



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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File Reference Number:

12/9/11/L456/6

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

DEA Reference No. : 12/9/11/L456/6
PROJECT NUMBER : 105684
CLIENT : Eskom Holdings (Pty) Ltd (Generation Division)
CLIENT REPRESENTATIVE : Ms Deidre Herbst
REPORT TITLE : Proposed Brine Evaporation Expansion Process at Tutuka
Power Station, Mpumalanga
REPORT STATUS : Draft
PREPARED BY : Louise Corbett
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REPORT NUMBER : 5422
DATE : April 2011

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Practitioner: Environmental Services

Approved by:



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Technical Director: Environmental Services

This report is to be referred to in bibliographies as: AURECON. 2011. Proposed Brine Evaporation Expansion Process at Tutuka Power Station, Mpumalanga: Draft BAR. Report No. 5422/ 105684

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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:

Background

The Tutuka Power Station near Standerton, Mpumalanga, currently treats 16.4 megalitres (Ml)/day of waste water (brine) from the nearby New Denmark Colliery (NDC) underground coal mine, and 6 Ml/day of cooling water from the power plant, by reverse osmosis (RO). The treated water is separated into a clean and brine stream: the clean stream (which accounts for 86.6 % of treated water) is reutilised by the power plant, while the brine stream is utilised for dust suppression on the ash dump (1.07 Ml/day), evaporated in three boilers (0.54 Ml/day) and returned to the mine for disposal in underground compartment 321 (0.89 Ml/day).

The NDC currently disposes of the brine water received from the power station in a cavern (Compartment 321 East) approximately 200 m underground. The disposal of brine water in the underground cavern is governed by a directive issued by the DWA, which expires on the 31 October 2011. The capacity of the underground cavern approved for the disposal of brine water is diminishing. As such the NDC is in the process of undertaking an environmental impact assessment (EIA)(Mpumalanga Department of Economic Development, Environment and Tourism Reference number: 17/2/2/2GS09) for suitable alternatives for the disposal of brine after 31 October 2011.

Currently, 1.07 Ml/day of brine water is used for dust suppression on the power station's ash dump. This volume however, exceeds the recommended volume for ash suppression purposes. Studies¹ indicate that this volume exceeds that which evaporates off the ash dump, and that brine water flows through the pile, resulting in reactions that cause contamination of the groundwater below the ash dump. In order to reduce the quantity of brine water to be disposed of on the ash dump, and hence curb any groundwater contamination, Tutuka Power Station is in the process of constructing a brine concentration plant adjacent to the existing reverse osmosis plant, which would reduce the volume of brine from 3 Ml/day to 1 Ml/day. The brine concentration proposal and the accompanying environmental impact assessment (EIA)¹ was approved by the Department of Environmental Affairs (DEA) on 8 February 2011. It is anticipated that the brine concentration works will be operational by 31 December 2011.

Tutuka has, since 2003, evaporated up to 0.54 Ml of waste water per day, on an *ad hoc* basis, in three of the six boilers (boilers 1, 2 and 3). In addition to the construction of the brine concentration plant, Tutuka Power Station is proposing to expand the brine evaporation facilities in order to further reduce the volume of brine water and provide a back up system to brine concentration. This was not addressed in the aforementioned EIA and consequently is the focus of this Basic Assessment Report (BAR). By expanding this facility to the remaining three boilers, Tutuka Power Station anticipates that the amount of water evaporated would be increased to 1.31 Ml/day. This would address the period between the construction of the mine's approved disposal method and the operation of the brine concentration works, when the mine is not allowed to dispose of brine in terms of the DWA directive. **Figures 1-3** below show the process flow diagram, after the DWA directive has expired in October 2011 and prior to the construction of the proposed NDC brine ponds, for the current and proposed treatment of brine with and without the approved brine concentration plant and proposed expanded brine evaporation process.

¹ AURECON. 2010. Proposed Brine Treatment Works at the Tutuka Power Station, Mpumalanga: Final EIAR. Report No. 5192A/105684.

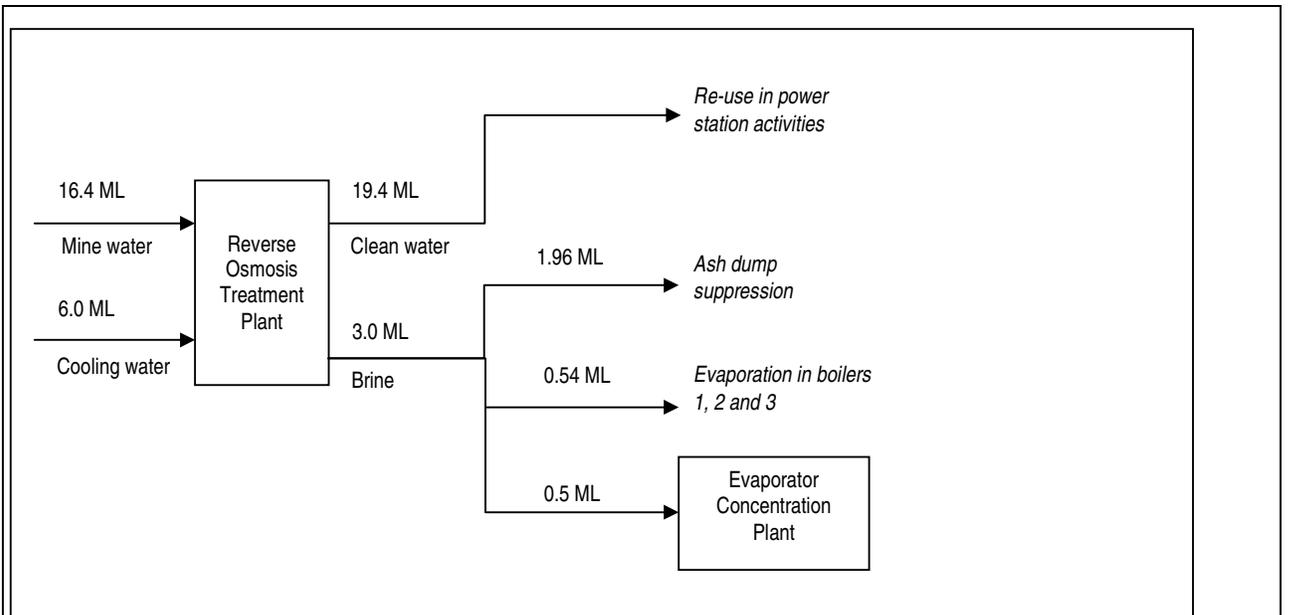


Figure 1 Process flow diagram of current brine treatment and disposal, prior to construction of approved brine concentration plant and proposed NDC brine ponds (per day)

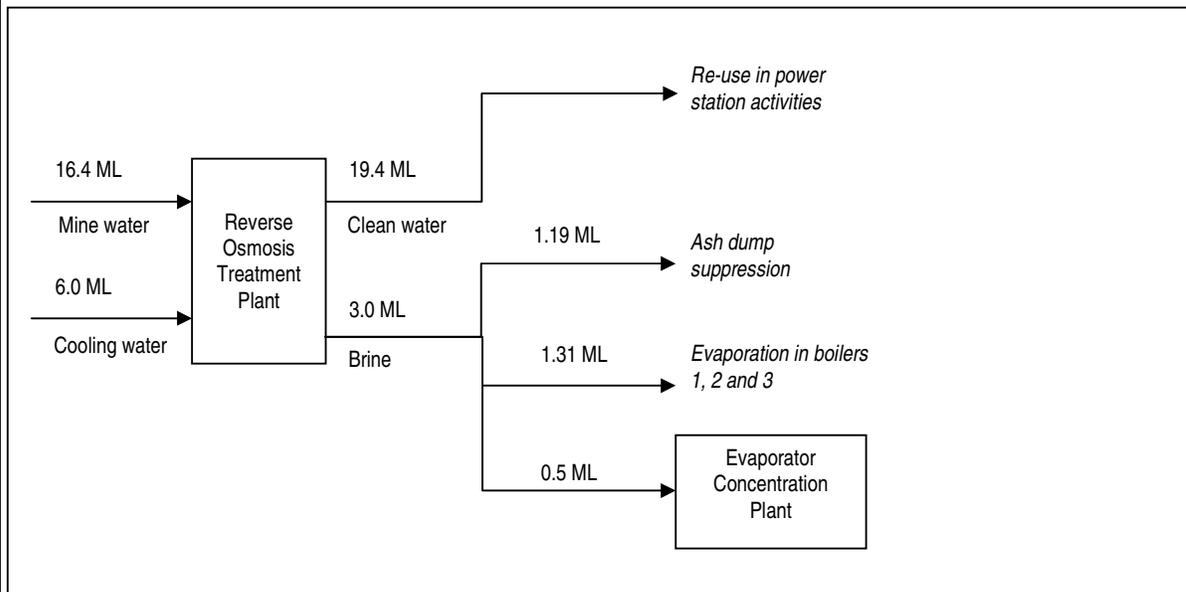


Figure 2 Process flow diagram of brine treatment and disposal with proposed expansion of brine evaporation, prior to construction of approved brine concentration plant and proposed NDC brine ponds (per day)

During the evaporation process, brine is injected towards the bottom of the boiler, below the level where the pulverised fuel is injected and ignited (fire ball), where temperatures are cooler (about 650°C, compared to between 1 300°C and 1 700°C higher in the boiler where combustion occurs) to prevent volatilisation of the salts. The brine is evaporated at a rate of 10 - 24 m³/hour per unit or 0.54 ML/day, up to a maximum volume of some 1 ML per day. Evaporation is conducted continuously when the unit is operating at a load factor of greater than 380 MW.

This proposed expansion would involve minor structural modifications (installation of measuring equipment, a 10 m³ tank and ducting) to boilers 4, 5 and 6 to be carried out in the boiler area, located within the confines of the

Tutuka Power Station. This area is located within the power station itself and has a concrete base. The area is also access-controlled. Figure 1 in **Annexure A** indicates the locality of the boilers, and other components described above.

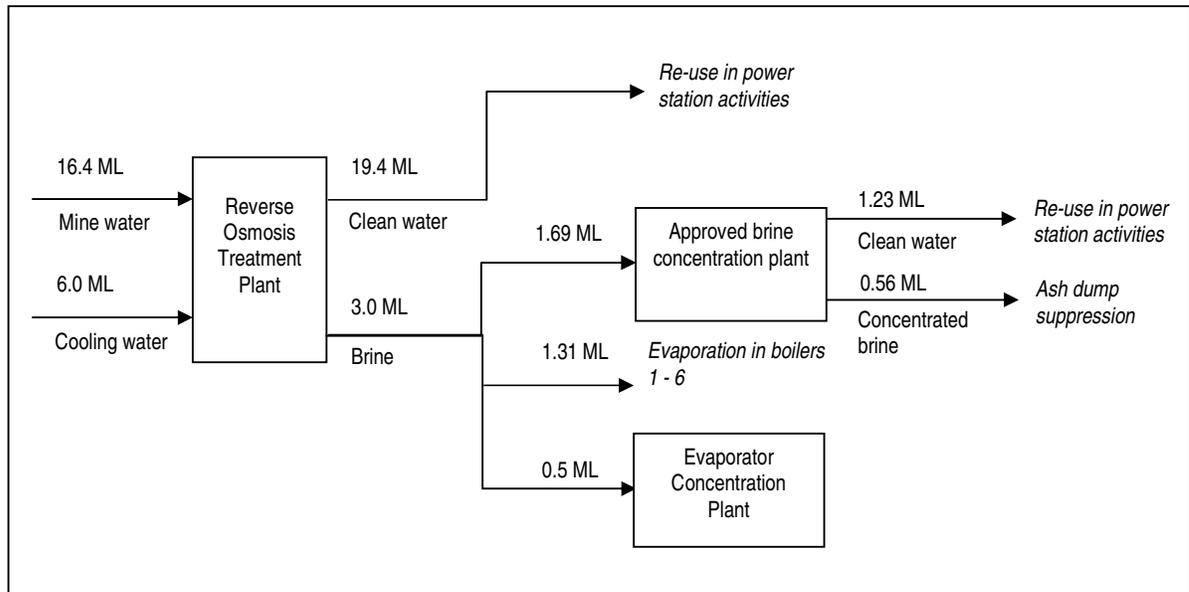


Figure 3 Process flow diagram of brine treatment and disposal with approved brine concentration plant and proposed expansion of brine evaporation, prior to construction of proposed NDC brine ponds (per day)

Note that this Basic Assessment process is for a Waste Management Licence in terms of the National Environmental Management: Waste Act (No. 59 of 2008) for the proposed evaporation process expansion as well as the existing evaporation process

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.

(a) Location alternatives

The proposed activity involves modifications to existing boilers, located within the Tutuka Power Station precinct. As such, no location alternatives exist.

(b) Type of activity alternatives

Alternatives to the proposed expanded evaporation process are discussed and screened in detail in Aurecon (2010), DEA reference number 12/12/20/1789. These include the following²:

² Eskom, (2008) Tutuka power station Brine Treatment Proposal. .

1. Wet-ashing,
2. Evaporation ponds
 - a. One large pond, sized to evaporate all brine;
 - b. Phased implementation, where ponds are sized for evaporation and storage;
 - c. Enhanced evaporation; and
 - d. Forced evaporation for further brine reduction before disposal in ponds.
3. Brine evaporator/ crystalliser.
4. "No-go" alternative

These investigations were undertaken by Eskom and Golder Associates in conjunction with Anglo Coal. More detail on these options is provided in Aurecon (2010) and a summary has been provided here.

A comparison of the first three options showed that the environmental risk, its consequences and cost of the wet ashing option due to the requirement for a liner system were very high. Furthermore, it would not be logical for the power station to change ashing technology as the dry ashing plant and associated systems have been maximised for operational efficiency. The brine treatment with four phased evaporation ponds (Option 2B) was considered to be the most viable option. The lifecycle cost analysis confers its economic feasibility when compared with the other options investigated. The pre-treatment was considered to be essential to reduce the scaling potential of the brine, with a recovery of 66 %.

Eskom and New Denmark Colliery are intricately linked by the coal contract as well as the treatment and disposal of brine. As such both parties agreed to take a portion of the responsibility for the brine treatment and disposal. Eskom has traditionally treated the underground polluted coal mine water, whilst New Denmark Colliery has disposed of the concentrated brine. After investigation of the options described above it was agreed by the two parties (Eskom and New Denmark Colliery) that Tutuka Power Station (Eskom) would continue treating the polluted underground coal mine water, and would take on the responsibility for a second brine concentration process. New Denmark Colliery would continue to take responsibility for the disposal of the brine by further investigating the disposal options described above and implementing the most acceptable option, as a matter of urgency. As such only the proposed concentration of brine (Option 2B) was assessed in Aurecon (2010) and subsequently approved.

This BAR motivates for an activity to complement the above approved alternative in order to avoid any gaps between construction and operation of the final selected alternatives. The proposed brine evaporation alternative may also be used as back-up should the station's RO plant system experience challenges during operations.

(c) Design or layout alternatives

The proposed design modifications to boilers 4, 5 and 6 are based on earlier design modifications successfully carried out on boilers 1, 2 and 3 in 2003, which illustrated that the boiler efficiency was not compromised by the modifications. Preliminary analysis of air quality monitoring on the atmospheric emissions from these boilers indicate that this form of brine processing results in a minor improvement in particulate emissions from the power station³. As the proposed modifications have already been tested and proven through the existing evaporation process, no other reasonable or feasible design or layout alternatives have been identified for the proposed modifications.

³ Communication between Aurecon (Ms Louise Corbett and Mr Brett Lawson) and Department of Environmental Affairs: Authorisations and Waste Disposal Management (Messrs Mpho Tshitangoni and Lucas Mahlangu) dated 22nd October 2010.

(d) Technology alternatives

The technology involved in the proposed activity involves the utilisation of excess heat energy which is currently not exploited. Alternative technologies would require an alternative energy source, which is not considered to be reasonable or feasible. As such no other technology alternatives will be assessed.

(e) Operational alternatives

The successful operation of earlier implementations of this technology (on boilers 1, 2 and 3), indicate no shortcomings or inefficiencies in the operations thereof. As such, no operational alternatives are considered viable.

(f) No-go alternative

Should the proposed project not go ahead as detailed herein (i.e.: the no-go alternative), post October 2011 when the existing DWA directive governing the disposal of brine expires, no suitable options for brine disposal would be available until the brine concentration works is operational from 31 December 2011 and the NDC's disposal alternative is approved and is in operation.

In terms of the EIA Regulations GN. No. R385 of 21 April 2006, the option of not proceeding with a proposed activity must be considered as an alternative. As such the "no-go" alternative is considered for the brine treatment alternatives.

In the "no-go" alternative, unconcentrated brine would continue to be irrigated on the ash dump with the resultant over-irrigation and the likely continuing pollution of the groundwater below the ash dump, and potentially migration of the pollution plume off the Eskom property. Alternatively Eskom could return all 3 MI per day of the brine to the colliery after treatment in its existing RO, resulting in the cavern in which the colliery is disposing of the brine (compartment 321) reaching capacity sooner than expected. Should the colliery continue to dispose of the brine in the cavern it would overflow and force the mine to shut down operations. Alternatively the colliery would have to shut down operations to stop the production of brine which it is unable to dispose of. As the colliery provides for 60 % of the coal requirements of Tutuka power station, the power station would also have to run at reduced capacity (i.e. at 40 %) relying on imported coal only. Alternatively Eskom would need to increase the volume of imported coal, which may be challenging, given that coal mines are typically engaged in long term supply contracts with customers, and would probably not be able to supply the changed coal requirements to a new customer at short notice.

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 ⁴ (preferred or only site alternative)	26° 46.570 '	29° 21.136 '

⁴ "Alternative S.." refer to site alternatives.

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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:

Alternative A1 (preferred activity alternative)

Size of the activity:

56 m²

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

Size of the site/servitude:

Alternative:

Alternative A1 (preferred activity alternative)

Pretorius Vlei Farm No. 374: Portion 4 = 187.53 ha Portion 10 = 257.73 ha Portion 11 = 257.73 ha Mooimeisiesfontein Farm No 376: Portion 1= 157 ha Portion 2 = 19.56 ha Portion 4 = 175.59 ha Portion 8 = 142.54 ha Portion 10 = 228.14 ha Total site size: 1 425.82 ha Total site size: 14 558 200 m ²

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:

Not applicable – access road exists.

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

The proposed expansion of the evaporation process would take place within the existing power station building and hence no new facility would be constructed.

9. ACTIVITY MOTIVATION

9(a) Socio-economic value of the activity

What is the expected capital value of the activity on completion?	R 7.3 million	
What is the expected yearly income that will be generated by or as a result of the activity?	R 0	
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?	10	
What is the expected value of the employment opportunities during the development phase?	R 2.1 million	
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?	1 temporary opportunity (6 months)	
What is the expected current value of the employment opportunities during the first 10 years?	R 1.2 million	
What percentage of this will accrue to previously disadvantaged individuals?	100 %	

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?	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 expansion of the evaporation facility would reduce the quantity of brine water which needs to be disposed of underground, as well as on the ash dump. This would decrease any potential risks associated with the disposal of this brine (e.g.: groundwater pollution).		
3.	Will the land use / development have any benefits for the local communities	YES	NO

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	where it will be located?		
4.	Explain: Ten employment opportunities would be generated during the construction period which would benefit people within the local communities. Furthermore, the reduced risk of groundwater pollution as a result of this proposed project is beneficial.		

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?

m ³

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

Construction would entail pipe work, tanks and pumps installation. Any waste from the construction phase would be disposed of in the power station's approved waste disposal site.

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

Not applicable

Will the activity produce solid waste during its operational phase?

YES	NO
-----	----

If yes, what estimated quantity will be produced per month?

453.6 m ³

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

Salts from the brine precipitate out into the effluent water in the ash box and then onto the ash which is removed via the coarse ash conveyors to the existing ash dump. Effluent water in the ash box comes from the water treatment plant on site.

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

On the existing ash dump, within the Tutuka Power Station precinct. It should be noted that this volume of salts is currently disposed on the ash dump in liquid form.

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

YES	NO
-----	----

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in a municipal sewage system?

--	--

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:			
Contact person:			
Postal address:			
Postal code:			
Telephone:	Cell:		
E-mail:	Fax:		

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

Not applicable as waste water will not be generated by the evaporation process proposed herein.

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:

See Impact on Air Quality in Section D2.
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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:

--

12. WATER USE

Please indicate the source(s) of water that will be used for the activity by ticking the appropriate box(es)
The activity will not use water.

<input type="checkbox"/> municipal	<input type="checkbox"/> water board	<input type="checkbox"/> groundwater	<input type="checkbox"/> river, stream, dam or lake	<input type="checkbox"/> other	<input type="checkbox"/> 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.

13. ENERGY EFFICIENCY

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

The proposed alterations to the 3 boilers will make use of existing heat energy generated by normal operation of the Tutuka Power Station when operating above a load factor of 380 MW. This energy is not currently being fully utilised, hence the proposed alterations to the boilers are energy efficient and will not involve additional energy consumption.

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

SECTION B: SITE / AREA / PROPERTY DESCRIPTION

Important notes:

- 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):

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

- 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 are contained in Annexure D.

Property description/physical address:	Tutuka Power Station Portions 4, 10 and 11 of the farm Pretorius Vlei No. 374 Portions 1, 2, 4, 8 and 10 of the farm Mooimeisiesfontein No. 376 Portion 1 of the farm Spioenkop No. 375 Standerton Mpumalanga
--	--

Bethal-Standerton Road, Standerton, 2430
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Current land-use zoning:	Special – Power Generation, existing industrial use at the station and ash dump
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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: This is included as 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

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
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 station⁵**
- 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:

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:

⁵ The site of the proposed brine evaporation project is located within the confines of the Tutuka Power Station precinct (see Annexure A) and as such this application is neither influenced by, nor influences, the Tutuka Power Station.

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:		
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

Sections 1-5 below will be completed after the public comment period on the Draft Basic Assessment Report (BAR). The following public participation will be undertaken:

- The Draft BAR will be made available to the public at the Thuthukani and Standerton Public Libraries, the security centre at Tutuka Power Station and online on Eskom's and Aurecon's websites for 40 days.
- All registered I&APs will be informed of the lodging of the Draft BAR for public comment by means of a letter in English and Afrikaans, which will be posted and e-mailed.
- The availability of the Draft BAR will be advertised in English and Afrikaans in the Standerton Advertiser and Cosmos News, respectively.
- Any written comments received will be collated and responded to in a Comments and Response Report, which will be attached to the Final BAR.
- 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 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 being applied 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.

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:

- Department of Environmental Affairs: Authorisations and Waste Disposal Management
- Department of Water Affairs
- Mpumalanga Department of Economic Development, Environment and Tourism
- Mpumalanga Department of Agriculture, Rural Development and Land Administration
- Gert Sibande District Municipality
- Lekwa Local Municipality

List of authorities from whom comments have been received:

No comments on the proposed brine evaporation expansion process have been received to date, however this section will be updated at end of public participation period.

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?⁶

YES

NO

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

--

⁶ The location and scope of the project are limited to within the confines of the existing Tutuka power station, and of a nature which obviates the necessity for a public participation process.

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.

To be completed after the public comment period on the Draft Basic Assessment Report.

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):

To be completed after the public comment period on the Draft Basic Assessment Report.

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.

A copy of the methodology used for the assessment of potential impacts is included in Annexure D.

Alternative 1(preferred alternative)

1. Construction impacts:
2. Operational impacts:
 - o Impact on water resources
 - o Impact on air quality
3. Decommissioning impacts
4. Cumulative impacts

1) Construction impacts

The construction of the proposed expansion of the brine evaporation process would be a relatively short-term activity, with a duration not exceeding six months. The construction will involve modifications to boilers 4, 5 and 6 and a 10 m³ tank (which would refill daily with brine) in order to evaporate additional brine to that currently being evaporated in boilers 1, 2 and 3. Construction would take place in and around the boilers, within the confines of the fenced-off, access controlled Tutuka Power Station. This area has a concrete base and is inside an existing building. Eskom has indicated that 10 construction workers would be required for installation of the proposed brine evaporation plant at boilers 4, 5 and 6. The proposed project is considered to have a low intensity, short duration and local extent and therefore a **low (positive)** impact on local economics. As the limited construction required takes place within an existing power station and is six months long, no visual, noise, pollution or other construction phase impacts would result from the proposed expansion.

2) Operational impacts

- Impact on water resources

Perched and regional aquifers are present at the site of the ash dump. Geohydrology studies (GHT Consulting Scientists, 2010 in Aurecon, 2010) undertaken for the site have indicated that the aquifers below the ash dump are polluted due to over irrigation of the ash dump with brine, and hence throughflow of brine in the ash dump. Indications from the groundwater studies are that the pollution plume is moving very slowly, and is attenuating with distance from the ash dump, and hence it is unlikely to spread beyond the site. However, the possibility of affecting nearby surface water sources is high, e.g. the Wolvespruit drainage channel east of the ash dump.

The proposed expansion of the brine evaporation process would allow brine evaporation to occur continuously operational until Eskom has constructed its new brine concentration plant. This would reduce the volume of brine irrigated on the ash dumps hence decreasing the risk of groundwater pollution from the ash dump. This impact is considered to be low intensity, site specific and short term and therefore of **very low positive** significance.

- Impact on air quality

There is the potential for brine evaporation to have an impact on air quality. Therefore Airshed Planning Professionals (Pty) Ltd (Airshed) were appointed to examine air quality data from the boilers with and without brine evaporation. The air quality report is attached in **Annexure D** and a summary is provided here. The first emissions monitoring period was conducted on 30 June 2010 with brine evaporation at an average rate of 15.2 m³/hour and 8 July 2010 without brine evaporation. Since the first monitoring period was performed for a relatively short period, a follow-up monitoring period was conducted that extended over five days. The second monitoring period was conducted from 24 to 28 November 2010 with brine evaporation at an average rate of 9.1 m³/hour and from 26 to 30 December 2010 without brine evaporation.

Comparisons between the two operating conditions, with and without brine evaporation, for the two monitoring campaigns are shown in **Figure 4** and **Figure 5**, respectively. In both cases, the evaporation of brine has led to emission concentrations lower than without brine. However, with the first data set no temperature, moisture and oxygen corrections could be applied to normalise the concentrations. With the second data set, the concentrations could be normalised for temperature but not moisture and oxygen. Since the oxygen content in the flue gas may be similar for the two periods with and without brine evaporation it could be expected that oxygen correction may not be as significant as moisture correction. Emissions of stack gases are usually expressed on a dry gas basis so that variations in the moisture content of the stack gas do not affect the assessment of the emissions. It is expected that the evaporation of brine would result in increased moisture in the flue gas, however the significance of this increase is not known. Since the brine evaporation rate of 9.1 m³/hour is relatively small compared to the amount of coal usage it is not expected to raise the moisture content of the flue gas substantially, perhaps 5 %.

The operating conditions for the first campaign is summarised in **Table 4**. The power loads during the two periods were fairly similar, although slightly higher during the brine evaporation test as brine is only evaporated when output is 380 MW or more (and hence when there are higher loads). The average particulate concentration is less for the brine evaporation, even if the moisture differed up to 17 %.

The conditions for the second dataset are summarised in **Table 5**. The average concentration with no brine was 157 mg/Nm³ and the average when brine was evaporated is slightly higher at 168 mg/Nm³. However, the average load without brine was significantly less, i.e. 459 MW when compared to the 593 MW with brine. For an average load factor of 580 MW, based on the results for the case without brine,

the projected average concentration would be 194 mg/m³. This implies that the brine results in an emission concentration of about 13% lower. However, this could not be corrected for the potential increased moisture content with the introduction of brine, which could reduce the difference. Nonetheless, even if the moisture rose by 10% during the tests the concentration would still be less or the same as without brine.

Table 4: Range and average load and emission concentrations (first campaign)

	Brine Injection		No Brine Injection	
	Load (MW)	Particulate Emission Concentration (mg/Nm ³)	Load (MW)	Particulate Emission Concentration (mg/Nm ³)
Minimum	567	218 [263] ^(a)	497	227 [235] ^(a)
Average	589	245	567	290
Maximum	600	289 [284] ^(b)	592	494 [383] ^(b)

Notes:

(a) – value in brackets is the concentration at the minimum load

(b) – value in brackets is the concentration at the maximum load

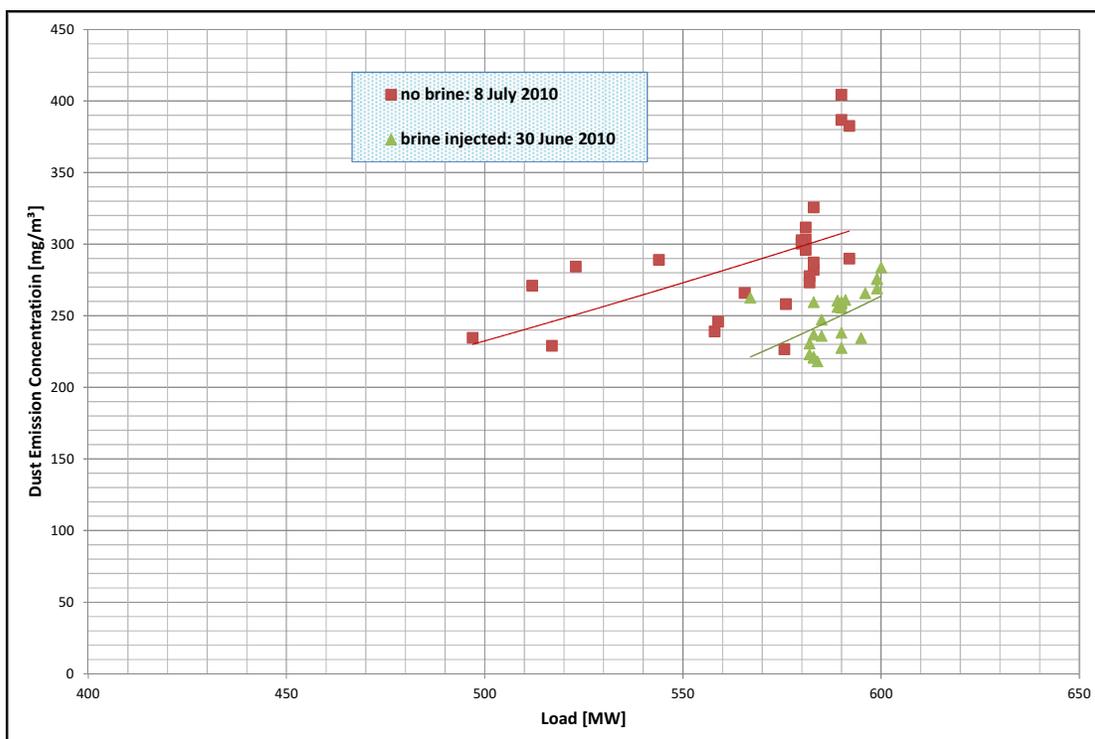


Figure 4 Comparison between the conditions with and without brine injection observe during the 24-hour monitoring campaign

Since the average temperatures in the electrostatic precipitator remained similar, the resulting plume would have the same buoyancy with or without brine evaporation and should therefore not affect ground level particulate concentrations.

The results from the sampling campaigns indicate that there would be no significant difference in particulate emission concentrations, perhaps even a lowering of the concentration with brine injection.

It is not clear why there is the potential reduction in concentration with the injection of brine, although it may be related to a change in the resistivity of the ash as a result of the brine injection, and a resultant improvement in the efficiency of the electrostatic precipitators.

Table 5: Range and average load and emission concentrations (second campaign)

	Brine Injection		No Brine Injection	
	Load (MW)	Particulate Emission Concentration (mg/Nm ³)	Load (MW)	Particulate Emission Concentration (mg/Nm ³)
Minimum	508	55 [206] ^(a)	269	70 [72] ^(a)
Average	593	168	459	157
Maximum	604	263 [198] ^(b)	604	327 [268] ^(b)

Notes:

(a) – value in brackets is the concentration at the minimum load

(b) – value in brackets is the concentration at the maximum load

The emission monitoring results from four datasets (two with and two without brine evaporation), indicate with reasonable confidence that there is no significant difference in the particulate emission concentrations at the Tutuka Unit 2 boiler.

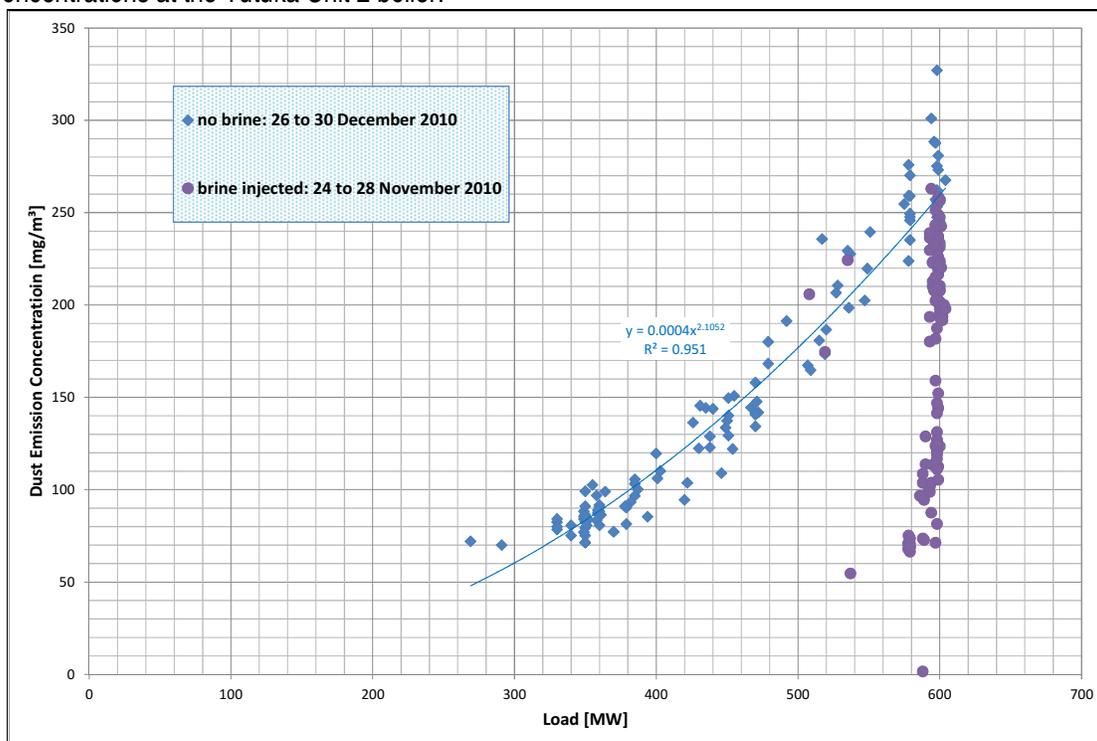


Figure 5 Comparison between the conditions with and without brine injection observe during the 5-day monitoring campaign

In conclusion, the emission monitoring results from these datasets show an emission concentration reduction of up to 13%. However, this could not be corrected for the potential increased moisture content with the introduction of brine, which could reduce the difference. Nonetheless, even if the moisture rose by 10% during the tests the concentration would still be less or the same as without brine.

It can therefore be concluded with reasonable confidence that there would be no increase, even perhaps a decrease, in the particulate emission concentrations with the introduction of brine.

Based on the Air Quality report it is anticipated that **no impact** would result on air quality.

3) Decommissioning impacts

The proposed modifications of the boilers would be decommissioned when Tutuka Power Station is decommissioned. It would be necessary for Tutuka 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 brine evaporation process expansion.

4) Cumulative impacts

No cumulative impacts, positive or negative, are anticipated.

No-go Alternative

1. Operational impacts:

- Impact on groundwater; and
- Impact on economy.

- Impact on groundwater

As noted above geohydrology studies (GHT Consulting Scientists, 2010 in Aurecon, 2010) undertaken for the site have indicated that the aquifers below the ash dump are polluted due to over irrigation of the ash dump with brine.

In the "no-go" alternative for the proposed brine expansion process, brine would continue to be irrigated on the ash dump until the approved NDC alternative disposal option is operational. The volume of water to be irrigated would be reduced after the brine concentration works is operational, however the concentration of salts would increase. Although evaporation on the ash dump is likely to be greater than the volume of water irrigated, the risk of through flow in the ash dump would remain, particularly should evaporation not continue in boilers 1, 2 and 3.

Alternatively Eskom could return all 3 MI per day (or 1 MI once the brine concentration plant is operational) of the brine to the NDC after treatment, with potential impacts on the South African economy, due to the possibility of the shutdown of the mine, with its concomitant impact on the operation of the power station.

The potential impact of the "no-go" alternative on groundwater is considered to be of medium magnitude, site specific extent and short term duration, and therefore of **low (-)** significance, without mitigation.

Mitigation measures ("No-go" alternative)

Irrigation of brine should be halted, via the concentration and diversion of the concentrated brine back to the mine and evaporation of the brine until NDC's brine ponds are constructed. Alternatively, the irrigation of brine could be halted, and additional unconcentrated brine (or concentrated brine once the brine concentration plant is operational) returned to the mine. While this would improve the impact on the groundwater resource, it would have broader economic implications, described below.

- Impact on economy

In the “no-go” alternative for the expansion of the brine evaporation process, brine (either 3 MI/day or 1 MI/day depending on whether the brine concentration plant has been constructed) would continue to be irrigated on the ash dump with the resultant over-irrigation, and hence potentially the continuing pollution of the groundwater below the ash dump. Alternatively Eskom could return all the brine to the colliery after treatment. The cavern in which the colliery is disposing of the brine could reach capacity sooner than expected. Should the colliery continue to dispose of the brine in the cavern after October 2011, in contravention of the DWA directive, it could overflow and force the mine to shut down operations. Alternatively the colliery would have to shut down operation to stop the production of brine which it is unable to dispose of, until the construction of the approved NDC brine ponds.

As the colliery provides for 60 % of the coal requirements of Tutuka power station, the power station would also have to run at reduced capacity (i.e. at 40 %) relying on imported coal only, if the NDC were to shut down or reduce production. As energy is strongly linked to productivity, an energy shortage in South Africa would have negative consequences on the South African economy. Alternatively Eskom would need to increase the volume of imported coal, which is likely to be challenging, given that coal mines are typically engaged in long term supply contracts with customers, and would probably not be able to supply coal to a new customer at short notice. Should Eskom buy imported coal this could also increase the price of electricity which could have a negative impact on the South African economy. Furthermore, this would reduce Eskom’s ability to provide power to the country.

The potential impact of the “no-go” alternative on the South African economy is considered to be of low magnitude, regional extent and short term and therefore of **low (-)** significance, without mitigation. The potential impact after mitigation is considered to be **neutral**⁷.

Mitigation measures (“No-go” alternative)

Eskom would need to further manage demand to ensure reserve margins are sufficient to meet the country’s needs.

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)

PHASE	IMPACTS	
	Without mitigation	With Mitigation
Construction	No impact	No impact
- Local socio-economics	Low (+)	Low (+)

⁷ It should be noted that while this potential impact with mitigation is rated as neutral significance Tutuka Power Station has a capacity of 3 654 MW, which is a significant portion of the South African electricity demand. As such the power station is a significant contributor to maintaining the South African economy.

BASIC ASSESSMENT REPORT

Operation		
- Water resources	Low (+)	Low (+)
- Air quality	No impact	No impact
Decommissioning	No impact	No impact
Cumulative	No impact	No impact

The two potential impacts identified for the proposed project, namely the potential impact on water resources and potential impact on local socio-economics, are considered to be of low positive significance. However, the potential impacts resulting from the No-go would result in impacts of low negative significance on water resources and the economy.

No-go alternative (compulsory)

PHASE	IMPACTS	
	Without mitigation	With Mitigation
Operation		
- Water resources	Low (-)	Neutral
- Economy	Low (-)	Neutral

Should the project not go ahead as detailed herein (i.e.: the no-go alternative), the capacity of the Tutuka Power Station to treat waste water from the New Denmark Colliery would remain unchanged. This would have negative consequences post October 2011 when the existing directive governing the disposal of waste water expires, and before the NDC proposed brine ponds have been constructed. The potential impacts resulting from the No-go are considered to be of low negative significance on water resources and the economy.

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
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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 only potential impact identified for the proposed project, namely the potential impact on water resources, is considered to be of low positive significance. No mitigation measures were identified.
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Is an EMPr attached?

YES	NO
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The EMPr must be attached as **Annexure E**.

SECTION F: ANNEXURES

The following annexures must be attached as appropriate:

- Annexure A Locality map and site plan
- Annexure B Photographs
- Annexure C Assessment methodology
- Annexure D Air quality report
- Annexure E Environmental Management Programme