	None	N/A
National Water Act, 1998 (Act No. 36 of 1998)	Department of Water Affairs and Forestry (DWAF)	Water Use License Application	Process underway
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	South African Heritage Resources Agency (SAHRA)	SAHRA Authorisation	RoD received
Integrated Coastal Management Bill (2007)	Department of Environmental Affairs and Tourism (DEAT)	None	N/A
Marine Pollution (Control and Civil Liability) Act (Act No.6 of 1981)	Department of Environmental Affairs and Tourism (DEAT)	None	N/A
Marine Living Resources Act (Act No. 18 of 1998)	Department of Environmental Affairs and Tourism (DEAT)	None	N/A
Water Services Act (1997)	Department of Water Affairs and Forestry (DWAF)	Permit to be a water services provider	Process underway
National Ports Act (2005)	Department of Environmental Affairs and Tourism (DEAT)	None	N/A

POLICY/ GUIDELINES	ADMINISTERING AUTHORITY
Guideline 3: General Guide to the EIA Regulations (2006)	Department of Environmental Affairs and Tourism (DEAT)
Guideline 4: Public Participation and Tourism (2006)	Department of Environmental Affairs and Tourism (DEAT)
Guideline 5: Assessment of Alternatives and Impacts in support of the EIA Regulations (2006)	Department of Environmental Affairs and Tourism (DEAT)
Draft White Paper on Integrated Pollution and Waste Management for South Africa	Department of Environmental Affairs and Tourism (DEAT)
Guideline on the Interpretation of the Listed Activities (2006)	Department of Environmental Affairs and Development Planning (D:EA&DP)
Guideline on Alternatives (2007)	Department of Environmental Affairs and Development Planning (D:EA&DP)
Guideline on Public Participation (2007)	Department of Environmental Affairs and Development Planning (D:EA&DP)
Guidelines for the Evaluation of Possible Environmental Impacts during the development of Seawater Desalination Processes	Department of Water Affairs and Forestry (DWAF)

SECTION B: DESCRIPTION OF RECEIVING ENVIRONMENT

Site/Area Description

For linear activities (pipelines etc) as well as activities that cover very large sites, it may be necessary to complete copies of this section for each part of the site that has a significantly different environment. In such cases please complete copies of Section B and indicate the area which is covered by each copy No. on the Site Plan.

Section B Copy No. (e.g. A):

1. GRADIENT OF THE SITE

Indicate the general gradient of the sites (tick the appropriate box).

Alternative S1:

Flat	<input checked="" type="checkbox"/> Flatter than 1:10	1:10 — 1:5	Steeper than 1:5
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Alternative S2:

Flat	<input checked="" type="checkbox"/> Flatter than 1:10	1:10 — 1:5	Steeper than 1:5
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Alternative S3:

Flat	<input checked="" type="checkbox"/> Flatter than 1:10	1:10 — 1:5	Steeper than 1:5
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2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site (tick ("✓") the appropriate box(es)).

Alternative S1:

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	<input checked="" type="checkbox"/> Dune	<input checked="" type="checkbox"/> Sea-front	Other
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Alternative S2:

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	<input type="checkbox"/> Dune	<input checked="" type="checkbox"/> Sea-front	Other
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Alternative S3:

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	Plain	Undulating plain/low hills	<input type="checkbox"/> Dune	<input checked="" type="checkbox"/> Sea-front	Other
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If other, please describe

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3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on or near any of the following (tick ("✓") the appropriate boxes)?

	Alternative S1			Alternative S2			Alternative S3		
	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Shallow water table (less than 1.5m deep)	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Seasonally wet soils (often close to water bodies)	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Unstable rocky slopes or steep slopes with loose soil	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Dispersive soils (soils that dissolve in water)	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Soils with high clay content	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Any other unstable soil or geological feature	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
An area sensitive to erosion	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE

If any of the answers to the above are "YES" or "unsure", specialist input may be requested by the Department. (Information in respect of the above will often be available at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used).

► **Note:** A groundwater specialist was consulted while completing the above table. A Groundwater Resources Impact Assessment is available in **Appendix G2** of this report.

4. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites (tick ("✓") the appropriate boxes)

	Alternative S1			Alternative S2			Alternative S3		
	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Perennial River	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Non-Perennial River	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Permanent Wetland	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Seasonal Wetland	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Artificial Wetland	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE
Estuarine / Lagoonal wetland	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE	✓ YES	NO	UNSURE

5. VEGETATION / GROUNDCOVER

Tick ("✓") and describe (where required) the vegetation types / groundcover present on the site.

Alternative S1:

Indigenous Vegetation - good condition	✓	Indigenous Vegetation with scattered aliens		Indigenous Vegetation with heavy alien infestation	
Identify the vegetation type above: Cape Seashore Vegetation/ Langebaan Dune Strandveld		Identify the vegetation type above:		Identify the vegetation type above:	
Provide ecosystem status for above: Least Threatened		Provide ecosystem status for above:		Provide Ecosystem status for above:	
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface		Void dominated by alien species		✓ Distinctive soil conditions (e.g. Sand over shale, quartz patches, limestone, alluvial deposits, termitaria etc.) – A parabolic dune system	
✓ Bare soil		Building or other structure		Sport field	
Paved surface		Cultivated land		✓ Other Sea front / dune area	

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Alternative S2:

Indigenous Vegetation – good condition	Indigenous Vegetation with scattered aliens	Indigenous Vegetation with heavy alien infestation	✓
Identify the vegetation type above:	Identify the vegetation type above:	Identify the vegetation type above: This site is not characterised by a “vegetation type” <i>per se</i> – there are only several dune species found on the site. The site falls within the highly disturbed Cape Seashore Vegetation type.	
Provide ecosystem status for above:	Provide ecosystem status for above:	Provide Ecosystem status for above: Least Threatened	
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface	✓ Veld dominated by alien species	Distinctive soil conditions (e.g. Sand over shale, quartz patches, limstone, alluvial deposits, termitaria etc.) – describe	
✓ Bare soil	✓ Building or other structure	Sport field	
Paved surface	Cultivated land	✓ Other Sea front	

Alternative S3:

Indigenous Vegetation – good condition	Indigenous Vegetation with scattered aliens	Indigenous Vegetation with heavy alien infestation	
Identify the vegetation type above:	Identify the vegetation type above:	Identify the vegetation type above: No vegetation type as the site is on a man made structure with few to no floral species occurring on it.	
Provide ecosystem status for above:	Provide ecosystem status for above:	Provide Ecosystem status for above: None.	
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface	Veld dominated by alien species	Distinctive soil conditions (e.g. Sand over shale, quartz patches, limstone, alluvial deposits, termitaria etc.) – describe	
✓ Bare soil	Building or other structure	Sport field	
Paved surface	Cultivated land	✓ Other Quay – Reclaimed land No indigenous vegetation cover	

Please note: The Department may request specialist input/studies depending on the nature of the vegetation type / groundcover and potential impact(s) of the proposed activity/ies.

To assist with the identification of the vegetation type and ecosystem status consult <http://bgis.sanbi.org> or BGIShelp@sanbi.org.

Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used.

Note: A botanical specialist was consulted while completing the above table. A Botanical Assessment is available in **Appendix G1** of this report.

6. LAND USE CHARACTER OF SURROUNDING AREA

Tick (“✓”) the current land uses and/or prominent features that occur within +/- 500m radius of the site and neighbouring properties if these are located beyond 500m of the site. **Please note:** The Department may request specialist input/studies depending on the nature of the land use character of the area and potential impact(s) of the proposed activity/ies.

Note: An aerial photograph indicating the main surrounding land uses is available in **Appendix B16** of this report.

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Alternative S1:

✓ Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	Commercial & warehousing	Light industrial	Medium industrial	✓ Heavy industrial
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism & Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	✓ Quarry, sand or borrow pit	✓ Dam or reservoir
Hospital/medical center	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	✓ Railway line	Major road (4 lanes or more)	Airport
✓ Harbour	Sport facilities	Golf course	Pole fields	Filling station
Landfill or waste treatment site	Plantation	Agriculture	River, stream or wetland	✓ Nature conservation area
Mountain, koppie or ridge	Museum	Historical building	Graveyard	Archaeological site
Other land uses (describe):	✓ Port and Iron Ore Handling Facility			

Alternative S2:

✓ Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	Commercial & warehousing	Light industrial	Medium industrial	✓ Heavy industrial
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism & Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	Quarry, sand or borrow pit	Dam or reservoir
Hospital/medical center	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	✓ Railway line	Major road (4 lanes or more)	Airport
✓ Harbour	Sport facilities	Golf course	Pole fields	Filling station
Landfill or waste treatment site	Plantation	Agriculture	River, stream or wetland	Nature conservation area
Mountain, koppie or ridge	Museum	Historical building	Graveyard	Archaeological site
Other land uses (describe):	✓ Port and Iron Ore Handling Facility			

Alternative S3:

Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	✓ Commercial & warehousing	Light industrial	Medium industrial	✓ Heavy industrial
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism & Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	Quarry, sand or borrow pit	Dam or reservoir
Hospital/medical center	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	✓ Railway line	Major road (4 lanes or more)	Airport
✓ Harbour	Sport facilities	Golf course	Pole fields	Filling station
Landfill or waste treatment site	Plantation	Agriculture	River, stream or wetland	Nature conservation area
Mountain, koppie or ridge	Museum	Historical building	Graveyard	Archaeological site
Other land uses (describe):	✓ Port and Iron Ore Handling Facility			

7. REGIONAL PLANNING CONTEXT

Is the activity permitted in terms of the property's existing land use rights? Please explain			
Yes. The property is zoned for "Port and related activities" and thus industrial activities such as the proposed RO Plant are permitted.			
Will the activity be in line with the following?			
Provincial Spatial Development Framework (PSDF)	✓ YES	NO	Please explain
<p>The Western Cape Provincial Spatial Development Framework (WCPSDF, 2005) specifically states that the Saldanha Bay area has potential industrial development nodes. The Iron Ore Handling Facility is an industrial activity that has a positive impact on the economy of the area. The WCPSDF also states that a priority for the area is water conservation, and the proposed RO Plant will help conserve municipal-supplied fresh water and therefore be <i>consistent</i> with the framework. According to the WCPSDF the West Coast region is the region to be most extremely affected by global climate change, and as a result the area will be more affected by droughts and water shortages. The proposed RO plant will reduce the impact that possible future water restrictions will have on dust suppression at the handling facility.</p> <p>The residential activity in Saldanha Bay is very seasonal according to the WCPSDF, as it depends on holiday peak demands. This often results in peak demands for services often outstripping supply, particularly for water supply and treatment. The proposed RO Plant will help reduce the demand for water and will help curb the problem of environmental damage caused by providing permanent services infrastructure which is only needed during peak periods.</p>			
Urban edge / Edge of Built environment for the area	✓ YES	NO	Please explain
It is proposed that the RO Plant be located within Transnet's property which is currently developed as a port with related activities, primarily the Iron Ore Handling Facility.			
Integrated Development Plan of the Local Municipality	✓ YES	NO	Please explain
It is proposed that the RO Plant be located within Transnet's property which is currently developed as a port with related activities, primarily the Iron Ore Handling Facility.			
Spatial Development Framework of the Local Municipality	✓ YES	NO	Please explain
<p>The Saldanha Bay Spatial Development Framework (SDF) emphasises the need to address problems regarding basic needs, support of previously disadvantaged groups, the stimulation of economic growth and the maintenance of already developed areas. Access to fresh water is a basic right, and the RO Plant will help to alleviate the pressures on the water requirements for the Saldanha Bay area. The construction and operation of the RO Plant will create numerous jobs – mainly for previously disadvantaged individuals. The activities at the iron ore handling facility contribute to economic growth in the region, and the proposed expansions which the RO Plant will be able to supply potable water to for dust suppression will further stimulate this economic growth.</p>			
Approved Structure Plan of the Municipality	✓ YES	NO	Please explain
It is proposed that the RO Plant be located within Transnet's property which is currently developed as a port with related activities, primarily the Iron Ore Handling Facility. This is in line with the approved Structure Plan of the Municipality.			
Any other Plans	YES	NO	Please explain
None			

8. SOCIO-ECONOMIC CONTEXT

Describe the existing social and economic characteristics of the community in order to provide baseline information.

<p>The location of the proposed RO Plant falls within Saldanha Bay Local Municipality, which is part of the West Coast District Municipality. The local municipality encompasses towns such as Saldanha, Langebaan and Vredenburg. Although Saldanha Bay's sheltered harbour plays an important role as an industrial port (which includes the Sishen-Saldanha iron ore handling facility), the town is not only important for export but also hosts many other industries, including mariculture, and tourism among others.</p> <p>The Saldanha Bay Local Municipality covers an area of 1 767 km² and has a population size of 88 000. More than 75% of the population lives in Vredenburg, Saldanha or Langebaan. The majority of the residents of Saldanha (67%) are Afrikaans – speaking coloured people. English and Xhosa are also spoken in the region. The industrial development in the area led to an influx of people in the area looking for jobs and new opportunities. The population of the municipal area increased from a total of 57 031 in 1996 to 84 474 in 2001. This is a 48% increase, which will continue to rise with development along the West Coast, such as increased imports and exports from Saldanha harbour, further industrial development and the possible construction of a gas plant in the vicinity of Saldanha Bay.</p> <p>Continued migration will increase the need for the delivery of basic services, and will be accompanied by secondary service delivery such as health, social and educational services. The population growth rate for the next couple of years is expected to be at least 5%. If this expected growth rate materializes, a population of 250 000 is predicted by 2015. Approximately 33.4% of this population will be employed in the industrial and commercial sectors. This projection assumes that for each primary job opportunity created in the industrial sector, seven people will migrate to the area.</p> <p>Unemployment is a big problem in the area, especially for people who do not have suitable qualifications. Alcohol and drug abuse are the predominant social problems in the area, leading to an entire spectrum of other problems. 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 and the NamaKwa Sands Smelter. Saldanha had the socio-cultural characteristics of a small fishing community with a fair degree of coherence and stability but the competition for work opportunities at Mittal Steel changed relationships between residents</p>

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of the established community, and this has left its impact on the social fabric and morale. The influx of newcomers leads to the establishment of shack settlements, a drastic rise in unemployment and an increase in crime and violence. Until the construction of the R27 provincial road in the 1970s, 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. Langebaan has transformed from a sleepy coastal village to a development node complete with yacht harbour, resorts, casino and supermarkets. Similarly the Port of Saldanha has grown significantly absorbing much of what was until recently a bleak and deserted stretch of shoreline along the northern edge of the Bay.

Despite the rampant development, there are still areas that retain the sense of wilderness that until recently characterized the area. Along the Eastern side of the bay are semi-stabilised dunes, large tracts of Strandveld vegetation punctuated by granite outcrops which are a characteristic of this area. In recent years the area has become famous for its fossil wealth – just inland of Langebaan is the largest Miocene (5-6 million years old) Fossil deposit in the world, parts of which are on display at Langebaanweg Fossil Park. Close to Hopefield further inland are the Pleistocene fossil beds at Elandsfontein (last million years) famous for the discovery of the early human species *Homo ergaster* (Saldanha man). On the edges of the lagoon Dr Dave Roberts and Dr Lee Berger discovered the 200 000 year old footprints of an early modern human fossilized in calcrete sediments. At Hoedjiespunt Prof. John Parkington has excavated on the site of an ancient hyena lair where skull fragments and teeth of an early human were found showing that parts of the body of this person were consumed by hyenas more than 300 years ago. Nearby, fossilized within the calcretes and aeoleanites are shell fish, animal bone, ashly hearths of people who lived in the area more than 100 000 years ago. A plethora of Late Stone Age sites dating to within the last 5000 years has been excavated on Club Mykonos and surrounding land firmly demonstrating the hunter gatherers, and later Khoekhoen pastoralists where camping on those parts of the bay where there were rocky shorelines that could provide them with shellfish and other marine foods. Thus it can be seen, like most places in South Africa, Saldanha Bay has a past which spans millions of years.

9. CULTURAL/HISTORICAL FEATURES

Please be advised that if section 38 of the National Heritage Resources Act 25 of 1999 is applicable to your proposed development, then you are requested to furnish this Department with written comment from Heritage Western Cape as part of your public participation process. Section 38 of the Act states as follows:

38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as-

- (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- (b) the construction of a bridge or similar structure exceeding 50m in length;
- (c) any development or other activity which will change the character of a site-
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Alternative S1:

Are there any signs of culturally or historically significant elements including archaeological or palaeontological sites, on or in close proximity to the site?	YES	✓ NO
UNCERTAIN		
If YES, explain:		
If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist if one was already appointed:	The following findings were described in the <i>Heritage Impact Assessment of the Proposed Reverse Osmosis Plant</i> prepared by Tim Hart from the University of Cape Town's Department of Archaeology (Report attached as Appendix G4a): <ul style="list-style-type: none"> No shipwreck material has been identified close to any of the three alternative sites. The chances of impacts on marine fossil bearing sediments during construction of the beach wells and pipelines is very low due to the comparatively shallow depths and the small amount of disturbance created by this activity. No land based archaeological or palaeontological material will be impacted on as all the site alternatives are already highly disturbed or situated on reclaimed land. No protected structures or graves were identified in the study area. 	
Will any building or structure older than 60 years be affected in any way?	YES	✓ NO
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	✓ YES	NO
If yes, please submit or, make sure that the applicant or a specialist submit the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application.		
► Note: A Notice of Intent to Develop (NID) as well as a Heritage Impact Assessment (HIA) was submitted to Heritage Western Cape and a Record of Decision has been received. Copies of these documents are available in Appendix G4a and G4b .		

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Alternative S2:

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site?	YES	✓ NO
UNCERTAIN		
If YES, explain:		
If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist if one was already appointed:	<p>The following findings were described in the <i>Heritage Impact Assessment of the Proposed Reverse Osmosis Plant</i> prepared by Tim Hart from the University of Cape Town's Department of Archaeology (Report attached as Appendix G4a):</p> <ul style="list-style-type: none"> No shipwreck material has been identified close to any of the three alternative sites. The chances of impacts on marine fossil bearing sediments during construction of the beach wells and pipelines is very low due to the comparatively shallow depths and the small amount of disturbance created by this activity. No land based archaeological or palaeontological material will be impacted on as all the site alternatives are already highly disturbed or situated on reclaimed land. No protected structures or graves were identified in the study area. 	
Will any building or structure older than 60 years be affected in any way?	YES	✓ NO
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	✓ YES	NO
If yes, please submit or, make sure that the applicant or a specialist submit the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application.		
<p>► Note: A Notice of Intent to Develop (NID) as well as a Heritage Impact Assessment (HIA) was submitted to Heritage Western Cape and a Record of Decision has been received. Copies of these documents are available in Appendix G4a and G4b.</p>		

Alternative S3:

Are there any signs of culturally or historically significant elements, as defined in section 2 of the National Heritage Resources Act, 1999, (Act No. 25 of 1999), including archaeological or palaeontological sites, on or close (within 20m) to the site?	YES	✓ NO
UNCERTAIN		
If YES, explain:		
If uncertain, the Department may request that specialist input be provided to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist if one was already appointed:	<p>The following findings were described in the <i>Heritage Impact Assessment of the Proposed Reverse Osmosis Plant</i> prepared by Tim Hart from the University of Cape Town's Department of Archaeology (Report attached as Appendix G4a):</p> <ul style="list-style-type: none"> No shipwreck material has been identified close to any of the three alternative sites. The chances of impacts on marine fossil bearing sediments during construction of the beach wells and pipelines is very low due to the comparatively shallow depths and the small amount of disturbance created by this activity. No land based archaeological or palaeontological material will be impacted on as all the site alternatives are already highly disturbed or situated on reclaimed land. No protected structures or graves were identified in the study area. 	
Will any building or structure older than 60 years be affected in any way?	YES	✓ NO
Is it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	✓ YES	NO
If yes, please submit or, make sure that the applicant or a specialist submit the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application.		
<p>► Note: A Notice of Intent to Develop (NID) as well as a Heritage Impact Assessment (HIA) was submitted to Heritage Western Cape and a Record of Decision has been received. Copies of these documents are available in Appendix G4a and G4b.</p>		

Please note: Heritage Western Cape / South African Heritage Resource Agency (which ever is the competent authority under the circumstance) comments needs to be submitted along with this Basic Assessment Report.

► **Note:** These are attached in **Appendix E5**.

SECTION C: PUBLIC PARTICIPATION

The person conducting the public participation process must fulfil the requirements outlined in Regulation 56 and also take into account this Department's guideline on Public participation.

Please tick ("✓") the appropriate box to indicate whether the specific requirement was undertaken or whether exemption has been applied for.

1. Were all potential interested and affected parties notified of the application by –			
(a) having fixed a notice board at a place conspicuous to the public at the boundary or on the fence of -			
(i) the site where the activity to which the application relates is or is to be undertaken and	✓ YES	NO	EXEMPTION
(ii) any alternative site mentioned in the application	✓ YES	NO	EXEMPTION
(b) having given written notice to –			
(i) the owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site	✓ YES	NO	EXEMPTION
(ii) the owners and occupiers of land within 100 metres of the boundary of the site or alternative site who are or may be directly affected by the activity	✓ YES	NO	EXEMPTION
(iii) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represents the community in the area	✓ YES	NO	EXEMPTION
(iv) the municipality which has jurisdiction in the area; and	✓ YES	NO	EXEMPTION
(v) any organ of state having jurisdiction in respect of any aspect of the activity	✓ YES	NO	EXEMPTION
(c) having placed an advertisement in –			
(i) one local newspaper, or	✓ YES	NO	EXEMPTION
(ii) the official EIA <i>Gazette</i>	YES	✓ NO †††	EXEMPTION
(d) having placed an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken. (This requirement need not be complied with if an advertisement has been placed in the official EIA <i>Gazette</i> referred to in (c)(ii) above.	✓ YES	NO	EXEMPTION
2. Was a register of interested and affected parties opened, maintained and made available to any person requesting access to the register in writing? (copy of register to be included in Appendix E)	✓ YES	NO	EXEMPTION
3. Were all registered interested and affected parties given access to this application form and basic assessment report and any other report(s) compiled in relation to this application and was an opportunity for interested and affected parties to comment on the report(s) in writing provided?	✓ YES	NO	EXEMPTION
4. Were stakeholders that have direct interests in the site or property, such as servitude holders and service providers, informed of the application at least 30 (thirty) calendar days before the submission of this application and were they provided with the opportunity to comment. (Comments to be included in the comments and response report as described below)	✓ YES	NO	EXEMPTION
5. Were Municipalities and other organs of state notified and given an opportunity to comment? (This information must also be included in the comments and response report)	✓ YES	NO	EXEMPTION

Please note: Proof of all of the above must be submitted as part of the public participation information to be attached to this basic assessment report as Appendix E. Should any of the responses be "No" and no application for exemption from that requirement was

††† **Note:** The official EIA *Gazette* is unavailable and thus notification of the proposed activity was placed in two local and three provincial newspapers.

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applied for, the Department will not proceed with evaluating / processing the application until that specific requirement is undertaken. Any exemption application must be brought to the attention of all interest and affected parties through the public participation process.

The practitioner must record all comments and respond to each comment of the public / interested and affected party before the application is submitted. The comments and responses must be captured in a **Comments and Responses Report** as prescribed in the regulations and must also include a description of the public participation process followed and this report must also be included in the public participation information to be attached to this basic assessment report as Appendix E.

If an application is for a linear or ocean-based activity and strict compliance with the above requirements is inappropriate, the person conducting the public participation process may deviate from the requirements to the extent and in the manner as may be agreed to by this Department.

SECTION D: IMPACT ASSESSMENT

Please note: The information in this section must be duplicated for all the alternatives (where relevant).

1. WASTE, EFFLUENT AND EMISSION MANAGEMENT

► **Note:** The information provided in this section is relevant to all alternatives.

(a) Solid waste management

Will the activity produce solid waste (including rubble) during the construction phase?	✓ YES	NO
If yes, what estimated quantity during the construction period?	Quantities unknown, but very negligible in terms of current solid waste quantities disposed of at the Iron Ore Handling Facility.	
It is anticipated that the solid waste that will be produced during the construction period of the RO Plant will include construction debris contaminated by oils, empty drums, empty paint and coating containers, waste paint and/or solvents, waste concrete, rubble, scrap metal, waste cable, waste plastic, batteries, light bulbs, circuit boards, domestic waste, pallets etc.		

Where and how will the construction solid waste be treated / disposed of (describe)?
Construction solid waste will be stored at a designated storage facility within the Contractors site. The management of construction waste will be monitored using the Transnet Construction Environmental Management Plan (EMP). Contractors will be required to comply with this EMP and will have to produce method statements regarding the disposal of solid waste as a result of construction. The solid waste will be removed by the local municipality which currently removes solid waste from the Iron ore handling <u>facility and disposes it at a suitable facility</u> . The municipality supplies bins for waste removal, and additional bins are supplied by the municipality as and when requested (a monthly fee is paid per bin).

Will the activity produce solid waste during its operational phase?	✓ YES	NO
If Yes, what estimated quantity will be produced per month?	2-4m ³	

Where and how will the solid waste be treated / disposed of (describe)?
Operational waste will be taken to the Transnet Port Terminals designated waste facility within the Port boundaries. The waste gets removed from the site on a weekly basis by the Municipality.
Currently, all waste which is classified as hazardous in terms of the Minimum Requirements for Waste Handling, Classification and Disposal at the Iron Ore Handling Facility is removed by an appointed private contractor. Any hazardous waste generated as a result of the RO process will be removed by an appointed private contractor (however, it is not anticipated that any hazardous waste will be generated).

Has the municipality or relevant authority confirmed that sufficient capacity exist for treating / disposing of the solid waste to be generated by this activity(ies)? If yes, provide written confirmation from Municipality or relevant authority Note: there is no written agreement between the Municipality and Transnet, however Transnet do pay the Council an amount per (general) waste bin supplied and waste disposed. Additional bins are supplied by the Council as and when requested, at a cost (per bin).	✓ YES	NO
Will the activity produce solid waste that will be treated and/or disposed of at another facility other than into a municipal waste stream?	YES	✓ NO
If yes, has this facility confirmed that sufficient capacity exist for treating / disposing of the solid waste to be generated by this activity(ies)? Provide written confirmation from the facility and provide the following particulars of the facility:	YES	NO
Does the facility have an operating license? (If yes, please attach a copy of the license.)	YES	NO
Facility name: N/A		
Contact person: N/A		
Postal address: N/A		
	Postal code: N/A	
Telephone: N/A	Cell: N/A	
E-mail: N/A	Fax: N/A	

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(b) Effluent

Will the activity produce sewage and or any other effluent?	✓ YES	NO
<p>The activity will produce brine (saline water) as a result of the RO process which extracts the fresh water from the sea water resulting in more saline water as a by-product. Backwash water from the DMFs will also be blended with the brine and discharged back into the ocean.</p> <p>The RO process will also produce wastewater as a result of the intermittent cleaning of the RO membranes and filters. This wastewater will contain a number of chemicals⁺⁺⁺ (as listed in Tables below) and will be disposed of in the municipal sewer^{sss}. The chemicals that will be appropriately stored on site and used in the cleaning process are provided below. The RO Plant should operate under normal conditions at the designed consumption, but it is possible that the membranes foul more than anticipated and if this is the case then the frequency of RO membrane cleaning will need to increase. Thus, two chemical consumption quantities are given below, the design consumption quantities and the maximum consumption quantities, which will not be exceeded but have been included in the assessment of impacts by the specialists.</p>		

Table: RO Plant Chemical Consumption (Design Consumption)

Chemical	Function	Daily [kg]	Discharged with
Flocculant (Ferric chloride)	Filtration dosing	26	Permeate & brine
Non-oxidising biocide ^{****}	Filtration Shock Dosing	4	Permeate & brine
Antiscalant	RO Dosing	24	Permeate & brine
Limestone (Calcium Carbonate)	Water remineralisation	86	Permeate
Sodium hypochlorite (intake pipes only)	Product dosing	7	Permeate
Citric acid	RO membrane cleaning	3.3	Sewage/waste disposal
EDTA (amino acid)	RO membrane cleaning	1.6	Sewage/waste disposal
STPP (Sodium tripolyphosphate)*	RO membrane cleaning	1.6	Sewage/waste disposal
TSP (Trisodium phosphate)*	RO membrane cleaning	1.6	Sewage/waste disposal
SLS (sulphate)	RO membrane cleaning	0.2	Sewage/waste disposal
Caustic soda (Sodium/calcium Hydroxide)	RO membrane cleaning	0.4	Sewage/waste disposal
<i>Hydrochloric acid</i>	<i>pH modification</i>	<i>0.2</i>	<i>Sewage/waste disposal</i>
<i>Ammonium hydroxide</i>	<i>pH modification</i>	<i>0.2</i>	<i>Sewage/waste disposal</i>
<i>Sodium metabisulphite</i>	<i>Membrane preservation</i>	<i>1.7</i>	<i>Sewage/waste disposal</i>

Table: RO Plant Chemical Consumption (Maximum Consumption)

Chemical	Function	Daily [kg]	Discharged with
Flocculant (Ferric chloride)	Filtration dosing	43	Permeate & brine
Non-oxidising biocide	Filtration Shock Dosing	7	Permeate & brine
Antiscalant	RO Dosing	40	Permeate & brine
Limestone (Calcium Carbonate)	Water remineralisation	115	Permeate
Sodium hypochlorite (intake pipes only)	Product dosing	9	Permeate
Citric acid	RO membrane cleaning	9.9	Sewage/waste disposal
EDTA (amino acid)	RO membrane cleaning	6.6	Sewage/waste disposal
STPP (Sodium tripolyphosphate)*	RO membrane cleaning	6.6	Sewage/waste disposal
TSP (Trisodium phosphate)*	RO membrane cleaning	6.6	Sewage/waste disposal
SLS (sulphate)	RO membrane cleaning	0.7	Sewage/waste disposal
Caustic soda (Sodium/calcium Hydroxide)	RO membrane cleaning	1.1	Sewage/waste disposal
<i>Hydrochloric acid</i>	<i>pH modification</i>	<i>0.6</i>	<i>Sewage/waste disposal</i>
<i>Ammonium hydroxide</i>	<i>pH modification</i>	<i>0.6</i>	<i>Sewage/waste disposal</i>
<i>Sodium metabisulphite</i>	<i>Membrane preservation</i>	<i>5.1</i>	<i>Sewage/waste disposal</i>

Ablution facilities will be available in the RO building and the sewage from this facility will either be disposed and treated via a septic tank at the three site alternatives, or will be routed to the existing sewer system (at sites 2 and 3). Annual throughput will not exceed 2 000m³.

What estimated quantity will be produced per month?	Brine (including DMF backwash, from 3 RO modules)	132 000m ³
What estimated quantity will be produced per month?	Sewage effluent / wastewater (CIP)	Design-24 m ³ max-72 m ³
Will the effluent be treated and/or disposed of in a municipal system?	✓ Yes ^{tttt}	NO
<p>If Yes, has the municipality or relevant authority confirmed that sufficient unallocated capacity exist for treating / disposing of the sewage or any other effluent to be generated by this activity(ies)? Provide written confirmation from the Municipality or relevant authority</p> <p><u>No, the municipality has agreed informally to the wastewater being disposed of in the municipal system, however formal written comment is still outstanding.</u></p>		

⁺⁺⁺ Refer to chemicals marked with *: After discussions with the Saldanha Bay Municipality it has been agreed that Sodium tripolyphosphate (STPP) and Trisodium phosphate 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.

^{sss} Note: The municipality has agreed informally to the wastewater being disposed of in the municipal system, however, formal written comment is still outstanding.

^{****} Note that the discharging of brine containing oxidizing biocides has also been assessed for completeness.

^{tttt} Note: Only the CIP backwash and sewage will be disposed of via the municipal system.

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Will any effluent produced be treated and/or disposed of on site?	✓ Yes	NO
If yes, briefly describe the nature of the effluent and how it will be disposed of:		
The brine (including backwash effluent) from the RO plant process will be discharged by pipeline into the sea (either Small or Big Bay depending on the site alternative).		
Effluent from the ablation facilities within the RO building will either be disposed and treated via a septic tank at the three site alternatives, or will be routed to the existing sewer system (at sites 2 and 3).		
Will the activity produce effluent that will be treated and/or disposed of at another facility?	✓ YES	NO
If yes, has this facility confirmed that sufficient capacity exist for treating / disposing of the liquid effluent to be generated by this activity(ies)? Provide written confirmation from the facility and provide the following particulars of the facility:	✓ YES	NO
Does the facility have an operating license? (If yes, please attach a copy of the license.)	✓ YES	NO
Facility name: <u>Saldanha Bay Municipality</u>		
Contact person: <u>Pierre Maritz</u>		
Postal address: <u>Private Bag X12, Vredenburg</u>		
	Postal code: <u>7380</u>	
Telephone: <u>022 701 7112</u>	Cell: <u>Unknown</u>	
E-mail: <u>pierrem@saldanhabay.co.za</u>	Fax: <u>Unknown</u>	

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:
The use of salt abstracted from the brine was considered but found to be unviable (refer to Section 7 of the Main BA Report)

(c) Emissions into the atmosphere

Will the activity produce emissions that will be disposed of into the atmosphere?	YES	✓ NO
If yes, does it require approval in terms of relevant legislation?	YES	✓ NO
Describe the emissions in terms of type and concentration and how it will be treated/mitigated:		
N/A		

2. WATER USE

► **Note:** The information provided in this section is relevant to all alternatives.

Please indicate the source(s) of water for the activity by ticking ("✓") the appropriate box(es)

<input checked="" type="checkbox"/> Municipal	<input type="checkbox"/> Water board	<input type="checkbox"/> Groundwater	<input type="checkbox"/> River, Stream, Dam or Lake	<input checked="" type="checkbox"/> Other Sea water	<input type="checkbox"/> The activity will not use water
---	---	---	--	---	--

If water is to be extracted from a groundwater source, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:	240 000m ³ seawater will be extracted from 3 RO modules.
--	---

Please provide proof of assurance of water supply eg. letter of confirmation from municipality / water user associations, yield of borehole

► **Note:** A letter from the local authority confirming the water allocation for the Port is attached as Appendix H5.

Does the activity require a water use permit / license from DWAF? YES NO

If yes, please submit the necessary application to Department of Water Affairs and Forestry and attach proof thereof to this application.

► **Note:** An application for a water use licence (associated with storage of water and the discharge of water in any manner which contains waste from, or which has been heated in, any industrial or power generation process: 21h) is currently being prepared for submission to DWAF

3. POWER SUPPLY

► **Note:** The information provided in this section is relevant to all alternatives.

Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source

Eskom currently supplies power to the Iron Ore Handling Facility and will be the source of power supply for the proposed RO Plant.

If power supply is not available, where will power be sourced from?
There is a potable storage reservoir which has a 48 hour retention time and it is not anticipated that power supply will be cut for longer than this. No back up power source will thus be required.

4. ENERGY EFFICIENCY

► **Note:** The information provided in this section is relevant to all alternatives.

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:
An energy recovery device will be installed to make the RO process more energy efficient. The energy recovery consists of a turbine (driven by the brine), which is directly coupled to a pump that pressurizes the sea water intake. The energy recovery turbine will recover the residual energy in the brine discharge stream and this energy will be used to boost the feed pressure to the membranes. Indications are that these systems can reduce each RO Plant modules' consumption. The waste brine exits the RO module at a pressure of approximately 55 bar, thus there is a lot of energy in the brine. This energy is normally wasted, but an energy recovery module can redirect this energy into the seawater entering the RO Plant and thus decrease the energy needed by the seawater pump.
Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:
Refer to discussion above regarding the energy recovery system.

5. NOISE IMPACTS

► **Note:** The information provided in this section is relevant to all alternatives.

Will the activity result in any noise impacts during the construction phase?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
If yes, please describe and indicate the measures proposed to mitigate and manage these impacts?		
Potential noise impacts related with the construction phase would mainly be associated with the earth moving equipment (e.g. excavators, front end loaders, compactors) as well as mobile cranes, welding equipment (e.g. grinders, drills within RO plant building) hand tools, drilling rig, trucks, concrete vibrators and jack hammers. The RO plant is proposed in an area where noise is already above normal rural/urban intensity, as it is within a heavy industrial area. The RO plant is approximately 3km from the nearest residential development, and therefore impact on surrounding residents is not anticipated. It is unlikely that the noise from construction activities would create a nuisance factor. Potential noise impacts will also be mitigated by ensuring that machinery is kept in good working order, and ensuring that construction activities be limited to normal working hours (i.e. 07:00 – 17:00).		
Will the activity result in any noise impacts during its operational phase?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
If yes, please describe and indicate the measures proposed to mitigate and manage these impacts?		
The pressurization pumps and the brine discharge pumps will operate at very high pressure heads and create noise in the immediate plant area. The RO Plant is proposed in an area where noise is already above normal rural/urban intensity, as it is within a heavy industrial area. The location of the proposed RO Plant is approximately 3km from the nearest residential development, and therefore impact on surrounding residents is not anticipated. Recommendations from Mackenzie Hoy and Associates Consulting Acoustic Engineers (refer to Appendix H2) to mitigate potential noise will be used in the design of the RO plant building. The recommendations include:		
<ul style="list-style-type: none"> • The RO Plant pressurization pumps and the entire plant should be housed in a separate building which should be sound proofed and have internal acoustic treatment (if the noise ratings from the equipment in the building exceed 85dBa). • Internal acoustic treatment, consisting of wall cladding, should be used to limit noise within the RO building. The limit for internal noise should be no more than 85dBa as measured at the entrance door to the structure. 		

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential noise impact(s) of the proposed activity/ies.

6. VISUAL IMPACTS

► **Note:** The information provided in this section is relevant to all alternatives.

Will the activity result in any visual impacts?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
If yes, please describe and indicate the measures proposed to mitigate and manage these impacts?		
The RO building will be approximately 5-10m high with a floor <u>area</u> of approximately 2400m ² and any development of this size will have a visual impact. However, the impact is insignificant due to its location within an already developed Iron Ore Handling Facility, which already has highly significant visual impacts. Depending on the site location of the RO plant, the RO building may be visible from the town of Saldanha across Small Bay, and it is recommended that the roof material be non-reflective to reduce the visual impact. The RO building will not be visible from the R27 (the West Coast Road), nor will it be visible from Main Road 559. The beach wells proposed at Site alternative 1 will not have a high visual impact as they will only be visible approximately 1m above the beach. This beach area is not accessible to the general public, and the Iron Ore Handling Facility blocks the view of this beach area from the town of Saldanha across the bay. The boreholes proposed at Site alternative 3 are likely to have a very limited visual impact as they will only extend slightly above ground level, and will not be seen above the existing infrastructure found at the site (such as conveyors).		
Will the activity result in potential lighting impacts at night?	<input checked="" type="checkbox"/> YES	<input type="checkbox"/> NO
If yes, please describe and indicate the measures proposed to mitigate and manage these impacts?		
The RO Plant will be operational for 24 hours (i.e. continuously) and it is therefore likely that lights will be on within the RO building at night. However, the impact is insignificant due to the location of the RO building in an already developed Iron Ore Handling Facility which already has highly significant visual impacts (including night lights).		

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential visual impact(s) of the proposed activity/ies.

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7. SOCIO-ECONOMIC IMPLICATIONS OF THE ACTIVITY

► **Note:** The information provided in this section is relevant to all alternatives.

What is the expected capital value of the activity on completion?	R32 500 000.00
What is the expected yearly income or contribution to the economy that will be generated by or as a result of the activity?	There will be no direct contribution to the economy
Will the activity contribute to service infrastructure?	✓ YES NO
How many new employment opportunities will be created in the construction phase of the activity?	+105
What is the expected value of the employment opportunities during the construction phase?	R 5 500 000
What percentage of this will accrue to previously disadvantaged individuals?	+75%

How will this be ensured and monitored (please explain):	
All contractors and sub-contractors will keep a record of the percentage of local contractors in their workforce. Transnet Industrial Relations (IR) department will keep records for tracking purposes and these will be updated on a monthly basis. Appointments will be made in close consultation with the Construction Manager or IR Manager. Contractors are required to source local labour from the Department of Labour offices in Vredenburg.	

How many permanent new employment opportunities will be created during the operational phase of the activity?	+ 10
What is the expected current value of the employment opportunities during the first 10 years?	Approximately R10 million over 10 years.
What percentage of this will accrue to previously disadvantaged individuals?	80-90%.

How will this be ensured and monitored (please explain):	
Transnet Port Terminals has an equity requirement regarding the percentage of employment that must go to Previously Disadvantage Individuals. Appointments will be made in close consultation with the Health, Safety and Environment co-ordinator who will liaise with the Local Council which has a list of local people in need of employment.	

8. IMPACTS THAT MAY RESULT FROM THE PLANNING, DESIGN AND CONSTRUCTION PHASE

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the planning, design and construction phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

► **Note:** At the onset of this BA process Site 1 was the preferred site alternative. However, after consultation with various specialists Site 3 has evolved to be the preferred alternative. To maintain consistency throughout the process (as well as in Specialist Studies) the numbering of the sites has remained the same. Therefore **Site 3 is the preferred site alternative** and the option of borehole intake on the quay (adjacent to the Multi-purpose Terminal) and a pipeline discharge (at caisson 3 into Big Bay) is the preferred layout option (**S3d**).

► **Note:** The potential impacts associated with the construction of the RO Plant as well as feed-water intake and brine discharge structures are likely to be far less significant than impacts associated with port expansion activities which are proposed.

► **Note:** This section is based on the following specialist studies available in **Appendix G**:

- Proposed Reverse Osmosis Plant for the Transnet Iron Ore Handling Facility, Saldanha: Botanical Assessment (compiled by B. Low & M. Berry) (**Appendix G1**);
- Environmental Impact Assessment: Port of Saldanha, Proposed Reverse Osmosis Water Desalination Plant, Groundwater Resources Impact Assessment (compiled by D. Visser, M. Goes & P. Rosewarne) (**Appendix G2**);
- Environmental Impact Assessment: Proposed Reverse Osmosis Plant, Port of Saldanha, Specialist Marine Impact Assessment (compiled by R. van Ballegooyen, A. Pulfrich & N. Steffani) (**Appendix G3**); and
- Heritage Impact Assessment of Proposed Reverse Osmosis Plant at the Iron Ore Handling Facility Port of Saldanha, Western Cape (compiled by T. Hart) (**Appendix G4**).

BASIC ASSESSMENT REPORT

Alternative S1a (refer to figure in Appendix B2)			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Botanical Impacts			
Loss of dune vegetation due to the construction of the RO Plant building and the associated pipelines, beach wells etc. on the primary dunes east of the existing facility.	Very High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species Perform a search and rescue operation (guided by a specialist botanist) to remove and relocate any rare or useful plants further along the coast 	Very High
Impact on local biodiversity and Red Data species due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species Perform a search and rescue operation (guided by a specialist botanist) to remove and relocate any rare or useful plants further along the coast 	Medium
Impact on system connectivity (between the coast and inland) due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Medium
Loss of dune function due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	Very High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	High
Impact on conservation status of vegetation types due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Medium
<i>Note that mitigation to offset the impacts of the construction of the RO Plant in the primary dunes is extremely difficult given the high sand mobility and general instability of the coastline above the high water mark.</i>			
Geohydrological Impact			
Impact on local groundwater due to fuel, oil and grease spillages during construction of intake and discharge beach wells and pipelines. High concentrations will contaminate local groundwater system which may be detrimental to the biota associated with the beach when contaminated groundwater eventually discharges into the ocean.	Insignificant	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Increased salinity of near shore groundwater system due to excavations/drilling to install beach wells which might introduce sea water into the near shore groundwater system and disturbance of the natural groundwater system conditions due to the excavations/drilling to install beach wells.	Insignificant	<ul style="list-style-type: none"> Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole. Contain the silt-laden water from the boreholes (airlifted during cleaning and development) in the "mud pits" used for mixing the drilling additive in and once the work is completed backfill and clean the site. Enforce "good-house keeping" during the construction phase. Set up a groundwater monitoring scheme. 	Insignificant
Heritage Impacts			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines, beach wells and all associated infrastructure.	Low	<ul style="list-style-type: none"> Report the discovery of any fossil shell/bone to a qualified palaeontologist. Retain drilling cores for inspection by a palaeontologist. 	Very Low
Marine Impacts			
Impact on the marine environment and species due to the construction of intake beach wells	Medium	<ul style="list-style-type: none"> No significant mitigation possible other than avoiding beach well construction. 	Medium
Impact on the marine environment and species due to the construction of discharge infrastructure	Very Low	<ul style="list-style-type: none"> Not deemed necessary. 	Very Low

BASIC ASSESSMENT REPORT

Alternative S1b (refer to figure in Appendix B3)			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Botanical Impacts			
Loss of dune vegetation due to the construction of the RO Plant building and the associated pipelines, on the primary dunes east of the existing facility.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	High
Impact on local biodiversity and Red Data species due to the construction of the RO Plant building and the associated pipelines.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Medium
Impact on system connectivity (between the coast and inland) due to the construction of the RO Plant building and the associated pipelines.	Medium	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Low
Loss of dune function due to the construction of the RO Plant building and the associated pipelines.	Very High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	High
Impact on conservation status of vegetation types due to the construction of the RO Plant building and the associated pipelines.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Medium
<i>Note that mitigation to offset the impacts of the construction of the RO Plant in the primary dunes is extremely difficult given the high sand mobility and general instability of the coastline above the high water mark.</i>			
Geohydrological Impact			
Impact on local groundwater due to fuel, oil and grease spillages during construction of intake and discharge beach wells and pipelines. High concentrations will contaminate local groundwater system which may be detrimental to the biota associated with the beach when contaminated groundwater eventually discharges into the ocean.	Insignificant	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Heritage Impacts			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines and all associated infrastructure.	Low	<ul style="list-style-type: none"> Report the discovery of any fossil shell/bone to a qualified palaeontologist. Retain drilling cores for inspection by a palaeontologist. 	Very Low
Marine Impacts			
Impact on the marine environment and species due to the construction of intake pipelines	Medium	<ul style="list-style-type: none"> Limited mitigation is possible using "best practice" mitigation measures during construction. 	Medium
Impact on the marine environment and species due to the construction of discharge infrastructure	Very Low	<ul style="list-style-type: none"> Not deemed necessary. 	Very Low

Alternative S1c⁺⁺⁺ (refer to figure in Appendix B4)			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Botanical Impacts			
Loss of dune vegetation due to the construction of the RO Plant building and the associated pipelines, beach wells etc. on the primary dunes east of the existing facility.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	High
Impact on local biodiversity and Red Data species due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Medium
Impact on system connectivity (between the coast and inland) due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	Medium	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Low

⁺⁺⁺ Note: Groundwater investigations have indicated that this alternative is not feasible.

BASIC ASSESSMENT REPORT

Loss of dune function due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	Very High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	High
Impact on conservation status of vegetation types due to the construction of the RO Plant building and the associated pipelines, beach wells etc.	High	<ul style="list-style-type: none"> Constantly manage the mobile dune system by maintaining sand movement and planting appropriate species 	Medium
<i>Note that mitigation to offset the impacts of the construction of the RO Plant in the primary dunes is extremely difficult given the high sand mobility and general instability of the coastline above the high water mark.</i>			
Geohydrological Impact			
Impact on local groundwater due to fuel, oil and grease spillages during construction of intake and discharge beach wells and pipelines. High concentrations will contaminate local groundwater system which may be detrimental to the biota associated with the beach when contaminated groundwater eventually discharges into the ocean.	Insignificant	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Increased salinity of near shore groundwater system due to excavations/drilling to install beach wells which might introduce sea water into the near shore groundwater system.	Insignificant	<ul style="list-style-type: none"> Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole. 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. Enforce "good-house keeping" during the construction phase. Set up a groundwater monitoring scheme. 	Insignificant
Disturbance of the natural groundwater system conditions due to the excavations/drilling to install beach wells.	Insignificant	<ul style="list-style-type: none"> Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole. 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. Enforce "good-house keeping" during the construction phase. Set up a groundwater monitoring scheme. 	Insignificant
Heritage Impacts			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines, beach wells and all associated infrastructure.	Low	<ul style="list-style-type: none"> Report the discovery of any fossil shell/bone to a qualified palaeontologist. Retain drilling cores for inspection by a palaeontologist. 	Very Low
Marine Impacts			
Impact on the marine environment and species due to the construction of intake beach wells	Medium	<ul style="list-style-type: none"> No significant mitigation possible other than avoiding beach well construction. 	Medium

Alternative S2a (refer to figure in Appendix B5)

Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Loss of dune vegetation due to the construction of the RO Plant building and the associated pipelines, beach wells etc. on the primary dunes east of the existing facility.	Low	<ul style="list-style-type: none"> Plant a variety of locally occurring indigenous species to help stabilise the bare and partially vegetated sand. 	None
Geohydrological Impact			

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Impact on local groundwater due to fuel, oil and grease spillages during construction of intake and discharge beach wells and pipelines.	Insignificant	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Increased salinity of near shore groundwater system due to excavations/drilling to install beach wells which might introduce sea water into the near shore groundwater system.	Insignificant	<ul style="list-style-type: none"> Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole. 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. Enforce "good-house keeping" during the construction phase. Set up a groundwater monitoring scheme. 	Insignificant
Disturbance of the natural groundwater system conditions due to the excavations/drilling to install beach wells.	Insignificant	<ul style="list-style-type: none"> Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole. 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. Enforce "good-house keeping" during the construction phase. Set up a groundwater monitoring scheme. 	Insignificant
Heritage Impact			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines, beach wells and all associated infrastructure.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Marine Impacts			
Impact on the marine environment and species due to the construction of intake beach wells	Medium	<ul style="list-style-type: none"> Restrict vehicle traffic associated with pipeline and well construction to clearly demarcated access routes. Apply "good house-keeping" including:- <ul style="list-style-type: none"> Park vehicles on drip trays when vehicles are parked on the beach. No vehicle maintenance or refuelling on the beach. Accidental diesel and hydrocarbon spills must be cleaned up as prescribed in a strictly enforced Environmental Management Plan (EMP). No concrete mixing on the beach. 	Medium
Impact on the marine environment and species due to the construction of discharge pipeline	Medium	<ul style="list-style-type: none"> No significant mitigation possible other than avoiding beach well construction. 	Medium
Impact on the marine environment and species due to the construction of discharge infrastructure	Medium	<ul style="list-style-type: none"> Limited mitigation is possible using "best practice" mitigation measures during construction. 	Medium

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Alternative S2b (refer to figure in Appendix B6)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact on the natural vegetation at the site due to the construction of the RO Plant building and associated infrastructure.	Low	<ul style="list-style-type: none"> Plant a variety of locally occurring indigenous species to help stabilise the bare and partially vegetated sand. 	None
Geohydrological Impact			
Impact on local groundwater due to fuel, oil and grease spillages during construction of intake and discharge pipelines.	Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Heritage Impact			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines and all associated infrastructure.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Marine Impacts			
Impact on the marine environment and species due to the construction of intake pipelines	Medium	<ul style="list-style-type: none"> Restrict vehicle traffic associated with pipeline and well construction to clearly demarcated access routes. Apply "good house-keeping" including:- <ul style="list-style-type: none"> Park vehicles on drip trays when vehicles are parked on the beach. No vehicle maintenance or refuelling on the beach. Accidental diesel and hydrocarbon spills must be cleaned up as prescribed in a strictly enforced Environmental Management Plan (EMP). No concrete mixing on the beach. 	Medium
Impact on the marine environment and species due to the construction of discharge pipeline	Medium	<ul style="list-style-type: none"> Limited mitigation is possible using "best practice" mitigation measures during construction. 	Medium

Alternative S3a (refer to figure in Appendix B7)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact of RO Plant and associated infrastructure construction on the natural vegetation at the site.	None	<ul style="list-style-type: none"> No mitigation required. 	None
Geohydrological Impact			
None	N/A	<ul style="list-style-type: none"> N/A 	N/A
Heritage Impact			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines, beach wells and all associated infrastructure.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Marine Impacts			
Impact on the marine environment and species due to the construction of intake pipelines	Very low	<ul style="list-style-type: none"> Not deemed necessary other than normal environmental "best practice". 	Very low
Impact on the marine environment and species due to the construction of discharge pipeline	Medium	<ul style="list-style-type: none"> Limited mitigation is possible using "best practice" mitigation measures during construction. 	Medium

Alternative S3b (refer to figure in Appendix B8)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact of RO Plant and associated infrastructure construction on the natural vegetation at the site.	None	• No mitigation required.	None
Geohydrological Impact			
None	N/A	• N/A	N/A
Heritage Impact			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines and all associated infrastructure.	Insignificant	• No mitigation required.	Insignificant
Marine Impacts			
Impact on the marine environment and species due to the construction of intake pipelines	Very low	• Not deemed necessary other than normal environmental "best practice".	Very low
Impact on the marine environment and species due to the construction of discharge pipeline	Medium	• Limited mitigation is possible using "best practice" mitigation measures during construction.	Medium

Alternative S3c (refer to figure in Appendix B9)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact of RO Plant and associated infrastructure construction on the natural vegetation at the site.	None	• No mitigation required.	None
Geohydrological Impact			
None	N/A	• N/A	N/A
Heritage Impact			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines, beach wells and all associated infrastructure.	Insignificant	• No mitigation required.	Insignificant
Marine Impacts			
Impact on the marine environment and species due to the construction of discharge infrastructure at Caisson 3.	Very Low	• No mitigation required.	Very Low
Impact on the marine environment and species due to the construction of intake boreholes.	Very Low	• No mitigation required.	Very Low

Alternative S3d (refer to figure in Appendix B10) (preferred activity alternative)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact of RO Plant and associated infrastructure construction on the natural vegetation at the site.	None	• No mitigation required.	None
Geohydrological Impact			
None	N/A	• N/A	N/A
Heritage Impact			
Impact on cultural heritage resources due to the construction of the RO Plant building, pipelines, beach wells and all associated infrastructure.	Insignificant	• No mitigation required.	Insignificant

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Marine Impacts			
Impact on the marine environment and species due to the construction of discharge infrastructure at Caisson 3.	Very Low	<ul style="list-style-type: none"> No mitigation required. 	Very Low
Impact on the marine environment and species due to the construction of intake boreholes.	Very Low	<ul style="list-style-type: none"> No mitigation required. 	Very Low

Preferred Reservoir Site (refer to figure in Appendix B11)			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact on the natural vegetation due to the construction of the water storage reservoir.	Low	<ul style="list-style-type: none"> <i>Ensure that the reservoir is</i> kept at the greatest distance from the dunes 	None
Heritage Impact			
Impact on cultural heritage resources due to the construction of the water storage reservoir.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Geohydrological Impact			
None	N/A	N/A	N/A
Marine Impacts			
None	N/A	N/A	N/A

2nd Preferred Reservoir Site (refer to figure in Appendix B12)			
<u>Potential impacts:</u>	<u>Significance rating of impacts (Low, Medium, Medium-High, High, Very High):</u>	<u>Proposed mitigation:</u>	<u>Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):</u>
<u>Botanical Impact</u>			
<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>Heritage Impact</u>			
<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>Geohydrological Impact</u>			
<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>
<u>Marine Impacts</u>			
<u>None</u>	<u>N/A</u>	<u>N/A</u>	<u>N/A</u>

3rd Preferred Reservoir Site (refer to figure in Appendix B13)			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Botanical Impact			
Impact on the natural vegetation due to the construction of the water storage reservoir.	Low	<ul style="list-style-type: none"> <i>Ensure that the reservoir is</i> kept to the confines of the borrow pit and does not impact on the parabolic dunes to the north Rehabilitate the surrounding area, particularly towards the dunes in the north, after construction. 	None
Heritage Impact			
Impact on cultural heritage resources due to the construction of the water storage reservoir.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Geohydrological Impact			
None	N/A	N/A	N/A

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Marine Impacts			
None	N/A	N/A	N/A

9. IMPACTS THAT MAY RESULT FROM THE OPERATIONAL PHASE

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the operational phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

Alternative S1a (refer to figure in Appendix B2)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Increased salinity of near shore groundwater system conditions due to the abstraction of water via beach wells which will result in the intrusion of saline seawater into the local shore groundwater.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Contamination of the groundwater system as a result of accidental spillage and leakage of chemicals at the RO Plant.	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Marine Impacts			
Impact of brine discharge on increased salinity levels.	Low	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design. 	Low
Impact of brine discharge on temperature.	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{§§§§} .	Medium	<ul style="list-style-type: none"> Aerate effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Low	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation is likely to be required, other than optimal discharge diffuser design. 	Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Low	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation likely to be required, other than optimal discharge diffuser design. 	Low
Impact of co-discharged constituents.	Low	<ul style="list-style-type: none"> Dispose of CIP chemicals either to the sewage (waste treatment) system or to a waste disposal site. 	Very Low
Impact of entrainment of biota.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Impact of flow distortion.	Low	<ul style="list-style-type: none"> No mitigation required. 	Low
Impact on sediment dynamics due to brine discharge.	Insignificant	<ul style="list-style-type: none"> No mitigation recommended 	Insignificant

Alternative S1b (refer to figure in Appendix B3)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Contamination of the groundwater system as a result of spillage and leakage of chemicals at the RO Plant.	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant

^{§§§§} The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

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Marine Impacts			
Impact of brine discharge on increased salinity levels.	Low	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design. 	Low
Impact of brine discharge on temperature.	Low	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design. 	Low
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{*****} .	Medium	<ul style="list-style-type: none"> Aerate effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Medium	<ul style="list-style-type: none"> Carefully monitor and manage dosing to ensure minimal residual chlorine concentrations in the discharge. 	Very Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Medium	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation likely to be required, other than optimal discharge diffuser design. 	Medium
Impact of co-discharged constituents.	Low	<ul style="list-style-type: none"> Dispose of CIP chemicals either to the sewage (waste treatment) system or to a waste disposal site. 	Very Low
Impact of entrainment of biota.	Medium	<ul style="list-style-type: none"> Engineering team to design intake pipeline to avoid entrainment. 	Low
Impact of flow distortion.	Low	<ul style="list-style-type: none"> No mitigation required. 	Low
Impact on sediment dynamics due to brine discharge.	Insignificant	<ul style="list-style-type: none"> No mitigation recommended. 	Insignificant

Alternative S1c (refer to figure in Appendix B4)

NOTE: THIS OPTION WAS FOUND TO BE NOT FEASIBLE

Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Increase in salinity of near shore groundwater system and introduction of biocides by brine discharge in beach wells.	High	<ul style="list-style-type: none"> No mitigation recommended. 	High
Increased salinity of near shore groundwater system conditions due to the abstraction of water via beach wells which will result in the intrusion of saline seawater into the local shore groundwater.	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Contamination of the groundwater system as a result of accidental spillage and leakage of chemicals at the RO Plant which may eventually discharge into the ocean.	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant

Alternative S2a (refer to figure in Appendix B5)

Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Increase in salinity of near shore groundwater system by intrusion of saline sea water	Insignificant	<ul style="list-style-type: none"> No mitigation required. 	Insignificant
Accidental spillage and leakage of chemicals at the desalination plant resulting in possible contamination of groundwater system	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant

***** The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

BASIC ASSESSMENT REPORT

Marine Impacts			
Impact of brine discharge on increased salinity levels	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design 	Low
Impact of brine discharge on temperature	Low/Medium	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low/Medium
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{†††††} .	Medium	<ul style="list-style-type: none"> Aeration of the effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Low	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation is likely to be required, other than optimal discharge diffuser design. 	Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Low	<ul style="list-style-type: none"> If biocide dosage is as low as anticipated, no mitigation likely to be required, other than optimal discharge diffuser design. 	Low
Impact of co-discharged constituents	Low	<ul style="list-style-type: none"> Dispose of CIP chemicals either to the sewage (waste treatment) system or to a waste disposal site. 	Very Low
Impact of entrainment of biota	Insignificant	<ul style="list-style-type: none"> No mitigation deemed necessary 	Insignificant
Impact of flow distortion	Low	<ul style="list-style-type: none"> No mitigation recommended 	Low
Impact on sediment dynamics due to brine discharge	Low	<ul style="list-style-type: none"> No mitigation recommended, however appropriate engineering design should negate any potential impacts. 	Low

Alternative S2b (refer to figure in Appendix B6)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Accidental spillage and leakage of chemicals at the desalination plant resulting in possible contamination of groundwater system	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Marine Impacts			
Impact of brine discharge on increased salinity levels.	Low	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design. 	Low
Impact of brine discharge on temperature	Low/Medium	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design. 	Low/Medium
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{†††††} .	Medium	<ul style="list-style-type: none"> Aeration of the effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Medium	<ul style="list-style-type: none"> Carefully monitor and manage dosing to ensure minimal residual chlorine concentrations in the discharge. 	Very Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Medium	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation likely to be required, other than optimal discharge diffuser design. 	Medium
Impact of co-discharged constituents	Low/Medium	<ul style="list-style-type: none"> Dispose of CIP chemicals either to the sewage (waste treatment) system or to a waste disposal site. Monitoring of sediment accumulation 	Very Low
Impact of entrainment of biota	Medium	<ul style="list-style-type: none"> Engineering team to design intake pipeline to avoid entrainment. 	Low
Impact of flow distortion	Low	<ul style="list-style-type: none"> No mitigation recommended 	Low
Impact on sediment dynamics Impact on sediment dynamics due to brine discharge	Low	<ul style="list-style-type: none"> No mitigation recommended, however appropriate engineering design should negate any potential impacts. 	Low

^{†††††} The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

^{†††††} The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

Alternative S3a (refer to figure in Appendix B7)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Accidental spillage and leakage of chemicals at the desalination plant resulting in possible contamination of groundwater system	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Marine Impacts			
Impact of brine discharge on increased salinity levels	Low	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design 	Low
Impact of brine discharge on temperature	Low	<ul style="list-style-type: none"> No mitigation considered, other than optimal discharge diffuser design. 	Low
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{§§§§§} .	Medium	<ul style="list-style-type: none"> Aeration of the effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Medium	<ul style="list-style-type: none"> Carefully monitor and manage dosing to ensure minimal residual chlorine concentrations in the discharge. 	Very Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Low	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation likely to be required, other than optimal discharge diffuser design. 	Low
Impact of co-discharged constituents	Low	<ul style="list-style-type: none"> Dispose of CIP chemicals either to the sewage (waste treatment) system or to a waste disposal site. 	Very Low
Impact of entrainment of biota	Medium	<ul style="list-style-type: none"> Engineering team to design intake pipeline to avoid entrainment. 	Low
Impact of flow distortion	Low	<ul style="list-style-type: none"> No mitigation recommended 	Low
Impact on sediment dynamics due to brine discharge	Low	<ul style="list-style-type: none"> No mitigation recommended, however appropriate engineering design should negate any potential impacts. 	Low

Alternative S3b (refer to figure in Appendix B8)			
Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Accidental spillage and leakage of chemicals at the desalination plant resulting in possible contamination of groundwater system	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Marine Impacts			
Impact of brine discharge on increased salinity levels	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design 	Low
Impact of brine discharge on temperature	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{*****} .	Medium	<ul style="list-style-type: none"> Aeration of the effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Medium	<ul style="list-style-type: none"> Carefully monitor and manage dosing to ensure minimal residual chlorine concentrations in the discharge. 	Very Low

^{§§§§§} The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

^{*****} The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

BASIC ASSESSMENT REPORT

Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Low	<ul style="list-style-type: none"> If biocide dosage is as specified, no mitigation likely to be required, other than optimal discharge diffuser design. 	Low
Impact of co-discharged constituents	Low	<ul style="list-style-type: none"> Dispose of CIP chemicals either to the sewage (waste treatment) system or to a waste disposal site. 	Very Low
Impact of entrainment of biota	Medium	<ul style="list-style-type: none"> Engineering team to design intake pipeline to avoid entrainment. 	Low
Impact of flow distortion	Low	<ul style="list-style-type: none"> No mitigation recommended 	Low
Impact on sediment dynamics due to brine discharge	Low	<ul style="list-style-type: none"> No mitigation recommended, however appropriate engineering design should negate any potential impacts. 	Low

Alternative S3c (refer to figure in Appendix B9)

Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Intake of contaminated water at the quay wells polluted by operations at the adjacent stockpile area and other infrastructure	Very low	<ul style="list-style-type: none"> Continuation of existing good 'housekeeping', by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. 	Insignificant
Marine Impacts			
Impact of brine discharge on increased salinity levels	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design 	Low
Impact of brine discharge on temperature	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low
Impact of the addition of oxygen-scavenging compounds in the brine discharge ^{†††††} .	Medium	<ul style="list-style-type: none"> Aeration of the effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOCl).	Low	<ul style="list-style-type: none"> Management of dosing to ensure minimal chlorine concentrations in the discharge 	Very Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low
Impact of co-discharged constituents	Low	<ul style="list-style-type: none"> Management of dosing to ensure minimal chlorine concentrations in the discharge 	Very Low
Impact of entrainment of biota	Insignificant	<ul style="list-style-type: none"> No mitigation deemed necessary 	Insignificant
Impact of flow distortion	Low	<ul style="list-style-type: none"> No mitigation recommended 	Low
Impact on sediment dynamics due to brine discharge	Insignificant	<ul style="list-style-type: none"> No mitigation recommended 	Insignificant

Alternative S3d (refer to figure in Appendix B10) (preferred activity alternative)

Potential impacts:	Significance rating of impacts(Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation(Low, Medium, Medium-High, High, Very High):
Geohydrological Impacts			
Accidental spillage and leakage of chemicals at the desalination plant resulting in possible contamination of groundwater system	Very Low	<ul style="list-style-type: none"> Apply good 'housekeeping' by keeping accidental spills of chemicals, fuels, oil and/or grease to a minimum. Put in place procedures to quickly and effectively repair any leakages and remove the contaminated soil in the event of spillages on site. 	Insignificant
Intake of contaminated water at the quay wells polluted by operations at the adjacent stockpile area and other infrastructure	Very low	<ul style="list-style-type: none"> Continuation of existing good 'housekeeping'. 	Insignificant
Marine Impacts			
Impact of brine discharge on increased salinity levels	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design 	Low
Impact of brine discharge on temperature	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low

^{†††††} The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed.

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Impact of the addition of oxygen-scavenging compounds in the brine discharge ⁺⁺⁺⁺⁺ .	Medium	<ul style="list-style-type: none"> Aeration of the effluent prior to discharge. 	Very Low
Impact of brine discharge with increased Oxidising Biocides (NaOC).	Low	<ul style="list-style-type: none"> Management of dosing to ensure minimal chlorine concentrations in the discharge 	Very Low
Impact of brine discharge with increased Non-oxidising Biocides (DBNPA)	Low	<ul style="list-style-type: none"> Optimal discharge diffuser design. 	Low
Impact of co-discharged constituents	Low	<ul style="list-style-type: none"> Management of dosing to ensure minimal chlorine concentrations in the discharge 	Very Low
Impact of entrainment of biota	Insignificant	<ul style="list-style-type: none"> No mitigation deemed necessary 	Insignificant
Impact of flow distortion	Low	<ul style="list-style-type: none"> No mitigation recommended 	Low
Impact on sediment dynamics due to brine discharge	Insignificant	<ul style="list-style-type: none"> No mitigation recommended 	Insignificant

10. IMPACTS THAT MAY RESULT FROM THE DECOMMISSIONING AND CLOSURE PHASE

Briefly describe and compare the potential impacts (as appropriate), significance rating of impacts, proposed mitigation and significance rating of impacts after mitigation that are likely to occur as a result of the decommissioning and closure phase for the various alternatives of the proposed development. This must include an assessment of the significance of all impacts.

► Note: *The minimum anticipated life span of the RO Plant and all associated infrastructure is 25 to 50 years. No decommissioning procedures or restoration plans have been compiled at this stage, as it is envisaged that the plant will be refurbished rather than decommissioned after the anticipated 25 to 50 years. The only likely impact of the decommissioning phase would be on the marine environment, and the marine specialists have noted in their report that these impacts are expected to be minimal in comparison to those occurring during the operational phase, and therefore no key issues relating to the marine environment have been identified at this stage. Full decommissioning of the RO Plant will require a separate Basic Assessment in terms of GR 386 (listed activity 23).*

Alternative S1			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
See note above.			

Alternative S2			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
See note above.			

Alternative S3			
Potential impacts:	Significance rating of impacts (Low, Medium, Medium-High, High, Very High):	Proposed mitigation:	Significance rating of impacts after mitigation (Low, Medium, Medium-High, High, Very High):
See note above.			

⁺⁺⁺⁺⁺ The use of sodium metabisulfite as a neutralising agent to the oxidising biocide (chlorine) is not proposed for the RO plant as the use of chlorine will be limited to the product (i.e. potable water). Nevertheless the consequences of its potential use is assessed

11. CUMULATIVE IMPACTS

Describe potential impacts that, on their own may not be significant, but will be significant when added to the impact of other activities or existing impacts in the environment and substantiate response (The information in this section must be provided for all the alternatives as well):

Anthropogenic activities can result in numerous and complex effects on the natural and social environment. While many of these are direct and immediate, the environmental effects of individual activities (or projects) can combine and interact with other activities in time and space to cause incremental or aggregate effects. Effects from disparate activities may accumulate or interact to cause additional effects that may not be apparent when assessing the individual activities one at a time (Canadian Environmental Protection Agency, no date).

The IFC Procedure for Environmental and Social Review of Projects (IFC, 1998) states that environmental assessment should include consideration of "... cumulative impacts of existing projects, the proposed project and anticipated future projects." For the purposes of this report, cumulative impacts are defined as 'direct and indirect impacts that act together with current or future potential impacts of other activities or proposed activities in the area/region that affect the same resources and/or receptors'.

Note that accumulative effects (i.e. the overall effect of different types of impacts at the same location) and interactive effects (where two different types of impacts, which may not be important in isolation, react with each other to create a new impact that might be important) are sometimes also included in definitions of cumulative impacts (ERM, 2006).

It must be noted that the following analysis is necessarily of a generic nature and focuses on key issues of the proposed RO plant and how these might be influenced by cumulative impacts with other activities in the Bay.

Although the impact of the proposed RO Plant will be relatively small in terms of the current activities at the Iron Ore Handling Facility as well as the proposed upgrades of the port, the proposed RO Plant would contribute to the following potential cumulative impacts:

- The potential *low negative impact* on the marine environment and the quality of water in Saldanha Bay. This relates (mainly) to the option of brine discharge in Small Bay where there are a number of existing activities that potentially have a negative impact on the quality of the marine environment 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 (which will contain quantities of wastewater as a result of the dual media filter backwash) from the proposed RO Plant will add 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 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 making 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 expanded Iron Ore Handling Facility. However, the benefits of the RO Plant in providing a sustainable and reliable alternative water supply to ensure that suitable dust mitigation can take place, without placing additional pressure on the scarce water resources in the area, needs to be recognised.

12. IMPACT SUMMARY OF PREFERRED ALTERNATIVE

Having assessed the significance of impacts of the various alternatives, please provide an overall summary and reasons for selecting the preferred alternative.

The following list provides a summary of the significance of impacts for the preferred alternative (3d):

- The potential *insignificant impact* on vegetation and flora associated with the construction of the RO Plant building and associated infrastructure;
- The potential *insignificant impact* on groundwater resources;
- The potential *insignificant impact* on heritage resources associated with the drilling of boreholes;
- The potential *very low impact* on marine species associated with the construction of the RO Plant building and associated infrastructure;
- The potential *low impact* on salinity levels associated with the brine discharge;
- The potential *low impact* associated with the temperature of the brine discharged;
- The potential *insignificant impact* associated with the visual impact of the RO Plant;
- The potential *insignificant impact* associated with the noise impact of the RO Plant;
- The potential *very low impact* associated with the addition of oxygen-scavenging compounds in the brine discharge^{§§§§§§};
- The potential *very low impact* associated with the discharge of brine containing increased Oxidising Biocides (NaOCl);
- The potential *low impact* associated with the discharge of brine containing increased Non-oxidising Biocides (DBNPA);
- The potential *insignificant impact* associated with the entrainment of biota;

^{§§§§§§} The use of oxygen scavenging compounds and oxidising biocides are not part of the current project description but have, however, been included for completeness purposes.

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- The potential *very low impact* associated with co-discharged constituents;
- The potential *low impact* on flow distortion due to brine discharge; and
- The potential *insignificant impact* on sediment dynamics due to brine discharge.

Site 3 is the preferred alternative as it will have the least impact on the vegetation, groundwater, (possible) heritage resources, and marine system of the 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. Intake boreholes will help to reduce chemical pretreatment which will reduce the impact of these chemicals on the environment and at this location will have no impact on ground water resources. Discharge at Caisson 3 has the benefit of using existing infrastructure to attach the discharge pipework to and will also have the potential mitigating effects of propeller wash which will help disperse the brine discharge.

13 RECOMMENDATION OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

In my view (EAP), the information contained in this application form and the documentation attached hereto is sufficient to make a decision in respect of the activity applied for.

✓ YES

~~NO~~

If "NO", list the aspects that should be further assessed through additional specialist input/assessment or whether this application must be subjected to a Scoping process before a decision can be made:

N/A

If "YES", please list recommended conditions, including mitigation measures, that should in your view be considered for inclusion in an authorisation if the activity is authorised by the competent authority:

► Note: At the onset of this BA process Site 1 was the preferred site alternative. However, after consultation with various specialists Site 3 has evolved to be the preferred alternative. To maintain consistency throughout the process (as well as in Specialist Studies) the numbering of the sites has remained the same. Therefore **Site 3 is the preferred site alternative** and the option of borehole intake on the quay (adjacent to the Multi-purpose Terminal) and a pipeline discharge (at caisson 3 into Big Bay) is the preferred layout option (3d).

The following **essential mitigation measures** (provided in the specialist studies refer to **Appendix G**) must be included in an authorisation if the preferred alternative (3d) is authorised:

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. Design pipeline discharge with an optimal diffuser.
3. Control dosing of biocides based on feedback from monitoring systems.
4. Develop a monitoring programme (as discussed in the Marine Specialist Assessment) to assess 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 construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;
 - c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
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.

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Should one of the other alternatives assessed as part of this BA process, other than 3d be approved **additional** mitigation measures, as detailed below (and in the specialist studies) will need to be implemented.

Essential mitigation measures for Site 1a:

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 Botanical impacts:

1. Conduct a search and rescue operation entailing the removal of rare or useful plants that will be affected by the construction of the RO Plant and associated infrastructure. This operation must be guided by a specialist botanist.
2. Constantly manage and maintain the mobile dune system.
3. Plant appropriate species to help maintain the dune system.
4. Implement a biodiversity offset (conservation area).

Essential mitigation measures for Geohydrological impacts:

1. Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark.
2. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole construction.
3. 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.
4. Set up a groundwater monitoring scheme.

Essential mitigation measures for Heritage impacts:

1. Retain a sample of representative drill cores on site from the geotechnical study [this mitigation measure has already been enforced and drill core samples have been retained on site].

Essential mitigation measures for Marine impacts:

1. Limit and restrict vehicular traffic on the beach during construction and operational phase to clearly demarcated access routes and construction areas only.
2. Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
3. Enforce "good house-keeping" including:
 - Drip trays under all vehicles on the beach;
 - No vehicle maintenance or refuelling on beach;
 - Accidental diesel and hydrocarbon spills to be cleaned up accordingly; and
 - No concrete mixing on beach.
4. Actively rehabilitate above the high water mark during and after the construction phase.
5. Design pipeline discharge with an optimal diffuser.

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 construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - f) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - g) Vehicle maintenance and refuelling;
 - h) Concrete works;
 - i) Monitoring of the brine discharge;
 - j) Storage of chemicals on site, etc.
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.

Essential mitigation measures for Site 1b:

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 Botanical impacts

1. Conduct a search and rescue operation entailing the removal of rare or useful plants that will be affected by the construction of the RO Plant and associated infrastructure. This operation must be guided by a specialist botanist.
2. Constantly manage and maintain the mobile dune system.
3. Plant appropriate species to help maintain the dune system.
4. Implement a biodiversity offset (conservation area).

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Essential mitigation measures for Heritage impacts:

1. Transnet to retain a sample of representative drill cores on site from the geotechnical study [this mitigation measure has already been enforced and drill core samples have been retained on site].

Essential mitigation measures for Marine impacts:

1. Limit and restrict vehicular traffic on the beach during construction and operational phase to clearly demarcated access routes and construction areas only.
2. Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
3. Enforce "good house-keeping" including:
 - Drip trays under all vehicles on the beach;
 - No vehicle maintenance or refuelling on beach;
 - Accidental diesel and hydrocarbon spills to be cleaned up accordingly; and
 - No concrete mixing on beach.
4. Actively rehabilitate above the high water mark during and after the construction phase.
5. Use sub-surface intakes.
6. Adjust intake velocities on pipelines to reduce entrainment of biota. Intake velocities should be kept below -0.15 m.s^{-1} .
7. Ensure that all pipeline intakes have screens. These must be specifically sized to prevent fish from entering the system while still allowing adequate water flow.
8. Design pipeline discharge with an optimal diffuser.
9. Reduce residual chlorine concentration in the brine discharge to a level below that which may have lethal or sublethal effects on the biota (dechlorination).

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.
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 construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;
 - c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
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.

Essential mitigation measures for Site 1c: N/A as this option was found to be NOT FEASIBLE.

Essential mitigation measures for Site 2a:

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 Botanical impacts

1. Plant appropriate indigenous species to help rehabilitate and maintain the dune system.

Essential mitigation measures for Geohydrological impacts

1. Space intake beach wells ~50m apart (edge to edge) parallel to the shoreline and as close as possible to, but above, the high water mark.
2. Use only biodegradable non-toxic drilling additives (e.g. Polyflip) during beach well and/or borehole construction.
3. 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.
4. Set up a groundwater monitoring scheme.

Essential mitigation measures for Marine impacts:

1. Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
2. Enforce "good house-keeping" including:
 - Drip trays under all vehicles on the beach;
 - No vehicle maintenance or refuelling on beach;
 - Accidental diesel and hydrocarbon spills to be cleaned up accordingly; and
 - No concrete mixing on beach.
3. Design pipeline discharge with an optimal diffuser.

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.
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.

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3. Formulate and implement a construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;
 - c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
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.

Essential mitigation measures for Site 2b:

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 Botanical impacts

1. Plant appropriate indigenous species to help rehabilitate and maintain the dune system.

Essential mitigation measures for Marine impacts:

1. Enforce "good house-keeping" including:
 - Drip trays under all vehicles on the beach;
 - No vehicle maintenance or refuelling on beach;
 - Accidental diesel and hydrocarbon spills to be cleaned up accordingly; and
 - No concrete mixing on beach.
2. Use sub-surface intakes.
3. Adjust intake velocities on pipelines to reduce entrainment of biota. Intake velocities should be kept below $\sim 0.15 \text{ m.s}^{-1}$.
4. Ensure that all pipeline intakes have screens.
5. Dechlorinate brine before discharge (only if an oxidising biocide is used).
6. Design pipeline discharge with an optimal diffuser.

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.
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 construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;
 - c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
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.

Essential mitigation measures for Site 3a:

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 Marine impacts:

1. Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
2. Use sub-surface intakes.
3. Adjust intake velocities on pipelines to reduce entrainment of biota. Intake velocities should be kept below $\sim 0.15 \text{ m.s}^{-1}$.
4. Ensure that all pipeline intakes have screens.
5. Dechlorinate brine before discharge (only if an oxidising biocide is used).
6. Design pipeline discharge with an optimal diffuser.

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.
2. Store all chemicals used in the RO process appropriately as prescribed in the Occupational Health and Safety Act, 85 of

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- 1993 and obtain all relevant permits from the local authority prior to storage of the chemicals.
3. Formulate and implement a construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;
 - c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
 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.

Essential mitigation measures for Site 3b:

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 Marine impacts:

1. Manage all construction in the coastal zone to a strictly enforced Environmental Management Plan.
2. Use sub-surface intakes.
3. Adjust intake velocities on pipelines to reduce entrainment of biota. Intake velocities should be kept below $\sim 0.15 \text{ m.s}^{-1}$.
4. Ensure that all pipeline intakes have screens.
5. Dechlorinate brine before discharge (only if an oxidising biocide is used).
6. Design pipeline discharge with an optimal diffuser.

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.
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 construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;
 - c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
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.

Essential mitigation measures for Site 3c:

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 beach well and/or 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. Design pipeline discharge with an optimal diffuser.

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.
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 construction phase EMP and additional working procedures (as part of the Port's Environmental Management System [EMS]) for the operational phase of the project, which must include specifications to address the following:
 - a) Management of accidental spills of chemicals, fuel, oil and / or grease;
 - b) Vehicle maintenance and refuelling;

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- c) Concrete works;
 - d) Monitoring of the brine discharge;
 - e) Storage of chemicals on site, etc.
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.

It is recommended that a Construction Phase Environmental Management Plan (CEMP) form part of the environmental authorisation for the proposed RO Plant. Working Procedures (as part of the Port's Environmental Management System [EMS]) for the Operational Phase of the project must be submitted to DEAT for approval before operations at the RO Plant begin. These Working Procedures must be specific to the operations at the RO Plant and the operational phase of the RO Plant must not commence prior to this document being submitted and approved by DEAT

APPENDICES

The following appendices must be attached where appropriate:

Appendix	Tick ("✓") box if Appendix is attached
Appendix A: Location map	✓
Appendix B: Site plan(s)	✓
Appendix C: Owner(s) consent(s)	N/A
Appendix D: Photographs	✓
Appendix E: Public participation information: including a copy of the register of interested and affected parties, the comments and responses report, proof of notices, advertisements and any other public participation information as required in Section C above.	✓
Appendix F: Permit(s) / license(s) from any other organ of state including service letters from the municipality	✓
Appendix G: Specialist Report(s)	✓
Appendix H: Additional Documents	✓

DECLARATIONS

The Applicant

I....., in my personal capacity or duly authorized thereto hereby declare that:

- The information contained in this application form is true and correct, and
- I am fully aware of my responsibilities in terms of the National Environmental Management Act of 1989 (“NEMA”) (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations (“EIA Regulations”) in terms of NEMA (Government Notice No. R. 385, R. 386, and R. 387 in the Government Gazette of 21 April 2006 refer), and that failure to comply with these requirements may constitute an offence in terms of NEMA and the EIA Regulations.

Note: If acting in a representative capacity, a certified copy of the resolution or power of attorney must be attached.

Signature of the applicant:

Name of company:

Date:

The independent Environmental Assessment Practitioner

I....., as the appointed independent environmental practitioner hereby declare that:

- The information contained in this application form is true and correct, and
- I am fully aware of my responsibilities in terms of the National Environmental Management Act of 1989 (“NEMA”) (Act No. 107 of 1998) and the Environmental Impact Assessment Regulations (“EIA Regulations”) in terms of NEMA (Government Notice No. R. 385, R. 386, and R. 387 in the Government Gazette of 21 April 2006 refer), and that failure to comply with these requirements may constitute an offence in terms of NEMA and the EIA Regulations.

Note: The terms of reference must be attached.

► **Note:** The proposal (which provides the terms of reference for PDNA/SRK JV) for this Basic Assessment is attached to the Main Report as **Appendix H3**

Signature of the environmental practitioner:

Name of company:

Date: