environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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File Reference Number:	
Application Number:	
Date Received:	

Basic assessment report in terms of the Environmental Impact Assessment Regulations, 2010, promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

Kindly note that:

1. This **basic assessment report** is a standard report that may be required by a competent authority in terms of the EIA Regulations, 2010 and is meant to streamline applications. Please make sure that it is the report used by the particular competent authority for the activity that is being applied for.

2. The report must be typed within the spaces provided in the form. The size of the spaces provided is not necessarily indicative of the amount of information to be provided. The report is in the form of a table that can extend itself as each space is filled with typing.

3. Where applicable **tick** the boxes that are applicable in the report.

4. An incomplete report may be returned to the applicant for revision.

5. The use of "not applicable" in the report must be done with circumspection because if it is used in respect of material information that is required by the competent authority for assessing the application, it may result in the rejection of the application as provided for in the regulations.

6. This report must be handed in at offices of the relevant competent authority as determined by each authority.

7. No faxed or e-mailed reports will be accepted.

8. The report must be compiled by an independent environmental assessment practitioner.

9. Unless protected by law, all information in the report will become public information on receipt by the competent authority. Any interested and affected party should be provided with the information contained in this report on request, during any stage of the application process.

10. A competent authority may require that for specified types of activities in defined situations only parts of this report need to be completed.

REPORT CONTROL SHEET

REFERENCE NO.	12/12/20/2273
PROJECT NO.	106833
TITLE	Proposed Reverse Osmosis Plant at the Hendrina Power Station, Mpumalanga: Final Basic Assessment Report.
AUTHORS & PREPARED BY	Louise Corbett of Aurecon South Africa (Pty) Ltd (PO Box 494, Cape Town, 8000)
CLIENT	Eskom Holdings (Pty) Ltd
CLIENT REPRESENTATIVE	Tobile Bokwe
REPORT STATUS	Final
REPORT NUMBER	5473A
REPORT DATE	August 2011

Authors:

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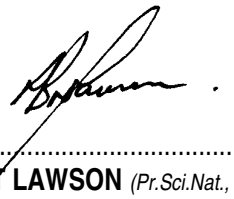
Practitioner: Environmental Services

Approved by:



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This report is to be referred to in bibliographies as: AURECON. 2011. Proposed Reverse Osmosis Plant at the Hendrina Power Station, Mpumalanga: Final Basic Assessment Report. Report No. 5473A/106833

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LIST OF ANNEXURES

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section? | YES | **NO** |

If YES, please complete the form entitled "Details of specialist and declaration of interest" for appointment of a specialist for each specialist thus appointed:
Any specialist reports must be contained in Annexure D.

1. ACTIVITY DESCRIPTION

Describe the activity, which is being applied for, in detail[1]:

Eskom Holdings (Pty) Ltd (Eskom) proposes to construct a Reverse Osmosis (RO) plant at Hendrina Power Station (Hendrina) in Pullenshope, Mpumalanga.

1. Background

Hendrina Power Station is located approximately 16 km north north west of Hendrina town in the Steve Tshwete Local Municipality in Mpumalanga. Hendrina was completely commissioned in 1976 and consists of ten units of 200 megawatts (MW) each (i.e. a total of 2 000 MW) and operates wet cooling and ashing systems. The station's wet ashing system consists of five dams with a combined total surface area of approximately 210 hectares (ha). The power station layout is provided in **Annexure A**.

Hendrina obtains raw water from the Komati water system, which consists of Nooitgedacht and Vygeboom dams. The Komati system is augmented from the Usutu system via the Komati/Usutu link. Other power stations supplied by the Komati system include Arnot, Komati and Duvha Power Stations.

a) Cooling system

In the wet cooling system, raw water is gravity fed into the ponds of cooling towers no. 7 and 8 on the south side of Hendrina, and cooling towers no. 3 and 4 on the north side to make up for all the water losses experienced in the system. The most prominent contributor of the losses is the evaporation which happens in the cooling towers.

The cooling water is circulated via the cooling water pumps which take water from the cooling tower ponds and pump this water to the condenser where it cools the exhaust steam from the turbine. The return water from the condenser is at a higher temperature because of the heat it has absorbed from the steam. This hot water returns to the cooling towers where it is distributed as a fine spray by the flow distributors inside the cooling towers. This fine spray is cooled by the draft, which is created by the design and shape of the cooling tower, which evaporates some of the water whilst the rest of the water remains in liquid form and fills the cooling tower ponds.

This remnant liquid water, together with the make-up water from the raw water reservoirs, is then re-circulated in the aforementioned process.

[1] Please note that this description should not be a verbatim repetition of the listed activity as contained in the relevant Government Notice, but should be a brief description of activities to be undertaken as per the project description.

b) Ashing system

Coal that is used in the power station possesses useful constituents which aid the process of combustion; the other constituents are waste material and form ash. When the coal is burnt in the furnace the ash still remains as it is not volatile. The ash which remains is of two different grades namely coarse ash and fly ash. The coarse ash is the ash which collects at the bottom of the furnace and is often slightly larger in particle size in comparison to the fly ash. The fly ash, which is more commonly known as dust, flies through the top end of the furnace into the flue, where it is captured by bag filters.

The coarse ash is collected in the ash hoppers which are situated below the furnace, whereas the fly ash collects in dust hoppers. These hoppers are filled with water to facilitate the movement of ash (as slurry). The water used for the conveyance of ash is ash water return (AWR) from the upper dams, which is usually supplemented with service water (untreated raw water which is pumped from the water treatment plant (WTP)) and wastewater generated from the demineralised water production process. This water enters the hopper and mixes with the ash, the resultant ash/water mixture collects in ash sumps and is subsequently pumped by the ash pumps to booster pumps which increase the pressure head so that the ash can be transported to the ash dams which are situated a few kilometres away from the station (see **Annexure A**).

The ash water slurry that is pumped to the ash dams collects at the different discharge points on the ash dams. The ash settles at the bottom and the water is then sucked by a penstock which directs it to the new lower dams. From the new lower dams the water is pumped to the old lower dams which in turn pump the water to the upper dams (AWR dams). The upper dams then pump the water back to the station as AWR to be used in the afore-mentioned ashing process.

c) Water Management at Hendrina

The station currently receives, on average, approximately 82 megalitre (ML) of raw water per day, with the power station operating at an average load factor of 75 %. Of the raw water received 77 % evaporates from cooling water, 3.5 % evaporates from the steam water cycle, 3.5 % is absorbed by ash, 12 % evaporates from the ash system and 3.5 % is used for potable production. The remaining 0.5 % is lost from smaller power station systems.

The effluents from the water treatment processes are used as make-up water for transporting ash from the power station to the ash dams. During this process some of these effluents are absorbed by the ash and the balance evaporates from the ash dams.

The ash dams and AWR dams are constructed and operated to have a free board of approximately 1.5 m (height of dam wall above water level). During wet season an additional volume of storm water (see Table 1) collected in the ashing system must be accommodated. Storm water enters the ash dams and is pumped to the AWR dams. This causes the free board of both the ash dams and the AWR dams to decrease. Should the ash dams overflow they overflow into the AWR dams. Should the AWR dams overflow they would spill to the environment. As such the additional volume of storm water is a risk to Eskom's Zero Liquid Effluent Discharge (ZLED) policy compliance and the environment and has to be accommodated in order to comply with the station's licence conditions and legislation.

Table 1: Wet season storm water gain from Hendrina Power Station ash dams

Rainfall (millimetre per annum)	Storm water gain (Megalitre (Ml)/ day)
690	11
800	13
900	14.5
1 000	16
1 050	17

2. Proposed project

Eskom has considered the risk to the current water management system, the environment, and compliance with Eskom's ZLED at Hendrina as described above, and proposes to construct a Reverse Osmosis (RO) plant to treat the concentrated cooling water (CCW). The treated water (permeate) from this plant would be re-used as a feed for the demineralisation plant at the power station's WTP or, should there not be sufficient demand for demineralised water, it would be re-used as cooling water. Demineralised water is used to form steam in a closed system in the boilers, which then drives the turbines which in turn creates power. The steam is then cooled inside a closed system in the cooling tower, and is then returned to the boilers to be heated once more.

By removing or decreasing the salts from the CCW due to the proposed RO plant the raw water currently used for producing demineralised water could be replaced with treated CCW water from the proposed RO plant, thus decreasing the stations raw water consumption. Alternately the treated water from the proposed RO plant could be re-used as cooling water, which would also decrease the raw water consumption.

A decrease in raw water consumption is possible because the ashing system was designed to operate with cooling water as an occasional feed only. However, due to deterioration in the quality of the raw water supplied to Hendrina, the number of cycles for which cooling water can be re-used as cooling water is constrained and hence there is more blowdown of CCW than anticipated. Blowdown is when all the CCW system is emptied from the system and replaced by fresh raw water. The ashing system makes use of the blowdown CCW, in order to avoid creating an additional waste stream. Therefore the ashing system has water in excess of its requirements, particularly when large volumes of storm water are received in above-average rainfall years. The ashing system does however still require CCW during dry periods when there is not sufficient storm water and other effluent feeds for the ashing process.

Installation of the RO plant at Hendrina would make it possible to better manage the ash dams effectively as the volume of CCW sent to the ash dams would be reduced. This would free up additional volume within the ashing system (ash dams and AWR dams) to accommodate excess storm water in above average rainfall years and thereby ensure conformance to the ZLED policy, the National Water Act and Water Use Licence conditions.

The proposed RO plant would also assist in reducing the quantity of imported soluble salts (i.e. commercial chemicals) used in the production of demineralised water by 30 %. This is due to the requirement for suitable quality feed water for the production of demineralised water, which requires that salts are removed from the raw water feed. The proposed RO process would use less chemicals in the removal of salts from the feed water for demineralised water than the current demineralised water production process. This would result in a better quality feed water, which in turn would require less chemicals to produce demineralised water. As such the volume of salts to be disposed on the ash

dam would ultimately decrease when using RO water as a feed for the demineralisation process. The reduced need for chemicals would also result in a cost saving for Eskom.

a) Proposed RO Plant process

The proposed RO plant for Hendrina would treat 8 ML/day of CCW, which is equivalent to 2 920 ML per annum. The feed water to the proposed RO plant would be supplied from a tap-off from the cooling water sedimentation plant on the northern side of the station with an existing interlink from the south cooling water plant.

The plant would be designed with a minimum recovery of 80 %. The plant would be modular so that the plant could continue to operate whilst modules are offline for maintenance, hence allowing an availability of 90 %. It would also be designed to remove organics and other impurities such that the permeate (recovery water) would satisfy the quality requirements for feed water to the demineralised water process).

The recovered water (permeate) would primarily be sent to the demineralisation plant, and in cases where there is no need at the demineralisation plant, the water would be sent to the cooling water system. It is anticipated 6.4 ML/day of permeate would be produced by the proposed RO plant. The reject stream, including the effluent from clean in place chemicals from the plant, would be transferred to the existing effluent neutralisation sump at the WTP, from where it would be pumped and disposed via the wet ashing process. It is anticipated 1.6 ML/day of reject would be produced.

Should the RO plant be offline, feed water to the demineralisation plant would be obtained from raw water as is currently practised.

b) Physical requirements of the RO plant

The plant would be located on the north side of the station, between two cooling towers (see **Annexure A** and photographs in **Annexure B**). Access to the plant would be as shown **Annexure A**.

The RO plant would be constructed on a concrete slab within a footprint of 0.5 ha.

It is anticipated that the following chemicals would be used in the proposed RO process:

- Sulfuric acid (H_2SO4);
- Sodium hypochlorite (NaOCl);
- Hydrochloric Acid (HCl);
- Solar SMBS 96 ($C_6H_4NO_5SNa$);
- MemMagic;
- Genesol 703;
- Genesol 40; and
- Genesol 38.

Please find attached in **Annexure C** Material Safety Data Sheets for these chemicals. Liquid chemicals would be stored in 25 L drums or in 1 000 L flowbins, whilst dry chemicals would be stored in 25 kg bags. These chemical would be stored in bunded areas in keeping with the requirements for hazardous chemical storage. It is anticipated that the combined capacity of the above-mentioned chemicals would be less than 30 Ml (which is below the threshold which requires environmental authorisation).

The following pipelines would be required for the proposed RO plant, with approximate lengths:

- From the cooling water sedimentation basin to the proposed RO plant (approximately 100 m);
- From the proposed RO plant to the demineralisation plant in the WTP (approximately 150 m);
- From the proposed RO plant to the cooling water system (approximately 100 m); and
- From the proposed RO plant to the effluent sumps at the WTP (approximately 130 m).

Pipes would be above ground except where they cross roads, in which instance they would be buried.

3. Legal requirements

In terms of the National Environmental Management: Waste Act (No. 59 of 2008)(NEM:WA) the proposed treatment of waste in an RO plant, as described above, is listed in Category B of Schedule 1 (Government Notice (GN) No. 718 of 3 July 2009). The following activities are applicable:

No.	Listed activity (category B)
7	The treatment of effluent, wastewater or sewage with an annual throughput capacity of 15 000 cubic metres or more.
11	The construction of facilities for activities listed in Category B of this Schedule (not in isolation to associated activity).

According to Section 4 of Schedule 1, "…a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct an environmental impact assessment process, as stipulated in the environmental impact assessment regulations made under section 24(4) of National Environmental Management Act…as part of the waste licence application."

Furthermore, in terms of the National Environmental Management Act (No. 107 of 1998) (NEMA) the proposed RO plant is also listed in GN No. 544 of 18 June 2010. The following activity is applicable:

No.	Listed activity (GN No. 544, 18 June 2010)
28	The expansion of or changes to existing facilities for any process or activity where such expansion or changes to will result in the need for a permit or license in terms of national or provincial legislation governing the release of emissions or pollution, excluding where the facility, process or activity is included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case that Act will apply.

According to Section 3(2) of GN No. 544 of 18 June 2010, "The investigation, assessment and communication of potential impact of activities must follow the procedure as prescribed in regulations 21 to 25 of the Environmental Impact Assessment Regulations published in terms of section 24(5) of the Act." Section 21 to 25 of the EIA Regulations refers to the BA process.

However, Section 20 (4) of the NEMA allows that "If an applicant intends undertaking an activity to which S&EIR [Scoping and Environmental Impact Report] must be applied in terms of subregulation (2) and the applicant, on advice of the EAP managing the application, is for any reason of the view that it is likely that the competent authority will be able to reach a decision on the basis of information provided in a basic assessment report, the applicant may apply, in writing, to the competent authority for permission to apply basic assessment instead of S&EIR to the application."

A motivation for a downgrade from an EIA to a BA process was subsequently submitted to DEA on 1 April 2011, based on the following:

1. The project is a brownfields development. All activities would occur within the confines of the

power station, on land already impacted either through ash disposal or the power station precinct.
2. The re-use of water from CCW would result in a net gain for the environment, compared to the current status, as the risk of a pollution event would be reduced.
3. Effluent from the proposed RO plant would not increase the volume of effluent disposed of at Hendrina.
4. The proposed RO plant would result in a decreased salt load being disposed of in the ash dam.
5. The proposed RO plant would allow for decreased water consumption at Hendrina.
6. The footprint of the proposed RO plant and associated infrastructure would be relatively small, approximately 5 000 m^2 and 480 m^2, respectively.
7. The proposed RO plant would be integrated with the existing cooling water infrastructure.

The downgrade was subsequently approved by DEA on 12 April 2011 (see **Annexure D** for a copy of the DEA approval of downgrade letter). As such a BA process, as outlined in sections 21 to 25 of Regulation R543, is currently being undertaken for the proposed project.

2. FEASIBLE AND REASONABLE ALTERNATIVES

"alternatives", in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

(a) the property on which or location where it is proposed to undertake the activity;
(b) the type of activity to be undertaken;
(c) the design or layout of the activity;
(d) the technology to be used in the activity;
(e) the operational aspects of the activity; and
(f) the option of not implementing the activity.

Describe alternatives that are considered in this application. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether 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. 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.

Paragraphs 3 – 13 below should be completed for each alternative.

(1) Location alternatives

The proposed activity involves modifications to structures located within the Hendrina Power Station precinct. As such, no external location alternatives exist. Two sites were considered for the location of the RO plant within the confines of Hendrina, namely Cooling Water North (CWN) and Cooling Water South (CWS) (see **Annexure A**) and the advantages and disadvantages were compared, as presented below.

Option 1: Siting the RO Plant at CWN

Advantages:

- The plant would be in close proximity to the feed water (cooling water) as well as the product discharge point (the demineralisation plant) which would allow for shorter connection pipelines from both the feed and to the discharge point.

- Current infrastructure such as road, piping, bulk chemical offloading systems at the water treatment plant could be used for the RO plant with minimum modifications.

Option 2: Siting the RO Plant at CWS
Advantages:

- The plant would be in close proximity to the feed water (cooling water) which would allow for a shorter connection pipeline from the feed.

Disadvantages:

- The plant would be far from the product discharge point (demineralisation plant) and would therefore require long pipe work to transport the discharge to the water treatment plant. This would be associated with an increase cost and footprint on the environment.
- Infrastructure such as bulk chemical offloading and access roads on the CWS is not adequate as compared to the CWN.

As CWN has more advantages and no disadvantages compared to CWS, Eskom is proposing to locate the proposed RO plant at CWN, as shown in **Annexure A**, and hence only option 1 will be considered further.

(2) Activity type alternatives

A number of alternative activities were considered and the advantages and disadvantages of each are noted below.

2.1.1. Increasing the evaporative footprint of the ash dam
Advantages:
-
Disadvantages:

a. Relatively large footprint
b. Retention of higher volume of stormwater (particularly during high rainfall periods)
c. Increased water consumption during low rainfall years

2.1.2. Discharge of polluted water
Advantages:
-
Disadvantages:

a. Not in line with Eskom ZLED policy
b. No more assimilative capacity in resource stream (Olifants river catchment)

2.1.3. Storage of polluted water
Advantages:
-
Disadvantages:

a. Insufficient draw down within the power station water management system to consume the excess cumulated

2.1.4. Recycling of CCW
Advantages:

a. Re-use of wastewater allows for decreased raw water consumption

b. Footprint relatively small and located within already impacted power station precinct
c. Results in better quality feed water and a reduction in volume of chemicals for demineralisation process. This results in a cost saving.

Disadvantages:

-

As the recycling of CCW has more advantages and no disadvantages compared to other alternatives, only this activity alternative will be considered further.

(3) Design or layout alternatives

Only one layout alternative was considered.

(4) Technology alternatives

A number of technology activities were considered and the advantages and disadvantages of each are noted below.

4.1 Alternatives considered:

4.1.1. Cold Lime softening

Advantages:

-

Disadvantages:

a. No synergy with the demineralised water production process
b. Relatively high capital cost
c. While it assists with the removal of salts from CCW, the advantage is not as significant as an RO, especially when considering the cost of lime softening

4.1.2. Evaporation Ponds:

Advantages:

-

Disadvantages:

a. Relatively high capital cost
b. Wastage of water

4.1.3. Electro deionisation Reversal (EDR)

Advantages:

-

Disadvantages:

a. Product water quality not ideal for demineralised water production
b. Relatively high capital cost

4.1.4. RO plant

Advantages:

a. Allows recycling of water as product water quality ideal for demineralised water production
b. Relatively low capital cost

Disadvantages:

-

As a proposed RO plant has more advantages and no disadvantages compared to other alternatives, only this activity alternative will be considered further.

(5) No-go alternative / Maintain Status Quo

Should the proposed project not go ahead as detailed herein (i.e.: the no-go alternative), the risk of non-compliance with Eskom's Zero Liquid Effluent Discharge policy and the station's licence conditions and legislation will remain, with its concomitant risk on the natural environment.

In terms of the National Environmental Management Act (No. 107 of 1998), the option of not proceeding with a proposed activity must be considered as an alternative. As such the "no-go" alternative is considered and assessed in this BAR.

In summary, the following alternatives will be assessed in this BAR:

- Recycling of CCW via a proposed RO plant at the CWN location; and
- The no-go alternative.

3. ACTIVITY POSITION

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 should be in degrees and decimal minutes. The minutes should have 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.

List alternative sites, if applicable.

Alternative:	Latitude (S):		Longitude (E):	
Alternative S1[2] (preferred or only site alternative)	26°	1.632'	29°	36.129'

For route alternatives that are longer than 500m, please provide an addendum with co-ordinates taken every 250 meters along the route for each alternative alignment.

4. PHYSICAL SIZE OF ACTIVITY

Indicate the physical size of the preferred activity/technology as well as alternative activities/technologies (footprints):

Alternative:	Size of the activity:
Alternative A1[3] (preferred activity alternative)	RO plant building: 5 000 m² Pipelines: 480 m² **Total: 5 480 m²**

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

Alternative:	Size of the site/servitude:
Alternative A1 (preferred activity alternative)(Erf 162)	8 343 353 m²

[2] "Alternative S.." refer to site alternatives.
[3] "Alternative A.." refer to activity, process, technology or other alternatives.

5. SITE ACCESS

Does ready access to the site exist?	**YES**	NO
If NO, what is the distance over which a new access road will be built		m

Describe the type of access road planned:

N/A

Include the position of the access road on the site plan and required map, as well as an indication of the road in relation to the site.

6. SITE OF ROUTE PLAN

See **Annexure A**.

7. SITE PHOTOGRAPHS

See **Annexure B**.

8. FACILITY ILLUSTRATION

A description of the facility if not currently available as this would only be finalised at the detailed design phase. However, the facility would be similar in appearance to the existing buildings on site, both in terms of colour and height. It is anticipated that proposed RO plant would be a maximum of 80 m wide, 35 m long and 5.5 m tall. This footprint would incorporate the following components:

- Building dimensions: 15 m x 45 m x 5.5 m height (highest point of the roof)
- Outside the building:
  - Clarifier / Floc Tank: 5.73 m diameter x 3.0 m height (120 m^3 capacity)
  - Back wash settler Tank: 5.73 m diameter x 4.5 m height (120 m^3 capacity)
  - RO feed water Tank: 5.73 m diameter x 3.0 m height (120 m^3 capacity)
  - Permeate storage Tank: 8.6 m diameter x 4.5 m height (300 m^3 capacity)
  - small chemical storage tanks (x 4): 1.5 m diameter x 2.0 m height (5 m^3 capacity) (height)

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R60 000 000	
What is the expected yearly income that will be generated by or as a result of the activity?	R0	
Will the activity contribute to service infrastructure?	**YES**	NO
Is the activity a public amenity?	YES	**NO**
How many new employment opportunities will be created in the development phase of the activity?	± 20	
What is the expected value of the employment opportunities during the development phase?	±R6 000 000	
What percentage of this will accrue to previously disadvantaged individuals?	60 %	
How many permanent new employment opportunities will be created during the operational phase of the activity?	5	

What is the expected current value of the employment opportunities during the first 10 years?	±R4 500 000
What percentage of this will accrue to previously disadvantaged individuals?	80 %

9(b) Need and desirability of the activity

Motivate and explain the need and desirability of the activity (including demand for the activity):

NEED:			
1.	Was the relevant provincial planning department involved in the application?[4]	**YES**	NO
2.	Does the proposed land use fall within the relevant provincial planning framework?	**YES**	NO
3.	If the answer to questions 1 and / or 2 was NO, please provide further motivation / explanation:		

DESIRABILITY:			
1.	Does the proposed land use / development fit the surrounding area?	**YES**	NO
2.	Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?	**YES**	NO
3.	Will the benefits of the proposed land use / development outweigh the negative impacts of it?	**YES**	NO
4.	If the answer to any of the questions 1-3 was NO, please provide further motivation / explanation:		
5.	Will the proposed land use / development impact on the sense of place?	YES	**NO**
6.	Will the proposed land use / development set a precedent?	YES	**NO**
7.	Will any person's rights be affected by the proposed land use / development?	YES	**NO**
8.	Will the proposed land use / development compromise the "urban edge"?	YES	**NO**
9.	If the answer to any of the question 5-8 was YES, please provide further motivation / explanation:		

BENEFITS:			
1.	Will the land use / development have any benefits for society in general?	**YES**	NO
2.	Explain:		
	The proposed RO plant would improve the ability of the power station to manage stormwater and hence reduce the risk of contamination of natural water sources.		
3.	Will the land use / development have any benefits for the local communities where it will be located?	**YES**	NO
4.	Explain:		
	Approximately 20 employment opportunities, of which at least 13 would be available to the local community, would be generated during the construction period which would benefit people within the local communities. Furthermore, the reduced risk of water pollution as a result of this proposed project is beneficial.		

[4] Mpumalanga's Department of Agriculture, Rural Development and Land Administration has been notified of the proposed project.

10. APPLICABLE LEGISLATION, POLICIES AND / OR GUIDELINES

List all legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations, if applicable:

Title of legislation, policy or guideline:	Administering authority:	Date:
National Environmental Management Act (No. 107 of 1998): Section 28(1)	Department of Environmental Affairs (DEA)	1998
National Environmental Management: Waste Act (No. 59 of 2008)	DEA	2008

11. WASTE, EFFLUENT, EMISSIONS AND NOISE MANAGEMENT

11(a) Solid waste management

Will the activity produce solid construction waste during the construction/initiation phase?	**YES**	NO
If yes, what estimated quantity will be produced per month?	Less than 5 m^3	

How will the construction solid waste be disposed of (describe)?

The solid waste would be transported and disposed at the local Eskom solid waste site.

Where will the construction solid waste be disposed of (describe)?

The local Eskom solid waste site.

Will the activity produce solid waste during its operational phase?	YES	**NO**
If yes, what estimated quantity will be produced per month?	m^3	

How will the solid waste be disposed of (describe)?

N/A

Where will the solid waste be disposed if it does not feed into a municipal waste stream (describe)?

N/A

If the solid waste (construction or operational phases) will not be disposed of in a registered landfill site or be taken up in a municipal waste stream, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Can any part of the solid waste be classified as hazardous in terms of the relevant legislation?	YES	**NO**

If yes, inform the competent authority and request a change to an application for scoping and EIA.

Is the activity that is being applied for a solid waste handling or treatment facility?	YES	**NO**

If yes, then the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

11(b) Liquid effluent

Will the activity produce effluent, other than normal sewage, that will be disposed of in a municipal sewage system?	YES	**NO**
If yes, what estimated quantity will be produced per month?	m^3	
Will the activity produce any effluent that will be treated and/or disposed of on site?	**YES**	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.

Will the activity produce effluent that will be treated and/or disposed of at another facility?	YES	**NO**

If yes, provide the particulars of the facility:

Facility name: Hendrina Power Station Ash Dams

Contact person:	Julian Nair		
Postal address:	PO Box 1003, Pullenshope, Mpumalanga		
Postal code:	1096		
Telephone:	013 296 3400	Cell:	082 887 9493
E-mail:	nairj@eskom.co.za	Fax:	086 586 3847

Describe the measures that will be taken to ensure the optimal reuse or recycling of waste water, if any:

The proposed RO plant would treat CCW so that it can be re-used in the power station. The effluent from the proposed RO process would be disposed of in the ash dams, which is where the CCW is currently disposed of, hence there would not be an increase in effluent volumes.

11(c) Emissions into the atmosphere

Will the activity release emissions into the atmosphere?	YES	**NO**
If yes, is it controlled by any legislation of any sphere of government?	YES	NO

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the emissions in terms of type and concentration:

N/A

11(d) Generation of noise

Will the activity generate noise?	**YES**	NO
If yes, is it controlled by any legislation of any sphere of government?	YES	**NO**

If yes, the applicant should consult with the competent authority to determine whether it is necessary to change to an application for scoping and EIA.
If no, describe the noise in terms of type and level:

Noise from the proposed RO plant would come from electric motor driven pumps and would be local to the plant. Please see section D2 for an assessment of the potential noise impact.

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es).
No additional water would be required for the proposed RO plant as it would treat CCW.

municipal	water board	groundwater	river, stream, dam or lake	other	**the activity will not use water**

If water is to be extracted from groundwater, river, stream, dam, lake or any other natural feature, please indicate the volume that will be extracted per month:		litres
Does the activity require a water use permit from the Department of Water Affairs?	**YES**	NO

If yes, please submit the necessary application to the Department of Water Affairs and attach proof thereof to this application if it has been submitted.

A water use license will be applied for in due course.

13. ENERGY EFFICIENCY

Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

Eskom promotes energy efficiency and therefore energy efficiency and recovery will be incorporated in the design of the proposed RO plant wherever feasible.

Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

Where feasible, waste heat recovery will be incorporated into the design, as well as energy efficient measures.

SECTION B: SITE / AREA / PROPERTY DESCRIPTION

Important notes:

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

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

2. Paragraphs 1 - 6 below must be completed for each alternative.

3. Has a specialist been consulted to assist with the completion of this section?

YES	**NO**

If YES, please complete the form entitled "Details of specialist and declaration of interest" for each specialist thus appointed:
All specialist reports must be contained in Annexure D.

Property description/physical address:	Remainder of Farm 162, Nkangala District (Middelburg, Mpumalanga)
	(Farm name, portion etc.) Where a large number of properties are involved (e.g. linear activities), please attach a full list to this application.
	Hendrina Power Station, Impala Street, Pullenshope, Mpumalanga
	In instances where there is more than one town or district involved, please attach a list of towns or districts to this application.
Current land-use zoning:	Agriculture (The site is used for power generation and associated activities).
	In instances where there is more than one current land-use zoning, please attach a list of current land use zonings that also indicate which portions each use pertains to , to this application.

Is a change of land-use or a consent use application required?	YES	**NO**
Must a building plan be submitted to the local authority?	YES	**NO**

Locality map: See **Annexure A**.

1. GRADIENT OF THE SITE

Indicate the general gradient of the site.
Alternative S1:

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site:
2.1 Ridgeline
2.2 Plateau
2.3 Side slope of hill/mountain
2.4 Closed valley
2.5 Open valley

2.6 **Plain**
2.7 Undulating plain / low hills
2.8 Dune
2.9 Seafront

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on any of the following (tick the appropriate boxes)?

	Alternative S1:	
Shallow water table (less than 1.5m deep)	YES	**NO**
Dolomite, sinkhole or doline areas	YES	**NO**
Seasonally wet soils (often close to water bodies)	YES	**NO**
Unstable rocky slopes or steep slopes with loose soil	YES	**NO**
Dispersive soils (soils that dissolve in water)	YES	**NO**
Soils with high clay content (clay fraction more than 40%)	YES	**NO**
Any other unstable soil or geological feature	YES	**NO**
An area sensitive to erosion	YES	**NO**

If you are unsure about any of the above or if you are concerned that any of the above aspects may be an issue of concern in the application, an appropriate specialist should be appointed to assist in the completion of this section. (Information in respect of the above will often be available as part of the project information or at the planning sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by the Council for Geo Science may also be consulted).

4. GROUNDCOVER

Indicate the types of groundcover present on the site:

The location of all identified rare or endangered species or other elements should be accurately indicated on the site plan(s).

Natural veld - good condition[E]	Natural veld with scattered aliens[E]	Natural veld with heavy alien infestation[E]	Veld dominated by alien species[E]	**Gardens (lawn)**
Sport field	Cultivated land	**Paved surface**	**Building or other structure**	Bare soil

If any of the boxes marked with an "[E] "is ticked, please consult an appropriate specialist to assist in the completion of this section if the environmental assessment practitioner doesn't have the necessary expertise.

5. LAND USE CHARACTER OF SURROUNDING AREA

Indicate land uses and/or prominent features that does currently occur within a 500m radius of the site and give description of how this influences the application or may be impacted upon by the application:

5.1 Natural area
5.2 Low density residential
5.3 Medium density residential
5.4 High density residential
5.5 Informal residential[A]
5.6 Retail commercial & warehousing
5.7 Light industrial
5.8 Medium industrial [AN]
5.9 Heavy industrial [AN]
5.10 Power station
5.11 Office/consulting room
5.12 Military or police base/station/compound
5.13 Spoil heap or slimes dam[A]
5.14 Quarry, sand or borrow pit
5.15 Dam or reservoir
5.16 Hospital/medical centre
5.17 School
5.18 Tertiary education facility
5.19 Church
5.20 Old age home
5.21 Sewage treatment plant[A]
5.22 Train station or shunting yard [N]
5.23 Railway line [N]
5.24 Major road (4 lanes or more) [N]
5.25 Airport [N]
5.26 Harbour
5.27 Sport facilities
5.28 Golf course
5.29 Polo fields
5.30 Filling station [H]
5.31 Landfill or waste treatment site
5.32 Plantation
5.33 Agriculture
5.34 River, stream or wetland
5.35 Nature conservation area
5.36 Mountain, koppie or ridge
5.37 Museum
5.38 Historical building
5.39 Protected Area
5.40 Graveyard
5.41 Archaeological site
5.42 Other land uses (describe)

If any of the boxes marked with an "[N] "are ticked, how will this impact / be impacted upon by the proposed activity?

If any of the boxes marked with an "An" are ticked, how will this impact / be impacted upon by the proposed activity?

If YES, specify and explain: The proposed RO plant will not negatively affect, or be affected by, any of the existing operations on the power station or the coal yard (heavy industry).

If any of the boxes marked with an "H" are ticked, how will this impact / be impacted upon by the proposed activity.
If YES, specify and explain:

6. CULTURAL/HISTORICAL FEATURES

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:	N/A	
If uncertain, conduct a specialist investigation by a recognised specialist in the field to establish whether there is such a feature(s) present on or close to the site.		
Briefly explain the findings of the specialist:		
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 submits the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application if such application has been made.

SECTION C: PUBLIC PARTICIPATION

The following public participation has been undertaken:

- The proposed project was advertised in English and Afrikaans in the Middelburg Observer and Interested and Affected Parties (I&APs) on 13 May 2011 were invited to register and comment on the proposed project. A copy of the advertisement is included in **Annexure E**.
- Registered I&APs were notified of the proposed project via mail on 16 May 2011 and invited to comment on the proposed project (see a copy of the notification in **Annexure E**). A list of registered I&APs, including adjacent landowners, the local and regional municipalities, relevant government departments and the local councillor is included in **Annexure E**.
- A maildrop took place in Pullenshope, whereby the above-mentioned notice was delivered to all houses in the town, on 13 May 2011.
- I&APs were provided with a 21 day comment period until 3 June 2011. One comment was received (see **Annexure E**) and have been collated and responded to in a Comments and Response Report (CRR), which is included in **Annexure F.** A copy of the CRR has been sent to all those who submitted comments.
- The Draft BAR was made available to the public at the Pullenshope Public Library, the security centre at Hendrina Power Station and online on Eskom's and Aurecon's websites from 15 June 2011 to 1 August 2011.
- A poster, in English and Afrikaans, was erected at the entrance to Hendrina Power Station inviting I&APs to comment on the Draft BAR. A copy of the poster is contained in **Annexure E**.
- All registered I&APs were informed of the lodging of the Draft BAR for public comment by means of a letter in English and Afrikaans, which was posted and e-mailed on 15 June 2011. A copy of the letter has been included in **Annexure E**.
- All registered I&APs were informed of the change in date of the Open House from 14 July 2011 to 19 July 2011 on 1 July 2011. A copy of this letter is included in **Annexure E**.
- An advertisement was placed in English, Afrikaans, Zulu and Sepedi in the Middelburg Observer to notify the public of the change in date of the Open House from 14 July 2011 to 19 July 2011 on 8 July 2011. A copy of this advertisement is included in **Annexure E**.
- Two written comments were received and are included in **Annexure E**. The comments were collated and responded to in CRRII, which is included in **Annexure F**.

Actions which will be undertaken simultaneously with the lodging of this final report:

- The Final BAR will be made available for a 21 day comment period at the same locations as the Draft BAR.
- All registered I&APs will be informed of the lodging of the Final BAR for public comment by means of a letter in English and Afrikaans, which will be posted and e-mailed.
- All registered I&APs will be informed of the Department of Environmental Affairs decision and their right to appeal the decision by means of a letter in English and Afrikaans, which will be posted and e-mailed.

1. ADVERTISEMENT

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

(a) fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the competent authority) 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
  (ii) any alternative site mentioned in the application;

(b) giving written notice to—
  (i) the owner or person in control of that land if the applicant is not the owner or person in control of the land;
  (ii) the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iii) owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;
  (iv) the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;
  (v) the municipality which has jurisdiction in the area;
  (vi) any organ of state having jurisdiction in respect of any aspect of the activity; and
  (vii) any other party as required by the competent authority;

(c) placing an advertisement in—
  (i) one local newspaper; or
  (ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;

(d) placing 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: Provided that this paragraph need not be complied with if an advertisement has been placed in an official *Gazette* referred to in subregulation 54(c)(ii); and

(e) using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to—
  (i) illiteracy;
  (ii) disability; or
  (iii) any other disadvantage.

2. CONTENT OF ADVERTISEMENTS AND NOTICES

A notice board, advertisement or notices must:

(a) indicate the details of the application which is subjected to public participation; and

(b) state—
  (i) that the application has been submitted to the competent authority in terms of these Regulations, as the case may be;
  (ii) whether basic assessment or scoping procedures are beingapplied to the application, in the case of an application for environmental authorisation;
  (iii) the nature and location of the activity to which the application relates;

(iv) where further information on the application or activity can be obtained; and
(v) the manner in which and the person to whom representations in respect of the application may be made.

3. PLACEMENT OF ADVERTISEMENTS AND NOTICES

Where the proposed activity may have impacts that extend beyond the municipal area where it is located, a notice must be placed in at least one provincial newspaper or national newspaper, indicating that an application will be submitted to the competent authority in terms of these regulations, the nature and location of the activity, where further information on the proposed activity can be obtained and the manner in which representations in respect of the application can be made, unless a notice has been placed in any *Gazette* that is published specifically for the purpose of providing notice to the public of applications made in terms of the EIA regulations.

Advertisements and notices must make provision for all alternatives.

4. DETERMINATION OF APPROPRIATE MEASURES

The practitioner must ensure that the public participation is adequate and must determine whether a public meeting or any other additional measure is appropriate or not based on the particular nature of each case. Special attention should be given to the involvement of local community structures such as Ward Committees, ratepayers associations and traditional authorities where appropriate. Please note that public concerns that emerge at a later stage that should have been addressed may cause the competent authority to withdraw any authorisation it may have issued if it becomes apparent that the public participation process was inadequate.

5. COMMENTS AND RESPONSE REPORT

The practitioner must record all comments and respond to each comment of the public before the application is submitted. The comments and responses must be captured in a comments and response report as prescribed in the EIA regulations and be attached to this application. The comments and response report must be attached under Annexure F.

6. AUTHORITY PARTICIPATION

Please note that a complete list of all organs of state and or any other applicable authority with their contact details must be appended to the basic assessment report or scoping report, whichever is applicable. A list of relevant organs of state is appended in Annexure E.

Authorities are key interested and affected parties in each application and no decision on any application will be made before the relevant local authority is provided with the opportunity to give input.

List of authorities informed:

- Steve Tshwete Local Municipality
- Nkangala District Municipality
- DEA: Environmental Impact Evaluation
- DEA: Waste Stream Management
- Department of Water Affairs (DWA)
- Mpumalanga Department of Agriculture and Land Administration: Environmental Management
- Mpumalanga Department of Economic Development, Environment and Tourism

- South African Heritage Resources Association (SAHRA)

List of authorities from whom comments have been received:

SAHRA
DWA

7. CONSULTATION WITH OTHER STAKEHOLDERS

Note that, for linear activities, or where deviation from the public participation requirements may be appropriate, the person conducting the public participation process may deviate from the requirements of that subregulation to the extent and in the manner as may be agreed to by the competent authority. Proof of any such agreement must be provided, where applicable.

Has any comment been received from stakeholders?	**YES**	NO

If "YES", briefly describe the feedback below (also attach copies of any correspondence to and from the stakeholders to this application):

One comment was received during the Initiation Phase and this is included in **Annexure E.**

Issue raised:

1. Actions to be taken if Telkom lines are to be moved.

Response:

1. The proposed project would not affect any Telkom infrastructure.

Two comments were received during the Assessment Phase and these are included in **Annexure E.**
Issues raised:

2. A Heritage Impact Assessment for the project is not necessary.
3. No water use licence application is required in terms of section 21 (c) and (i).
4. Contact Dr Paul Meulenbeld for any queries.

Responses:

2. Noted.
3. Noted. Eskom will submit a water use licence application for the relevant section in due course.
4. Noted.

SECTION D: IMPACT ASSESSMENT

The assessment of impacts must adhere to the minimum requirements in the EIA Regulations, 2010, and should take applicable official guidelines into account. The issues raised by interested and affected parties should also be addressed in the assessment of impacts.

1. ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

List the main issues raised by interested and affected parties.

See Section C7 above.

Response from the practitioner to the issues raised by the interested and affected parties (A full response must be given in the Comments and Response Report that must be attached to this report as Annexure F):

See Section C7 above.

2. IMPACTS THAT MAY RESULT FROM THE PLANNING AND DESIGN, CONSTRUCTION, OPERATIONAL, DECOMMISSIONING AND CLOSURE PHASES AS WELL AS PROPOSED MITIGATION MEASURES

List the potential direct, indirect and cumulative property/activity/design/technology/operational alternative related impacts (as appropriate) that are likely to occur as a result of the planning and design phase, construction phase, operational phase, decommissioning and closure phase, including impacts relating to the choice of site/activity/technology alternatives as well as the mitigation measures that may eliminate or reduce the potential impacts listed.

Alternative (preferred alternative)

DIRECT IMPACTS:

The potential impacts identified for this project are as follows:

-Operational phase impacts:

- Impact on water resources;
- Impact on visual aesthetics; and
- Noise impacts.

-Construction phase impacts of proposed RO plant on biophysical and socio-economic environments:

- Impact on socio-economic environment;
- Disturbance of flora and fauna;
- Sedimentation and erosion of water ways;
- Increase in traffic volumes;
- Storage of hazardous substances on site;
- Noise pollution; and
- Dust impact.

-Decommissioning phase impacts.

The methodology used for the assessment of potential impacts is included in **Annexure G**.

Operation Phase Impacts

- *Impact on water resources*

The proposed RO plant could reduce the risk of pollution to water resources through improving water management at Hendrina Power Station. Furthermore, if there is a spill at the proposed plant it could affect groundwater resources.

The site falls within tertiary catchment B12B and the perennial East Woes-Alleenspruit runs alongside the ash dams in a south to north direction, approximately 600 m to the east. The East Woes-Alleenspruit has extensive associated wetlands, however a number of these take the form of instream dams between Hendrina and the adjacent colliery. The stream either passes under the stockyard, or was diverted, and is designated as Class D- Largely Modified. The stream drains to the Middelburg Dam, approximately 22 km north of Hendrina. The most serious water quality issue of concern in the Middelburg Dam is the high concentrations of total dissolved solids and specifically sulphate.

According to the Steve Tshwete Local Municipality (LM), Spatial Development Framework (SDF) (2008), a substantial increase in salinity levels in the East Woes-Alleenspruit is observed as it passes through coal-mining areas. This stream has a low base flows that increases the impact of mining related pollutions on it. The East Woes-Alleenspruit and the Zevenfontein Spruit have the highest calcium and magnesium concentrations, due to mining activities and natural weathering of geological formations, in the catchment. An effective buffering system occurs in the Woes-Alleenspruit, which decreases the effect of acid mine drainage on the stream. The East Woes-Alleenspruit has low heavy metal concentrations.

According to the Steve Tshwete LM SDF (2008), the B12B catchment is impacted by various land uses including towns and related settlements, coal mining, power generation, agriculture, feedlots and other industrial activities. Hendrina Power Station falls into two subcatchment areas which are designated as Important & Necessary and Highly Significant in terms of the Mpumalanga Biodiversity Conservation Plan, however in terms of this plan it does not fall within any sensitive terrestrial biodiversity areas. No conservation areas are located near to (within 10 km) of the power station.

As noted previously, Eskom has considered the risk of pollution to the current water management system, the environment and compliance with Eskom's ZLED at Hendrina as described in Section A1, and as such proposes to construct a RO plant to treat the CCW. The treated water (permeate) from this plant would be re-used as a feed for the demineralisation plant at the power station's WTP or, should there not be sufficient demand for demineralised water, it would be re-used as cooling water.

Installation of the RO plant at Hendrina would reduce water consumption which would free up resources either for the environment or for other water users. Furthermore, it would result in an improvement in the water management system and hence reduce the risk of spillages and associated potential pollution to natural water resources, which are already significantly negatively impacted on.

The proposed RO plant would have a concrete base and drainage to the existing dirty water system on site. Therefore any spillages at the plant would not be able to percolate into the groundwater at the RO plant site.

Based on the above, the potential impact of the proposed RO plant on water resources is considered to be of low magnitude, local extent and long term and therefore of **low (positive (+))** significance, without mitigation. No mitigation is considered to be necessary.

The potential impact of the "no-go" alternative on water resources (i.e. potential spills) is considered to be of low magnitude, site specific extent and long term duration, and therefore of **low (negative (-))** significance, without mitigation.

- *Visual impacts*

The area surrounding the Hendrina power station is located at some 1 620 – 1 640 metres above mean sea level. The area is gently undulating, with a very gradual slope west to east towards the East Woes-Alleenspruit. The power station precinct and ash dam are located some 20 – 40 m higher than Pullenshope.

The landscape is covered in grassland with a few sparse trees. As such the landscape does not offer significant visual absorption capacity and the power station is visible for many kilometres. The potential therefore exists that the proposed RO plant could be visible from many kilometres away, however the location for the proposed RO plant is such that it is amongst the existing power station infrastructure in the power station precinct, adjacent to the existing water treatment plant. As such the proposed RO plant would be set in the context of the existing structures of the power station. Furthermore, the buildings and structures such as the cooling towers and other treatment plant in the vicinity of the proposed plant are significantly taller than the proposed RO plant. To contextualise this, the proposed structure is unlikely to be taller than a two storey building, whilst the existing power station height is 180 m tall. Many of these existing structures also screen the site from receptors. It is anticipated that proposed RO plant would be a maximum of 80 m wide, 35 m long and 5.5 m tall.

The distance from the site of the proposed RO plant to the nearest sensitive receptor, residences in Pullen's Hope, is 720 m. A golf course, with many rows of trees, lies between the power station and Pullen's Hope. To the north and east of the golf course lies a colliery, which is the only other receptor in the area. Due to the presence of industrial equipment and buildings, the colliery cannot be considered a sensitive receptor. As such no sensitive receptors are located near to the site. Furthermore, even though the visual absorption capacity of the surrounding landscape is relatively low and the power station itself is highly visible, due to the vegetation type, topography, the fact that the proposed RO plant would be located within a brownfields industrial complex and that it would be much smaller than the surrounding infrastructure, the proposed plant would not be out of context in the circumstances.

Based on the above the potential visual impact of the proposed RO would be of neutral magnitude, local extent and permanent and therefore of **neutral** significance, with or without mitigation. No mitigation is considered necessary.

No impacts on visual considerations would result from the "no-go" alternative.

- *Noise impacts*

The area surrounding the power station consists predominantly of undulating croplands. As such the rural atmosphere generates little noise, except during planting or harvest times when large machinery may be used. The power station itself is the largest source of noise pollution in the area, with noise also generated by the coal conveyors and the colliery adjacent to the site. The potential exists for noise from the proposed RO plant to affect surrounding landowners.

The site is located approximately 160 m away from the main power station building and consequently,

the ambient noise levels are elevated due to industrial activity taking place. In a typical RO plant, such as operated by Eskom at Tutuka Power Station in Mpumalanga, the noise generated by the RO plant is very high with ear protection required for employees who work within the plant. However, the high noise levels of the RO plant are contained within an enclosed building, such that ear protection is not required if one is located outside the RO plant building. The proposed RO plant may similarly generate high levels of noise. However, the proposed RO plant would be housed in a similar building to that used to house the Tutuka Power Station RO plant, in order to attenuate the sound to an appropriate level.

As noted above, the distance from the site of the proposed RO plant to the nearest sensitive receptor, residences in Pullen's Hope, is 720 m, which provides an effective buffer against any noise which would be generated by the proposed RO plant.

The external noise level of the proposed RO plant (outside the building which houses it) is likely to be similar to that of a standard wastewater treatment works, and is therefore expected to reduce to a level of 40 dB at a distance of 300 m (50 dB is a typical level of noise in a library). Therefore, given that no sensitive noise receptors are located nearby the power station and that there is a minimum buffer of 720 m to the nearest sensitive receptor, the potential impact of noise is considered to be **neutral** in the context of the existing power station noise (i.e. the noise generated by the proposed RO plant is likely to be indistinguishable from background noise beyond the power station boundary). No mitigation is necessary.

No impacts on noise would result from the "no-go" alternative.

Construction Phase Impacts

The following potential impacts have been identified as relevant to the construction of this project:

- Impact on socio-economic environment;
- Disturbance of flora and fauna;
- Sedimentation and erosion of water ways;
- Increase in traffic volumes;
- Storage of hazardous substances on site;
- Noise pollution; and
- Dust impact.

} **Composite Assessment**

A life-cycle EMP is contained in **Annexure H** of this report, which specifies the mitigation measures that should be implemented during the construction phase of the project.

Impact on socio-economic environment
The construction of the proposed RO plant would be a relatively short-term activity, with a duration not exceeding six months. Eskom has indicated that approximately 20 construction workers would be required for construction of the proposed RO plant. The proposed project is considered to have a low intensity, short duration and local extent and therefore a **low (positive)** impact on local socio-economics, with or without mitigation. No mitigation is considered to be necessary.

Disturbance of flora and fauna
This impact considers impacts beyond the permanent footprint impacts of the proposed RO plant. The affected area is a brownfields site, which was initially disturbed through the construction activities associated with the establishment of the power station and its associated infrastructure. The land cover

in the vicinity of the proposed facility is grass.

Alien plant seeds could however be introduced with construction material such as sand or other materials, with any disturbed areas being particularly vulnerable.

Any affected fauna, such as birds, would generally be largely mobile and would relocate during the construction phase and are likely to recolonise the area, once the construction phase has been completed and the disturbed areas rehabilitated.

Disturbed areas, such as the pipeline routes, should be rehabilitated with grass seeds immediately after construction.

Sedimentation and erosion
The sediment loads of any drainage depressions may increase due to the excavations on the site, the laying of infrastructure and other construction related activities. This would be exacerbated during the wet season and during intense rainfall events. However, it should be noted that the site consists of a formalised drainage systems, which would divert any stormwater from the site to dirty water dams, thereby minimising any escape of sediment from the site boundaries.

Disturbed areas, such as the pipeline routes, should be rehabilitated with grass seeds immediately after construction.

Increase in traffic volumes
Construction vehicles are likely to make use of the existing roads, including the N11, to transport equipment and material to the construction site. Construction related traffic could impact negatively on the traffic flow in the vicinity and on the integrity of the affected roads. This may exacerbate the risk of vehicular accidents.

Signage and safety measures during the construction of the access roads should comply with the guidelines as set out in the latest issue of the SADC Road Traffic Signs Manual. However, it should be noted that the duration of the construction phase would be approximately six months and hence very short, with minimal additional construction related traffic generated.

Storage of hazardous substances on site
As at any construction site, various hazardous substances are likely to be used and stored on site during construction. These substances include amongst other things, diesel, curing compounds, shutter oil and cement. Utilisation of such substances in close proximity to the aquatic environment such as wetlands is of greater concern than when used in a terrestrial environment. However, as noted above, only formalised drainage systems exist on site, which would divert any stormwater and run-off from the site to dirty water dams on site.

Use of hazardous substances at a construction site is controlled by various legislation. The management and protection of the environment would however be achieved through the implementation of an EMP, which would *inter alia* specify the storage details of hazardous compounds and the emergency procedures to follow in the event of a spillage.

Typical mitigation measures include storage of the material in a bunded area, with a volume of 110 % of the storage container, refuelling of vehicles in designated areas that have a protective surface covering and the utilisation of drip trays for stationary plant. Refer to **Annexure H** for the EMP.

Noise pollution
An increase in noise pollution would be expected from the operation of heavy machinery during the construction period, as well as due to the increased traffic. The severity of this impact is likely to be reduced due to the low numbers of people in close proximity to the site, and the existing background noise of the power station. However, it is recommended that construction is limited to normal working hours (07:00 to 18:00) to reduce any potential noise impacts at night.

Dust impacts
Construction vehicles are likely to make use of the existing roads, including the N11 and roads to the power station, to transport equipment and material to the construction site. Access to the proposed site is formalised due to the existing road network within the power station precinct providing the necessary access. Earthworks would also be undertaken during the construction process. These activities would potentially exacerbate dust especially in the dry winter months. The dust impact would be managed through the EMP, which would include procedures for dealing with dust pollution events including watering of roads, etc.

Summary assessment
Since the construction of the proposed RO would last approximately six months and due to the low magnitude of the construction works the potential impact during the construction period is considered to be of low magnitude, local extent and for the construction period and therefore of **very low (-)** significance, without mitigation. The implementation of good practice measures as contained in the EMP in **Annexure H** would reduce this impact to **neutral**.

No construction impacts would result from the "no-go" alternative.

Decommissioning Impacts:
The proposed RO plant and associated infrastructure would be decommissioned when the power station is decommissioned. It would be necessary for Hendrina Power Station to comply with the relevant environmental legislation at this point in the future. No additional impacts, beyond those of the power station's decommissioning impacts, are anticipated to result from the proposed RO plant.

No decommissioning impacts would result from the "no-go" alternative.

INDIRECT IMPACTS:
None.

CUMULATIVE IMPACTS:
None.

3. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

The significance of the potential impacts, with and without available mitigation measures, are summarised in the table and subsequent concluding paragraph below.

Alternative A (preferred alternative)

Proposed RO plant and associated infrastructure (preferred alternative)

PHASE	IMPACTS	
	Without mitigation	With Mitigation
Construction		
- Local socio-economics	Low (+)	Low (+)
- Composite assessment	Very Low (-)	Neutral
Operation		
- Water resources	Low (+)	Low (+)
- Visual impacts	Neutral	Neutral
- Noise impacts	Neutral	Neutral
Decommissioning		
	No impact	No impact
Cumulative		
	No impact	No impact

Two potential impacts identified for the proposed project, namely the potential impact on water resources and construction phase impacts on local socio-economics, are considered to be of low positive significance. One potential impact, namely composite construction phase impacts was considered to be of very low (-) significance (without mitigation) and neutral (with mitigation). However, the potential impacts resulting from the No-go would result in impacts of low negative significance on water resources.

No-go alternative (compulsory)

PHASE	IMPACTS	
	Without mitigation	With Mitigation
Construction	No impact	No impact
Operation		
- Water resources	Low (-)	Low (-)
Decommissioning		
	No impact	No impact
Cumulative		
	No impact	No impact

Should the project not go ahead as detailed herein (i.e.: the no-go alternative), the capacity of the Hendrina Power Station to manage water would remain unchanged, and the resultant risk to natural water resources would remain. This could have negative consequences should a spillage occur. The potential impacts resulting from the No-go are considered to be of low negative significance on water resources.

SECTION E: RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?	**YES**	NO

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

The lifecycle EMP (see **Annexure H**) must be adhered to		
Is an EMPr attached?	**YES**	NO

The EMPr is attached as **Annexure H**.

SECTION F: ANNEXURES

The following Annexures must be attached as appropriate:

ANNEXURE A	Location Map and Layout
ANNEXURE B	Photographs
ANNEXURE C	Material Safety Data Sheets
ANNEXURE D	DEA approval of downgrade
ANNEXURE E	Public Participation Process
ANNEXURE F	Comments and Response Report
ANNEXURE G	Assessment Methodology
ANNEXURE H	Life-Cycle EMP