Report No: [5192A/105684]

ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: PROPOSED BRINE TREATMENT WORKS AT TUTUKA POWER STATION, MPUMALANGA

FINAL ENVIRONMENTAL IMPACT ASSESSMENT REPORT

August 2010

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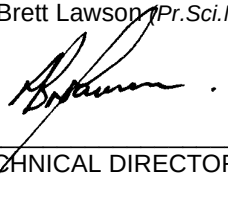

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GLOSSARY OF TERMS

Brine	Water saturated with or containing large amounts of a salt, especially sodium chloride.
Environment	The surroundings (biophysical, social and economic) within which humans exist and that are made up of i. the land, water and atmosphere of the earth; ii. micro organisms, plant and animal life; iii. any part or combination of (i) and (ii) and the interrelationships among and between them; and iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;
Environmental Impact Assessment (EIA)	A study of the environmental consequences of a proposed course of action.
Environmental Impact Report Assessment (EIAR)	A report assessing the potential significant impacts as identified during the Scoping phase.
Environmental impact	An environmental change caused by some human act.
Environmental Management Programme (EMP)	A document that provides procedures for mitigating and monitoring environmental impacts, during the construction, operation and decommissioning phases.
Public Participation Process	A process of involving the public in order to identify needs, address concerns, in order to contribute to more informed decision making relating to a proposed project, programme or development
Reject	Water saturated with or containing large amounts of a salt, especially sodium chloride, as defined above in the "brine" definition. For the purposes of this project, "reject" is considered to be synonymous with "brine".
Scoping	A procedure for determining the extent of and approach to an EIA, used to focus the EIA to ensure that only the significant issues and reasonable alternatives are examined in detail
Scoping Report	A report describing the issues identified

ABBREVIATIONS

BID	Background Information Document
CRR	Comments and Response Report
DARDLA	Department of Agriculture Rural Development and Land Administration
DEA	Department of Environmental Affairs (previously Department of Environmental Affairs and Tourism)
DEAT	Department of Environmental Affairs and Tourism
DSR	Draft Scoping Report
DWA	Department of Water Affairs
EAP	Environmental Assessment Practitioner
EAPSA	Environmental Assessment Practitioner of South Africa
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
FSR	Final Scoping Report
GA	General Authorisation
GN	Government Notice
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IWULA	Integrated Water Use License Application
LM	Local Municipality
MBCP	Mpumalanga Biodiversity Conservation Plan

M	Metres
Ml	Megalitres
NEMA	National Environmental Management Act (No. 107 of 1998) (as amended)
NEMWA	National Environmental Management: Waste Act (No. 59 of 2008)
NHRA	National Heritage Resources Act (No. 25 of 1999)
NWA	National Water Act (No. 36 of 1998)
PES	Present Ecological Status
RO	Reverse osmosis
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
ToR	Terms of Reference
WWTW	Wastewater treatment works
℃	Degrees Celsius
dB	Degrees Decibel
m^3	Cubic metre

1 INTRODUCTION AND BACKGROUND

The purpose of this Chapter is to introduce the project and describe the relevant legal framework within which the project takes place. Other applicable policies and guidelines are also discussed. The Terms of Reference, scope of and approach to the Environmental Impact Assessment are described and assumptions and limitations are stated.

1.1 INTRODUCTION

Eskom was proposing to construct additional infrastructure at the existing Tutuka power station, approximately 22 km north east of Standerton, Mpumalanga Province, for the treatment of groundwater from the station's ash dump area and wastewater from the mine. The treatment facilities was to have consisted of two components; namely upgrading the existing reverse osmosis (RO) treatment plant to include an additional brine (hereinafter referred to as reject) concentration plant and the construction of a groundwater treatment works.

The motivation for the proposed groundwater treatment works was that over irrigation of the ash dump with reject had caused a groundwater pollution plume to develop beneath the ash dump. As such Eskom was proposing the abstraction of this pollution plume, as a technical solution, and its treatment at the proposed groundwater treatment works, in order to prevent the spread of the pollution plume. A Geohydrology Study was undertaken in order to assess the impact of abstraction on the pollution plume and identify locations for boreholes for the abstraction process. Findings of the geohydrological study indicated that the pollution plume would not spread should irrigation with reject on the ash dump be halted. It also indicated ~~uncertainty as to whether~~ that the abstraction of the entire plume would not be possible, based on the varied geology present beneath the ash dump. The geohydrological study is included in **Annexure A**. Based on these findings this proposal was not continued further. ~~further investigations were deemed necessary. Before continuing with this component of the EIA,~~ Appropriate studies will be undertaken and an appropriate approach to the management of the pollution plume investigated, and the most effective integrated solution adopted by Eskom. Once the best way forward with regards to the groundwater pollution plume has been decided, Eskom may need to initiate a separate approval process, as required. Therefore the groundwater treatment works will no longer form part of the current EIA process.

As the proposed reject concentration plant, together with the installation for brine handling by New Denmark Colliery, would ensure that it would not be necessary to irrigate any of the reject on the ash dump, Eskom wishes to proceed with this component of the project urgently, in order to prevent the continuation of the pollution plume as well as ensure continuation of coal supply from the New Denmark Colliery. Therefore this Environmental Impact Assessment Report (EIAR) is focused on the proposed construction of the reject concentration plant at the existing RO plant area only, within the power station precinct (see **Figure 1.1**). It is presumed that this change (reduction) in the scope of the original EIA process is acceptable to the environmental authorities, as an entire component of the project is being reinvestigated.

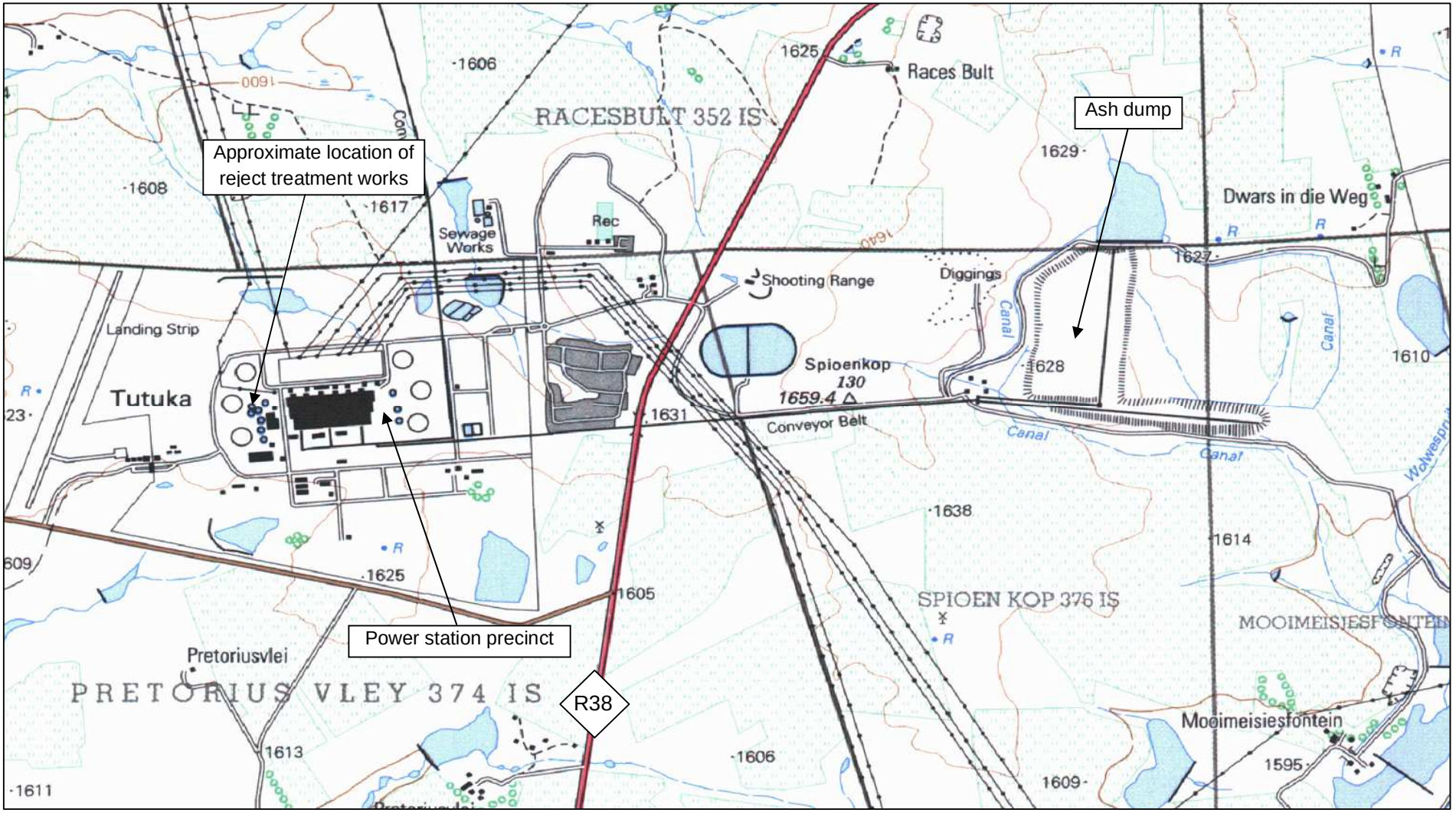

Figure 1.1 Location of the Tutuka power station and proposed reject treatment plant (2629 CD)

A new pipeline would transport the concentrated reject from the proposed reject concentration plant to New Denmark Colliery for their disposal thereof. The EIA process for authorisation of the pipeline, including the portion on the power station's property, will be included in the mine's EIA process for their disposal facilities. The pipeline is likely to follow the existing pipeline route on the power station property, however the final route would be determined in the mine's EIA process.

It was indicated in the Scoping Report that should Eskom's exemption application for the proposed expansion of the reject evaporation process (currently being undertaken in three of the six boilers) be rejected, the proposed expansion would be included in this EIA, if possible. However, additional information is required to assess the impacts of the proposed expansion and therefore, due to the urgency of the proposed reject concentration plant, it was decided to undertake a separate EIA process for the proposed expansion project.

In terms of the National Environmental Management Act (No. 107 of 1998) (as amended) (NEMA), the proposed project triggers an activity, which requires authorisation from the competent environmental authority before the proposed project can be undertaken.

Furthermore, the National Environmental Management: Waste Act (No. 59 of 2008) (NEMWA) provides various measures for the prevention of pollution and ecological degradation, as well as for ecologically sustainable development in order to protect human health and the environment. In this regard, NEMWA identifies and lists certain activities which require a waste management licence and environmental authorisation via the NEMA EIA process, prior to commencement of those activities.

As this proposed project triggers a number of listed activities in terms of NEMA and NEMWA, it accordingly requires environmental authorisation and a waste management licence. Since Eskom is a state-owned enterprise, the competent authority is the national Department of Environmental Affairs (DEA). DEA's decision will be based on the outcome of this EIA process.

The EIA Phase is the last phase in the EIA process. Accordingly, this EIA Report (EIAR) aims to collate, synthesise and analyse information from a range of sources to provide sufficient information for DEA to make an informed decision on whether or not the potential environmental impacts associated with the proposed reject concentration plant at the Tutuka Power Station are acceptable from an environmental perspective (the EIA process and sequence of documents produced as a result of the process are illustrated in **Figure 1.2**). Accordingly the EIAR:

- Outlines the legal and policy framework;
- Describes the Public Participation Process undertaken to date;
- Describes strategic and planning considerations;
- Describes the proposed project and its alternatives;
- Describes the assessment methodology used; and
- Assesses potential impacts and possible mitigation measures.

The EIA process will integrate the requirements for both the environmental authorisation[1] and waste management licensing, in order to obtain a streamlined decision-making process.

1.2 LEGAL REQUIREMENTS

1.2.1 National Environmental Management Act, No. 107 of 1998

NEMA, as amended, establishes the principles for decision-making on matters affecting the environment. Section 2 sets out the National Environmental Management Principles which apply to the actions of organs of state that may significantly affect the environment. Furthermore, Section 28(1) states that "every person who causes or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring". If such pollution cannot be prevented then appropriate measures must be taken to minimise or rectify such pollution.

Eskom has the responsibility to ensure that the proposed activity as well as the EIA process conforms to the principles of NEMA. In developing the EIA process, Aurecon has been cognisant of this need, and accordingly the EA process has been undertaken in terms of NEMA and the EIA Regulations promulgated on 21 April 2006[2].

In terms of the EIA regulations, certain activities are identified, which require authorisation from the competent environmental authority, in this case DEA, before commencing. Listed activities in Government Notice (GN) No. 387 require Scoping and EIA whilst those in GN No. 386 require Basic Assessment (unless they are being assessed under an EIA process). The activity being applied for in this EIA process is listed in **Table 1.1**.

Table 1.1 Listed activities in terms of NEMA GN No. R387, April 2006, to be authorised for the proposed treatment works

NO.	LISTED ACTIVITY
GN No. R387, July 2006	
1(e)	The construction of facilities or infrastructure, including associated structures or infrastructure, for- any process or activity which requires a permit or license in terms of legislation governing the generation or release of emissions, pollution, effluent or waste and which is not identified in Government Notice No. R. 386 of 2006;

It should be noted that the proposed project does not trigger any activities listed in Regulation 386 of the NEMA EIA Regulations. The application form has been revised to exclude activities relating to the previously proposed groundwater treatment works and is included in **Annexure B.**

[1] Section 32 of Regulation 385 of NEMA lists the content required in an EIAR.
[2] GN No. R 385, R 386 and R 387 in Government Gazette No 28753 of 21 April 2006.

The Minister of Water and Environmental Affairs published amendments to the EIA Regulations under NEMA (the "Draft EIA Regulations") on 18 June 2010. The amendments to the listed activities for which environmental authorisation is required, were published in three sets of notices (GN R.544, GN R.545 and GN R.546 in *Government Gazette 33306* of 18 June 2010). These amendments came into effect on 2 August 2010. Transition arrangements contained in these amendments indicate that a NEMA application currently being undertaken (such as this) will be dispensed with in terms of the previous NEMA regulations (promulgated in 2006). Furthermore where an application submitted in terms of the previous NEMA regulations (such as this application) is pending, in relation to an activity of which a component of the same activity was not listed under the previous NEMA Notices, but is now listed in terms of section 24(2) of the Act, the competent authority must dispense of such application in terms of the previous NEMA EIA Regulations and may authorise the activity listed in terms of section 24(2) as if it was applied for, on condition that all impacts of the newly listed activity and requirements of these regulations have also been considered and adequately assessed by the applicant.

Consequently the amended listed activities were considered, to ensure that the scope of the current EIA process is broad enough to include both the current and future listed activities. However, no new amended listed activities were identified.

Since the proposed project is based in Mpumalanga Province, DEA will work closely with the provincial Department of Agriculture Rural Development and Land Administration (DARDLA)[3], to ensure that the provincial environmental concerns are specifically identified and addressed.

Further information on the EIA approach is provided in **Section 1.3**.

1.2.2 National Environmental Management: Waste Act, No. 59 of 2008

NEMWA seeks to reform the law on waste management by making provision for various measures for the prevention of pollution and ecological degradation, as well as ecologically sustainable development in order to protect health and the environment through waste management. In this regard, NEMWA provides for national norms and standards for regulating waste management in all spheres of government and provides for the licensing and control of waste management activities, as well as the remediation of contaminated land.

The objectives of NEMWA include minimising the consumption of natural resources; avoiding and minimising the generation of waste; reducing, re-using, recycling and recovering waste; treating and safely disposing of waste as a last resort; promoting and ensuring the effective delivery of waste services; remediating land where contamination presents or may present a significant risk of harm to health or the environment; and achieving integrated waste management reporting and planning.

[3] Mr Surgeon Marebane from the Mpumalanga Department of Agriculture, Conservation and Environment was initially contacted as the environmental commenting authority. He informed the EAPs that the Department of Agriculture Rural Development and Land Administration would provide the relevant commenting function in this instance.

Generally, the Act seeks to ensure that people are aware of the impact of waste on their health, well-being and the environment and to give effect to the constitutional right in order to secure an environment that is not harmful to one's health or well-being.

The proposed project includes a number of activities listed under NEMWA and therefore a waste management licence is required. The activities in terms of NEMWA, GN No. 718 of 3 July 2009, Category B, being applied for in this EIA process are listed in **Table 1.2**.

Table 1.2 Listed activities in terms of NEMWA, GN No. 718 of 3 July 2009, Category B, to be authorised for the proposed treatment works

NO.	LISTED ACTIVITY
GN No. 718, 3 July 2009, Category B	
4	The biological, physical or physico-chemical treatment of hazardous waste at a facility that has the capacity to receive in excess of 500 kg of hazardous waste per day.
5	The treatment of hazardous waste using any form of treatment regardless of the size or capacity of such a facility to treat such waste.
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).

As noted above, activities that require a waste management licence must comply with the NEMA EIA process, as part of the licensing process. The waste management licence application form is included in **Annexure B**.

1.2.3 National Heritage Resources Act, No. 25 of 1999

Although this Act was identified in the Scoping Report as being a relevant statute, it is no longer relevant to the proposed project as it specifically applied to the groundwater treatment works component of the project, which is no longer the subject of this EIA process, as detailed above.

1.2.4 Other applicable legislation, policies and guidelines

a) National Water Act, No. 36 of 1998

Although this Act was identified in the Scoping Report as being a relevant statute, it is no longer relevant to the proposed project as it specifically applied to the groundwater treatment works component of the project, which is no longer the subject of this EIA process, as detailed above. No natural water sources would be impacted, either by abstraction of disposal, by the proposed reject concentration plant.

b) Guidelines

This EIA process is informed by the series of national Environmental Guidelines[4] where applicable and relevant:

- Integrated Environmental Information Management, Information Series 2: Scoping (Department of Environmental Affairs and Tourism (DEAT), 2002);
- Integrated Environmental Information Management, Information Series 3: Stakeholder Engagement (DEAT, 2002);
- Integrated Environmental Information Management, Information Series 4: Specialist Studies (DEAT, 2002);
- Integrated Environmental Information Management, Information Series: Environmental Impact Reporting (DEAT, 2004);
- Integrated Environmental Management, Information Series 11: Criteria for determining Alternatives in EIA (DEAT, 2004);
- Integrated Environmental Information Management, Information Series 12: Environmental Management Plans (DEAT, 2004);
- Integrated Environmental Management Guideline Series, Guideline 3: General Guide to the Environmental Impact Assessment Regulations. Unpublished (DEAT, 2005);
- Integrated Environmental Management Guideline Series, Guideline 4: Public Participation, in support of the EIA Regulations. Unpublished (DEAT, 2005); and
- Integrated Environmental Management Guideline Series, Guideline 7: Detailed Guide to Implementation of the Environmental Impact Assessment Regulations. Unpublished (DEAT, 2007).

1.3 APPROACH TO THE PROJECT

There are three distinct phases in the EIA process, as required in terms of NEMA, namely the Initial Application, the Scoping and EIA Phases. The EIA process is described below and diagrammatically represented in **Figure 1.2**.

To date, the EIA process has unfolded as follows:

- A desktop review of relevant literature, including a review of previous environmental studies in the area, was undertaken. These included, *inter alia*, the following:
    - Gert Sibande District Municipality Spatial Development Framework (SDF)(2009);
    - Gert Sibande District Municipality Integrated Development Plan (IDP) 2009/10 (2009);
    - Lekwa Local Municipality (LM) SDF (2008);
    - Lekwa LM IDP 2009/10 (2009);
    - Vegetation Map of South Africa (Mucina & Rutherford, 2006); and

[4] Note that these Guidelines have not yet been subjected to the requisite public consultation process as required by Section 74 of R385 of NEMA.

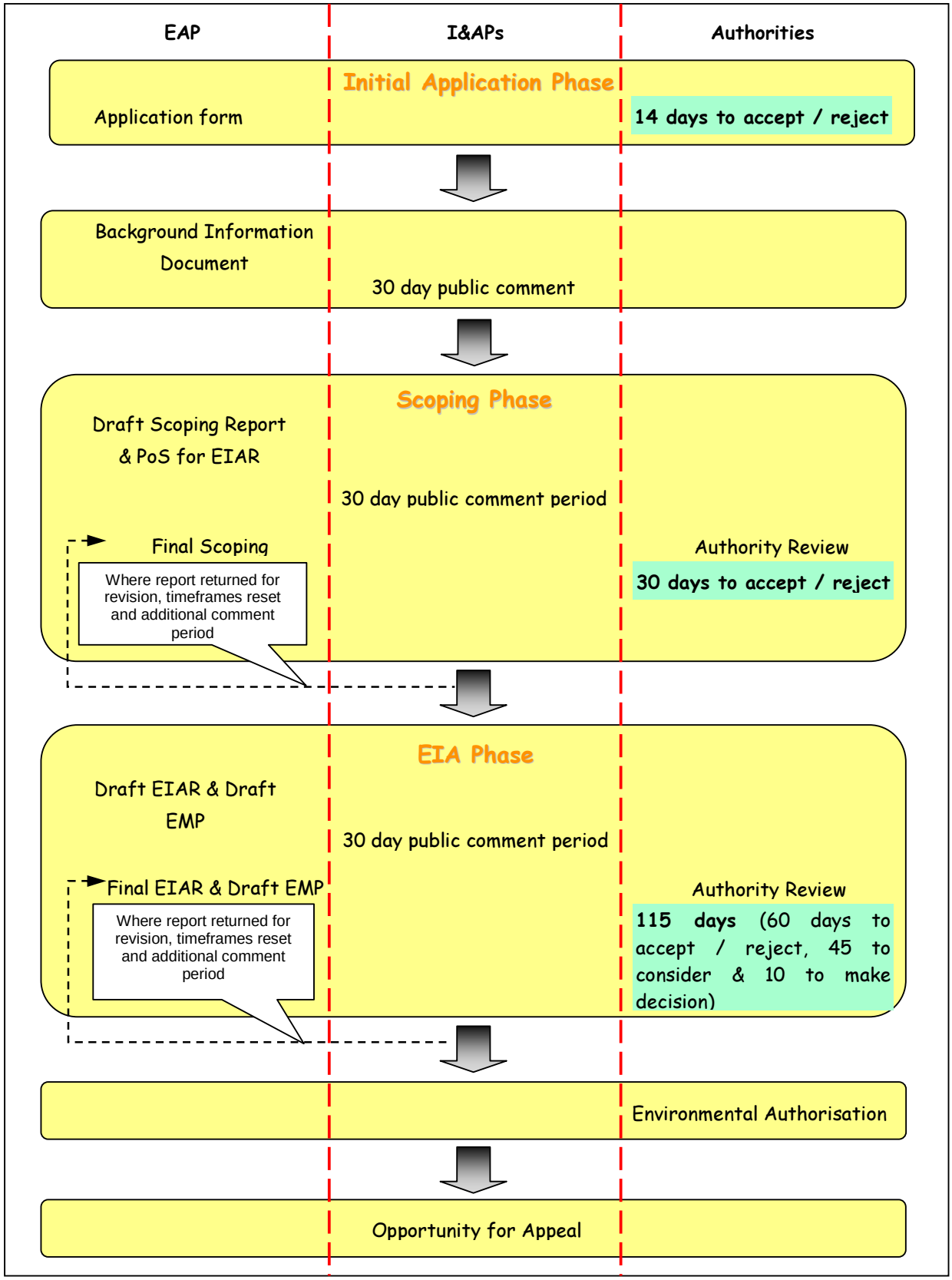

Figure 1.2 The EIA process in terms of NEMA

  - Tutuka Waste Disposal Site: Proposed extension of the existing General Waste Disposal Site (and associated infrastructure) at the Tutuka power station. Draft Scoping Report. (Zitholele Consulting, 2009).
- Submission of an EIA Application Form and a Waste Management Licence application form to notify DEA of the project, submitted on 17 December 2009. This represents the Initial Application Phase of the EIA process. Acknowledgement of receipts of the EIA Application Form and of the Waste Management Licence form was received from both DEA (Environmental Impact Management) and DEA (Authorisations and Waste Disposal Management) on 10 February 2010.
- Distribution of the Background Information Document (BID) on 26 January 2010 to inform Interested and Affected Parties (I&APs) of the project and to invite I&APs to register on the database;
- Advertisements were placed in a suite of national, regional and local newspapers notifying the broader public of the initiation of the EIA and inviting them to register as I&APs from 29 January 2010;
- A site notice was erected at the east and west security entrances and at the ash disposal entrance at Tutuka power station on 9 February 2010;
- The Draft Scoping Report (DSR) was 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 website from 10 March 2010. All registered I&APs were informed of the lodging of the DSR for public comment and invited to open house / public meetings by means of a letter posted on 10 March 2010;
- Advertisements were place in the Standerton Advertiser and the Highveld Tribune on 11 March 2010 and 16 March 2010 respectively, inviting the general public to attend the meetings.
- A Focus Group Meeting was held on Wednesday, 24 March 2010, where the findings of the DSR were presented to invited authorities and key stakeholders. The meeting was held in the Thuthukani Community Centre Board Room.
- The Public Meeting / Open House was held on Wednesday, 24 March 2010 to present and discuss the findings of the DSR at the Thuthukani Community Centre;
- All comments received were summarised in a Comments and Responses Report (CRR) and response to queries raised compiled by the project team;
- The Final Scoping Report (FSR) was 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 website from 19 April 2010. All registered I&APs were informed of the lodging of the FSR for public comment by means of a letter posted on 19 April 2010;
- The FSR was submitted to DEA on 19 April 2010; and
- Approval for the Plan of Study was issued by DEA: Waste on 11 May 2010 and by DEA: Integrated Environmental Management on 14 June 2010.

The FSR outlined the full range of potential environmental impacts and feasible project alternatives and how these were derived. Moreover, it included a Plan of Study for EIA, which outlined the proposed approach to the current EIA phase, including the requisite specialist investigations to be undertaken. The FSR was submitted to DEA on 19 April 2010 and accepted

on 11 May 2010 by DEA: Waste Stream Management and on 14 June 2010 by DEA: Environmental Impact Management (see **Annexure C**). It should be noted that the FSR included the groundwater treatment works originally proposed by Eskom and as such many of the impacts which would have been investigated have fallen away. Only potential impacts relevant to the proposed reject concentration plant are assessed in this report. This is detailed in Chapter 5 below.

EIA Phase

As noted above, there are three distinct phases in the EIA process. This report covers the final EIA Phase.

The purpose of the EIAR is to describe and asses the range of feasible alternatives identified during the Scoping process in terms of the potential environmental impacts identified. The ultimate purpose is to provide a basis for informed decision making, firstly by the applicant with respect to the option(s) they wish to pursue, and secondly by the environmental authority regarding the environmental acceptability of the applicant's preferred option.

The approach to the EIA Phase entailed a site visit and undertaking further review of relevant literature. The results of this review have been used to describe and assess the significance of the identified potential impacts associated with the proposed reject concentration plant. This EIA Report synthesises the key issues arising out of the PPP to date, to provide a balanced view of the proposed activities and the implications for the environment.

1.3.1 Authority involvement

As indicated earlier, DEA will fulfil the role of the competent environmental authority for this project and will make a decision in light of the information presented in the final EIA Report. However, given that the project is located in Mpumalanga province, DEA will work closely with the Mpumalanga DARDLA in the decision-making process.

There are other authorities who have a commenting role to play in the EIA process. Their comments on the EIA Report will help to inform DEA's decision making. These authorities include:

- Mpumalanga Department of Agriculture Rural Development and Land Administration; and
- Department of Water Affairs (DWA).

1.3.2 Decision making

Based on the information gathered during the EIA Phase (including the impact assessment and the PPP) and the comments submitted by the commenting authorities, DEA will issue an Environmental Decision. The decision will either be to authorise the proposed activity (with certain conditions) or reject the application for the proposed activity. In addition DEA has the

prerogative to request further information, should they believe that insufficient information has been provided, on which to base an informed decision.

Following the issuing of the Environmental Authorisation, DEA's decision will be communicated by means of letters to all registered I&APs and there will be an appeal period within which I&APs will have an opportunity to appeal to the Minister of Water and Environmental Affairs in terms of NEMA and NEMWA.

1.4 ASSUMPTIONS AND LIMITATIONS

1.4.1 Assumptions

In undertaking this investigation and compiling the EIA Report, the following has been assumed:

- The strategic level investigations undertaken by Eskom prior to the commencement of the EIA process are technologically acceptable and robust.
- The information provided by the applicant and specialists is accurate and unbiased.
- The scope of this investigation is limited to assessing the environmental impacts associated with the proposed reject concentration plant. The project does not include infrastructure required by the New Denmark Colliery to deal with the concentrated reject received from the Tutuka power station or the pipeline from the proposed reject concentration plant to the New Denmark Colliery, as this is the subject of an EIA process to be undertaken by the mine.

1.4.2 Gaps in knowledge

This EIA Report has identified the potential environmental impacts associated with the proposed activities. However, Eskom is undertaking further work on the proposed reject concentration plant and investigations in parallel with this EIA process from a technical feasibility perspective. As such the nature and significance of the impacts presented in this report could change, should new information become available, or as the project description is refined. The purpose of this section is therefore to highlight gaps in knowledge when the EIA phase of the project was undertaken, namely:

- The planning for the proposed brine concentration plant is at a feasibility level and therefore some of the specific details are not available to the EIA process. This EIA process forms a part of the suite of feasibility studies, and as these studies progress, more information will become available. This will require the various authorities, and especially DEA, to issue their comments and ultimately their environmental decision to allow for the type of refinements that typically occur during these feasibility studies and detailed design phase of projects. Undertaking the EIA process in parallel with the feasibility study does however have a number of benefits, such as integrating environmental aspects into the layout and design and therefore ultimately encouraging a more environmentally sensitive and sustainable project.
- The environmental impacts associated with the disposal of concentrated reject by the New Denmark Colliery, and its transportation from Tutuka Power Station, are not

considered as part of this EIA process, as the New Denmark Colliery is undertaking a separate EIA process to deal with the process.

1.5 INDEPENDENCE

The requirement for independence of the environmental consultant is aimed at reducing the potential for bias in the environmental process. Neither Aurecon nor any of its sub-consultants are subsidiaries of Eskom. Furthermore, all these parties do not have any interests in secondary or downstream developments that may arise out of the authorisation of the proposed project.

The Project Director, Mr Brett Lawson is appropriately qualified and registered with the relevant professional bodies. Mr Lawson is a certified Environmental Assessment Practitioner of South Africa (EAPSA), and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions. Furthermore, Miss Louise Corbett has applied for registration with the South African Council for Natural Scientific Professions, the outcome of which is pending. Consequently Aurecon is bound by the codes of conduct of EAPSA and the South African Council for Natural Scientific Professions.

1.6 DETAILS AND EXPERTISE OF THE EAPS WHO COMPILED THE EIA REPORT

As noted above, the Project Director, Mr Brett Lawson is appropriately qualified and registered with the relevant professional bodies. Mr Lawson is a certified Environmental Assessment Practitioner of South Africa (EAPSA), and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions. Mr Lawson has an MA degree in Environmental and Geographical Science, and has over 15 years in the field of impact assessment, as well as many years experience in Nature Conservation. Miss Louise Corbett is an Environmental Practitioner with four years experience in the field. Miss Corbett has a BSc Honours degree in Environmental and Geographical Science. Furthermore, Miss Corbett has applied for registration with the South African Council for Natural Scientific Professions, the outcome of which is pending. Aurecon and the above environmental assessment practitioners are bound by the codes of conduct for EAPSA and the South African Council for Natural Scientific Professions. The CV summaries of the key Aurecon staff were included in the Plan of Study for EIA in Chapter 5 of the Scoping Report, should further detail be required.

1.7 CONTENT AND STRUCTURE OF THIS REPORT

As outlined above, the EIA process undertaken to date has culminated in the production of a comprehensive Scoping Report, which provided detailed information relevant to the project. However, for the sake of being succinct, information contained within the Scoping Report is not repeated within this EIA Report unless it has direct bearing on the issues under discussion.

Accordingly, to ensure a holistic understanding of the project, the nature of the activities and the substance of the EIA process, it is critical that this EIA Report is read in conjunction with the FSR (Aurecon, 2010). It should however, be noted that the Scoping Report also scoped potential impacts associated with the groundwater treatment works originally proposed by Eskom. As this component of the project is no longer part of this EIA, sections of the Scoping Report are no longer relevant, in the current context.

The structure of this EIA Report has been informed by the requirements of Regulation 385 of NEMA, to facilitate informed decision making by the proponent and the competent environmental authority. The EIA Report contains the following information, as is required in terms of Regulation 32(2) of Regulation 385 of NEMA:

Table 1.3 NEMA requirements for Environmental Impact Reports

REGULATION	CONTENT AS REQUIRED BY NEMA	CHAPTER/ANNEXURE
32 (2) (a)	Details of (i) the EAP who compiled the report; and	***Project Detail Page Section 1.6***
	Details (ii) the expertise of the EAP to carry out an environmental impact assessment;	***Section 1.6 (summaries of EAP CVs provided in Chapter 5 of Final Scoping Report(FSR))***
32 (2) (b)	A detailed description of the proposed activity;	***Chapter 3***
32 (2) (c)	a description of the property on which the activity is to be undertaken and the location of the activity on the property, or if it is –	***Section 2.1 & Figure 1.1, (Full description in Section 2 of the FSR)***
	(i) a linear activity, a description of the route of the activity; or	***N/A***
	(ii) an ocean-based activity, the coordinates where the activity is to be undertaken;	***N/A***
32 (2) (d)	a description of the environment that may be affected by the activity and the manner in which the physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity;	***Chapter 5***
32 (2) (e)	details of the public participation process conducted in terms of subregulation (1), including –	***Chapter 2***
	(i) steps undertaken in accordance with the plan of study;	***Chapter 2***
	(ii) a list of persons, organisations and organs of state that were registered as interested and affected parties;	***Annexure B***
	(iii) a summary of comments received from, and a summary of issues raised by registered interested and affected parties, the date of receipt of these comments and the response of the EAP to those comments; and	***Overview provided in Chapter 2, Comments Response Report (CRR) I in Annexure G of the FSR and Annexure G***

REGULATION	CONTENT AS REQUIRED BY NEMA	CHAPTER/ANNEXURE
	(iv) copies of any representations, objections and comments received from registered interested and affected parties;	***Annexure F of the FSR and Annexure G***
32 (2) (f)	a description of the need and desirability of the proposed activity and identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity;	***Chapter 3, Section 3.1 and Chapter 5***
32 (2) (g)	an indication of the methodology used in determining the significance of potential environmental impacts;	***Chapter 4***
32 (2) (h)	a description and comparative assessment of all alternatives identified during the environmental impact assessment process;	***Section 3.3 and Chapter 5***
32 (2) (i)	a summary of the findings and recommendations of any specialist report or report on a specialised process;	***Section 5.2.1***
32 (2) (j)	a description of all environmental issues that were identified during the environmental impact assessment process, an assessment of the significance of each issue and an indication of the extent to which the issue could be addressed by the adoption of mitigation measures;	***Chapter 5***
32 (2) (k)	an assessment of each identified potentially significant impact, including –	***Chapter 5***
	(i) cumulative impacts;	***Each impact within Chapter 5 includes all of these aspects***
	(ii) the nature of the impact;	
	(iii) the extent and duration of the impact	
	(iv) the probability of the impact occurring;	
	(v) the degree to which the impact can be reversed;	
	(vi) the degree to which the impact may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact can be mitigated;	
32 (2) (l)	a description of any assumptions, uncertainties and gaps in knowledge;	***Section 1.4***
32 (2) (m)	an opinion as to whether the activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	***Chapter* 6**
32 (2) (n)	an environmental impact statement which contains –	***Chapter* 6**
	(i) a summary of the key findings of the environmental impact assessment; and	***Table 6.1***

REGULATION	CONTENT AS REQUIRED BY NEMA	CHAPTER/ANNEXURE
	(ii) a comparative assessment of the positive and negative implications of the proposed activity and identified alternatives;	***Chapter 5 and Table 6.1***
32 (2) (o)	a draft environmental management plan that complies with regulation **34**;	***Annexure E***
32 (2) (p)	copies of any specialist reports and reports on specialised processes complying with regulation **33**; and	***Annexure A***
32 (2) (q)	any specific information that may be required by the competent authority.	***Refer to DEA's letters of acceptance of the POS for EIA in Annexure C***

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2 THE PUBLIC PARTICIPATION PROCESS

The purpose of this Chapter is to provide an outline of the Public Participation Process, a summary of the process undertaken to date, and the way forward with respect to public participation as part of the EIA Phase of this project. This Chapter also provides a summary of the key issues that have been raised to date.

2.1 INTRODUCTION

Consultation with I&APs forms an integral component of an EIA process (see **Figure 1.2**) and enables *inter alia* directly affected landowners, neighbouring landowners, stakeholders, communities and interested parties to identify the issues and concerns relating to the proposed activity, which they feel should be addressed in the process. The approach to this public participation process, summarised in the Plan of Study for EIA (Chapter 5 of the Scoping Report), has taken cognisance of the DEAT Guideline on Stakeholder Engagement (2002).

Public participation, as required in terms of the EIA Regulations can, in general, be separated into the following phases:

Initiation of Public Participation Process
During this phase, I&APs are notified of the initiation of the environmental investigation, to enable them to register as I&APs, and raise issues and concerns at the outset of the investigation.

Comment on Draft and Final Reports
During the Scoping and EIA Phases, registered I&APs are provided with an opportunity to comment on draft and final versions of the reports. This is enabled by the lodging of the reports at suitable locations and invitations to public meetings/open houses to discuss the content of the relevant report.

Decision and Appeal period
This is the final phase of the public participation process. Once the competent authority has made their decision and issued an Environmental Decision, the applicant and I&APs are notified of the decision and have the opportunity to appeal to the national Minister of Environmental Affairs, within the stipulated timeframes.

Progress with respect to these various stages for the current project is discussed in more detail below. It should be noted that the public participation process developed for this investigation meets the minimum requirements of NEMA.

2.2 SUMMARY OF PPP TO DATE

2.2.1 Initiation of public participation process

The approach adopted for the current investigation was to identify as many I&APs as possible initially, through a suite of activities, as follows:

- Placing advertisements in regional and local newspapers;
- Placing notice boards at both site entrances and at the ash dump entrance;
- Providing written notice and a Background Information Document (BID) to potential I&APs including surrounding landowners, organs of state, ward councillors and relevant authorities; and
- Requesting potential I&APs to recommend other potential I&APs to include on the database (chain referral process).

Thereafter, the remainder of the communications were focused on registered I&APs and on local advertising. Consequently, the initial advertising campaign was broad and thorough and invited the members of the public to register as I&APs.

2.2.2 Public participation related to the Scoping Phase

The DSR was made available from 10 March 2010, and was available for 33 days at the Thuthukani and Standerton Public Libraries, the security centre at Tutuka Power Station and online on Eskom's and Aurecon's website. The availability of the DSR and an invitation to attend an Open House and Public meeting were advertised in the Standerton Advertiser and the Highveld Tribune on 11 and 16 March 2010 respectively. A letter was also posted to all registered I&APs on 10 March 2010.

A Focus Group Meeting was held on Wednesday, 24 March 2010, where the findings of the DSR were presented to invited authorities and key stakeholders. The meeting was held in the Thuthukani Community Centre Board Room.

The DSR was presented to the public at the Open House and Public Meeting on 24 March 2010 at the Thuthukani Community Centre. Attendees were provided with an opportunity to ask questions and provide comment on the report.

The comment period closed on 12 April 2010 and all comments received after the release of the DSR (included in Annexure F of the FSR) were included in CRR II.

Currently ~~109~~ 114I&APs are registered on the project database (see **Annexure D** for a list of current I&APs).

Once the Scoping Report was finalised, it was submitted to DEA and lodged in the same locations as the DSR.

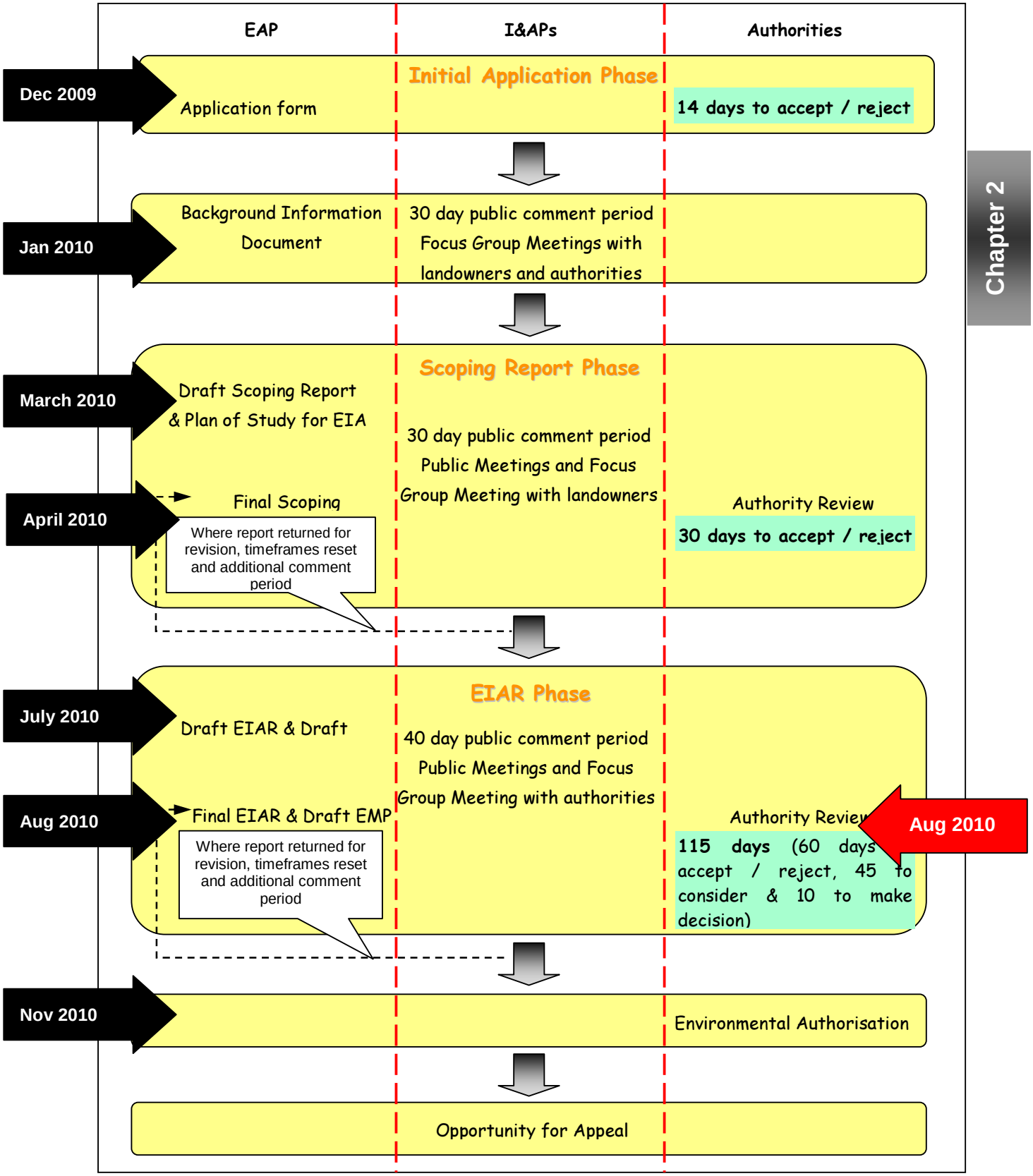

Figure 2.2.1 The EIA process undertaken to date

Notes of the focus group and public meetings at the DSR stage were posted to all meeting attendees and a copy of the CRR II was sent to all those who had submitted comment.

2.3 KEY ISSUES RAISED BY I&APS DURING THE SCOPING PHASE

Key issues raised by the public during the Scoping Phase are recorded in CRR I and II which are included in Annexure G of the FSR. The major issues raised by I&APs can briefly be summaries as follows:

Biophysical issues

- Impact of ash dam runoff on the Grootdraai Dam
- Monitoring and licensing requirements in terms of the National Water Act (NWA)
- End-use of treated groundwater

EIA issues

- Identified stakeholders

Heritage Issues

- Content of HIA

Socio-Economic issues

- Employment opportunities and recruitment procedures

Please note that some of the issues raised were related to the groundwater treatment works, which has been removed from the scope EIA phase of the of the current EIA process, for further investigation (as explained in Section 1.1).

2.4 COMMENT ON DRAFT EIAR

The last stage of the PPP involved the public review of and comment on the Draft EIAR[5]. Letters of notification and Summaries of the Draft EIAR were sent to all registered I&APs (refer to **Annexure D** for the current database) on 6 July 2010, informing them of the availability of the report for their review and comment. The letter is included in **Annexure F**. Registered I&APs were also notified of a Focus Group Meeting being held on 21 July 2010 at Thuthukani Community Centre from 11h00 – 12h30 to discuss the findings of the EIAR. I&APs were requested to RSVP for more details. Notes of the meeting are included in **Annexure F**.

Copies of the Draft EIAR were lodged at the Thuthukani and Standerton Public Libraries, the security centre at Tutuka Power Station and online on Eskom's and Aurecon's website and on the Aurecon website (www.eskom.co.za/eia and www.aurecongroup.com/ - follow the South Africa and public participation links).

[5] A 21 day comment period on the Final EIAR will also be provided, however any comments received will not be included in a CRR and will instead be collated and forwarded directly to DEA.

The public had until 7 August 2010[6] to submit written comment on the Draft EIAR. Cognisance was taken of all comments when compiling the final report, and these comments, together with the study team and Applicant's responses thereto, are included as **Annexure G** in the final report. Where appropriate, the report has been updated.

Various authorities were provided with an opportunity to comment on the Draft EIAR. These include:

- DEA: Environmental Impact Evaluation;
- DEA: Waste Stream Management;
- DWA; and
- DARDLA.

2.5 DECISION AND APPEAL PERIOD

~~Once~~ The Final EIAR ~~has been completed, and all I&AP comments have been incorporated into the report[7], the document~~ will be submitted to DEA, who must, within 60 days, do one of the following:

- Accept the report;
- Notify the applicant that the report has been referred for specialist review;
- Request amendments to the report; or
- Reject the report if it does not materially comply with regulations.

If the report is accepted, DEA must within 45 days:

(a) Grant authorisation in respect of all or part of the activity applied for; or
(b) Refuse authorisation in respect of all or part of the activity.

Once DEA issued their decision on the proposed project, all registered I&APs on the project database will be notified of the outcome of the decision within ten calendar days of the Environmental Authorisation having been issued. Should anyone (a member of public, registered I&AP or the Applicant) wish to appeal DEA's decision, a Notice of Intention to Appeal in terms of Section 62 of NEMA must be lodged with the Minister of Water and Environmental Affairs within 10 calendar days of the I&AP being notified and the substantive Appeal must be lodged within 30 days of the Notice.

Copies of the Final EIAR can be viewed at the same locations as the Draft EIAR until 14 September 2010. Any comments received will not be included in a Comments and Response Report and will instead be collates and forwarded directly to DEA. If you would like to comment on the Final EIAR, please submit your comments on or before **14 September 2010** to:

Aurecon
Attention: Louise Corbett
Fax: (021) 424 5588 /

[6] Note that as 7 August 2010 is a Saturday, comments were accepted until Tuesday, 10 August 2010.
[7] As noted previously a 21 day comment period on the Final EIAR will also be given. However any comments received will not be included in a CRR and will instead be collated and forwarded directly to DEA.

E-mail: louise.corbett@af.aurecongroup.com /
PO Box 494, Cape Town, 8000

3 DESCRIPTION OF PROPOSED ACTIVITY AND ALTERNATIVES

This chapter describes the components of the proposed project that could have an impact on the environment, and then summarises the suite of alternatives that were proposed for further consideration in the Scoping Report.

3.1 THE NEED FOR THE PROPOSED ACTIVITY

The Eskom Tutuka Power Station is supplied with coal from the New Denmark Colliery, which is owned and operated by Anglo Coal. The coal is mined via an underground mining process, at depths of approximately 200 m below the surface. During the operation of the mine it was discovered that underground water was filling up the mining areas, making the mine inoperable. Consequently, from 1989 onwards, underground mine water from the New Denmark Colliery, as a result of coal mining activities, was sent to the Tutuka power station for treatment, as the power station had the facility to treat the mine water. This was undertaken as a measure to maintain the coal mining operations and ultimately the operation of the power station, as it prevented the potential flooding of the mine, as the mine has a long term contract to supply coal to the power station.

The underground water is treated via an RO treatment process at a rate of 22.4 megalitres (Ml)/day (16.4 Ml consists of mine water and 6 Ml consists of cooling water from the power station). The treated water is split into two streams, namely a clean stream and a reject stream (referred to as the reject stream). The reject stream accounts for some 13.4 % of the water (3.0 Ml of 22.4 Ml per day). Of the 3.0 Ml of reject produced per day, 1.07 Ml is utilised on the ash dump for dust suppression, 0.54 Ml is evaporated in the power station's boilers 1, 2 and 3 and the remaining 0.89 Ml is returned to the mine for storage (see **Figure 3.1**). An additional 0.50 Ml/day is further concentrated through an evaporator concentration plant. The condensate (0.36 Ml/day) is returned to the cooling water as make up and the reject (0.14 Ml/day) is utilised of in the fly ash conditioning system.

The volume of reject used for dust suppression currently exceeds the optimal volume for dust suppression. When more wastewater is applied on the ash than what is evaporated, the field capacity is exceeded. This implies a flow of water through the ash which carries pollutants towards the groundwater. Consequently, continued disposal of reject on the ash dump is no longer considered to be a feasible solution, as it has resulted in the generation of leachate, causing groundwater pollution.

Some of the excess reject has been evaporated in three of the six boilers (boilers 1, 2 and 3). Eskom commenced with the evaporation of reject in 2003 in one boiler and, once it had been determined that the evaporation of reject did not affect the efficiency of the boiler, the activity was expanded to two further boilers. During the evaporation process, reject is injected at the bottom of the boiler, below the level where the pulverised fuel is injected and ignited, where temperatures are cooler (about 650℃, compared to b etween 1 300℃ and 1 700℃ higher in the

boiler where combustion occurs) to prevent volatilisation of the salts. The reject is evaporated at a rate of 10 - 14 m^3/hour per unit or an average of 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 of greater than 380 MW.

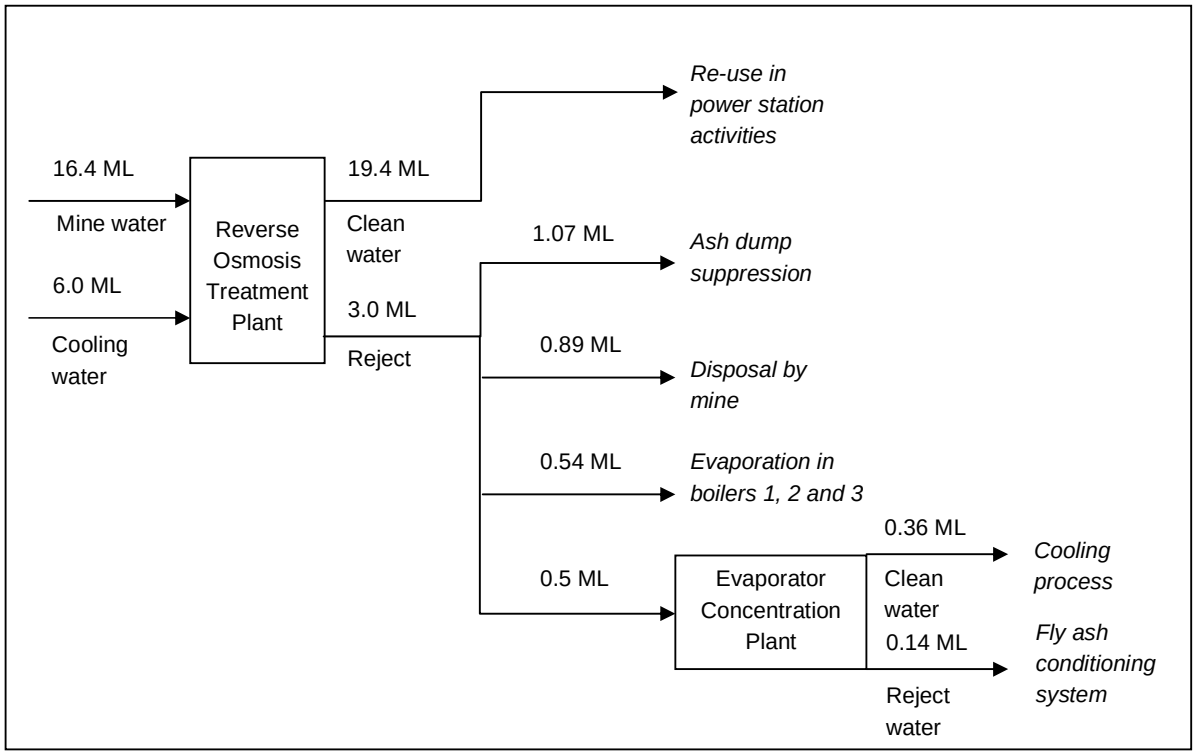

Figure 3.1 Process flow diagram of daily reject treatment and disposal

The remaining 0.89 Ml of reject, not evaporated or used for dust suppression, is returned to the New Denmark Colliery where it is stored in mined caverns. The 240 m deep caverns used for the storage of reject are located in impermeable rock so that there is less risk of groundwater contamination. The mine holds a Directive, which expires on 31 October 2010, for the disposal of the reject in this manner. However, the current storage volume is diminishing. The mine is therefore investigating disposal options for the reject and will apply for a new disposal licence, in terms of NEMWA and NWA, and amend their approved Environmental Management Programme in terms of Mineral and Petroleum Resources Development Act (No. 28 of 2002) in due course.

As noted above, reject water is currently used for irrigation of the dry ash dump for the purposes of dust suppression. The volume of reject used for irrigation (1.07 Ml per day) exceeds the carrying capacity of the ash dump, resulting in the generation of leachate, which has historically been penetrating the groundwater resource, leading to pollution of the resource. Consequently, Eskom proposed to abstract the polluted groundwater, undertake initial removals of metals and other pollutants from the groundwater at the ash dump in a new waste water treatment plant, and then pump the water to the RO plant for further treatment, including reject concentration in the proposed expanded reject concentration plant.

Consequently, Eskom proposed the expansion of the reject concentration plant and the construction of a groundwater treatment plant at the power station to process the polluted groundwater and further concentrate the reject, respectively, which would then be returned to the mine for disposal.

However, in the investigations undertaken after the Scoping Phase the Geohydrology Study, undertaken in order to assess the impact of the proposed groundwater treatment works on the pollution plume, found that the pollution plume would not spread should irrigation with reject be halted. It also indicated ~~uncertainty as to whether~~ that the abstraction of the entire plume would not be possible, based on the varied geology present beneath the ash dump. A number of recommendations were made in the report (see **Annexure A**) including:

- Continuation of quarterly monitoring should pollution plume conditions remain the same;
- Increase annual analysis of Cr6+ to boreholes south of the ash stack;
- Investigate options for plume interception should increasing trends in pollution indicator element concentrations become evident;
- Cease irrigation of reject;
- Investigate the Cr6+ analysis method and the conversion of Cr6+ to Cr3+ and retention factors of Cr6+;
- Drill additional boreholes in new and old portions of the ash stack to determine and monitor the water levels in and below the stack to establish trends in the drying process of the ash stack;
- Drill additional boreholes east of the advancing ash stack, to establish current groundwater qualities and to serve as future monitoring boreholes. Should the pollution plume spread in this direction (in the direction of the Wolwe Spruit) further investigations for containing the plume must be undertaken; and
- Continue proper management of the dirty / clean water separation system south and east of the ash stack, particularly along the natural drainage system of the Wolwe Spruit.

Based on these findings further monitoring and investigations have to be undertaken to determine the most effective approach to addressing the pollution plume.

As the proposed reject concentration plant would ensure that it would not be necessary to irrigate any of the reject on the ash dump, Eskom wishes to proceed with this component of the project urgently, in order to arrest the continuation of the pollution plume. Therefore the ground water treatment works will no longer form part of the current EIA process. Once a suitable solution with regards to the groundwater pollution plume has been determined, appropriate authorisation processes will be followed, if necessary, for those activities. Therefore this EIA Report (EIAR) is for the proposed construction of the reject concentration plant at the existing RO plant.

3.2 DESCRIPTION OF THE PROPOSED ACTIVITY

Eskom's Tutuka power station proposes to upgrade its RO plant through construction of an additional reject concentration plant, within the power station precinct. The project requires a 3 Ml per day reject concentration plant, adjacent to the existing RO plant. A new pipeline would

be required to transport reject back to the mine for disposal and this will form part of the mine's EIA process.

Figure 3.2 shows the process flow diagram of the proposed reject treatment and disposal (volumes per day).

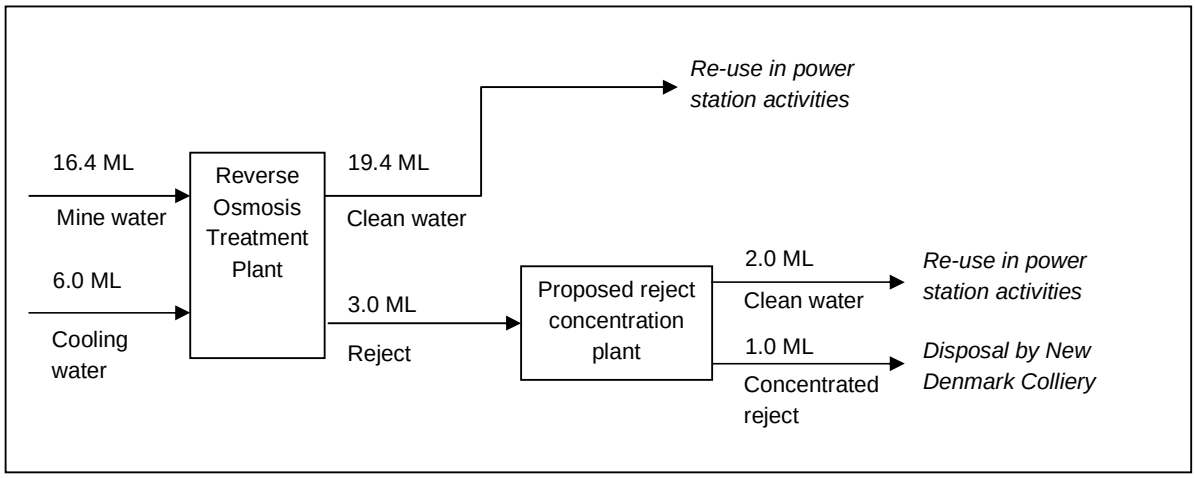

Figure 3.2 Process flow diagram of daily proposed reject treatment and disposal

~~As an interim measure,~~ Eskom is also proposing the expansion of a reject evaporation process, which currently takes place in boilers 1, 2 and 3, to boilers 4, 5 and 6. No additional infrastructure would be required for this, only minor modifications to the boilers. This project would be an interim measure to reduce the volume of water irrigated on the ash dump and returned to the mine as well as a back up in the future, such as during maintenance periods for the proposed brine concentration plant. This proposed expansion process would therefore form the subject of a separate process.

3.3 CONSIDERATION OF ALTERNATIVES

3.3.1 Introduction

NEMA requires that alternatives are considered during the EIA process. An important function of the Scoping Phase is to screen alternatives to derive a list of feasible alternatives that need to be assessed in further detail in the EIA Phase. An alternative can be defined as a possible course of action, in place of another, that would meet the same purpose and need (DEAT, 2004). Alternatives could include, amongst others, the following:

- Activity alternatives – also referred to as project alternatives. Requires a change in the nature of the proposed activity. This category of alternatives is most appropriate at a strategic decision-making level.
- Location alternatives – alternative locations for the entire project proposal or for components of the project proposal.
- Site layout alternatives – Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site.

The above categories of alternatives are the ones most pertinent to this EIA process, and will be explored in detail below. The purpose of this section of the report is to provide an overview of the alternatives identified and screened for the proposed project which are assessed in this EIA Report.

3.3.2 Activity alternatives

Fundamentally different alternatives for achieving the project's goal are normally assessed at a strategic level. In this regard, a number of options were investigated to resolve the problem of excess reject, namely[8]:

I. Wet-ashing,
II. Evaporation ponds
    A. One large pond, sized to evaporate all reject;
    B. Phased implementation, where ponds are sized for evaporation and storage;
    C. Enhanced evaporation; and
    D. Forced evaporation for further reject reduction before disposal in ponds.
III. Reject evaporator/ crystalliser.
IV. "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 2.3.2 of the FSR.

A comparison of the first three options during the Scoping Phase 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 has been maximised for operational efficiency. The reject 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 reject, 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 reject. As such both parties agreed to take a portion of the responsibility for the reject treatment and disposal. Eskom has traditionally treated the underground polluted coal mine water, whilst New Denmark Colliery has disposed of the concentrated reject. 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 reject concentration process. New Denmark Colliery would continue to take responsibility for the disposal of the reject by further investigating the options described above and implementing the most acceptable option, as a matter of urgency.

[8] Eskom, (2008) Tutuka power station Brine Treatment Proposal. .

As such only the proposed concentration of reject (Option 2B) is assessed in the EIAR. As it is statutorily required that the "no-go" alternative be considered, it is also be assessed in this EIAR.

a) Preferred reject treatment alternative (Option 2B)

The proposed reject treatment plant would consist of pre-treatment, filtration and high pressure secondary desalination to achieve maximum recovery of the reject (see **Figure 3.3**).

The pre-treatment would involve a softening process whereby scale-forming compounds would be removed from the reject by adding lime and soda ash to allow the reject to be processed through the high pressure desalination step. The sludge/precipitate from this process would be discharged to the existing clarifier sludge blowdown sumps, at the water treatment plant ~~for treatment and disposal~~. The sludge/precipitate consists of carbonates and sulphates. The sludge from the blowdown sumps and RO process collects at ash conditioner sumps from where it is pumped via the ash conditioner pumps to the ash conditioners to condition the ash to reach a moisture content of approximately 15 %. The conditioned ash is then conveyed on conveyor belts to the ash dump.

Currently 1 255 m^3/day softening sludge is used in the ash conditioning sumps, to which the proposed reject concentration plant would add 108 m^3/day. No change in capacity would be required to the existing sumps or pumps, nor the pipeline which connects the sumps and pumps. This would reduce the volume of dirty water required to condition the ash. A new pipeline would be required from the proposed pre-treatment plant to the ash conditioner sumps.

The softened reject would be neutralized with sulphuric acid and an anti-scalant added. The reject would then be processed through ultrafiltration membranes to remove suspended solids. Provision would be made for cleaning-in-place for the membranes in order to ensure that they remain clean of foulants.

The ultrafiltered product would then be dosed with an anti-scalant to limit scaling on the RO membranes. The product would then be processed through RO membranes at high pressure. The RO membranes would be of the high rejection sea water type.

The treated water obtained from this process would be of a good quality and would be used in the power station processes such as for cooling water. The high concentration reject which is produced would be piped to New Denmark Colliery for disposal.

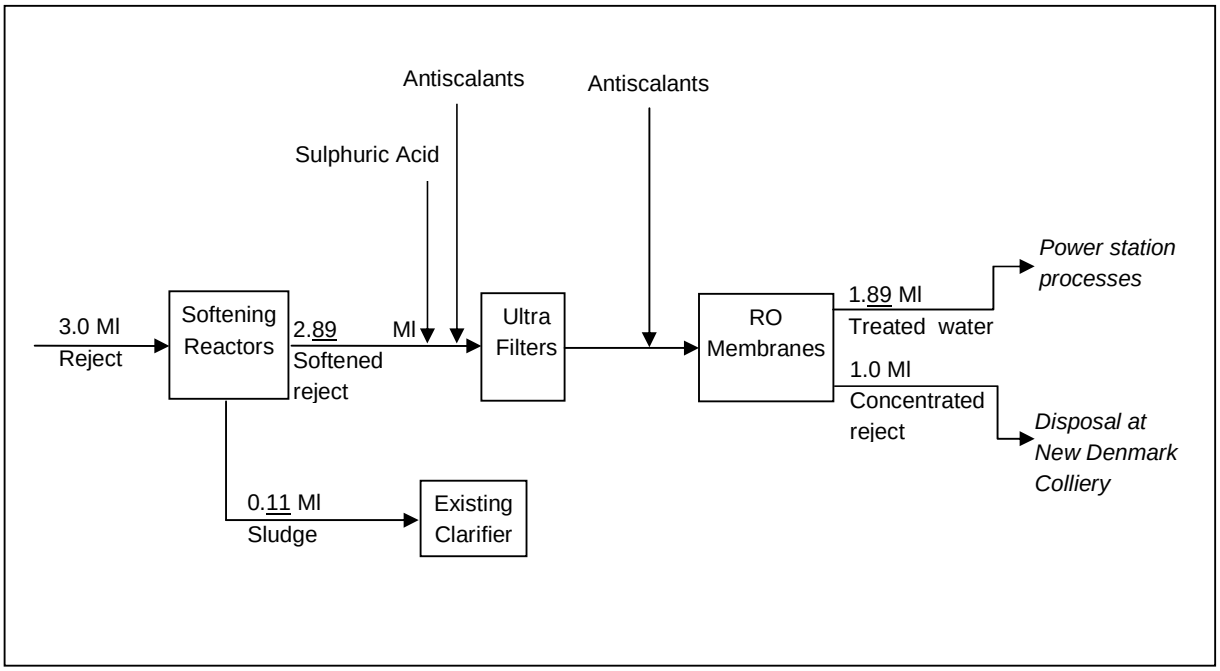

Figure 3.3 Process flow diagram of the proposed reject treatment plant (volume per day)

A minimum of 66 % (or 1.~~94~~89 Ml/day) recovery is expected from the reject concentration plant, but this could increase to as high as ~~75~~ 80 %, dependent on the appointed supplier. A higher recovery rate would result in less concentrated reject and greater recovery of clean water. Continuous on-line analytical equipment would be installed to ensure efficient operation of the process.

b) "No-go" alternative

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 reject treatment alternatives.

In the "no-go" alternative for the reject treatment facility, unconcentrated reject 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 Ml per day of the reject to the colliery after treatment in its existing RO, resulting in the cavern in which the colliery is disposing of the reject reaching capacity sooner than expected. Should the colliery continue to dispose of the reject in the cavern, it would overflow and force the mine to shut down operations. Alternatively the colliery would have to shut down operation to stop the production of reject 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 coal to a new customer at short notice.

3.3.3 Site location alternatives

Once the need for the proposed reject concentration plant had been established, Eskom considered the location of the proposed works. It was noted that the most economically feasible location for the treatment works would be near to the source of their respective feed streams. As such Eskom ~~has~~ proposed three site alternatives for the proposed reject pre-treatment works and one site for the proposed reject concentration plant, near to the existing RO works within the power station precinct (see **Figure 3.4 - Figure 3.8**).

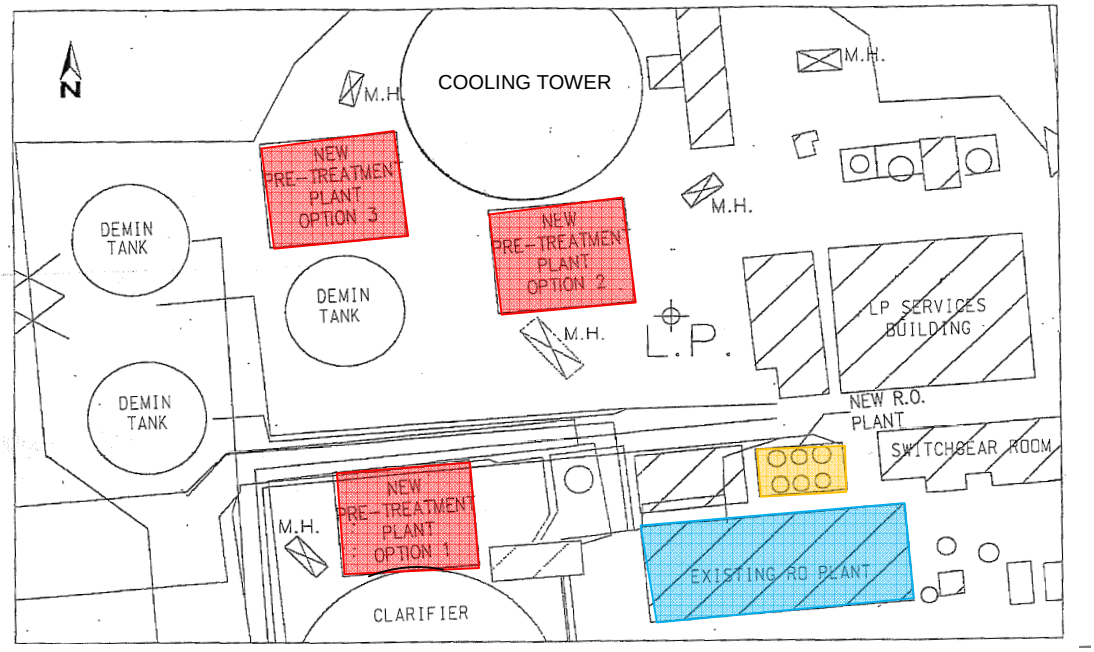

Figure 3.4 Alternative locations for the proposed pre-treatment plant (in red), the proposed RO/reject concentrator plant (in orange) and the existing RO (in blue)

However, the footprint of the infrastructure needed to be expanded to ensure the facilities would fit within the proposed sites and as such new sites were identified to allow for the larger area required (see **Figure 3.5**).

All these areas have been disturbed (i.e. are not in a natural state) by the construction of the power station and its infrastructure, and are therefore considered to be brownfield sites. The proposed reject treatment works consists of two components, namely a pre-treatment facility and a treatment works component. The treatment works (new RO) component could be located on one of three locations either east or north of ~~would be adjacent to~~ the existing RO process ~~in each of the three location alternatives~~. The pre-treatment facility could be located on one of three locations between the existing RO and the north eastern ~~cooling towers~~ CW pump house. The size of the footprints of the pre-treatment plant is approximately 1200 ~~500~~ m^2 and the RO plant is approximately 540 ~~145~~ m^2. Pipeline route corridors of 5 m width have also been

identified for each of the pre-treatment components, linking the pre-treatment components to the ash conditioner pump. The pipeline routes range in length from 80 – 125 m and the pipeline would have a diameter of 100 mm.

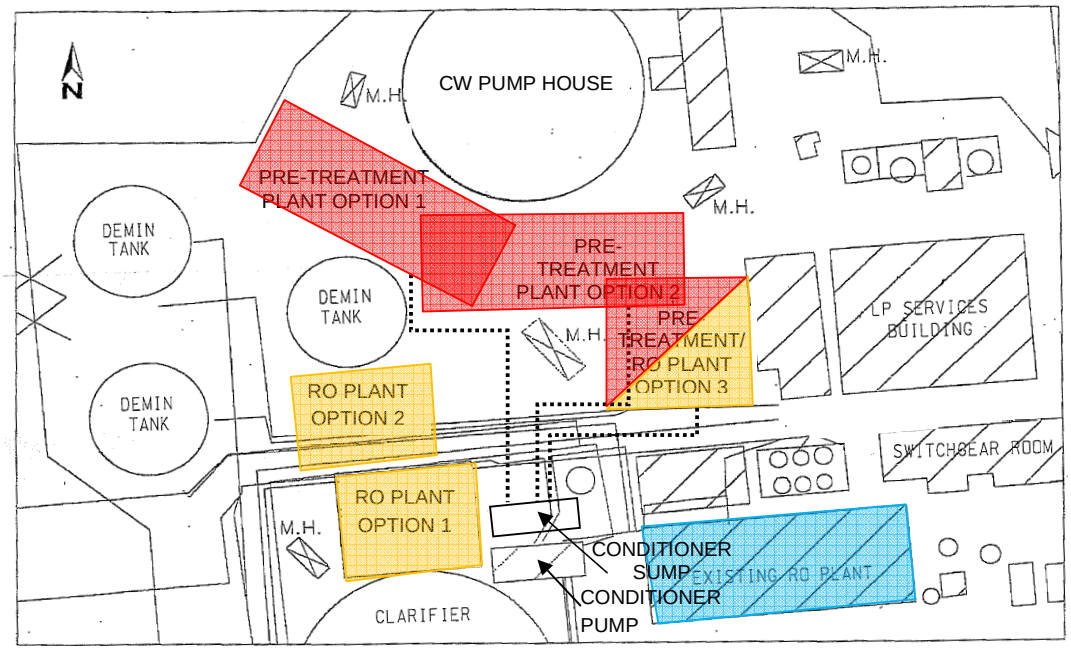

Figure 3.5 Alternative locations for the proposed pre-treatment plant (in red), the proposed RO/reject concentrator plant (in orange), proposed pipeline route corridors (dotted lines) and the existing RO (in blue)

~~**Figure 3.6 Location alternative for the proposed reject concentration plant, immediately adjacent to existing RO process (08/12/09)**~~

Figure 3.7 General area of location alternatives ~~1-3~~ for the proposed pre-treatment and treatment/RO facilities of the proposed reject concentration plant, adjacent to cooling towers (08/12/09)

Figure 3.8 Location of ~~pre-~~treatment/RO plant option 1 (courtesy J v Schalkwyk, 22/04/10)

3.3.4 Site layout alternatives

Site layouts were to be considered as part of the Plan of Study for EIA, these would have been specifically for the groundwater treatment works, which is no longer being considered in this EIAR. As such site layout alternatives will not be assessed in this EIR.

3.3.5 Summary of alternatives

To summarise, the feasible alternatives which will be assessed in this EIAR include the following:

- Activity alternatives:
  - Concentration of reject via a reject concentration plant; and
  - "No-go" alternative to reject concentration plant.
- Location alternatives:
  - Three locations for the pre-treatment component of the proposed reject concentration plant including pipeline route corridors; and
  - Three locations for the reject treatment/RO component of the proposed reject concentration plant.
  - ~~Three locations for the proposed reject plant.~~

4 ASSESSMENT METHODOLOGY

The purpose of this Chapter is to describe the assessment methodology that is applied to the assessment of the impacts. The assessment context and cumulative impacts are also discussed in this chapter.

4.1 INTRODUCTION

The purpose of this chapter is to describe the assessment methodology utilised in determining the significance of the construction and operational impacts of the proposed reject concentration plant, and where applicable the possible alternatives, on the biophysical and socio-economic environment. The methodology was developed by Aurecon (previously Ninham Shand) in 1995 and has been continually refined based on our experience of its application to over 300 EIA processes. The methodology is broadly consistent with requirements of Regulation 32(2)(k) of Regulation 385. Furthermore, the methodology is consistent with that described in the DEAT Guideline Document on the EIA Regulations (1998). The methodology was outlined in the Plan of Study for EIA and in accepting the FSR, DEA has ratified this approach.

4.2 ASSESSMENT METHODOLOGY

This section outlines the proposed method for assessing the significance of the potential environmental impacts outlined above. As indicated, these include both operational and construction phase impacts.

For each impact, the EXTENT (spatial scale), MAGNITUDE and DURATION (time scale) would be described. These criteria would be used to ascertain the SIGNIFICANCE of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described in the EIAR represents the full range of plausible and pragmatic measures but does not necessarily imply that they would be implemented.

The tables on the following pages show the scale used to assess these variables, and defines each of the rating categories.

Table 4.1 Assessment criteria for the evaluation of impacts

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	**Regional**	Beyond a 5 km radius from the boundary of the candidate site.
	Local	Within a 5 km radius from the boundary of the candidate site.
	Site specific	On site or within 100 m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	**High**	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact	**Construction period**	Up to 2 years
	Medium Term	2 – 15 years after construction
	Long Term	More than 15 years after construction

The SIGNIFICANCE of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in **Table 4.2**.

Table 4.2 Definition of significance ratings

SIGNIFICANCE RATINGS	LEVEL OF CRITERIA REQUIRED
High	• High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and medium term duration or a local extent and long term duration • Medium magnitude with a regional extent and long term duration
Medium	• High magnitude with a local extent and medium term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long term duration
Low	• High magnitude with a site specific extent and construction period duration • Medium magnitude with a site specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long term duration
Very low	• Low magnitude with a site specific extent and construction period duration • Very low magnitude with any combination of extent and duration except regional and long term
Neutral	• Zero magnitude with any combination of extent and duration

Once the significance of an impact has been determined, the PROBABILITY of this impact occurring as well as the CONFIDENCE in the assessment of the impact, would be determined using the rating systems outlined in **Table 4.3**and **Table 4.4** respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the REVERSIBILITY of the impact is estimated using the rating system outlined in **Table 4.5**.

Table 4.3 Definition of probability ratings

PROBABILITY RATINGS	CRITERIA
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 4.4 Definition of confidence ratings

CONFIDENCE RATINGS	CRITERIA
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 4.5 Definition of reversibility ratings

REVERSIBILITY RATINGS	CRITERIA
Irreversible	The activity will lead to an impact that is in all practical terms permanent.
Reversible	The impact is reversible within 2 years after the cause or stress is removed.

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5 ASSESSMENT OF POTENTIAL IMPACTS AND POSSIBLE MITIGATION MEASURES

This Chapter forms the focus of the EIAR. It contains a detailed assessment of the operational (or long-term) impacts as well as the construction phase impacts on the biophysical and socio-economic environments using the methodology described in Chapter 4. A summary of the assessment is contained in Chapter 5.

5.1 INTRODUCTION

This Chapter describes the potential impacts on the biophysical and socio-economic environments, which may occur due to the proposed activities described in Chapter 3. These include potential impacts, which may arise during the operation of the proposed development (i.e. long-term impacts) as well as the potential construction related impacts (i.e. short to medium term). The assessment of potential impacts will help to inform and confirm the selection of the preferred alternatives to be submitted to DEA for consideration. In turn, DEA's decision on the environmental acceptability of the proposed project and the setting of conditions of authorisation (should the project be authorised) will be informed by this chapter, amongst other information, contained in this EIAR.

A number of impacts, relating only to the groundwater treatment works which no longer forms part of this EIA, were identified in the Scoping Phase. These impacts, which are no longer relevant to this EIA process, are as follows:
Operational phase impacts on the biophysical and socio-economic environments

- Operational phase impacts on biophysical environment
  - Impact on the terrestrial fauna and flora; and
  - Impact on aquatic flora and fauna.
- Operational phase impacts on socio-economic environment
  - Impact on heritage resources;

These impacts will no longer be assessed within this EIAR as they are not relevant to the proposed reject concentration plant. Therefore only the following impacts, identified in the Scoping Phase, are assessed in this EIAR:

The potential impacts identified during the Scoping Phase of this project are as follows:

- Operational phase impacts of proposed reject concentration plant on biophysical environment
  - Impact on groundwater resources.
- Operational phase impacts on socio-economic environment
  - Impact on visual aesthetics; and
  - Noise impacts

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

- Disturbance of flora and fauna;
- Sedimentation and erosion of water ways;
- Increase in traffic volumes;
- Storage of hazardous substances on site;
- Increased risk of fire;
- Noise pollution; and
- Dust impact.

Each of these impacts is assessed in detail in a section below. The baseline and potential impacts that could result from the proposed development are described and assessed. Mitigation measures are recommended. Finally, comment is provided on the potential cumulative impacts[9] which could result should this development, and others like it in the area, be approved.

The methodology used to assess the potential impacts is detailed in Chapter 4 of this report. The (+) or (-) after the significance of an impact indicates whether the impact is positive or negative. The terms "No Mit" and "Mit" reflected in the assessment tables in this chapter refer to the impact with no mitigation and with potential mitigation, respectively.

5.2 OPERATIONAL PHASE IMPACTS ON BIOPHYSICAL ENVIRONMENT

5.2.1 Impact on groundwater

Perched and regional aquifers are present at the site of the ash dump. Geohydrology studies (GHT Consulting Scientists, 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 reject (the full geohydrology study is included in **Annexure A**).

In the "no-go" alternative for the reject concentration plant, reject 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. 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. The current extent of the plume is shown in **Figure 5.1**. However, the possibility of affecting nearby surface water sources is high, e.g. the Wolvespruit drainage channel east of the ash dump.

Alternatively Eskom could return all 3 Ml per day of the reject to the colliery after treatment in its existing RO, 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 (assessed in **Section 5.3.2**).

[9] EIA's are typically carried out on specific developments, whereas cumulative impacts result from broader biophysical, social and economic considerations, which typically cannot be addressed at the project level.

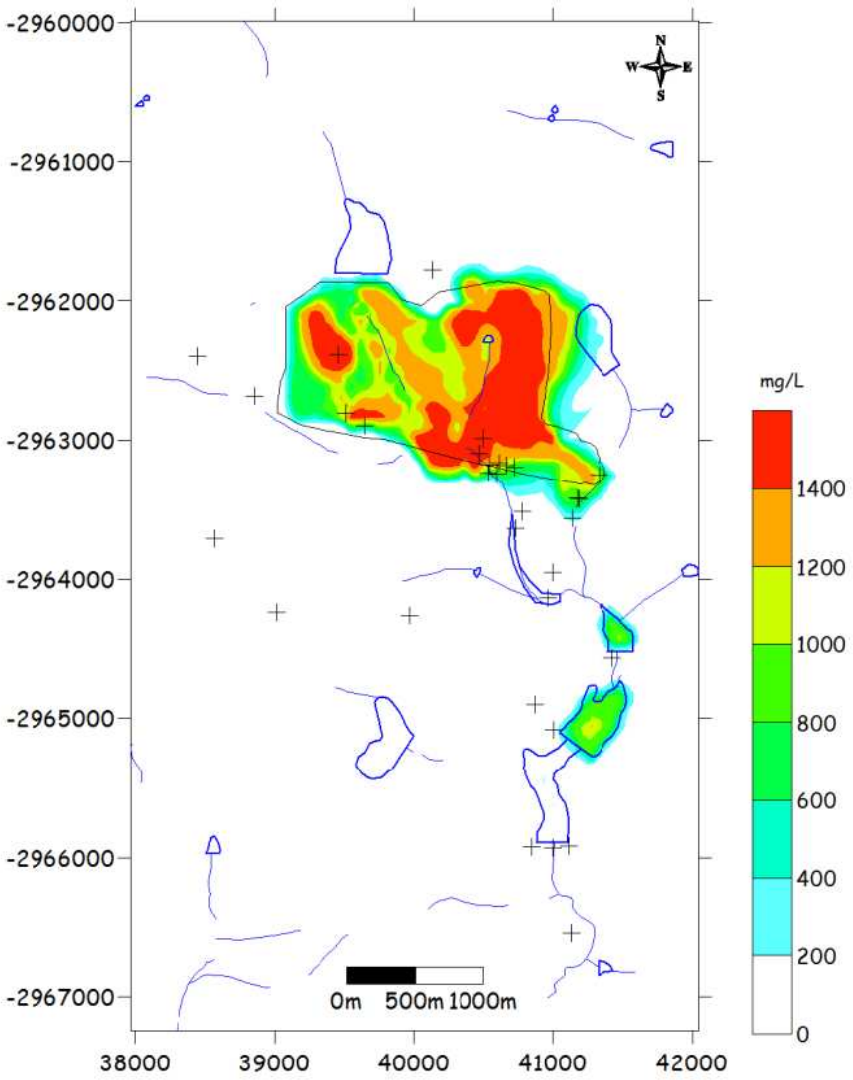

Figure 5.1 Current pollution plume extent, as modelled for sulphate (SO_4) simulated concentrations

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

Should the proposed reject concentration plant be constructed no reject would be irrigated on the ash dump and therefore the existing pollution plume would not spread. As such the potential impact of the proposed reject concentration plant on the groundwater is considered to be medium positive magnitude, site specific and long term and therefore of **medium (+)** significance, without mitigation. This would not differ for the alternative locations of the reject concentration plant. **Table 5.1** provides a synopsis of the potential impact.

Mitigation measures ("No-go" alternative)

Irrigation of reject should be halted, via the concentration and diversion of the concentrated reject back to the mine. Alternatively, the irrigation of reject could be halted, and additional unconcentrated reject returned to the mine. While this would improve the impact on the

groundwater resource, it would have broader economic implications, described later in this chapter.

Table 5.1 Impact of proposed reject concentration plant on groundwater

Impact of proposed reject concentration plant on groundwater		
	No mitigation	**Mitigation**
Extent	Site	N/A
Magnitude	Medium	N/A
Duration	Long Term	N/A
SIGNIFICANCE	**Medium (+)**	**N/A**
Probability	Definite	N/A
Confidence	Sure	N/A
Reversibility	Reversible	N/A
Impact of the "no-go" on groundwater		
	No mitigation	**Mitigation**
Extent	Site	Site
Magnitude	Medium	Low
Duration	Long Term	Long Term
SIGNIFICANCE	**Medium (-)**	**Low (-)**
Probability	Definite	Definite
Confidence	Sure	Sure
Reversibility	Reversible	Reversible

5.3 OPERATIONAL PHASE IMPACTS ON THE SOCIAL ENVIRONMENT

This section of the report describes the socio-economic environment and considers the long-term or operational phase impacts on the social and economic environment that may be associated with the proposed activities, as follows:

- Visual impacts;
- Impact on the economy; and
- Noise impacts.

5.3.1 Visual impacts

The area surrounding the Tutuka power station is located at some 1 640 metres above mean sea level. The area is gently undulating, with a very gradual slope north to south towards the Grootdraai Dam. The power station precinct and ash dump are located at the highest point in the immediate surrounds.

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 reject concentration plant would be visible from

many kilometres away. The proposed locations of the proposed reject treatment works are amongst the power station infrastructure in the power station precinct, adjacent to the existing RO plant. As such the proposed reject treatment works would be in the context of the existing structures of the power station. Furthermore, the buildings and structures such as the cooling towers and boilers in the vicinity of the proposed treatment works are significantly taller than the proposed concentration plant. To contextualise this, the proposed structures would not be taller than a two storey building, whilst the existing cooling towers are some 143 m tall, and the boiler houses are 100 m tall. Many of these existing structures also screen the site with site 3 of the proposed pre-treatment structure being the most visible.

The distance from the proposed sites for the pre-treatment and RO components of the plants to the power station site boundary ranges from 900 m to 1 200 m. No sensitive receptors are located near to the site boundary. 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 infrastructure would be located within a brownfields industrial complex and that it would be much smaller than the surrounding infrastructure, the proposed infrastructure would not be out of context in the circumstances.

Based on the above the potential visual impact of the proposed reject concentration plant (both the treatment/RO and pre-treatment facilities) at any of the proposed sites would be of very low magnitude, local extent and permanent and therefore of **very low (-)** significance, without mitigation. No impacts on visual considerations would result from the "no-go" alternative. **Table 5.2** provides a synopsis of the potential impact.

Mitigation measures
No mitigation is considered necessary.

Table 5.2 Impact of proposed reject concentration plant on visual considerations

Impact of proposed reject concentration plant on visual considerations		
	No mitigation	**Mitigation**
Extent	Local	Local
Magnitude	Very Low	Very Low
Duration	Long term	Long term
SIGNIFICANCE	**Very Low (-)**	**Very Low (-)**
Probability	Definite	Definite
Confidence	Sure	Sure
Reversibility	Reversible	Reversible
Impact of the "no-go" alternative on visual considerations		
	No mitigation	**Mitigation**
Extent	-	-
Magnitude	-	-
Duration	-	-
SIGNIFICANCE	**N/A**	**N/A**
Probability	-	-

Confidence	-	-
Reversibility	-	-

5.3.2 Impact on economy

In the "no-go" alternative for the reject concentration plant, reject 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 (assessed in **Section 5.2.1**). Alternatively Eskom could return all 3 Ml per day of the reject to the colliery after treatment in its existing RO. The cavern in which the colliery is disposing of the reject would reach capacity sooner than expected. Should the colliery continue to dispose of the reject in the cavern, it would overflow and force the mine to shut down operations. Alternatively the colliery would have to shut down operation to stop the production of reject which it is unable to dispose of. The colliery would then need to construct a reject disposal facility (e.g. evaporation ponds) to handle the 3 Ml per day. The size of these ponds would not be viable (an estimated area of approximately 78 ha would be required) and the cost of such an installation would not be feasible.

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 New Denmark Colliery 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 local 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 long term and therefore of **medium (-)** significance, without mitigation. The potential impact after mitigation is considered to be **neutral**[10]. No impact on the South African economy would result from the proposed reject concentration works. **Table 5.3** provides a synopsis of the potential impact.

Mitigation measures ("No-go" alternative)
Eskom would need to further manage demand to ensure reserve margins are sufficient to meet the country's needs.

[10] It should be noted that while this potential impact with mitigation is rated as neutral significance Tutuka Power Station has a capacity of 3 654MW, 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.

Table 5.3 Impact of the proposed reject concentration plant on local economy

Impact of the proposed reject concentration plant on local economy		
	No mitigation	**Mitigation**
Extent	-	-
Magnitude	-	-
Duration	-	-
SIGNIFICANCE	**N/A**	**N/A**
Probability	-	-
Confidence	-	-
Reversibility	-	-
Impact of the "no-go" alternative on the local economy		
	No mitigation	**Mitigation**
Extent	Regional	Regional
Magnitude	Low	-
Duration	Long term	Long term
SIGNIFICANCE	**Medium (-)**	**Neutral**
Probability	Probable	Probable
Confidence	Sure	Sure
Reversibility	Reversible	-

5.3.3 Noise impacts

The area surrounding the Tutuka Power Station consists predominantly of undulating grazing lands. As such the rural atmosphere generates little noise. The power station itself is the largest source of noise pollution in the area, together with the ash conveyors and other activities on site. The potential exists for noise from the proposed reject concentration plant to affect surrounding landowners.

A standard wastewater treatment works generates a noise level of 40 dB at a distance of 300 m, based on the noise levels of the aerators. A noise level of 40 dB in itself is considered to be quiet, and for the sake of comparison, normal conversation has a noise level of some 65 dB.

The existing RO Plant is located on the western side of power station precinct in close proximity to the coal milling plant and conveyors for one of the boiler units. Consequently, the ambient noise levels are elevated due to industrial activity taking place in the vicinity of the RO plant. Furthermore, 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 reject concentration plant may generate high levels of noise. However, the reject concentration plant (both the pre-treatment and treatment/RO component) would be housed in ~~a~~ similar buildings to that used to house the RO plant, in order to attenuate the sound to an appropriate level.

The closest boundary of the power station site is over 900 m from the proposed alternative locations of the pre-treatment and reject concentration plants, providing a noise buffer between Eskom's activities and the surrounding landowners.

The external noise level of the proposed RO plant (outside the buildings 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. Therefore, given that no sensitive noise receptors are located nearby the power station and that there is a minimum buffer of 900 m within the power station precinct, 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 reject concentration plant is likely to be indistinguishable from background noise beyond the power station boundary). This would not differ for the alternative locations of the reject concentration plant. **Table 5.4** provides a synopsis of the potential impact.

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

Mitigation measures
No mitigation is necessary.

Table 5.4 Impact of proposed reject concentration plant on noise

Impact of proposed reject concentration plant on noise		
	No mitigation	**Mitigation**
Extent	Local	Local
Magnitude	Zero	Zero
Duration	Permanent	Permanent
SIGNIFICANCE	**Neutral**	**Neutral**
Probability	Definite	Definite
Confidence	Sure	Sure
Reversibility	Reversible	Reversible
Impact of the "no-go" alternative on noise		
	No mitigation	**Mitigation**
Extent	-	-
Magnitude	-	-
Duration	-	-
SIGNIFICANCE	**N/A**	**N/A**
Probability	-	-
Confidence	-	-
Reversibility	-	-

5.4 CONSTRUCTION PHASE IMPACTS ON THE BIOPHYSICAL AND SOCIAL ENVIRONMENTS

These impacts relate to the short-term impacts that occur during the construction phase. The proposed reject concentration plant would be constructed over a period of some 24 months.

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

- Disturbance of flora and fauna;
- Sedimentation and erosion;
- Increase in traffic volumes;
- Interruption of road services;
- Storage of hazardous substances on site;
- Security risks; and
- Dust impact.

Composite Assessment

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

5.4.1 Disturbance of flora and fauna

This impact considers impacts beyond the permanent footprint impacts of the proposed reject concentration 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 mostly colonised by grass and other alien species.

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 route corridor, should be rehabilitated with indigenous grass seeds immediately after construction.

5.4.2 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 route corridor, should be rehabilitated with indigenous grass seeds immediately after construction.

5.4.3 Increase in traffic volumes

Construction vehicles are likely to make use of the existing roads, including the R38, 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 construction activity duration would be very short, with minimal additional construction related traffic generated.

5.4.4 Storage of hazardous substances on site

As at any construction site, various hazardous substances are likely to be used and stored on site. 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 E** for the EMP.

5.4.5 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. As the power station operates 24 hours a day it would not be necessary to limit working hours.

5.4.6 Dust impacts

Construction vehicles are likely to make use of the existing roads, including the R38 and roads to the ash dump, 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.

5.4.7 Summary assessment

Since the construction of the proposed reject concentration plant would last 24 months and due to the low magnitude of the construction works the potential impact during the construction period is considered to be of very low magnitude, local extent and for the construction period and therefore of **low (-)** significance, without mitigation. The implementation of good practice measures as contained in the EMP in **Annexure E** would reduce this impact to **very low**. This would not differ for the alternative locations of the reject concentration plant. **Table 5.5** provides a synopsis of the potential impact.

Table 5.5 Impact of construction of proposed reject concentration plant

Impact of construction of proposed reject concentration plant		
	No mitigation	**Mitigation**
Extent	Local	Site
Magnitude	Low	Very Low
Duration	Construction	Construction
SIGNIFICANCE	**Low (-)**	**Very Low (-)**
Probability	Definite	Definite
Confidence	Sure	Sure
Reversibility	Reversible	Reversible

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6 CONCLUSION AND RECOMMENDATIONS

The purpose of this Chapter is to briefly summarise and conclude the EIAR and describe the way forward.

6.1 CONCLUSIONS

The proposed project comprises the construction of a reject concentration plant.

Aurecon submits that this Draft EIAR provides a comprehensive assessment of the environmental issues associated with each of the feasible alternatives of the proposed reject concentration plant outlined in the FSR and the associated Plan of Study for EIA. These impacts and alternatives were derived in response to inputs from consultation with I&APs, provincial and local authorities, and the EIA project team.

Table 6.1 provides a summary of the significance of the environmental impacts associated with this proposed project.

Table 6.1 Summary of significance of the potential impacts associated with the proposed development

	IMPACT	Reject Concentration Plant*		"No-go" alternative	
		No Mit	With Mit	No Mit	With Mit
OPERATIONAL PHASE IMPACTS					
1	Impact on groundwater resources	*M+*	N/A	M	L
2	Impact on visual aesthetics	VL	VL	N/A	N/A
3	Impact on economy	N/A	N/A	M	N
4	Impact on noise	N	N	N/A	N/A
CONSTRUCTION PHASE IMPACTS					
5	Composite assessment	L	VL-L	N/A	N/A

* This assessment is the same for each of the three site alternatives for both the pre-treatment and treatment/RO components as well as the pipeline route corridors.

KEY				
	H	High Significance	VL	Very Low Significance
	M-H	Medium to High Significance	N	Neutral Significance
	M	Medium Significance	*H+*	High positive significance
	L-M	Low to Medium Significance	*M+*	Medium positive significance
	L	Low Significance	*L+*	Low positive significance
	VL-L	Very Low to Low Significance		

Chapter 6

6.2 LEVEL OF CONFIDENCE IN ASSESSMENT

With reference to the information available at the feasibility stage of the project planning cycle, the confidence in the environmental assessment undertaken is regarded as being acceptable for the decision-making, specifically in terms of the environmental impacts and risks. The EAP believes that the information contained within the FSR and this EIAR is adequate to inform Eskom's decision making regarding which alternatives to pursue and will allow DEA to be able to determine the environmental acceptability of the proposed alternatives.

It is acknowledged that the project details will evolve during the detailed design and construction phases to a limited extent. However, these are unlikely to change the overall environmental acceptability of the proposed project and any significant deviation from what was assessed in this EIAR should be subject to further assessment. If this was to occur, an amendment to the Environmental Authorisation may be required in which case the prescribed process would be followed.

6.3 OPERATIONAL PHASE IMPACTS

With reference to **Table 6.1**, the most significant (medium (-)) operational phase impacts on the biophysical and social environment, without mitigation was for the potential impacts of the "no-go" alternative on groundwater and the economy. With the impact of mitigation measures the impact on the economy would decrease to neutral however the impact on groundwater would remain the same. It should be noted that the only potential positive impact is that of the proposed reject concentration plant on groundwater.

In terms of differences in the potential impacts of the site alternatives, including the alternative pipeline route corridors, they are all considered to be equivalent, and therefore no differences would result. As such it is recommended that Eskom choose its preferred option based on technical and financial considerations, and there is no environmental difference between the site alternatives.

6.4 CONSTRUCTION PHASE IMPACTS

None of the construction phase impacts were deemed to have a significant impact on the environment, given their duration (approximately 24 months) and localised extent. The construction impacts were assessed to be of **low (-)** significance, without mitigation measures. With the implementation of the recommended EMP the significance of construction phase impacts is likely to reduce to **very low (-)**.

6.5 RECOMMENDATIONS

Chapter 5 has outlined a few mitigation measures which, if implemented, could significantly reduce the negative impacts associated with the project. Where appropriate, these and any others identified by DEA could be enforced as Conditions of Approval in the Environmental Authorisation, should DEA issue a positive Environmental Authorisation. The mitigation measures are outlined below:

Proposed reject concentration plant:
Construction phase impacts: Implement an EMP

"No-go" alternative:
Impact on groundwater: Stop irrigation of reject
Impact on the economy: Ensure electricity demand is managed so that reserve margins are sufficient to meet the countries needs.

6.5.1 Considerations in identification of preferred alternative

Following the finalisation in the EIAR, the next step in the EIA process is for Eskom to identify their preferred option, utilising this EIAR together with technical and financial considerations to inform their decision.

In comparing the proposed reject concentration plant and the "no-go" alternatives it can be seen that the "no-go" alternative results in negative impacts of **medium (-)** significance on the biophysical and socio-economic environment whilst the proposed reject concentration works results in **medium (+)** impacts and **low (-)** impacts on the environment. As such the proposed reject concentration plant is the preferred activity alternative.

With regards to the site alternatives, including the alternative pipeline route corridors, for the proposed reject concentration plant, the three alternatives for both the pre-treatment and treatment/RO components have the same impacts, all of which are of **low (-)** or lower significance. As such there is no site preference from an environmental perspective.

6.5.2 Opinion with respect to environmental authorisation

Regulation 32(2)(m) of the EIA Regulations requires that the EAP include an opinion as to whether the activity should be authorised or not.

The impacts associated with the proposed reject concentration plant would result in local impacts (both biophysical and some social) that would negatively affect the area. The significance of these impacts **without mitigation** are deemed to be of **low or lower** significance. However, with the implementation of the recommended mitigation measures the significance of the negative impacts would be minimized and would be **very low**.

Associated with the proposed project is a positive impact on groundwater of **medium (+)** significance.

Based on the above, the EAP is of the opinion that the proposed reject concentration plant, and the three pre-treatment component sites and associated pipelines and the three RO site alternatives being applied for be authorised as the benefits outweigh the localised, short term negative environmental impacts. The significance of negative impacts can be reduced with effective and appropriate mitigation through a construction EMP, as described in this report. If authorised, the implementation of an EMP should be included as a condition of approval.

6.6 WAY FORWARD

~~The next stage of this EIA process involves lodging this Draft EIAR at a suite of public venues and hosting a Focus Group Meeting. The opportunities for public involvement are as follows:~~

- ~~Commenting on the Draft EIAR, which is lodged at the Thuthukani and Standerton Public Libraries, the security centre at Tutuka Power Station and on the Eskom (www.eskom.co.za/eia) and Aurecon websites (www.aurecongroup.com/)(follow the South Africa and public participation links). The public will have until 7 August 2010 to submit written comment on the Draft EIAR to Aurecon;~~
- ~~All registered I&APs were notified of the availability of the Draft EIAR by means of a letter which includes a copy of the Draft EIAR Executive Summary.~~

~~Registered I&APs were also notified of a Focus Group Meeting being held on 21 July 2010 at Thuthukani Community Centre from 11h00 – 12h30 to discuss the findings of the EIAR. I&APs were requested to RSVP.~~

~~Once~~ The Final EIAR has been completed, and ~~all I&AP comments have been incorporated into the report,~~ it will be submitted to DEA for review and decision-making.

Copies of the Final EIAR can be viewed at the same locations as the Draft EIAR until 14 September 2010. Any comments received will not be included in a Comments and Response Report and will instead be collates and forwarded directly to DEA. If you would like to comment on the Final EIAR, please submit your comments on or before **14 September 2010** to:

Aurecon
Attention: Louise Corbett
Fax: (021) 424 5588 /
E-mail: louise.corbett@af.aurecongroup.com /
PO Box 494, Cape Town, 8000

Once DEA has reviewed the Final EIAR, they will need to ascertain whether the EIA process undertaken met the legal requirements and whether there is adequate information to make an informed decision. Should the above requirements be met, they will then need to decide on the environmental acceptability of the proposed project. Their decision will be documented in an Environmental Authorisation, which will detail the decision, the reasons therefore, and any related conditions. Following the issuing of the Environmental Authorisation, DEA's decision will

be communicated by means of a letter to all registered I&APs and the appeal process will commence, during which any party concerned will have the opportunity to appeal the decision to the Minister of Environmental Affairs in terms of NEMA and NEMWA.

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