



PROPOSED BRINE AND GROUNDWATER WORKS AT TUTUKA POWER STATION, MPUMALANGA: ENVIRONMENTAL IMPACT ASSESSMENT

FOCUS GROUP MEETING NOTES

DATE
24 March 2010

TIME
11h00 - 13h00

VENUE
Thuthukani Community Centre, Thuthukani

PRESENT:

No.	Name	Organisation
1	Neels Vermaak	Department of Water Affairs
2	Jurgen Dunn	Gert Sibande District Municipality
3	Bhekinkosi Mndawe	Department of Economic Development, Environment & Tourism: Environmental Impact Management
4	Tebogo Mogakabe	Department of Agriculture Rural Development and Land Administration
5	Ben Steyn	Mooimeisiesfontein Farm
6	Conrad Steyn	Mooimeisiesfontein Farm
7	Ryno Lacock	Eskom Tutuka Power Station
8	Mike van der Walt	Eskom Tutuka Power Station
9	Lenny Govender	Eskom
10	Egard Janse van Rensburg	Eskom Tutuka Power Station
11	Tobile Bokwe	Eskom
12	Solomon Tshoko	Eskom
13	Ashwin West	Aurecon
14	Louise Corbett	Aurecon
15	Brett Lawson	Aurecon

NOTES FROM FORMAL PRESENTATION:

Mr Ashwin West (AW) opened the meeting and welcomed all those attending. AW introduced the project team and explained the purpose of the meeting.

Mr Ryno Lacock (RL) explained the project context and motivation and provided an overview of the proposed project.

Miss Louise Corbett (LC) described the approach to the EIA process for the proposed project and the public participation process undertaken to date. LC provided a summary of the proposed project alternatives and potential impacts identified to date and how these aspects would be dealt with in the EIA Phase. These potential impacts are listed below:

- Operational phase impacts (biophysical):
 - Impact on the terrestrial fauna & flora;
 - Impact on aquatic fauna & flora; &
 - Impact on groundwater resources.
- Operational phase impacts (social):
 - Visual impact;
 - Impact on heritage resources; &
 - Noise impact.

A general discussion was held at the end of the presentation. Please refer to Appendix A for a copy of the presentation from the meeting. Notes of the general discussion are provided below.

NO.	NOTES FROM GENERAL DISCUSSION
1	<p>Ben Steyn (BS) queried how large the underground lake was, that was causing the seepage of brine water into the underground mine workings.</p> <p>RL explained that it was very large, larger than the mine. He also noted that it was not a single large body of water but consisted of a complex set of caverns. He noted that the lake would overlie the future expansions of the mine and that flooding of the mine would therefore be an issue for the duration of the mine's life.</p>
2	<p>BS asked how deep the boreholes on Eskom's property were.</p> <p>Egard Janse van Rensburg noted that the current boreholes ranged from approximately 30 m to 50 m.</p>
3	<p>Bhekinkosi Mndawe (BM) questioned whether there was similar treatment of brine elsewhere.</p> <p>RL noted that while mining houses such as Anglo Coal and Billiton were desalinating mine water through reverse osmosis plants, the mine water in their processes was not as saline as that being treated at Tutuka Power Station. Therefore industry was developing a new solution for the brine concentration, based on expertise in sea water desalination. Sea water desalination is widely undertaken in countries in the Middle East and the technology is well established.</p>
4	<p>BS queried if the northern portion of the mine was operational.</p> <p>RL noted that while it was not currently operational, plans were in place to reactivate the northern portion in the future.</p> <p>BS questioned whether it would experience the same problems with brine as the rest of the mine.</p> <p>RL indicated that this was indeed the case. He noted that the currently proposed concentration plant only considered the existing brine volume. Should this be increased it was possible that the concentration plant would need to be expanded. He also noted that the power station could not wait any longer to deal with the brine and groundwater pollution problems, and was therefore moving ahead with the project, without certainty on the mine's expansion plans.</p>
5	<p>BS queried if the boreholes would be automated or manned, when in operation.</p> <p>Egard Janse van Rensburg (EJvR) noted that the pumps would be automated, and would contain submersible pumps, operated remotely. RL added that the intention was to avoid installing infrastructure that would attract crime i.e. they would not install above-ground pipes or cables, or solar panels, as these were likely to attract thieves to the site.</p>
6	<p>BM queried why there was only one site alternative for the groundwater treatment plant.</p> <p>RL responded that the proposed location of the groundwater treatment plant was on historically disturbed land. It would be located on top of a rehabilitated portion of the ash dump.</p>
7	<p>Jurgen Dunn (JD) queried if there was any increased risk of leaks, etc through pumping the highly concentrated brine through pipes.</p> <p>RL noted that high density polyethylene (HDPE) plastic pipes were currently used. These pipes are unaffected by corrosion and it was therefore anticipated that the pipes would be unaffected by the increased salinity.</p>
8	<p>BM enquired as to any other technical studies would be undertaken.</p>

NO.	NOTES FROM GENERAL DISCUSSION
	<p>AW noted that terrestrial ecology, aquatic ecology, heritage and groundwater studies were being undertaken as part of the Environmental Impact Assessment (EIA) process.</p> <p>Brett Lawson (BL) noted that other engineering studies undertaken by Eskom would provide input to the EIA.</p>
9	<p>BS noted that the largest environmental damage is incurred during the construction phase of such projects. He noted that these impacts need to be managed.</p> <p>LC responded that an Environmental Management Plan (EMP) would be compiled to control construction related activities. AW added that Eskom would be responsible for ensuring that the conditions of the EMP are adhered to.</p>
10	<p>BS noted that there is a large birdlife in the area, especially in the vicinity of the dams and wetlands located on and around the Mooimeisiesfontein Farm, to the south of the ash dump.</p>

AW thanked everyone for their time and closed the meeting at 12:45.

ANNEXURE A

Presentation

Proposed Brine and Groundwater
Treatment Works at Tutuka Power
Station, Mpumalanga



Agenda

11:00	Welcome, introduction & objectives (AW)
11:10	Overview of the proposed project (Eskom)
11:45	Environmental Impact Assessment (LC)
11:50	Presentation of Draft Scoping Report (LC)
12:30	Discussion on Draft Scoping Report
12:55 – 13:00	Way forward (AW)



WELCOME & INTRODUCTION

Ashwin West



Introductions

- Mr Ryno Lacock (Eskom)
- Mr Tobile Bokwe (Eskom)
- Mr Egard Janse van Rensburg (Eskom)
- Mike van der Walt (Eskom)
- Lenny Govender (Eskom)
- Egard Janse van Rensburg (Eskom)
- Tobile Bokwe (Eskom)
- Solomon Msheko (Eskom)
- Ryno Lacock (Eskom)
- Mr Brett Lawson (Aurecon)
- Mr Ashwin West (Aurecon)
- Miss Louise Corbett (Aurecon)



Meeting Guidelines

- Language
- Record of the Meeting
- Timing
- Respect others
 - Turn off cellphone
 - Speakers must be recognised by facilitator before speaking
 - Say your name before you speak
 - Agree to disagree



Objectives

- Provide brief description of project
- Present contents of Draft Scoping Report (DSR)
- Provide opportunity for public comment on DSR



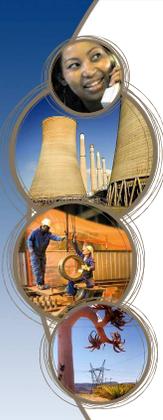
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OVERVIEW OF THE PROPOSED PROJECT

Eskom



Eskom



TUTUKA POWER STATION BRINE SOLUTION

Forum : Brine Project EIA Focus Meeting

Date : 24 March 2010

CONTENTS

Eskom

1. Resolution
2. Background
3. Current Problems
4. Alternative Solutions Considered
5. Proposed Solutions
6. Scope of Work
7. Project Benefits
8. Questions



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1. RESOLUTION

Eskom

- Construct a brine concentration plant to reduce the excess brine from 3 MI/day to 1 MI/day.
- Construct a ground water treatment plant at the ash dump area to recover and treat the underground water pollution plume.
- Optimise the boiler brine evaporation process as an interim solution to evaporate approximately 0,54 MI/day.

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2. BACKGROUND

Eskom

- Mine discharged underground water into natural environment until 1989.
- Mine had the option to stop discharge or close down.
- In response, mine water recovery to Tutuka was initiated at 1,5 MI/day.
- In 1991, the EDR desalination plant was extended to 6 trains, 12 MI/day and the recovery from the mine increased to 3,5 MI/day.
- In 1998, the EDR plant was replaced with a Spiral-wound Reverse Osmosis (SRO) plant with 12,5 MI/day and the mine recovery increased to 8 MI/d.
- Mine water influx increased as surface area of the mine increased.
- SRO plant extended to 25 MI/day in 2006.
- In 2006, a directive was obtained from DWAF to store 0,89 MI/day brine in an underground compartment 321E.
- This directive expired in November 2009.

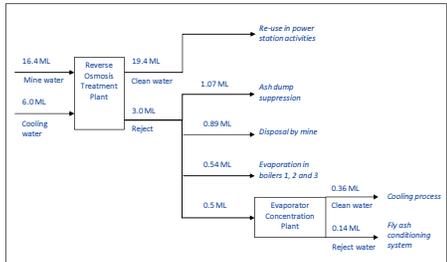
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BACKGROUND CONT...

Eskom

- Currently, Tutuka receives about 16.4MI/day "mine water" from New Denmark mine. The water is treated via the Tutuka Spiral-wound Reverse Osmosis (SRO) plant. The clean water is used by the power plant, and the 3 MI/day brine that is produced, is currently disposed of as is shown below.



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    graph LR
      MW[16.4 ML Mine water] --> SRO[Reverse Osmosis Treatment Plant]
      CW[6.0 ML Cooling water] --> SRO
      SRO --> CleanWater[19.4 ML Clean water]
      SRO --> Reject[3.0 ML Reject]
      CleanWater --> Reuse[Re-use in power station activities]
      CleanWater --> AS[Ash dump suppression]
      CleanWater --> Disposal[Disposal by mine]
      CleanWater --> Evap[Evaporation in boilers 1, 2 and 3]
      CleanWater --> ECP[Evaporator Concentration Plant]
      ECP --> CleanWater2[0.36 ML Clean water]
      ECP --> RW[0.14 ML Reject water]
      CleanWater2 --> CP[Cooling process]
      RW --> FCS[Fly ash conditioning system]
  
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BACKGROUND CONT...



Current Spiral Wound Reverse Osmosis Plant (SRO)



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BACKGROUND CONT.....



- The mine has obtained an extension of the directive from DWAF to store brine (0.89M/day) in an underground mine compartment (compartment 321E).
- This final extension expires in October 2011.
- It is expected that compartment 321E will be filled to capacity soon, and that it will decant cleaner contaminated water into other parts of the mine.
- Contractually, the handling of water in the mine is the liability of New Denmark Colliery. Eskom is liable for the associated costs.
- An additional issue relates to ash dump dust suppression using brine.
- This was caused by a combination of factors:
 - Use of brine as a water saving measure instead of raw water.
 - Excessive dust suppression on the ash dump (to get rid of excess brine).
- This practice has created an underground water pollution plume.
- Eskom has to comply with the National Water Act (Act 36 of 1998) Section 19, Prevention and Remedying Effects of Pollution.

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3. CURRENT PROBLEMS



- The power station currently produces 3Ml of brine per day.
- Approx 2,1 Ml/day of this brine is handled at Tutuka Power Station.
- The remaining 0,89 Ml/day of brine, is pumped back to the mine and stored in underground compartment 321E.
- A pollution plume has developed at the ash dump due to excessive dust suppression using the excess brine water.
- DWAF granted Anglo Coal an extension to discharge brine into compartment 321E.
- This directive expires 31 October 2011 and cannot be extended.



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4. ALTERNATIVE SOLUTIONS CONSIDERED



Alternative considered	Factors considered
Do nothing (continue as is)	Not an option, Eskom will be contravening the National Water Act (Act 36 of 1998) and the new Waste Management Act.
Convert the existing dry ash dump operation to a wet ash dam operation, creating a brine sink.	Historically, Eskom has dealt with the treatment of the underground mine water and NDC has dealt with the disposal of the reject. It would not be logical to change ashing technology as the dry ashing plant have been maximised for operational efficiency. Dry ashing plant would have to be modified or replaced to allow for wet ashing. This is the most costly option and will also put the liability of the long term storage of brine (as part of the wet ash) on Eskom.
Brine concentration Plant with Evaporator Crystalliser	Historically, Eskom has dealt with the treatment of the underground mine water and NDC has dealt with the disposal of the reject. Costly option and the liability for the final brine storage.
Brine concentration Plant with Four Evaporation Ponds Phased Approach	Historically, Eskom has dealt with the treatment of the underground mine water and NDC has dealt with the disposal of the reject. Costly option and the liability for the final brine storage then lies with Eskom.

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5. PROPOSED SOLUTIONS

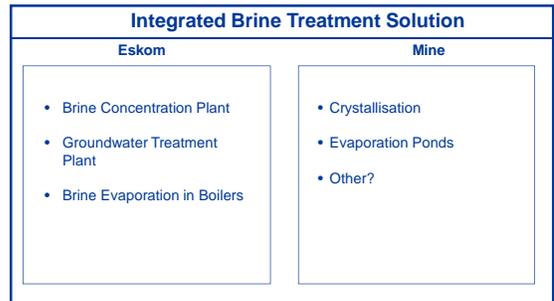


- Install a new brine concentration plant to reduce the brine from 3Ml/day to 1 Ml/day of concentrated brine to make the quantities more manageable for disposal to the mine.
- Optimise the boiler brine evaporation to dispose brine as a short term solution.
- Install a ground water treatment plant to recover and treat the underground pollution plume at the ash dump.
- Eskom is jointly working with Anglo Coal to find solutions to dispose or store the concentrated brine on a permanent basis.

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5. PROPOSED SOLUTIONS CONT...



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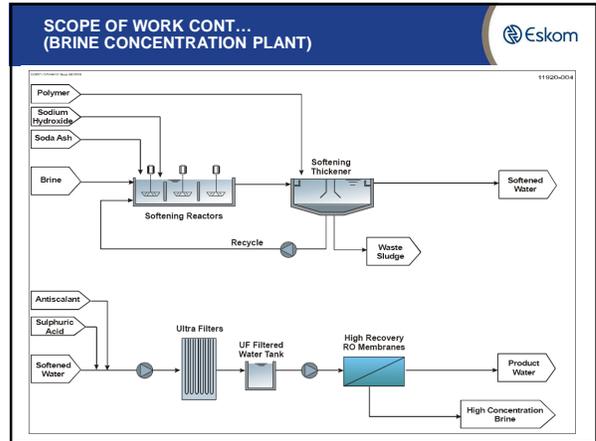
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6. SCOPE OF WORK

1. **Construct a brine concentration plant** which will consist of pre-treatment, filtration and high-pressure secondary desalination to achieve maximum recovery of the feed brine.

- The brine concentration plant shall consist of pre-treatment by softening prior to the secondary RO plant.
- The sludge from this process shall be discharged to the existing clarifier blow down sumps.
- The softened brine shall be processed through ultra filtration membranes and solids will be removed.
- The ultra filtration product shall be further dosed with an anti-scalant to limit scaling.
- High pressure RO feed pumps shall be used to overcome the osmotic pressure of the brine and produce permeate.
- This permeate shall be reused as cooling tower make-up at Tutuka.

The brine concentration plant recovery rate is 66%



SCOPE OF WORK CONT... (BRINE CONCENTRATION PLANT)

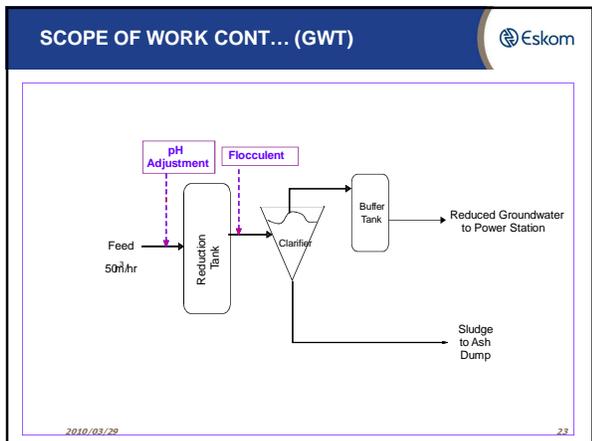
Capacity of brine concentration plant.

Streams	Flow rate
Feed	125 m3/hr
Waste sludge	2,5 m3/hr
Product water	80,85 m3/hr
High concentrated brine	41,65 m3/hr

SCOPE OF WORK CONT... (Ground Water Treatment plant)

2. **Underground pollution plume reduction.**

- Construct a ground water treatment plant at the ash dump to recover and treat the pollution plume.
- Drill, case and install bore hole pumps.
- Install a water treatment plant at the ash dump where the heavy metals will be removed.
- The sludge from the clarifiers will be disposed of at the ash dump due to common properties.
- The recovered water will be pumped back to the Power Station for treatment.
- The feed to this plant is 50 m3/hr and waste sludge flow is expected to be 1 m3/hr.



SCOPE OF WORK CONT... (BOILER INJECTION)

3. **Optimise the boiler brine evaporation** where approximately 0,54 Ml/day of brine can be evaporated inside the boilers.

This is the subject of a separate exemption application.

7. PROJECT BENEFITS



- The brine volume will be reduced from 3 MI/day to 1 MI/day.
- 2 MI/day of product water can be used as cooling tower make-up.
- Raw water saving from the Grootdraai dam would be 730 000 000 litres/annum.
- The mine storage requirements will reduce to 1MI/day of concentrated brine.
- Dust suppression with brine will cease.
- Dirty water from the ash dump dirty dam can be used as a cleaner option for ash dump dust suppression.
- The underground pollution plume at the ash dump will be cleaned up.

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QUESTIONS ?



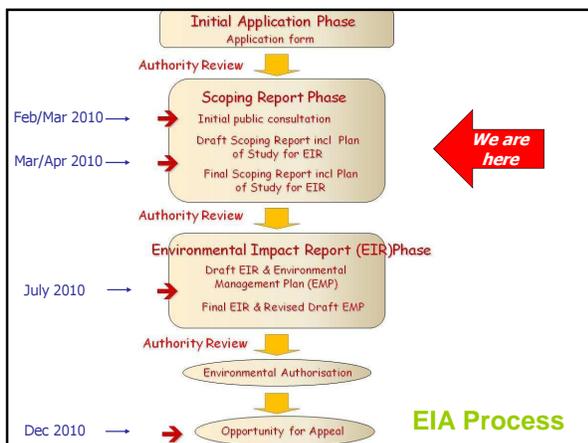
ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS

Louise Corbett



Purpose of the EIA

- To satisfy requirements of:
 - National Environmental Management Act
 - National Environmental Management: Waste Act
 - National Heritage Resources Act
- To identify potential environmental impacts (social & biophysical) & determine their likely significance
- To allow for public involvement
- To inform Eskom's decision-making
- To inform Environmental Authority's Decision


DRAFT SCOPING REPORT

Louise Corbett



Report No: 1187/09/04

ENVIRONMENTAL IMPACT ASSESSMENT: PROPOSED BRINE AND GROUNDWATER TREATMENT WORKS AT THE TUTUKA POWER STATION, MPUMALANGA

Draft Scoping Report
(SA-MW-001-02/2010-09-01-01-12/11/2009/0004)



March 2010



Purpose of the Scoping Phase

- Identify alternatives & potential impacts requiring more detailed investigation in the EIA Phase
- Based on:
 - Literature review
 - Professional input (technical & environmental)
 - Public input
- Forms basis for Plan of Study for EIA



Availability of the Scoping Report

- Available, from 10 March 2010, at
 - Standerton & Thuthukani Public Libraries
 - Security centres at Tutuka Power Station
- Available on the Internet:
 - <http://www.eskom.co.za/eia>
 - <http://www.aurecongroup.com> (follow the Africa-Middle East & public participation links)
- Registered I&APs notified & sent Summary Document on 10 March 2010



Comment on DSR

- Captured at Focus Group & Public Meetings & on Response Forms
- All comments responded to in Comments & Response Report
- Scoping Report & Plan of Study for EIA revised in light of comment, where necessary
- All comments will be included in Final Scoping Report submitted to DEA
- DEA may require additional changes to Plan of Study for EIA



Alternatives

Alternative:

'a possible course of action, in place of another, that would meet the same purpose and need'

Ref: DEAT, 2004



Alternatives cont.

- Legal requirement for EIA to consider alternatives
- 3 types of alternatives considered in the Scoping Phase:
 - Activity alternatives
 - Location alternatives
 - Site layout alternatives
- Activity alternatives:
 - Concentration of reject via a reject concentration plant;
 - "No-go" alternative to reject concentration plant;
 - Treatment of polluted groundwater via a groundwater treatment plant; &
 - "No-go" alternative to the groundwater treatment plant.

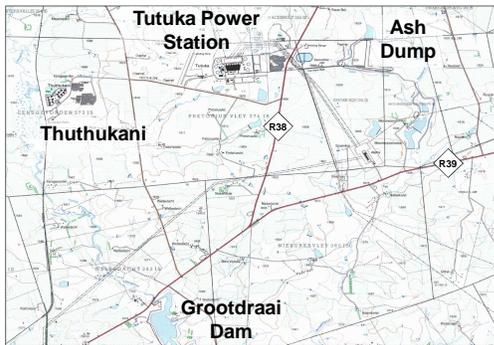


Alternatives cont.

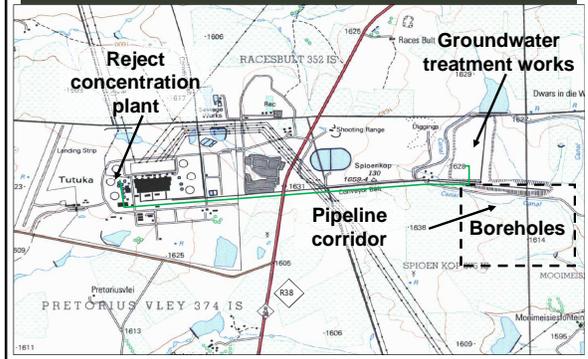
- Location alternatives:
 - Two locations for proposed reject plant; &
 - One location for proposed groundwater plant.
- Site layout alternatives :
 - One layout per location.



Site location



Site



Reject concentration plant alternative locations



Reject Evaporation

- Currently undertaken in boilers 1-3
- Proposed expansion to boilers 4-6
- Interim measure until proposed reject concentration plant in place
- Undertaking a separate exemption application
- If turned down by DEA (Waste), will include in current EIA, if possible

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Potential impacts

- Operational phase impacts (biophysical):
 - Impact on the terrestrial fauna & flora;
 - Impact on aquatic fauna & flora; &
 - Impact on groundwater resources.
- Operational phase impacts (social):
 - Visual impact;
 - Impact on heritage resources; &
 - Noise impact.

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Terrestrial fauna and flora

- Context
 - Endangered Soweto Highveld Grassland
 - 'Important and Necessary' areas of land in terms of Mpumalanga Biodiversity Conservation Plan
- Potential impact
 - Impact on terrestrial habitats, plants & animals (from footprints & servitudes)

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Terrestrial fauna and flora cont.

- Recommendation
 - Terrestrial ecological impact assessment to determine impact on communities & ecosystems
 - Recommend mitigation measures
- Dr Johan du Preez, Makecha Development Associates



Aquatic flora and fauna

- Context
 - Importance of conservation of wetland areas
- Potential impact
 - Impact on aquatic habitats, plants & animals (from footprints & servitudes)



Aquatic flora and fauna cont.

- Recommendation
 - Aquatic ecological assessment to:
 - Delineate any wetlands & aquatic systems
 - Determine impact on communities & ecosystems
 - Recommend mitigation measures
 - Alan Cochran, Golder



Groundwater resources

- Context
 - Contamination of groundwater under ash dump through over-irrigation
- Potential impact
 - Impact on water resource and downstream users (through Eskom's abstraction of contaminated water)



Groundwater resources cont.

- Recommendation
 - Pollution plume modelling
 - Groundwater study to determine sustainable yield of contaminated aquifer & appropriate pumping rates
- Shaun Staats, GHT, & Mannie Levin, Aurecon



Visual impact

- Context
 - Power station on a high point in surrounding area
 - Vegetation low & offers little cover
- Potential impact
 - Visibility from surrounding area
- Recommendation
 - EAP Assessment



Heritage resources

- Context
 - Site historically disturbed
 - Potentially heritage material (buried)
- Potential impact
 - Destruction of heritage material during construction
- Recommendation
 - Phase 1 Heritage Assessment
 - Dr Johnny van Schalkwyk



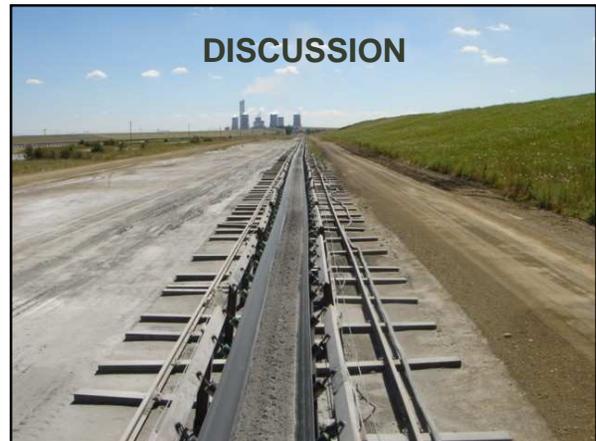
Noise impact

- Context
 - Rural area, most noise from power station, conveyors & other power station activities
- Potential impact
 - Increase in noise from groundwater treatment works & reject concentration plant
- Recommendation
 - EAP Assessment



IWULA

- Listed activity in terms of National Water Act (No. 36 of 1998) - water use license required
- Aurecon undertaking Integrated Water Use Licence Application (IWULA), including:
 - Surface Hydrology Assessment
 - Geohydrology Assessment
 - Salt and Water Balance
- Will include public participation for IWULA in the future



WAY FORWARD

Ashwin West



Way Forward

- Provide comments on DSR
- Report will be updated & finalised
- 21 day comment period on final report & final report submitted to DEA
- DEA will either reject the application or instruct the applicant to proceed to the EIA Phase, or require amendments to the Scoping Report &/or Plan of Study for EIA before continuing



Availability of the Scoping Report

- Available at
 - Standerton & Thuthukani Public Libraries
 - Security centres at Tutuka Power Station
- Available on the Internet:
 - <http://www.eskom.co.za/eia>
 - <http://www.aurecongroup.com> (follow the Africa-Middle East & public participation links)



Comment on Draft Scoping Report

Comments on DSR by **12 April 2010**

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THANK YOU

