



Proposed Expansion of Ash Disposal Facilities at Hendrina Power Station

SPECIALIST AVIFAUNAL IMPACT ASSESMENT

*SCOPING REPORT
May 2011*

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This avifaunal specialist study and report was undertaken and compiled by Jon Smallie and Andrew Pearson in their capacities as avifaunal specialists for the Endangered Wildlife Trust (EWT).

Declaration of Independence

Specialist Investigator

The Natural Scientific Professions Act of 2003 aims to "Provide for the establishment of the South African Council of Natural Scientific Professions (SACNASP) and for the registration of professional, candidate and certified natural scientists; and to provide for matters connected therewith."

"Only a registered person may practice in a consulting capacity" – Natural Scientific Professions Act of 2003 (20(1)-pg 14)

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Declaration of Independence

All specialist investigators specified above declare that:

- We act as independent specialists for this project.
 - We consider ourselves bound by the rules and ethics of the South African Council for Natural Scientific Professions.
 - We do not have any personal or financial interest in the project except for financial compensation for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2006.
 - We will not be affected by the outcome of the environmental process, of which this report forms part of.
 - We do not have any influence over the decisions made by the governing authorities.
 - We do not object to or endorse the proposed developments, but aim to present facts and our best scientific and professional opinion with regard to the impacts of the development.
 - We undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Environmental Impact Assessment Regulations, 2006.
 - Should we consider ourselves to be in conflict with any of the above declarations, we shall formally submit a Notice of Withdrawal to all relevant parties and formally register as an Interested and Affected Party.
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Terms and Liabilities

- This report is based on a short term investigation using the available information and data related to the site to be affected. No long term investigation or monitoring was conducted.
- The Precautionary Principle has been applied throughout this investigation.
- The specialist investigator, and the Endangered Wildlife Trust, for whom he/she works, does not accept any responsibility for the conclusions, suggestions, limitations and recommendations made in good faith, based on the information presented to them, obtained from these assessments or requests made to them for the purposes of this assessment.
- Additional information may become known or available during a later stage of the process for which no allowance could have been made at the time of this report.
- The specialist investigator withholds the right to amend this report, recommendations and conclusions at any stage should additional information become available.
- Information, recommendations and conclusions in this report cannot be applied to any other area without proper investigation.
- This report and all of the information contained herein remain the intellectual property of the Endangered Wildlife Trust.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist investigator as specified above.
- Acceptance of this report, in any physical or digital form, serves to confirm acknowledgment of these terms and liabilities.

Signed on the 9th May 2011 by Jon Smallie in his capacity as specialist investigator for the Endangered Wildlife Trust's Wildlife and Energy Programme.

A handwritten signature in blue ink, appearing to read 'J Smallie', is centered on a light yellow rectangular background.

Executive Summary

Eskom Power Generation are proposing an approximately 200 hectare ash dam to be constructed at the Hendrina Power Station in the Mpumalanga Province, and the Endangered Wildlife Trust (EWT) was appointed by Lidwala Consulting Engineers (SA) (Pty) Ltd to undertake an avifaunal Impact Assessment for the Scoping phase of the Environmental Impact Assessment (EIA). A pre-screening exercise had identified five alternative ash dam sites, which are assessed and rated during this avifaunal scoping study. A site visit as well as extensive desk top study was conducted in order to achieve this. Various data sources were examined to determine the presence of red data species in the area.

The South African Bird Atlas Project 1 (SABAP1) recorded 16 Red Listed Species in the study area. An Important Bird Area (IBA) was identified to the South East of the study area. SABAP 2, Coordinated Waterbird Count (CWAC) data and CAR data were also considered.

The greatest impact of the proposed activities on avifauna, are predicted to be the possible loss of habitat for certain species. Correct silting of the Ash dam is critical, and for this reason a sensitivity map was created showing no-go areas. The five alternative sites were given a preference ranking. Alternative site E was preferred, as it is closest to existing infrastructure, and has the smallest development footprint.

Introduction

Eskom Power Generation are proposing an approximately 200 hectare ash dam to be constructed at the Hendrina Power Station in the Mpumalanga Province. Lidwala Consulting Engineers (SA) (Pty) Ltd was appointed to undertake the required Environmental Impact Assessment (EIA), and subsequently appointed the EWT to undertake an avifaunal specialist assessment of the proposed site alternatives in the study area. This assessment comprised of an initial screening phase (encompassing an 8 km radius centered on the Power Station) , followed by a scoping phase. For the compilation of this scoping report, a site visit was conducted on 4th May 2011. Five alternative sites have been proposed, and one outcome of this study was to rate these sites according to predicted avifaunal impact. Three of the five alternative sites were visited, while access to the remaining two was restricted on the day of the site visit, however the surrounding areas of these sites were observed for identification of avifaunal habitat.

The study area falls within the 2629BA and 2529DC Quarter Degree Grid Squares (QDGS) and the South African Bird Atlas Project (SABAP) records 193 and 221 bird species of which 16 are Red Listed Species (Harrison *et al*,1997) and one species is protected internationally under the Bonn Convention on Migratory Species. In addition the study area includes 2 Coordinated Waterbird Count (CWAC) areas which are regarded as sites important for water birds either by virtue of the species present or the numbers in which they are represented. The 2629BA QDGS, in which all 5 alternative sites are found, also incorporates part of an Important Bird Area (IBA) - Amersfoort-bethal-carolina District – although this IBA falls outside of the 8km study radius.

In light of the above, the study area is important for avifauna and it is imperative that all sensitive habitats are conserved. The proposed Ash Dam should therefore only be constructed in a site of low sensitivity from an avifaunal perspective.

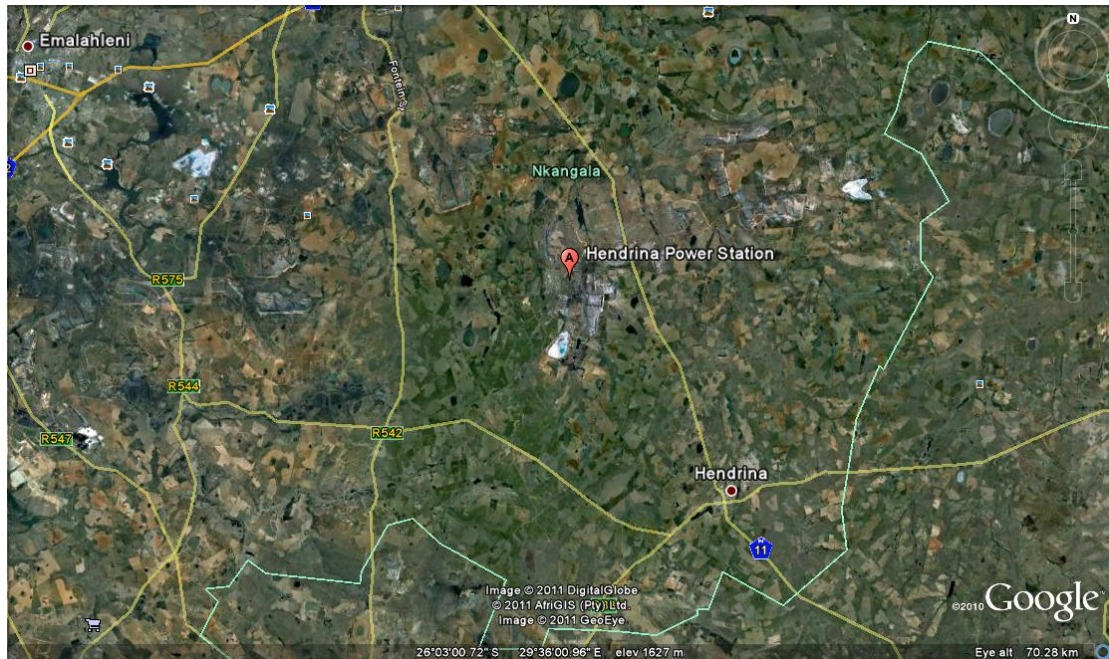


Figure 1: Google Earth Image showing the location of Hendrina Power Station in relation to regional and national roads, as well as the Towns of Emalahleni and Hendrina

Terms of Reference

The following terms of reference for the EWT avifaunal study were adopted:

- **Identification of sensitive sites:** The bird sensitive sections of the study area will be assessed.
- **Describe affected environment and determine status quo:** The existing environment will be described and the bird communities most likely to be impacted will be identified. Different bird micro-habitats will be described as well as the species associated with those habitats.
- **Describe focal species:** Threatened bird species (as per red data book status), will be identified, and species most likely to be impacted upon will be identified.
- **Identification of impacts:** The potential impact on the birds will be identified.
- **Propose and explain mitigation measures:** Practical mitigation measures will be recommended and discussed.
- **Site Ranking:** The 5 proposed alternative sites will be ranked given a preference in terms of the lowest potential avifaunal impact

Methodology

The study was initially conducted from a desk top level during a pre-screening phase. Using various GIS layers, 1:50 000 topographical maps and google earth images, key features within the study area were identified and mapped using ARCGIS 9.3 and were assigned a sensitivity rating as is tabled below.

Table 1: Sensitivity analysis

	Description
Lower Sensitivity	Built up areas, roads, mines, existing ash dams, railway lines and high voltage power lines
Medium Sensitivity	Remaining cultivated lands and farm lands
Higher Sensitivity	Wetlands, rivers and streams, farm dams, CWAC sites,

In addition all Sensitivity areas were buffered as follows:

- 250m for high sensitivity areas
- 100m for high voltage Eskom lines
- 200m for sensitivity areas.

The resultant sensitivity Map is shown in figure 9.

The various data sets discussed below under “sources of information” were collected. This data was examined to determine the location and abundance of sensitive Red Data species in the study area. A site visit was conducted. Bird micro-habitats were then identified and described. The position of the alternative sites, relative to sensitive areas and available microhabitats, was assessed. The impacts of the proposed project on birds were then predicted.

Sources of Information

The following information sources were consulted in order to conduct this study:

- Bird distribution data of the Southern African Bird Atlas Project (SABAP – Harrison et al, 1997) obtained from the Avian Demography Unit (ADU) of the University of Cape Town, as a means to ascertain which species occur within the study area. A data set was obtained for these quarter degree squares (TABLE 1).
 - The SABAP 2 data for the relevant Pentad was also consulted.
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- Data from the Co-ordinated Avifaunal Road count project (CAR – Young, Harrison, Navarro, Anderson & Colahan, 1997) for the “Mpumalanga Precinct”.
- Data from the Co-ordinated Waterbird Count (CWAC) project was also consulted to determine whether any CWAC sites exist in the study area (Taylor, Navarro, Wren- Sargent, Harrison & Kieswetter, 1999).
- The Important Bird Areas of southern Africa (IBA) project data (Barnes 1998) was consulted to determine its relevance to this project.
- The conservation status of all bird species occurring in the aforementioned quarter degree square was determined with the use of The Eskom Red Data book of birds of South Africa, Lesotho and Swaziland (Barnes, 2000).
- Electronic 1:50 000 maps were obtained from the Surveyor General.

High resolution satellite imagery from Google Earth was used to aid in the identification of micro-habitats

Scope, Limitations and Assumptions

This study forms part of the scoping phase and aims to evaluate the alternative sites identified during the pre-screening exercise. This study made the assumption that the above sources of information are reliable. The following factors may potentially detract from the accuracy of the predicted results:

- The SABAP data covers the period 1986-1997. Bird distribution patterns fluctuate continuously according to availability of food and nesting substrate.
- Sources of error in the SABAP database, particularly inadequate coverage of some quarter degree squares. This means that the reporting rates of species may not be an accurate reflection of the true densities in quarter degree squares that were sparsely covered during the data collecting period.
- During the site visit, it was not possible to access the entire extent of all proposed sites.

General comment: Predictions in this study are based on experience of these and similar species in different parts of South Africa. Bird behaviour can never be entirely reduced to formulas that will hold true under all circumstances.

Criteria used to rank Sites

As all five alternative sites are within the same ODGS, the SABAP1 data could not be used as a criterion to differentiate sites. However, by identifying the red-listed bird species in the study area, and then by looking at the available Bird Micro-habitats of each site, a site preference ranking was possible (TABLE 2). Comparing the position of the alternative sites relative to sensitive areas and available microhabitats assisted in this regard.

Site Preference Rating (SPR)

Table 2: Site Preference Ratings for the proposed Sites

Site Alternative	Site Preference Ranking	Criteria/Explanation
A	Acceptable (3)	Predominantly agricultural land
B	Acceptable (3)	Predominantly agricultural land
C	Not Preferred (2)	Site is furthest from power station.
D	Not Preferred (2)	Site is in close proximity to wetlands
E	Preferred (4)	Alternative is closest to existing power station. Smallest footprint. Site is predominantly agricultural land.

Regional Overview

Data on the bird species that could occur in the study area and their abundance was obtained from the Southern African Bird Atlas Project (Harrison *et al*, 1997). These data provided an indication of the bird species that were recorded in the quarter degree squares within which this proposed project falls, i.e. 2629BA and 2529DC.

Table 3: Red Listed bird species recorded in the quarter degree squares (2629BA and 2529DC) within which the study area is located (Harrison *et al*, 1997). Report rates are percentages of the number of times a species was recorded by the number of times the square was counted. Conservation status is classified according to Barnes (2000).

Total Cards		66	64
Total Species		193	221
Total Breeding Species		44	27
Name	Conservation status	2629BA report rate	2529DC report rate
Botha's Lark	EN	2	-
Southern Bald Ibis	VU	5	14
African Marsh-Harrier	VU	2	-
Lesser Kestrel	VU	3	13
African Grass Owl	VU	2	2
Denham's Bustard	VU	-	2
White-bellied Korhaan	VU	-	2
Yellow-billed Stork	NT	3	-
Greater Flamingo	NT	27	36
Lesser Flamingo	NT	8	17
Secretarybird	NT	3	5
Black Harrier	NT	2	-
Pallid Harrier	NT	-	2
Blue Korhaan	NT	3	2
Black-winged Pratincole	NT	5	2
Black Stork	NT	-	5
White Stork	Bonn	11	14

EN=Endangered; VU=Vulnerable; NT=Near-threatened; Bonn=Protected Internationally under the Bonn Convention on Migratory Species.

The SABAP data lists 1 Endangered, 6 Vulnerable and 9 near threatened species as occurring within the study area. In addition, one species, the White Stork is protected internationally under the Bonn Convention on Migratory Species.

SABAP 2 data was also consulted, with the two pentads in the study area, 2600_2935 and 2555_2935, recording totals of 70 and 78 species respectively. Only one card had been submitted for pentad 2600_2935, while three counts have been conducted in pentad 2555_2935 to date. This represents insufficient data to be considered an accurate indication of species present or absent. It was noted, however, that pentad 2555_2935 had report rates of 33% (i.e. 1 of 3 counts) for both Greater and Lesser Flamingoes

Two CWAC sites occur in the study area. A potential CWAC site is any body of water, other than the oceans, which supports a significant number of birds. This definition includes natural pans, vleis, marshes, lakes, rivers, estuaries and lagoons as well as the whole gamut of manmade impoundments. The two CWAC sites are Oranje Pan and Coetzeespruit Dam. Key IUCN Listed species recorded at the CWAC sites include the Greater Flamingo and African Marsh-Harrier.

CAR route MM03 of the Mpumalanga Precinct runs in close proximity to the Study area. Southern Bald Ibis was the only key species recorded on this route during the study period.

The 2629BA QDGS, in which all 5 alternative sites are found, also incorporates part of an Important Bird Area (IBA) - Amersfoort-bethal-carolina District. Although this IBA falls outside of the 8km study radius, it is known to hold a large proportion (>10%) of the global population of the endangered Botha's Lark (Barnes 1998). This species favors short dense, natural grassland found on plateaus and upper hill slopes. Such habitat was not observed at any of the proposed sites for this project. The majority of the study area comprised of agricultural lands, planted pastures, vleis and dams which are habitats not usually preferred by Botha's Lark. The Globally threatened Wattled Crane was listed as a vagrant to this IBA, while other key listed species recorded include Southern Bald Ibis, Lesser Kestrel, Blue Crane, African Grass Owl, Lanner Falcon and Blackwinged Lapwing. However, of these only the Southern Bald Ibis, African Grass Owl and Lesser Kestrel were recorded in the SABAP1 data from the QDGS, and the fact that the study area does not fall within the IBA, suggests that those species not recorded in SABAP1 data, are unlikely to occur on site.

Bird Micro-habitats

An examination of the micro habitats available to birds was conducted. These are generally evident at a much smaller spatial scale than vegetation types, and are determined by a host of factors such as vegetation type, topography, land use and man-made infrastructure. The following micro-habitats were identified in the study area.

Cultivated Lands and Pasture



Figure 2: Cultivated lands in the study area. This picture was taken at Alternative site E, however, such mielie fields are found extensively at all alternatives.



Figure 3: Grazing land and pasture

Arable or cultivated land as well as pastures, represents a significant feeding area for many bird species in any landscape for the following reasons: through opening up the soil surface, land preparation makes many insects, seeds, bulbs and other food sources readily accessible to birds and other predators; the crop or pasture plants cultivated are often eaten themselves by birds, or attract insects which are in turn eaten by birds; during the dry season arable lands often represent the only green or attractive food sources in an otherwise dry landscape. Arable lands exist in this study area, mostly planted to pasture or corn at the time of site visit. Relevant bird species that will be attracted to these areas include the Denham's Bustard and White Stork

Drainage Lines and Wetlands



Figure 4: A drainage line, with evidence of erosion, observed on site.



Figure 5: The drainage line pictured above in figure 3, leads to this wetland area, which was the extension of a large dam.

Drainage lines and wetlands are an important form of habitat to numerous species. Drainage lines are often surrounded by natural grasslands, which may provide habitat for species such as African Grass Owl and Botha's lark. Various waterfowl, such as ducks and geese, may make use of these areas

Man-made Dams



Figure 6: A dam observed close to Alternative B.

Artificially constructed dams have become important attractants to various bird species in the South African landscape. Various waterfowl frequent these areas and crane species often use dams to roost in communally. Birds such as flamingos and African Spoonbills may make use of these areas. Therefore dams are a key element of this study, and as shown in the sensitivity map, should be classed as no-go areas for this project.

Open Grassland



Figure 7: One of the few natural grassy areas observed on site

Grasslands represent a significant feeding area for many bird species, as well as possible breeding areas for others such as the African Grass Owl. Specifically,

these open grassland patches typically attract the Blue Crane, Grey Crowned Crane (which have been identified in the nearby IBA discussed above) Southern Bald Ibis, Secretarybird, White-bellied Korhaan, Denham's Bustard and White Stork. The grassland patches are also a favourite foraging area for game birds such as francolins and Helmeted Guineafowl. This in turn attracts large raptors because of both the presence and accessibility of prey.

Stands of Alien Trees



Figure 8: Patches of alien trees were observed in the east the study area.

These areas will mostly be important to physically smaller bird species and passerines, as well as providing roosting for certain raptors and larger species such as Geese and Ibises.

Table 4 below shows the micro habitats that each Red Data bird typically frequents in the study area. It must be stressed that birds can and will, by virtue of their mobility, utilise almost any areas in a landscape from time to time. However, the analysis below represents each species' most preferred or normal habitats. These locations are where most of the birds of that species will spend most of their time – so logically that is where impacts on those species will be most significant.

Table 4: Preferred Micro-habitats and likelihood of occurrence on site of Red Data species recorded in the relevant ODGS's.

Species	Preferred Micro-habitat	Likelihood of occurrence on site
Botha's Lark	Long, mature natural grassland	Unlikely
Southern Bald Ibis	Grassland	Likely
African Marsh-Harrier	Dams and Wetlands	Possible
Lesser Kestrel	Arable lands and Grasslands	Possible
African Grass Owl	Grasslands	Unlikely
Denham's Bustard	Cultivated lands and Grasslands	Possible
White-bellied Korhaan	Cultivated lands and Grasslands	Possible
Yellow-billed Stork	Cultivated lands and Grasslands	Possible
Greater Flamingo	Dams and wetlands	Possible
Lesser Flamingo	Dams and Wetlands	Possible
Secretarybird	Cultivated lands and Grasslands	Unlikely
Black Harrier	Cultivated lands and Grasslands	Possible
Pallid Harrier	Grasslands and Wetlands	Unlikely
Blue Korhaan	Cultivated lands and Grasslands	Possible
Black-winged Pratincole	Cultivated lands and Grasslands	Possible
Black Stork	Rivers and Kloofs	Unlikely
White Stork	Cultivated lands and Grasslands	Likely

Sensitivity Analysis

Many of the abovementioned Red Listed species preferred habitat is grassland, wetlands, river courses, dams, all of which are prevalent in the study area. Key species which will be attracted to these areas include Greater and Lesser Flamingo, African Marsh-Harrier, African Grass Owl, Yellow-billed Stork, etc. Such areas have therefore been allocated as High Sensitivity areas during the pre-screening exercise. Arable lands are scattered throughout this study area, mostly planted to maize are discussed further above. Relevant bird species that will be attracted to these areas include most importantly the Black-winged Pratincole, Blue Korhaan, Denham's Bustard, Lesser Kestrel, White Stork and assorted non red listed species. Arable or Cultivated lands have therefore been assigned Medium Sensitivity. Areas assigned Low Sensitivity are all disturbed

areas (built-up areas, mines, existing ash dams, roads, etc.) and are regarded as less important areas for avifauna. These areas are preferred for construction of the proposed Ash Dam.

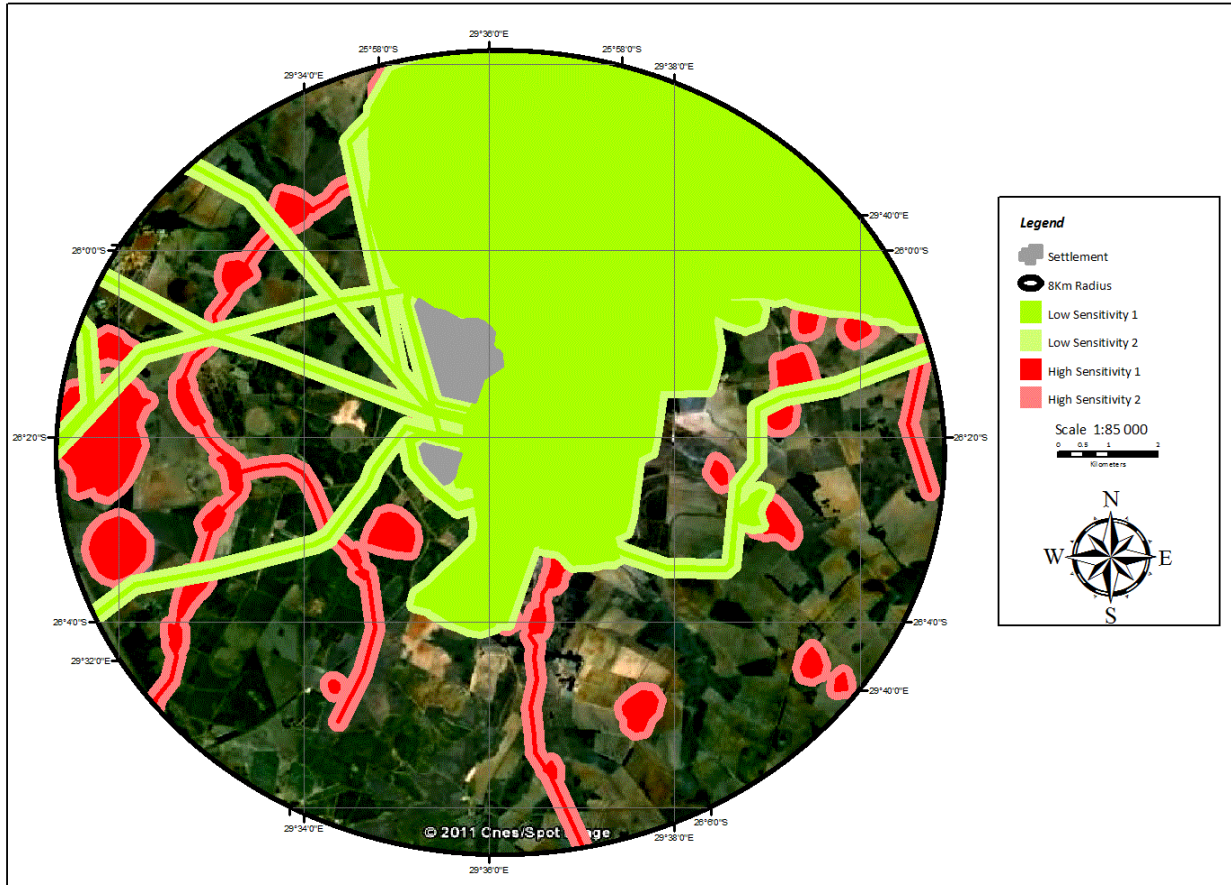


Figure 9: Avifaunal sensitivity map

Site specific Results

Site specific observations were conducted during a site visit in May 2011. Figure 10 below shows the routes taken (tracked using GPS) to examine the area during the site visit, as well as specific observation points (A1;A2;B1;B2;C1;D1;D2;E1;E2;F) or points of interest.

Alternative A

This exact location of this alternative was not accessible during the site visit. A long distance view of the area was obtained (from observation points A1 and A2

in Figure 10) and revealed that the site is mostly farmlands and maize fields. A desktop review also found that this site has a medium to low sensitivity.

*Site Preference Ranking: **Acceptable (3)***

Alternative B

The area was accessible during the site visit and consists of primarily cultivated lands ("mielie fields") A black shouldered kite was observed hunting at this site (Fig 10- Observation point B2), indicating the possible presence of a rodent population. The Northern end of the site is bisected by an existing power line, while east of the site a small dam (Observation Point F) was observed with various bird species present.

*Site Preference Ranking: **Acceptable (3)***

Alternative C

This exact location of this alternative was not accessible during the site visit. A long distance view of the area was obtained from the rail bridge observation point (Fig 10 – C1) and revealed that the site is mostly farmlands and maize fields. Farm dams were also visible in proximity to this site while little other infrastructure (e.g. houses, roads and power lines) was observed in the area. For this reason, and the distance of the site from the Power Station, this site is not preferred.

*Site Preference Ranking: **Not Preferred (2)***

Alternative D

This site was in close proximity to a prominent drainage line and a large dam to the West and South of the site. It is also near to a mining area ("Total Tumela Mine") and the predominant microhabitat appears to be cultivated lands with some natural grassland areas. Various water birds were observed at observation point D2, from where the photograph in Figure 5 was taken.

*Site Preference Ranking: **Not Preferred (2)***

Alternative E

This site is situated closest to the Power Station, and is also the smallest of the proposed alternatives. There were no visible water bodies nearby, and it consists

primarily of cultivated lands (“mielie fields”). It has many disturbed areas such as roads and powerlines in close proximity.

Site Preference Ranking: Preferred (4)

Table 5 below shows a list of species observed within the site during the site visit. The corresponding observation point (see Figure 10) or the alternative site, where the species was observed, is given where applicable/possible. Note that this is merely for indicative purposes, and the species are listed in no particular order. Furthermore, it must be noted that the visit was conducted in winter, and this list represents incidental observations (which could be positively identified) as the intention of the site visit was not to seek out species.

Table 5: Site Visit Species List.

Species	Place of observation
Swainson’s Spurfowl	E1
Red-billed Quelea	E2
Blacksmith Lapwing	Multiple Observations
Cattle Egret	Multiple Observations
Great Egret	D2
African Stonechat	Multiple Observations
Common Fiscal	Multiple Observations
Fan-tailed Widowbird	C1
Hamerkop	Unspecified
Wattled Starling	Multiple Observations
African Spoonbill	F
African Sacred Ibis	F
Spur-winged Goose	D2
Egyptian Goose	F
White-breasted Cormorant	F
Reed Cormorant	F
Red-knobbed Coot	Multiple Observations
Common Moorhen	F
Grey Heron	Multiple Observations
Laughing Dove	Multiple Observations
Cape Turtle-dove	Multiple Observations
Helmeted Guineafowl	Multiple Observations

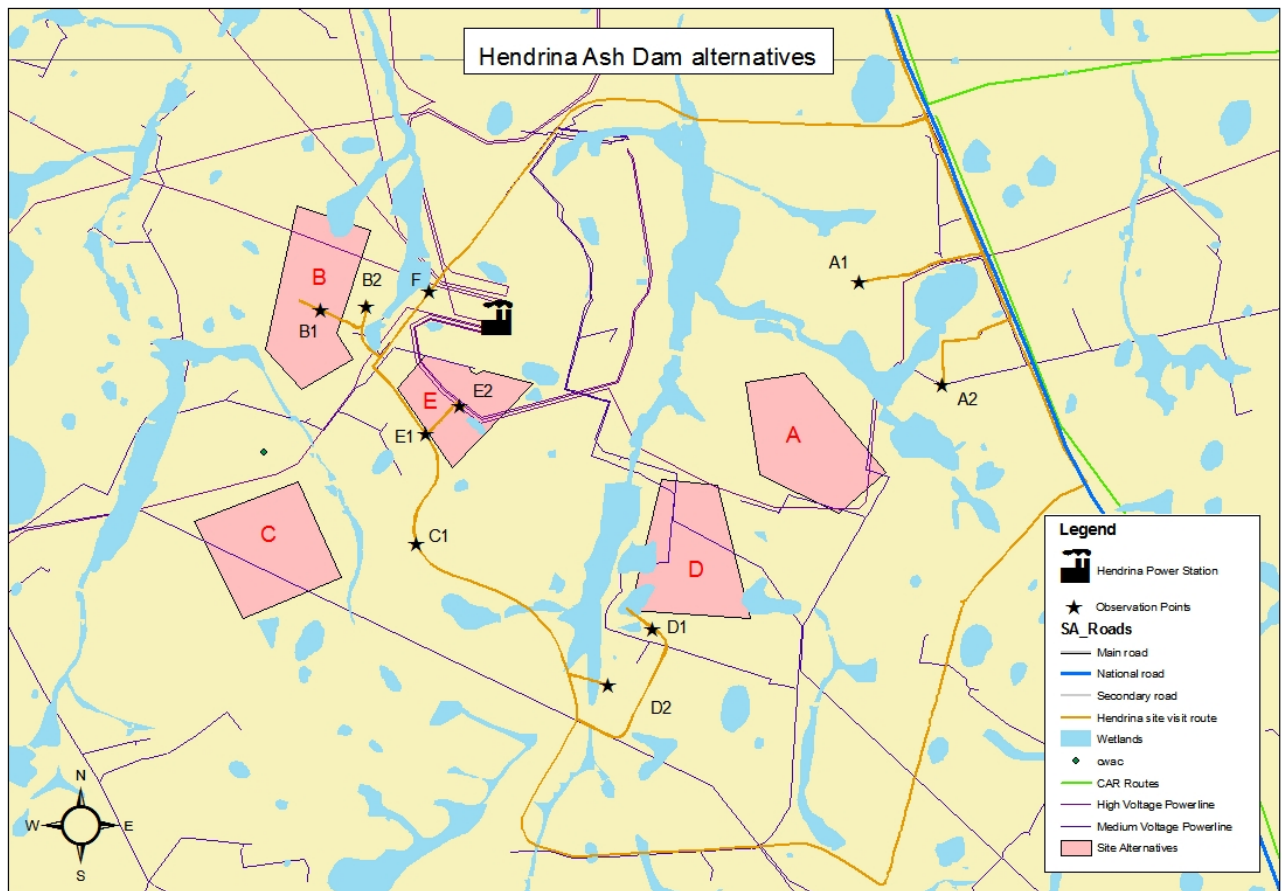


Figure 10: The five alternative sites in relation to existing electrical infrastructure, CWAC site, CAR routes, site visit route and wetland areas. The stars represent observations made during the site visit.

Predicted Impacts of Ash Dams

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.

Conclusions

The study area was found to be relatively disturbed, with few remaining natural areas in tact. Arable lands, especially mielie fields, for the major microhabitat available to birds at most of the alternate sites. The greatest impact of the proposed project is likely to be that of habitat destruction. Of the five proposed alternatives, none presented any identifiable fatal flaws, however, the smaller site, which is closest to the Power station- that is site E- is preferred. Provided that the Ash Dam is constructed in an area of Low Sensitivity, as is illustrated in 9, the impacts to avifauna should be within acceptable limits. Possible impacts of associated infrastructure (e.g. roads, power lines, conveyors, pipelines and pump stations) will be assessed upon completion of the scoping phase, when the preferred alternative has been chosen.

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