
7. PUBLIC PARTICIPATION

(See Appendix 10 for the PPP Report)

7.1. INTRODUCTION

This chapter provides a detailed account of the Public Participation Process (PPP) conducted during the EIA Study. It outlines the purpose, the activities undertaken and way forward. The process is a consultative process that allows relevant stakeholders namely; the project proponent, the Environmental Assessment Practitioner (EAP), parties likely to be directly affected or that merely have an interest in the proposed project (I&APs) a platform for dialogue throughout the duration of the entire project. This process serves to promote transparency, participative planning and informed decision-making.

The objectives of the PPP are to:

- Identify Interested and Affected Parties (I&APs) and to develop a database of these stakeholders.
- Inform the stakeholders about the proposed project, so as to determine their attitudes towards the project and to seek their advice or issues of concerns.
- Provide a platform through which the questions and issues of concerns raised by the I&APs can be addressed.
- Document information gathered throughout the consultation process.
- Identify issues of environmental significance.
- Assist in guiding the identification of suitable substation sites and power line corridors.

Public participation programme was undertaken during the scoping phase of this study and the way forward for the consultation strategy in the EIA Phase was outlined in the Plan of Study for EIA that was submitted together with the Final Scoping Report on 14 September 2010 to the Department of Environmental Affairs (DEA). The two documents were accepted and approved by DEA on 07 October 2010.

The consultation process in both the Scoping and EIA Phase was guided by National Environmental Management Act, 1998; Chapter 6 (Sections 56 – 59) of EIA Regulations and the need to adhere to the spirit of best practice.

With the approval of the Final Scoping (FSR) and the Plan of Study (Pos) for EIA and the authorisation to continue with the EIA Phase, the PIP team considered it necessary to:

- Continue conducting an inclusive consultation with all sectors of stakeholders in the study area.
- Enhance transparency and accountability in decision making.

7.2. LEGAL REQUIREMENTS

The requirement for the PPP is guided by the National Environmental Management Act (NEMA), which under Section 28 stipulates that the EIA process has to have adequate and appropriate opportunity for public participation in decisions that may affect the environment. The EIA Regulations promulgated in terms of Chapter 5 of NEMA, details the minimum requirements of the process to be adopted. They spell out the following:

- A notice to publicise the proposed project should be carried out.
- A register of identified and consulted I &APs is to be established.

- The EAP is to submit the project reports for a mandated period for public review prior to finalisation and submission of the reports to the authority.
- The I&APs to have an opportunity to provide comments directly to the competent authority on the reports submitted to the authority.
- The issues raised and discussed during the consultation process to be documented.

7.3. THE APPROACH

The approach adopted for the PPP undertaken is underpinned by the following principles of good practice.

- **Proactive:** The process was initiated early and actively sought to identify and involve relevant stakeholders.
- **Inclusive:** The process included consultations with different groups of society including state and traditional authorities, private landowners and the private sector.
- **Accessible, Open and Transparent:** The process to enable a continuous flow of reliable and up-to – date project related information that is easily accessible.
- **Respect for public input:** Public participation will only be effective and efficient if there is assurance that, in the process of decision-making, contributions from the public are evaluated, analysed and given proper consideration in a timely manner.

The following activities were carried out during this round of the process:

7.3.1. Submission of Notice of Intent

Margen (MIS) on behalf of the applicant submitted an application for environmental authorisation for this project to DEA (then DEAT) on the 17 July 2009. (See Appendix 1). Consent letters were incorporated into the application. The application was acknowledged on the 24 July 2009. (See Appendix 2).

7.3.2. Reconnaissance Site Visits

The EAP and the Applicant went for a site visit on 10 July 2009. The team was also joined by the Land use Planner from Moses Kotane Local municipality. The objectives of the site visit were to:

- Gather information that could be used in the consultation process,
- Develop the preliminary understanding of the social context (representative structures, language, communication media, etc),
- Identify areas where information could be made accessible to the local communities and venues for public meetings, and
- Determine those parties or structures that may be interested in and/or affected by the proposed developments (farming communities, municipalities, tribal lands and villages etc).

7.3.3. Stakeholder Identification and Database Development

The I&APs identification process was initiated by using a standard list from which relevant stakeholders were selected. Relevance was based on parameters such as the project location, nature of proposed project and environmental components likely to be affected, mandated governing bodies etc. The standard list comprises of:

- National, Provincial and Local Government Departments.

- Non-Governmental Organisation.
- Stakeholders in the Business, Industry & Tourism Industry.
- Traditional leaders.

The PPP practitioner further refined the list by carrying out a deed search that provided the farm names, details and contacts of the landowners. The database was expanded through a process of networking and referrals. The database included as Appendix 10D only represents the stakeholders that have been identified thus far in the process. MIS will continue to manage and update it throughout the entire EIA process. Table 16 reflects a summary of the current database.

Table 16: Interested & Affected Parties Database Summary

Stakeholder Category	Number	Name
Government Departments	5	<ul style="list-style-type: none"> • NW Department of Agriculture, Conservation & Environment, • Rural Development & Land Reform, • Roads & Transport • Environmental Affairs • Water Affairs & Forestry
Landowners	158	<ul style="list-style-type: none"> • See database for details (Appendix 10D)
Farmers Associations	1	<ul style="list-style-type: none"> • Swartruggens Farmers Association
Mines	4	<ul style="list-style-type: none"> • Impala Platinum Mine • Bafokeng Rasimone Platinum Mine • Platinum Group Metals • Wesizwe Platinum Limited Mine
Municipalities	3	<ul style="list-style-type: none"> • Bonjanala District Municipality • Kgetleng Rivier Local Municipality • Rustenburg Local Municipality • Moses Kotane Local Municipality
Other Organisations	8	<ul style="list-style-type: none"> • SAHRA • Sun City • Birdlife SA • WESSA • Civil Aviation Authority (CAA) • Endangered Wildlife Trust (EWT) • Pilanesburg National Parks & Tourism

Stakeholder Category	Number	Name
		<ul style="list-style-type: none"> • North West Parks & Tourism Board
Traditional Authorities	6	<ul style="list-style-type: none"> • Royal Bafokeng Nation • Bakubung Ba Ratheo • Bapo II Ba Mogale • Bakgatla Ba kgafela • Baphalane • Bakwena Ba Modimosana Ba Mmatau Trust

7.3.4. Information Dissemination

A number of methods were applied in order to reach and to inform stakeholders about the proposed project. These activities were carried out in August 2009 and they were namely:

- **Issuing of PPP Invitation Letters to relevant stakeholders:** The invitation letters were addressed to individuals and organisations by name and were accompanied by the Background Information Document (BID), including maps of the project location and of alternative sites, routes and a registration Form (Appendix 10A).

The purpose of the BID is to provide information about the proposed project and the EIA process. It provides an overview about the project, the motivation, project locality, likely project related impacts. It also provides details of what to expect of the EIA process, the consultation process, and Specialist studies to be undertaken. As part of the BID, a register and comment sheet is provided to enable the public to register as an I&AP and to provide the consultants with written comments. The registration sheet also ensures that the names and contact details of I&APs are captured correctly on the database so that they may receive all project-related information and invitations to public even.

- **Placement of Newspaper Advertisement** in the Rustenburg Herald Newspaper on Thursday, 07 August 2009. The advert made a request for Interested and Affected Parties (I&APs) to register with, and submit their comments to Margen. (Appendix 10B).
- **Site Notices** to inform surrounding communities and landowners immediately adjacent to the proposed development were placed in various locations within the boundaries of the study area, on Tuesday, 11 & 12 August 2009. See Appendix 10C for an example of the site notice that was placed.

7.3.5. Meetings and Workshops

Meetings in the form of one-on-one meetings or focus group meetings were carried out for the purpose of engaging directly with identified stakeholders. Table 17, below summarises the series of meetings that were conducted and those presented in *Italics* reflect meetings undertaken during the Public review period. The proposed project was presented to the audience in attendance and thereafter stakeholders were given the opportunity to ask questions, raise any concerns and give suggestions. The discussions were documented in minutes, which were in turn distributed either by post or email to the respective stakeholders for comment and authentication. See Appendix 10E for the minutes. A Comments and Response report, was also compiled and incorporated as Appendix 10F. All correspondence (emails,

faxes, post etc) received from various stakeholders outside the meetings held are attached in Appendix 10G.

Table 17: Summary of Stakeholder Consultation Meetings during Scoping Phase (Refer to Appendix 10)

Date	Activity	Participants	Number attended	Venue
11 August 2009	Presentation at a focus group meeting	Bafokeng Rasimone Platinum Mine	6	Bafokeng Rasimone Platinum Mine Offices – Rustenburg
11 August 2009	Presentation at a focus group meeting	Bakubung Ba Ratheo Traditional Council	17	Bakubung Ba Ratheo Traditional Council Office
11 August 2009	Presentation at a public meeting (The councilor from Rustenburg Local Municipality was invited)	Chaneng Community	20	Chaneng Primary School
12 August 2009	Presentation at a focus group meeting	Bakwena Ba Modimosana ba Mmatau	15	Mmatau Tribal Office
12 August 2009	Presentation at a focus group meeting	Royal Bafokeng Nation	6	RBN Office
04 September 2009	Presentation at a focus group meeting	Bapo Ba Mogale (Bapo 2)	6	Bapo 2 Tribal Office
11 September 2009	Presentation at a focus group meeting	Landowners	18	Zwaarverbiend
25 September 2009	Correspondence of Offer letter from PTM	Platinum Group Metal (PTM)	N/A	PTM Offices – JHB
28 October 2009	Presentation at a focus group meeting. Discussion on both Delta - Epsilon (Masa- Selomo) DEIR and Ngwedi s/s new sites alternatives.	Royal Bafokeng Nation		RBN Offices
18 November 2009	Presentation on the Ngwedi s/s new sites alternatives based on Bakubung Master Plan.	Bakubung Ba Ratheo Traditional Council	11	Bakubung Ba Ratheo Traditional Council Office

Date	Activity	Participants	Number attended	Venue
21 December 2009	Presentation at a focus group meeting	Impala Platinum Mine	6	Impala Platinum Mine - Rustenburg
15 January 2010	Presentation at a focus group meeting	Impala Platinum Mine	7	Impala Platinum Mine - Rustenburg
12 March 2010	Presentation at a focus group meeting	Platinum Group Metal	6	PTM Offices, Johannesburg
25 March 2010	Presentation at a focus group meeting	Kgetleng Rivier, Rustenburg, Moses Kotane Local Municipalities and Department of Rural Development & Land Reform	4	Rustenburg Municipal Offices
16 April 2010	Presentation at a focus group meeting.	Impala Platinum Mine	6	Impala Platinum Offices
Public Review Period Meetings				
Date	Activity	Participants	Number attended	
28 June 2010	Presentation at a focus group meeting.	Impala Platinum Mine	6	Impala Platinum Offices
30 June 2010	Presentation at a focus group meeting.	Bakubung Ba Ratheo Traditional Council	10	Bakubung Ba Ratheo Traditional Offices
30 June 2010	Presentation at a focus group meeting.	Rustenburg, Moses Kotane Local Municipalities and Department of Rural Development & Land Reform Sun City Resort	5	Rustenburg Municipal Offices
01 July 2010	Presentation at a focus group meeting.	Impala Platinum Mine Styldrift Mine	12	Impala Projects Offices

Date	Activity	Participants	Number attended	Venue
		Bafokeng Rasimone Platinum Mine Royal Bafokeng Administration		
01 July 2010	Presentation at a focus group meeting.	Landowners	28	Sundown Ranch Hotel
01 July 2010	Presentation at a focus group meeting.	Wesizwe	5	Wesizwe Site Offices
26 July 2010	Presentation at a focus group meeting.	Bakwena Ba Modimosana ba Mmatau	50	Mmatau Village Tribal Offices
27 July 2010	Presentation at a public meeting.	General public	8	Sundown Ranch Hotel
27 July 2010	Presentation at a public meeting.	General public	60	Chaneng Primary School
04 August 2010	Presentation at a public meeting.	General public	77	Bapo II Tribal Hall

7.4. FINAL SCOPING REPORT (FSR) AND PLAN OF STUDY FOR EIA (PoS)

The Final Scoping Report (FSR) was compiled and submitted together with the Plan of Study (PoS) for the EIA to the DEA on 31 August 2010 and both these documents were accepted and approved by DEA on 07 October 2010.

The FSR and PoS for EIA were placed at the information points throughout the study area. Electronic version of the FSR was distributed to landowners on request. Information points where copies of the FSR and the PoS for EIA were placed are as indicated in table 18 below:

Table 18: Information Points for FSR and PoS

Venue	Physical address
Zwaardverdiend 212 JP	Mr. A Lit's place (Portion1)
TAU Swartruggens	Mr. WDF Rochie's place
Rustenburg Public Library	Cnr. Thabo Mbeki & Heystek Street
Sun City	Welcome Centre
Sundown Ranch Hotel	R565 road between Boshhoek & Sun City

7.4.1. Stakeholder Mapping

Stakeholder mapping is a process of visually representing stakeholder engagement process undertaken in the project area. The project area is identified according to farms that are transacted by the power line corridors and substation sites. According to NEMA Section 56 all landowners within the linear route, substation and 100m from the routes must be consulted. The project area was demarcated according to this principle. A deeds search was conducted for the purpose of obtaining landowner information and for consulting with them. The information was mapped on within each stage to show the progress in the consultation process. It is expected that all the I&APs will be consulted before the end of EIA phase.

The stakeholder mapping identified 551 farm portions within the 44 parent farms in the project area. The consultation process per farm portion was mapped by allocating each activity a unique identifier from 0 to 5 (Table 19). 0 meant the public participation was not conducted. Some farm portions did not exist on the deeds database and this was categorised as 5.

Table 19: Database Categories

ID	PIP Description
0	No PIP
1	Deed search not done
2	No contact details
3	Sent info
4	Participated
5	Portion doesn't exist in DS (Deed search)

7.4.2. Stakeholder Identification Process

Deed search and searches on pervious project database were conducted to find landowner details and contact landowners. For the mapping purposes, the stakeholder database was categorised according to specific identities.

PIP Phase One – Scoping Phase

The first phase of the stakeholder database was started in September 2009. Information on the project was sent to 36 farm portion owners and 7 farm portion owners participated (responded).

PIP Phase Two – Scoping Phase

Phase two was conducted in November 2009.

The study site consists of the following land owners:

- Privately held farms
- State-owned land
- Tribal authority land
- Land leased to mining companies

During the Deed search the following issues were encountered:

- Some farm portions did not exist
- Contact details for some landowners were not available

More farms were contacted and the PIP database results are presented in Table 20 below:

Table 20: Phase Two Consultations

ID	PIP Description	PIP Progress
0	No PIP	
1	Deed search not done	
2	No contact details	23
3	Sent info	109
4	Participated	165
5	Portion doesn't exist in DS (Deed search)	25

PIP Phase Three – Scoping Phase

The aim of Phase three was to intensify the participation process. The meetings were undertaken on 28 June 2010 and 01 July 2010.

- This phase involved verifying landowners and the portions they owned.
- Finding contact details for the remaining portions.
- Finding leased farms and contacting both the owner and the lessee. In cases where a farm has been leased to a mine, it's important that the mine is contacted even if the tribal authority/ state have given consent. This is necessary because the mine structures may impact on the proposed routes.
- If a farm portion does not exist on the Deed search, the team contacted adjacent landowners for information. According to the PIP team, adjacent landowners have been reluctant to confirm or give more details. The PIP team is therefore collected the details during meetings. The process also includes contacting landowners to verify or find the land-use activity on the farm.

Table 21: Phase Three Consultations

ID	PIP Description	PIP Progress
0	No PIP	
1	Deed search not done	
2	No contact details	20
3	Sent info	36
4	Participated	243
5	Portion doesn't exist in DS (Deed search)	23

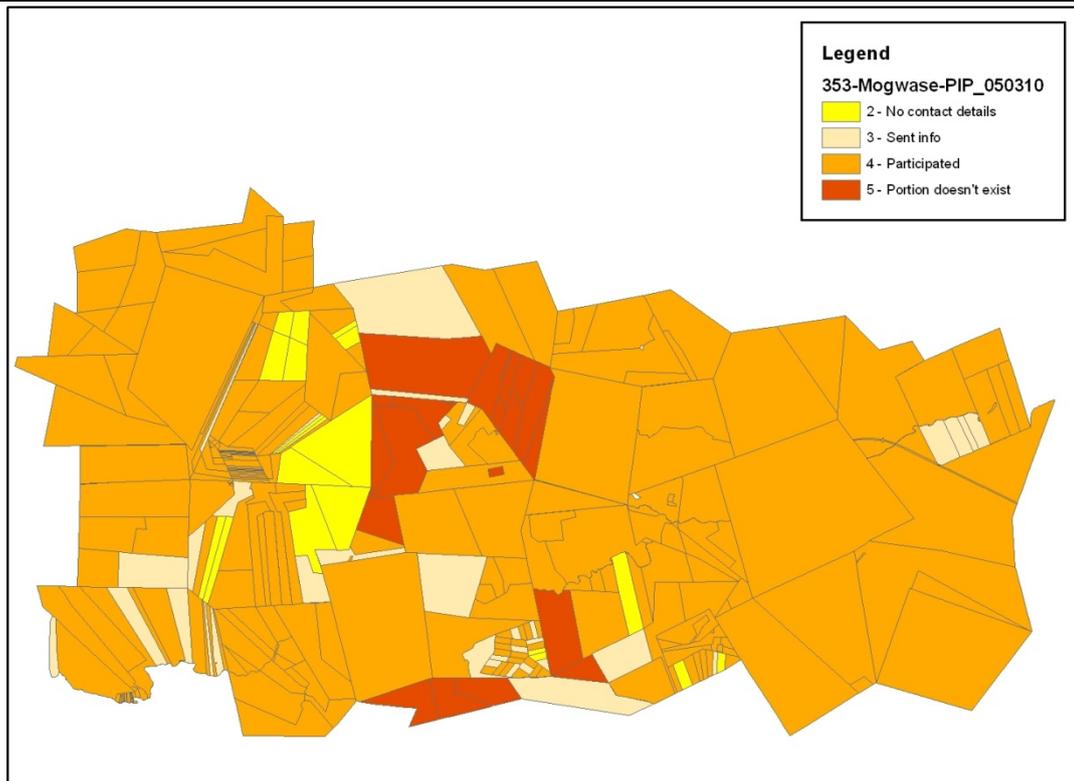


Figure 26: Map Depicting Phase Three Consultations

PIP phase Four – Scoping Phase

This phase was conducted in May 2010. An additional three corridors were included into the project scope and this required more farm inclusions. New cadastral data from the Department of Rural Development and Land Reform was also used to conduct the mapping. In the cadastral data, some farm portions for individual farms were either decreased or increased. With the inclusion of the new data, the PIP progress list changed into the table below.

Table 22: Phase Four Consultations

ID	PIP Description	PIP Progress
0	No PIP	7
1	Deed search not done	98
2	No contact details	123
3	Sent info	19
4	Participated	256
5	Portion doesn't exist in DS (Deed search)	48

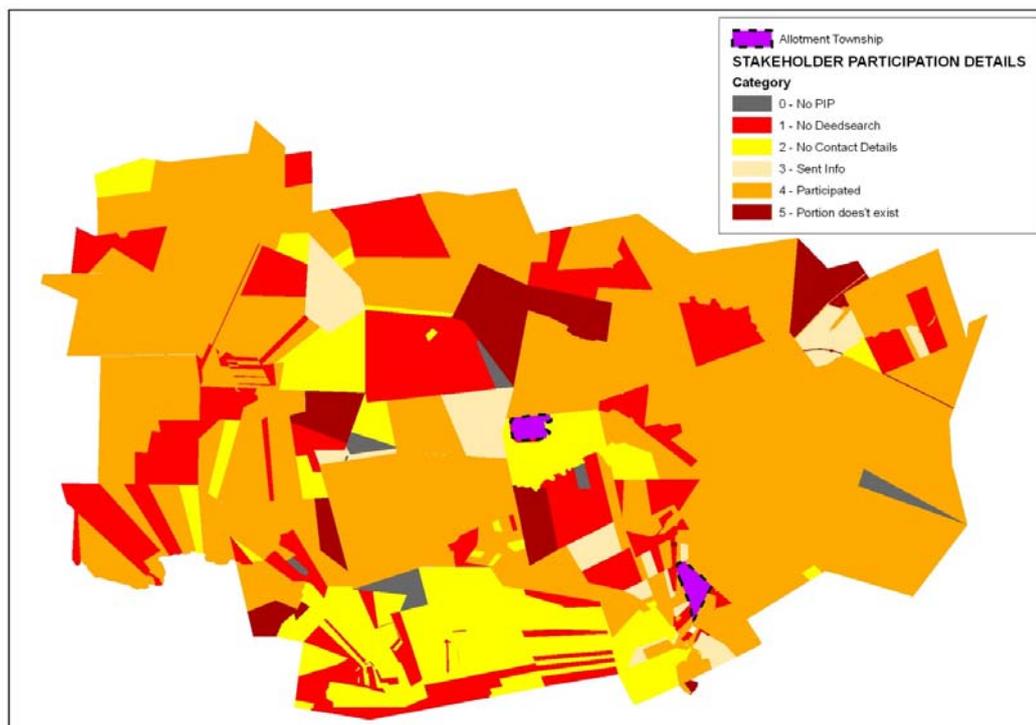


Figure 27: Map Depicting Phase Four Consultations

PIP phase Five

This phase was conducted in October 2010. New cadastral data from the Department of Rural Development and Land Reform was also used to conduct the mapping. In the cadastral data, some farm portions for individual farms were either decreased or increased. With the inclusion of the new data, the PIP progress list changed into the table below. The extent to which the directly affected parties, landowners have been involved in the study at the DEIR stage, is estimated to 90% as shown in Figure 28 below.

Table 23: Phase Five Consultations

ID	PIP Description	PIP Progress	%
0	No PIP	0	0.0
1	Deed search not done	0	0.0
2	No contact details	36	6.5
3	Sent info	21	3.8
4	Participated	369	67.0
5	Portion doesn't exist in deed search	26	4.7

Of the 551 total farm portions, no farm portions were within category 0 as well as category 1. 36 farm portions were within category 2 and do not have contact details. Within category 3 of all landowners that were sent information, 21 have not responded. Those who responded and therefore participated (Category 4) were the owners of 369 farm portions. In Category 5, 26 farm portions did not exist in the deeds database. Officials at Deeds Office advised that portion

that did not exist when conducting deed's search were portions which had been transferred to one of the owners of the other farm portions. Ownership of farm portions shown as non-existent was confirmed at the meetings.

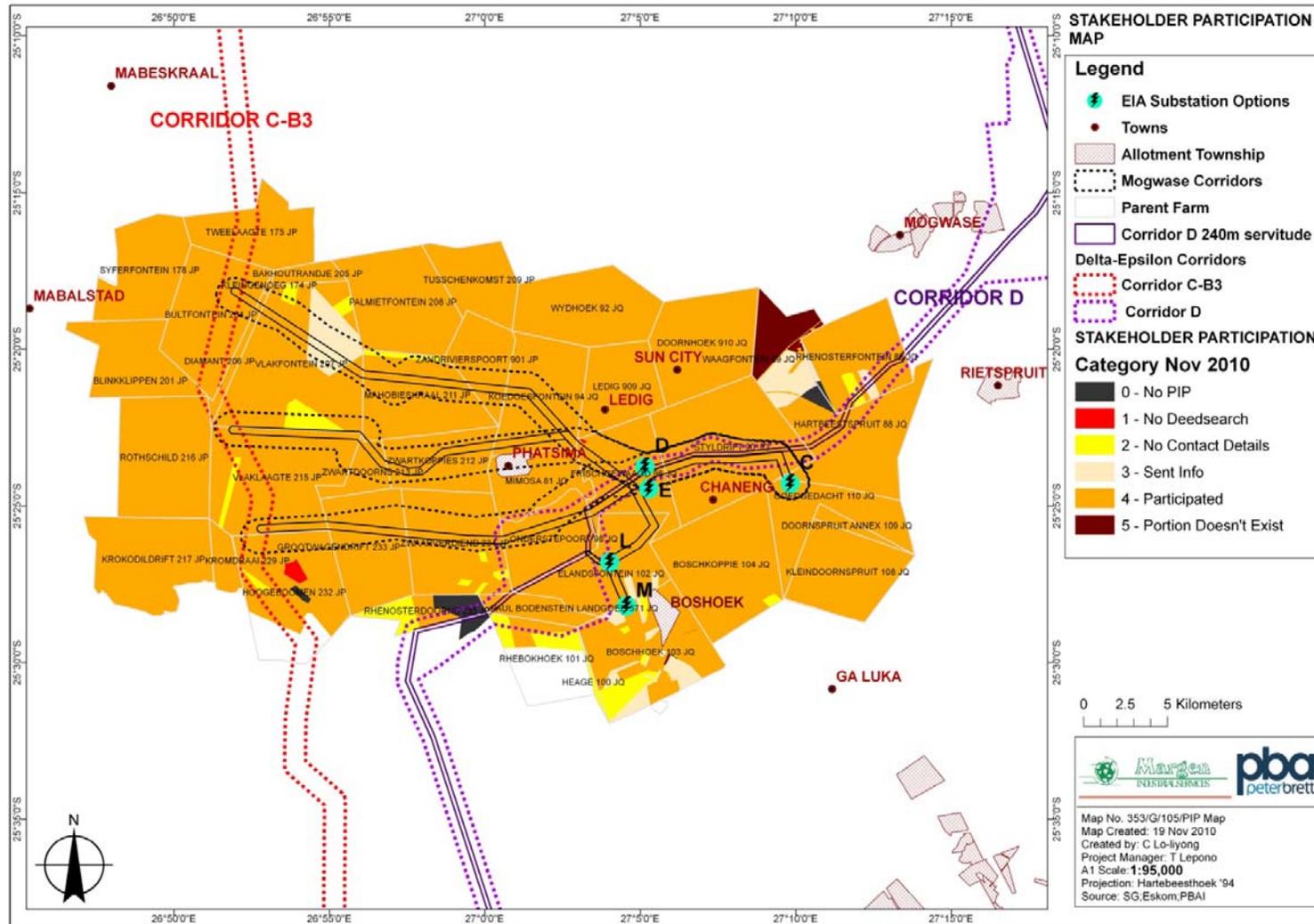


Figure 28: Stakeholder Map at DEIR

7.5. ISSUES AND CONCERNS RAISED BY I&APS

I&APs raised issues and concerns regarding the proposed project. The Comments and Responses Report has been updated since August 2009. The Main Issues and concerns raised by I&APs and general responses to these issues are summarised in the following table 24:

Table 24: Issues and Concerns Raised During the Study by I&APs

Issue / Concern	Remark	General Response
Economic	Job creation & Local opportunities	These kinds of projects involve high expertise that requires specialisation; it will create few jobs like clearing of bushes.
Safety & Well being	Veld Fire. Health and safety, Electromagnetic field,	Strategies and programmes for maintaining servitudes exist within Eskom. There is no conclusive evidence on the impact of EMF from power lines on living organism
Land Issues & Compensation	Compensation & property value reduction	Market related value is paid based on the recommendation of an independent property evaluator.
Aesthetics	Visual impacts, Loss of sense of place	Relevant specialist will undertake impact assessment study and in turn provide recommendations for the mitigation of likely impacts where possible.
Farming Related Issues	Loss of agricultural land	Crop farming and grazing is allowed under the power lines. Only tall plantations are not allowed.
Natural Environment & Heritage	Impact on fauna, flora, birds, historical & archaeological sites	Relevant specialists form part of the study team and will give advice on mitigation measures.
Social	Relocation of people & migration of construction workers	Environmental Control Officer (ECO) will liaise with communities to ensure harmonious interaction between local communities & construction workers. Relocation is done only if the line cannot be diverted.
Technical	Underground cabling	There is no technology in SA for putting power lines of this magnitude underground and this will be more detrimental to the environment during construction and maintenance phase.

7.6. PUBLIC PARTICIPATION PROCESS IN THE EIA PHASE

In keeping with the Principles of Public Participation as stipulated in NEMA, meetings are planned for EIA Phase to discuss the Draft Environmental Impact Report (DEIR). The public participation programme at this stage will aim to:

- Inform all identified I&APs about the draft findings of the EIA and potentially recommended routes.
- Create channels of communication through which I&APs can further contribute to the EIA process and raise any other issues and concerns regarding the preferred routes.
- Provide information used for decision-making;
- Promote transparency and an understanding of the proposed project and its potential environmental (social and biophysical) impacts.

7.6.1. Media Announcement for the Availability of DEIR and Public Meetings

In accordance with the requirements of NEMA, and to ensure attendance from the broader public, the dates and venues for the public meetings will be advertised in the local newspaper, in the predominant languages of the area.

The advertisement announcing the series of public meetings will also include the availability of the draft EIR. The advertisement will include the public places where the draft EIR will be available and the review period.

7.7. ASSUMPTIONS AND LIMITATIONS

7.7.1. Assumptions

- For scoping phase the study process is assumed to have elicited most of the issues and problems requiring detailed studies in the EIA phase.
- The stakeholder's participation is considered to have assisted in identifying suitable alternative substation sites and corridors for detailed study in the next phase.
- The area is characterized by the presence of mining industry, game/ecotourism business, agricultural farming and settlement. It is assumed that most categories of stakeholders participated in the study process to date.
- Is it unlikely that all stakeholders would have been identified and contacted by the end of Scoping, especially the landowners. Every effort was, however, made to involve as many broad based representatives of the stakeholders in the area of the proposed development.
- All information provided by Eskom and I&APs to the Environmental Team was correct and valid at the time it was provided.

7.7.2. Limitations

- A study area of this magnitude presented a large number of potentially affected, diverse stakeholders and contributed to the perceptible poor attendance at meetings.
- Landowners often only want to be involved once they are certain that their properties are directly affected by the final route alignments and this might be too late to make an input.
- This report and its investigations are project specific, and consequently the environmental team did not evaluate any other power source alternatives.

- Landowners believe that their inputs or comments will not be considered as was the case with Delta-Epsilon Project. Inputs given during the study process of Delta-Epsilon Project are considered to have been ignored. Hence landowner participation was adequate but with scepticism.
- Farming stakeholders believe that the study team is considerate to mining houses in the area. Mining companies already have plans which make the choice of substation site and corridors difficult. It would seem most stakeholders participate with “Not in my back yard” attitude

7.8. WAY FORWARD

- The following activities are planned for the comment period of the DEIR
 - The **DEIR** will be made available for public reviews for 30 days from **18th January 2011** to **17th February 2011** at several information centres outlined in the table above.
 - Advertising the DEIR and notifying stakeholders about its availability
 - The executive summary of the Draft Environmental Impact Report, Reply sheet, map and comment and response report will be forwarded to registered I&APs.
 - Placement of DEIR at public places for review
 - Series of meetings will be held with key stakeholders and the public.
 - Distribution of minutes to stakeholders
 - Update the DEIR with information from comment period
 - The DEIR will be updated with the information received from stakeholders to make it a final environmental impact report that will be submitted to DEA.
- The following activities will be undertaken in the public domain:
 - All I&APs will be informed of the submission of the FEIR to the relevant authority for authorization.
 - Make stakeholders aware of the additional information included in the Draft Environmental Impact Report (DEIR)The FEIR will be placed at information points when authorisation is granted or declined, all I&APs registered in the database will be informed.

8. IMPACT ASSESSMENT

During Scoping Phase, a total of 13 sites were identified. Eight of these sites were dropped and five (C, D, E, L and M) were subjected to detailed technical environmental assessment. All five sites fall within the Rustenburg Local Municipality (refer to section 3)

This section presents the assessment of key environmental issues that were identified during the EIA phase and of the proposed alternatives for the Ngwedi Main Transmission Substation and associated turn-ins. In terms of the project related impacts, the process will give an indication of the impacts that will and that will not require mitigation. It will inform the process that will result in the recommendation of preferable power line route alignments and substation sites from the best environmentally sound perspective.

8.1. IMPACT RANKING CRITERIA

The significance of project related environmental impacts was determined through a criterion that relies on the application of scientific measurements and on professional judgement. Environmental significance was assessed for each impact in the respective project phases and was also determined for before and after the implementation of recommended mitigation measures. Environmental significance depends on the nature of the impact, which is dependent on the impact characteristics that are namely the extent, intensity, duration, frequency and probability (Table 25).

The impacts were categorised into Class A and Class B of which the former refers to those impacts that do not vary from one option to the next one, and the latter vary amongst the proposed project alternatives. Class B impacts are the basis for the comparative analysis of the project alternatives and the basis on which the preferred options were determined.

In summary, the process endeavours to identify what is important or acceptable, activities that will require environmental management actions and it will also assists with the schedule for the implementation of the management measures.

The significance of the project impacts was calculated based on the following formulae:

$$\text{Impact Significance} = \text{consequence (extent + duration + intensity)} \times \text{probability}$$

The Impact Assessment Framework is as follows:

Table 25: Impact Assessment Framework

Consequence (C)	Extent (E)	Rating	Duration (D)	Rating	Intensity (I)	Rating
	Site	1	Immediate	1	Negligible	1
Local	2	Short-term	2	Low	2	
Regional	3	Medium-term	3	Moderate	3	
National	4	Long term	4	High	4	
International	5	Permanent	5	Very High	5	
Probability	Frequency of Occurrence			Rating		

(P)	None	0				
	Improbable	1				
	Low Probability	2				
	Medium Probability	3				
	High Probability	4				
	Definite	5				
Significance (S)	Negligible	Low	Low-Medium	Medium	Medium-High	High
	0	1-15	16- 30	31 -45	46-60	> 60

Table 26: Significance Rating Matrix

	Consequence (Intensity + Frequency+ Extent+ Duration)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Probability (P)	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	Colour Codes	Negligible 0		Low 1 – 15		Low-Medium 16 – 30			Medium 31-45			Medium- High 46 - 60			High > 60

8.2. ASSESSMENT OF IMPACTS

The assessments below utilised much of the information presented from the specialist reports that can be found in Appendices 4 - 9 the report. All the specialists were asked to assess the study area to establish the sensitivity of the area in terms of their specific field of speciality and the expected impacts they identified that the proposed electricity infrastructure would have in regard to their speciality.

9. AVIFAUNA

A comparison of each route alignment and of the proposed substation sites was based on the observations made during the site visit, on the evaluation of available literature on micro habitats, land use types and avifauna in the study area. Google Earth was also used to examine the study area remotely. This exercise was used to determine which of the alternatives would have the least impact on the avifauna.

It is widely accepted in ornithological circles that vegetation structure is more important in determining bird species abundance than vegetation species composition.⁴⁸ The land use and vegetation types databases and identified micro-habitats were used to compile an environmental profile of the study area. The South African Bird Atlas Project, and the location of the project in relation to the IBA's were considered in order to identify the birds that are likely to occur in the study area. The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland was used for the identification of red data species.

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) was obtained for the quarter degree square which covers the study area, from the Avian Demography Unit of the University of Cape Town, as a means to ascertain which species occur within the study area.
- The conservation status of all bird species occurring in the aforementioned quarter degree squares was determined with the use of The Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Barnes, 2000).
- A classification of the vegetation types in the study area was obtained from (Mucina and Rutherford, 2006)
- A classification of the land uses was obtained from the CSIR
- Google Earth was used to examine the study area.
- The location of the project in relation to the Important Bird Areas (IBA's) was considered (Barnes, 1998).
- The substation sites were visited and the corridor alternatives assessed in the field.

9.1. ELECTROCUTIONS

Electrocutions are not possible on the larger transmission lines as the relevant clearances between live parts and live and earthed components exceed the wingspan of any bird. Thus this impact will not exist and as such is not discussed any further.

Electrocutions within the substation, during its operation, could potentially have a negative impact on a variety of bird species, particularly those species that regularly utilize the electrical infrastructure within the substation yard on which to breed and nest e.g. crows, herons, sparrows, owls and geese. However, the more sensitive species recorded in the area do not utilize substation yards extensively and therefore the significance of the impact is considered to be negligible. This impact will therefore not be discussed further.

⁴⁸ Harrison et al 1997. The atlas of southern African birds. Vol. 1&2. BirdLife South Africa: Johannesburg.

9.2. COLLISIONS

Collisions will be one of the major impacts of the transmission lines. Collisions will mainly impact on the larger slower flying birds, the flamingoes, secretary birds, vultures and storks for example. The presence of Pilanesberg National Park means that the vulture species are likely to occur in this area and as such these would also be species of concern when erecting a new power line. Mitigation should focus on correct alignment choice as well as marking sensitive spans that must be identified in an avifaunal site specific "walk down" of the lines once the preferred alternative is chosen and has been surveyed. Should this be done competently the impact of collisions can be mitigated to an acceptable level from an avifaunal perspective.

9.3. HABITAT DESTRUCTION

The largest impact will be with the building of the substation, however some of the proposed sites are disturbed and degraded and as such this is not seen as a significant impact should the preferred site be chosen (see the alternatives discussion below). One species of concern, the Yellow-throated sandgrouse is known to occur in the area, although the report rate is very low. It is imperative to avoid these known hotspots for the Yellow-throated sandgrouse and to make sure that habitat destruction and disturbance does not interfere with these species during construction and maintenance activities associated with the project. The avifaunal site specific "walk down" (EMP) will further detail how to deal with any nesting and breeding birds found in close proximity to the new power line corridors or the substation site. The impact on avifauna can thus be kept to a minimum should these recommendations be followed.

9.4. DISTURBANCE

Again this impact is likely to be low if the recommended site and corridor alternatives are chosen. The study area is disturbed and degraded and as such this is not seen as a significant impact should the preferred sites be chosen. The proposed development falls within two Important Bird Areas (IBAs), namely SA 023 Pilanesberg and SA 025 Magaliesberg and Witwatersrand areas. The former is known to have over 300 bird species including collision sensitive birds such as the Secretary bird, Kori Bustard, Blue Crane and Black Stork. The latter has large population of raptors and in fact has two breeding colonies of Cape Vultures.

This development falls within two IBA's, the SA 023 Pilanesberg National Park and the SA 025 Magaliesberg and Witwatersberg areas. The area between these two IBA's is academic as the birds being so mobile could, and probably will, occur within the area not identified as an IBA. The area that is not classified as an IBA is also very narrow and thus the same species are likely to occur in this area. Thus no great advantage is gained from keeping the development out of the IBA's in this area. The avifaunal specific EMP will also recommend measures that should be followed to further reduce this impact of disturbance. If this is done the impact will be within acceptable limits.

9.5. FAULTING CAUSED BY BIRDS

Birds that could cause faulting are in very low abundance in this area and thus this would not be a very significant impact. Although the towers will be higher than the surrounding vegetation and therefore an attractive roost and perch site for certain species, the disturbance of the area and low abundance of these larger species means this impact would be improbable. This is also a fairly easy impact to mitigate reactively by the installation of bird guards and as such the overall significance of this impact will be low. From an avifaunal point of view it would be best to

use the cross rope suspension type design as this design is immune to electrical faulting caused by birds.

9.6. COMPARISON OF ALTERNATIVES – SUBSTATION SITES

9.6.1. Site C

- This area is less disturbed and except for the presence of the mine. It is also relatively untransformed and a good habitat for grassland associated birds.
- Although the area is in the same land use category as alternative D, this site is in much better environmental condition (as it is less disturbed and degraded). This makes it more attractive and thus more sensitive for avifauna.

9.6.2. Site D

- Situated near to human settlements, which is positive for avifauna as the disturbance associated with human settlements means that the sensitive bird species are unlikely to occur in the area.
- This alternative is very close to the Elands River, which is negative for avifauna as certain species may be attracted to the river and come in close proximity to the power lines servicing this substation.

9.6.3. Site E

- This site is currently burned grassland that seems to be quite disturbed and degraded.
- The area is used for cattle grazing and prospecting is under way nearby.
- This site is approximately 100m away from an existing transmission line.

9.6.4. Site L

- Situated 2.1km west of the R565 road and 3.8km south of the Elands River.
- Situated in an area of more pristine vegetation, this is negative for avifauna as more disturbance and degradations means less chance of sensitive species occurring here.

9.6.5. Site M

- Situated 1.13km west of the R565 road and 6.5km south of the Eland River.
- This site is also in an area of more pristine vegetation and as such will be of greater impact on avifauna.

9.7. COMPARISON OF ALTERNATIVES – TRANSMISSION LINES (TURN-INS)

9.7.1. Corridor 1

- From the selected substation site this corridor takes a northerly route towards the Matimba – Midas existing transmission line. It follows the Marang – Midas 400kV power line for approximately half of the distance, this is an advantage to avifauna as placing power lines together helps to mitigate for the impact of collisions. It is recommended that the new line be placed as close as possible to the existing line to maximize this benefit.
- It runs in close proximity to the R565 road for a section of the alignment, this is positive for avifauna as it will result in fewer access roads and as such lower habitat destruction.
- Crosses the Elands River once near the existing Marang – Midas line. It is strongly recommended that this be placed next to the Marang – Midas power line especially, at the river crossing to help mitigate for the impact of collisions.

- This alignment runs for most of its route outside of the IBA, this is however not very meaningful as discussed under Section 6.6 above.
- It is strongly recommended that this corridor be used in conjunction with substation site E as this results in the shortest length of transmission line and follows the best alignment.

9.7.2. Corridor 2

- From the selected substation site this corridor takes a central route to the Matimba Midas existing transmission line. It runs inside of the IBA for the majority of the alignment, as discussed above this is not very meaningful.
- Follows the existing Marang – Midas 400kV power line for approximately 5km, this is an advantage to avifauna as it will help to mitigate the impact of collisions, this would be especially beneficial if the new line could be placed as close to the existing Marang – Midas power line as possible where the line crosses the Elands river.
- Does not run near any road resulting in a greater number of roads needed during construction and this will result in a greater amount of habitat destruction.

9.7.3. Corridor 3

- From the selected substation this corridor takes a southern route to the Matimba – Midas existing transmission power line. It runs inside the IBA for the entire alignment but as mentioned above this is not very meaningful to avifauna in this area.
- Does not follow any existing transmission lines on this alignment, this is negative for avifauna as the collision risk will be increased.
- Runs in close proximity to the Elands River for the majority of the route, this is negative for avifauna as the river will attract certain species placing them at higher collision risk with a new power line.
- Does not occur near a road and as such more habitat destruction and disturbance will result from the building of new access roads for construction and maintenance. In addition this has the potential to be of greater significance as it occurs near the Elands River and as such the vegetation and habitat will be of greater sensitivity to avifauna.

9.7.4. Corridor 4

- This corridor is essentially a link between the above corridor alternatives and substation L and M. In other words should substation L or M be used this corridor would be required to service the substation. If neither of these two is used then this corridor will not be required.
- 3km of this corridor run next to the existing Marang Midas 400KV line, this is an advantage to avifauna as described above.
- This corridor also occurs near the R565 road and as such minimal new roads will need to be constructed to service this line.
- Entire corridor occurs within the IBA, but as mentioned above this is not very meaningful.
- This corridor will need to be linked to either corridor 1, 2 or 3 to reach the Matimba Midas line and as such if substation L or M are used this alignment should follow corridor 1 as the most highly preferred corridor.

9.7.5. Corridor 5

- The purpose of this corridor is to link substation site L to the Delta Epsilon corridor D, should this corridor be chosen.
- It is a very short corridor of 1.5km in length.
- As it is so short the impact of this line will be minimal.

9.7.6. Delta – Epsilon lines

The proposed Delta – Epsilon lines will not have much of an impact on avifauna when assessing the scope of this project. The impact of these lines is subject to another EIA report. The only factor to consider in the scope of this project is the location of the substation, as it will have to be connected to the Delta – Epsilon lines. All of the alternatives are placed close to Corridor D, except for substation sites C, L and M, which would require additional turn in lines to connect the substation to the Delta – Epsilon corridor. This should be seen as an additional negative for avifauna as it is additional transmission line that would not be required if substation D or E are chosen. As discussed above substation Site E is the most highly preferred and as such this is the substation site that should be chosen taking into account all impacts and corridors. If Delta – Epsilon corridor D, is chosen there will be no additional impact as the lines have to run in the same direction to connect to Matimba-Midas power line.

9.8. IMPACT TABLES

As can be seen in Table 27 below, the preferred alternative is site is Site E from an avifaunal perspective. The reasons for this include the fact that it is located away from the Elands River, occurs on an area of disturbed land and critically, results in the most ideal transmission line alignment and length. Corridor 1 is the most highly preferred from an avifaunal perspective as it follows an existing transmission line for some of the route, as well as occurring near the road, which will limit the amount of habitat destruction that will be necessary. The other corridors are all possible but are not preferred from an avifaunal perspective.

Table 27: Impact Table for Avifauna

Site	Level of Significance	Sensitivity Class Pre-Mitigation	Sensitivity Class Post-Mitigation	Preference Rating 1 = Least Preferred 5 = Highly Preferred
Site C	36	Med	Low – Med	3
Site D	40	Med	Low – Med	2
Site E	24	Low – Med	Low	5
Site L	36	Med	Low – Med	3
Site M	36	Med	Low – Med	3
Corridor 1	24	Low – Med	Low	5
Corridor 2	36	Med	Low	3
Corridor 3	36	Med	Low	2

Corridor 4*				3
Corridor 5*				3

Note: It is difficult to assess corridors 4 and 5 as they are very short and will not have a high impact on avifauna. They can both be considered to be of LOW level of significance due to their short length. It is much more important from an avifaunal perspective to get the three main corridors assessed above correct

9.9. MITIGATION MEASURES

- Mitigation should focus on correct alignment choice as well as marking sensitive spans that must be identified in an avifaunal site specific “walk down” of the lines once the preferred alternative is chosen and has been surveyed.
- EMP to be developed to keep impacts to a minimum and preferred site to be used

10. BIODIVERSITY

No impacts were identified that could lead to a beneficial impact on the ecological environment of the study area since the proposed development is largely destructive as it involves the removal of vegetation and alteration of habitat. Impacts resulting from the construction and operation of this development on ecological attributes of the study area are largely restricted to the physical impacts on biota or the habitat in which they occur.

Direct impacts, such as habitat destruction and modifications, are regarded immediate, long-term and of high significance. These impacts are mostly measurable and fairly easy to assess as the effects thereof is immediately visible and can be determined to an acceptable level of certainty. In contrast, the effect of indirect impacts is not immediately evident and can consequently not be measured immediately. A measure of estimation is therefore necessary in order to evaluate these impacts. Lastly, impacts of a cumulative nature places direct and indirect impacts of this projects into a regional and national context, particularly in view of similar or resultant developments and activities.

Impacts were identified that are of relevance to any development in a natural environment. These impacts might not all occur, or the extent of impact might be limited and the relevance of these impacts will firstly be determined prior to being implemented in the Impact Assessment.

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.

10.1. DESTRUCTION OF THREATENED & PROTECTED FLORA SPECIES

This impact is regarded a direct impact as it results in the physical damage or destruction of Red Data or Threatened species or areas that are suitable for these species, representing a significant impact on the biodiversity of a region. Threatened species, in most cases, do not contribute significantly to the biodiversity of an area in terms of sheer numbers as there are generally few of them, but a high ecological value is placed on the presence of such species in an area as they represent an indication of pristine habitat conditions. Conversely, the presence of pristine habitat conditions can frequently be accepted as an indication of the potential presence of species of conservation importance, particularly in moist habitat conditions.

The presence of some protected tree species within the study area was confirmed during the site investigation. Furthermore, the likelihood of Red Data flora species occurring within the parts of the study area is likely as some areas were found to be moderately suitable for some of these species. The likelihood of this impact occurring is therefore regarded moderate and will therefore be evaluated in the Impact Assessment.

10.2. DIRECT IMPACTS ON THREATENED FAUNA SPECIES

Direct threats to threatened fauna species is regarded low in probability, mainly as a result of the ability of fauna species to migrate away from areas where impacts occur, also considering the type of development and activities. Probably the only exception to this statement will be in the event where extremely localised habitat that are occupied by threatened fauna species are impacted by construction and operational activities to the extent that the habitat no longer satisfy the habitat requirements of the particular species, or where an increase in the isolation and fragmentation factors renders the remaining habitat inadequate.

Most of the threatened fauna species potentially occurring in the study area have relatively wide habitat preferences and ample suitable habitat is presently available throughout the study area. To place this aspect into context it is estimated that habitat loss and transformation resulting from often overlooked impacts, such as overgrazing, infestation by invasive shrubs and agriculture probably contribute more to impacts on most threatened fauna species than this development. However, some Red Data fauna species might occur in the study area that does have specific habitat requirements.

The likelihood of Red Data fauna species occurring within the parts of the study area is likely as these areas were found to be suitable for some of these species. The likelihood of this impact occurring is therefore regarded moderate and is therefore included as part of the Impact Assessment.

10.3. DESTRUCTION OF SENSITIVE/ PRISTINE HABITAT TYPES

The loss of pristine habitat types or habitat that are regarded sensitive as a result of restricted presence in the larger region (atypical habitat) represents a potential loss of habitat and biodiversity on a regional scale. Sensitive habitat types include mountains, ridges, koppies, wetlands, rivers, streams and localised habitat types of significant physiognomic variation and unique species composition. These areas represent centres of atypical habitat and contain biological attributes that are not frequently encountered in the greater surrounds. A high conservation value is generally ascribed to floristic communities and faunal assemblages that occupy these areas as they contribute significantly to the biodiversity of a region.

Relative small parts of the study area are regarded highly sensitive and are highly likely to be occupied by a diverse species composition as well as flora and fauna species of conservation importance. The likelihood of this impact occurring is therefore regarded high and will therefore be included as part of the Impact Assessment.

10.4. DIRECT IMPACTS ON COMMON FAUNA SPECIES

The likelihood of this impact occurring is relatively low as a result of the ability of animal species to migrate away from direct impacts. The tolerance levels of common animal species occurring in the study area is of such a nature that surrounding areas will suffice in habitat requirements of species forced to move from areas of impact. It is also unlikely that the conservation status

of common animal species will be affected as a result of direct and indirect impacts of power lines on these species and their habitat.

The nature of the development is expected to result in direct impacts on fauna species in spite of the ability of most animals to avoid direct contact. This impact is unavoidable and will therefore be included as part of the Impact Assessment.

10.5. FLORISTIC SPECIES CHANGES SUBSEQUENT TO DEVELOPMENT

This impact is regarded as an indirect impact. The transformation of natural habitat during the construction process will inevitably result in the establishment of habitat types that are not considered representative of the region. While impacts are generally regarded to be of low severity, impacted areas are frequently invaded by species not normally associated with the region (exotic and invasive species). In addition, many species that are not necessarily abundant in the region will increase in abundance as a result of more favourable habitat conditions being created as a result of habitat manipulation activities (encroacher species). This effect is more pronounced in the floristic component, but changed habitat conditions in the habitat will inevitably imply minor changes in the faunal component that occupies the habitat.

Construction will result in alteration of the vegetation in parts of the study area and it is likely that the current vegetation will become infested with weeds and invasive species. This impact will therefore be evaluated as part of the Impact Assessment.

10.6. FAUNAL INTERACTIONS WITH STRUCTURES, SERVITUDES & PERSONNEL

It should be noted that animals generally avoid contact with human structures, but do grow accustomed to structures after a period. While the structures are usually visible, injuries and death of animals do occur sporadically as a result of accidental contact. An aspect that is of concern is the presence of vehicles on access and infrastructure roads, leading to road kills, particularly amongst nocturnal animals that abound in the study area. This impact was frequently observed in the study area during the site investigation period.

Alteration of habitat conditions within the development areas does not necessarily imply a decrease in faunal habitation. These areas are frequently preferred by certain fauna species. The establishment of a dominant grass layer generally results in increased presence of grazer species, which might lead to an unlikely, but similar increase in predation within these areas.

The presence of personnel within the development area during construction and maintenance periods will inevitably result in some, but normally limited, contact with animals. While most of the larger animal species are likely to move away from human contact, dangerous encounters with snakes, scorpions and possibly larger predators always remain likely. Similarly, the presence of humans within areas of natural habitat could potentially result in killing of animals by means of snaring, poaching, poisoning, trapping, etc.

The nature of the proposed development is expected to result in indirect impacts on the fauna species. In addition, direct interaction of fauna species with infrastructure is likely to occur. This impact will therefore be evaluated as part of the Impact Assessment.

10.7. IMPACTS ON SURROUNDING HABITAT/ SPECIES

Surrounding areas and species present in the direct vicinity of the study area could be affected by indirect impacts resulting from construction and operation activities. This indirect impact could potentially include all of the above impacts, depending on the sensitivity and status of

surrounding habitat and species as well as the extent of impact activities. Considering the type of development, the extent of this impact is expected to be relative small.

The indirect nature of this impact dictates that potential impacts spreading from the proposed development into bordering areas is likely to affect natural habitat adversely. This impact is relevant and will therefore be included as part of the Impact Assessment.

10.8. IMPACTS ON SA'S CONSERVATION OBLIGATIONS & TARGETS

This impact is regarded a cumulative impact since it affects the status of conservation strategies and targets on a local as well as national level and is viewed in conjunction with other types of local and regional impacts that affects conservation areas. The importance of regional habitat types is based on the conservation status ascribed to vegetation types, but only includes Least Threatened vegetation types. Furthermore, no declared conservation areas will be affected by the proposed development. Loss of parts of the natural vegetation is expected to result in an insignificant, indirect impact on the conservation status of the regional vegetation types and no declared conservation areas will be directly affected.

10.9. INCREASE IN LOCAL & REGIONAL FRAGMENTATION/ ISOLATION OF HABITAT

The loss of natural habitat, even small areas, implies that biological attributes have permanently lost that ability of occupying that space, effectively meaning that a higher premium is placed on available food, water and habitat resources in the immediate surrounds. This, in some instances might mean that the viable population of plants or animals in a region will decrease proportionally with the loss of habitat, eventually decreasing beyond a viable population size.

The danger in this type of cumulative impact is that effects are not known, or is not visible; with immediate effect and normally when these effects become visible they are beyond repair. Linear developments affect the migratory success of animals in particular. An important mitigation measure in this regard is to utilise existing causal factors of habitat fragmentation.

The general region is characterised by low levels of transformation and the introduction of new developments are sometime perceived as the 'thin end of the wedge', paving the way for additional developments, ultimately resulting in a fragmented landscape. Cumulative effects of habitat transformation are regarded relevant and this impact is therefore included as part of the Impact Assessment.

10.10. INCREASE IN ENVIRONMENTAL DEGRADATION

Cumulative impacts associated with this type of development will lead to initial, incremental or augmentation of existing types of environmental degradation, including impacts on the air, soil and water present within available habitat. Pollution of these elements might not always be immediately visible or readily quantifiable, but incremental or fractional increases might rise to levels where biological attributes could be affected adversely on a local or regional scale. In most cases are these effects are not bound and is dispersed, or diluted over an area that is much larger than the actual footprint of the causal factor.

Similarly, developments in untransformed and pristine areas are usually not characterised by visibly significant environmental degradation and these impacts are usually most prevalent in areas where continuous and long-term impacts have been experienced.

The nature of the development dictates that the biological environment is unlikely to be affected by effluents, spillages or any chemical that is extracted or transported. However, the

susceptibility of sensitive habitat types towards even low levels of degradation does represent a threat. This impact is therefore relevant and will be included as part of the Impact Assessment.

10.11. COMPARISON OF ALTERNATIVES – SUBSTATION SITES

10.11.1. Site C

The vegetation of this site comprises relative pristine open *Acacia savanna* on open plains. A moderate sensitivity is ascribed to this site, but no sensitive habitat is noted in the surrounds. A relative high grazing factor is noted.

The use of this option would result in a significant increase in the extent of habitat that would be affected as this option is located significantly further towards the east (away from the proposed Delta – Epsilon power line Corridor D). This option is therefore ranked as the third least preferred option.

10.11.2. Site D

The proximity of this site renders it relative sensitive. The vegetation is not regarded particularly sensitive as it comprises old agricultural fields. Surrounding areas are however relative pristine, comprising open *Acacia savanna*. A relative high grazing factor is noted.

In spite of the high sensitivity of the nearby Elands River, this site is recommended as the second preferred alternative. The use of any of the proposed substation options would imply the crossing of the Elands River.

10.11.3. Site E

Old agricultural fields characterise this site and a low sensitivity is ascribed. The vegetation is characterised by open *Acacia savanna* on clayey soils. This site is also located relative close to existing lines.

Habitat present within the proposed site is regarded relative low in sensitivity, rendering this site the most preferred option. The use of this option would, similar to Site D, implies the crossing of the Elands River, but it is possible to mitigate against significant impacts.

10.11.4. Site L

This site is characterised by natural/ pristine woodland with a relative high diversity. A moderate level of habitat variation is also noted, rendering this site relative sensitive. Woody species frequently encountered include *Olea europaea*, *Searsia* species, *Sclerocarya birrea*, *Boscia albitrunca* and *Acacia* species.

The use of this option implies a significant increase in the extent of habitat that will be affected by the associated powerlines. In addition, the habitat that is present within this option is regarded pristine and sensitive.

10.11.5. Site M

This site is situated on woodland plains comprising degraded *Acacia veld* with *Dichrostachys cinerea* infestation in parts. The site is characterised by red soils. The vegetation is dominated by *Acacia* species, but some *Sclerocarya birrea* individuals are present in the surrounds. While no sensitive habitat is noted on the site, rocky outcrops and hills are noted towards the north-west. The use of this option implies a significant increase in the extent of habitat that will be affected by the associated powerlines, in spite of a relative low sensitivity of the habitat that is present within this option.

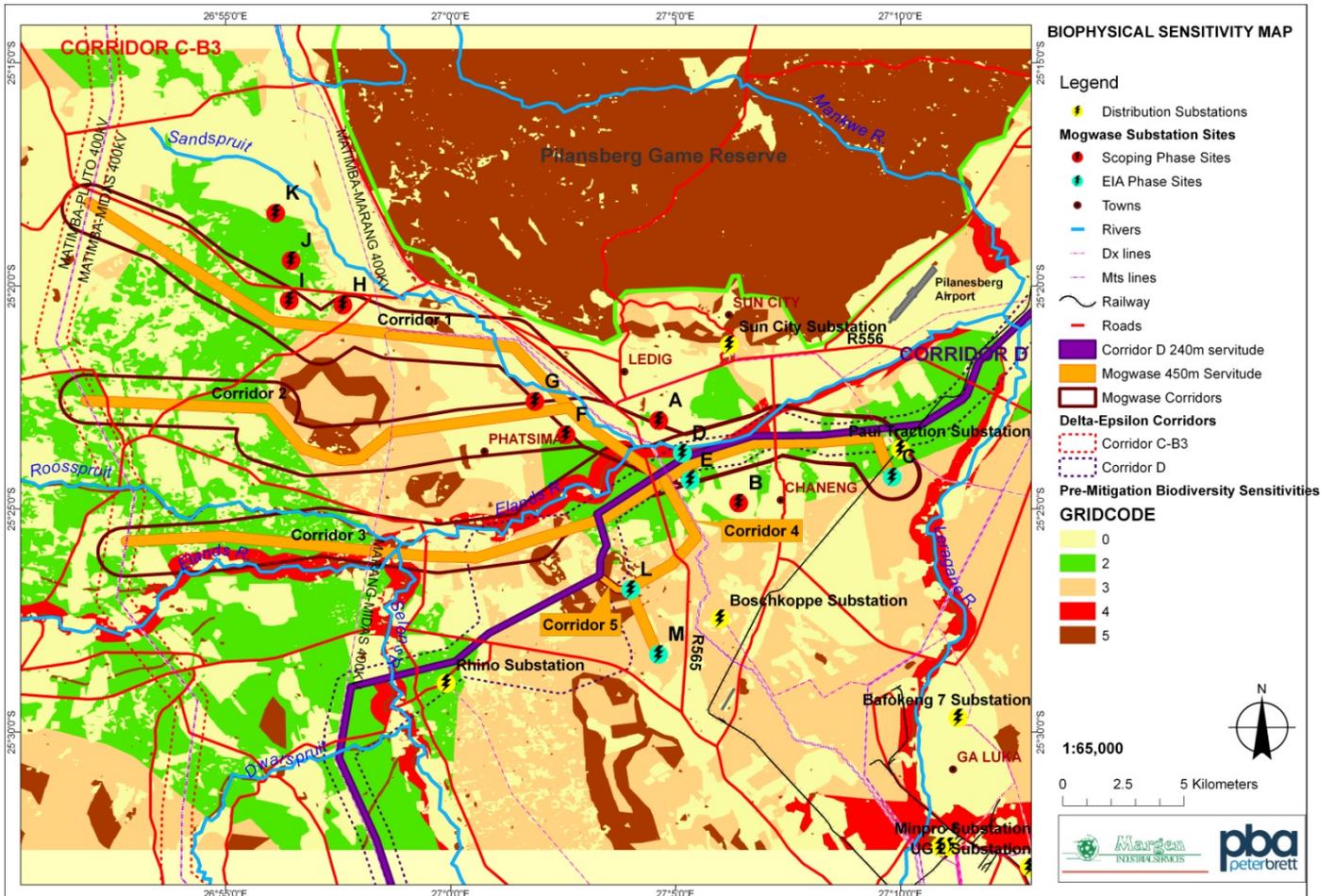


Figure 29: Biophysical Sensitivity Map

10.12. COMPARISON OF ALTERNATIVES – TRANSMISSION POWER LINES (TURN-INS)

It should be noted that, although a preference rating is presented, the location of high sensitivity areas is such that a suitable corridor could theoretically be selected that would avoid significant impacts within any of the High sensitivity areas. Results of the floristic assessment indicate that there is relative little difference between the various options on the basis of floristic sensitivity calculations.

10.12.1. Corridor 1

Comprises the second lowest extent of High and the lowest extent of Medium sensitivity habitat and is the recommended as the preferred option. The presence of several river crossings, particularly in the eastern section, represents a challenge in this option, but it would theoretically be possible to utilise less sensitive parts of the corridor in order to minimise riparian crossings. The southern part of the eastern section is strongly recommended for this purpose, also considering the position of the proposed substation sites. The location of other high sensitivity habitat (ridges, mountains) is such that it could easily be avoided.

Results of the biophysical, flora and faunal investigations revealed this corridor as the option that is expected to result in the least impact on sensitive habitat. While sensitive habitat do occur in the central part of this corridor, it would be possible to avoid significant impact by means of careful route selection.

10.12.2. Corridor 2

Comprises the highest extent of High sensitivity habitat and the middle section is regarded the most sensitive section, comprising ridges, outcrops and rivers. Avoiding impacts in these areas would be problematical as no clear corridor could be selected that would avoid these areas. However, these areas are fairly small and isolated and the loss of these sensitive areas, although significant, is not regarded unacceptable.

This option is recommended as the second preferred option, expected to result in moderate impact levels on sensitive habitat in the central part of the corridor. While careful route selection might result in reduced levels of impact, relative high impacts are nonetheless expected to occur.

10.12.3. Corridor 3

Comprises the lowest extent of High sensitivity habitat on the basis of calculations, the nature of the rivers in this option is such that large areas of the central and eastern sections are rendered sensitive to the presence of powerlines. Also, Option 3 comprises the highest extent of Medium sensitivity and the lowest extent of Medium-low habitat and is ultimately regarded the least preferred option. The extensive length of the Elands River that will be situated parallel to the proposed lines is the most significant consideration in this recommendation.

This option is indicated as the least preferred option. The presence of the Elands River that is likely to be affected by the presence of powerlines represents the most significant consideration. Also, the extensive presence of relative pristine habitat where biodiversity 'friendly' land uses are practices renders this option the least feasible.

10.12.4. Corridor 4 and 5

Results of the biophysical assessment indicate that corridors 4 and 5 comprise the highest extent of high sensitivity habitat. In terms of biophysical aspects, these corridors are therefore not preferred.

10.12.5. Delta – Epsilon lines

The turn- ins from Delta – Epsilon (Masa - Selomo) Corridor D to the proposed site C covers areas that are mostly of Medium – Low and Low sensitivity. The distance for the proposed turn-ins present the shortest route, which is expected to result in relatively low levels of impacts on the biodiversity, attributes of the region. This option is considered moderately suitable for the proposed development.

10.13. IMPACT TABLES

The preferred substation site is Site E (Table 28). The recommendation is firstly driven by the distance from proposed Delta-Epsilon Line D and secondly by the sensitivity of habitat that will be affected by the construction and operation activities. The preference ranking of the substations was done taking the associated line sensitivity into account. The most preferred corridor from biodiversity impact perspective is Corridor 1.

Table 28: Impact Tables for Biodiversity

Alternative	Construction		Operational & Decommissioning	
	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation
Corridor 1	31.2	25.9	25.0	19.3
Corridor 2	33.8	31.5	28.6	22.0

Alternative	Construction		Operational & Decommissioning	
	Pre-mitigation	Post-mitigation	Pre-mitigation	Post-mitigation
Corridor 3	37.4	34.3	28.6	22.0
Corridor 4	37.4	34.3	28.6	22.0
Corridor 5	37.4	34.3	28.6	22.0
Site C	37.4	34.3	23.1	20.2
Site D	28.1	22.2	25.4	22.2
Site E	24.6	21.6	25.4	22.2
Site L	37.4	34.3	23.1	20.2
Site M	37.4	34.3	23.1	20.2

10.14. MITIGATION MEASURES

The most important mitigation measure is the exclusion of sensitive areas from the proposed development. By limiting development to areas of lower ecological sensitivity, most of the impacts associated with high significance events will be avoided altogether. Refer to the specialist report in Appendix 5 for a comprehensive list of mitigation measures.

11. HERITAGE

Archaeological remains are defined as human-made objects that reflect past ways of life deposited on or in the ground. In most instances these objects are often not visible above ground due to the disturbances that may have occurred as a result on various anthropogenic activities and as a result most archaeological resources are underground. The heritage of the area is heavily affected by mining and agriculture such that the cultural landscape, in particular, is generally disturbed from its original condition.

Stone Age settlement

Although several scatters of Middle Stone Age tools were noted, no manufacturing or base camp site was identified.

Iron Age settlements

A total number of 10 Late Iron Age stone-walled settlements were recorded in the survey area. Three of these locals are associated with the mega site known as Marothodi, the erstwhile capital of the Batlokwa, a Tswana-speaking group that still lives in the area today. Marothodi is up for nomination as a Grade 1 (National) heritage site. Most of the Iron Age sites date to the late 18th to early 19th centuries and are associated with Tswana occupation.

Historical buildings and features

A total of four farm house complexes were recorded, but this number could be substantially higher due to the fact that earlier farm complexes have been demolished or vacated. Mostly only foundation structures remain. The early farm houses date to the 1880s when the land north of Rustenburg was surveyed for the first time. This early date is also substantiated by the Surveyor General's transfer date of the farms which is 1880s and 1890s.

Graveyards

A total of 10 graveyards, cemeteries and isolated graves were recorded. Although some are formalised cemeteries, most of the graves are unmarked and are therefore by default regarded as older than 60 years. According to the NHRA (Act 25 of 1999) four general categories of graves can be identified, which are:

- Graves younger than 60 years;
- Graves older than 60 years, but younger than 100 years;
- Graves older than 100 years; and
- Graves of victims of conflict or of individuals of royal descent.

Most of the graves are therefore protected by the NHRA (Act no 25 of 1999), Section 36. The two shrines are part of 'living heritage' and are used for religious practices. These features and their associated practices should be treated with respect.

However, also note the following:

It should be kept in mind that archaeological deposits usually occur below ground level. Should archaeological artefacts or skeletal material be revealed in the area during construction, such activities should be halted, and a university or museum notified in order for an investigation and evaluation of the find(s) to take place (*cf.* NHRA (Act No. 25 of 1999), Section 36 (6)).

11.1. IMPACT ASSESSMENT FOR HERITAGE

Sites C,D,E and L are preferred substation sites as they occur in open spaces with no associated heritage sites. The most preferred corridor from the heritage impact perspective is Corridor 3 followed by Corridor 5 (Table 29).

Table 29: Impact Assessment Table for Heritage

Site	Preference	Comments
Site C	Preferred option	Open spaces with no associated heritage sites. Located on old agricultural fields
Site D	Preferred option	Open spaces with no associated heritage sites. Located on old agricultural fields
Site E	Preferred option	Open spaces with no associated heritage sites. Located on old agricultural fields
Site L	Preferred option	Open spaces with no associated heritage sites.
Site M	Less preferred option	Two LIA sites are located on a spur at the location of this option. Because the substation is located on top of a spur mitigation will be difficult, as space for alternative placement is limited.
Corridor 1	Less preferred option	Most of the heritage sites were recorded on this option, including the LIA site known as Marothodi. This aspect and its proximity to Pilwe Hill with other known archaeological sites, makes this option less preferred.
Corridor 2	Less preferred option	Most of the heritage sites are contained areas and damage can be avoided. Proximity to Pilwe Hill with known archaeological sites, makes this option less preferred.
Corridor 3	Most preferred option	Least number of heritage sites and follows the Elands River floodplain where the potential for other sites are low.
Corridor 4	Less preferred option	Two LIA sites are located on a spur on the southern section of this option. The sites are located in the area where the line terminates at the proposed substation M. Because the substation is located on top of a spur mitigation will be difficult, as space for alternative placement is limited.
Corridor 5	Preferred option	No heritage sites recorded. The line follows existing infrastructure (e.g. roads).

11.2. MITIGATION MEASURES

- Construction supervisors and crews must be trained to recognise archaeological or cultural-historical 'chance finds' during construction.
- If finds are encountered, then these will not be disturbed, damaged or removed, but will be brought to the immediate attention of the ECO. An archaeologist will be brought in to assess the finds, and who will make specific recommendations at that time.
- All work around the site should be immediately discontinued so as to avoid damage to the site until the specialist has given the go-ahead for work to continue.
- The impact of overhead power lines on heritage resources will generally be low as the only footprint left are the towers which cover a limited area; the power lines can be constructed so to avoid heritage sites and heritage sites can be conserved beneath power lines if pylons are spaced in such a way that they do not affect the sites.

12. SOCIAL

A number of issues that are relevant to the social context were noted during the public participation process. These included the following main issues:

Line Routing: Landowners are of the opinion that Eskom will choose a shorter, more economical route. The economic assessment should also take cognizance of the losses to be encountered by the landowners and not only focus of the economic implications to Eskom.

Land Issues and Compensation: Landowners are concerned about the visual impact of the proposed power lines as they believe that this will chase away international clients, some of the landowners are doing game farming and that compensation should be made for property devaluation and loss of business.

Health and Safety: Main concern from stakeholders is about the danger posed by the powerline passing through the area, because they think the lines can burn or start veld fire.

Job Opportunities: Stakeholders wanted to know what kind of jobs will this project bring and they requested establishment of local office that would be responsible for employment.

Land use changes occur as a result of the construction activities, servitude and presence of the line and towers, which could result in psychosocial and safety impacts on people and animals. The planned substation and power lines will thus have to be adapted to accommodate anticipated developments in the project area, particularly with regards to tourism, agriculture and mining. The trade and manufacturing sectors are usually closer to the urban areas and are therefore unlikely to be directly affected by either the substation or the new power lines.

A substantial proportion of the study area is occupied by mining property, particularly where the proposed substation sites are located. Agriculture is also evidently a predominant land use type, particularly along corridor 3 and parts of corridor 2. Land use changes are therefore considered in the subsequent sections in terms of agriculture, mining and tourism.

Agriculture – Cultivated lands: As stated above, Corridor 3 contains the greater share of cultivated lands. This follows the Elands and Roosspruit rivers and which are utilised for irrigation, including some centre-pivot irrigation. The cultivated strip along the rivers is between 1km and 2km wide, so to avoid the cultivated areas in Corridor 3, the new lines will need to be at least 2km from the river. In Corridor 2, there are a number of old lands in the western sections and some of these may be actively cultivated. However, most of the lands appear to be dryland cropping.

The impact of the proposed substation sites does not appear to be significant on cultivated lands, but particularly sites D and E which are in the mining areas. The substation will prevent any other land use taking place and full financial compensation will need to be made. Substations placed next to cultivated lands may affect some of the operations mentioned below, but it will be the power lines that are likely to have the more lasting effect.

The presence of the lines does not automatically indicate loss of croplands and cultivation. Most cultivation activities may continue under Transmission power lines. However, there will be some impact:

- Ploughing around tower structures and anchor lines. This will reduce planted areas and the efficiency of the lands, but will not stop cultivation. The anchor lines can be marked to avoid collision.

- Disruption of irrigation systems. Most irrigation systems, including centre-pivot systems can operate under transmission lines, although this is not a preferred condition. In most cases the lines will be placed to minimise disruption to centre pivot operations, unless there are very dense areas of centre pivots, such as is found on the Crocodile River to the north. The pivots along the Elands River are generally fairly widely spread.
- Pest control by crop spraying. Aerial crop spraying (fixed wing or helicopter methods) are dangerous in the vicinity of power lines and should not be done (usually within a distance of 1.5 to 2km). This affects pest control and the production of the lands. Crop spraying can take place above the lines, but the effect has been shown to be limited. Therefore, as a result, production levels will be affected if spraying is usually done by aerial methods. In some cases crop spraying still continues in the presence of power lines, but this is a highly dangerous practice and is not recommended.
- Impact on GPS navigation systems. GPS navigation systems are becoming more widely used in South Africa, particularly in the Potchefstroom areas. These are highly sensitive and accurate GPS units that improve mechanical cultivation and overall production of the lands. Satellite signals to the GPS systems, unlike hand held units, are disrupted in the presence of high voltage power lines, and may take up to 45 minutes to stabilise. This severely disrupts cultivation activities, and will limit application of GPS navigation on lands crossed by power lines. Therefore, production will again be reduced.
- Uncontrolled access to farms and potential damage to crops during both construction and maintenance of the lines. These costs may be reasonably accurately calculated and compensation paid. However the nuisance factor and invasion of privacy is often a continual irritation to the farmer.
- Some loss of value of the property may occur if, because of the presence of the lines, it is perceived by prospective buyers that the productivity of the land is reduced or impaired by the power lines. It is important that this issue is carefully considered by the landowner at the time Eskom negotiates the servitude.

Agriculture – Grazing lands: Extensive grazing (as opposed to intensive) and livestock farming appears on all the routes, though it appears most prevalent on Corridors 1 & 2. Intensive stock farming (feed lots, chicken farms) is not evident in the corridors.

Grazing land is generally one of the least impacted by transmission power lines. The main issues include:

- Health of the animals in the vicinity of the lines. Concerns are frequently raised about the potentially harmful effects of EMFs (Electric and Magnetic Fields) generated by power lines, on livestock, and especially breeding livestock. International research on this issue is not conclusive, but the approach adopted by Eskom follows the precautionary principle; provided animals or people are not confined to being under the power lines for long periods of time, the risk of health effects from EMFs is very low. Therefore the lines should not cross over chicken houses, stables or milking parlours, but free range animals are seen to be at very low risk. It is not seen that any of the corridors threaten such structures. There may, however, be breeding camps where cattle or game is confined to a small area (e.g. <1ha) under power lines for periods of time for breeding purposes. Under these situations, it would be recommended to move the lines away from the breeding camps.

- Gates left open, animals stolen or escaped. Gates are usually placed at the points where the new lines cross boundary fences. Although only Eskom and the land owner should have the keys to these gates, there are frequently reports of problems with these gates. Invariably an Eskom contractor leaves a gate open, or the gates are used by other for access to poach game or steal livestock. Mitigation for this is described in the point below.
- Unauthorised access and invasion of privacy. Maintenance crews are required to access the site to maintain the servitude to protect the power line. Tree under the lines are trimmed or removed, and at time grass may be cut. It is not uncommon these maintenance crews to arrive unannounced, and be found by the farmer on his land by chance. Additionally, there is risk of bush fired started by contractors, and of waste left behind by them. The preferred mitigation for this issue is to allow the landowner to undertake maintenance of the servitude according to Eskom specifications, and to be compensated by Eskom for the work done. This limits access by maintenance crews that will come annually, or once every two years. However, Eskom will still need to inspect the servitude (usually by air/helicopter), and will still need right of access for emergencies and to repair damaged lines.
- In general, power lines have relatively small impact on farms used for extensive grazing, including a relatively low impact on property values as production should not be affected.

Overall, Corridors 1 and 2 offer the least impact on agricultural land, in particular Corridor 1 where there are fewer cultivated lands. The impact is seen to be low in both cases, provided adequate mitigation is undertaken (mainly the management of the construction and maintenance phases). Impact on Corridor 3 is seen to be moderate if the lines are routed to avoid centre pivot installations.

The potential impact of the development on the agricultural sector as a whole, both in the district and in terms of the national contribution is seen to be low, as most of the existing activities should still be able to continue once the lines and substation are operational. Furthermore, the contribution of the study area to the national agricultural sector is relatively small.

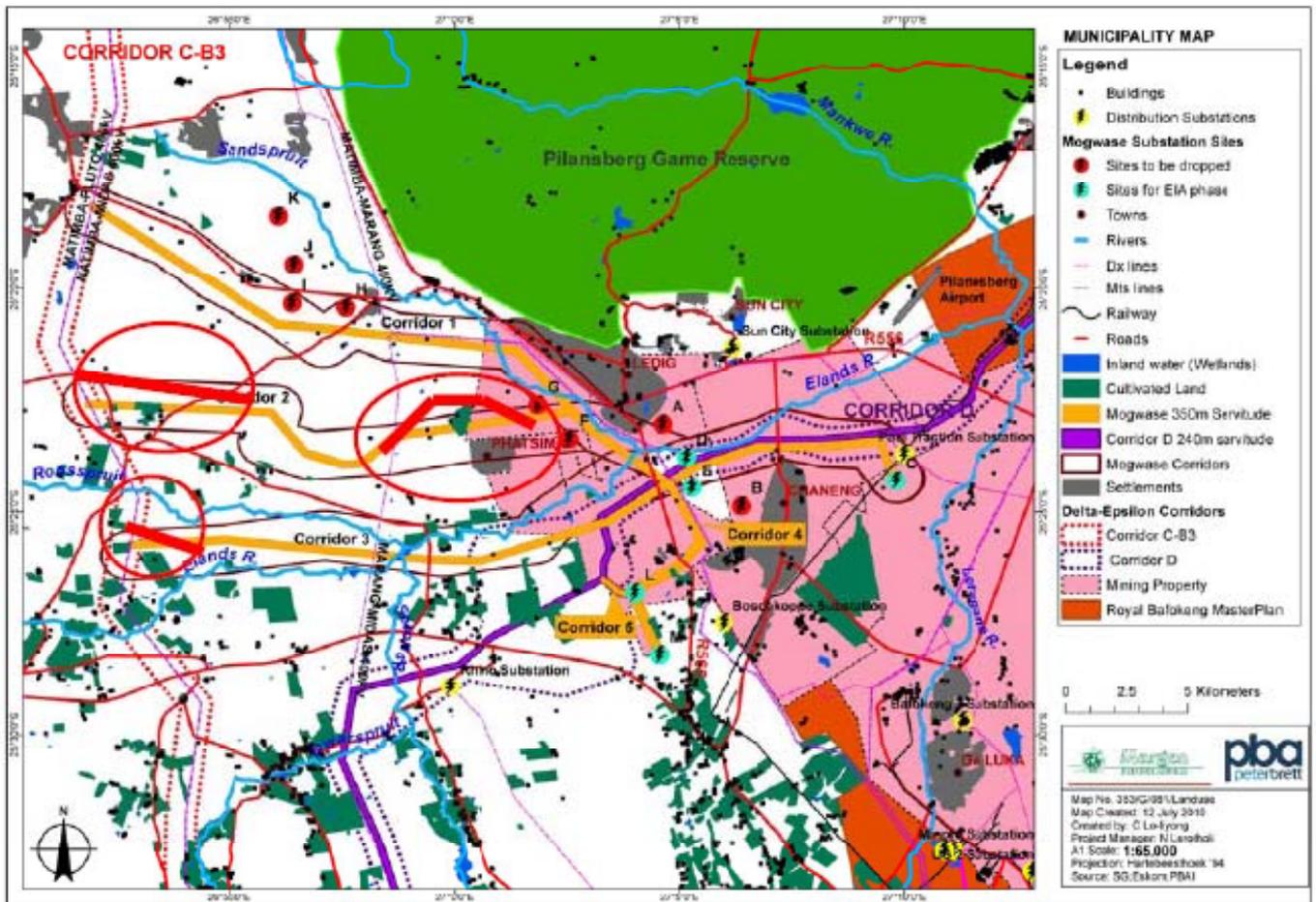


Figure 30: Proposed deviations (red lines) to avoid cultivated land along corridors 2 & 3

Mining – Mining is an activity that is very intensive in land and energy use. The location of a mine and its operations are determined by the location of the ore, and operational costs arising from movement of the ore and other resources between the mining site and the processing site. Mining being a production activity, the norm is to have operations running uninterrupted 24 hours a day. With such a set up, operational costs are kept to manageable levels and output is optimised. It is evident therefore that electricity is used intensively in this regard, and any interruption in power supply results in huge losses, both on the costs side and on the output side.

The mining sector in the study area is one of the main consumers of electricity and is also one of the main growth sectors. Therefore the mining sector will benefit directly from the proposed substation and power line development. As the major economic contributor to the GDP of the Bojanala District Council, securing the growth potential of the mining sector will have direct benefit to the district. Furthermore, the district contributes to almost 20% of the mining economy of the country, and future growth will therefore have national benefit.

Substations and power lines are also similar industrial land uses to that of mining, and it would make sense that this new infrastructure should be placed close to, and within, the mining area. However, power lines and substations are not necessarily compatible with mining operations and can restrict surface activities and even sterilise mineral resources.

The corridors under study all pass through the mining areas, and through Platinum Group Metals property mostly. The substation sites are also located on property owned by Implats, Wesizwe and Platinum Group Metals. Therefore there has been close liaison with these mines during the study.

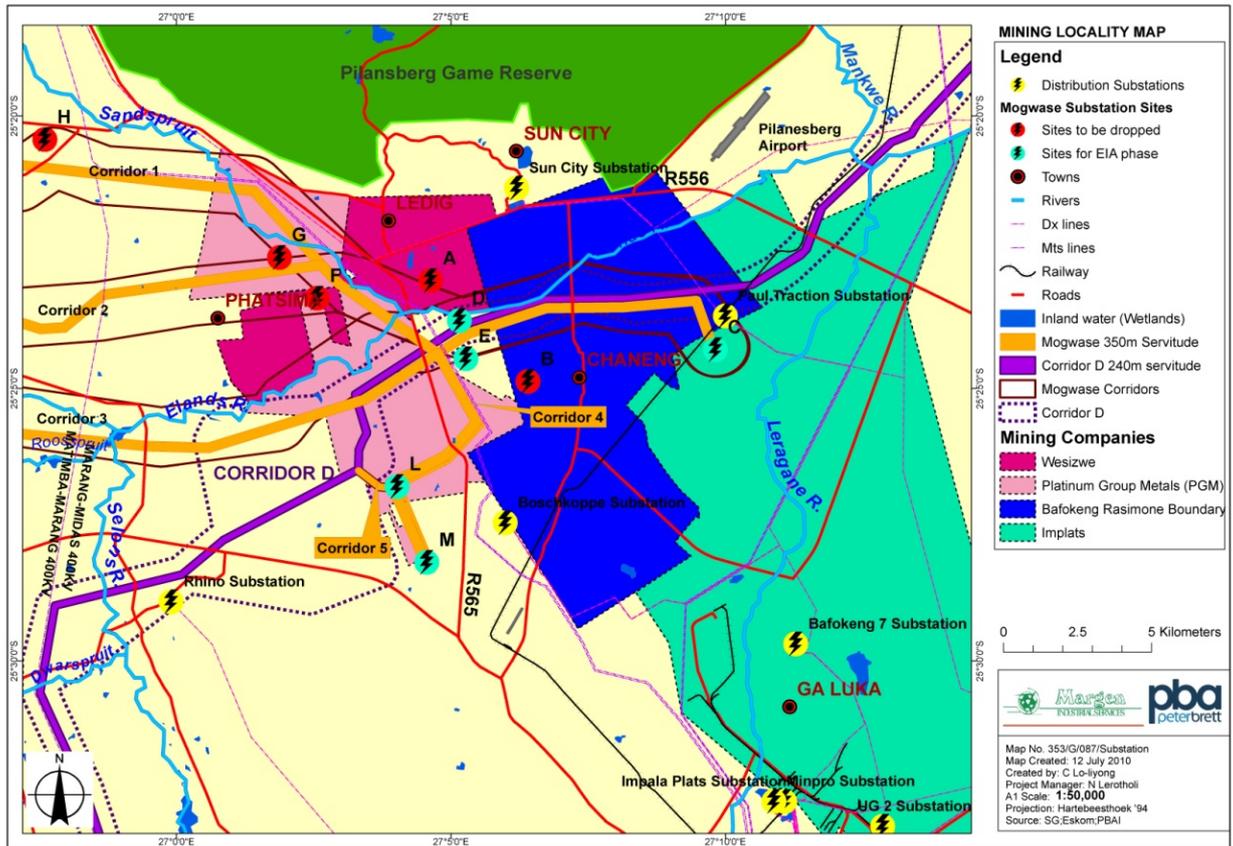


Figure 31: Mining Locality Map

There is currently no surface infrastructure for mining on any of the proposed substation sites, and none of the mining houses have indicated plans to sink shafts in the vicinity of the proposed substation sites, although there is new mining development close to sites D and E along the Elands River. The proposed corridors should also not have any significant impacts on mining operations in the area. Nonetheless, it would still be necessary to work closely with the mining companies in the selection of the most suitable corridor and substation site that would allow for future expansions.

Without disruption of surface operations, there should be minimal impact on the mining sector. There may need to be careful placement of the substation platform and power line towers during the negotiation and design stages of the project, but it is understood there is sufficient space for the electricity new infrastructure within the alternatives presented in Figure 32. Either substation sites D or E would be preferable in terms of location within the load centre and supply direct to the mines. However, location of the substation at sites C, L or M appear to be feasible in terms of mining related impacts.

Therefore, with careful placement if the new infrastructure during negotiation and design, the overall impact on the mining sector is seen to be moderate to moderate-high.

By the association mentioned in Section 3.7, impacts on the manufacturing and trade sectors are similarly seen to be positive, though perhaps less direct. A moderate-low to moderate-high impact is considered to be the level of impact.

Tourism – The North West Province is not seen to be one of South Africa’s top tourism destinations, but it still hosts two nationally important tourist locations; Sun City and the nearby Pilanesberg Game Reserve. Proximity to the Gauteng Province means that it is one of the closest locations for big game viewing and wilderness activities.

The effects of a High Voltage Transmission Line (HVTL) on the tourism industry mainly have to do with the visual and aesthetic impacts. Establishments offering nature and scenic landscapes will be highly sensitive to the visual intrusion of transmission power lines. The power lines areas are an industrial feature, and out of place in wilderness environments. There is therefore a risk of reduced tourist visits to the area. Areas of concern, or those that are considered highly sensitive, include national parks, private lodges and private game farms offering hunting and photo safaris to international visitors.

A study of tourism related land use in the Delta-Epsilon EIA highlighted the Pilanesberg National Park/Sun City to the north and private game farms and the Magaliesberg Biosphere to the south of the Elands/Roosspruit rivers as being the most sensitive areas in this part of the province. Corridor 3 lies on the northern edge of this area. The areas around Chaneng and Ledig, and further east and west indicated relatively low tourist related land use and therefore potentially less sensitive to the visual intrusion of power lines from a tourism perspective. This includes Corridors 1 and the substation sites C, D and E. Additionally, land use around these substation sites and along the Elands River to the east of Ledig is mining and will continue to develop industrial-type infrastructure as this mining sector grows. Therefore, views south from the Sun City and Pilanesberg areas will see an industrial landscape, and the addition of the substation and power lines is estimated to be a lower cumulative impact than placing this new infrastructure further south at sites L and M.

The impact of corridor 1 is therefore expected to be minimal given the low level of tourism in the area, as a major portion of this corridor runs along areas without much scenic value. Additionally, no game farms have been identified within corridor 1. There are, however, lodges and game farms along corridor 2 and corridor 3, such that the proposed project might have a negative economic impact on the tourism industry within these corridors. There are also planned developments of lodges and chalets on farm Grootwagendrift 233, which is along corridor 3. Consultations with landowners indicated that corridor 3 is not preferred, specifically because of the game farming activities occurring in the latter part of this corridor around farm Onderstepoort 98 and its surrounds. Sundown Ranch located on farm Elandsfontein 102 JQ also has a lion park. During consultations, the managers of the Sundown Ranch indicated that they are not concerned about corridor 4 and 5 running through the farm, as well as the locality of substation sites E and L. These proposed alternatives would not affect commercial activities, as there is already a smelter and powerlines going through the area, such that it is not so pristine anymore.

In addition to the visual impact, there are a number of other potential impacts relating to the tourism industry that may arise.. During the construction period, it would not be possible to hunt or view game in the affected farms. This is partly due to safety considerations for construction personnel, but also because very few tourists/hunters would be interested in viewing or hunting game in close proximity to a fairly large construction site. The landowner could, therefore, potentially suffer a loss of income for the duration of the construction period. Furthermore, during the operation phase, game capturing by helicopter becomes dangerous when game has to be captured in the vicinity of a power line. The lines would have to be clearly marked to avoid collisions of low-flying helicopters herding game.

Overall, the impact on the tourism sector in the study area is seen to be moderate-low to moderate if the lines follow Corridors 2 or 3, and low if the lines follow Corridor 1. Substation sites within the mining areas are preferred, including Sites C, D and E, where the impact on tourism is seen to be low. The impact on the nationally significant sites of the Pilanesberg and Sun City are seen to be low.

Property Value – External factors such as the presence of adverse conditions or features adjacent to the property that are beyond the owners' control can, and in most cases do, affect property values. Examples of such external factors include dumps, bad odours, neighbours who allow their property to deteriorate, and power transmission lines.

In general power lines and substations are seen to have negative influences on property values. From a study by Demacon (2009), power lines may reduce property values by anything from 5% to 30%, depending on the property and land use. In this study area, properties with minimal improvements and more remote from urban centres tended to attract the lower values (typically <R7,500/ha). These included cattle farms and grazing land. These properties would normally be impacted the least by the presence of power lines.

The next category of value (R7,500-R20,000/ha) included properties with some investment value and included game farms with some tourism component. The next category (R20,000 to R40,000) offered higher levels of productivity and included game farms with a greater tourism investment value. Above this the land use included high end irrigation farms with equivalent high production potential, mining areas and properties close to urban areas.

It is the higher value properties that are likely to be affected more by the presence of power lines, though this would exclude mining and industrial properties where the presence of lines may actually add value provided there is no disruption of operations. This emphasises that properties where value includes scenic quality will be more affected than properties valued primarily on production or location to services.

From the studies to date, the likely disruption to mining activities are understood to be small and the presence of the power lines and substations generally seen as a positive addition to the environment. As such, the impact on mine property values (provided there are minimal disruption of surface operations) is seen to be minimal. Hence impacts on property values on sites C, D and E, and on the corridor along the Elands River east of Phastima, is seen to be low.

The land use along corridor 1 is seen to be largely cattle farming and some game farming without much tourism. Here again, the impact on property values is expected to be low.

In corridors 2 and 3, but particularly 3, the presence of both some irrigation farms and game farms with tourism components, the potential impact on property prices is anticipated to be moderate-low to moderate.

There are measures that can be taken to reduce the impact on property values if the power lines cannot be routed away from the property in question. These include:

- Running the lines along existing linear infrastructure (eg roads, rail lines, other power lines). This is possible along corridors 1 and 4 in particular.
- Following farm boundaries where possible. This is often difficult, especially with transmission lines where Eskom prefers to avoid bends where possible, but in some cases it may be possible to achieve this. This generally reduces the land area disrupted by power lines. This is possible in part for corridor 2, but is very difficult to achieve for corridors 3 and 5.

With this in mind, it appears that corridors 1 and 4 are the options that would have the least impact on property values.

12.1. MITIGATION MEASURES

- Poverty and equity: A form of compensation should also be granted to individuals who are residing in informal settlements within the servitude and assistance with relocation should be given. This issue should be approached with caution as this might set a precedent for future projects (people might deliberately move onto a servitude for the purpose of receiving compensation). Photos of the servitude should be taken prior to the negotiation process to monitor opportunistic settlement in the servitude for the purpose of being compensated.
- Compensation should not focus on monetary compensation only and should also include re-establishment of livelihoods. Where necessary, impacted people should be assisted to move, and should receive counselling.
- Local customs should be acknowledged. E.g. the necessary ceremonies should be performed during the relocation and reburial of graves and Eskom should compensate affected families. However, this is unlikely to happen as Eskom would reroute the line and/or move towers to avoid this.

13. VISUAL

The Visual Impact Assessment (VIA) study aims to determine the aesthetic value of the visual resource (receiving environment) and the influence of the proposed development on the receiving environment from a visual impact point of view. To this end, a baseline study was carried out in which the landscape character, landscape quality and sense of place were used to evaluate the aesthetic value of the visual resource or the receiving environment. The assessment also includes the evaluation of the visual receptors.

Visual Intrusion: of the proposed project components will be simulated in order to determine the nature and degree of intrusion within the study due to this project.

Visibility and Visual Exposure: Visibility will be determined by conducting a view shed analysis in order to determine all potential observation sites (the view shed) from which a project component would be visible. The relative distance of the viewer from the proposed component will determine visual exposure.

Impact on the Visual Environment and the sense of Place of the Study Area: Using visual intrusion, visibility and visual exposure criteria, along with criteria that determine the sense of place, the magnitude of the impact on the visual environment and sense of place will be predicted. The significance of the impact will then be qualified in terms of sensitivity (landscape and visual receptors), extent, duration and probability of the impact. The cumulative impact of visual impacts of the operational activities will also be identified and rated.

13.1. ASSESSMENT OF PROPOSED SUBSTATION SITES

13.1.1. Site C

The proposed site is located on old agricultural fields approximately 3.5km to the east of Chaneng Township. The area is relatively flat and the vegetation in the area is open grassland with scattered trees. The railway line passes just north of the proposed site and the mine activities are located approximately 1.7km south-west of the site. The activities associated with the proposed site are a mixture of open grassland and human activities and therefore the scenic quality / visual resource value is considered to be *moderate*.

13.1.2. Site D

The proposed area is relatively flat with a slight slope towards the Elands River. The vegetation in the area is a combination of grassland and open woodland. Existing mining activities are located approximately 5km south of the site and to the west are the existing power lines. The site is also located close to the residential townships. Due to the combination of high, moderate and low visual resources the scenic quality / visual resource value for Alternative Site D is considered to be *moderate*.

13.1.3. Site E

The proposed area is relatively flat with a slight slope towards the Elands River. Alternative Site E is located further away from the Elands River but next to one of the tributaries of the Elands River. The vegetation in the area is a combination of grassland and open woodland. The natural element of the site is disturbed by human activities such as townships, power lines and mining towards the south. Due to the combination of high, moderate and low visual resources the scenic quality / visual resource value for Alternative Site E is considered to be *moderate*.

13.1.4. Site L

This site is located approximately 1.7km west of the R565 and 1km south-west of Sunset Ranch. The vegetation is a combination of woodland trees and grasses and one of the

tributaries of the Elands River runs to the east of the site. To the west of the site is a koppie and land use activities surrounding the site include tourist / holiday accommodation and farming activities. Considering the landscape character of the site it can be said the proposed site has a **high** scenic quality / visual resource value.

13.1.5. Site M

This site is located approximately 1km west of the R565 and almost directly across the road from the Boshhoek Mining Area (2.5km south-east of Site M). The vegetation in the area is open grassland which appears to be grazing field or old agricultural fields. The surrounding vegetation is woodland. Other activities include the farming activities to the east and the south of the site as well as farmsteads and the lodges (Boshhoek Farm Lodge and Boskloof Guesthouse) to the south-west of the site. The proposed site is a combination of natural elements and human activities and therefore has a **moderate** scenic quality / visual resource value.

13.2. ASSESSMENT OF CORRIDOR OPTIONS

13.2.1. Corridor 1

The landscape character along Corridor 1 varies from areas that have a high visual resource such as the koppies, river and the natural vegetation areas to areas with lower resource value such as the roads, residential areas and along the existing power lines. The scenic quality / visual resource value thus also differs from area to area but half of the route alignment is next to the existing power lines, roads and the residential areas which give Corridor 1 a **low to moderate** scenic quality / visual resource value.

13.2.2. Corridor 2

The corridor is aligned from a westerly direction and runs over grassland areas, along the mountain and koppies before it passes north of the Phatsima Township and connects with the proposed Substation Alternatives D and E. The proposed alignment has fewer areas that has been compromised by human activities and runs along more areas with higher visual resource values and therefore has a **moderate to high** visual resource value.

13.2.3. Corridor 3

The proposed Corridor 3 stretches over a mixture of agricultural lands and grassland areas and runs more or less along the Elands River for a greater percentage of the route alignment. The corridor also passes through two koppies. The only human activities along this route are the agricultural fields and the farmsteads. It can therefore be said that the scenic quality of the route alignment varies from **moderate to high**.

13.2.4. Corridor 4 and 5

Corridor 4 runs in a north-south direction and is aligned along the R565. It crosses over the Sundown Ranch before it connects with Alternative Site L and M. Corridor 5 is a short connection between Corridor D and Alternative Site L. The scenic quality / visual resource value of these corridors can be rated as **moderate**.

13.2.5. Delta-Epsilon Corridor D

The alignment traverses various land uses that differ from the natural areas (open grassland, rivers, mountains and hills) to cultivated lands and farmsteads. The proposed corridor passes between the Ledig and Chaneng Townships. There are not a lot of human impacts along the route and the main human activities are agricultural activities. The dominant landscape along the route is the natural landscape areas. The turn-ins of Delta Epsilon Corridor D towards the

Substation Alternatives D, E and C have more human activities especially with the towns of Ledig and Chaneng as well as surrounding mining activities. It can therefore be said that the section of Corridor D up to the substation alternative D and E has a **high** scenic quality and the section between Substations D, E and C (Including the turn-in to Substation C and D) has a **moderate** scenic quality value.

The intensity of visual impact is determined using visibility, visual intrusion, visual exposure and viewer sensitivity criteria. When the intensity of impact is qualified with spatial, duration and probability criteria the significance of the impact can be predicted (refer to Appendix C).

In synthesising the criteria used to establish the *intensity* of visual impact (visual intrusion, visibility, visual exposure and sensitivity), a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful, and should not be used as a substitute for reasoned professional judgement.

A summary of the intensity of impact predicted for the substation alternatives and the corridor alternatives is indicated in Table 8 and derived from the discussion in the preceding sections. Refer to Table 30 for the summary of the scenic quality of the Corridors and the substation alternatives.

Table 30: Intensity of Visual Impact

<p>High Corridor 2 and 3</p>	<p>Moderate Corridor 4 and 5 Substation Alternatives C, D, E, L and M</p>	<p>Low Corridor 1</p>	<p>Negligible</p>
<p>Total loss of or major alteration to key elements, features, characteristics of the baseline environment.</p> <p>I.e. Introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape.</p>	<p>Partial loss of or alteration to key elements, features, characteristics of the baseline environment.</p> <p>Introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape.</p>	<p>Minor loss of or alteration to key elements, features, characteristics of the baseline environment.</p> <p>Introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.</p>	<p>Very minor loss or alteration to key elements, features, characteristics of the baseline environment.</p> <p>Introduction of elements that is not uncharacteristic with the surrounding landscape – approximating the ‘no change’ situation.</p>
<p><i>Result:</i></p> <p>High scenic quality impacts and major loss of attributes of pre-development views.</p>	<p><i>Result:</i></p> <p>Moderate scenic quality impacts and moderate loss of attributes of pre-development views.</p>	<p><i>Result:</i></p> <p>Low scenic quality impacts and minor loss of attributes of pre-development views.</p>	<p><i>Result:</i></p> <p>Negligible scenic quality impacts and loss of attributes of pre-development views.</p>

13.3. IMPACT TABLES

The *intensity* of impact, rated in Table 31, is further qualified with *extent*, *duration* and *probability* criteria to determine the *significance* of the visual impact. In this case a numerical value is attached to the various criteria to establish the value of the significance of the potential impact.

The proposed options for the power line corridor and the substations were compared and the result of the comparison is that Corridor 1 is the preferred route for the power line. This is mainly due to the fact that the visual resource value / scenic quality is low and that due to the existing infrastructure the power lines will be less intrusive. The viewers along this corridor are also exposed to the existing infrastructure and already have power lines in the middle ground of their view.

According to the impact assessment the intensity as well as the significance of the visual impact of all the alternatives for the substation location will be moderate. The visual impacts will be easier to mitigate as vegetation screens can be planted on the boundaries of sensitive viewer locations. The sensitive viewers vary from residential areas, lodges and guest houses to farmsteads and local farm roads.

As stated above, the impact of the proposed substation would be very similar for each of the proposed sites due to the relative close location of the proposed sites in relation to each other. In the opinion of the author the best proposal would be Alternative Site C as this site is located close to the Paul Traction Substation, thus localising the impact of the disturbance / visual intrusion.

Table 31: Impact Table for Visual Impacts

Site	Level of Significance Pre-Mitigation (Operation and Maintenance)	Sensitivity Class Pre-Mitigation	Sensitivity Class Post-Mitigation
Site C	52	Medium - High	Medium
Site D	52	Medium - High	Medium
Site E	52	Medium - High	Medium
Site L	52	Medium - High	Medium
Site M	52	Medium - High	Medium
Corridor 1	44	Medium	Medium
Corridor 2	60	Medium - High	Medium
Corridor 3	60	Medium - High	Medium
Corridor 4	52	Medium - High	Medium
Corridor 5	52	Medium - High	Medium

13.4. MITIGATION MEASURES

- It is proposed that as little vegetation as possible be removed for the construction of the substation.
- Screening vegetation should be planted.
- It should be noted that screening vegetation is much more effective when planted closer to the sensitive viewer location. For example when planted on the boundary on Chaneng Township.
- Indigenous vegetation should be used when planting the vegetation screen.
- Direct lighting away from possible views.
- Use security lighting that is motion activated upon illegal entry and movement only i.e. this way the lights will mostly be off and not be the cause of extensive light pollution
- A registered Landscape Architect (SACLAP) should be appointed to design the relevant mitigation measures and to ensure that they are effectively implemented.
- It is proposed that corridors should follow existing power line routes / roads or farm boundaries where traversing farm land.

14. FLOODLINES

Indicative floodlines have been developed for 8 sites within the project area. Sites selected for assessment were based on following criteria:

- i) Location of a potential watercourse crossing point for a powerline
- ii) Potential site location for substation near a main river
- iii) As floodlines are indicative, sites were selected to be as representative of surrounding channel and floodplain conditions as possible.

The location of sites selected for assessment can be seen below in Figure 32.

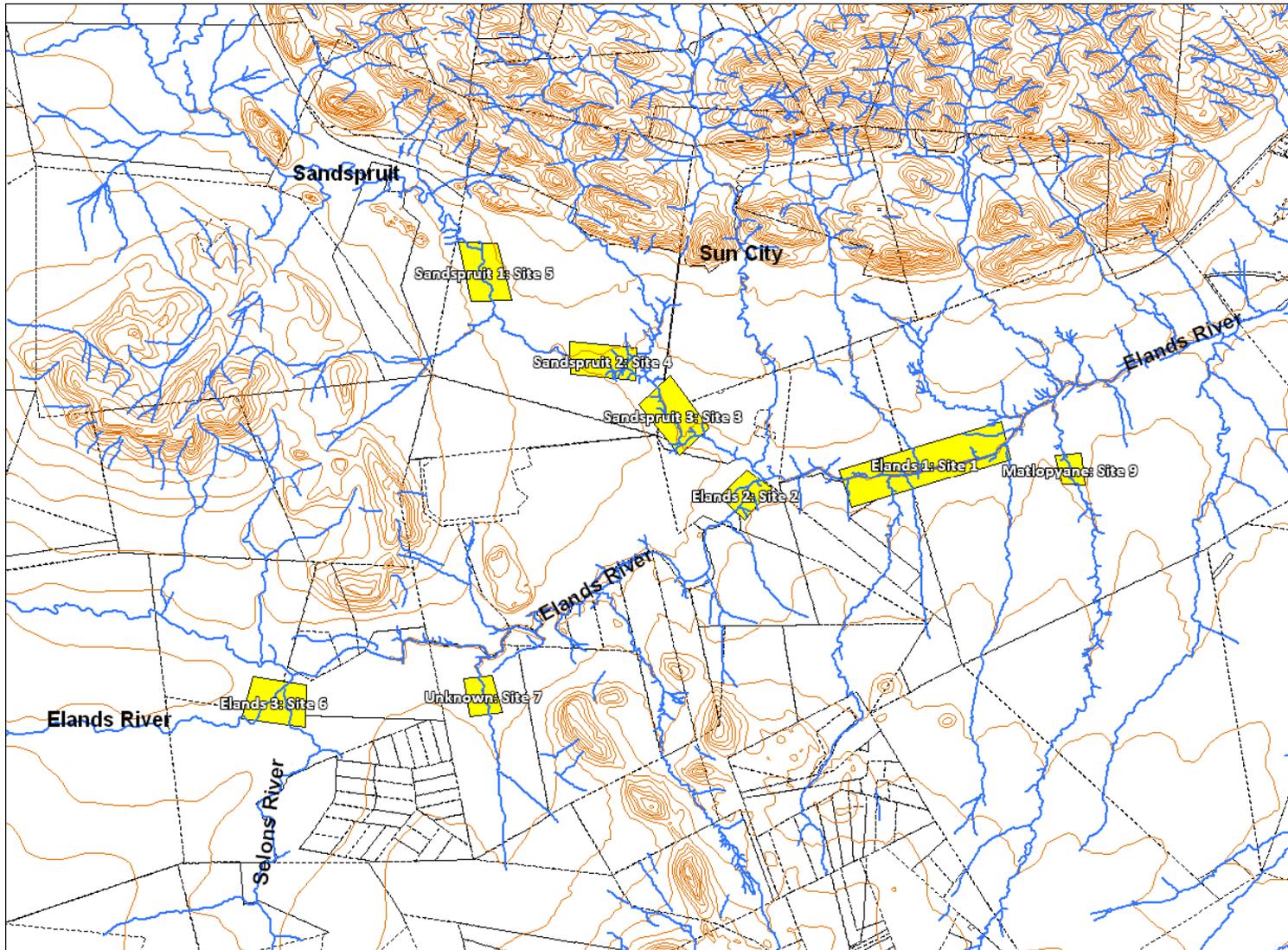


Figure 32: Study site locations

The resulting flood stage at each section surveyed is plotted onto the map, using original survey points for reference. These cross sections were then linked together using indicated floodlines. The positions of the indicated floodlines presented in this report are interpreted from topographical conditions suggested by SG 20m contours.

14.1. ASSESSMENT OF SUBSTATION SITES

The only substation site that appears to be near a substantial watercourse is Substation Site D.

Figure 33 below shows potential locations of the proposed 600m x 600m substation footprint. As a general guide, the substation should be a minimum of 100m from the 100 year floodplain on the Elands River, and 100m from the local drainage lines. This should be possible to achieve, but may need slight adjustment to the footprint to accommodate the substation at the upstream location. The downstream location appears more open, but may be interfering with the new mine development on the right bank just north of Chaneng. This has not been investigated.

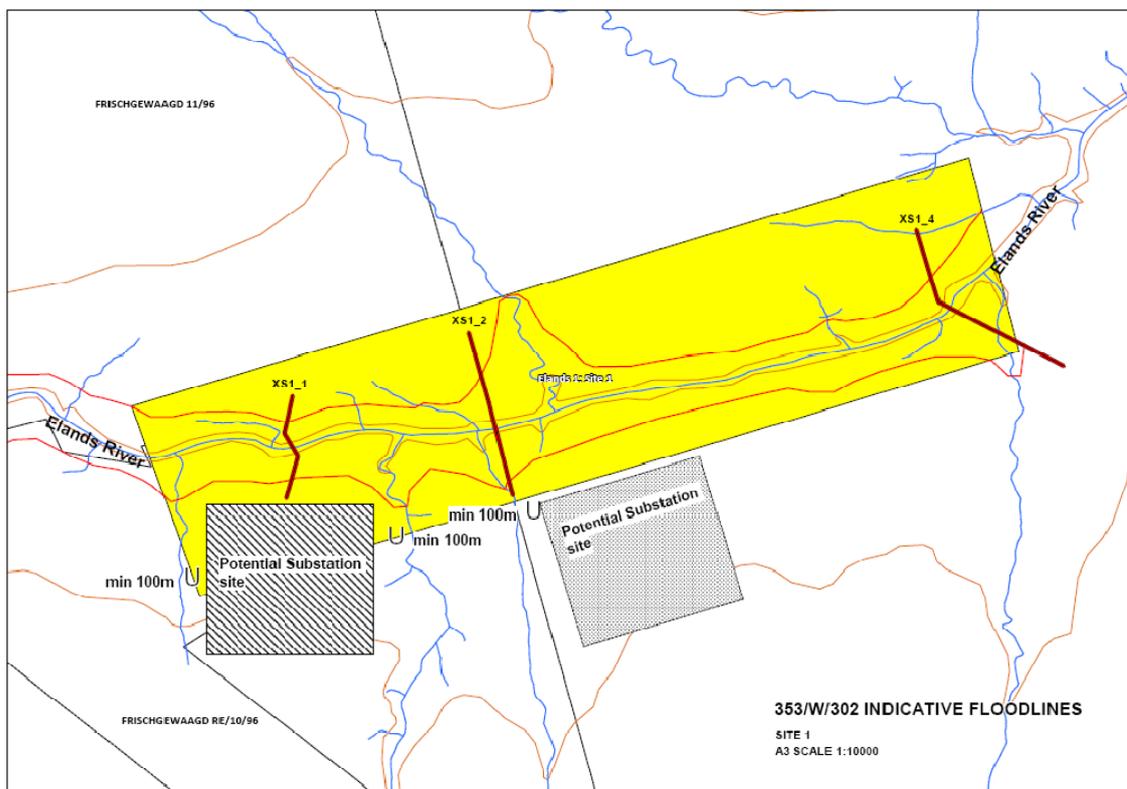


Figure 33: Site D Footprint from Elands River

Should development within the Elands River floodplain be considered, the following should be assessed:

- Flood impact on the structure and its operation. The average flood width in this area is estimated to be 350m-400m, and floodplain depths up to 1.5m. Flow velocities are estimated to be less than 1m/s. These normally do not pose any real difficulties for design of the foundations and base of the substation, so the risk of impact on the structure is seen to be low and manageable (though the cost of the mitigation on the design of the structure will be higher). However, detailed design should confirm this.
- Impact on flood levels in the immediate area. If the footprint of the development encroaches into the floodplain, there will be an increase in flood levels at the site and for some distance upstream. With a small encroachment (say 10m-50m) the impact

should be small given the flood conditions described in the previous point. The effect on surrounding property should be contained within an estimated 250m upstream of the site. This area is largely grazing land with limited infrastructure and any rise in flood levels may in fact go unnoticed. The significance of the impact of raised flood levels on surrounding property is seen to be low. Nevertheless, this should be confirmed by detailed hydraulic analysis if there is any consideration of placing the substation in the floodplain.

- Pollution risk and drainage of the substation during a flood event. Drainage of the substation during a flood may be affected by flood waters on one side of the substation. This may be mitigated by raising the platform of the substation such that the stormwater outfalls are above the design flood level. However, should a pollution incident occur (e.g. a leaking transformer), the internal substation drainage would need to provide adequate storage volume to ensure there is no spill of transformer oils (or other pollutant) into the river. Again, these issues can be mitigated through adequate design of the substation, but will require additional cost.

The issues raised above are likely to occur and will persist for the life of the substation (until it is demolished). The extent of the impacts will be local unless a pollution incident occurs. In all cases the impacts can be mitigated within the design of the substation **and post mitigation significance is considered low.**

From a floodplain management perspective, there is no automatic presumption against developing the substation within the floodplain at the sites presented in Figure 36 provided the necessary detailed hydraulic studies and design modifications are done. However, it is not good practice to develop within the 100 year floodplain and, where possible, a 100m buffer should be kept between the edge of the floodplain and the substation boundary.

14.2. ASSESSMENT OF POWER LINES CORRIDORS

The proposed corridors show the power lines crossing a number of large and small watercourses. The main flood related issues relating to power lines crossing watercourses are:

- Impact on flood conditions due to towers placed in the flood line. This includes the increase of flood conditions in the environment around the tower(s) and any associated impacts.
- Risk of damage of towers during a flood. This would include high velocities, damage to tower base and foundations, debris build-up against the tower (and potential structural failure) and power line conductors touching the water surface

In general these issues can be mitigated by the correct placement of the towers and design of the structures. In most cases the designer will seek to span the flood plain, thereby avoiding these issues for all except the very extreme flood events. On the Elands River the estimated 100 year flood width is between 250m and 400m except at confluences with tributaries. 400kV and 765kv lines may span these distances if the river is being crossed at right angles. On the other rivers in this study the top width of the estimated flood lines are all less than 200m and will be easily spanned by the power lines, even at oblique angles. Therefore the flood risk at the following sites (Table 32) is seen to be addressed by merely spanning the floodplain.

Table 32: Flood widths at proposed power line crossings.

Site	Watercourse	Flood width in line with power lines (m)	Potential to span?
Site 2	Elands R.	150 to 200m	Yes
Site 5	Sandspruit	100 to 200m	Yes
Site 6	Elands R.	400 to 900m	No
Site 7	Unknown	100 to 130m	Yes
Site 8	Unknown	Not measured, but similar to Site 7 ~ 130m	Yes
Site 9	Matlopyane	60 to 80m	Yes
Site 10	Unknown	Not measured, but similar to Site 9 ~ 80m	Yes

At the Selons/Elands River confluence the combined 100 year floodplain may be over 800m wide, requiring at least one set of towers in the floodplain. However floodplain velocities will be low (<1m/s) and flood depths expected to be less than 2.5m, but with an average of around 1.5m. These are not difficult design conditions for towers unless there are geotechnical problems.

Moving the lines closer to the Roospruit/Elands confluence will see the floodplain narrow to an estimated 400m (parallel to the power lines), and this may be spanned by the power line, or at least the towers will be on the edges of the flooded area. However, other environmental factors may carry greater importance, pushing the lines south past the Elands/Selons confluence, and along the farm boundary. In this case, the flood conditions described above should not prevent the location of the lines there.

Should the towers be located in the floodplain at Site 6, the impact on flood conditions in the local environment are expected to be negligible. The width of the tower structures (<20m) are very small in relation to the overall flood width (>400m) and any backwater effect will be difficult to measure.

Therefore the overall impact on flooding due to lines crossing at Site 6 is seen to be low to negligible on flood conditions, and low impact on the towers themselves. Design adjustments to mitigate any impact on the towers are expected to be small.

Power lines parallel to watercourses.

Sites 1, 3 and 4 are locations where the new lines will run parallel to the watercourse, and therefore potentially within the 100 year floodplain. For the reasons given for Site 6 above, the potential impact on flood conditions in the environment around towers in the floodplain are usually small to negligible due to the small width of the towers in relation to the overall width of the floodplain. Therefore, the main issue here is seen to be the potential impact of the flood waters on the towers and operation of the lines.

At Sites 4 and 3 it is proposed the new lines follow existing 400kV power lines that run along the left (east) bank of the Sandspruit. These existing power lines follow the river with towers often placed within 100m of the watercourse (in some cases as close as 20m). The estimated

flood width along the Sandspruit varies between 70m and 160m, with floodplain depths averaging at approximately 1m and velocities between 0.8m/s and 1.3m/s. Though slightly faster than the Elands River floodplain velocities, these are still manageable from a tower design perspective provided the geotechnical conditions are suitable. Scour and debris build up is not expected to be a problem.

Therefore, between Sites 3 and 5 it is expected some of the towers of the proposed new lines will stand in the floodplain if the new lines are to run immediately parallel to the existing lines. The impact of these towers on flood conditions in the immediate environment is expected to be small to negligible for the reasons given above. The impact of flood flows on the towers is seen to be small and manageable through design adjustments. However, although the overall impact is seen to be low, it is recommended that further hydraulic analysis is undertaken during detailed design to ensure the right measures are taken in the design.

At Site 1 it is anticipated the new lines will run within the 100 year flood line on the right (south) bank unless the lines can be moved further south out of the floodplain. As previously mentioned, in Site 1 the estimated flood depth and velocity are around 1.5m and <1m/s. Therefore again towers in the floodplain should not be at high risk of damage or operational failure, especially where they are placed closer to the edge of the floodplain. The significance of flood impacts either on the local flood conditions or on the tower structures is therefore seen to be low, and manageable through proper design. As with Sites 3 to 5, should it be expected that the new lines will run close to, or within, the indicative 100 year flood line presented in Figure 34, then further detailed hydraulic assessment is recommended during the design phase.

At Site 6 the power lines cross complex section of the floodplain where three watercourses come together; the Roospruit, and the Selons and Elands Rivers. Figure 38 shows the indicative flood lines estimated for this site. Flood conditions in each watercourse will combine to form the floodplain.

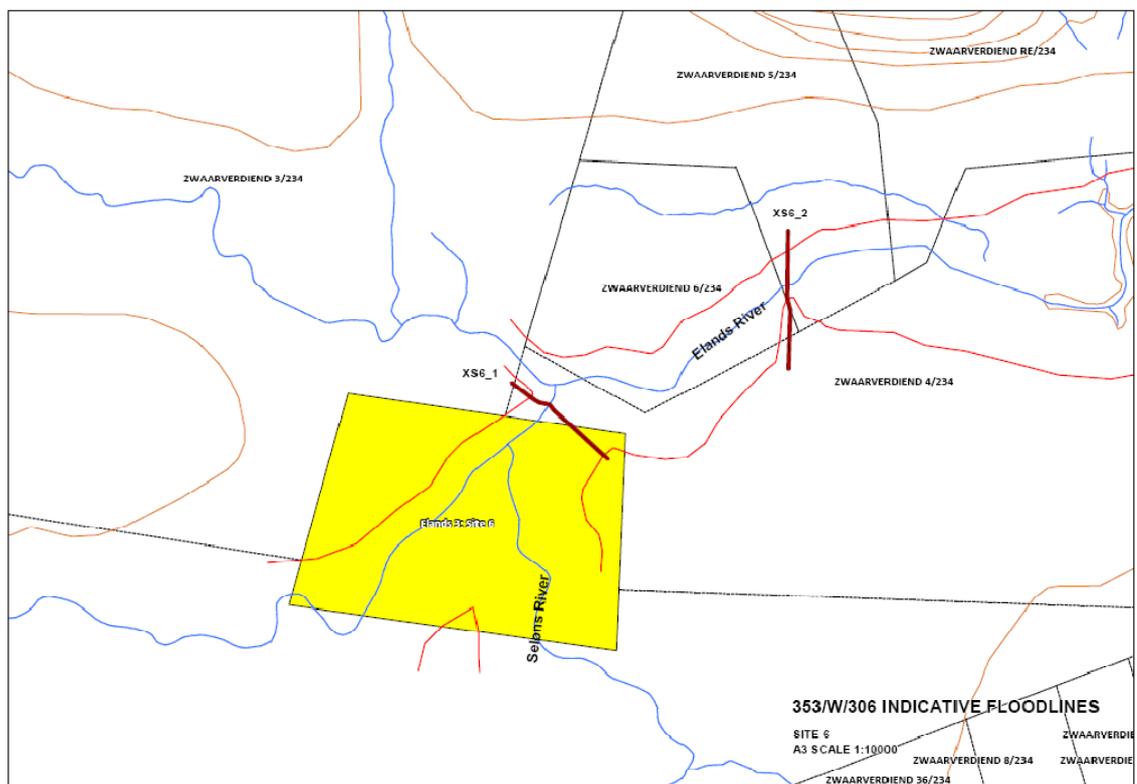


Figure 34: Site 6

14.3. SUMMARY OF RESULTS FROM SPECIALIST ASSESSMENTS

Table 35 presents the alternatives that the Specialists recommended as the more suitable options for the proposed development. Corridor 1 and Substation E were the most preferred. Corridor 1 and Corridor 2 are least preferred by the Heritage Specialist because most of the heritage sites were recorded on this option, including the Late Iron Age (LIA) site known as Marothodi. There are also large settlements in and around Pilwe Hill with known archaeological sites and occur on Corridor 2, this makes this option less preferred from heritage perspective. However, the impacts of overhead power lines on these sites can be avoided by constructing towers so to avoid these sites. Substation Site M was least preferred because two LIA sites are located on a spur at the location of this option. Because the substation is located on top of a spur mitigation will be difficult, as space for alternative placement is limited.

As for Visual Specialist, the impact of the proposed substation would be very similar for each of the proposed sites due to the relative close location of the proposed sites in relation to each other. The best proposal, however, would be Site C as this site is located close to the Paul Traction Substation, thus localising the impact of the visual intrusion. The proposed Corridor 1 follows the existing power lines and the R565. Most of the viewers are exposed to existing power lines or infrastructure along this route and therefore the power lines will be less intrusive.

The Biodiversity Specialist recommended Site E as the most preferred because the habitat present within the proposed site is regarded relative low in sensitivity, rendering this site the most preferred option. The use of this option would, similar to Site D, imply crossing of the Elands River, but it is possible to mitigate against significant impacts.

Overall, Corridors 1 and 2 offer the least impact on agricultural land, in particular Corridor 1 where there are fewer cultivated lands. The impact is seen to be low in both cases, provided adequate mitigation is undertaken (mainly the management of the construction and maintenance phases). Impact on Corridor 3 is seen to be moderate if the lines are routed to avoid centre pivot installations.

Flood risk analysis was also undertaken and it revealed that the only substation site that appears to be near a substantial watercourse is Substation Site D. The proposed corridors show the power lines crossing a number of large and small watercourses. The main flood related issues relating to power lines crossing watercourses are:

- Impact on flood conditions due to towers placed in the flood line. This includes the increase of flood conditions in the environment around the tower(s) and any associated impacts.
- Risk of damage of towers during a flood. This would include high velocities, damage to tower base and foundations, debris build-up against the tower (and potential structural failure) and power line conductors touching the water surface

In general these issues can be mitigated by the correct placement of the towers and design of the structures.

Indicated in Table 33 is a summary that indicates the Specialists preferences.

Table 33: Project Alternatives Suitability Table

	Corridor 1	Corridor 2	Corridor 3	Corridor 4	Corridor 5	Site C	Site D	Site E	Site L	Site M
Avifauna	√	X	X	X	X	X	X	√	X	X
Biodiversity	√	X	X	X	X	X	X	√	X	X
Heritage	X	X	√	X	√	√	√	√	√	X
Social	√	X	X	X	X	X	√	√	X	X
Visual	√	X	X	√	√	√	√	√	√	√

√ = Suitable

X = Less Suitable

14.4. POTENTIAL FATAL FLAWS

No potential fatal flaws were identified for this study; however the following environmental aspects presented in Table 34 are not preferred.

Table 34: Areas which are not preferred for Power Line and Substation Infrastructure

Main Environmental Aspect	Areas	Description
Geology	Unstable areas	These could include fault zones, seismic zones and dolomitic areas where sinkholes and subsidence are likely.
	Shallow bedrock	The occurrence of shallow bedrock will cause difficulties with earthworks and will develop poor quality seepage and leakage. Areas with proper gravel/soils will be more appropriate for substation development.
	Structural geology	The occurrence of dykes and faults could serve as preferred pathways for groundwater seepage and movement.
Topography and drainage	Areas characterised by steep gradients, where stability of slopes could be problematic	It is desirable that the area chosen for the substation augments the stability of the new substation.
Land Capability	Mining Prospecting Area	Project to avoid the sterilisation of mining rights and future project developments.

Main Environmental Aspect	Areas	Description
	Areas of prime agricultural land	Where prime agricultural land is present, these areas should be avoided if possible.
Natural Vegetation / plant life	Sensitive ecological land - These include nature reserves and areas of ecological and cultural or historical significance	The establishment of the substation should not increase the environmental impacts on the sensitive sites in the area and therefore should not impact on sensitive ecological sites.
Animal life	Endangered wildlife within the area of site selection	The establishment of the substation should not increase the environmental impacts on the sensitive sites in the area and therefore should not impact on endangered wildlife species.
Surface Water	Areas in close proximity to significant surface water bodies	These would include watercourses or dams and should be avoided.
Relocations	Corridors could potentially result in relocations.	Options are to be modified such as to avoid the relocation of people.
Sites with Archaeological and cultural interest	Sensitive ecological and/or historical areas - These include nature reserves and areas of ecological and cultural or historical significance.	The establishment of the substation should not increase the environmental impacts on the legacy sites in the area and therefore should not impact on sensitive ecological and/or historical sites.