

4. ASSESSMENT OF POTENTIAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION OF THE PROPOSED MATIMBA-WITKOP NO 2 400 kV TRANSMISSION LINE

The EIA is required to achieve an integrated and balanced view of the potential environmental impacts associated with the proposed project, as well as make recommendations regarding appropriate mitigation measures such that an informed decision can be made by the environmental authorities. Integration of the specialist studies is a key component in the determination of a preferred corridor for the establishment of the proposed 400 kV Transmission line between Matimba and Witkop Substations. This chapter of the EIA Report, provides a summary of the findings and recommendations of each specialist study. It is recommended that this chapter be read in conjunction with the detailed specialist reports included within Appendices F to O.

4.1. Potential Impacts on the Biophysical Environment

4.1.1. Overview of the Ecological Condition of the Study Area

All areas within the study area unsuitable for crop cultivation were mainly used for livestock production during the 20th century. Several different management practices were applied during this time (e.g. different camp systems, wagon wheel systems, withholding or use of fire, different approaches to game and livestock ratios, etc). Depending on the degree of utilisation and the specific succession and duration of management practices applied through the years, the natural vegetation was transformed to various degrees of species composition and veld condition. It can, therefore, be stated with confidence, that the term “pristine” veld (in the strict sense) cannot be applied to any significantly large area of bushveld within the study area.

However, as a result of the rugged topography and generally low agricultural potential through the nek between the Masebe Nature Reserve and Moepel Farms in the Waterberg Biosphere Reserve area through which corridor 1 passes, there has historically been a limited use of this area for cultivation purposes. Therefore, this area is considered to be in a well conserved state. The considerable variation in habitat in this section of the study area caused by a complex collection of environmental parameters (such as soils, aspect, drainage and exposure over time), has given rise to ecological systems of rich biodiversity in terms of fauna and flora. Localised disturbance in this area has, however, resulted from the presence of

existing infrastructure such as the Matimba-Witkop No 1 400 kV Transmission line, various roads and fence lines.

The dominant land use in the western section of the study area has recently changed from being mainly agriculture and livestock farming to commercial game farming and conservation (e.g. Zingela Lodge, Rhinoland Safaris, Keta Private Game Reserve, Waterberg Biosphere Reserve, Masebe Nature Reserve, Moepel Farms Nature Reserve). All four corridors pass through the Waterberg Biosphere Reserve area. It should be noted that it is not feasibly possible to avoid the Waterberg Biosphere with this proposed development, due to the extent of this reserve area. Therefore, the most suitable alignment across this area is required to be selected.

The land use in the eastern section is currently dominated by numerous rural settlements and agricultural practices, including several irrigated fields.

Therefore, from an ecological perspective, impact on the eastern section of the study area is considered to be of greater significance than that on the western section.

Corridors 1, 2 and 4 closely follow existing linear infrastructure (i.e. the road network and powerline infrastructure), with a portion of corridor 3 deviating for a short distance. As a result of construction activities associated with this infrastructure, localised disturbance within these corridors has historically occurred.

Corridor 3 deviates from corridor 2 in a south-westerly direction west of Marken. The corridor is proposed to follow farm boundaries as far as possible, and then join with corridor 1 outside of the Waterberg Biosphere Reserve area. The area within this deviation is considered to be generally less impacted by human activity than corridor 2, and is not currently impacted upon by linear development infrastructure.

4.1.2. *Potential Impacts on Flora*

- *Potential Impacts on Natural Vegetation:*
Activities related to the construction and maintenance of the proposed Transmission line could impact on an individual plant, group of plants or sensitive habitat (e.g. through the partial or total destruction of the vegetation at tower sites and/or during the establishment of access roads, or as a result of the clearance of the servitude). However, the original vegetation which occurred within the study area contained elements of arid woodland,

moist woodland and sour grassland. The original vegetation cover has been extensively degraded and almost completely transformed to a semi-natural state through agriculture (cultivation, overgrazing, bush encroachment etc.) and various other human activities (rural communities, roads etc.) in many places within the study area. This is particularly the case in the eastern portion of the study area between the Masebe Nature Reserve and Witkop Substation. In these areas, the potential impact on the natural vegetation is anticipated to be negligible.

As a result of the generally low agricultural potential associated with the highly leached, shallow and gravelly soils through the Waterberg Biosphere Reserve area, as well as the difficult and sometimes inaccessible terrain, there has historically been a limited use of this area for cultivation purposes. Therefore, this area is considered to be in a better conserved state than the remainder of the study area which have been extensively used for agriculture. As a result, numerous Red Data plant species have a high likelihood of occurring in this area. In addition, the high variation in habitat within the Waterberg Biosphere area has resulted in a high diversity of terrestrial fauna species being found here. Construction of a proposed Transmission line through areas historically less impacted on by human activities is, therefore, anticipated to have a localised, long-term impact of high significance on the vegetation.

- *Potential Impacts on Red Data Plant Species:*

The potential impact of the proposed Transmission line on Red Data plant species which are likely to occur within the area of the Waterberg Biosphere Reserve through which corridor 1 passes is anticipated to be localised, long-term and of a high significance but can be mitigated through the implementation of appropriate mitigation measures (e.g. careful placement of towers and access roads). Disturbance of these species is required to be avoided as far as possible. In addition, activities within the Waterberg Biosphere area during construction and maintenance will be required to be kept to a minimum. However, this potential impact can be successfully mitigated through the appropriate placement of towers so as to minimise the potential impact on these species, as well as through the implementation of appropriate practices during the construction, operation and maintenance phases of the project. Appropriate mitigation measures must be developed in consultation with a suitably qualified person/ organisation, and included within an Environmental Management Plan (EMP). In addition, a detailed vegetation study will be required to be undertaken along the final alignment prior to the commencement of construction, particularly through the Waterberg Biosphere Reserve area.

- *Potential Impacts on Valuable/Highly Regarded Plant Species*

Outstanding specimens of rare or characteristic bushveld trees or shrubs (e.g. *Ficus abutilifolia* (large-leaved rock fig), *Adenia spinosa*, *Berchemia zeyheri* (red ivory), *Combretum imberbe* (hardekool), *Maerua angolensis* (bead bean), *Spirostachys africana* (tamboti) or *Sesamothamnus lugardii* occur within the study area. Although these species may not be Red Data species, individual specimens or groups of plants may display unique size, age or other characteristics that warrant special mitigation measures. In addition, certain trees and shrubs are highly regarded for either their browsing value (e.g. *Acacia erioloba*, *Boscia albitrunca*, and *B. foetida*) or their medicinal and/or food value (*Sclerocarya birrea*, *Mimusops zeyheri* etc.) and are consequently jealously guarded by the landowners. Special care during construction and operation of the proposed Transmission line is required to ensure the long-term conservation of these species.

The potential impacts on larger trees and shrubs can be successfully mitigated through site-specific design of the towers (e.g. the heightening of the towers by approximately 4 m where required), such that the need for removal of these specimens is minimised.

- *Potential Impacts on Riparian Vegetation and Wetlands*

Several non-perennial streams and rivers traverse the study area. Vegetation associated with streams and/or rivers channels (riparian vegetation) is regarded as highly sensitive to any development. Therefore, disturbance to this vegetation should be avoided as far as possible.

Wetlands occur in several localities within the study area (e.g. Uitkomst farm along the western section of the corridor 1, Goedgedacht farm west of Marken). Due to the sensitive nature of wetland habitats and the important role they play in the functioning of the broader ecological system, disturbance to these systems should be avoided as far as possible.

- *Alien and Invasive Plant Species*

Any physical disturbance of the soil gives rise to conditions favourable to the invasion of pioneer plant species, which in many cases are exotics with invasive qualities. The management and control of declared weeds and invader plants is regulated by the Conservation of Agricultural Resources Act (No 43 of 1983).

Poorly planned access roads can alter the water drainage patterns and lead to a total change in species composition of the effected vegetation. Disturbance of the roots and surrounding soil conditions of *Dichrostachys cinerea* (sickle bush) plants may cause prolific sprouting/re-sprouting, eventually leading to a bush encroachment problem. Non-selective clearing of the servitude may also lead to major changes in species composition and the eventual dominance of a few species in the surrounding area, which could ultimately lead to a decrease in local species diversity. Indiscriminate use of chemicals to control invasive species during servitude clearing operations may negatively impact on the surrounding vegetation.

In order to minimise encroachment by densifiers such as *Dichrostachys cinerea*, clearing of vegetation within the servitude between the towers should be kept to a minimum, and should be undertaken very selectively.

Declared weeds and plant invaders should be controlled and managed according to the regulations of the Conservation of Agricultural Resources Act. All necessary actions prescribed by this Act must be included within the EMP.

- *Impacts on the Transmission line Associated with Fire*

Eskom currently experience outages on the existing Matimba-Witkop No 1 400 kV Transmission line as a result of veld fires, particularly in the area close to Ellisras. These veld fires currently impact on the operation of the existing Matimba-Witkop No 1 400 kV Transmission line, resulting in outages in some areas. The construction of the proposed new line parallel to the existing line may result in similar impacts on the operation of this new line unless appropriate mitigation measures are implemented. Proposed mitigation measures include:

- * Appropriate design of the towers (e.g. heightening by approximately 4 m) in areas known to be susceptible to veld fires should be implemented.
- * Various human activities during construction and operation will increase the risk of veld fires emanating and spreading from within the servitude. Strict conditions must be included within the Environmental Management Plan (EMP) outlining the conduct of employees during construction and operation (e.g. fires should not be permitted in fire susceptible areas).

4.1.3. Potential Impacts on Avifauna

Generally speaking, it is unavoidable that birds are influenced through interaction with infrastructure, including powerlines. Two common problems in southern Africa are electrocution of birds, and birds colliding with the earthwire of powerlines. Other problems include electrical faults caused by bird excreta when roosting or breeding on powerline infrastructure, and disturbance and habitat disturbance during construction and maintenance activities.

- *Impacts as a result of Electrocutions*

Large birds of prey are the most commonly electrocuted by powerlines. The large Transmission line structures (i.e. from 275 kV to the 765 kV) are generally not a threat to large raptors, as the towers are designed in such a manner that the birds cannot perch in close proximity to the high-voltage line conductors. In fact, these powerlines have proved to be beneficial to certain large bird species by providing safe nesting and roosting sites in areas where suitable natural alternatives are scarce. Electrocutions on large Transmission line structures are rare, although it may occasionally happen, presumably *via* the bird streamer mechanism (i.e. bird excreta effectively forming a “streamer” and, therefore, a connection between the bird and un-insulated portions of the powerline infrastructure). In areas where the streamer effect could pose a threat to the reliable operation of the Transmission line, bird guards should be implemented (Figure 4.1).



Figure 4.1: Bird guards should be implemented in areas where the streamer effect could pose a threat to the reliable operation of the Transmission line

- *Impacts as a result of Collisions*

Collisions with the earthwire of the proposed Transmission line is the only potentially significant impact of the line on bird species along any of the proposed corridors. The most likely scenarios where collisions will occur are the following:

- * where vultures congregate at a carcass near the powerlines;
- * waterbirds fly down drainage lines and collide with the line at river crossings;
- * at seasonal waterbodies where the powerline skirts or crosses the waterbody;
- * where White and Abdim's Storks congregate in large flocks in agricultural areas; or
- * near active Secretarybird nests.

This impact is anticipated to be of a long-term nature.

Impacts as a result of human activities has been extensive in large areas of the study area, completely altering both the bird species composition and behaviour from what was historically the case. In these areas, the potential for this impact to occur is low as the occurrence of sensitive species is anticipated to be low.

However, in the section of corridor 1 which passes through the Waterberg Biosphere Reserve area, historical patterns of occurrence and species composition may occur due to the relatively undisturbed nature of the habitats in this area. Therefore, the potential for the impact to occur in this section of the study area is considered to be high, as the likelihood of occurrence of sensitive species is high. However, it is generally accepted the bird collisions can be effectively reduced by marking the earthwire of the Transmission line with suitable anti-collision devices (Figure 4.2).



Figure 4.2: Bird diverters have been developed and have effectively reduced the incidents of bird collisions with Transmission lines

Areas in which these devices should be implemented are as follows:

- * Corridor 1: Points 1, 3, 4, 5, 7 indicated on Figure 4.3 overleaf.
- * Corridor 2: Points 1, 2, 6, 6, 7 indicated on Figure 4.3 overleaf.

The area and actual spans to be marked should be verified by the ornithological consultant.

4.1.4. Erosion Risk

Rainfall, slope angle, sediment grain size and vegetation cover interact to determine the erodability of soils. Increases in rainfall intensity/duration and/or slope angle can lead to greater erodability of soils, while a decrease in vegetation cover can have the same effect. The anticipated sandy nature of most of the soils within the corridors would make them susceptible to erosion. The following mitigation measures are proposed:

- Steep slopes should be avoided as far as possible throughout the study area.
- Towers should not be erected below the upper limit of the flood debris.
- The disturbance of vegetation should be kept to a minimum wherever practical.

4.1.5. Conclusions and Recommendations

Considering the findings of all the detailed specialist studies undertaken with regards to the biophysical environment, the order of preference for the corridor for the construction of the proposed Transmission line between the Matimba and Witkop Substations is as follows:

- Option 1: Corridor 2 or corridor 4 as the area within these corridors is largely disturbed by current and historical human activities.
- Option 2: Corridor 1, with appropriate mitigation measures being implemented and the new line is to be constructed parallel to the existing Matimba-Witkop No 1 400 kV Transmission line.
- The construction of the Transmission line within corridor 3 is not favoured, as this corridor impacts on an area considered to be relatively undisturbed, and not currently impacted by existing powerline infrastructure. The construction of the Transmission line within this corridor would, therefore, result in a new impact on the area. This corridor alternative is, therefore, not recommended.

4.2. Potential Impacts on the Social Environment

The major towns in the study area are Ellisras, Marken and Pietersburg, with rural settlements scattered throughout. This area is located in the area of jurisdiction of two district municipalities, namely the Capricorn District Municipality (DC 35) and the Waterberg District Municipality (DC 36).

4.2.1. Potential Social Impacts

- *Employment Opportunities and Influx of Temporary Workers*
It is not anticipated that the proposed project will create a significant number of employment opportunities, as the construction activities associated with the erection of towers and stringing of conductors usually require highly skilled personnel. Limited opportunities exist for manual labour where the appointed contractor could make use of locals (e.g. bush clearing and the installation of gates). These opportunities will, however, be of a short duration. As a result, it is not anticipated that there will be an influx of workers into the area as a result of the proposed project. In order to minimise the potential for influx of workers, however, it is recommended that local labour be utilised as far as possible.

- *Residential Proximity and/or Relocation*

Experience has shown that the majority of I&APs do not want to reside in close proximity to the proposed Transmission line due to the visual impact on their properties, as well as health and safety related concerns. Residential proximity-related impacts are highly probable, especially in cases where properties are traversed by the proposed corridor, or where the proposed route passes close to rural settlements. These properties and settlements will be affected during the construction and operational phases of the project.
- *Potential Impacts on Local Government and Regional Benefits*

The implementation of the proposed project is required to meet the growing electricity requirements in the greater Pietersburg and Potgietersrus areas. Therefore, indirect benefits could accrue to the Polokwane and Mogalakwena Municipalities, as new economic benefits and opportunities in the greater Pietersburg and Potgietersrus areas could be realised. It is, however, not anticipated that the proposed project will have any direct or indirect impacts on the Lephalale Municipality.

The Northern Province would, therefore, indirectly benefit from the proposed project although it is not anticipated that there would be any industrial diversification (e.g. utilisation of local equipment and supplies) during the construction or operational phases of the proposed project.

- *Potential Health Impacts*

Drawing on the existing body of research, the World Health Organisation (WHO, 2001) has stated that it is becoming increasingly unlikely that exposure to EMFs constitutes a serious health hazard, although it concedes that some uncertainty remains. The height of the Transmission lines and the 55 m servitude area limits the exposure to EMFs on the ground, and Eskom has indicated that they do not allow anyone to live within the servitude, which will eliminate the possibility of constant exposure of an individual to EMFs.
- *Potential Safety and Security Impacts*

Safety and security is a source of concern, especially during the construction phase, when there would be construction worker movement on various individual's properties. Potential impacts include increased crime, the loss of livestock and game through open gates and/or as a result of poaching, as well as worker safety in areas where potentially

dangerous animals are located (e.g. rhinoceros and elephant). Should the proposed Transmission line be located in close proximity to dense settlements, the general safety risks associated with any type of construction activity would also be applicable here.

In order to adequately address safety and security issues associated with the construction and operational phases of the project, Eskom should consult with representative forums of all parties affected by the proposed Transmission line.

4.2.2. Potential Impacts on Land Use

- *Potential Impacts on Towns and Settlements*

Certain informal settlements may be affected by the proposed corridor alignments. However, this impact is anticipated to be generally peripheral, and could be avoided through the minimal realignment of the Transmission line within the corridor such that the new line would skirt the settlements rather than crossing over portions thereof.

The proposed Transmission line may restrict the future extension of townships and settlements which are located in close proximity to the proposed servitude, as no residential buildings are permitted under the powerline. In this regard, specific reference is made to Vianen, Ga-rapadi, Ga-monare, Nong, Ga-mathekga, Mesuka, Ga-molopa, Ga-monene, Diretsaneng, Ga-malapila, Goedehoop, Vlakfontein B, Ga-mokwena, Segoahleng, Ga-matlapa and Marapong.

Numerous rural settlements occur within the eastern portion of the study area between Masebe Nature Reserve and Witkop Substation. All four proposed corridors will potentially impact on those settlements in close proximity to the study area. Corridors 2, 3 and 4 will potentially impact on a number of rural settlements between Diretsaneng and Ellisras (including, *inter alia*, Diretsaneng, Vianen, Nong and Setateng), as well as on the town of Marken. All four proposed corridors will potentially impact on Marapong.

Except for Marapong, the proposed Transmission line can be aligned in such a way within the identified corridor that it does not restrict future extension of the township developments. At Marapong, the restriction of future developments will be inevitable if the proposed Transmission line is aligned adjacent to the existing Matimba-Witkop No 1 400 kV Transmission line servitude. In order to minimise this potential impact, it is recommended that the final alignment of the proposed Transmission line be as far to either the south or north of the township possible.

In areas where it is not possible to realign the proposed Transmission line in order to avoid traversing existing townships or settlements (e.g. as a result of the physical characteristics of the environment), relocation of households may be necessary. Careful planning of the final Transmission line alignment is required in this regard in order to minimise the need for relocation.

- *Potential Impacts on Agricultural Activities*

Some agricultural activities, such as maize farming, are permitted within the Transmission line servitude. However, some forms of farming, e.g. citrus farming may pose problems if the citrus trees grow too high (i.e. higher than 4 m) and are, therefore, restricted.

The base plinths of the self-supporting towers (to be used on a bend) occupy areas of valuable farm land, which will be permanently lost to agriculture. The members of the cross-rope suspension tower, which is proposed to be used for the majority of the Transmission line length, have a small footprint and will, therefore, have a very low, localised impact in terms of the loss of agricultural land. In order to minimise the area of agricultural land which is lost to the footprint of the erected towers, it is recommended that the cross-rope suspension towers be used as far as possible. This will enable landowners to use valuable agricultural land around the smaller footprint of this tower type (refer to Figure 4.4).



Figure 4.4: Use of the cross-rope suspension tower will enable landowners to use valuable agricultural land around the smaller footprint of this tower type

The placement of towers on farm portions may restrict access and movement. This applies to central pivot irrigation schemes and access for crop-spraying aircraft. This would typically apply to the area around the larger rivers in the study area (e.g. the Lephhalala River). In order to minimise this potential impact, the type of farming activity and farming equipment used on each affected farm should be considered before the final placement of infrastructure is confirmed.

- *Potential Impacts on Nature Conservation Areas and Exemption Farms*

The proposed Transmission line may have the effect of functionally dividing certain conservation areas or farm portions, where the presence of a powerline “divides” the farm portion into two or more portions. The presence of major powerline infrastructure in close proximity to a game lodge may require that either the lodge is relocated, or the Transmission line is realigned away from the lodge area.

- *Potential Impacts on Development Clusters*

Proposed corridor 1 passes through two areas which have been identified as potential Development Clusters. However, the proposed Transmission line is not anticipated to negatively impact on any existing or future planning within these areas.

Proposed corridor 2 passes through two Development Clusters. The first cluster is found in the Marken area and serves as a Local Services Point. Careful consideration will be required to be given to planning of the route alignment and the placement of towers in this area. The second cluster is found at Setateng, but does not pose a problem in terms of the proposed Transmission line, as the cluster is restricted by R518 Road on its southern boundary, and the Transmission line could potentially be aligned to the south of road R518.

4.2.3. Potential Impacts on Tourism Potential

The proposed Transmission line is not anticipated to have any impact on the tourism potential of the nature reserves situated near to Ellisras, including the Mokolo Dam Nature Reserve and the D’Nyala Nature Reserve.

- *Potential Impacts on Private Game Farms*

The proposed Transmission line traverses a number of large and smaller private game farms between Ellisras and the Waterberg Biosphere Reserve area. Therefore, the

potential impact on the tourism potential of these game farms is anticipated to be of high significance.

However, farms located within corridor 1 are currently traversed and impacted by the existing Matimba-Witkop No 1 400 kV Transmission line. Therefore, it is anticipated that the potential impact will be minimised if the proposed Transmission line is constructed in parallel to the existing Transmission line, as it is considered reasonable to assume that this existing line has been taken into account in the planning of the existing tourism-related activities. A short-term impact is, however, anticipated during construction.

Farms located within corridor 2 currently do not have existing Transmission line infrastructure, but may be traversed by the local distribution lines. Where no powerline infrastructure exists on farms within this corridor (such as those farms located close to Marken), a new impact will be introduced, which will significantly impact on the visual quality, thus potentially impacting on the tourism activities currently being undertaken in this area (e.g. game viewing and hunting). This impact is considered to be long-term and of moderate to high significance.

- *Potential Impacts on Conservation Areas*

It is anticipated that there will be a marginal impact on tourism potential and development in the area of the Waterberg Biosphere Reserve through which proposed corridor 1 passes, provided that the proposed Transmission line is constructed in parallel to the existing Matimba-Witkop No 1 400 kV Transmission line which currently traverses this area. A short-term impact is, however, anticipated during construction.

If the proposed Transmission line is constructed within corridor 2, a highly significant impact is anticipated on Masebe Nature Reserve, as this reserve will effectively be “boxed in” by Transmission line infrastructure, resulting in a visual impact to the north, east and south of the reserve (Figure 4.5).

The proposed Transmission line does not impact on any tourism areas between the Waterberg Biosphere Reserve area and the Witkop Substation. The main land use in this area is communal farming, and the area is not considered to have future tourism potential.

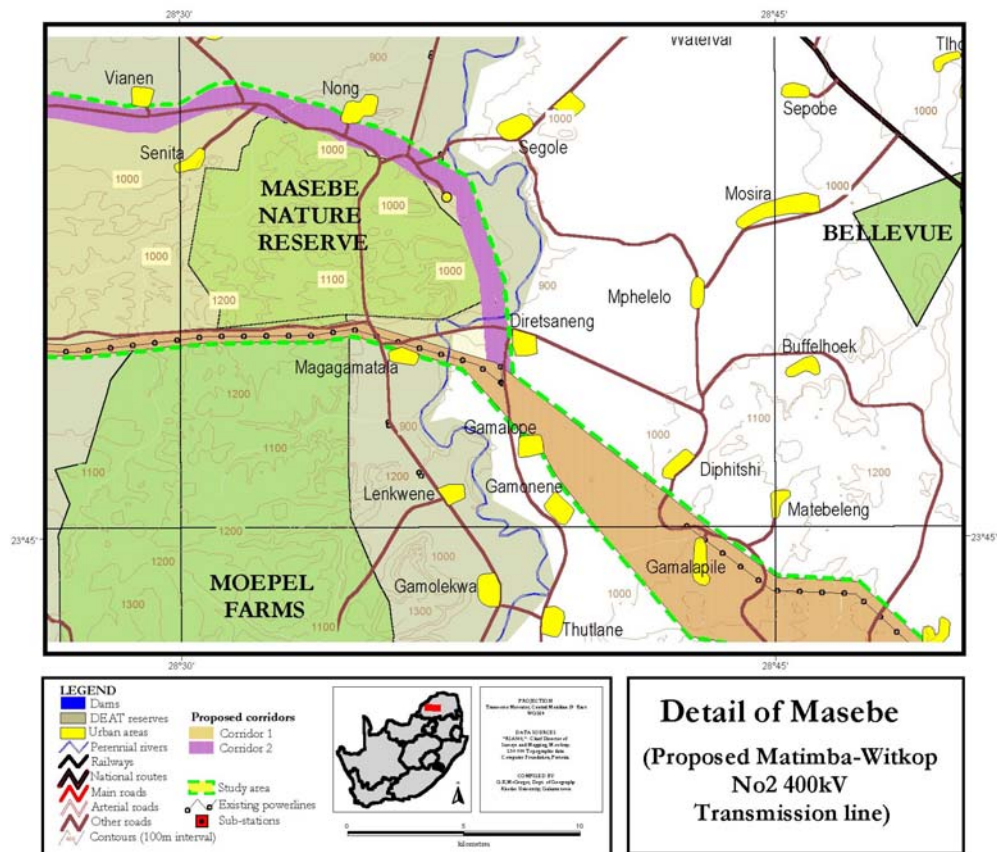


Figure 4.5: Map indicating the proposed position of Corridors 1 and 2 in the vicinity of the Masebe Nature Reserve, and the Waterberg Biosphere Reserve area

4.2.4. Potential Visual Impacts

The study area is impacted by existing developments and infrastructure such as mining operations, urban and rural settlements, roads, rail roads, existing powerlines and substations and the Matimba Powerstation. Visibility is anticipated to be greater in the open, flatter terrain characteristic of the extreme western and eastern portions of the study area (Figure 4.6). The vegetation characteristic of this section has been largely disturbed by agricultural practices and, therefore, new developments within this area are anticipated to be highly visible from the surrounding area.

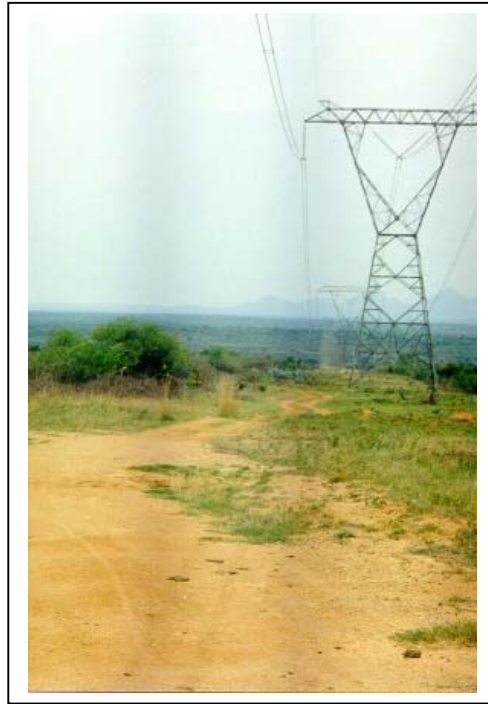


Figure 4.6: Uninterrupted vista with low vegetation promotes visibility of the towers

The section of the Waterberg Biosphere Reserve area through which corridor 1 passes is densely vegetated, resulting in limited visibility when on the ground (Figure 4.7).



Figure 4.7: Tower of the existing 400 kV Transmission line against a mottled, vegetation backdrop near Moepel Farms in the Waterberg Biosphere Reserve indicates the reduction in visual impact as a result of dense vegetation and topographical relief

Critical areas within the study area in terms of views and visibility include tourist attraction areas, such as private game lodges and the Waterberg Biosphere Reserve area, public routes, residences and towns located in close proximity to the proposed corridors.

- *Nature Reserves, Tourism and Game Farming:*

Corridor 1 will be visible from a large portion of the Waterberg Biosphere Reserve (including Moepel Farms and Masebe Nature Reserve), but the impact will potentially be low to very low, mainly as a result of the local topography. A narrow zone of medium to high impact is apparent in close proximity to the line. This potential impact will be minimised by the presence of the existing 400 kV Transmission line in this area.

Corridors 2, 3 and 4 show a similar impact through the Waterberg Biosphere Reserve area, with a larger area within the high impact zone. Therefore, the visual impact associated with these corridors through the Biosphere area is considered to be of a higher significance than that associated with corridor 1.

Numerous hunting and game lodges are located between the Ellisras and Waterberg Biosphere Reserve (i.e. the western section of the study area). Corridor 1 is anticipated to have the lowest potential impact on these activities as this corridor follows the existing Matimba-Witkop No 1 400 kV Transmission line. As this existing line was constructed in the 1970s, it is considered reasonable to assume that tourism-related operations have been planned away from this existing line.

Corridors 2 and 4 are anticipated to have a similar impact, with large areas in the high impact zone. The visual impact on smaller tourism-related activities and game farms along this corridor is anticipated to be higher than on the larger farms located mainly within corridor 1, as it is more difficult to plan activities away from the line on these smaller farms.

Corridor 3 is anticipated to have a high to very high impact on tourism-related facilities and game farms between Marken and Overysseel. This impact is considered to be highly significant as this area is not currently impacted on by linear infrastructure.

- *Built-up Areas and Settlements:*

High visual impact is anticipated in areas where settlements are located in close proximity to the proposed Transmission line. In the eastern section of the study area, uninterrupted vista with low vegetation promotes visibility of the towers. Where the

relief and vegetation changes to koppies and some trees amongst the settlements, the existing Transmission line is well camouflaged by the mottled background created by the nature of the vegetation and topography in the area.

Setateng and Gamonyeki are not potentially influenced or impacted by corridors 1 and 3. For corridors 2 and 4 the impact on these two settlements are potentially high.

At Overysel, the impact associated with corridor 3 is considered to be high a impact. In addition, impact on game farms and tourism operations within this corridor is anticipated to be high. Corridors 2 and 3 are anticipated to have a low impact in this area.

Due to the low relief in the area around Ellisras, impacts are generally in the high impact category. All four corridors show similar results here. The high impact in this area may be reduced by the quality of the view, which is lowered by the presence of existing developments such as the town of Ellisras, Matimba Powerstation and the numerous powerlines, as well as several mining operations.

- *Conclusions:*

In terms of visibility, corridor 1 is clearly the preferred corridor from a visual impact perspective. It follows the existing Transmission line, and it is obscured in critical areas by topography and dense vegetation.

Corridors 2 and 4 are very similar, although corridor 4 does not impact on Setateng and Gamonyeki settlements.

Corridor 3 shows high to very high impact in the critical tourism and game farming areas west of the Marken.

4.2.5. Potential Impacts on Heritage Sites

Potential impacts on heritage sites associated with the construction of a Transmission line are generally as a result of:

- clearing of the servitude;
- the placement of the towers; and
- visual impact on historical sites left in situ.

No sites with high cultural or scientific value were identified within the study area. However, a number of grave sites were identified. These sites should be avoided as far as possible, and access by the local community should not be inhibited. Should it be necessary to disturb or relocate graves, the next of kin should be located and consulted.

It is recommended that a survey of the final Transmission line alignment be undertaken by a suitably qualified archaeologist prior to the commencement of construction in order to minimise the potential impact on identified sites.

4.2.6. Conclusions and Recommendations

Considering the findings of all the detailed specialist studies undertaken with regards to the social environment, the order of preference for the corridor for the construction of the proposed Transmission line between the Matimba and Witkop Substations is as follows:

- Option 1: Corridor 1, as this corridor will have the least significant impact on settlements, land use and tourism operations within the study area.
- Option 2: Corridor 2 or 4, with the implementation of appropriate mitigation measures.
- The construction of the Transmission line within corridor is not recommended, as it will result in highly significant impacts on the social environment since the area within this corridor is currently not impacted by linear infrastructure.

4.3. Overall Conclusions

Table 4.1 overleaf provides a summary of the recommendations made regarding the proposed Transmission line between the Matimba and Witkop Substations. Figure 4.8 provides an overview of the potentially sensitive areas identified within the specialist studies.

Each corridor was ranked by each specialist from most preferred to least preferred, and these findings were workshopped by all the specialists in order to provide a considered and consolidated preferred nomination. Considering the findings of all the detailed studies undertaken (refer to Table 4.1 and Appendices F to O), as well as the results from the specialist workshop, the order of preference for the corridor for the construction of the Transmission line is as follows:

- Corridor 1 is recommended as the first option.

- Corridors 2 or 4 are recommended as the second option.
- Corridor 3 is not recommended as this option is anticipated to have an impact of high significance on both the biophysical and social environment.

Although biophysical impacts are potentially higher on corridor 1 than the routes skirting Masebe (corridors 2, 3 and 4), these impacts can be minimised through the implementation of appropriate mitigation measures. Therefore, for the establishment of Transmission line within the study area, the impacts on the social environment are anticipated to be greater impact to the environment as a whole. In light of this, the nominated preferred corridor is Corridor 1, including the section of corridor 3 which follows the existing Distribution line from the Matimba Substation to the juncture with the R518 (refer to Figure 4.9). This decision is the consensus of all specialists on the project and includes sufficient scope to allow for local deviation of the servitude to avoid sensitive areas identified in this study, and other sensitive sites that may be identified during the design phase.

These conclusions are pending the outcome of the public and authority comment on this draft EIA report.

These conclusions are the result of an intensive and comprehensive study. This has included the specialist assessments, based on issues identified within the Scoping Phase, as well as the parallel process of public participation. The public consultation exercise has been extensive and every effort has been made to include representative stakeholders in the study area.

It is considered that the study process has been successful and fully comprehensive.

Table 4.1: Summary of findings of detailed specialist studies undertaken regarding the proposed Matimba-Witkop No 2 400 kV Transmission line

Issue	Corridor 1	Corridor 2	Corridor 3	Corridor 4
<i>Social Environment</i>				
Land use	<p>Impacts on possible future expansion plans of Marapong township near Matimba powerstation. The proposed Transmission line will be required to be aligned as far to the north or south of the township as possible. Remainder of corridor has few land use issues as other settlements can be avoided by minor realignment within corridor.</p> <p>Option 1</p>	<p>Impacts on possible future expansion plans of Marapong township near Matimba powerstation. Construction of the Transmission line in this corridor will result in the “Boxing in” of Masebe Reserve by Transmission lines, which will have a significant negative impact on this reserve. Eastern section of corridor has few land use issues as other settlements can be avoided by minor realignment within corridor</p> <p>Option 2</p>	<p>Impacts on possible future expansion plans of Marapong township near Matimba powerstation. “Boxing in” of Masebe Reserve by Transmission lines. The construction of the Transmission line within this corridor may restrict irrigation activities along the Lephhalala River. Division of properties (game farms) if farm boundaries are not followed.</p> <p>Option 4</p>	<p>Impacts on possible future expansion plans of Marapong township near Matimba powerstation. “Boxing in” of Masebe Reserve by Transmission lines. Division of game farms if the construction of the Transmission line does not take farm boundaries into account. Eastern section of corridor has few land use issues as other settlements can be avoided by minor realignment within corridor</p> <p>Option 3</p>
Tourism potential	<p>It is reasonable to assume that existing tourism developments within this corridor have taken the existing 400 kV Transmission line into account during planning. This is the preferred option by the Biosphere Reserve and UNESCO.</p> <p>Option 1</p>	<p>“Boxing in” of Masebe Reserve by Transmission lines. West of Marken – impacts in terms of traversing small farms. Potentially high impact on game farms between east of Masebe Nature Reserve and Ellisras (e.g. Rhinoland Safaris)</p> <p>Option 3</p>	<p>“Boxing in” of Masebe Reserve by Transmission lines. Potential impact on smaller game farms near Marken. Potential impacts on the farms Goedgedacht and Twiga (breed endangered species). Potential impacts on game farms in Overysseel area.</p> <p>Option 4</p>	<p>“Boxing in” of Masebe Reserve by Transmission lines. Potential impact on smaller game farms near Marken.</p> <p>Option 2</p>

Issue	Corridor 1	Corridor 2	Corridor 3	Corridor 4
Social Impacts	<p>Potential impact on game and hunting lodges and other tourism operations.</p> <p>Potential impacts on hunting activities.</p> <p>Impacts minimised by presence of existing Transmission line.</p> <p>Impacts on properties around Witkop Substation.</p> <p>Option 1</p>	<p>Potentially negative impact on game farms in the Marken area, unless the Transmission line is constructed parallel to the R518.</p> <p>Some areas are impacted by existing lines across farms (275 and 132 kV).</p> <p>Some areas have no existing lines, and therefore, the proposed Transmission line will introduce a new impact.</p> <p>Potential impact on the town of Marken and Setateng.</p> <p>Potential impact on small game and hunting lodges.</p> <p>Impacts on properties around Witkop Substation.</p> <p>Option 2</p>	<p>Potentially negative impact on game farms in the Marken area, unless the Transmission line is constructed parallel to the R518.</p> <p>Most opposition received to this option. Considered a no-go option.</p> <p>Potential impact on the town of Marken and Overysse.</p> <p>Potential impact on small game and hunting lodges in the vicinity of Marken.</p> <p>Impacts on properties around Witkop Substation.</p> <p>Option 4</p>	<p>Potentially negative impact on game farms in the Marken area, unless the Transmission line is constructed parallel to the R518.</p> <p>Division of small game farms.</p> <p>Potential impact on the town of Marken and Setateng.</p> <p>Potential impact on small game and hunting lodges.</p> <p>Impacts on properties around Witkop Substation.</p> <p>Option 3</p>
Archaeological, cultural and historical sites	No significant sites identified.	<p>No significant sites identified.</p> <p>Community graveyards identified – will have to be avoided during placement of line.</p>	No significant sites identified.	No significant sites identified.
Visual/Aesthetic quality	<p>Vegetation and topography reduce visual impact in the Waterberg Biosphere area, particularly the nek between Moepel Farms and Masebe Nature Reserve.</p> <p>Impact minimised by visual character of Ellisras area.</p> <p>Existing visual impact from Matimba-Witkop No 1 400 kV</p>	<p>High impact on communities north and east of Masebe Nature Reserve.</p> <p>“Boxing in” of Masebe Nature Reserve will have a high impact on this reserve.</p> <p>Impact minimised by visual character of Ellisras area.</p>	<p>“Boxing in” of Masebe Nature Reserve will have a high impact on this reserve.</p> <p>Impact high in Overysse area due to the limited nature of linear infrastructure in this area.</p> <p>High impact on Goedgedacht and Twiga.</p> <p>Impact minimised by visual</p>	<p>High visibility along corridor, imposing a new impact in areas where no there are no existing powerlines.</p> <p>“Boxing in” of Masebe Nature Reserve will have a high impact on this reserve.</p> <p>Impact minimised by visual character of Ellisras area.</p>

Issue	Corridor 1	Corridor 2	Corridor 3	Corridor 4
	Transmission line. Option 1	Option 3	character of Ellisras area. Option 4	Option 2
<i>Biophysical Environment</i>				
Flora and fauna	Potentially 29 Red Data plant species within the Waterberg Biosphere area; 11 with a high probability of occurrence. Certain trees conserved by the local community (medicinal, food value). Wetland area identified. Option 2 (with implementation of mitigation measures potentially Option 1)	Vegetation degraded except in localised areas (i.e. on game farms). Wetland area identified west of Marken. Option 1	Vegetation on game farms considered to be in a fairly good condition. Option 3	Vegetation degraded except in localised areas (i.e. on game farms). Wetland area identified west of Marken. Option 1
Avifauna	Between Witkop Substation and the Biosphere the area is degraded with localised patches of natural vegetation. More river crossings than other corridors. Less disturbance to habitats (only existing 400 kV line from Biosphere to Matimba). Option 2 (with implementation of mitigation measures potentially Option 1)	Fewer river crossings than corridor 1. Higher disturbance of the area implies that birds will avoid this area. Existing 132 kV Distribution line imposes an existing impact on the area. Option 1	The construction of a Transmission line within this corridor will introduce a new impact into this area. Irrigation along river implies a concentration of birds. Not recommended. Option 3	Fewer river crossings than corridor 1. Higher disturbance of the area implies that birds will avoid this area. Existing Distribution lines impose an existing impact on the area. Option 1

Issue	Corridor 1	Corridor 2	Corridor 3	Corridor 4
Agricultural potential	<p>Area through Biosphere has low agricultural potential.</p> <p>Option 1</p>	<p>Limited agricultural potential.</p> <p>Option 2</p>	<p>Higher agricultural potential associated with the Lephalala River where irrigation is currently being undertaken.</p> <p>Option 3</p>	<p>Limited agricultural potential.</p> <p>Option 2</p>

4.4. Overall Recommendations

The recommendations arising from this study focus predominantly on the role and implementation of the Environmental Management Plan (EMP). The specialist studies identify areas and issues which are required to be addressed by this EMP, and the role of the EMP is seen to be vital to the successful implementation of the various mitigation measures which have been recommended at various points within this report. The application of the EMP for all life cycle phases of the new line, including design, construction, operation and decommissioning is considered to be key in achieving appropriate environmental management standards.

Specific to these developments, it is recommended that use of the specialists is actively planned as part of the design and construction phases:

- Specialist botanist to survey the final Transmission line route to identify sensitive and endangered plants, particularly at the tower footings.
- Specialist archaeologist to survey the final Transmission line route to assess the site specific impacts on sites on the route, particularly the tower footings.
- Bird specialist to review placement of 'bird flight diverters' and bird guards at key locations along the preferred alignment within the preferred corridor.

It is also recommended that the process of communication and consultation with the community representatives is maintained after the award of environmental authorisation, but particularly during the construction phase.