

**10 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT****10.1 Introduction****10.1.1 Project Background**

Eskom's core business is the generation, transmission and distribution of electricity throughout South Africa. Electricity by its nature cannot be stored and must be used as it is generated. Therefore electricity is generated according to supply-demand requirements. The reliable provision of electricity by Eskom is critical to industrial development and poverty alleviation in the country.

If Eskom is to meet its mandate and commitment to supply the ever-increasing needs of end-users in South Africa, it has to continually expand its infrastructure of generation capacity and transmission and distribution power lines. This expansion includes not only the building of new power stations but also expanding and upgrading existing power stations to extend their life.

The Hendrina Power Station, in the Mpumalanga Province currently uses a wet ashing system for the disposal of ash. Hendrina Power Station currently has five ash dams, of which two (Ash dam 3 and 5) are currently in operation, the other three (Ash dam 1, 2 & 4) are not in use for the following reasons:

- Having reached full capacity (Dam 1)
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- Temporary decommissioning (Dam 4). Ash dam 4 will be re-commissioned in 2011.

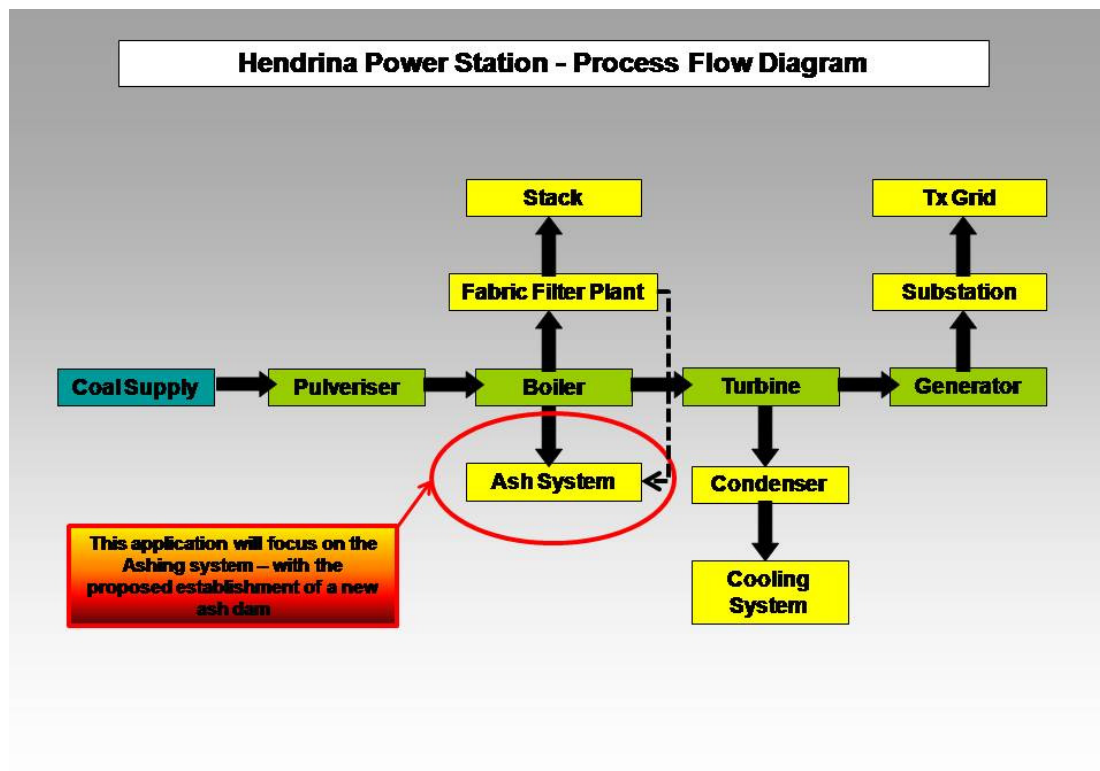
At the current rate of disposal on Dams 3, 4 and 5, the rate-of-rise will exceed 4m/year in 2018, which is not acceptable in terms of structural stability. The Hendrina Power Station is anticipated to ash approximately 64.2 million m<sup>3</sup> until the end of its life span which is currently estimated to be 2035.

It has been determined, through studies, that the existing ashing facilities are not capable to provide sufficient ash disposal capacity for this amount of ash for the full life of the station. The existing facilities (Ash Dams 3, 4 and 5) allow for the disposal of 20.9 million m<sup>3</sup>. Therefore, Hendrina Power Station proposes to extend its ashing facilities and associated infrastructure with the following development specifications:

- Additional airspace of 43.3 million m<sup>3</sup>
- Ash dam ground footprint of 139 ha
- Ground footprint of associated infrastructure such as Ash Water Return Dams of 70 ha

The need for this extension is to allow the Hendrina Power Station to continue ashing in an environmentally responsible way for the duration of the operating life of the Power Station. The need for the extension is related to the deteriorating coal quality, higher load factors, the installation of the Fabric filter plant (to meet requirements in terms of the

National Environmental Management: Air Quality Act (Act 39 of 2004)) and the need to extend station life. The following diagram (**Figure 10.1**) provides an overview of the activities on site and where this project fits within the process.



**Figure 10.1:** An overview of the activities on site and where this project fits within the process

### 10.1.2 Purpose of the Plan of Study for EIA

This document is intended to provide a summary of the key findings of the Scoping Phase of the EIA and to describe the activities to be undertaken in the Impact Assessment Phase of the EIA. Legislatively, the document is required to provide the following:

- A description of the environmental issues identified during scoping phase that may require further investigation and assessment;
- A description of the feasible design and placement alternatives identified during scoping that may be further investigated;
- An indication of additional information required to determine the potential impacts of the proposed activity on the environment;
- A description of the proposed method of identifying these impacts; and
- A description of the proposed criteria for assessing the significance of these impacts.

The requirements of Regulation 28 of Government Notice R.543 promulgated in terms of section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998) have been reviewed in order to ensure compliance therewith. These requirements are as follows:

- A description of the tasks that will be undertaken as part of the environmental impact assessment process, including any specialist reports or specialised processes, and the manner in which such tasks will be undertaken;
- An indication of the stages at which the competent authority will be consulted;
- A description of the proposed method of assessing the environmental issues and alternatives, including the option of not proceeding with the activity;
- Particulars of the public participation process that will be conducted during the environmental impact assessment process; and
- Any specific information required by the competent authority.

In addition, there are a number of other requirements which the PoS for EIA must address. These include the following:

- The DEAT EIA Regulations Guideline Document (April 1998);
- The DEA response to the Final Scoping Report and Plan of Study for EIA (when received).

### **10.1.3 Details of Applicant**

The details of the applicant are shown in **Table 10.1** below.

**Table 10.1:** Details of the applicant

<b>Name of Applicant:</b>	Eskom Holding Limited (Hendrina Power Station)
<b>Contact person:</b>	Julian Nair (Power Station Manager)
<b>Postal Address:</b>	Private Bag X1003, Pullenshope, 1096
<b>Tel:</b>	+27 (0)13 296 3400
<b>Fax:</b>	+27 (0)13 296 3569
<b>E-mail:</b>	NairJ@eskom.co.za

### **10.1.4 Details of Environmental Assessment Practitioner**

The details of the Environmental Assessment Practitioner are shown in **Table 10.2** below.

**Table 10.2:** Details of the independent EIA consultant (Environmental Assessment Practitioner)

<b>Name of Consultant:</b>	Lidwala Environmental & Planning Services (Pty) Ltd
<b>Contact person:</b>	Mr. Frank van der Kooy (PrSciNat) / Ms. Ashlea Strong (CEAPSA)
<b>Postal Address:</b>	P.O. Box 4221, Northcliff, 2115
<b>Tel:</b>	087 351 5145
<b>Fax:</b>	086 686 1628
<b>E-mail:</b>	fvdkooy@absamail.co.za / astrong@lidwala.com

### 10.1.5 Details of Authorities

The details of the relevant authorities are shown in **Table 10.3** below.

**Table 10.3:** Details of the relevant authorities

<b>Name:</b>	National Department of Environmental Affairs
<b>Contact person:</b>	Nyiko Ngoveni / Mmatlala Rabothata
<b>Address:</b>	Nyiko Ngoveni / Mmatlala Rabothata
<b>Tel:</b>	315 Pretorius Street, Pretoria, 0001
<b>Fax:</b>	+27 (0) 12 395 1694/1768
<b>E-mail:</b>	+27 (0) 12 320 7539
<b>Name:</b>	Mpumalanga Department of Economic Development, Environment and Tourism
<b>Contact person:</b>	Mrs Dineo Tswai
<b>Address:</b>	c/o Botha and Northey Streets, Pavillion Building, Witbank, 1035
<b>Tel:</b>	+27 (0) 13 690 2595
<b>Name:</b>	Department of Water Affairs
<b>Address:</b>	185 Schoeman Street, Pretoria
<b>Tel:</b>	012 336 8664

### 10.2 Summary of Project Description

The Hendrina Power Station, in the Mpumalanga Province currently uses a wet ashing system for the disposal of ash. Hendrina Power Station currently has five ash dams, of which two (Ash dam 3 and 5) are currently in operation, the other three (Ash dam 1, 2 & 4) are not in use for the following reasons:

- Having reached full capacity (Dam 1)
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At the current rate of disposal on Dams 3, 4 and 5, the rate-of-rise will exceed 4m/year in 2018, which is not acceptable in terms of structural stability. The Hendrina Power Station is anticipated to ash approximately 64.2 million m<sup>3</sup> until the end of its life span which is currently estimated to be 2035.

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### **10.3 Summary of the Legislation Context**

The legislative framework applicable to this project is diverse and consists of a number of Acts, Regulations and Treaties which must be complied with. A summary of the key legislation is provided hereunder.

- National Environmental Management: Waste Act No 59 of 2008
- The National Environmental Management: Air Quality Act No 39 of 2004;
- GN R1179 (GG 16536 of 25 August 1995) – Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act No 85 of 1993;
- Hazardous Substances Act No 15 of 1973
- Constitution of South Africa, 1996 (with reference to noise)
- National Environmental Management Act No 107 of 1998 (with reference to noise and prevention of pollution)
- National Environmental Management: Biodiversity Act No 10 of 2004 (in respect of Fauna, Flora and National Heritage Resources)
- Conservation of Agricultural Resources Act No 43 of 1989 (in respect of Fauna, Flora and National Heritage Resources)
- National Forest Act No 84 of 1998 (in respect of protected trees)
- National Veld and Forest Fire Act No 101 of 1998
- National Heritage Resources Act No 25 of 1999
- Promotion of Access to Information Act No 2 of 2000 (in respect of record-keeping and interested and affected parties and monitoring of environmental impacts:

A full legal review will be undertaken during the EIA phase of the project.

### **10.4 Summary of the Scoping Phase**

#### **10.4.1 Description of the Study Area**

Hendrina Power Station is located in the Mpumalanga Province approximately 24 km south of Middleburg and 20 km North of the town of Hendrina. The power station and surrounds falls within the Steve Tshwete Local Municipality which forms part of the larger Nkangala District Municipality.

The greater part of the study area is made up of agricultural and mining activities (**Figure 10.2**). The proposed study area, for alternative sites for the proposed new ash dam, is located within an 8 km radius of the centre point of the Hendrina Power Station Site (**Figure 10.3**).



**Figure 10.2:** The agricultural and mining activities that form the greater part of the study area



#### **10.4.2 Description of the Baseline Environment**

The area within the study area is characterised by typical undulating terrain of the Mpumalanga Province. The natural topography of the area has been highly disturbed as a result of mining and agricultural activities.

The climate in the study area can be described as typical highveld conditions with summers that are moderate and wet, while winters are cold and dry. The mean annual precipitation is approximately 735 mm/year, with rain experienced predominantly in the summer months (October to April). Minimum temperatures have been recorded from -1.8°C to 13.7°C with maximum temperatures ranging between 18°C and 27°C. The prevailing wind direction is recorded as being from the north-east and north.

The Hendrina power station and surrounds are located on coal-bearing rocks of the Vryheid Formation, part of the lower Karoo Supergroup. These rocks are principally deltaic and fluvial siltstones and mudstones, with subordinate sandstones (Johnson et al, 2006). The coal seams originated as peat swamps, or similar environments. Where the Dwyka Group is absent (suspected in the study area), the Vryheid Formation has been deposited directly onto rugged pre-Karoo topography, and the thickness of the Formation can be quite variable as a result. The Vryheid Formation rocks are well lithified (hard) and have little primary porosity

Terrestrial grassland patches that are captured within the respective site alternatives represent the Eastern Highveld Grassland. This vegetation type is Endangered and only small fractions are conserved in statutory reserves. Some 44% is transformed by cultivation, plantations, mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact than which is currently indicated by land cover data. The vegetation is short dense grassland dominated by *Aristida*, *Digitaria*, *Eragrostis*, *Themeda* and *Tristachya* species. Small rocky outcrops are scattered across the landscape. Wiry grasses and woody species are associated with these outcrops. These include species such as *Acacia caffra*, *Celtis africana*, *Diospyros lycioides*, *Parinari capensis*, *Protea caffra* and *Searsia magalismsontanum* (Mucina & Rutherford, 2006). The Endangered status of this vegetation type warrants a medium-high environmental sensitivity. Small portions of the Eastern Temperate Freshwater Wetlands vegetation type are located within the study area

The property falls within the Upper Olifants Sub-Area of the Olifants Water Management Area (WMA4). The Upper Olifants Sub-Area is the most urbanised of the 4 sub-areas in WMA4. The Upper Olifants covers an area of 11 464 km<sup>2</sup> with a mean annual runoff of 10 780 million m<sup>3</sup> (Midgley et al., 1994). Surface runoff in this area is regulated by a number of large dams, namely Witbank, Bronkhorstspruit and the Middleburg dams (Basson et al., 1997). Majority of the urban population is located in Witbank and Middelburg areas, and it is projected that the population in these urban areas is expected to grow in the near future therefore increasing the water requirement in the Sub-Area. Extensive coal mining



activities are taking place in the sub-area, both for export to other provinces and for use in the six active coal fired power stations in the sub-area. Water quality in this sub-area is therefore under threat. Mining activities in the area impact on the natural hydrological system by increasing infiltration and recharge rates of the groundwater. Approximately 62 million m<sup>3</sup> is predicted to decant from mining activities (post closure) every year, creating a need for water quality management plans in this Sub-Area (DWAF, 2004).

Groundwater storage and transport in the unweathered Vryheid Formation is likely to be mainly via fractures, bedding planes, joints and other secondary discontinuities. The success of a water supply borehole in these rocks depends on whether one or more of these structures are intersected. In general the Vryheid Formation is considered to be a minor aquifer, with some abstractions of local importance. Relatively minor outcrops of the Rooiberg and Quaggasnek Formations that underlie the Vryheid Formation are also found in the study area.

### **10.4.3 Summary of Alternatives**

#### *a) No-Go Alternative*

The 'no go' alternative is the option of not expanding the ashing system at the Hendrina Power Station with the development of a new ash dam.

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The 'no go' option will, therefore, contribute negatively to the provision of reliable base load power to the national grid. It will result in the need to close down the power station due to the lack of ash disposal facilities, causing a long term reduction in electricity supply. It is important to note that the additional power output from Hendrina Power Station is still required to meet the national demand irrespective of the new-build activities.

The 'no go' alternative will, however, be investigated further in the EIA phase as an alternative as required by the EIA Regulations.

#### *b) Ash Disposal Method*

The coal-fired power generation process results in large quantities of ash, which is disposed of in ash dams. Generally, Eskom uses coal of a low grade (called middlings coal) which produces a larger mass of ash during combustion. Over time, the quality of the coal provided to Eskom has degraded, due to higher ash quantities in the coal. With regards to ash management, Eskom uses either wet or dry methods of ash disposal. The Hendrina Power Station utilises a wet ashing disposal method. This process entails the hydraulic conveyance of ash where ash is mixed with water and pumped in the form of slurry via steel pipelines. The slurry is allowed to settle in the ash dams, and the water decanted to storage dams for re-use.

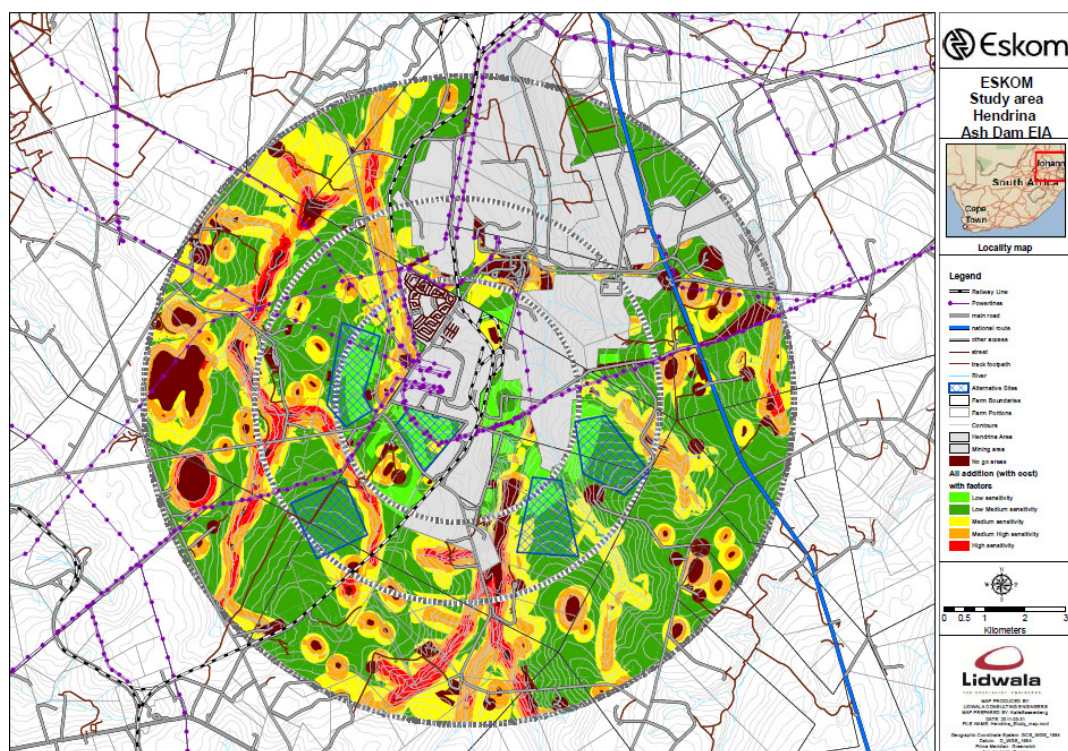
Due to the fact that Hendrina Power Station utilises a wet ashing disposal method, a strategic decision was taken that the new proposed ash dam will be built in order to link in with the existing ashing system.

c) Location Alternatives

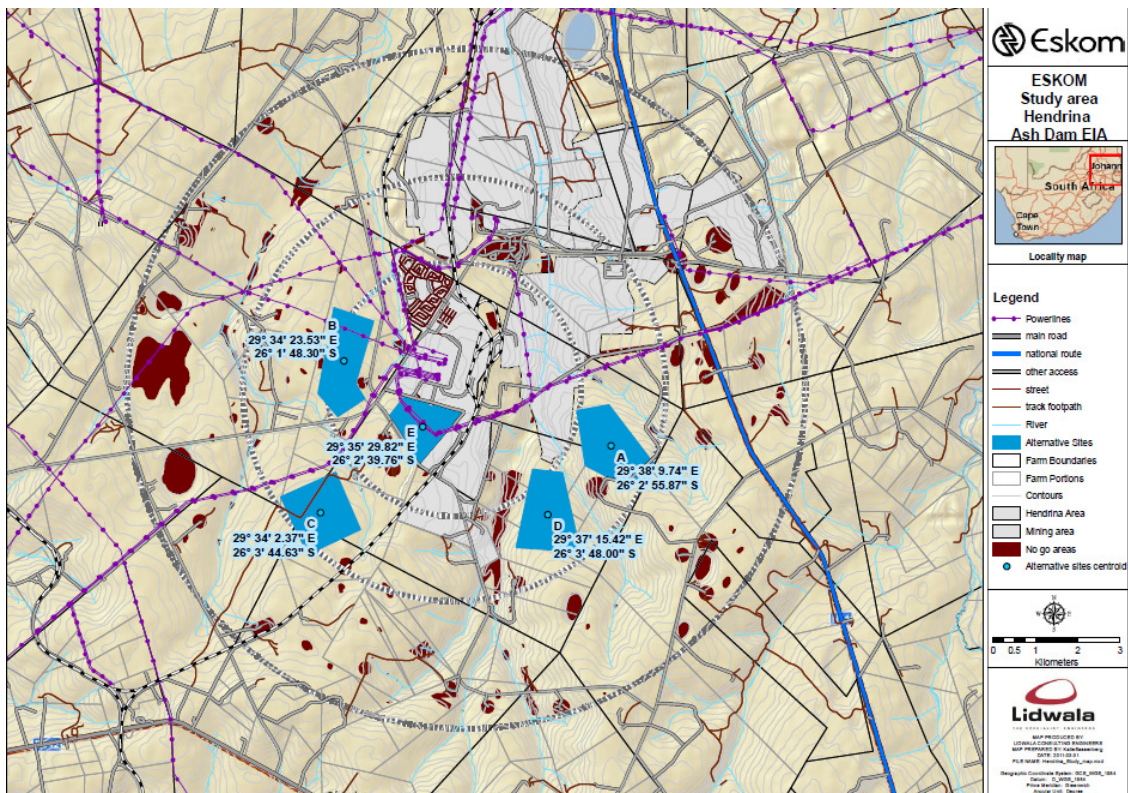
A screening study was initiated upfront in the process in order to identify potential sites within the study area that would be suitable for use as alternative sites for the proposed new ash dam. The study area was demarcated using an 8 km radius around the Hendrina Power Station. Within this 8km radius two further demarcations were included, although based on technical impacts such as the costs involved in the project and the risk of security of supply, the distances involved also take into account the potential additional environmental impacts in terms of the distance required for new infrastructure to be constructed and operated.

- A 3 km radius within which no additional technical costs would be incurred in terms of the construction and operational of the proposed new ash dam;
- A 5 km radius within which minimal additional technical costs would be incurred in terms of the construction and operation of the proposed new ash dam

In order to ensure that sites were identified in the most objective manner possible, a sensitivity mapping exercise was undertaken for the study area. The purpose of such an exercise was to identify suitable areas within the study area that could accommodate the proposed new ash dam and associated infrastructure and to pro-actively identify sensitive areas (i.e. fatal flaws) that should ideally be avoided. **Figure 10.4** shows the final sensitivity map that was utilised to identify the five alternative sites (**Figure 10.5**) assessed in this scoping report.



**Figure 10.4:** Recommended alternative sites (sensitivity map with the adjustment factors with cost)



**Figure 10.5:** Five Alternative sites for further consideration during the Scoping Phase

The evaluation and nomination of a preferred site involves a highly interdisciplinary approach. The approach undertaken has involved a number of specialist studies which examine a number of different issues. In order to evaluate sites and determine a preferred site, the studies need to be comparative and therefore a site rating matrix was developed. The site preference rating system is applied to each discipline, and the rating of each site was conducted according to the following system:

- 1 = Not suitable for development / No-Go (impact of very high significance - negative)
- 2 = not preferred (impact of high significance - negative)
- 3 = acceptable (impact of moderate significance - negative)
- 4 = Preferred (impact of low or negligible significance - negative)

The final Site Ranking matrix is shown in **Table 10.4**.

**Table 10.4:** Final Site Ranking Matrix

Study	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E
<b>Biodiversity</b>	3	3	3	2	2
<b>Avifauna</b>	3	3	2	2	4
<b>Surface Water</b>	2	2	3	1	4
<b>Ground</b>	2	3	4	2	2

<b>water</b>					
<b>Social</b>	4	2	2	2	4
<b>Visual</b>	2	3	2	3	4
<b>Design and Technical</b>	2	3	2	2	4
<b>Total</b>	<b>18</b>	<b>19</b>	<b>18</b>	<b>14</b>	<b>24</b>

From the above preference rating results it is clear that Alternative E is by far the preferred site overall with Alternative B as the second most preferred site.

In addition to the screening process and the above site preference rating exercise (**Table 10.4**) the fatal flaws listed in the Minimum Requirements have also been taken into account in order to ensure that the most preferable site has been identified for further study in the EIA phase of this project. The Minimum Requirements require that no landfill / disposal site be developed in an area with an inherent fatal flaw. Through the fatal flaw discussion Alternatives A, B, and D could be eliminated (**Table 10.5**)

**Table 10.5:** Minimum Requirement Fatal Flaws

<b>Fatal Flaw</b>	<b>Discussion</b>	<b>Site eliminated</b>
Any area characterised by any factor that would prohibit the development of a landfill at prohibitive cost	The Eskom technical team deemed that any alternative located within a 8km radius of the power station could be deemed suitable in terms of cost. However, after ground truthing, the independent engineering input received noted that Site A is situated directly adjacent to Optimum Mine's open cast mining operation and Site D is just east of Total coal's Tumela Mine and on the "opposite" side of the open cast workings and a large dam to the existing power station facilities and is therefore considered too inaccessible. These two sites are therefore not considered technically feasible options without excessive expense.	Alternative A, C and D
Areas overlying viable mineral resource	Although this is not deemed a specific fatal flaw in terms of the minimum requirements – it could be linked to a couple of the above items specifically in terms of incompatible land uses. It is also Eskom's policy, where possible,	Alternative A, B and D

	<p>to avoid sterilising viable mineral resources. The entire area is situated on coal resources, the exact viability of which we are unable to determine for certain at this stage. However, Alternative A and D are directly adjacent to both Optimum's and Total's opencast mining operations and are therefore anticipated to be on a viable resource. During a site visit (for ground truthing) it was noted that there are a number of mining right applications on the go within the study area, one particular application, for Kebrafield (Pty) Ltd (DMR Reference number: 30/5/1/2/2/479MR) is situated over a fairly large area to the west of the power station and includes all the farm portions included in the area identified for alternative B.</p>	
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The preferred sites identified from the site preference rating exercise (**Table 10.4**) include Alternative E and B. The above discussion (**Table 10.5**) with regards to the Minimum requirements fatal flaws excludes alternatives A, D and B for either being deemed technically unfeasible (without excessive expense) or overlying viable coal resource.

Therefore, with the results of the two site selection discussions above only two sites are left for consideration as alternative sites for the proposed ash dam, i.e. Alternatives E and C.

The choice of a preferred site is required to take all aspects of the environment into account, social, biophysical, technical and economic aspects. Alternative C is deemed suitable from a cost perspective as it falls within the 8 km radius of the power station, from a technical point of view it can also be deemed suitable as apart from being a fair distance from site there are no major barriers (from a technical point of view) that would make the site unfeasible. The social study noted that Alternative C was situated close to a number of agricultural settlements and was also found to have the highest visual exposure of all 5 alternatives. From a biophysical point of view Alternative C is considered to be far less preferred than Alternative E as linear infrastructure required such as access roads, power lines and pipelines would be required to traverse at least 3 – 4 km from the power station to the site without the option of not crossing surface water features that were highlighted as higher sensitive areas by the surface water, biodiversity, avifauna and groundwater specialists during the screening phase.

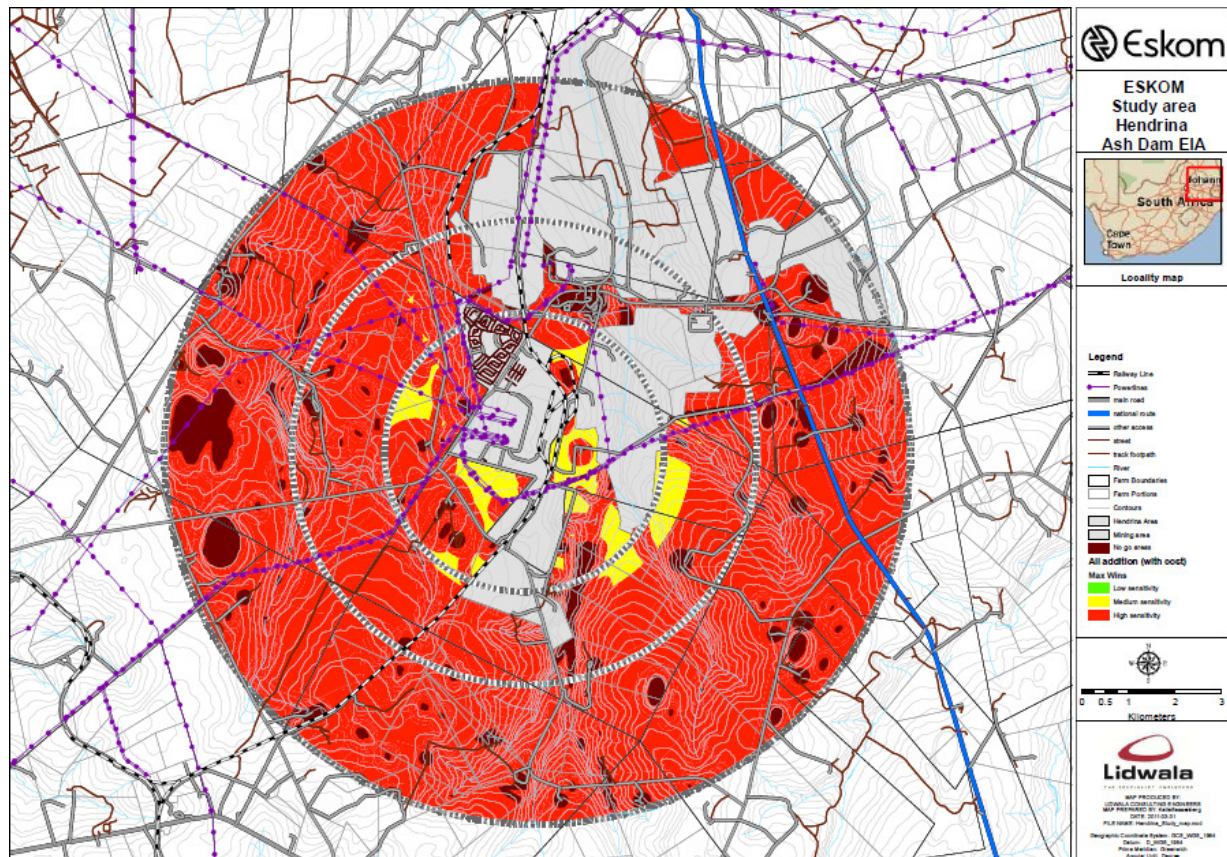
The surface water system in question is a perennial system. Nel et al. (2004) lists a status of critically endangered for all the river signatures associated with the study area, which will include the surface water feature that would need to be crossed by linear infrastructure required for a new ash dam at alternative C. The ascribed river status indicates a limited amount of intact river systems carrying the same heterogeneity signatures nationally. This implies a severe loss in aquatic ecological functioning and aquatic diversity in similar river signatures on a national scale (Nel et al., 2004). Therefore, it is anticipated that the use of Alternative C as a preferred site would increase the risk of pollution and the associated environmental degradation of the system in question.

The above discussion clearly shows that Alternative C is not a recommended alternative. Alternative E due the additional impacts that would occur due to the construction and operation of the linear infrastructure required. Alternative E is considered more favourable due to its close proximity to the existing facilities and due to the fact that this alternative would be able to link in with many of the existing associated facilities therefore reducing the required footprint substantially. In terms of the cost mapping, Alternative E is within the 3km radius which does not require any additional costs for the development of the new ash dam.

In addition to the above discussion the "Max wins" map (taking cost into account – as required in the minimum requirements) from the screening study can be consulted to support the preference for Alternative E. The "max wins" map was developed by keeping all areas deemed sensitive (in all study areas) sensitive (**Figure 10.6**), Alternative E is clearly shown to be situated in one of the few areas deemed acceptable for the placement of the ash dam.

**Therefore, this scoping study recommends that Alternative E and the No-go Alternative are carried forward to the EIA phase.**

Due to the preferred site, the EIA will also need to assess alternative corridor alignments for the relocation of the power lines that traverse Alternative E.



**Figure 10.6:** Max Wins map (including cost) from the screening study – showing acceptable areas for site choice

#### 10.4.4 Summary of Public Participation to date

The Environmental Impact Assessment (EIA) process for the proposed new ash dam is comprised of two main phases, namely the Scoping phase and Impact Assessment phase. This report documents the tasks which have been undertaken as part of the Scoping phase of the EIA. These tasks include the public participation process and the documentation of the issues which have been identified as a result of these activities.

To date, tasks that have commenced include the:

- Identification of stakeholders or I&APs;
- Notification and advertisements;
- Background Information Documents; and
- Ongoing consultation and engagement

The Draft Scoping Report will be released for public review and comment from **2 June to 12 July 2011**. During the review period a public participation process (PPP) will be undertaken, allowing Interested and Affected Parties (I&APs) to engage with the project proponents and independent environmental consultants. The PPP will consist of a public open day and one-on-one interactions where required. Issues raised by I&APs during the public participation process will be documented and included in the Final



Scoping Report.

The relevant authorities required to review the proposed project and provide an Environmental Authorisation were consulted from the outset of this study, and have been engaged throughout the project process. The National Department of Environmental Affairs (DEA), is the competent authority for this Project. The Department of Water Affairs (DWA), and the Mpumalanga Department of Economic Development, Environment and Tourism (MDEDET) are noted as key commenting authorities.

### **10.5 Description of Environmental Issues Identified During Scoping**

The following impacts have been identified for additional study during the EIA phase and are deemed to be issues of potentially **medium to high significance** or those anticipated to require specific mitigation measures:

#### **Biophysical Impacts – Ash Dam:**

- **Geology**
  - Impacts related to the construction-related earthworks as well as the pollution of geological features in case of spillage/leakage of hydrocarbon and other hazardous material from storage facilities have been identified as having a medium significance.
  - Mitigation measures are required to be identified.
- **Geotechnical issues**
  - Phase 1 geotechnical study will be undertaken in the EIA phase.
- **Topography**
  - Change to drainage patterns due to construction-related earthworks and additional stormwater drainage patterns.
  - Mitigation measures are required to be identified.
- **Soil**
  - Pollution of soil due to handling, use and storage of hazardous substances during construction and operation.
  - The loss of available top soil.
  - Mitigation measures are required to be identified.
- **Land Capability**
  - Key variables that determine the land capability of the study area such as soil fertility reduced and disturbed due to the potential activities related to the ash dam.
  - The loss of viable agricultural land.
  - Mitigation measures are required to be identified.

- **Avifauna**

The greatest predicted Impact of Ash dams on avifauna are the destruction of habitat and disturbance of birds during construction. During the construction phase, habitat destruction and alteration inevitably takes place. Habitat destruction is anticipated to be the most significant impact in this study area. However, this can be minimized and mitigated should the smallest alternative be chosen. Similarly, the above mentioned construction and maintenance activities impact on bird through disturbance, particularly during bird breeding activities. Disturbance of birds is anticipated to be of lower significance than habitat destruction. Leachate from fly ash dams can contain heavy metals (Theism and Marley, 1979) which could result in contamination of surrounding water sources, used by water birds in the study area. Correct placing of the new dam, away from wetlands, dams and water bodies, will help to mitigate this impact.

In addition to the expansion of the ash dams the project will also include the expansion of the relevant infrastructure associated with the ashing system, such as pipelines, storm water trenches, seepage water collection systems, pump stations, seepage dams etc, and may also involve the relocation of certain infrastructure (e.g. power lines) depending on which alternative is chosen. The impacts of such associated infrastructure on avifauna are predicted to be minimal, so long as the infrastructure is within the proposed ash dam footprint. Infrastructure outside of the proposed footprint (i.e. outside of the 5 proposed alternatives), will be assessed in the EIA phase of the project, upon determination of the preferred site.

- **Biodiversity**

Ten impacts were identified that are of relevance to any development in a natural environment. Impacts were placed in three categories, namely:

- Direct impacts:
  - Destruction of threatened and protected flora species;
  - Direct impacts on threatened fauna species;
  - Destruction of sensitive/ pristine habitat types;
  - Direct impacts on common fauna species;
- Indirect Impacts:
  - Floristic species changes subsequent to development;
  - Faunal interactions with structures, servitudes and personnel;
  - Impacts on surrounding habitat/ species;
- Cumulative Impacts:
  - Impacts on SA's conservation obligations & targets (VEGMAP vegetation types);
  - Increase in local and regional fragmentation/ isolation of habitat; and
  - Increase in environmental degradation.

Other, more subtle impacts on biological components, such as changes in local, regional and global climate, effects of noise pollution on fauna species, increase in acid rain and ground water deterioration are impacts that cannot be quantified to an acceptable level of certainty and is mostly subjective in nature as either little literature is available on the topic or contradictory information exist.

- **Surface Water**

- Contamination of surface water from seepage and run off.
- Loss of aquatic biodiversity.
- Loss of runoff into the catchment.
- The detailed aquatic ecological impact assessment will quantify the significance of possible impacts associated with the preferred site.

- **Groundwater**

- Contamination of ground water due to hydrocarbon spillage and seepage into groundwater reserves, affecting groundwater quality.
- Mitigation measures are required to be identified.
- Further construction of infrastructure and compaction of the area will further contribute to reduced water infiltration rates to replenish groundwater aquifers. Mitigation measures are required to be identified.

- **Noise**

- Change in ambient noise levels during both construction and operation.

- **Air Quality**

- Increase in dust generating activities during construction and operation including exceedances of PM10 concentrations and exceedances of dustfall rates.
- Mitigation measures may be required to be identified if required.

### **Socio-Economic Impacts – Ash Dam:**

- Visual impacts of preferred site
- Disturbance of cultural or historical sites
- Economic benefits through employment
- Continued generation of Electricity over the long term at Hendrina Power Station
- Health risks from elevated PM10 concentrations and dust fall rates
- Loss of groundwater resource to local users (in terms of potential groundwater contamination)
- Inflow of temporary workers.
- Mitigation measures are required to be identified.

### **Potential Impacts associated with relocating the Powerlines at Alternative E**

- Visual impact of the new powerline routes and proposed tower structures;

- Loss of land capability if relocated over agricultural land and the loss of available top soil;
- Loss of aquatic habitat and contamination of surface water ecosystems due to sedimentation;
- Loss of biodiversity and habitats;
- Potential groundwater contamination due to chemical spillage during construction;
- Collisions and electrocutions of birds;
- Disruption of land use and loss of economic potential; and
- Increase in health risk to neighbouring residents due to EMF.

The above mentioned impacts will be investigated in more detail during the EIA phase of the project.

## **10.6 Impact Assessment Phase**

### **10.6.1 Introduction**

The purpose of the Impact Assessment Phase of an EIA is as follows:

- Address issues that have been raised during the Scoping Phase;
- Assess alternatives to the proposed activity in a comparative manner;
- Assess all identified impacts and determine the significance of each impact; and
- Formulate mitigation measures.

Numerous acceptable approaches and methodologies exist by which the above purpose can be achieved. The legislation in South Africa, including the guideline documents published in support thereof, does not provide a specific methodology for the assessment of impacts. Rather, an assessment framework is provided within which environmental assessment practitioners are expected to structure a project-specific assessment methodology. This assessment framework recognises that there are different methodologies available for assessing the impact of a development but that the specific methodology selected must provide for the following:

- A clear process for impact identification, prediction and evaluation;
- The specification of impact identification techniques;
- Criteria for evaluating the significance of impacts;
- The design of mitigation measures to address impacts;
- Defining types of impacts (direct, indirect or cumulative); and
- Specification of uncertainties.

This section of the Final Plan of Study for EIA serves to describe the manner in which Lidwala EPS intends undertaking the Impact Assessment Phase of the EIA.

### 10.6.2 Decision-Making Framework

A number of authorisations, permits and other development approvals are required to be obtained by Eskom Holdings Limited. **Table 10.6** provides a summary of the development approvals required and the current status of the applications for these approvals.

**Table 10.6:** Development approvals, Authorisations and Permits required for the Proposed Project

Approval Required	Document	Department Responsible for Issuing Approval	Status of Application
Environmental Authorisation in of the National Environmental Management Act (Act 107 of 1998)		National Department of Environmental Affairs (DEA)	An integrated application was submitted and an integrated authorisation will be provided to Eskom at the end of the process.
Waste Management Licence in terms of the National Environmental Management: Waste Act No 59 of 2008		National Department of Environmental Affairs (DEA)	

### 10.6.3 Impact Assessment Methodology

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed new ash dam and the relocation of the power lines. The process of assessing the impacts of the project encompasses the following four activities:

- Identification and assessment of potential impacts;
- Prediction of the nature, magnitude, extent and duration of potentially significant impacts;
- Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity; and
- Evaluation of the significance of the impact after the mitigation measures have been implemented i.e. the significance of the residual impact.

The possible impacts associated with the project were primarily identified in the Scoping Phase through on-site and desktop study and public consultation. In the Impact Assessment Phase, additional impacts will be identified through the more in-depth specialist investigations to be undertaken and through the ongoing consultation process with interested and affected parties.

In accordance with Government Notice R.543, promulgated in terms of section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), specialists will be required to assess the significance of potential impacts in terms of the following criteria:

- Cumulative impacts;
- Nature of the impact;
- Extent of the impact;
- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Impact non-reversibility;
- Impact on irreplaceable resources; and
- Confidence level.

Issues are assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected and how it will be affected;
- The physical **extent**, wherein it is indicated whether:
  - \* 1 - the impact will be limited to the site;
  - \* 2 - the impact will be limited to the local area;
  - \* 3 - the impact will be limited to the region;
  - \* 4 - the impact will be national; or
  - \* 5 - the impact will be international;
- The **duration**, wherein it is indicated whether the lifetime of the impact will be:
  - \* 1 - of a very short duration (0–1 years);
  - \* 2 - of a short duration (2-5 years);
  - \* 3 - medium-term (5–15 years);
  - \* 4 - long term (> 15 years); or
  - \* 5 - permanent;
- The **magnitude of impact on ecological processes**, quantified on a scale from 0-10, where a score is assigned:
  - \* 0 - small and will have no effect on the environment;
  - \* 2 - minor and will not result in an impact on processes;
  - \* 4 - low and will cause a slight impact on processes;
  - \* 6 - moderate and will result in processes continuing but in a modified way;
  - \* 8 - high (processes are altered to the extent that they temporarily cease); or
  - \* 10 - very high and results in complete destruction of patterns and permanent cessation of processes;
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:
  - \* 1 - very improbable (probably will not happen);
  - \* 2 - improbable (some possibility, but low likelihood);
  - \* 3 - probable (distinct possibility);
  - \* 4 - highly probable (most likely); or
  - \* 5 - definite (impact will occur regardless of any prevention measures);
- the **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- the **status**, which is described as either positive, negative or neutral;

- the degree to which the impact can be reversed;
- the degree to which the impact may cause irreplaceable loss of resources; and
- the degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

$S = (E+D+M)*P$ ; where

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- **< 30 points:** Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- **31-60 points:** Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- **> 60 points:** High (i.e. where the impact must have an influence on the decision process to develop in the area).

#### **10.6.4 Public Participation Process (PPP)**

PPP during the impact assessment phase revolves around the review and findings of the EIA, which will be presented in the Draft Environmental Impact Report (EIR). All I&APs will be notified of the progress to date and availability of the Draft EIR, via mail, email and advertisements in local newspapers. A legislated period of 40 consecutive days will be allowed for public comment. Reports will be made available in the following way:

- Distribution for comment at central public places, which were used during the scoping phase. Provision has been made for the placement of the reports at three venues;
- The document will be made available to download from Lidwala's website; and
- Copies of CDs will be made available on request.

Either a public meeting or an open day (depending on specific requests) is proposed to be held during this phase (venue to be confirmed). The meeting / open day will be facilitated by key members of the PPP project team. The purpose of the public meeting or open day will be to present the findings of the impact assessment. Focus group meetings will be held, if required, in accordance with topics of concern raised during the scoping phase as well as the assessment phase. I&APs will be given the opportunity to debate and discuss key issues and concerns.

All comments received during the EIA phase will be recorded in the comments and response report, which will be included in the draft and final EIR. The final EIR will incorporate public comment received on the Draft EIR and will be made available for public review with hard copies distributed mainly to the authorities and key stakeholders.

### **Notification of Environmental Authorisation**

All I&APs will receive a letter at the end of the process notifying them of the authority's decision, thanking them for their contributions, and explaining the appeals procedure.

### **10.6.5 Consultation with DEA**

It is envisaged that consultation with DEA and MDEDET will coincide with the compilation of the following key documents:

- PoS for EIA;
- Draft EIR and EMP and Waste Licence Report (WLR); and
- Final EIR and EMP and WLR.

Consultation outside of the above deliverables will be undertaken as necessary in order to ensure that DEA and MDEDET are aware of the status of the project.

### **10.6.6 Terms of Reference for Specialist Studies**

**Table 10.7** provides a list of the Specialists that are involved in this study and their areas of expertise.

**Table 10.7:** List of Specialist Studies

<b>Specialist Study</b>	<b>Organisation Responsible for the Study</b>
Impacts on groundwater	Metago Water GeoSciences Consulting
Impacts on surface water and aquatic fauna & flora	Ecotone Freshwater Consultants
Impacts on terrestrial fauna & flora	Bathusi Environmental
Impacts on soils & agricultural potential	Agricultural Research Council
Impacts on heritage resources	Johnny van Schalkwyk
Impacts on air quality	Airshed Planning Professionals
Impacts due to noise	Francois Malherbe Acoustic Consultants
Impacts on the social environment	Lidwala Consulting Engineers (SA)
Impacts on avifauna	Endangered Wildlife Trust
Visual impact assessment	MetroGIS
Conceptual Design	Lidwala Consulting Engineers (SA) and Alan Robinson
Geotechnical Studies	Alan Robinson
GIS	Lidwala Consulting Engineers (SA)
Survey	Global Geomatics

The terms of reference for each of the above mentioned specialist studies during the EIA phase of the project are detailed below.



- **Biodiversity (Bathusi Environmental)**

The Terms of Reference for the biophysical assessment is as follows:

- Obtain all relevant biophysical data for the preferred alternative;
- Assess the importance and relevance of biophysical attributes in terms of the local ecology;
- Present an overview of relevant biophysical attributes and estimated sensitivity in terms of biodiversity;
- Compile a biophysical sensitivity analysis of the area;
- Incorporate results into the Biodiversity Impact Evaluation; and
- Map all relevant aspects.

The Terms of Reference for the floristic EIA assessment is as follows:

- Obtain all relevant PRECIS and Red Listed flora information;
- Incorporate MTPA requirements in assessments and subsequent reports;
- Conduct a photo analysis of the proposed area;
- Identify preliminary floristic variations;
- Survey the area for plant community variations;
- Survey the area for floristic diversity (common flora species, Red List flora species, alien and invasive plant species and plant with medicinal properties);
- Assess the potential presence of Red List flora species;
- Assess the habitat suitability for Red List flora species;
- Assess the presence of Protected tree species;
- Describe the variation in floristic communities in terms of physical attributes;
- Describe the status and importance of regional vegetation types;
- Compile a floristic sensitivity analysis;
- Incorporate results into the Biodiversity Impact Evaluation;
- Map all relevant aspects; and
- Present all results in a suitable format.

The Terms of Reference for the faunal EIA assessment is as follows:

- Obtain all relevant PRECIS and Red Listed faunal information;
- Incorporate MTPA requirements in assessments and subsequent reports;
- Survey the site for faunal diversity by means of relevant survey methods;
- Assess the potential presence of Red Listed fauna species;
- Assess habitat suitability for Red Listed fauna species;
- Describe the status of available habitat;
- Compile a faunal sensitivity analysis;
- Incorporate results into the Biodiversity Impact Evaluation;
- Map all relevant aspects; and
- Present all results in a suitable format.

- **Avifauna (EWT)**

The following scope of work will be applicable:

- Acquire shape files of the proposed sites
- Map these files against known sensitive avifaunal environments (IBA's protected areas, etc)
- Map these files against existing power lines
- Map these files against CSIR land cover data and vegetation data.
- Utilise the SABAP data for the various quarter degree squares to get a baseline of what avifauna occurs in the area.
- Analyse this data for each route and mathematically determine a sensitivity for each route. This will be done by taking into account sensitive sites from the land cover data as well as the IBA's etc.
- Visit the site and assess the alternatives.
- Amend the report and add impact tables for the remaining routes in the EIA phase.
- Conduct a site visit if needed during the EIA phase.
- Once tower positions have been specified conduct an avifaunal EMP to determine which spans require mitigation and have input into micro level siting.
- Compile the EMP report and waste management report

- **Soil and Agricultural Potential (Agricultural Research Council)**

- Land type and digital elevation data would be manipulated to provide the following:
  - Land type map of the study area.
  - Slope class map.
  - Agricultural potential map, showing the distribution of dry land agricultural potential classes per land type.
  - Tables defining the dominant, sub-dominant and sub-sub dominant soils per land type. The average texture and depth of each category will be provided.
- A land cover class map will be produced from the National Land Cover Database
- A detailed survey of the study area will be undertaken
- A report will accompany the maps, and will contain tables and describe the methodology used

- **Ground Water (Metago Water GeoSciences)**

The EIA phase will go into more detail, using existing data including the Department of Water Affairs' (DWA) GRA I and GRA II datasets, the NGDB and the WARMS database. A third site visit will be conducted, and water samples will be taken from accessible boreholes (up to eight samples) and submitted to an accredited laboratory for major and minor ion analysis. This will allow ambient groundwater quality to be characterised, prior to the establishment of the new ash storage facility. Provision has also been made for the development of a numerical groundwater flow and transport model (modelling sub-phase),

using suitable identified parameters, to allow for better quantification of groundwater impacts by the ash dam, and to assist in the development of an adequate monitoring network. The following parameters will be determined or estimated where possible, from available data, on-site measurements, or following the numerical modelling process:

- · Aquifer hydraulic properties (T and S)
- · Aquifer types according to accepted classifications
- · Potential single and cumulative impacts of ash dam extension on the groundwater (nature, extent, duration, intensity, probability and significance), along with level of confidence of assessment
- · Assessment of alternatives will include evaluation of the “no-go” option
- · Suggested mitigation measures and/or management actions
- · Proposed groundwater monitoring programme

An estimate of groundwater vulnerability will be included in the assessment, as well as an estimate of the impact of groundwater pollution on nearby groundwater users. All deliverables will be in a format suitable for inclusion in the final Baseline and EIA reports. Provision has been made for a one-day site visit in the EIA phase, a one-day workshop, and input into the EMP and waste application report.

- **Surface Water (Ecotone Freshwater Consulting)**

The Scope of Work that will be encompassed to reach the objectives is outlined below:

- A field survey for the EIA phase to collect river and wetland data and identify potential impacts. The detailed survey will make use of the following methods and indices at the selected sites:
  - Aquatic Macroinvertebrates - SASS5 (Dickens & Graham, 2002).
  - Fish – FRAI (Kleynhans, 2009).
  - Habitat – IHAS v.2 (McMillan, 1998)
  - Habitat - IHI (Kleynhans, 1996).
- Riparian Vegetation - VEGRAI (Kleynhans, Mackenzie & Louw, 2009).
  - Fish cover ratings (Kleynhans, 2009)
  - Water Quality: Selected (applicable) in situ water quality variables.
  - Applicable wetland assessment methodology dependant on the type of wetlands present on the site – either Palustrine wetland habitat assessment (Kleynhans, 1996) or WET IHI.
- Input into the EMP based on the potential impacts and findings of the detailed EIA report.
- Input into the Waste License based on the potential impacts and findings of the detailed EIA and Waste License application report.

- **Approach.**

For each ecological component an assessment will be made of the reference, or natural, conditions in the detailed EIA study. The Present Ecological State (PES) for the

ecological responses (aquatic invertebrates, riparian vegetation, wetlands and fish) will be determined for each site. These methods are based on DWA's rule-based models for each main ecosystem component as follows (responses):

- SASS5: South African Scoring System Version 5 (Dickens & Graham, 2007).
- FRAI: Fish Response Assessment Index (Kleynhans, 2007).
- VEGRAI: Riparian Vegetation Response Assessment Index (Kleynhans, Mackenzie & Louw, 2007).
- Wetlands: TBA based on types of wetlands present on selected study site.

The models use a ranking system in which key ecological components are ranked, rated, weighted and finally integrated to provide consistent results. The results of the rule-based models for each component are provided as Ecological Categories (ECs) ranging from Natural (A) to Critically Modified (F) (**Table 10.8**).

**Table 10.8:** Ecological categories, categories, key colours and category descriptions presented within the biotic assessment.

Category	Category	Description
<b>A</b>	Very good	Unmodified state- no impacts, conditions natural.
<b>B</b>	Good	Largely natural- Small changes in community characteristics, most aspects natural.
<b>C</b>	Moderate	Moderately modified- Clear community modifications, some impairment of health evident.
<b>D</b>	Poor	Largely modified- Impairment of health clearly evident. Unacceptably impacted state.
<b>E</b>	Very poor	Seriously modified- Most community characteristics seriously modified, unacceptable state.
<b>F</b>	Critical	Critically modified- Extremely low species diversity Unacceptable state.

Data on driving variables will be collected to enrich and validate responder data. The following drivers will be assessed using DWAF approved methodology:

- IHAS v.2: Integrated Habitat Assessment Index version 2 (McMillan, 1998).
- IHI: Index of Habitat Integrity (Kleynhans, 2008).
- Water Quality: in situ variables only.

- **Heritage (Dr. J van Schalkwyk)**

A heritage impact assessment is not limited to archaeological artefacts, historical buildings and graves. It is far more encompassing and includes intangible and invisible resources such as places, oral traditions and rituals. The Act defines a heritage resource as any place or object of cultural significance i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. This includes the following wide range of places and objects:

- places, buildings, structures and equipment;

- places to which oral traditions are attached or which are associated with living heritage;
- historical settlements and townscapes;
- landscapes and natural features;
- geological sites of scientific or cultural importance;
- archaeological and palaeontological sites;
- graves and burial grounds;
- movable objects;
- battlefields; and
- traditional building techniques.

Reports in fulfilment of Section 27(3) of the Act must include the following information:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of the heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on such heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development

- **Visual (MetroGIS)**

This recommended work must be undertaken during the Environmental Impact Phase of reporting for this proposed project. In this respect, the Plan of Study for EIA is as follows:

- **Determine Visual Distance/Observer Proximity:**

In order to refine the visual exposure of the infrastructure on surrounding areas / receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence.

Proximity radii for the proposed site are created in order to indicate the scale and viewing distance of the infrastructure and to determine the prominence of the structures in relation to their environment.

MetroGIS determined the proximity radii based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for

larger facilities and downwards for smaller facilities (i.e. depending on the size and nature of the proposed infrastructure).

The proximity radii (calculated from the boundary lines of the site) are as follows:

- 0 – 2,5km. Short distance view where the facility would dominate the frame of vision and constitute a very high visual prominence.
- 2,5 - 5km. Medium distance view where the structures would be easily and comfortably visible and constitute a high visual prominence.
- Greater than 5km. Medium to longer distance view where the facility would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.

- **Determine Viewer Incidence/Viewer Perception**

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the infrastructure is favourable to all the observers, then the visual impact would be positive.

It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed facility and its related infrastructure.

It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

- **Determine the Visual Absorption Capacity of the landscape**

This is the capacity of the receiving environment to absorb or screen the potential visual impact of the proposed infrastructure. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.

The VAC also generally increases with distance, where discernable detail in visual characteristics of both environment and structure decreases.

The digital terrain model utilised in the calculation of the visual exposure of the facility does not incorporate the potential visual absorption capacity (VAC) of the region. It is therefore necessary to determine the VAC by means of the interpretation of the natural visual characteristics, supplemented with field observations.

- **Determine the Visual Impact Index**

The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact.

The above exercise should be undertaken for the ash dam as well as the ancillary infrastructure, as these structures are envisaged to have varying levels of visual impact at a more localised scale.

The site-specific issues (as mentioned earlier in the report) and potential sensitive visual receptors should be measured against this visual impact index and be addressed individually in terms of nature, extent, duration, probability, severity and significance of visual impact.

In addition, cumulative visual impact should be addressed, as well as suggested mitigation measures for all identified impacts (if any).

- **Social (Lidwala Consulting Engineers)**

The purpose of the Socio-economic impact assessment will be to conduct a systematic analysis in advance of the likely impacts that the project will have on the day-to-day life of individuals and communities. The assessment will serve to identify issues that will need to be addressed by avoidance or mitigation, as well as social impacts that cannot be resolved. Recommendations regarding mitigation measures will be developed for inclusion in the EMP. The socio-economic impact assessment will also highlight potential positive impacts of the project, so that these impacts may be enhanced.

The socio-economic impact assessment will draw on information obtained during the public participation process. In particular, the consultation with stakeholders will enable the project team to identify their needs, expectations and perceptions regarding the proposed development.

- *Socio-economic baseline assessment*

The objective of this phase will be to determine the most up to date socio-economic variables and trends that are likely to mediate the impact of the project on the lives of people. Issues to be addressed in this baseline assessment include:

- *Demographic profiles* of areas likely to be affected (including population sizes, economic activities, employment rates, livelihoods, access to services, etc.);
- Current and planned *development activities*;
- *Social characteristics* of potentially affected communities (e.g. community structures, social capital and cohesion, attitudes towards the project, future aspirations, etc.);
- Relationships between potentially affected communities and the environment (including *sense of place*, historical or cultural ties, etc.)
- *Assets* and *amenities* that may be lost, and productive activities that may be affected by the project;
- *Public health status* (including communicable and sexually transmitted diseases); and
- Current authority and capacity of *institutions* that may be involved in management and monitoring of the project's effects.

Data sources for the socio-economic baseline assessment will include:

- *Secondary* sources, such as existing publications and databases;
- Primary data collected through the public participation process and focused consultation with stakeholders by the EIA team; and
- Latest research from companies such as Global insight.

- *Projection and estimation of impacts*

This phase of the EIA will concentrate on the anticipated impacts associated with the most-preferred site identified during the Scoping Study.

- *Conceptualising social impacts.* This will entail assessing the *differences* between (a) predicted conditions *without* the development (extrapolated from the baseline projection) and (b) predicted conditions *with* the development.
- *Predicting responses to impacts.* This will entail determining the *significance* that affected individuals, communities and institutions attach to the identified socio-economic impacts.
- *Indirect and cumulative impacts.* This will entail estimating likely consequences and ripple effects of direct impacts. These may result from the incremental impacts of an action added to other past, present and reasonably foreseeable future.
- *Rating impacts* in terms of their nature, extent, duration, intensity, probability, overall significance and mitigation potential.

- *Development of mitigation and management measures*

This phase will involve the formulation of a detailed *Management Plan* containing the following:

- Description of mitigation measures for whatever is relevant.
- *Description of monitoring requirements.* This component of the plan will propose detailed arrangements required for monitoring impacts and the implementation of mitigating measures. It will include a description of monitoring methodology, specific operations and features to be monitored, monitoring reporting relationships, and other relevant arrangements.



- **Geotechnical study and Concept Design (Lidwala Consulting Engineers and Alan Robinson)**

The Geotechnical investigation will be a phase 1 investigation of the broader study area in order to identify those areas that will be suitable for the development of the proposed ash dam and will be undertaken during the screening phase of the study. The Geotechnical investigation has made provision for material testing.

The conceptual design will only be undertaken for the preferred site and will be undertaken in conjunction with the EIA phase of the project. The conceptual design will include associated infrastructure but has excluded materials handling infrastructure. The conceptual design costs include the costs required for a topographical ground survey of the preferred site. The following brief scope of work can be provided:

- **Phase 1 – Geotechnical Investigation and Conceptual design**

- Locate and select the site for the ash facilities, in conjunction with others.
- Carry out conceptual design.
- Evaluate the water balance of the ash facilities, including sizing of stormwater drains, and pollution control dams.
- Size the facilities for 17,5x106 m3 capacity, together with the associated stormwater control measures.
- Preliminary assessment of 1:50 and 100 floodlines, and possible river diversions, by others.
- Preliminary geotechnical investigation of the proposed sites for the dumps, and pollution control dams. (assuming geohydrology will be done by others)

- **Phase 2 – Preliminary Design**

- Confirm site selection.
- Geotechnical investigation of the selected site, and pollution control dams
- Refine the water balance of the ash facilities, for the mine as a whole, including pollution control dams and stormwater control measures.
- Refine the size and design the facilities for the selected site.
- Prepare preliminary design drawings of pre-deposition civil work.
- Others to carry an assessment of 1:50 and 100 floodlines, and possible river diversions.
- Cost estimate for civil pre-deposition work. (70% accuracy)

- **Air Quality Assessment (Airshed Planning Professionals)**

A full air quality impact assessment is not deemed necessary, however a professional opinion regarding this issue will be undertaken. As part of the professional opinion for the air quality assessment the scope of work includes assessing the baseline air quality without the new ash dam and the predicted impact (professional opinion) with the new dam. Unfortunately, the closest air quality monitoring station is at Elandsfontein,

approximately 30 km southwest of the power station. A comparison of these measurements with the predicted concentrations would therefore require the inclusion of all emission sources in a relatively large area, well beyond the current study area. This is not included in the proposal. Instead, the cumulative impacts would be dealt with in a qualitative manner, which includes the assessment of air quality from studies undertaken in the area, using a single background concentration to represent all other sources that may have a potential impact in the study area

The following sections contain brief discussions of the proposed methodology:

- *Baseline Air Quality Characterisation*

The baseline assessment will include the following:

- The regional climate and site-specific atmospheric dispersion potential;
- Preparation of hourly average meteorological data;
- Identification of existing sources of emission and characterisation of ambient air quality within the region based on observational data recorded to date (if available) and available studies.

- *Air Quality Impact Assessment (Professional Opinion):*

- Identification and quantification of all sources of atmospheric emissions associated with the new ash dam.
- Use a 1st tier screening model to provide some guidance on the potential impacts from the proposed ash dump.
- Provide a professional opinion on the proposed air quality impacts from the proposed ash dump and recommendations on air quality monitoring.

- **Noise Impact (Professional Opinion) (Francois Malherbe)**

A full noise impact is not deemed to be required, however, a professional opinion regarding this issue will be obtained. The following methodology has been proposed:

- A site visit will be conducted in order to familiarise the consultant with the environment of the proposed development. Possible noise issues and the nearest noise sensitive receptors will be identified.
- Although major environmental noise measurements are not expected to be necessary, samples of the noise emission levels of existing noise sources, such as pumping stations, will help during the assessment of possible noise issues.
- In order to illustrate the reasoning behind the assessment of noise related issues, sample calculations will be made. Please note that no in-depth modelling will be made.
- The results of the observations and calculations will be assessed in terms of the applicable Mpumalanga noise regulations and the guidelines provided in SANS 10103:2008 'The measurement and rating of environmental noise with respect to annoyance and to speech communication'.
- A professional opinion will be written describing methodology, results and findings of the noise study.

### **10.6.7 Requirements for Waste License Report**

The waste licensing process for listed activities under Schedule 1 in the National Environment Management Waste Act 2008 (NEMWA) is as defined in the Environmental Impact Assessment (EIA) regulations made under section 24(5) of the National Environmental Management Act (NEMA) No 107 of 1998.

The following information will be required to be submitted as supporting documentation when applying for the scheduled activities listed under Category B:

- Scoping and Environmental Impact Assessment Report which should include:
  - Description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed activity
  - Description of significant environmental impacts, including cumulative impacts, that may occur as a result of the undertaking of the activity
  - Conducting public participation as outlined in EIA Regulations
  - Closure plan (report) (*preferred site only*)
  - Operational plan (*preferred site only*)
  - Waste disposal facility designs (*preferred site only*)
  - Application and report documents
  - A3 size layout plans
  - Landfill conceptual designs (*preferred site only*)
  - Geo-hydrological report
  - Consideration of alternatives
  - Description of mitigation measures and risk assessment
  - Any inputs made by specialists to the extent that may be necessary
  - Any specific information as may be required by the competent authority
- Plan of study for environmental impact assessment which must among others include:
  - Description of the tasks to be undertaken as part of the environmental impact assessment process, including specialist report or specialized processes, and a manner in which such tasks will be undertaken
  - An indication of stages of stages at which the competent authority will be consulted
  - Description of methods for assessing issues and alternatives, including the no-go alternative
  - Particulars of participation process that will be conducted during the EIA process
  - Draft environmental management plan
  - Copies of any specialist reports and specialized processes

Items such as the conceptual design, closure report and operational report will be done on the preferred site only.

The Waste License Report and relevant supporting documentation will be compiled and released to the public and authorities concurrently with the Environmental Impact Report.

### **10.6.8 Proposed Project Programme for the EIA**

The programme for the EIA suggests the following timeframes with respect to the most important activities to be undertaken:

- Submission of the Draft EIR and WRL for public comment – October 2011
- Public meetings – November 2011
- Submission of the Final EIR and WLR to DEA – December 2011

The EIA process is iterative by nature and it should therefore be appreciated that the above dates are provided as guidance only and are subject to change.

### **10.7 Conclusions and Recommendations**

This Plan of Study for EIA is aimed at meeting the requirements of the EIA Regulations and the guidelines issued in respect thereof as a minimum.

The methodologies proposed for obtaining the information required to effectively identify and assess the potential environmental impacts of the project are considered to be comprehensive and sufficient to allow for the compilation of an EIR and EMP which addresses I&AP concerns and which will provide the competent authority with the appropriate information necessary to allow for informed decision-making on the application for authorisation.