

PROPOSED ZEUS-MERCURY 400Kv TRANSMISSION POWER LINE

EXTENDED STUDY

as part of the

ENVIRONMENTAL IMPACT ASSESMENT

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SUMMARY

This report serves to supplement the Social Impact Assessment Reports which were submitted as part of the Environmental Impact Assessments for the Zeus-Mercury proposed 400kV Transmission power line. Additional assessment of the area just west of the Vredefort Dome was necessary to identify a final route corridor for the proposed Transmission power line through this area.

For this extended study, specialist input was required as follows:

- Undertake the necessary site visit of the four alignments as proposed. Assess the alignments and alternatives and if necessary, recommend local deviations.
- Determine levels of significance for potential impacts along the routes.
- Recommend mitigation and/or management measures to address the impacts identified. Provide levels of significance before and after mitigation.
- Identify a preferred alignment. Recommend appropriate mitigation of potential impacts associated with the construction of the 400kV Transmission power line.

To inform the study, the area was visited, interviews were conducted, a desktop study was done, and maps and satellite images were studied.

The study area falls in Ward 1 of the Potchefstroom Local Municipality (PLM), which is part of the Southern District Municipality in the North West Province. The study area is rural in nature. The main activity in the area is commercial farming, and includes cattle, chicken, and crop farms.

Four potential alignments through the study area were identified for assessment. These are called the Central Alignment, Western Alignment 1, Western Alignment 2, and Eastern Alignment. Four additional alignments to the Eastern Alignment were added for assessment.

From the bottom left hand corner of the study area, the Central Alignment follows the existing line along a dirt road. It then crosses a tarred road, to follow the existing 400kV Transmission power line through the middle of a game farm. It then crosses cattle farms, cultivated land as well as a farm utilised for breakaways and adventure camps.

The Western Alignments 1 and 2 go through the western part of the study area. These proposed alignments do not follow existing infrastructure, but they do follow farm boundaries for most of the route. These alignments cross cattle farms and cultivated land, and are in close proximity of tourism facilities and smallholdings.

The Eastern Alignment goes southwards, and having crossed the tarred road, the proposed alignment follows a dirt road to finally join up with the existing line. It crosses cattle farms, cultivated land and a horse stud farm. It passes in close vicinity of chicken houses of Chubby Chick.

In order to assess the alternatives in respect of its anticipated social impacts, a distinction was made between the following impacts:

- Category 1: Impacts that are not expected to differ between the proposed alternatives, e.g. the number of employment opportunities that might be created by the proposed project are expected to remain the same, irrespective of the chosen alternative. These impacts were assessed in detail in the main Social Impact Assessment Report, and are not again discussed in this report. The assessment therefore did not consider the potential impacts as a result of

- institutional and legal processes (changes in the role, efficiency and operation of governments and other organizations) together with empowerment processes (changes in the ability of people to get involved in and can influence decision making processes);
- economic change processes were considered similar for all the alternatives. These include employment opportunities and compensation.
- Category 2: Impacts that are expected to be different between the proposed alternatives, e.g. the need to resettle certain households increases proportionately if the development traverses densely populated areas as opposed to skirting sparsely populated areas. The information gathered indicated that the main category 2 differentiators in choosing a final alignment would be in changes to demographic, land use, and socio-cultural processes during the operation of the 400kV Transmission power line. These change processes are defined as follows:
 - demographic change processes are the changes in the number and composition of people;
 - land use change processes are changes in land use patterns; and,
 - socio-cultural change processes are the changes in the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions.

The approach and methodologies that were applied to fulfil the objectives of this report included a field visit, interviews with eight I&APs, a desktop study, maps and satellite images were studied, and finally the potential impacts were rated and a quantitative comparative assessment was done.

The sub sections that follow discuss the current and future demographic, land use, and socio-cultural change processes without the line, followed by discussions on how the proposed 400kV Transmission power line might change these, and the impacts that might be expected as a result.

Demographic Change Processes

It is not expected that the rural population will show a significant change in population numbers. The land owners interviewed seemed to have settled in the area, and future plans do not include subdivision of land. Future plans that were mentioned were tourism related. Five of the eight land owners interviewed mentioned that they planned to develop/further develop tourism establishments on their land. An increase in tourist numbers to the area might therefore be expected, also in light of the presence of the Vredefort Dome on the eastern border of the ward. The tourism numbers will fluctuate, and will not be constant as it is dependent on seasons and holidays/weekends/long weekends. The majority of those who planned future tourism development felt that the line would detract from the experience they wanted to give their visitors, and they might have to adapt their plans as a result of the presence of the line. This is discussed in more detail under socio-cultural change processes.

The presence of the line will not significantly impact on current population numbers. It does not seem likely that people will move out of the area because of the presence of the 400kV Transmission power line. None of the landowners interviewed mentioned that they were considering leaving the area.

In terms of demographic processes, of concern are the potential health and safety **impacts** on people as a result of the proposed Transmission power line. Physical and mental health in the context of a power line is related to Electro and Magnetic Fields (EMFs), electrocution, fire and collapse of pylons. It is therefore preferable that an operational 765kV Transmission power line

skirts settlements and goes through less densely populated areas to mitigate potential health and safety impacts. The added benefit is that this mitigation measure will also result in more effectively mitigating impacts arising during construction. Construction activities, construction vehicles and the movement patterns of these vehicles and equipment might temporarily prohibit access to properties and other amenities in the area as well as increase noise levels, giving raise to an increase in frustration levels and the safety concerns of the residents. By impacting on as few people as possible, it will be possible to better manage potential construction impacts on people.

Land use Change Processes

In the study area, land was allocated to families in the late 1800's to early 1900's to cultivate the land. Over time the land was subdivided to accommodate the expanding families, and land was also sold to other families and newcomers to the area. The landuse has diversified somewhat over the years. Land use in the study area include cattle farming for meat and milk, cultivation of maize and sunflowers, a number chicken farms (Chubby Chick), buffalo breeding (Copperfield), tourism and a game farms. There are approximately two Lodges/Bed and Breakfasts in the study area, and an adventure camp. There are approximately four game areas in the study area, of which two are part of a tourist offering (Copperfield and Oude Waenhuis).

The study area borders the Vredefort Dome. According to the Mail and Guardian Online (14 July 2005), the Vredefort Dome was proclaimed a World Heritage Site at the 29th World Heritage Committee meeting. The committee then had to establish management structures, and comply with requirements of the Unesco (United Nations Educational, Scientific and Cultural Organisation) - all of which is in the process of being set up.

The most preferred alternative would be one that crosses grazing land, followed by cultivated land, and finally trees for browsers. Where the line does cross areas with centre pivots, the line should preferable follow boundary lines of farms or land parcels. The reasons for this order of preference are as a result of the potential **socio-economic impacts** of the line as a result of land use change processes.

Socio-cultural Change Processes

Socio-cultural change processes are the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions. The Transmission power line will not significantly affect the way in which people interact during operation. Inhabitants will still be able to move freely under the power line. All with the existing power line crossing their property, except the game farm owner of Copperfield, mentioned that they got used to it and that it did not bother them. However, it seemed as if the placement of the new line will impact on the way in which people relate to their environment. It seemed as if the placement of the line through an area untouched by a power line would impact negatively on the sense of place.

Considering the comments from interviewed affected parties, the proposed line will impact on the sense of place of inhabitants as well as tourists. The proposed line should therefore impact on the sense of place of as few people and tourist establishments as possible, as well as fit in with the current sense of place as much as possible. Displacement and relocation should be avoided to impact as little as possible on people's sense of place.

Conclusions

The study area was assessed considering Category 2 impacts in terms of demographic, land use, and socio-cultural changes which might occur as a result of the presence of the proposed line. The impact assessment is summarised ahead:

Table 9: Summary of the Significance of Potential Impacts

<i>Before mitigation</i>	<i>Eastern Alignment</i>		<i>Western Alignment 2</i>		<i>Western Alignment 1</i>		<i>Central Alignment</i>	
Health and safety Significance	Low -	18	Low-	18	Low -	22	Low-	18
Socio-economic (land use) Significance	Medium -	36	Medium -	44	Medium -	44	Medium -	36
Displacement Significance	High -	44	Medium-	44	Medium -	44	Medium -	44
<i>After mitigation</i>	<i>Eastern Alignment</i>		<i>Western Alignment 2</i>		<i>Western Alignment 1</i>		<i>Central Alignment</i>	
Health and safety Significance	Low -	18	Low -	22	Low-	18	Low-	18
Socio-economic (land use) Significance	Medium -	36	Medium -	44	Medium -	44	Medium -	36
Displacement Significance	Low –	22	Medium -	44	Medium -	44	Medium-	44

Without and with mitigation, the Central and Eastern Alignments are preferred when considering potential health and safety impacts, and potential land use changes in isolation. In terms of the potential number of people to be displaced, the Eastern Alignment along Alternatives 1 and 2 are preferred. However, considering these alternatives holistically and not in isolation, the following can be said:

- In terms of sense of place for the majority of those interviewed, the Central Alignment emerges as the preferred alternative because it follows an existing line. Landowners are already used to this line, and those affected by it have planned their activities and developments around this line. The owner of Coppertone, a tourist destination, does not prefer this alternative because of the potential impact on his game farm. This land owner has buried his distribution lines to minimise the impact on sense of place.

- In terms of existing tourist destinations in the area, the Eastern Alignment emerges as a preferred alternative. This alternative does not affect Oude Waenhuis and Coppertone, as well as have the least significant impact on the adventure farm - where the Eastern Alignment joins up with the Central Alignment. However, the tourism activities are not the only income of these owners, and it is not a given that a Transmission power lines will result in the closure of tourism destinations. The Central and Western Alignments are therefore not “no-go” areas because of tourism activities and are still possibilities despite the fact that these alignments are in the backyards of tourism establishments.
- In terms of potential health and safety impacts as well as potential future development, the Western Alignment 2 is the least preferred when considering the potential number of people that might be impacted on in case of potential health and safety impacts. According to the social specialist these are the potential impacts that should carry more weight in comparison to other potential impacts. Although the argument might be that it is improbable that the presence of the line might affect the health and safety of people, the potential impact (should it happen) might have a significant physical and mental health impact on people (e.g. injuries and death of important others). This will also mitigate impacts arising during construction. Construction activities, construction vehicles and the movement patterns of these vehicles and equipment might temporarily prohibit access to properties and other amenities in the area, giving raise to an increase in frustration levels and the safety concerns of the residents. Western Alignment 1 is the second least preferred alternative, because this is the next line closest to denser populations and potential future developments.
- Eastern Alignment following Alternatives 1 and 2 is preferred in terms of avoiding the potential displacement of people, and Alternative 1 does not follow existing roads and/or power lines. Following Alternative 1 might necessitate the construction of access roads. In this case, this alternative will interfere with less people’s daily movement patterns during construction as it does not follow the road which is used by more people.
- For the Central Alignment, access roads already exist, and this alternative will also interfere with less people’s daily movement patterns during construction as it does not follow a road which is used by more people.
- Many of the farms will be affected by the proposed line should Western Alignment 1, the Central Alignment or the Eastern Alignment be followed. These landowners have planned their activities to accommodate the existing line along the Central Alignment. It is recommended that a second line on their properties follow the existing line or follow along the borders of their properties in order not to further “dissect” their properties, impacting on land use and sense of place.
- The assessment of the potential impact of the proposed Transmission power line on the sense of place of the Vredefort Dome visitors will have to be informed by the Visual Impacts Assessment. The social specialist argues that the health and safety of people carry the most weight, and Western Alignments 1 and 2 are therefore not preferred. The social specialist also argues that the potential impacts on the directly affected parties carry more weight than the potential impact on visitors to the Vredefort Dome. Directly affected parties live in the area from day to day. Most of the directly affected parties are farmers who do not leave their home environment during the day to work elsewhere, and are therefore intensely involved with their home and surrounds. In terms of the preferred alignment considering the Vredefort Dome, the preferred alignment should be informed by the Heritage and Visual Impact Assessments.

In light of the results of this study,

- To the north of the R53, the central route is the preferred route. This section does not cut in between houses, but skirt the houses to the west; it follows an existing line with existing access roads; it passes to the east of the tourist adventure establishment; it affects less land for grazing and cultivation.
- This section of the central route (north of the R53) should be preferred should the Western Alignment 1 or the Eastern Alignment be the preferred alignments. Alignment Alternative 2 should therefore be given preference for the Eastern Alignment, and a similar connection should be considered from Western Alignment 1 to the Central Alignment.
- For the section south of the R53, the central alignment is preferred. Although the central alignment will in all likelihood result in the displacement and relocation of labourers, these labourers have complained about the noise of the existing line, and the impacts as a result may therefore not be as significant.
- Western Alignment 1 should avoid the Sandnek (next to Copperfield).

Based on the findings of this report, it can be concluded that the social environment in general poses no fatal flaws to the development of the proposed Transmission power line, under the condition that the identified mitigation measures as recommended in this document and the main SIA are implemented and adhered to.

The final route corridor should result in the displacement of a minimum number of people, and should have the least potentially significant negative impact on the health and safety of people as well as their sense of place. This will also mitigate impacts arising during construction. Construction activities, construction vehicles and the movement patterns of these vehicles and equipment might temporarily prohibit access to properties and other amenities in the area, giving rise to an increase in frustration levels and the safety concerns of the residents.

In light of these conclusions, the Central Alignment followed by the Eastern Alignment Alternative 4 is preferred, followed by the Western Alignment 1. The final selection of the preferred alignment in the context of the Vredefort Dome should be informed by the Heritage and Visual specialists.

The probability of social mobilisation against the project is highly probable. Social mobilisation is attitude formation and refers to the perception that people in the local community might form on the proposed project, which in turn would influence their attitude towards the project. Different members of the local community in the study area are unsupportive of different alignments, because of the potential impact on their land and plans, as well as the negative experience by some of the landowners of the negotiation process for the eastern alignment. Other landowners distrust the reason for the extended study.

The risk for social mobilisation is therefore high because the project proponent is perceived as dishonest. To ensure support of the project and reduce the risk of social mobilisation, the project proponent should at all times be seen to care about the local community. Transparent information should be supplied to the community from the outset of the project.

- The local community should play an active participatory role in the planning process, especially landowners of neighbouring properties.
- The undertakings in the EMP should also be implemented effectively and with due diligence.

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1. BACKGROUND AND INTRODUCTION

This report serves to supplement the Social Impact Assessment Reports which were submitted as part of the Environmental Impact Assessments for the Zeus-Mercury proposed 765kV Transmission power line. Additional assessment of the area just west of the Vredefort Dome was necessary to identify a final route corridor for the proposed Transmission power line through this area.

The first sub section below gives a description of the scope of work, followed by a section on the methodologies that were used to collect information, the limitations of the study, and finally a description of the study area.

1.1. SCOPE OF WORK

For this extended study, specialist input was required as follows:

- Undertake the necessary site visit of the four alignments as proposed. Assess the alignments and alternatives and if necessary, recommend local deviations.
- Determine levels of significance for potential impacts along the routes.
- Recommend mitigation and/or management measures to address the impacts identified. Provide levels of significance before and after mitigation.
- Identify a preferred alignment. Recommend appropriate mitigation of potential impacts associated with the construction of the 765kV Transmission power line.

1.2. APPROACH AND METHODOLOGY

This section focuses on the approach and methodologies that were applied to fulfil the objectives of this report. The area was visited, interviews were conducted, a desktop study was done, and maps and satellite images were studied.

Site visit and Interviews

The site visit was conducted on the 27th and 28th of September 2007. The study area was observed, and areas of importance (dwellings, buildings, lodges) were marked by using the GPS (Global Positioning System). Interviews with Interested and Affected parties were conducted to better understand their context.

Map and satellite images

A 1:50 000 map of the area was studied in detail and used during the field trip.

Google Earth was used to validate the information on the map and the observations made during the field visit.

The map results are attached to Addendum A.

Desktop study

Relevant sections of the Potchefstroom Local Municipality's Integrated Development Plan (IDP) and the minutes of a public meeting held on the 8th of August 2007 were studied. The website of the Municipal Demarcation Board was accessed for census data.

1.3. LIMITATIONS AND ASSUMPTIONS

- Unless otherwise stated, the demographic statistics reflected in this document are based on census 2001 data obtained from the Municipal Demarcation Board. Note that this data should only be viewed as indicative of the broad trends within the area and not as a rigid representation of the area. Potchefstroom LM (PLM) reports that, when comparing the PLM population statistics to the Southern District Municipality and the Klerksdorp Local Municipality, there is an indication that there was a significant census undercount for the PLM in the 2001 census.
- The study was done with the information available to the specialist at the time of executing the study, within the available time frames and budget. The sources consulted are not exhaustive, and additional information which might strengthen arguments, contradict information in this report and/or identify additional information might exist. However, the specialist did endeavour to take an evidence-based approach in the compilation of this report and did not intentionally exclude scientific information relevant to her assessment.
- Although the specialist endeavoured to mark all areas of importance (dwellings, buildings, lodges) by using the GPS (Global Positioning System), it might be possible that areas were missed. Also, people's actions can never be predicted with 100% accuracy, even when circumstances don't change and predictions are based rigorous research results. The different potential impacts therefore have to be assessed holistically, and not in isolation.

1.4. STUDY AREA AND PROPOSED ALIGNMENTS

This section provides a general description of the study area and the proposed alignments. More detailed descriptions follows in section 2. The study area falls in Ward 1 of the Potchefstroom Local Municipality (PLM), which is part of the Southern District Municipality in the North West Province. The study area is rural in nature. The main activity in the area is commercial farming, and includes cattle, chicken, and crop farms.

Four potential alignments through the study area were identified for assessment. These are called the Central Alignment, Western Alignment 1, Western Alignment 2, and Eastern Alignment. Four additional alignments to the Eastern Alignment were added for assessment.

From the bottom left hand corner of the study area (south), the Central Alignment follows the existing line along a dirt road. It then crosses a tarred road, to follow the existing 400kV Transmission power line through the middle of a game farm. It then crosses cattle farms, cultivated land as well as a farm utilised for breakaways and adventure camps.

The Western Alignments 1 and 2 go through the western part of the study area. These proposed alignments do not follow existing infrastructure, but they do follow farm boundaries for most of the route. These alignments cross cattle farms and cultivated land, and are in close proximity of tourism facilities and smallholdings.

The Eastern Alignment is in the east of the study area, and having crossed the tarred road, the proposed alignment follows a dirt road to finally join up with the existing line. It crosses cattle farms, cultivated land and a horse stud farm. It passes in close vicinity of chicken houses of Chubby Chick.

2. ASSESSMENT OF THE STUDY AREA

In order to assess the alternatives in respect of its anticipated social impacts, a distinction was made between the following impacts:

- Category 1: Impacts that are not expected to differ between the proposed alternatives, e.g. the number of employment opportunities that might be created by the proposed project are expected to remain the same, irrespective of the chosen alternative. These impacts were assessed in detail in the main Social Impact Assessment Report (Zeus-Mercury), and are not again discussed in this report. The assessment therefore did not consider the potential impacts as a result of
 - institutional and legal processes (changes in the role, efficiency and operation of governments and other organizations) together with empowerment processes (changes in the ability of people to get involved in and can influence decision making processes);
 - economic change processes were considered similar for all the alternatives. These include employment opportunities and compensation.
- Category 2: Impacts that are expected to be different between the proposed alternatives, e.g. the need to resettle certain households increases proportionately if the development traverses densely populated areas as opposed to skirting sparsely populated areas. The information gathered indicated that the main category 2 differentiators in choosing a final alignment would be in changes to demographic, land use, and socio-cultural processes during the operation of the 400kV Transmission power line. These change processes are defined as follows:
 - demographic change processes are the changes in the number and composition of people;
 - land use change processes are changes in land use patterns; and,
 - socio-cultural change processes are the changes in the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions.

The sub sections that follow discuss the current and future demographic, land use, and socio-cultural change processes without the line, followed by discussions on how the proposed 765kV Transmission power line might change these, and the impacts that might be expected as a result.

2.1. DEMOGRAPHIC CHANGE PROCESSES

2.1.1. Current situation without the proposed 400kV Transmission power line

A summary overview of the demographic and socio-demographic profile is depicted in the Table 1. Note that the Potchefstroom LM (PLM) reports that there is an indication that there was a significant census undercount for this municipality in the 2001 census.

Compared to the North West Province's estimated population density at 27.48 per km², the PLM population density is much higher at 48.01 people per km². Ward 1, however has an estimated population density of 7.44 per km², which reflects its rural character. It seems as if the population in the ward may grow somewhat over the next few years due to the residential developments on the western border of the ward (East of Potchefstroom).

As a scenario, taking the expected average population growth of 0.3% between the years 1995 and 2025 into consideration (Potchefstroom IDP), Ward 1 with an estimated total population of 12 222 and 3 812 households, might increase with approximately 3 600 people or 1 100 households. However, this is just a possible scenario, as it seems as if the population growth will mainly take place in other wards (towards Carltonville and in the Ikageng township area).

It is not expected that the rural population will show a significant change in population numbers. The land owners interviewed seemed to have settled in the area, and future plans do not include subdivision of land. Future plans that were mentioned were tourism related. Five of the eight land owners interviewed mentioned that they planned to develop/further develop tourism establishments on their land. An increase in tourist numbers to the area might therefore be expected, also in light of the presence of the Vredefort Dome on the eastern border of the ward. The tourism numbers will fluctuate, and will not be constant as it is dependent on seasons and holidays/weekends/long weekends. The majority of those who planned future tourism development felt that the line would detract from the experience they want to give their visitors, and they might have to adapt their plans as a result of the presence of the line. This is discussed in more detail under socio-cultural change processes.

Table 1: Demographic and Socio-demographic Profile

	NWP	SDM	PLM	Ward 1
Area size (km²)	116 180	14 644	2 673	1 642
Total population	3 193 339	81 007	128 345	12 222
Population density (people per km²)	27.4	55.32	48.01	7.44
Total households	898 606	274 560	34 025	3 812
Avg. persons per household	3.5	2.9	3.7	3.2
Population group	89.6% Black Africans	80.0% Black Africans	63.0% Black African	63.0% Black African
Gender	50.2% Male	51.8% Male	50.8% Female	56.9% Male
Age Group	54.1% 20-64	42% 20-64	60.0% 20-64	65.9% 20-64

2.1.2. Potential situation with the 400kV Transmission power line

The presence of the line will not significantly impact on current population numbers. It does not seem likely that people will move out of the area because of the presence of the 400kV Transmission power line. None of the landowners interviewed mentioned that they were considering leaving the area.

One landowner who might have the two lines crossing his land said: "Sentiment keeps me here. I have sweated blood for this place. I am the 3rd generation, and my granddad's namesake." The potential impact of the line on sense of place is discussed in the socio-cultural section.

In terms of demographic processes, of concern are the potential health and safety **impacts** on people as a result of the proposed Transmission power line. Physical and mental health in the context of a power line is related to Electro and Magnetic Fields (EMFs), electrocution, fire and collapse of pylons. The reason why mental health is mentioned in relation to physical health and EMFs is because the physical effect or knowledge of the potential physical effect of power lines on people could have an effect on the mental state of people. For example, although utilities in South Africa that are involved in the generation and distribution of electrical energy are bound by the Occupational Health and Safety (OHS) Act [63] to provide such services in a safe manner, and the International Commission for Non-Ionising Radiation Protection (ICNIRP) guidelines are used for assessing human exposure to EMFs, some people still fear that these guidelines are not sufficient. The public perceptions of risks sometimes differ significantly from objective risk assessments conducted by technical experts. Whereas technical assessments of risk takes into account only the probability and magnitude of events, subjective assessment of risk by the general public depends on a number of additional factors, and these factors include the degree of choice in the matter, benefits gained from the intervention, as well as whether the risks are immediate and detectable (e.g. the effect of EMFs might prove to be serious). The effects of a Transmission power line are not perceived to be immediate and easily detectable, the degree of choice in terms of where the line should go is limited, and the affected parties do not benefit directly in the case of this 400kV Transmission power line. Mental health impacts as a result of the perceived safety of the line in terms of EMFs are therefore a possibility.

Risks, other than EMFs, are that a line could cause fatal/traumatic accidents (e.g. electrocution). This could be caused by the collapse of a pylon and/or lines due to mechanical failure, disasters and fire. Fire can be caused by electrical malfunction or human error. Fatal accidents could also be caused by electrocution, which could be caused by induced charges, which can build up on fence wires mounted on wood posts near power lines. This phenomenon is generally restricted to higher voltage lines (200 kV or greater).

It is therefore preferable that an operational 400kV Transmission power line skirts settlements and goes through less densely populated areas to mitigate potential health and safety impacts. The added benefit is that this mitigation measure will also result in more effectively mitigating impacts arising during construction. Construction activities, construction vehicles and the movement patterns of these vehicles and equipment might temporarily prohibit access to properties and other amenities in the area as well as increase noise levels, giving rise to an increase in frustration levels and the safety concerns of the residents. By impacting on as few people as possible, it will be possible to better manage potential construction impacts on people.

2.1.3. Impact Assessment

To increase the likelihood of effectively mitigating health and safety impacts, the number of affected farm houses and farm labourers' houses as well as smallholdings should be taken into account in selecting a preferred alignment. In the study area, the labourers' houses are usually in a cluster of an average of four to five houses. Farm houses usually have outbuildings surrounding it, and labourer houses are usually situated in close vicinity to the farm houses.

Table 2 gives a breakdown of an estimate of the affected houses per the proposed alignments and alternatives, followed by an impact assessment, and a ranking of the alternatives in order of preference when considering potential health and safety impacts. Note that the number of houses to be affected is an estimate, based on the field trip, 1:50 000 maps and Google Earth. The houses within a 500 meter distance either side of the line were counted. This is a broader strip than the servitude (approximately 27.5 meters on either side). This distance was used to get a better understanding of the surrounding context and the extent of the potential impacts. The alternatives are assessed in Table 3.

Table 2: Potential Number of Affected Dwellings

Eastern Alignment	Western Alignment 2	Western Alignment 1	Central Alignment
Farm houses: 8-12 Labourer houses: 5 sets	Farm houses: 6-8 Labourer houses: 4 sets In close vicinity of a number of smallholdings, crosses six smallholdings and might affect houses an additional six houses. Through areas where a population increase can be expected.	Farm houses: 6-10 Labourer houses: 2 sets Lodges: 1 with 3 guest houses	Farm houses: 6-10 Labourer houses: 3 sets Lodge: 1 (10 couples)
Alignment Alternative 1	Alignment Alternative 2	Alignment Alternative 3	Alignment Alternative 4
Farm houses: 9 Labourer houses: 3 sets	Farm houses: 10 Labourer houses: 3 sets	Farm houses: 8-10 Labourer houses: 7 sets	Farm houses: 8-10 Labourer houses: 7 sets

Table 3: Health and Safety Impact Assessment

Demographic processes: potential health and safety impacts during operation.								
Category 2 Impact	Eastern Alignment		Western Alignment 2		Western Alignment 1		Central Alignment	
Duration	Long term	4	Long term	4	Long term	4	Long term	4
Extent	Site	1	Site	1	Site	1	Site	1
Magnitude (nr of people)	Low	4	Moderate	6	Low	4	Low	4
Probability	Low probability	2	Low probability	2	Low probability	2	Low probability	2
Significance	Low -	18	Low -	22	Low-	18	Low-	18

During construction:

Impact is intensified in close proximity to settlements, as is the case with the Western Alignment 2.

Mitigation measure:

The mitigation measure is that alignments with less dense populations should be chosen. Should this not be possible, then settlements should be skirted to avoid relocation, to decrease the number of people that might potentially be impacted on, and to allow for future developments. Also

- maintenance should be done diligently;
- people who move into the servitude, should be moved out of the servitude. The responsible party for monitoring this should be identified.

However, the implementation of these measures does not reduce the significance of the potential impacts.

Ranking of alternatives from most preferred to least preferred:

Central Alignment

Eastern with Alignment Alternative 2 (follows existing line)

Eastern Alignment

Western Alignment 1 (in close proximity to potential future development and resultant population densification)

Western Alignment 2

2.2. LAND USE CHANGE PROCESSES

2.2.1. Current situation without the proposed 400kV Transmission power line

Land use is “The way land is developed and used in terms of the types of activities allowed (agriculture, residences, industries, etc.) and the size of buildings and structures permitted. (www.soil.ncsu.edu/publications/BMPs/glossary.html).”

“Patterns of land use arise naturally in a culture through customs and practices, but land use may also be formally regulated by zoning, other laws or private agreements such as restrictive covenants (en.wikipedia.org/wiki/Land_use).”

In the study area, land was allocated to families in the late 1800’s to early 1900’s to cultivate the land. Over time the land was subdivided to accommodate the expanding families, and land was also sold to other families and newcomers to the area. The landuse has diversified somewhat over the years. Land use in the study area include cattle farming for meat and milk, cultivation of maize and sunflowers, a number chicken farms (Chubby Chick), buffalo breeding (Copperfield), tourism and a game farms. There are approximately two Lodges/Bed and Breakfasts in the study area, and an adventure camp. There are approximately four game areas in the study area, of which two are part of the tourist offering (Copperfield and Oude Waenhuis).

The study area borders the Vredefort Dome. The document *World Heritage Evaluation - IUCN Technical Evaluation Vredefort Dome (SA), Id no N1162*, describes the area as “The nominated serial property, Vredefort Dome, is located approximately 120 km to the south and west of Johannesburg, South Africa. Covering a total area of 30,111 ha, the serial property includes a main core component of 30,108 ha, and three smaller (each 1 ha in size) component sites - two to the west, and one to the south east of the core area. The three satellite sites were added to the

nomination, following discussions with IUCN, to include special outlier geological (outcrop) sites of significance to the overall geological story told at the nominated property.”

According to the Mail and Guardian Online (14 July 2005), the Vredefort Dome was proclaimed a World Heritage Site at the 29th World Heritage Committee meeting. The committee then had to establish management structures, and comply with requirements of the Unesco (United Nations Educational, Scientific and Cultural Organisation) - all of which is in the process of being set up.

2.2.2. Potential situation with the 400kV Transmission power line

The most preferred alternative would be one that crosses grazing land, followed by cultivated land, and finally trees for browsers. Where the line does cross areas with centre pivots, the line should preferably follow boundary lines of farms or land parcels. The reasons for this order of preference are as a result of the potential **socio-economic impacts** of the line as a result of land use change processes. The potential impacts of cultivated land, followed by grazing land, chicken farming, animal breeding, dwellings and planned developments are discussed.

Grazing land

During operation cattle and/or game can move freely under Transmission power lines and around pylons to graze, although entanglement with pylons has been reported by landowners. Because of land clearance in the servitude, grassland is improved, which increases the grazing footprint.

For browsers, fewer trees will be available as the servitude will probably be cleared of trees and grass will be cut short to mitigate the fire risk. This will result in less food for browsers like eland.

Cultivated land

It is possible to cultivate land under a power line, although it is not easy to cultivate land around a pylon. Pylons should preferably be placed in such a way that it does not impact on cultivated land. The lines might also impact on GPS used for ploughing. It is preferable that 765kV Transmission power lines skirt cultivated land with centre pivots altogether, as the placement of pylons might interfere with the space needed for the centre pivot.

Chicken houses

Structures are not allowed in the servitude, and chicken houses will have to be moved should they be in the servitude.

Animal breeding

It will be possible to carry on with animal breeding with a power line crossing a property. However, it might be perceived that EMFs negatively affect the fertility of animals.

Dwellings

The line might result in the displacement and relocation of people, because people are not allowed to live in the servitude for health and safety reasons. In this area, the displacement and relocation of people will mostly still be within the boundaries of their farms / the farms where they work. Should smallholdings or a smaller sized piece of farmland be affected, it might mean that

inhabitants will lose the piece of land because of the servitude might take up all or most of the land. For example, this will probably be the case for Sandnek on the Western Alternative 1.

Farmers have already planned their developments in such a way to avoid the existing line. One farmer built a house away from the existing line, although it would have been economically more viable to build in the vicinity of the existing line as it was closer to Potchefstroom town where they worked.

Tourism development is discussed in more detail under the socio-cultural section.

Development plans

At the time of writing this report the Spatial Development Framework of the municipality could not be accessed. It seemed as if the western area of ward 1, which borders the eastern side of Potchefstroom, was densifying. In light of the Vredefort Dome on the eastern side of the study area, the assumption is that the surrounding area is earmarked for tourism development, and that development will be focused to a greater extent towards Carltonville.

2.2.3. Impact Assessment

In conclusion, in selecting the final preferred alignment the potential socio-economic impacts as a result of land use change processes should be considered. Many of the farms in the study area are long and narrow, which means that no matter what alternative is chosen, the same land owner will be affected. Some of these landowners already have a line running across their land along the proposed Central Alignment. The majority of landowners interviewed preferred that the proposed line run parallel to the existing line. The reasons given were that it would be easier to manage fires, and that the negative visual impact will be focused in one area. Other advantages are that the maintenance will be easier to manage, that the number of landowners to be affected by maintenance activities will not be increased, and that existing access roads will be used. In terms of new access roads and new access roads not following existing infrastructure these:

- might necessitate the relocation of populations;
- would interfere with people's daily movement patterns and impact on their safety;
- would cut across private property, thereby increasing the number of landowners to be affected by construction and maintenance activities; and
- would interfere with tourism and recreational activities.

It is therefore preferable that existing infrastructure is followed, but also that settlements are avoided to mitigate potential health and safety impacts.

A broad, general description of the land use per alignment is given in Table 3. This is followed by a socio-economic impact assessment in Table 4. The exact percentage of grazing land, cultivated land, and other land uses that will be impacted on along the alignments are not given.

Table 4: Land use Description

Eastern Alignment	Western Alignment 2	Western Alignment 1	Central Alignment
<p>Crosses cattle and maize / sunflower farms, a horse stud farm, game farm, and an adventure farm.</p> <p>This alignment seems to have the most chicken farms.</p>	<p>Crosses cattle and maize / sunflower farms.</p> <p>Housing developments.</p>	<p>Crosses cattle and maize / sunflower farms, and some chicken farm(s), and an adventure farm.</p> <p>One farm for tourists (with small game farm).</p>	<p>Crosses cattle and maize / sunflower farms, and chicken farm(s).</p> <p>One farm for tourists (2000ha game farm).</p>

Table 5: Socio-economic Impact Assessment as a result of Land use Changes

Land use processes: potential socio-economic impacts during operation as a result of land use changes									
Category 2 Impact	Eastern Alignment		Western Alignment 2		Western Alignment 1		Central Alignment		
Duration	Long term	4	Long term	4	Long term	4	Long term	4	
Extent	Site	1	Site	1	Site	1	Site	1	
Magnitude	Low (mostly follows an existing road, and line if Alternative Alignment 2 is followed)	4	Medium (follows existing line for part of it, but might impact on town development)	6	Medium (no existing infrastructure is followed)	6	Low (follows an existing line, and pylons and development therefore placed to have a minimum impact)	4	
Probability	High	4	High	4	High	4	High	4	
Significance	Medium -	36	Medium -	44	Medium -	44	Medium -	36	
Mitigation measures:									
<ul style="list-style-type: none"> Where possible, pylons should be located on the border of the farmland, and along roads to lessen the loss of cultivated/grazing. It is suggested that construction, decommissioning and maintenance not take place during animal breeding months. An attempt should be made to avoid game grazing / browsing areas altogether because of the loss of trees and grass for grazing, and potential safety problems for animals during maintenance, operation and 									

decommissioning.

- Consultation should take place between the land owner and Eskom to determine the extent of permanent loss of land for cultivated/grazing due to the construction and decommissioning process and the presence of the pylon(s). Land owners should be compensated for the permanent loss of cultivated/grazing land.
- Upon agreement between the land owner and Eskom, land owners should be compensated for the permanent loss of portions of the land that is unreachable due to the presence of the pylon(s).
- The area should be rehabilitated upon completion of the construction activities to ensure that the land is returned in the same condition as prior to the construction activities. This, however, might not be possible depending on the height of the trees and the fire management precautions.
- The area should be rehabilitated upon completion of the decommissioning activities to ensure that the land is returned in the same condition as prior to the construction activities.
- Transmission power lines should be well earthed.
- A fire management plan should be in place.

The implementation of these measures will not reduce the overall significance of the potential impacts.

Ranking of alternatives from most preferred to least preferred:

Eastern Alignment and Alignment Alternative 2 and Central Alignment

Western Alignment 1

Western alignment 2

2.3. SOCIO-CULTURAL CHANGE PROCESSES

2.3.1. *Current situation without the proposed 400kV Transmission power line*

Socio-cultural change processes are the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions. The Transmission power line will not significantly affect the way in which people interact during operation. Inhabitants will still be able to move freely under the power line. All of the interviewees with the existing power line crossing their property, except the game farm owner of Copperfield, mentioned that they got used to the existing line. However, it seemed as if the placement of the new line will impact on the way in which people relate to their environment. It seemed as if the placement of the line through an area untouched by a power line would impact negatively on the sense of place.

Sense of place goes hand in hand with place attachment, which is the sense of connectedness a person/community feels towards certain places. Place attachment may be evident at different geographic levels, i.e. site specific (e.g. a house, burial site, or tree where religious gatherings take place), area specific (e.g. a residential area), and/or physiographic specific (e.g. an attachment to the look and feel of an area). The concept of sense of place attempts to integrate the character of a setting with the personal emotions, memories and cultural activities associated with such a setting.

Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. The impact of relocation depends on the level of attachment to a place, which in turn is informed by variables such as age and number of years spent in that particular area. Where people have been living in a specific area for years, they are used to their surroundings, e.g. the route they travel to work, the amenities (shops, businesses, leisure) they visit, etc. Apart from their

surroundings, one could also expect that they are attached to their houses and living conditions. Relocating such households would have an impact on the way of life they have grown accustomed to. The relocation of households should therefore be avoided as far as possible.

A strong sense of physiographic specific place seemed to be present amongst land owners in the study area. The landowners interviewed described the area as “die mooiste plek in die noordwes”, as having “beautiful natural areas”, “bosveld”, “pristine (ongeskonde)”, and the “klipkoppies” were mentioned as a unique feature of the area. They commented on the rural, farmland feel the area had, and a need to preserve the existing natural areas. The area was described a peaceful and removed from the stress of city life. Two landowners planned to build a house on the still pristine piece of land on their farms. A couple affected by the central Alignment commented on the beauty of the valley this alignment passed through, and that the line would spoil the views of the valley. According to them this is one of the few valleys in the area. They mentioned that the height of the Witrand Koppie and the Hanekraai Koppie are similar, and that the Transmission power line would therefore be on the same height, irrespective if it follows the Eastern Alignment or the Central Alignment. This same landowner bought up the pieces of land that was sold off the original family farm, in order to preserve the family farm as it was.

Another landowner mentioned the beautiful views which were afforded from his Lodge - views of the Potchefstroom valley and the Vredefort Dome were beautiful from the point where the Western Alignments go in a north-westerly direction.

For one landowner, the sense of place of the town of Potchefstroom was important. For him, the power line should not be visible from town and the Vredefort Dome by following the central Alignment on its western side.

The adventure / breakaway camp on Hartebeesfontein is situated on mostly natural land. The White Stinkwood Wood on this farm might be impacted on by Western Alignment 1, and this should be avoided. This cluster of trees is also called the “Nuwejaarsbos” as the Grimbeeck family used to gather here to celebrate the New Year. Currently this is an important landmark for the adventure camps and other recreational activities for visitors, and has historical value for the family.

The Vredefort Dome representative confirmed Dome Meteorite Park Group’s concerns about the visual impact of the alignments on the sense of place of the Dome area. The sense of place of the surrounding area is important to preserve the sense of place of the Dome. People entering the Dome area from Potchefstroom, mainly along the R53, should leave any infrastructure behind as soon as possible, and enter pristine farmland area. They were also concerned that the line would be visible from the Dome, and negatively impact on the sense of place of visitors to the Dome. The Dome was described as “pristine”. “untouched”, “rural”, “little human intervention”, “not industrial”, “peaceful atmosphere”, and “not populated by electrical lights.” The intention is to keep the area south of the R53 “clean” of infrastructure developments. Negotiations with farmers are taking place in an attempt to mitigate the visual impact of the chicken houses.

In terms of tourism, research on the psychological experience of sense of place suggests that people rapidly discount a landscape as soon as the first scar occurs, rather like a stain ruining a favourite garment (Petrich, 1993). Thereafter, any additional impacts on the landscape have a correspondingly smaller effect. The aesthetic impact of placing a Transmission power line in a landscape that already bears the marks of development would be less than that of placing it in a relatively unspoilt environment. MasterQ Research (2007) found that the placement of lines on a game farm should be carefully considered in order not to lose visitors.

The Copperfield Game Farm of 2000ha (4x5km) is affected by the Central Alignment. The existing line runs through the centre of the game farm. This game farm has approximately 14 animal species and includes Rhino, Buffalo, Kudu, Giraffe, Nyala, Impala, Bushbuck, Eland, and Duiker. The Lodge can take up to 10 couples, and the accommodation is 5-star type. The owner buried the distribution lines to his house to keep the area as natural as possible. International visitors mostly come from Europe. Visitors comment on the fact that the existing power line detract from the experience of nature and beautiful views. There are plans to restore the old farm house, which will be 50 meters from the Central Alignment. This owner's game farm "New Machaiwe" in the Klerksdorp area will be affected by two to six 400kV Transmission power lines.

The Oude Waenhuis Guest Lodge consists of three guest houses, and a dwelling. The Western Alignment crosses this Lodge. This lodge was built to be an Eco estate with a private game farm for the guests. Guests mainly come from the Gauteng area, and come for functions, business and festivals. From the guest houses, the valley and Vredefort Dome is seen. Three of the farms of this owner (including a game farm) will be affected by the Eastern Alignment, and the owner has already signed a servitude agreement.

2.3.2. Potential situation with the 400kV Transmission power line

Considering the comments from interviewed affected parties, the proposed line will impact on the sense of place of inhabitants as well as tourists. The proposed line should therefore impact on the sense of place of as few people and tourist establishments as possible, as well as fit in with the current sense of place as much as possible.

Should the Western Alignment 1 be selected, Oude Waenhuis dwellings and guest houses might have to be relocated, and if not, the line will still have a negative impact on sense of place. For Copperfield, no displacement will be necessary, but the sense of place is likely to be impacted on.

Displacement and relocation should be avoided to impact as little as possible on people's sense of place. Those affected by the Central Alignment and the Eastern Alignment will be relocated on their farm, but some of those affected by Western Alignments 1 and 2 might have to purchase a piece of land elsewhere.

2.3.3. Impact Assessment

In terms of putting the line along the existing line, the question of equity emerges. Should only some landowners carry the lines on their land? Should the load not be shared? In this study area, many land owners will be affected by the Eastern, Central and Western alignment due to the length of their farms and the number of farms they have in the area, and it is therefore preferable to keep the impact of two lines in the same area rather than spread it across the land.

People (labourers) along the Central Alignment had already been moved to accommodate the existing line. They might yet again have to be moved to accommodate the new line. They might be positive about this possibility as they have complained to the landowner about the irritation of the noise of the existing line. Should they be moved, they should be moved well away from the existing lines in order not to be exposed to the noise of the line. The possibility of noise of the line strengthens the argument that as few people as possible should be in close proximity to the line.

Table 6 summarises the number of households that might have to be displaced and relocated. Refer to Table 3 for an assessment on the number of households that are potentially affected, and Table 7 for the impact assessment. Table 8 reflects the potential impact on sense of place, considering the current developments.

Table 6: Potential Number of Affected Households and Tourist Establishments

Eastern Alignment	Western Alignment 2	Western Alignment 1	Central Alignment
<p>2 sets of labourer houses and 1 or 2 farm houses. It might be possible to avoid the farm houses.</p> <p>Should Alignment Alternative 1 be followed, 1 house might have to be demolished.</p> <p>Should Alignment Alternative 1 & 2 be followed, it might be possible to avoid all houses.</p>	<p>Most densely populated area.</p> <p>At least 4 houses and 2 sets of labourer houses will have to be relocated.</p> <p>It might be possible to avoid some of these.</p>	<p>The house on Sandnek will have to be demolished.</p> <p>Oude Waenhuis Lodge and the owner's dwelling might have to be relocated.</p> <p>It might be possible to avoid all of the above, but the sense of place will still be disturbed.</p>	<p>Displacement of 2 sets of labourer houses might be necessary.</p>

Table 7: Displacement Impact Assessment

Demographic processes: potential displacement impacts.									
Category 2 Impact	Eastern Alignment		Western Alignment 2		Western Alignment 1		Central Alignment		
Duration	Long term	4	Long term	4	Long term	4	Long term	4	
Extent	Site	1	Site	1	Site	1	Site	1	
Intensity (depends on person)	Low to High	6	Low to High	6	Low to High	6	Low to High	6	
Probability	High	4	High	4	High	4	High	4	
Significance before mitigation	High -	44	Medium-	44	Medium -	44	Medium -	44	
Specific Mitigation	Follow Alignment Alternatives 1 and 2		Might not be possible to avoid all houses				Labourer houses will have to be moved – but will be away from noise		
Significance after mitigation	Low – (low probability 2)	22	Medium -	44	Medium -	44	Medium-	44	
<p>General mitigation measures:</p> <ul style="list-style-type: none"> Skirt / avoid houses. Should labourer house have to be relocated, it should be next to roads to ensure easy access to 									

transport, and away from the line to ensure that the constant sound of the line does not negatively affect them.

Ranking of alternatives from most preferred to least preferred:

Eastern Alignment Alternative 1 and 2

Central Alignment

Eastern Alignment

Western Alignment 1

Western Alignment 2

In terms of sense of place for local inhabitants, it seems as if the Central Alignment emerges as the preferred alternative because it follows an existing line.

In terms of existing tourist destinations in the area, the Eastern Alignment emerges as a preferred alternative. This alternative does not affect Oude Waenhuis and Coppertone, as well as have the least significant impact on the adventure farm. The significance of the impact is difficult to assess because the landowners with tourist destinations do not prefer the Central Alignment or the Western Alignments (unlike most of the affected parties without tourism destinations).

In terms of sense of place, the social specialist prefers that existing power lines be followed, meaning that the Central Alignment should then be followed. The reasoning is that an existing line already impacts on the sense of place, and that this disturbance should be minimised in this way. This will impact on Copperfield. Copperfield does receive visitors in spite of the existing line through the middle of its land. It is not clear what the impact of a second line might be on the visitor numbers. Because Copperfield does not offer hunting activities, one can assume that visitors go there to view game and enjoy nature, and that the impact might be significant. Ideally, a study needs to be done to determine the loss of livelihood as a result of the line.

Research results of a socio-economic survey done by MasterQ Research (SES MQR, 2007) indicate that it is possible to carry on with tourism related activities on a game farm in the presence of power lines, although the presence of lines do detract from the experience of visitors, and international visitor numbers might decrease. Results indicated that the number of power lines, the placement of power lines and the size of farms are important considerations for placement of the lines in order to reduce the potential economic impact of the line.

Although Copperfield is not the only income of the owner, the owner has already agreed to 2-6 lines on his other farm in the Klerksdorp area. The same goes for the owner of Oude Waenhuis who has agreed that the proposed line crosses his three farms on the Eastern Alignment.

The selection of a final alignment considering sense of place, also considering the Vredefort Dome, will have to be informed by the Visual Impact Assessment and the Heritage Impact Assessment.

In terms of displacement of people, it seems as if following the Eastern Alignment with Alternatives 1 and 2 will result in the least displacement of people.

3. CONCLUSIONS AND RECOMMENDATIONS

The study area was assessed considering Category 2 impacts in terms of demographic, land use, and socio-cultural changes which might occur as a result of the presence of the proposed line. The impact assessment is summarised ahead:

Table 9: Summary of the Significance of Potential Impacts

Before mitigation	Eastern Alignment		Western Alignment 2		Western Alignment 1		Central Alignment	
Health and safety Significance	Low -	18	Low-	18	Low -	22	Low-	18
Socio-economic (land use) Significance	Medium -	36	Medium -	44	Medium -	44	Medium -	36
Displacement Significance	High -	44	Medium-	44	Medium -	44	Medium -	44
After mitigation	Eastern Alignment		Western Alignment 2		Western Alignment 1		Central Alignment	
Health and safety Significance	Low -	18	Low -	22	Low-	18	Low-	18
Socio-economic (land use) Significance	Medium -	36	Medium -	44	Medium -	44	Medium -	36
Displacement Significance	Low -	22	Medium -	44	Medium -	44	Medium-	44

Without and with mitigation, the Central and Eastern Alignments are preferred when considering potential health and safety impacts, and potential land use changes in isolation. In terms of the potential number of people to be displaced, the Eastern Alignment along Alternatives 1 and 2 are preferred. However, considering these alternatives holistically and not in isolation, the following can be said:

- In terms of sense of place for the majority of those interviewed, the Central Alignment emerges as the preferred alternative because it follows an existing line. Landowners are already used to this line, and those affected by it have planned their activities and developments around this line. The owner of Coppertone, a tourist destination, does not prefer this alternative because of the potential impact on his game farm. This land owner has buried his distribution lines to minimise the impact on sense of place.
- In terms of existing tourist destinations in the area, the Eastern Alignment emerges as a preferred alternative. This alternative does not affect Oude Waenhuis and Coppertone, as well as have the least significant impact on the adventure camp -because the Eastern Alignment joins up with the Central Alignment at the adventure destination. However, the tourism activities are not the only income of these owners, and it is not a given that a

Transmission power lines will result in the closure of tourism destinations. The Central and Western Alignments are therefore not “no-go” areas because of tourism activities and are still possibilities despite the fact that these alignments are in the backyards of tourism establishments.

- In terms of potential health and safety impacts as well as potential future development, the Western Alignment 2 is the least preferred when considering the potential number of people that might be impacted on in case of potential health and safety impacts. According to the social specialist these are the potential impacts that should carry more weight in comparison to other potential impacts. Although the argument might be that it is improbable that the presence of the line might affect the health and safety of people, the potential impact (should it happen) might have a significant physical and mental health impact on people (e.g. injuries and death of important others). This will also mitigate impacts arising during construction. Construction activities, construction vehicles and the movement patterns of these vehicles and equipment might temporarily prohibit access to properties and other amenities in the area, giving rise to an increase in frustration levels and the safety concerns of the residents. Western Alignment 1 is the second least preferred alternative, because this is the next line closest to denser populations and potential future developments.
- The Eastern Alignment following Alternatives 1 and 2 is preferred in terms of avoiding the potential displacement of people. Following Alternative 1 might necessitate the construction of access roads. In this case, this alternative will interfere with less people’s daily movement patterns during construction as it does not follow the public road which is used by more people.
- For the Central Alignment, access roads already exist, and this alternative will also interfere with less people’s daily movement patterns during construction as it does not follow a road which is used by more people.
- Many of the farms, already affected by the existing line, will be affected by the proposed line should Western Alignment 1, the Central Alignment or the Eastern Alignment be followed. These landowners have planned their activities to accommodate the existing line along the Central Alignment. It is recommended that a second line on their properties follow the existing line or follow along the borders of their properties in order not to further dissect their properties, spreading the impact on land use and sense of place to other part of their land.
- The assessment of the potential impact of the proposed Transmission power line on the sense of place of the Vredefort Dome visitors will have to be informed by the Visual Impact Assessment. The social specialist argues that the health and safety of people carry the most weight, and Western Alignments 1 and 2 are therefore not preferred. The social specialist also argues that the potential impacts on the directly affected parties carry more weight than the potential impact on visitors to the Vredefort Dome. Directly affected parties live in the area from day to day. Most of the directly affected parties are farmers who do not leave their home environment during the day to work elsewhere, and are therefore intensely involved with their home and surrounds. In terms of the preferred alignment considering the Vredefort Dome, the preferred alignment should be informed by the Heritage and Visual Impact Assessments.

In light of the results of this study,

- To the north of the R53, the central route is the preferred route. This section does not cut in between houses, but skirt the houses to the west; it follows an existing line with existing access roads; it passes to the east of the tourist adventure establishment (preferable); it affects less land for grazing and cultivation.
- This section of the central route (north of the R53) should be preferred should the Western Alignment 1 or the Eastern Alignment be the preferred alignments. Alignment Alternative 4 should therefore be given preference for the Eastern Alignment, and a similar connection should be considered from Western Alignment 1 to the Central Alignment.
- For the section south of the R53, the Central Alignment is preferred. Although the Central Alignment will in all likelihood result in the displacement and relocation of labourers, these labourers have complained about the noise of the existing line, and the impacts as a result may therefore not be as significant. This alignment will also follow an existing line which already dissects Copperfield. However, this game farm is not the only income of the owner, and it is improbable that the game farm will have to be closed down as a result of the line. Also, the existing line avoids the accommodation and dwellings.
- Western Alignment 1 should avoid Oude Waenhuis accommodation. This might push the line towards Western Alignment 2, which is not preferred.

Based on the findings of this report, it can be concluded that the social environment in general pose no fatal flaws to the development of the proposed Transmission power line, under the condition that the identified mitigation measures as recommended in this document and the main SIA are implemented and adhered to.

The final route corridor should result in the displacement of a minimum number of people, and should have the least potentially significant negative impact on the health and safety of people as well as their sense of place. This will also mitigate impacts arising during construction. Construction activities, construction vehicles and the movement patterns of these vehicles and equipment might temporarily prohibit access to properties and other amenities in the area, giving rise to an increase in frustration levels and the safety concerns of the residents.

In light of these conclusions, the Central Alignment followed by the Eastern Alignment Alternative 2 is preferred, followed by the Western Alignment 1. The final selection of the preferred alignment in the context of the Vredefort Dome should be informed by the Heritage and Visual specialists.

The probability of social mobilisation against the project is highly probable. Social mobilisation is attitude formation and refers to the perception that people in the local community might form on the proposed project, which in turn would influence their attitude towards the project. Different members of the local community in the study area is unsupportive of different alignments, because of the potential impact on their land and plans, as well as the negative experience by some of the landowners of the negotiation process for the eastern alignment. Other landowners distrust the reason for the extended study.

The risk for social mobilisation is therefore high because the project proponent is perceived as dishonest. To ensure support of the project and reduce the risk of social mobilisation, the project proponent should at all times be seen to care about the local community. Transparent information should be supplied to the community from the outset of the project.

- The local community should play an active participatory role in the planning process, especially landowners of neighbouring properties. This could be achieved by means of establishing a

community forum that meet quarterly or once a month to discuss issues and progress surrounding the project.

- The undertakings in the EMP should also be implemented effectively and with due diligence. The community need to feel that they receive some tangible benefits from the project, e.g. consideration, direct and indirect employment.

4. SOURCES CONSULTED

4.1.1. Project Documentation

- Minutes of meetings held during the PPP.
- SIA Report, Proposed Zeus-Perseus and Zeus-Mercury Transmission power lines.

4.1.2. Other Documentation

- MasterQ Research (2007). Socio-economic Survey, Potential Socio-economic Impacts in Constructing 4x400kV Transmission Power Lines from Mmamabula power station to Delta substation (SESMD MQR).
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4.1.3. Websites

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4.1.4. Personal Interviews

We'd like to thank the following affected parties for their time and input:

- Mr and Mrs Auckamp (Hartebeesfontein 437)
- Mr S de la Harpe of the Dome Meteorite Park Group
- Mr Fourie (Roodekraal 454 IQ / 4,5,7& Vogelzang 467IQ/R)
- Mr and Mrs Greyling (Rooipoortje 453IQ/85,86)
- Mr and Mrs John (Prinsloos Rust 489 IQ /11,13,15)
- Mr Louwrens (Rooipoortje 453IQ/75,87)
- Mr Scheepers (Sandnek)
- Mr and Mrs Rousseauw (Prinsloo Rust 489)