SPECIALIST REPORT: EIA Level Assessment Of The Flora Component Of A Proposed 400 kV Power Line From Arnot To Gumeni Substations, Mpumalanga

Commissioned by

Baagi Environmental Consultancy CC

Compiled by

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October 2012

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1 EXECUTIVE SUMMARY

Baagi Environmental Consultancy CC (Baagi EC) appointed EkoInfo CC to complete an EIA level assessment of the flora component of a proposed 400 kV power line from Arnot substation, near Belfast, to Gumeni substation, near Machadodorp, in Mpumalanga.

This document concerns only the detail/ EIA phaseof the Scoping – EIA process for the proposed 400 kV power lines, which it aimed to provide:

1. A descryption of the vegetation on regional and local scale
2. Highlight the presence or potential presence of species of concern (Red Data, protected, medicinal, alien vegetation) within the study area
3. Flag areas of high conservation importance with regards to vegetation based on available small-scale datasets.
4. Evaluate the proposed route alternatives in terms of their overall environmental sensitivity.

Achieving the above objectives will be in compliance with the National Environmental Management Biodiversity Act, 2004, which requires the assessment of ecosystem and species diversity.

Orientation

The study area is located within Mpumalanga, South Africa, stretches from southwest of the town Belfast to the west of the town of Machadodorp in the form of a rugby ball. The proposed power line will run between Arnot substation to the southwest of Belfast and Gumeni substation to the west of Machadodorp, a distance of close to 50 km as the crow flies (straight line).

Regional Context

The assessment of the vegetation within the study area on a regional level followed three phases:

1. Literature and desktop review
2. Site visit
3. Evaluation of the proposed route alternatives based on the available information from the literature – and desktop review and site visit.

The use of Geographic Information System (GIS) models based on available information (literature review and desktop assessment) to model flora sensitivity formed an integral part of this assessment. The use of the least cost concept enables the selection of alignment within the landscape (study area), which should represent the least environmental sensitive area and therefore have the least impact on the environment.

The study area concerns mainly grassland on a regional scale, with four regional vegetation units transecting the study area, namely:

1. Aquatic ecosystem/ Azonal vegetation
    a. Eastern Temperate Freshwater Wetlands
2. Terrestrial ecosystem/ zonal vegetation
    a. Eastern Highveld Grassland
    b. KaNgwane Montane Grassland
    c. Lydenburg Montane Grassland

All three the terrestrial grassland units are considered to be threatened of which the Eastern Highveld Grassland is Endangered and covers the largest portion of the study area.

Local Context

During the EIA phase of the project, data was collected at a local scale using plot methods. Twenty-four plots were surveyed within modelled habitat units using the Braun-Blanquet approach. The habitat units were compiled using the available small-scale datasets related to geology, land form and land cover. At each plot both environmental and vegetation attributes were recorded, the recorded data was analysed using Two Way Species Indicator Analysis (TWINSPAN) and MS Access.

Based on the results of the field survey, it was concluded that four local scale vegetation communities are present within the study area. These four local vegetation communities reflect the influence of altitude,

movement of water in the soil, soil texture and surface rock. The one community represents wetlands (unchannelled valleybottoms and hillside seeps) found up slope away from the prominent valley bottoms; the other three communities represent terrestrial grassland. This document does not discuss in detail the wetlands as they are addressed in a separate document.

In terms of species richness, 245 species were recorded of which the majority were forbs at a ratio of forb: grass of 3:1. Two threatened Red Data flora related species were recorded; however there identity and preferred habitat will have to be confirmed. Twelve Mpumalanga protected species were recorded, as well as medicinal plants; no alien invasive species were recorded within the survey plots. Alien invasive woody species are present in the landscape in association with past and current forestry activities. The following three families contained more than 50% of the species recorded, and should be prioritised in terms of rehabilitation, namely Poaceae, Asteraceae and Fabaceae. Especially the Asteraceae and Fabaceae forb species are important in terms of pollinator habitat and soil improvement.

Preferred Alternative

Overall all the evaluation methods used to assess the preferred/ least floristic route alignment indicated that alternative five (5) developed using the least cost approach is the least sensitive for the vegetation and therefore the most suitable. The most sensitive and therefore the least suitable route alignment is alternative 1. However, due to the small difference between alternative 5 and 3, alternative 3 could also be considered in support of the concept of keeping impacts together, while reducing habitat loss and – fragmentation.

Environmental Impact Assessment And Mitigation

Previous experience and the current study confirmed once again that the power lines themselves have very little impact on the grassland compared to the adjacent land use. However the access routes, construction camps and borrow pits required to construct access routes can and will have a significant impact on the landscape when placed and constructed through rocky areas (ridges). The location of these potential impact sources needs to be determined and assessed during the walk down phase.

With the current information available a very generic environmental management plan/ guidelines is presented, a more detailed and site specific environmental management plan can only be compiled on completion of the walk down along the final alignment, when:

1. The position and size of the construction camps are known
2. The distribution and extent of the access roads are known
3. The distribution and size of the borrow pits are known
4. The preliminary positions of the pylons are known
5. The preliminary position of the drum roll areas are known

	Person	Qualifications	Professional Registration - SACNASP	Report Status
Report compiled by	Willem de Frey	MSc Wildlife Management – UP, 1999	Botany & Ecology (400100/02)	Draft
Peer reviewed by	Willem de Frey	MSc Wildlife Management – UP, 1999	Botany & Ecology (400100/02)	**Version**
File route	D:\GIS\projekte\Specialist_ArnotGumeni_Baagi\Reports\Tx\EkoInfo CC EIA Flora Arnot_Gumeni 400kV.doc			1
Member: Willem de Frey **Registration no:** CC1995/34111/23				

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2 INTRODUCTION

Baagi Environmental Consultancy CC (Baagi EC) appointed EkoInfo CC to complete a detail assessment of the flora component of a proposed 400 kV power line from Arnot substation, near Belfast, to Gumeni substation, near Machadodorp, in Mpumalanga (Figure 1).

2.1 Scope Of Work/ Terms Of Reference

Based on the letter of appointment received from Baagi EC, the scope of work is as follows:
"The following will be your terms of reference for this project but not limited to that;

1. Description of state of vegetation in the study area is, outlining important characteristics and components thereof, which may be influence by the proposed infrastructure during construction and operation.
2. Identification of Red data species potentially affected by the proposed transmission line.
3. The identification of potential impacts (positive or negative, including cumulating impacts if relevant) of the proposed development on vegetation during construction and operation.
4. Particular attention must be paid to wetlands (requiring closed interaction with the wetland specialist).
5. The identification of mitigation measures for enhancing benefits and avoiding or mitigating negative impacts and risks (to be implemented during design, construction and operation of the proposed transmission line).
6. The provision of clear guideline to reduce vegetation damage and loss and to assist with rehabilitation where damage and loss are unavoidable and to reduce the risk of the spread of alien species.
7. Specialist will be required to attend two integration meeting and where necessary specialist will be requested to attend public participation meeting where need arise.
8. Specialist will be required to adhere and comply to the NEMA regulation as well as provincial and national authorities policies."

2.1.1 Regional context

The regional context aims at providing an overview of the study area on a regional scale (1: 250 000 or smaller), and consisted:

1. An environmental overview of the study area in terms of the vegetation and the ecological process associated with it
2. Highlight the presence or potential presence of species of concern (Red Data, protected, medicinal, alien vegetation) within the study area
3. Flag areas of high conservation importance with regards to vegetation based on available small-scale datasets.
4. Evaluate the proposed route alternatives in terms of their overall environmental sensitivity.

Achieving the above objectives will be in compliance with the National Environmental Management Biodiversity Act, 2004, which requires the assessment of ecosystem and species diversity.

2.1.2 Local context

During the current environmental impact component, data was collected across the study area, and the three final alignments (Alternative 1, Alternative 3, Alternative 5 (Least cost)) evaluated using the available information from both components (environmental impact).

2.2 Specialist Involvement

Willem de Frey is an independent registered professional in the fields of ecology and botany, with more than 15 years experience of working on small and large scale projects related to vegetation and vegetation distribution throughout Sub-Saharan Africa (Appendix A).

3 STUDY AREA

The study area is located within Mpumalanga, South Africa (Figure 1), stretches from west of the town Arnot to the southwest of the town of Machadodorp in the form of a rugby ball. This area covers approximately 983 km² or 1% of Mpumalanga (77 918 km²) or almost 5% of the Kruger National Park (18 989 km²). The proposed power line will run between Arnot substation to the west of Arnot and Gumeni substation to the southwest of Machadodorp, a distance of close to 50 km as the crow flies (straight line). There are existing power lines between these two substations (Figure 2).

4 METHODS

4.1 Regional Context

The assessment of the vegetation within the study area on a regional level followed three phases:

1. Literature and desktop review
2. Site visit
3. Evaluation of the proposed route alternatives based on the available information from the literature – and desktop review and site visit.

4.1.1 Literature and desktop review

Available small scale data sets from governmental institutions were accessed, such as:

1. South African National Biodiversity Institute (SANBI)
    a. PRECIS lists
    b. Threatened species lists
    c. National land cover 1995 & 2000
    d. Vegmap
2. Surveyor – General, Mowbray
    a. 1: 50 000 Topocadastral Vector Data
3. Mpumalanga Parks Board
    a. Conservation Plan
4. Geology – Council for Geoscience, 1: 250 000 scale lithology

4.1.2 Site visit

A reconnaissance level site visit was completed during November 2011. The aim of the site visit was to orientation oneself with the extent of the area, verify where possible certain aspects of the available small-scale datasets.

4.1.3 Proposed route alternative evaluation

Environmental modelling

The available small-scale datasets were used to model the extent of the landscape between the two substations. A profile of the habitat preference of threatened (Vulnerable, Endangered, Critical Endangered) Red Data plants were created using environmental attributes recorded with these species in SANBI's PRECIS list. The main parameters available were: Altitude, Geology, Topography, Soil/ Rockiness, Substrate/ Soil moisture, Vegetation. Based on the number of threatened Red Data flora recorded/ associated with a specific parameter, the parameter was given a ranking between one (low sensitivity) and five (high sensitivity). These parameters where then combined with land cover input to generate a total flora/ vegetation sensitivity model.

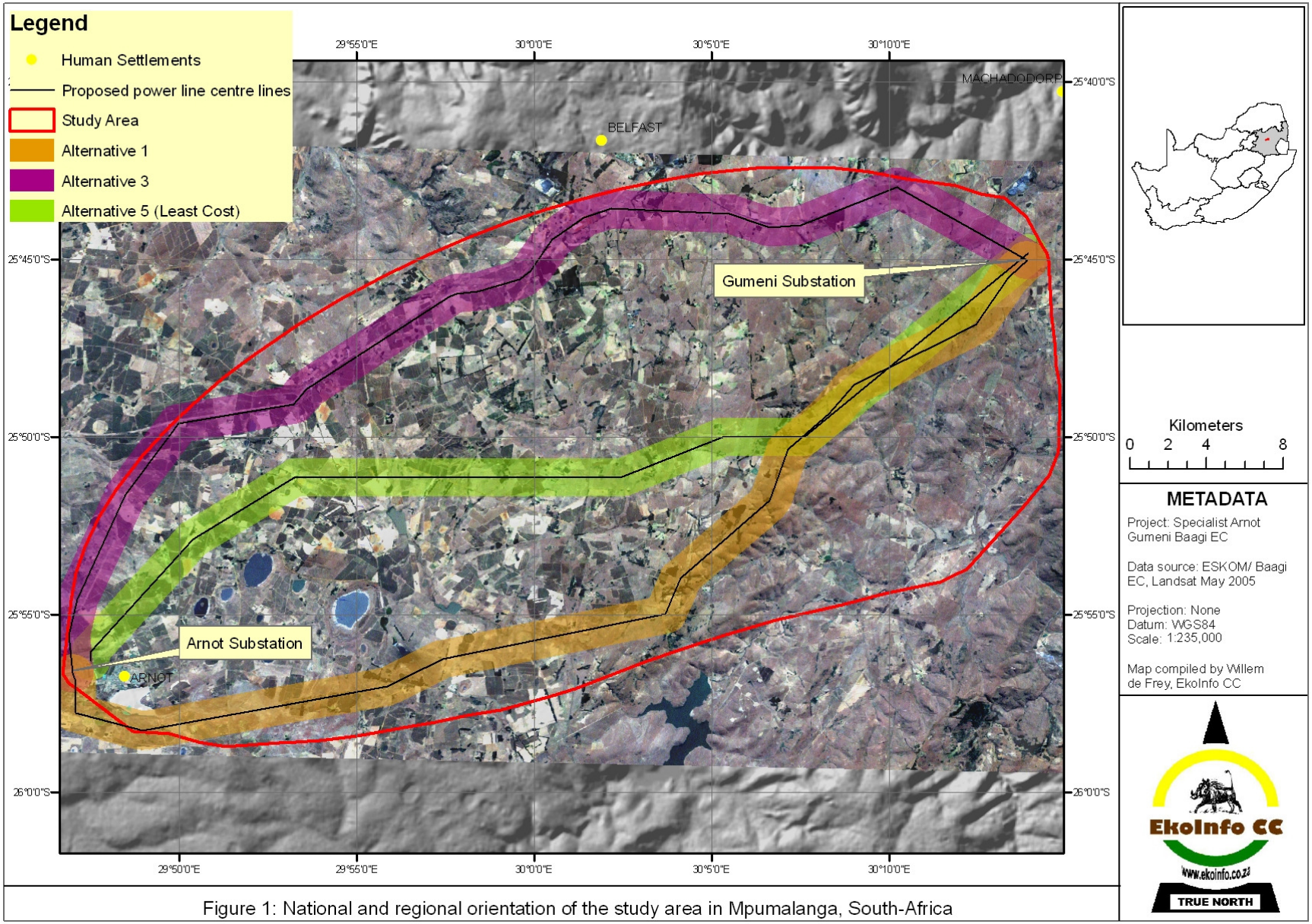
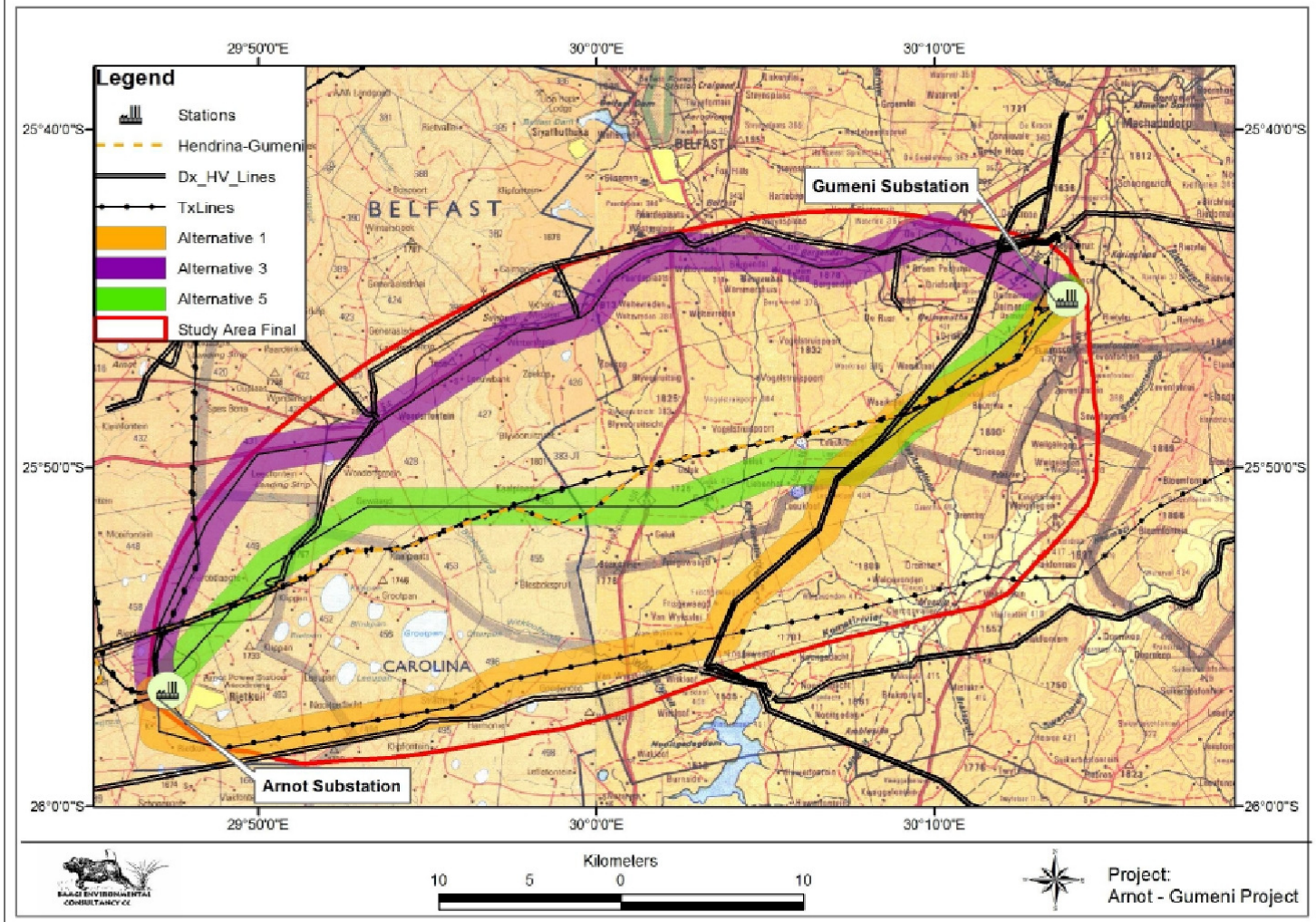
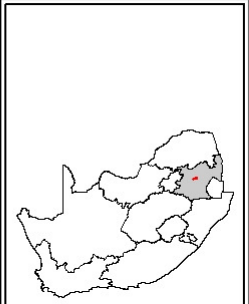


Figure 1: National and regional orientation of the study area in Mpumalanga, South-Africa





METADATA

Project: Specialist Arnot Gumeni Baagi EC

Data source: Baagi EC

Projection: None
Datum: WGS84
Scale:

Map compiled by Willem de Frey, EkoInfo CC

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TRUE NORTH

Figure 2: Overview of the proposed and existing linear power infrastructure in the area