STRATEGIC ENVIRONMENTAL ASSESSMENT
FOR EXPANSION OF ELECTRICITY GRID
INFRASTRUCTURE IN SOUTH AFRICA

Biodiversity and Ecological Impacts

(Terrestrial Ecosystems and Species) - Savanna and Grassland Biomes

STRATEGIC ENVIRONMENTAL ASSESSMENT FOR THE EXPANSION OF ELECTRICITY GRID INFRASTRUCTURE IN SOUTH AFRICA

Draft v3 Specialist Assessment Report for Stakeholder Review

SAVANNA AND GRASSLAND BIOMES

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ABBREVIATIONS AND ACRONYMS

CBA	Critical Biodiversity Area
CR	Critically Endangered
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
EIA	Environmental Impact Assessment
EN	Endangered
ESA	Ecological Support Area
IAP	Invasive Alien Plants
NFI	National Forest Inventory
SANBI	South African National Biodiversity Institute
SEA	Strategic Environmental Assessment
VU	Vulnerable

1 SUMMARY

South African grasslands have a large number of species which occur nowhere else in the world (high endemism) and are threatened due to the high degree of transformation. Grasslands are one of the most threatened biomes in the country as they are the biome in which most crop agriculture and forestry takes place, as well as being the region with a high proportion of South Africa's human settlement and mining (Mucina and Rutherford 2006). The grasslands have a high diversity of dichotomous plant species as well as a number of threatened animal species, especially reptiles. Past activities have already transformed large areas of some grassland types and therefore the remaining pockets of these grasslands are critical from a conservation perspective (Neke and Du Plessis 2004, Reyers et al. 2001). As a consequence many of the remaining natural grasslands are classified as Critically Biodiversity Areas and, if possible, should be avoided by Electricity Grid Infrastructure (EGI) development. Most of the grasslands falling within this expansion corridor are poorly conserved and considered as threatened vegetation types.

Savannas, although having a high biodiversity, are relatively homogenous over large areas. Compared to grasslands, savannas have far lower levels of threatened plant species. Despite this there are some very unique and threatened savanna habitats requiring special conservation. Many of KwaZulu-Natal's parks are found within the savannas, and the savannas contain many of South Africa's iconic large mammals, some of which are Endangered or Vulnerable. Powerline infrastructure is likely to limit large tree re-establishment in a narrow belt directly below the powerline (i.e. within the powerline servitude). With the exception of areas identified as Critical Biodiversity Areas, routing through the savannas should have relatively low significance impacts provided suggested mitigation measures are adhered to.

Both savanna and grassland are fire dependent ecosystems. It is important that fire regimes are maintained in both these biomes to maintain natural biodiversity; however, the maintenance of a fire regime is often in conflict with powerline management guidelines (Scholes 1997, O'Connor and Bredenkamp 1997).

Summary of overall environmental suitability of the expanded Eastern Electricity Grid Infrastructure Corridor in the Grassland and Savanna biomes:

Corridor	Overall Suitability	Comment
Expanded Eastern EGI Corridor	Moderate suitability for power line infrastructure development.	The Zululand area is an important biodiversity area, and a network of provincial and private conservation land create a number of pinch points for routing. This expanded corridor falls largely within the Savanna biome and Indian Ocean Coastal Belt Biome.

2 INTRODUCTION

This report deals only with the savanna and grassland areas within the expanded electricity grid infrastructure corridors, and since these biomes are only found with the eastern corridor, it is the only corridor discussed.

The key feature of powerlines is that they are linear in nature. They create extensive destruction of vegetation (approximately 1 ha) per pylon. In addition, vegetation between pylons is typically kept short to prevent interference and fire hazards. The distance between pylons has not been specified and is influenced by typography; however it typically cannot exceed 400m. This can result in this vegetation being retained at an unnaturally low structure. Access roads linked to gridlines also represent a potential disturbance to vegetation and a source of erosion.

One of the key terrestrial biodiversity impacts from pylons is on birds and bats. This is however not covered in this section as it is covered in separate dedicated chapters (Refer to the relevant separately attached chapters and Appendices of the SEA Report). Without sound management it is also likely that the corridor

can be a source of soil erosion. The powerlines will often, out of necessity, route directly up or down slopes, typically with construction and maintenance roads following the same path. The un-vegetated and loose soil just post construction can easily become trigger points for erosion.

When considering infrastructure projects of this nature it is important to consider the functional attributes of the biomes impacted and how the development may impact on these functional attributes. Tree height and density in savannas is a key functional attribute that may be changed. Fire frequency and intensity may also be altered as it is standard practice to limit fire impacts below power line infrastructure (Eskom, 2007).

A large component of the Expanded Eastern Electricity Grid Infrastructure (EGI) Corridor is either savanna or grassland vegetation (Figure 1). The balance is mostly Indian Ocean Coastal Belt Vegetation.

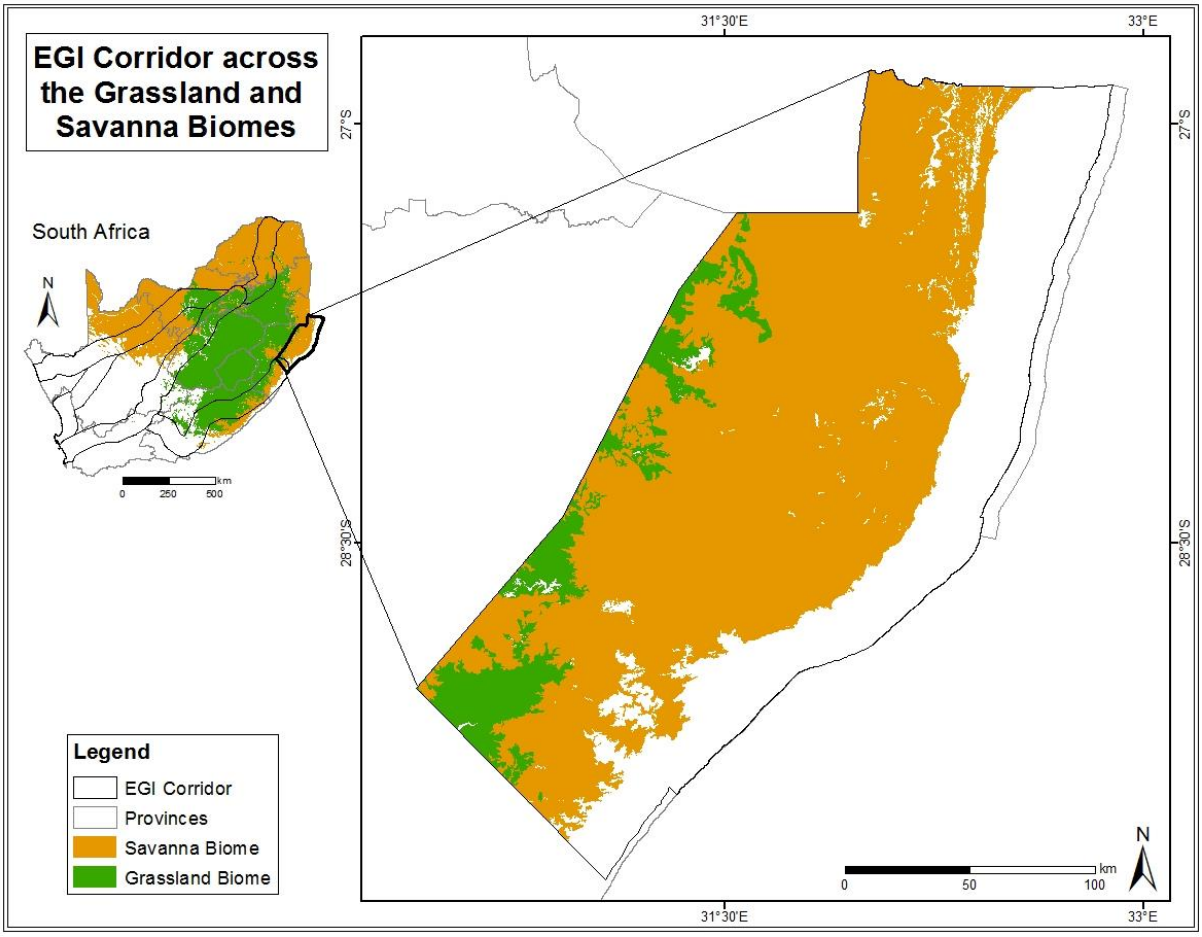

Figure 1: Location of savanna and grassland vegetation in the Expanded Eastern EGI corridor based on (Mucina and Rutherford, 2006)

The unique feature of savanna (Figure 3) that separates them from grassland is the occurrence of a tree layer in addition to an herbaceous layer. Savanna, although having a high alpha diversity (i.e. species diversity at the plot level), the species turnover, beta diversity, and landscape (gamma) diversity is relatively low (Scholes, 1997). This attribute of savanna makes them relatively resistant to small scale disturbances and a small disturbance is unlikely to have catastrophic loss to any particular species. However, there are specific locations with threatened species where these species would need protection. In addition, a number of the individual tree species within savannas are protected and require a permit to be cut (see Appendix A).

Grasslands (Figure 2), as the name implies, are dominated by a grass layer. However, from a biodiversity perspective, it is the huge diversity of non-grass species, often referred to as forbs, that give the grasslands

biome their high diversity (Mucina and Rutherford, 2006). It is also these forbs that are typically the rare or threatened species within the grasslands. Identifying and conserving these non-grass species will be of particular importance during the construction phase. In many cases these plants can be dug up and replanted once construction is completed.

Savanna, as a biome, is well conserved; however, many of the specific savanna vegetation types found within the corridor, are very poorly conserved, this is especially true for the Zululand area (Mucina and Rutherford, 2006) (Figure 3). Grasslands are arguably one of the most threatened biomes in the country, with many grassland types very poorly conserved (Figure 2) (SANBI no date; Mucina and Rutherford, 2006). In addition grasslands are one of the most transformed vegetation types, with a large proportion of the national cereal crop agriculture taking place in the grasslands (Reyers et al 2001, Fairbanks et al 2000). Most of the plantation forestry, a large proportion of mining as well as some of the biggest metropolitan areas are also located within the grassland biome. Large amounts of the grassland in the Expanded Eastern EGI corridor has been transformed into subsistence agriculture, forestry plantations and sugarcane fields (Fairbanks et al 2000). This places a high conservation importance on all remaining grassland.

Savanna and grassland are the home to a large number of mammals, and these animals move over considerable distances to locate grazing. During the powerline construction phase it is feasible that the movement of animals might be hindered if not managed appropriately, but this is not likely to be a factor in the post-construction phase assuming adequate rehabilitation is conducted. Small mammals, rodents, reptiles, invertebrates and ground birds, including disturbances to nesting sites, may be impacted during construction. If the post-construction habitat does not have the same functional attributes (e.g. vegetation type and density) as the original habitat then some of these species may have difficulty crossing or utilizing the new habitat. Many of the large and charismatic threatened mammal species such as both black and white rhinoceroses (*Diceros bicornis* & *Ceratotherium simum*), cheetah (*Acinonyx jubatus*) and cape hunting dogs (*Lycaon pictus*) are found in the savannas and grasslands of the corridor (Appendix B). These species are almost exclusively limited to protected areas and private reserves and as such their distribution is easily identified. Despite preventative measures being in place, construction activities may be a disturbance to these species, although post construction impacts will be minimal. A few large mammals such as leopard (*Panthera pardus*), mountain reedbuck (*Redunca fulvorufula*) and Oribi (*Ourebia ourebi*) may occur in suitable habitats outside of protected areas and will need specialists to identify potential suitable habitat (Child et al. 2016).

Small mammals, reptiles and insects distributions are far harder to ascertain, although a large number of Critically Endangered, Endangered and Vulnerable species occur within the powerline corridors (see Appendices A-D). In many cases these species have small ranges and often use burrows for shelter and breeding. As such the construction phase could potentially have high significance impacts. Understanding likely occurrences of threatened species will need a qualified specialist with a keen knowledge of the specific habitat requirements of the species. Attempting to map habitat requirements for all threatened species goes beyond the scope of this study, although locations of know occurrences are included and buffered (as described in Table 1).

Bats and birds, although a critical component of savanna and grassland habitats, are not considered in this report as they are fully covered in dedicated specialist reports. Similarly river and wetland systems and species are also dealt with on their own specialist report, however, they form an integral part of savanna and grassland ecosystems and this connectivity means that the independent studies must be considered together, not in isolation. Forest patches, including the Critically Endangered Sand Forest, are embedded in the grasslands. All forest patches are assumed excluded from potential routings and as such are given a Very High Sensitivity rating. It is also important to point out that the Indian Ocean Coastal Belt biome is considered in a separate assessment, this despite it having both large areas of open grassland as well as areas that have previously been defined as savanna.

The social importance of natural areas, including ‘sense-of-place’ is not covered in this report. However, it is important to emphasise that in addition to cropping and forestry, biodiversity-based tourism is an economically important and growing land use activity within the Savanna and Grassland Biomes along the

East Coast of KwaZulu-Natal. Biodiversity-based tourism is particularly sensitive to visual and sense-of-place impacts, regardless of whether they endanger the biodiversity populations directly or not.

Both savanna and grassland are fire dependent environments. Fire frequency is dependent on mean annual precipitation, with fire return intervals being once every two to three years in moist areas, but reducing in dry areas. Maintaining a fire frequency on the restored land is important for maintaining biological integrity of the vegetation type. Power lines, can on occasion, also be a direct cause of fire due to sparking and can therefore create unwanted fires. Consideration will need to be given as to how vegetation under the powerlines can be maintained given that fire exclusion under powerlines is a common management practice (Mucina and Rutherford 2006, O'Connor and Bredenkamp 1997, Scholes, 1997).

Although both grassland and savanna habitats are relatively well adapted to disturbances, complete clearance of the vegetation for pylons and partial clearing for roads and drag-lines during the construction phase will need direct intervention to ensure rapid and successful rehabilitation. Personal experience has shown that abandoned old fields in savannas can take 20 or more years before the re-establishment of trees, and even then it is often by early succession tree species. Active intervention will be needed if the habitats are to revert to near natural vegetation within reasonable timeframes.

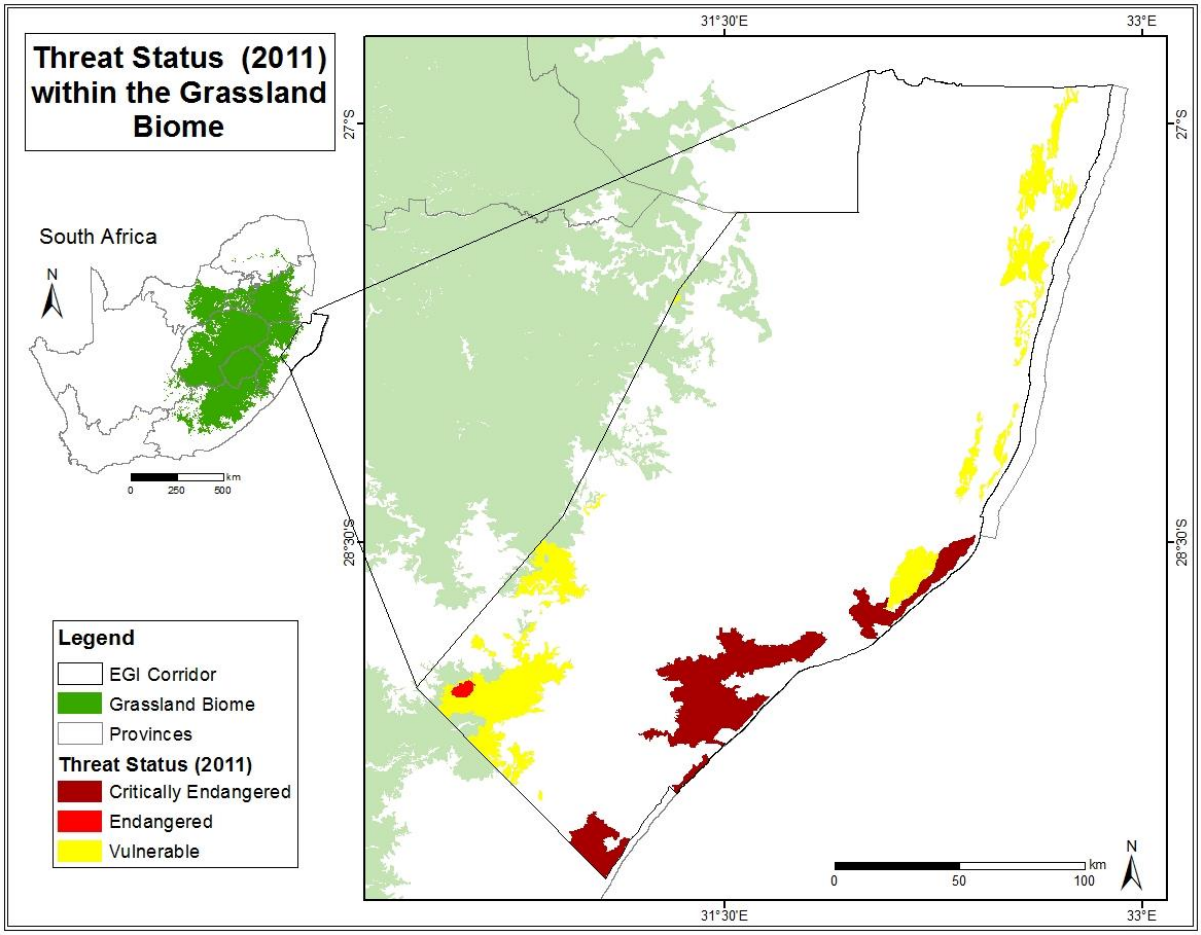

Figure 2: Conservation status of grassland ecosystems (functionally vegetation types from Mucina and Rutherford (2006)) as gazetted (Gazette No 34809 of 2011). Note, coastal grasslands depicted here fall outside of the grassland biome and are covered in the Indian Ocean Coastal Belt Biome Specialist Assessment.

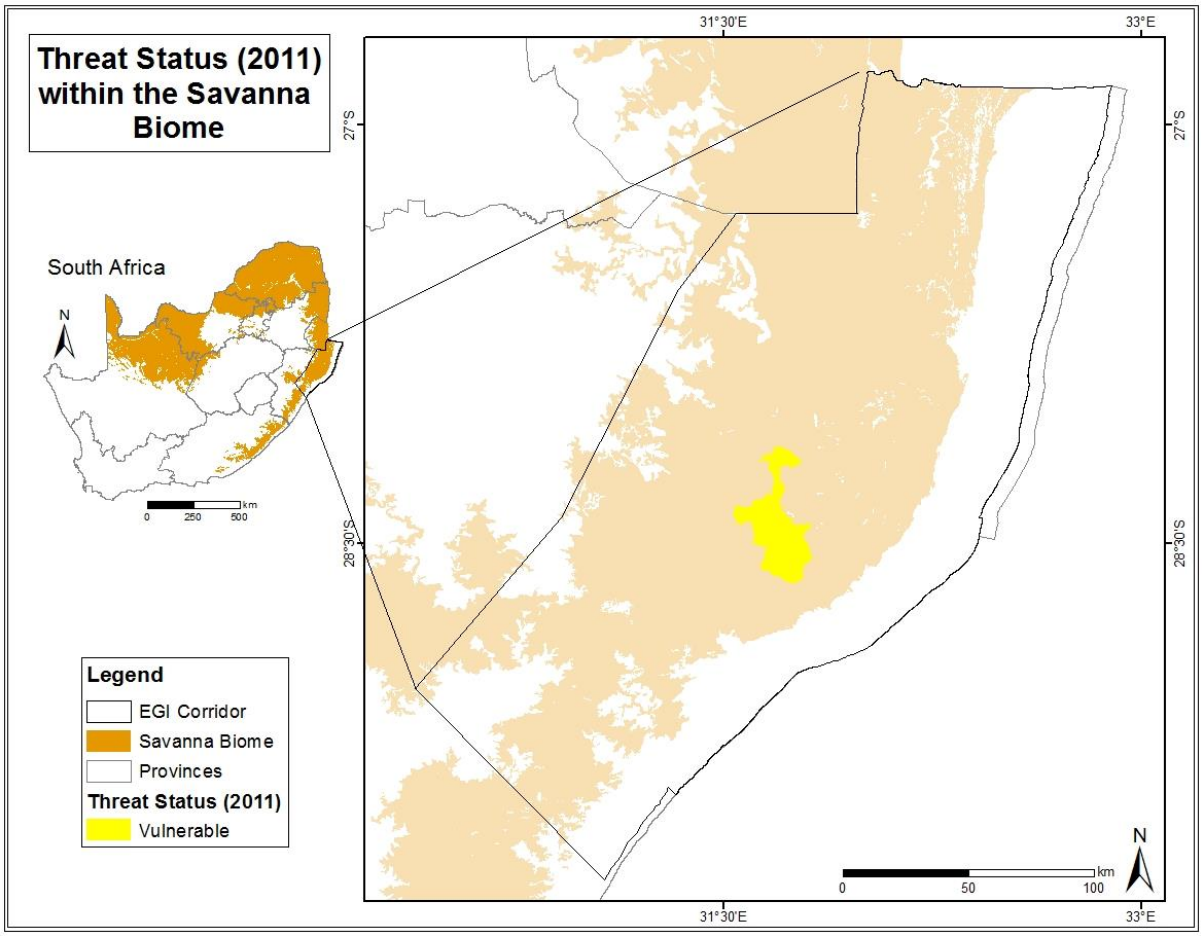

Figure 3: Conservation status of savanna ecosystems (functionally vegetation types from Mucina and Rutherford (2006)) as gazetted (Gazette No 34809 of 2011).

An important issue pertaining especially to grasslands, but to a lesser extent to savanna: disturbances during the construction phase are likely to result in alien invasive plant species colonising the post installation ground. Active alien plant removal interventions will be required until the natural vegetation is fully established. Although this concern is for both Grasslands and Savannas, it is the Grasslands which are most sensitive to this impact, with species such as *Acacia mearnsii* (black wattle) having seeds that can remain in the soil for decades, but which germinate in response to disturbances. Triffid weed, *Chromolaena odorata* is one of multiple common weeds in Savanna and is very common in the Zululand area where it can form impenetrable thickets. Given the vast range of habitats that will be covered by the powerlines, there are a large number for potential invasive species that can be involved. However, inspecting vehicles and clothing to ensure they do not accidently spread alien seeds into the area as well as ensuring identified alien plants are removed before they reach reproductive age can help mitigate impacts.

3 SCOPE OF THE BIODIVERSITY AND ECOLOGY ASSESSMENT FOR THE SAVANNA AND GRASSLAND BIOMES

This study focuses only of areas of savanna and grassland biomes, and considers these only from a biodiversity perspective. As noted above, embedded wetlands and river systems form a critical and integral component of savannas and grasslands, and in many cases are areas of greatest biodiversity concern. These areas are, however, excluded from this assessment as they are covered within a wetland specific assessment. The same is true for birds and bats. The study considers both the construction phase of the powerline (i.e. the construction of pylons and fixing of powerlines) as well as the operational phase. Decommissioning would be assumed to have similar disturbances to the construction phase.

The biomes as defined by Mucina and Rutherford (2006) are used as the basis for defining areas of savanna and grassland. It is, however, recognised that vegetation types within the Indian Ocean Coastal Belt have many commonalities with both savanna and grassland biomes and has been considered as part of these biomes in the past. The embedded sand forest has also been seen as a savanna type in the past.

This study is a high-level overview based on available secondary data sources. Fortunately provincial assessments of Critical Biodiversity Areas (CBAs) are available for KwaZulu-Natal and form the backbone of this assessment. The Geographic Information System (GIS) data used, based on the national and provincial assessments was compiled and provided by the South African National Biodiversity Institute (SANBI).

In addition, existing conservation areas are regarded as very high sensitivity or high sensitivity areas for conservation. There are a large number of provincial nature reserves within the corridors including the Hluhluwe–Imfolozi Reserve, Mkuzi, Tembe and Ndumo as well as the Ramsar iSimangaliso Wetland Park complex, although this is mostly Indian Ocean Coastal Belt vegetation.

All forest patches, although not grassland or savanna, have been rated as very high sensitivity and included in the grassland and savanna assessment where they are imbedded in these biomes. The Critically Endangered Sand Forest is highlighted as a highly threatened forest type found in this area.

4 APPROACH AND METHODOLOGY

4.1 Study Methodology

SANBI provided a data layer package of available GIS data. This was scanned to identify coverages that would be applicable to this study. In addition the background reports to the datasets were consulted. For this assessment the data described below were considered relevant. For each relevant data field an assessment was made as to whether the field has very high, high, medium or low biodiversity sensitivity for the savanna and grassland biome vegetation. This based on legislative and regulatory consideration, the priorities as defined by CBA categories and guided by expert judgement. The KwaZulu-Natal Biodiversity Sector Plan forms an important data source on the location of important biodiversity and areas critical for conservation.

4.2 Data Sources

Data sources used were collected and pre-processed by SANBI. The data used is summarised in Table 1.

Table 1: Data sources used for this assessment.

Data title	Source and date of publication	Data Description
Protected Areas	National Department of Environmental Affairs (DEA) South African Protected Areas Database, 2017. SANBI Protected Areas Database, 2011.	DEA Protected Areas database was compared against the SANBI protected areas database and discrepancies were resolved. Protected areas were added to the DEA data layer based on the SANBI layer in the Expanded Eastern EGI Corridor, otherwise both layers were consistent. Note: The Corridor area of the Hluhluwe–Umfolozi complex has a missing section on the National Protected Areas Database. This has been corrected in this report, but not in the base GIS maps.
CBA	Provincial datasets (KZN - 2016)	As prepared by SANBI based on the KwaZulu-Natal CBA assessments of 2016.
Threatened ecosystems	DEA and the SANBI 2011	Data as downloaded from the SANBI website
Natural Forest Areas	National Forest Inventory (NFI), sourced 2016, Department of Agriculture, Forestry and Fisheries	As prepared by SANBI

Data title	Source and date of publication	Data Description
	(DAFF)	
Critically Endangered, Endangered and Vulnerable species	Mammals – Child et al. 2016 Reptiles – Bates et al. 2014 Frogs – Minter et al. 2004 Plants - Raimondo et al 2009 as updated 2018	As prepared by SANBI Buffers of 2.5km around the Rodentia, Soricomorpha and Afrosoricida. 5km around everything else. For reptiles, amphibians and butterflies, a 2.5 km buffer, with the exception of *Crocodylus niloticus*, who should get a 25 km buffer. Mammal species have not been shown as they are predominantly linked to conservation areas (E.g. rhinoceros, wild dog) or are close to ubiquitous (leopard).

4.3 Assumptions and Limitations

This assessment relies exclusively on secondary data sources and is therefore dependant on any assumptions and limitations of the data sources. Overall key assumptions and limitations are given in Table 2.

Table 2: Assumptions and limitations.

Limitation	Included in the scope of this study	Excluded from the scope of this study	Assumption
Resource availability	Only existing, published datasets used	Field verification of datasets and outcomes, and extensive local expert consultation	Reasonable accuracy of data layers used. Field verification will take place on a site by site basis linked to development proposals.
Scale of analysis	This assessment provides a strategic overview or important conservation concerns	As above	As above
Scope	Limited to terrestrial biodiversity.	Excluding wetlands, birds and bats.	Wetlands, birds and bats biodiversity concerns are covered in separate specialist reports as part of this SEA.
Limitations imbedded in provided data	Datasets used, such as CBA, are used as provided	-	These data sources have multiple assumptions underpinning their development and these have not been considered

It was decided that buffering was not appropriate for most features and from a strictly biodiversity perspective. However, buffering for bird and bat impacts would be appropriate, but is covered in a separate study. Given that exact locations of rare and endangered species is not known, and due to the fact that these species may be mobile (animals) or more examples are likely to occur within the identified habitat (animals and plants), this data has been buffered.

4.4 Relevant Regulatory Instruments

Table 3 below provides a description of the applicable legislation and regulations.

Table 3: Regulatory instruments relevant to EGI development and environmental aspects in the Grassland and Savanna biomes.

Instrument	Key objective
International Instrument	
Ramsar Convention (The Convention of Wetlands of International Importance (1971 and amendments)	Protection and conservation of wetlands, particularly those of importance to waterfowl and waterfowl habitat.
National Environmental Management: Protected Areas Act, 2003	No development, construction or farming may be permitted in a nature reserve without the prior written approval of the management authority (Section 50 (5)). Also in a 'protected environment' the Minister or MEC may restrict or regulate development that may be inappropriate for the area given the purpose for which the area was declared (Section 5).
National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)	The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) provides for listing threatened or protected ecosystems, in one of four categories: critically endangered (CR), endangered (EN), vulnerable (VU) or protected. Activity 12 in Listing Notice 3 (Government Notice R324 of 7 April 2017) of the 2014 Environmental Impact Assessment (EIA) Regulations (as amended) relates to clearance of 300 m^2 or more of vegetation within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.
National Environmental Management Act (Act 107 of 1998), as amended	The National Environmental Management Act of 1998 (NEMA), outlines measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
NEMA EIA 2014 Regulations, as amended (Government Gazette 40772)	These regulations provide listed activities that require environmental authorisation prior to development because they are identified as having a potentially detrimental effect on natural ecosystems. Different sorts of activities are listed as environmental triggers that determine different levels of impact assessment and planning required. The regulations detail the procedures and timeframes to be followed for a basic or full scoping and EIA.
The National Forests Act (Act 84 of 1998)	The objective of this Act is to monitor and manage the sustainable use of forests. In terms of Section 12 (1) (d) of this Act and GN No. 1012 (promulgated under the National Forests Act), no person may, except under licence: Cut, disturb, damage or destroy a protected tree; or Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree.
List of protected trees species Gazette 37941 of 2014	Specifies which trees are protected under the National Forests Act (Act 84 of 1998).
KwaZulu-Natal Nature Conservation Act, 1992 (Act 29 of 1992)	According to the Natal Nature Conservation Ordinance No. 15 of 1974 and the KwaZulu-Natal Nature Conservation Act, 1992 (Act 29 of 1992), no person shall, among others: damage, destroy, or relocate any specially protected indigenous plant, except under the authority and in accordance with a permit from Ezemvelo KZN Wildlife (EKZNW).

5 CORRIDORS DESCRIPTION

An overview of the expanded Eastern EGI Corridor is given in Table 4.

Table 4: Environmental overview of the expanded Eastern EGI Corridor.

Site	Brief description
Expansion of Eastern EGI Corridor	This corridor covers the Zululand area stretching from the Mozambique border to just north of Durban. It includes much of what is referred to as the Maputoland Centre of Plant Endemism. Excluding the northern edge of this corridor which is grassland, and the coastal edge which is Indian Ocean Coastal Belt vegetation, the balance is savanna. Much of this savanna vegetation is from threatened savanna vegetation types. This region also has a large number of important conservation areas that are critical components of the conservation strategy for the region. In addition many of these reserves are key eco-tourism destinations. Though outside of the savanna and grasslands, the iSimangaliso Wetland Park complex is a Ramsar site and important wetland area. Much of this area is under communal land management forming part of the previous Zululand homeland. As such it tends to have a high human settlement density. Plantation forestry and sugarcane fields are two of the most important agricultural activities, and both of these have fragmented the natural biodiversity. List of Critically Endangered (CR), Endangered (EN) and Vulnerable (VU) species likely to be encountered in this region are provided in the Appendices B – D.

6 FEATURE SENSITIVITY MAPPING

6.1 Identification of feature sensitivity criteria

Feature sensitivity mapping is based on available national and provincial data (Table 1). The sensitivity of classes is based largely on sensitivities as used in National and KwaZulu-Natal Provincial biodiversity plans (see Table 5). All National and KwaZulu-Natal conservation area are considered of national biodiversity importance. The KwaZulu-Natal critical biodiversity plan was seen as the baseline for biodiversity conservation with CBA1 areas given very high status.

Occurrence of Critically Endangered (CR), Endangered (EN) or Vulnerable (VU) species within the powerline corridor is an issue of concern. Unfortunately, by the very nature of these species, for many of them exact locations of all individuals in the population are not known. We have therefore used buffers around recorded locations as a caution that these species may be found in the area and that precautions should be taken.

The ranking of sensitivity classes per feature is given in Table 5.

Table 5: Sensitivity ratings and buffers assigned to each feature class.

Feature Class	Feature Class Sensitivity	Buffer Distance Sensitivity
Protected Areas – national and provincial parks, forest wilderness, special nature reserves and forest nature reserves	Very High	None
Coastlines	Very High	None
All indigenous forests	Very High	None
CBA1	Very High	None
CBA2	High	None
Threatened ecosystems CR	Very High	None
EN	High	None
VU	Medium	None
Land Cover: Natural Area Land Cover: Modified areas	Low	None
Game Farms	medium	None
SANParks Buffer	High	
Protected Environments	High	None
National Protected Area Expansion	Medium	None
Mountain Catchment Areas	High	None
Biospheres	Medium	None
Botanical Gardens	Medium	None
Individual threatened taxa	High	As per the data in the table 1 above
ESA	Medium	None

7 FEATURE MAPS

7.1 Expanded Eastern EGI Corridor

This section highlights the different features that have been combined to develop the overall sensitivity map (Figure 4 and Figure 5). These maps are of a descriptive nature with the order of the drawing of features being the reverse order of the legend i.e. the first feature in the ledged is draw on top of lower features if they overlap. The feature maps are to aid in understanding of the sensitivity maps (section 8), but in no way attempt to designate sensitivity either in the order of features or the colours used.

The feature maps only include the savanna and grassland biomes. If parts of some features are of a different biome then in most cases they have been clipped out. It also means that important features such as conservation areas within the phase, but outside of the grassland and savanna may not be displayed.

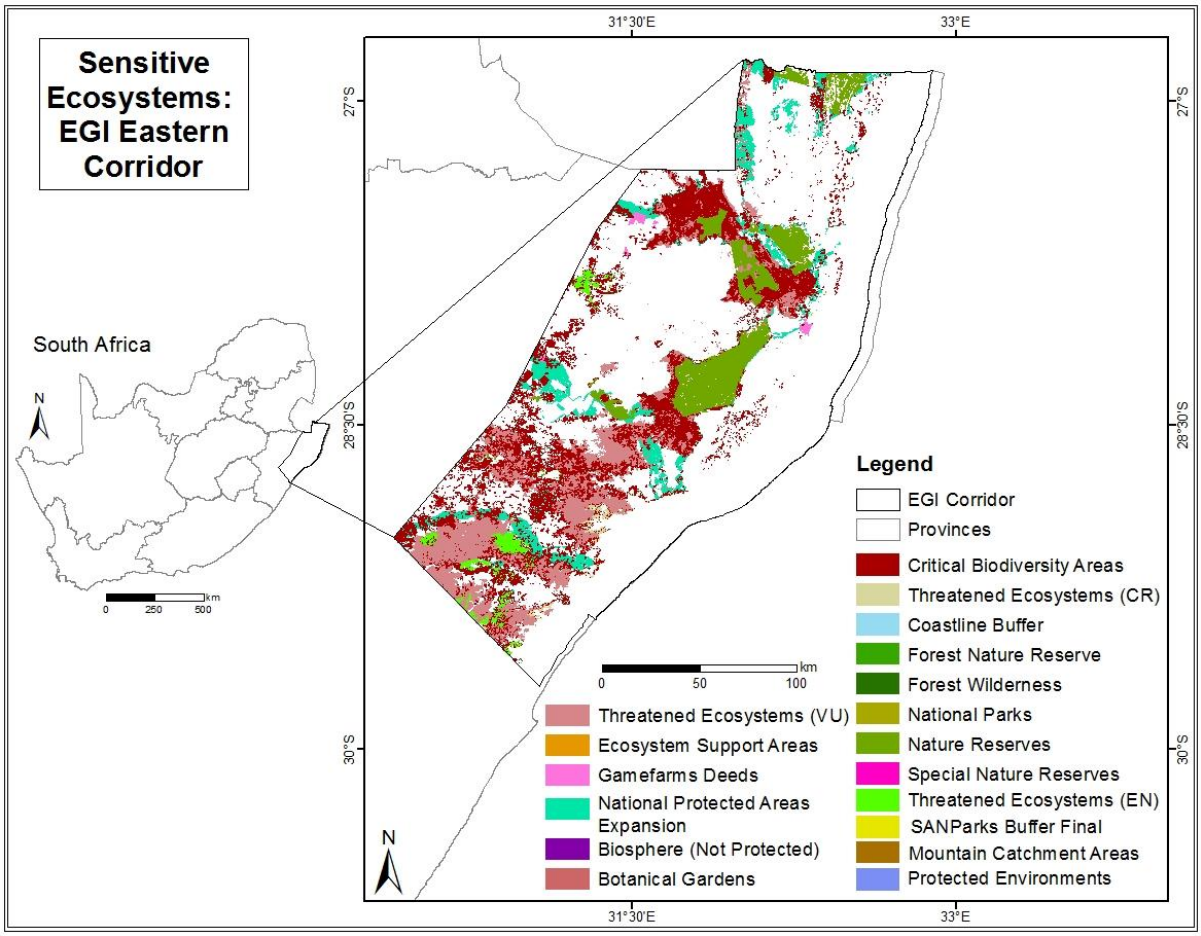

Figure 4: Summary map of feature classes used in the assessment of the expanded Eastern EGI Corridor.

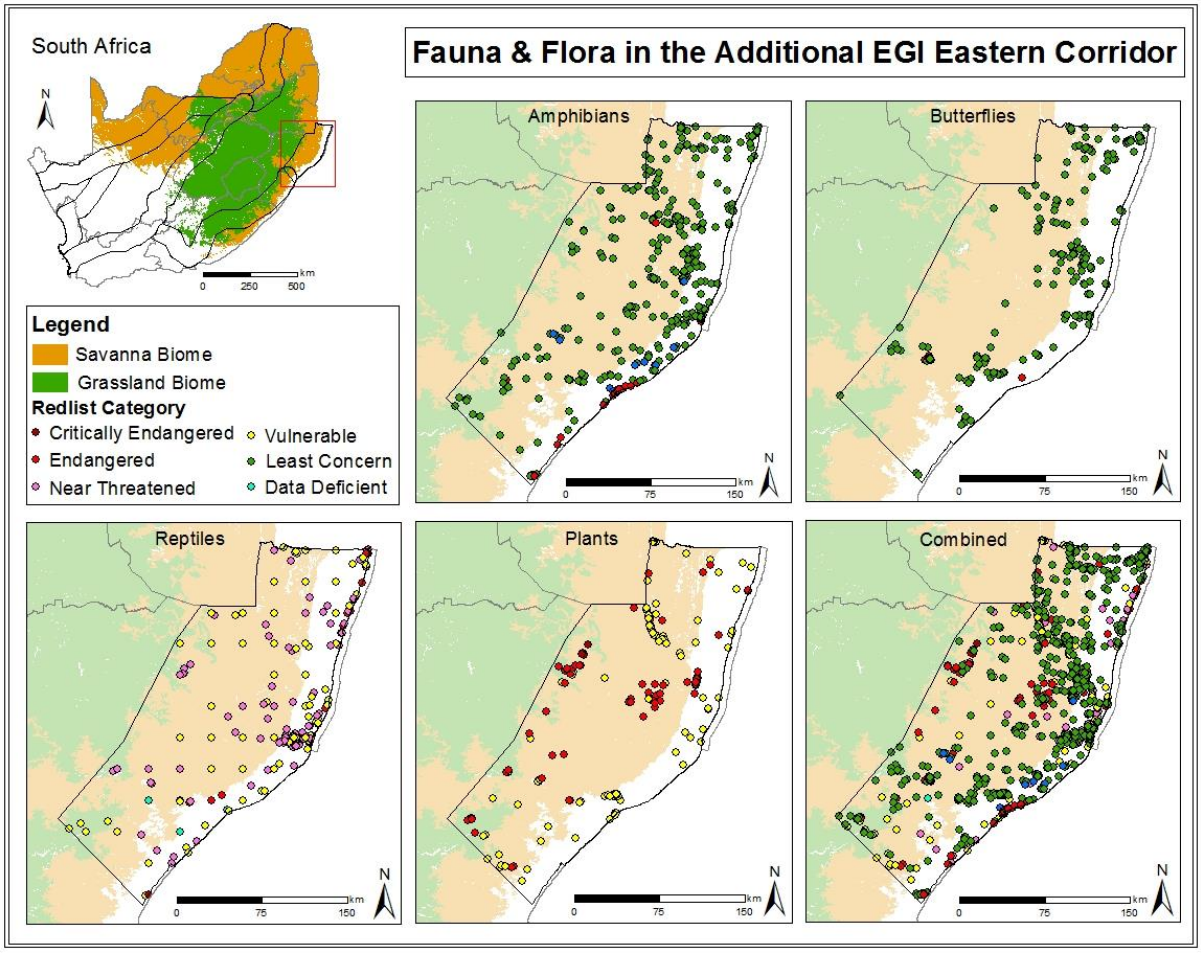

Figure 5: Summary maps of locations of critically endangered, endangered, vulnerable, near threatened and least concern amphibians, plants, butterflies and reptiles of the expanded Eastern EGI Corridor (see the appendixes for species lists). The map on the bottom row (extreme right) is a composite map of amphibians, plants, butterflies and reptiles.

8 FOUR-TIER SENSITIVITY MAPPING

The relative sensitivity mapping is based on a four-tier sensitivity classes approach with the following allocations:

- Dark Red : Very High Sensitivity
- Red : High Sensitivity,
- Orange : Medium Sensitivity
- Green : Low Sensitivity

Sensitivity maps have been drawn in the GIS system with low sensitivities forming the base, and then progressively higher sensitivities being overlayed. As such the highest sensitivity for any given area will be displayed and should be used in decision making.

8.1 Four Tier sensitivity maps

8.1.1 Expanded Eastern EGI Corridor

The expanded eastern corridor has a number of likely pinch points from a biodiversity perspective. The primary one being an area of irreplaceable conservation value linked to the complex of reserves including Mkuzi, Ubombo Mountain Reserve, Somkhanda Game Reserve, Zululand Rhino Reserve, Mduma, and the Thanda Private Reserve (Figure 6). Attempting to route coastward (to the east) would be inhibited by the iSimangaliso Wetland Park (Ramsar site) which are not shown on the maps as they are outside the grassland and savanna biomes.

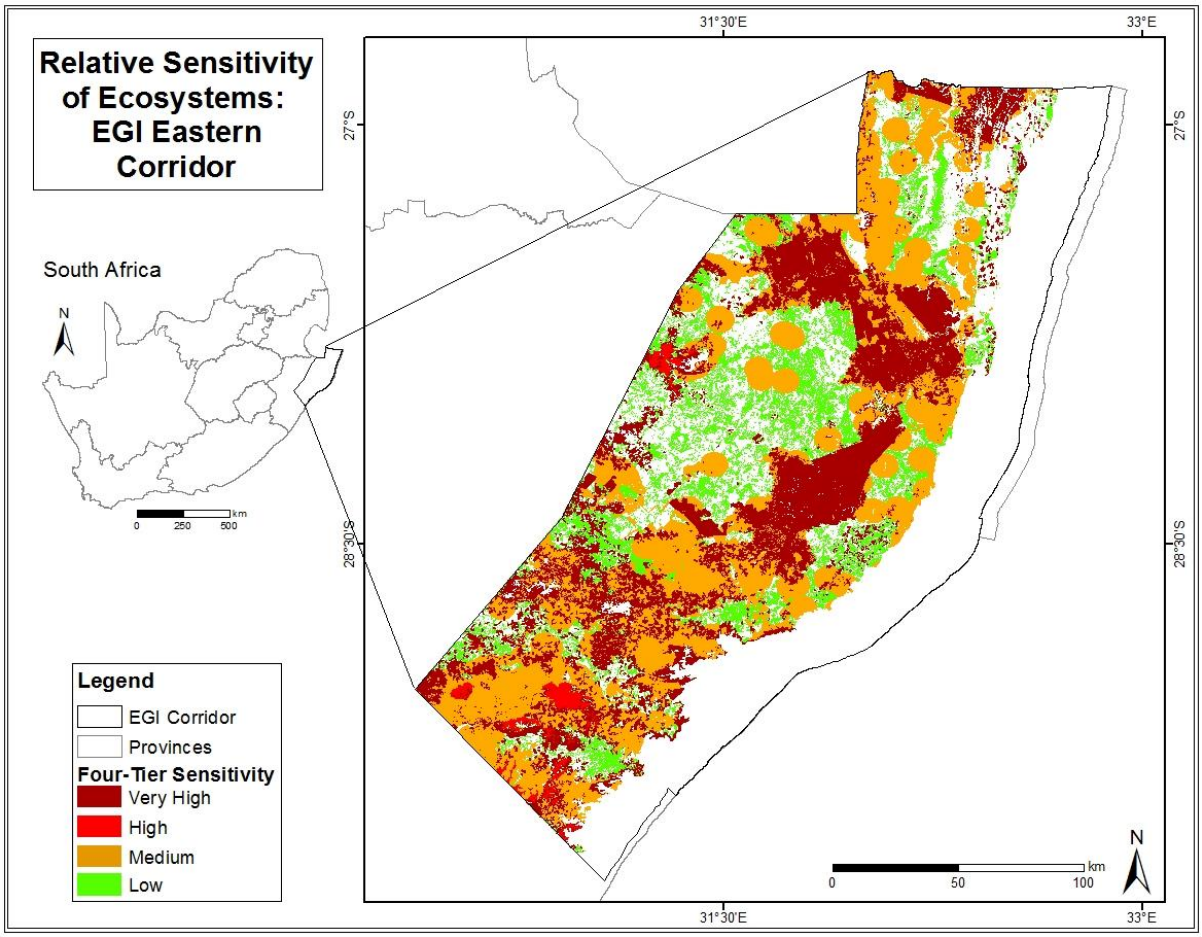

Figure 6: Four tier sensitivity map for the Expanded Eastern EGI Assessment

The southern section of the corridor, although not totally blocked as in the northern section, has multiple pinch points due to scattered areas of high biodiversity importance and a high likelihood of encountering threatened ecosystems and plant and animal species of conservation concern.

9 KEY POTENTIAL IMPACTS AND MITIGATION

The sensitivity map provides a strategic level guidance on areas where additional biodiversity related constraints to development are likely to be found. In most cases there are specific environmental constraints linked to all of the high sensitivity areas. For instance national legislation will govern any development proposed in national parks. Provincial legislation will govern development in provincial nature reserves or areas identified as CBAs. The project specific requirements in the various sensitivity areas will be captured in the Decision-Making tools that will prepared as part of this SEA.

The construction of powerlines and associated infrastructure has a number of key biodiversity impacts during the construction and operational phases.

The direct clearing of vegetation and disturbances to the area during pylon construction is one of the single biggest disturbances to biodiversity. The second potential disturbance is the road network created in support of the construction. It is assumed this will be mostly 4x4 tracks and not the full creation of graded dust roads. Some smaller additional impacts relate to activities such as mixing of cement for the pylon bases. Clearing of areas for pylon construction, access roads and drag lines can all act as points to imitate both erosion and the invasion of invasive alien plant (IAP) species and/or bush encroachment of less desirable indigenous species.

The most significant post-construction impact is that the vegetation under pylons is often kept at a low height to prevent fire and interference with the powerlines. It is normal that a permanent access road is also maintained.

Fire is a natural component of savanna and grassland systems, and suppressing fire will result in compositional and structural changes to the vegetation. In savannas the exclusion of trees from under the powerlines can change the vegetation structure, and hence the ability of the vegetation to support the migration of some species across the area. Some species such as snakes may attempt to climb pylons with potentially devastating impacts to the individual. The powerlines also are a hazard to birds, but this is covered in detail in the bird report and will not be covered here.

Table 6: Key potential impacts of EGI development to the Grassland and Savanna biomes and mitigation options.

Key Impacts	Site Specific Descriptions	Possible Effect	Mitigations
Vegetation clearing	There are many ecologically sensitive spots in the proposed corridor, and although the pylon footprint is relatively small it and access roads will impact on these areas.	Loss of ecologically significant habitats associated with these species.	Areas with a high abundance of endangered vegetation should be avoided if possible. Relocations of impacted species is a less optimum alternate.
Habitat structural changes	Cutting down of trees and changing fire regimes	Changes in species composition. Creation of barrier which some species may struggle to cross	Maintaining a tree layer (where appropriate). Maintaining fire regimes.
Habitat disturbance	Pylon sites, road networks and other forms of disturbance open the natural vegetation and allow for plant invasions. It can also destroy more sedentary or nesting animals.	Infestation of alien invasive species. Nick points that start soil erosion.	Clearing of Alien invasive species. Appropriate soil and water management.
Erosion	Pylons and access tracks/roads can lead to accelerated soil erosion	Erosion gullies	Route roads so they do not run directly up steep slopes, provide good drainage and erosion control, and re-vegetate bare soil.
Invasive alien plants	Introduced from land disturbances	Impact on indigenous vegetation, change fire profiles, change soil properties	Institute IAP prevention and clearing program.
Electrocution	Monkeys, snakes and other reptiles may climb the pylons and be electrocuted	Loss of individual animals	Barriers to prevent climbing.

10 BEST PRACTICE GUIDELINES AND MONITORING REQUIREMENTS

This section provides "best practice" (or "good practice") guidelines and management actions (including relevant standards) that cover the following development stages, and include practical, target-directed recommendations for monitoring of specified aspects raised in previous sections during planning, construction, operations, and rehabilitation.

Recommendations are based on Richardson et al. (2017).

10.1 Planning phase

- Consider where high biodiversity areas can be avoided
- Avoid routes that go over protected tree species (see Appendix A)
- Consider where threatened species can be avoided (see Appendices B - D and Figure 5)
- Consider seasonal timing – winter will likely be best to avoid breeding seasons when appropriate. Spring and autumn are typically most likely for seasonal migrations and if migrations are an issue should be avoided.
- Consider the workflow so that any area is only disrupted for a short period of time
- Plan road routes to minimise disruption to critical areas and to reduce risks of erosion

10.2 Construction phase

- Scan the proposed corridor for rare or threatened species. Obtain the appropriate permits if species are to be disrupted. If they cannot be avoided then either re-locate them (animals or plants) or remove them for replanting (for plants and where possible)
- Minimise the construction period at any site
- Minimise the construction footprint (area to be disturbed)
- Ensure proper drainage so that roads do not initiate erosion.
- Revegetate under pylons with species indigenous to the area. A mix of local grass species is best to rapidly establish ground cover and initiate ecological process.
- Train construction staff in procedures to minimise soil, vegetation and animal disturbance, and introduce and incentive/punishment scheme that rewards best practice and provides effective individual sanction for forbidden activities such as poaching or illicit plant collection.

10.3 Operations phase

- Minimise road usage
- Monitor for and control IAPs
- Monitor for and control soil erosion
- Minimise disturbance
- Maintain fire regimes
- Minimise clearing / cutting of high trees. Allow low trees to grow.
- Train and monitor operations staff in their duties with respect to biodiversity protection on the servitudes.
- Monitoring the fire regime on and around the servitude as well as vegetation height and fuel load.

10.4 Rehabilitation and post closure

- Ensure that if rare and endangered species have established within the construction sites that they are treated appropriately.
- Minimise disturbances to vegetation and animals when removing infrastructure
- Rehabilitate vegetation
- Monitor for IAPs and remove if found (for at least 5 years)

10.5 Monitoring requirements

Monitoring should be conducted twice yearly in summer for the first 2 years, then yearly in summer until natural vegetation cover is fully re-established, no erosion is being observed and there has been a 2 year period of no new alien invasion.

- Monitor vegetation re-establishment to ensure that there is a succession of the natural vegetation cover. Achieving good ground cover of indigenous vegetation as soon as possible should be the short term objective.
- Monitor the structure of the rehabilitated vegetation
- Monitor for erosion and changes in wetland areas
- Monitor the species composition
- Monitor for alien infestation
- Monitoring of poaching/livestock theft/illegal plant collection along the line of the powerline, especially where it passes through private or public protected areas, especially during construction, but also during operation.

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APPENDIX A: Trees protected through the National Forestry Act (Act 84 of 1998) and if they are likely to be encountered. Some of the species are limited to riverine or forest habitats and not strictly savanna or grassland species (Government Gazette 37941, 29 August 2014). Tree species not marked with a "YES" in the final column are unlikely to be naturally growing in the corridor.

BOTANICAL NAMES	ENGLISH COMMON NAMES	OTHER COMMON NAMES	NATIONAL TREE NUMBER	LIKELY TO OCCUR IN THE EXPANDED EASTERN EGI CORRIDOR
Acacia erioloba	Camel thorn	Kameeldoring	168	
Acacia haematoxylon	Grey camel thorn	Vaalkameeldoring, Mokholo	169	
Adansonia digitata	Baobab	Kremetart, Seboi, Mowana	467	
Afzelia quanzensis	Pod mahogany	Peulmahonie, Inkehli	207	YES
Balanites subsp. maughamii	Torchwood	Groendoring, Ugobandlovu	251	YES
Barringtonia racemosa	Powder-puff tree	Poeierkwasboom, Iboqo	524	
Boscia albitrunca	Shepherd's tree	Witgat, Umvithi	122	YES
Brachystegia spiciformis	Msasa	Msasa	198.1	
Breonadia salicina	Matumi	Mingerhout, Umfomfo	684	
Bruguiera gymnorrhize	Black mangrove	Swartwortelboom, IsiHlobane	527	
Cassipourea swaziensis	Swazi onionwood	Swazi uiehout	531.1	
Catha edulis	Bushman's tea	Boesmanstee, Umhlwazi	404	YES
Ceriops tagal	Indian mangrove	Indiese wortelboom, Isinkahe	525	
Cleistanthus schlechteri	False tamboti	Bastertamboti, Umzithi	320	YES
Colubrine nicholsonii	Pondo weeping thorn	Pondo-treurdoring	453.8	
Combretum imberbe	Leadwood	Hardekiil, Impondondlovu	539	
Curtisia dentata	Assegai	Assegaai, Umagunda	570	
Elaeodendron transvaalensis	Bushveld saffron	Bosveld-saffraan, Ingwavuma	416	YES
Erythrophysa transvaalensis	Bushveld red balloon	Bosveld-rooiklapperbos	436.2	
Euclea pseudebenus	Ebony guarri	Ebbeboom-ghwarrie	598	
Ficus trichopoda	Swamp fig	Moerasvy, Umvubu	54	YES

BOTANICAL NAMES	ENGLISH COMMON NAMES	OTHER COMMON NAMES	NATIONAL TREE NUMBER	LIKELY TO OCCUR IN THE EXPANDED EASTERN EGI CORRIDOR
Leucadendron argenteum	Silver tree,	Silwerboom	77	
Lumnitzera racemosa	Tonga mangrove	Tonga-wortelboom, isiKhahaesibomvu	552	
Lydenburgia abbottii	Pondo bushman's tea	Pondo-boesmanstee	407	
Lydenburgia cassinoides	Sekhukhuni bushman's tea	Sekhukhuni-boesmanstee	406	
Mimusops caffra	Coastal red milkwood	Kusrooimelkhout, Umkhakhayi	583	YES
Newtonia hildebrandtii	Lebombo wattle	Lebombo-wattel, Umfomothi	191	YES
Ocotea bullata	Stinkwood	Stinkhout, Umnukane	118	YES
Ozoroa namaquensis	Gariep resin tree	Gariep-harpuisboom	373.2	
Philenoptera violacea	Apple-leaf	Appelblaar, isiHomohomo	238	
Pittosporum viridiflorum	Cheesewood	Kasuur, Umfusamvu	139	YES
Podocarpus elongatus	Breede river yellowwood	Breeriviergeelhout	15	
Podocarpus falcatus (Afrocarpus falcatus)	Outeniqua yellowwood	Outeniquageelhout, Umsonti	16	YES
Podocarpus henkelii	Henkel's yellowwood	Henkel se geelhout, Umsonti	17	
Podocarpus latifolius	Real yellowwood	Regte-geelhout, Umkhoba	18	YES
Prota comptonii	Saddleback sugarbush	Barberton-suikerbos	88	
Protea curvata	Serpentine sugarbush	Serpentynsuikerbos	88.1	
Prunus africana	Red stinkwood	Rooistinkhout, Umdumezuz	147	YES
Pterocarpus angolensis	Wild teak	Kiaat, Umvangazi	236	
Rhizophora mucronata	Red mangrove	Rooiwortelboom	526	
Sclerocarya birrea subsp. caffra	Marula	Maroela, Umganu	360	YES
Securidaca longepedunculata	Violet tree	Krinkhout, Mmaba	303	

BOTANICAL NAMES	ENGLISH COMMON NAMES	OTHER COMMON NAMES	NATIONAL TREE NUMBER	LIKELY TO OCCUR IN THE EXPANDED EASTERN EGI CORRIDOR
Sideroxylon inerme subsp. inerme	White milkwood	Witmelkhout, Umakhwelafingqane	579	YES
Tephrosia pondoensis	Pondo poison pea	Pondo-gifertjie	226.1	
Warburgia salutaris	Pepper-bark tree	Peperbasboom, isiBaha	488	YES
Widdringtonia cedarbergensis	Clanwilliam cedar	Clanwilliamseder	19	
Widdringtonia schwarzii	Willowmore cedar	Baviaanskloofseder	21	

APPENDIX B: Savanna and Grassland Endangered and Vulnerable mammals that are likely to be encountered in the Expanded Eastern EGI Corridor.

ORDER	FAMILY	BOTANICAL NAME	ENGLISH COMMON NAMES	BIOME WHERE THE SPECIES IS LIKELY TO OCCUR
Endangered				
Afrosoricida	Chrysochloridae	*Amblysomus marleyi*	Marley's Golden Mole	Grassland
Artiodactyla	Bovidae	*Nesotragus moschatus zuluensis*	Suni	Savanna
Artiodactyla	Bovidae	*Redunca fulvorufula fulvorufula*	Mountain Reedbuck	Grassland
Carnivora	Canidae	*Lycaon pictus*	African Wild Dog	Savanna
Perissodactyla	Rhinocerotidae	*Diceros bicornis minor*	Southern-central Black Rhinoceros	Savanna
Artiodactyla	Bovidae	*Ourebia ourebi ourebi*	Oribi	Grassland
Vulnerable				
Artiodactyla	Bovidae	*Damaliscus lunatus lunatus*	Tsessebe	Savanna
Artiodactyla	Bovidae	*Philantomba monticola*	Blue Duiker	Savanna
Carnivora	Felidae	*Panthera pardus*	Leopard	Grassland Savanna
Pholidota	Manidae	*Smutsia temminckii*	Temminck's Ground Pangolin	Savanna
Primates	Cercopithecidae	*Cercopithecus albogularis labiatus*	Samango Monkey	Savanna
Carnivora	Felidae	*Acinonyx jubatus*	Cheetah	Savanna

APPENDIX C: Grassland Critically Endangered (CR), Endangered (EN), and Vulnerable (VU) plant species likely to be found in the grassland and forest habitats. The hot links link to the SANBI red list of South African plants where details including likely location of each species are likely to be found.

BOTANICAL NAME AND STATUS OF GRASSLAND SPECIES
Acalypha entumenica Prain EN
Alepidea cordifolia B.-E.van Wyk EN
Aloe saundersiae (Reynolds) Reynolds CR
Argyrolobium longifolium (Meisn.) Walp. VU
Asclepias gordon-grayae Nicholas EN
Aspalathus gerrardii Bolus VU
Brachystelma gerrardii Harv. EN
Brachystelma ngomense R.A.Dyer EN
Brachystelma sandersonii (Oliv.) N.E.Br. VU
Brachystelma vahrmeijeri R.A.Dyer EN
Cyathocoma bachmannii (Kük.) C.Archer VU
Dierama dubium N.E.Br. VU
Gerbera aurantiaca Sch.Bip. EN
Gymnosporia woodii Szyszyl. EN
Haworthiopsis limifolia (Marloth) G.D.Rowley VU
Helichrysum ingomense Hilliard EN
Kniphofia leucocephala Baijnath CR
Oxygonum dregeanum Meisn. subsp. *streyi* Germish. EN
Pachycarpus concolor E.Mey. subsp. *arenicola* Goyder VU
Restio zuluensis H.P.Linder VU
Riocreuxia woodii N.E.Br. CR PE
Schizoglossum ingomense N.E.Br. EN
Selago zuluensis Hilliard EN
Senecio dregeanus DC. VU
Senecio ngoyanus Hilliard VU
Senecio villifructus Hilliard EN
Syncolostemon latidens (N.E.Br.) Codd VU
Tephrosia inandensis H.M.L.Forbes EN
Thesium polygaloides A.W.Hill VU

APPENDIX D: Savanna Critically Endangered (CR), Endangered (EN), and Vulnerable (VU) plant species likely to be found. The hot links link to the SANBI red list of South African plants where details including likely location of each species are likely to be found.

BOTANICAL NAME AND STATUS OF SAVANNA SPECIES
Encephalartos lebomboensis I.Verd. EN
Raphionacme elsana Venter & R.L.Verh. EN
Warneckea parvifolia R.D.Stone & Ntetha CR
Euphorbia gerstneriana Bruyns VU
Dioscorea sylvatica Eckl. VU
Ceropegia cimiciodora Oberm. VU

APPENDIX E: Savanna and Grassland Critically Endangered (CR), Endangered (EN), and Vulnerable (VU) and Near Threatened (NT) Reptile species likely to be found.

ORDER	REPTILES SCIENTIFIC NAME	REPTILES COMMON NAME	IUCN STATUS
Squamata	*Bitis gabonica*	Gaboon Adder	NT
Squamata	*Bradypodion caeruleogula*	uMlalazi Dwarf Chameleon	EN
Squamata	*Chamaesaura macrolepis*	Large-scaled Grass Lizard	NT
Crocodylia	*Crocodylus niloticus*	Nile Crocodile	VU
Squamata	*Cryptoblepharus boutonii*	African Coral Rag Skink	EN
Squamata	*Dendroaspis angusticeps*	Green Mamba	VU
Squamata	*Homoroselaps dorsalis*	Striped Harlequin Snake	NT
Squamata	*Leptotyphlops telloi*	Tello's Thread Snake	NT
Squamata	*Lycophidion pygmaeum*	Pygmy Wolf Snake	NT
Squamata	*Macrelaps microlepidotus*	Natal Black Snake	NT
Squamata	*Natriciteres olivacea*	Olive Marsh Snake	NA
Testudines	*Pelusios rhodesianus*	Variable Hinged Terrapin	VU
Squamata	*Scelotes bourquini*	Bourquin's Dwarf Burrowing Skink	VU
Squamata	*Scelotes inornatus*	Durban Dwarf Burrowing Skink	CR
Squamata	*Tetradactylus breyeri*	Breyer's Long-tailed Seps	VU