

ESKOM TRANSMISSION
**Proposed Gamma-Grassridge 765kV Transmission Power Lines &
Gamma-substation**

Ecological & Biodiversity Assessment: Faunal Specialist Study

Draft Report: Gamma-substation

28 June 2007



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DECLARATION OF CONSULTANTS' INDEPENDENCE

M. Landman, G. Kerley and A. Boshoff (Faunal Specialists - Centre for African Conservation Ecology) are independent consultants to ACER (Africa) Environmental Management Consultants (for Eskom Transmission), i.e. they have no business, financial, personal or other interest in the activity, application or appeal in respect of which they were appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of these specialists performing such work.

EXECUTIVE SUMMARY

The aim of the study was to assess the potential impacts (and associated mitigating measures) on fauna during the construction and operation of the proposed Gamma-substation, which forms part of the larger Gamma-Grassridge 765kV Transmission Line project. By using the habitat characteristics of the area (i.e. Nama-Karoo shrublands) and the particular species' habitat requirements, twenty-two faunal species with conservation concern (e.g. restricted distribution range, Red Data Book species etc.) were identified in the study area. Riverine rabbits (Critically Endangered) are potentially most vulnerable (to direct loss/transformation of habitat and indirect effects, e.g. poaching and increased predation by raptors), due to their particularly limited distribution range and the fact that they are extreme habitat specialists. Although potential riverine rabbit habitat does occur on the proposed site, the habitat is thought to be of a low quality, presumably as a result of overgrazing by domestic herbivores (resulting in changes in vegetation structure and composition). Moreover, there are currently no records for riverine rabbits at the proposed site. As a precautionary measure, however, it is recommended that Eskom compensates for any potential loss/transformation of habitat by contributing towards the conservation of riverine rabbit habitat elsewhere. Potential impacts on the remaining fauna that occur in the study area may be within acceptable limits as these species are mobile, are more generalistic in their habitat requirements, and the area being transformed is relatively small (i.e. 172 ha). Impacts associated with the operation of the Gamma-substation (e.g. increased impact on raptor prey-populations through increased perch-availability, poaching and incidental predation of fauna by domestic dogs) will potentially have a low impact on fauna, provided that the recommended and specific mitigating measures are implemented.

1. BACKGROUND AND TERMS OF REFERENCE

ACER (Africa) Environmental Management Consultants contracted the Centre for African Conservation Ecology to undertake an Ecological and Biodiversity Assessment: Faunal Specialist Study for the development of the proposed Gamma-substation, as part of the larger Gamma-Grassridge 765kV Transmission Line (x2) project. In its entirety, this project covers the area between the Gamma-substation (situated near Victoria West, Northern Cape) and the Grassridge-substation (situated near Port Elizabeth, Eastern Cape), and is designed to meet current and projected future growth in electricity demand (related to the development of the Coega IDZ and associated industries) in the Eastern Cape.

The Faunal Specialist Study was required in terms of the scope of the full Environmental Impact Assessment for the proposed development and had to include the following:

- A description of the occurrence and distribution of fauna (i.e. butterflies, amphibians, reptiles and small-, medium- and large mammals) in the study area, which may be influenced by the proposed development, or which may influence the development during construction and operation.
- The identification of Red Data species potentially affected by the proposed development.
- The identification of species-specific habitats in the study area, which may be influenced by the proposed development.
- An assessment of the potential impacts (positive, negative or cumulative) on fauna during the construction and operation of the proposed development.
- The identification of specific mitigating measures, for enhancing benefits and avoiding or mitigating negative impacts and risks, which should be implemented during design, construction and operation of the proposed development.
- The formulation of a simple system to monitor potential impacts, and their management, based on key indicators.

2. APPROACH USED, ASSUMPTIONS AND LIMITATIONS

To assess the presence/absence of fauna (i.e. butterflies, amphibians, reptiles and small-, medium- and large mammals) that potentially occur naturally on the proposed Gamma-substation site, it was necessary to first assess the occurrence and distribution of faunal habitats in the study area. These habitats were delineated according to a number of biological characteristics, including vegetation type (Mucina & Rutherford 2006), geology and topography. Vegetation types that showed a high degree of similarity in terms of structure (and hence faunal habitat), and for which any differences that exist were considered unlikely to significantly influence the potential presence of faunal species, were combined. Faunal habitats were ground-truthed during a field survey.

Habitats in the study area that support sensitive fauna (i.e. riverine rabbits *Bunolagus monticularis*) could not be identified during the above desktop-survey, as the scale of the vegetation distribution maps did not allow for the detection of these particularly specific habitats. These, were subsequently assessed and mapped during a field survey with input from conservation specialists (Endangered Wildlife Trust – Riverine Rabbit Working Group (EWT-RRWG)).

The potential occurrence of fauna in the study area was determined according to the habitat characteristics of the area identified above (e.g. vegetation structure, geology, topography etc.) and the particular species' habitat requirements. Recent published literature (butterflies –

Henning 1989, Woodhall 2005; amphibians – Minter *et al.* 2004, reptiles – Branch 1988, Branch 1998 and mammals – Friedman & Daly 2004, Skinner & Chimimba 2005) was consulted to identify fauna with conservation concern that potentially occur naturally in the study area. Conservation concern was defined to include:

1. Fauna with a restricted distribution range, where a significant proportion (c. $\geq 10\%$) of the estimated distribution range of the species may be occupied by the proposed substation,
2. Fauna listed in the South African Red Data Book (SA RDB - Henning 1989, Branch 1988, Friedman & Daly 2004, Minter *et al.* 2004),
3. Fauna listed by the Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES 2007),
4. Fauna listed in the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species (DEAT 2007), and
5. Fauna that are used in traditional healing and to prepare traditional medicines (thus, vulnerable to poaching - Simelane 1996).

The assessment of the occurrence of fauna in the study area was limited by the general availability of information in the published literature, and the fact that species distribution surveys are often incomplete in terms of species and/or areas covered. Furthermore, the scale of the distribution maps in many literature sources only allows for generalised faunal ranges to be determined. Nevertheless, we consider our approach of using the habitat characteristics of the area, together with the particular species habitat requirements, to be a robust attempt to dealing with these challenges (especially in the case of the small-, medium- and large mammals).

Potential impacts on fauna during the construction and operation of the proposed Gamma-substation were assessed following a synthesis of the information gathered above, and were quantified based on 1) relevant literature, 2) expert opinion, and 3) personal observations of the functioning of these ecosystems and the impacts of similar activities (associated with the loss/transformation of habitats) within them.

3. STUDY AREA

The proposed Gamma-substation site (c. 172 ha; Figure 1) comprises the farms Uit Vlucht Fontein No. 233 and Schietkuil No. 3 in the Victoria West District of the Northern Cape.

Topographically, the area is characterised by generally flat and gently sloping plains, with a range of low hills and koppies to the north. Rainfall occurs mainly in autumn and summer, with peaks during March (Mucina & Rutherford 2006). Mean maximum and minimum temperatures are typically hot in summer (37 °C) and cold in winter (-8 °C).

3.1 Faunal habitats identified

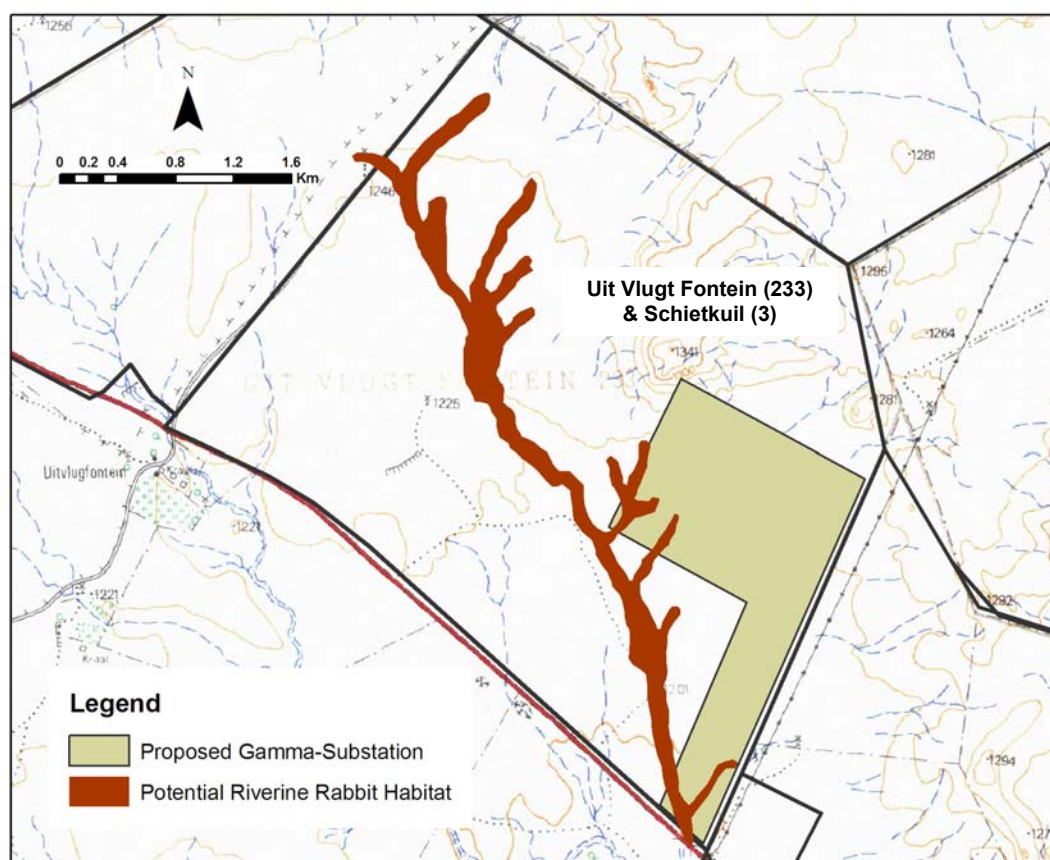
The Gamma-substation site comprises a single faunal habitat of typical Nama-Karoo shrublands, dominated by dwarf (generally <1 m tall) microphyllous shrubs (e.g. *Pentzia* sp., *Eroicephalus* sp., *Rosenia* sp. and *Lycium* sp.), succulents, geophytes and grasses (e.g. *Aristida* sp., *Eragrostis* sp.). Taller shrubs and small trees occur only along a non-perennial river-course and associated drainage lines that bisect the larger area. The cover of grasses in the area may vary with the occurrence of good autumn and summer rains.

3.2 Habitats that support sensitive fauna

Riverine rabbits are considered to be habitat specialists that are confined to the riparian shrubs on the narrow alluvial fringes of seasonal, dry river-courses (Skinner & Chimimba 2005). These riparian areas are usually characterised by shrubs between 50-100 cm tall, with vegetation cover provided by *Lycium* sp. and *Salsola* sp. (30%). Ephemeral grass cover may occur in some places, but usually do not comprise more than 5% of the area. Riverine rabbits may forage up to a distance of 2 km away from riparian areas (EWT-RRWG pers. comm.).

Potential suitable habitat for riverine rabbit was identified along the non-perennial river-course and associated drainage lines that bisect the larger Gamma-substation area (Figure 1). However, based on assessments by the EWT-RRWG done elsewhere (where Riverine rabbits are present), the habitat in the study area is thought to be of a low quality. This is considered to be as a result of overgrazing by domestic herbivores, which has changed vegetation structure and composition.

Figure 1 Occurrence and extent of distribution of potential riverine rabbit habitat on the larger Gamma-substation site (comprising the Uit Vlugt Fontein and Schietkuil properties).



4. FAUNA WITH CONSERVATION CONCERN

Twenty-two faunal species with conservation concern (i.e. restricted distribution range, SA RDB- NEMBA- and CITES listing, species that are used in traditional healing and to prepare traditional medicines) potentially occur naturally on the proposed Gamma-substation site (Table 1). These were characterised by butterflies (c. 14 %), reptiles (c. 45%) and mammals

(c. 41%). The absence of semi-permanent/permanent water sources in the study area (Wetland Specialist Study) potentially precludes the occurrence of amphibians. Although Riverine rabbits are listed as potentially present in the study area, no records of their occurrence on the proposed substation-site are available (EWT-RRWG, Unpublished data).

Table 1 List of fauna (butterflies – Henning 1989, Woodhall 2005; reptiles – Branch 1988, Branch 1998 and mammals – Friedman & Daly 2004, Skinner & Chimimba 2005) that potentially occur naturally on the proposed Gamma-substation site (comprising the Uit Vlucht Fontein and Schietkuil properties) for which conservation concern was identified. See notes below for clarification of abbreviations.

Class	Species	Common name	Conservation concern
BUTTERFLIES	<i>Phasis braueri</i>	Brauer's arrowhead	Restricted distribution range
	<i>Spialia satespes</i>	Boland sandman	Restricted distribution range
	<i>Tsitana uitenhaga</i>	Uitenhage sylph	Restricted distribution range
REPTILES	Chelonians		
	<i>Geochelone pardalis</i>	Leopard tortoise *	Provincial legislation: CITES APP II
	<i>Psammobates tentorius tentorius</i>	Tent tortoise *	Provincial legislation: CITES APP II
	Scaled Reptiles - Snakes & Lizards		
	<i>Lamprophis fiskii</i>	Fisk's house snake	SA RDB: Rare
	<i>Acontias meleagris orientalis</i>	Cape legless skink	Restricted distribution range
	<i>Bradypodion karrooicum</i>	Karoo dwarf chameleon *	Provincial legislation: CITES APP II
	<i>Chamaeleo namaquensis</i>	Namaqua chameleon *	Provincial legislation: CITES APP II
	<i>Cordylus polyzonus</i>	Karoo girdled lizard	Provincial legislation: CITES APP II
	<i>Nucras livida</i>	Karoo sandveld lizard	Restricted distribution range
<i>Pachydactylus oculatus</i>	Golden spotted thick-toed gecko	Restricted distribution range	
<i>Varanus albigularis</i>	Rock monitor *	Provincial legislation: CITES APP II	
SMALL, MEDIUM & LARGE MAMMALS	Bats		
	<i>Cistugo lesueuri</i>	Lesueur's wing-gland bat *	SA RDB: Near Threatened
	Insectivores		
	<i>Atelerix frontalis</i>	Southern African hedgehog *	SA RDB: Near Threatened; National legislation: NEMBA - Protected
	Medium Mammals - Herbivores		
	<i>Bunolagus monticularis</i>	Riverine rabbit	SA RDB & National legislation (NEMBA): Critically Endangered
	Medium & Large Mammals - Carnivores		
	<i>Caracal caracal</i>	Caracal *	Provincial legislation: CITES APP II
	<i>Felis nigripes</i>	Black-footed cat	National legislation: NEMBA - Protected; Provincial legislation: CITES APP I
	<i>Felis silvestris</i>	African wild cat	Provincial legislation: CITES APP II
<i>Mellivora capensis</i>	Honey badger *	SA RDB: Near Threatened; National legislation: NEMBA - Protected	
<i>Panthera pardus</i>	Leopard *	National legislation: NEMBA - Vulnerable; Provincial legislation: CITES APP I	
<i>Vulpes chama</i>	Cape fox *	National legislation: NEMBA - Protected	

* Species used in traditional healing and to prepare traditional medicines (Simelane 1996).

SA RDB (South African Red Data Book): Critically Endangered – species that are facing an extremely high risk of extinction in the wild; Vulnerable - species that are facing a high risk of extinction in the wild; Near Threatened - species that do not qualify for the Critically Endangered, Endangered or Vulnerable categories now, but may be close to qualifying, or is likely to qualify, for a threatened category in the near future; Rare - species that may become threatened with extinction because of low population numbers or a restricted range.

National Environmental Management: Biodiversity Act (Act No 10 of 2004) (NEMBA): Protected - species that have a high conservation value or national importance that require national protection (DEAT 2007).

Provincial legislation: Northern Cape Nature and Environmental Conservation Ordinance 19 of 1974 (CITES requirements are administered and enforced through this Provincial Ordinance).

CITES APP I: Species that are the most endangered among CITES (Convention of International Trade in Endangered Species of Wild Fauna and Flora) listed animals. These species are threatened with extinction and CITES prohibits international trade in specimens of these species except when the purpose of the import is not commercial, for instance for scientific research. In these exceptional cases, trade may take place provided it is authorized by the granting of a permit. Additionally Article VII of the Convention provides for exemptions to this prohibition and these requirements (CITES 2007).

CITES APP II: Although not necessarily threatened with extinction, the species may become so unless trade is strictly regulated to avoid utilisation incompatible with its survival. This prohibits the movement of endangered species unless special permits are obtained (CITES 2007).

5. POTENTIAL IMPACTS AND ASSOCIATED MITIGATING and MONITORING RECOMMENDATIONS FOR FAUNA WITH CONSERVATION CONCERN

The assessment of the potential impacts on fauna during the construction and operation of the proposed Gamma-substation is outlined in Table 2; Table 3 shows the associated mitigating measures and monitoring recommendations that should be implemented during the construction and operation of the development. Potential impacts and mitigating measures were assessed relative to the activities associated with the construction and operation of the substation (e.g. the construction and maintenance of access roads, the temporary storage of hazardous substances, the establishment and operation of construction camps) as outlined in the Final Scoping Report (December 2006).

Potential impacts on fauna were evaluated using the following criteria:

Nature	Description of the impact
Extent (spatial scale)	a) Limited to construction area, b) Area <2km around project site, c) Provincial scale, or d) National/international scale.
Duration	a) Short-term (0-3 yrs) or confined to the construction period, b) Medium-term (3-10 yrs), c) Long-term (>10 yrs), or d) Permanent - beyond the anticipated life-time of the project.
Intensity (magnitude/size/frequency)	High, Medium, Low or Negligible (no impact).
Frequency of occurrence	a) Continuous - without interruption, b) Intermittent - occurring from time to time, without specific periodicity, c) Periodic - occurring at more or less regular intervals, or d) Time-linked - occurring only or mostly at specific time of the day or week.
Probability of occurrence	a) Improbable - very low to low likelihood, b) Probable - distinct possibility, c) Highly probable - most likely, or d) Definite - the impact would occur regardless of mitigation measures.
Significance (assessed both with and without mitigation measures)	a) Low - impact will not have a significant influence on the environment, and, thus, will not be required to be significantly accommodated in the project design, b) Medium - impact could have an influence on the environment, which would require modification of the project design or alternative mitigation measures, or c) High - impact could/should block the project regardless of any mitigation measures.
Status of the impact	a) Positive - benefit, b) negative - cost, or c) neutral.

Table 2 An assessment of the potential impacts on fauna with conservation concern (Table 1) during the construction and operation of the proposed Gamma-substation (comprising the Uit Vlucht Fontein and Schietkuil properties) (see notes below for clarification of abbreviations). See Table 3 for mitigation measures referred to here.

Project period & area	Nature of Impact	Extent	Duration	Intensity *	Freq. of occurrence	Prob. of occurrence	Legislation [^]	Significance [No mitigation → Mitigation]	Status of impact	
Construction phase	Substation	Loss of faunal habitats through the clearing of vegetation. Although Riverine rabbit habitat has been identified at the proposed substation site (Figure 1), the habitat is thought to be of a low quality (Endangered Wildlife Trust - Riverine Rabbit Working Group (EWT-RRWG)).	Limited to construction area.	Permanent	<u>High</u> : All fauna (Table 1) & faunal processes; Riverine rabbits (Critically Endangered) are potentially most vulnerable, due to direct loss of habitat (& thus fragmentation of populations) & indirect effects (e.g. poaching, predation by raptors - see below). There are currently no records of Riverine rabbits at the proposed site (EWT-RRWG pers. comm).	Continuous	Definite	NEMA, NEMBA	Medium → Low	Negative
	Construction camps	1. Transformation of faunal habitats through: a) the clearing of vegetation, b) collection of fuel-wood, c) domestic waste disposal & d) establishment of invasive plant species in disturbed areas.	Area <2km around project site.	Medium-term	<u>Medium</u> : All fauna (Table 1) & faunal processes; Riverine rabbits (Critically Endangered) are potentially most vulnerable.	Time-linked	Probable	NEMA, NEMBA, CARA, ECA	Medium → Low	Negative
		2. Poaching & incidental predation of fauna by domestic dogs.	Area <2km around project site.	Short-term	<u>Medium</u> : All fauna, including those used in traditional healing & to prepare traditional medicines (Table 1).	Intermittent	Probable	NEMA, NEMBA, NECO	Low → Low	Negative
	Temp. storage of hazardous subst.	1. Transformation of faunal habitats through: a) clearing of vegetation & b) establishment of invasive plant species in disturbed areas.	Area <2km around project site.	Medium-term	<u>Medium</u> : All fauna (Table 1)	Time-linked	Definite	NEMA, NEMBA, CARA, ECA	Medium → Low	Negative
		2. Risks due to drowning or trapping of fauna in pits.	Area <2km around project site.	Short-term	<u>Medium</u> : All fauna (Table 1)	Time-linked	Probable	Unknown	Medium → Low	Negative
Access roads	Transformation of faunal habitats through: a) clearing of vegetation & b) establishment of invasive plant species in disturbed areas.	Limited to construction area.	Permanent	<u>Medium</u> : All fauna (Table 1) & faunal processes; Riverine rabbits (Critically Endangered) are potentially most vulnerable.	Continuous	Definite	NEMA, NEMBA, CARA	Medium → Low	Negative	
Operation phase	1. Transformation of faunal habitats through: a) on-going maintenance of cleared areas for access roads & b) establishment of invasive plants in disturbed areas.	Limited to construction area & access roads.	Permanent	<u>Medium</u> : All fauna (Table 1) & faunal processes; Riverine rabbits (Critically Endangered) are potentially most vulnerable.	Continuous	Definite	NEMA, NEMBA, CARA	Medium → Low	Negative	
	2. Increased impact on raptor-prey populations through increased perch-availability.	Area <2km around project site.	Permanent	<u>Medium</u> : All raptor-prey interactions (reptiles, medium & large mammals - Table 1).	Continuous	Highly probable	None	Low → Low	Negative	
	3. Decreased activity of herbivores (& predators) due to the presence of high intensity electro-magnetic fields (Nellemann et al. 2001, Vistnes & Nellemann 2001, Vistnes et al. 2001, Nellemann et al. 2003).	Area <2km around project site.	Permanent	<u>Unknown</u> : Potentially, all herbivores (directly) & predators (indirectly; Table 1).	Continuous	Probable	Unknown	Low → Low ?	Neutral or Negative ?	
	4. Poaching & incidental predation of fauna by domestic dogs during ongoing monitoring/control/maintenance of the substation/access roads.	Area <2km around project site.	Permanent	<u>Low</u> : All fauna, including those used in traditional healing & to prepare traditional medicines (Table 1).	Intermittent	Probable	NEMA, NEMBA, NECO	Low → Low	Negative	

* In all instances, the intensity of the impacts was based on expert opinion and relevant literature.

[^] The Constitution of the Republic of South Africa (Act No 108 of 1996) is the supreme law of the land and applies throughout.

National legislation: National Environmental Management Act (Act No 107 of 1998) (NEMA); National legislation: National Environmental Management: Biodiversity Act (Act No 10 of 2004) (NEMBA); National legislation: Conservation of Agricultural Resources Act (Act No 43 of 1983) (CARA); National legislation: Environment Conservation Act (Act No 73 of 1989) (ECA); Provincial legislation: Northern Cape Nature and Environmental Conservation Ordinance 19 of 1974 (CITES requirements are administered and enforced through this Provincial Ordinance) (NECO).

Table 3 An assessment of the mitigation measures and monitoring recommendations (relative to potential impacts on fauna with conservation concern – Table 2) that should be implemented during the construction and operation of the proposed Gamma-substation (comprising the Uit Vlugt Fontein and Schietkuil properties).

Project period & area	Nature of Impact	Mitigation measures	Monitoring recommendations	
Construction phase	Substation	Loss of faunal habitats through the clearing of vegetation. Although Riverine rabbit habitat has been identified at the proposed substation site (Figure 1), the habitat is thought to be of a low quality (Endangered Wildlife Trust - Riverine Rabbit Working Group (EWT-RRWG)).	In collaboration with the RRWG, Eskom should contribute towards securing/rehabilitating Riverine rabbit habitat at the proposed site (Figure 1) and elsewhere (See Appendix 1 for the EWT-Riverine rabbit rehabilitation framework).	EWT-RRWG to monitor the effectiveness of the mitigation measure for Riverine rabbits.
	Construction camps	1. Transformation of faunal habitats through: a) the clearing of vegetation, b) collection of fuel-wood, c) domestic waste disposal & d) establishment of invasive plant species in disturbed areas. 2. Poaching & incidental predation of fauna by domestic dogs.	1. Avoid vegetation clearing by locating construction camps in transformed habitats or at existing construction sites, 2. Construction camps should not be located in sensitive habitats (i.e. Riverine rabbit habitat - Figure 1), 3. Cleared areas should be rehabilitated (especially in the case of Riverine rabbit habitat), 4. Construction camps should be fenced to control the movement of staff, 5. Prohibit fuel-wood collection, 6. Provide alternative fuels, 7. Waste disposal to be managed professionally, 8. Develop and implement an invasive plant control and management plan to eradicate these species. 1. Strict control of staff movements, 2. Strict poaching control, 3. Exclude all domestic dogs.	1. Area cleared to be measured to ensure compliance, 2. Fuel-wood collection to be monitored, 3. Record all waste disposal actions on site, 4. EWT-RRWG to monitor the effectiveness of the mitigation measure for Riverine rabbits, 5. Assess the occurrence of invasive plant colonisation. 1. Monitor the incidence of poaching by staff, 2. Monitor the control of poaching, 3. Record all dogs associated with staff & their control.
	Temp. storage of hazardous subst.	1. Transformation of faunal habitats through: a) clearing of vegetation & b) establishment of invasive plant species in disturbed areas. 2. Risks due to drowning or trapping of fauna in pits.	1. Locate in transformed habitats, 2. Do not locate in sensitive habitats (Figure 1), 3. Cleared areas should be rehabilitated (especially in the case of Riverine rabbit habitat), 4. Hazardous substance disposal to be managed professionally, 5. Develop and implement an invasive plant control and management plan to eradicate these species. 1. Fence-off and secure storage pits, 2. Fill-in & rehabilitate pits after construction.	1. Monitor the effectiveness of the rehabilitation actions, 2. Assess the occurrence of invasive plant colonisation. 1. Confirm filling & monitor the effectiveness of the rehabilitation actions.
	Access roads	Transformation of faunal habitats through: a) clearing of vegetation & b) establishment of invasive plant species in disturbed areas.	1. Minimise clearing for road construction, 2. Eskom should contribute towards securing/rehabilitating Riverine rabbit habitat elsewhere, 3. Develop and implement an invasive plant control and management plan to eradicate these species.	1. Monitor vehicle use off demarcated roads, 2. EWT-RRWG to monitor the effectiveness of the mitigation measure for Riverine rabbits, 3. Assess the occurrence of invasive plant colonisation.
Operation phase	1. Transformation of faunal habitats through: a) on-going maintenance of cleared areas for access roads & b) establishment of invasive plants in disturbed areas.	1. Minimise clearing for road construction, 2. Eskom should contribute towards securing/rehabilitating Riverine rabbit habitat elsewhere, 3. Develop and implement an invasive plant control and management plan to eradicate these species.	1. Monitor vehicle use off demarcated roads, 2. EWT-RRWG to monitor the effectiveness of the mitigation measure for Riverine rabbits, 3. Assess the occurrence of invasive plant colonisation.	
	2. Increased impact on raptor-prey populations through increased perch-availability.	In collaboration with the EWT - Raptor Conservation Group, minimise perch-availability for raptors through pylon modifications, especially in/near sensitive habitats.	1. Monitor the extent of perch-use by raptors, 2. Periodically assess prey populations in the vicinity of the substation.	
	3. Decreased activity of herbivores (& predators) due to the presence of high intensity electro-magnetic fields (Nellemann et al. 2001, Vistnes & Nellemann 2001, Vistnes et al. 2001, Nellemann et al. 2003).	Unknown	Requires research to clarify.	
	4. Poaching & incidental predation of fauna by domestic dogs during ongoing monitoring/control/maintenance of the substation/access roads.	1. Strict control of staff movements, 2. Strict poaching control, 3. Exclude all domestic dogs.	1. Monitor the incidence of poaching by staff, 2. Monitor the control of poaching, 3. Record all dogs associated with staff & their control.	

6. CONCLUSIONS

The proposed development of the Gamma-substation will undoubtedly have a negative effect on faunal habitats, and thus associated fauna, especially during the construction phase. However, the implementation of specific mitigating measures will minimise the effects/impacts of the development during both construction and operation. Riverine rabbits (Critically Endangered) are potentially most vulnerable (to direct loss/transformation of habitat and indirect effects, e.g. poaching and increased predation by raptors), due to their particularly limited distribution range and the fact that they are extreme habitat specialists (Skinner & Chimimba 2005). Although potential riverine rabbit habitat does occur on the proposed site, the habitat is thought to be of a low quality, presumably as a result of overgrazing by domestic herbivores (resulting in changes in vegetation structure and composition). Furthermore, there are currently no records for riverine rabbits at the proposed site. Applying the precautionary principle, however, it is recommended that Eskom compensates for any potential loss/transformation of habitat by contributing towards the conservation of riverine rabbit habitat elsewhere. Potential impacts on the remaining fauna that occur in the study area may be within acceptable limits as these species are mobile, are more generalistic in their habitat requirements, and the area being transformed is relatively small (i.e. 172 ha).

7. REFERENCES

- Branch, W.R. (Ed.) 1988. South African Red Data Book - Reptiles and Amphibians. South African Scientific Programmes Report (Report 151). CSIR, Pretoria.
- Branch, B. 1998. Field guide to snakes and other reptiles of southern Africa. Struik Publishers, Cape Town.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, 2007. Appendices I, II and III. UNEP, www.IUCN.org
- Department of Environmental Affairs and Tourism, 2007. National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004): Publication of lists of Critically Endangered, Endangered, Vulnerable and Protected Species. Government Gazette, Republic of South Africa.
- Friedman, Y. & Daly, B. (Eds.) 2004. Red Data Book of the Mammals of South Africa: A Conservation Assessment: CBSG Southern Africa, Conservation Breeding Specialist Group (SSC/IUCN). Endangered Wildlife Trust, South Africa.
- Henning, S.F. 1989. South African Red Data Book - Butterflies. South African Scientific Programmes Report (Report 158). CSIR, Pretoria.
- Minter, L.R., Burger, M., Harrison, J.A., Braack, H.H., Bishop, P.J. & Kloepfer, D. (Eds.) 2004. Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. SI/MAB Series #9. Smithsonian Institution, Washington, DC.
- Mucina, L. & Rutherford, M.C. (Eds.) 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.
- Nellemann, C., Vistnes, I., Jordhoy, P. & Strand, O. 2001. Winter distribution of wild reindeer in relation to power lines, roads and resorts. *Biological Conservation* 101: 351-360.
- Nellemann, C., Vistnes, I., Jordhoy, P., Strand, O. & Newton, A. 2003. Progressive impact of piecemeal infrastructure development on wild reindeer. *Biological Conservation* 113: 307-317.
- Simelane, T.S. 1996. The traditional use of indigenous vertebrates. MSc Thesis, University of Port Elizabeth, Port Elizabeth.
- Skinner, J.D. & Chimimba, C.T. 2005. The mammals of the Southern African Subregion. Cambridge University Press, Cambridge.
- Vistnes, I. & Nellemann, C. 2001. Avoidance of cabins and power lines by reindeer during calving. *Journal of Wildlife Management* 65: 857-867.

- Vistnes, I., Nellemann, C., Jordhoy, P. & Strand, O. 2001. Wild reindeer: impacts of progressive infrastructure development on distribution and range use. *Polar Biology* 24: 531-537.
- Woodhall, S. 2005. Field guide to butterflies of South Africa. Struik Publishers, Cape Town.

APPENDIX

Endangered Wildlife Trust – Riverine Rabbit Working Group rehabilitation framework for Riverine rabbit habitat



RIVERINE RABBIT WORKING GROUP

A WORKING GROUP OF THE ENDANGERED WILDLIFE TRUST

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11 June 2007

RE: REHABILITATION OF SITES DEVELOPED BY ESKOM

The following proposal was drawn up to accompany the Specialist Study Report of the Centre for African Conservation Ecology (Nelson Mandela Metropolitan University, Port Elizabeth) as a mitigation measure for the Eskom Gamma-Substation and power line. The proposal covers the area where the power line and substation development would impact on riverine habitat in the distribution area of the critically endangered Riverine Rabbit (*Bunolagus monticularis*). The Endangered Wildlife Trust (EWT) aims to ensure that wherever development is undertaken in the *Bunolagus* distribution area, it is done in the best possible manner, with the least impact on the species and its habitat. With this proposal the EWT would like to involve Eskom in critical rehabilitation work and suggests that if the development is approved, Eskom would contract the EWT to conduct the vegetation rehabilitation of all disturbed sites that pose a threat to riverine habitat. This kind of interaction and proactive commitment by Eskom in the conservation of the Karoo's biodiversity will not only provide a marketing opportunity but also an acknowledgement of the companies care for the environment.

1. THE ENDANGERED WILDLIFE TRUST (EWT) AND RIVERINE RABBIT WORKING GROUP (RRWG)

The EWT is a non-governmental, non-profit, conservation organisation, founded in 1973 and operating throughout southern Africa. The EWT conserves threatened species and ecosystems in southern Africa by initiating research and conservation action programmes, implementing projects which mitigate threats facing species diversity and supporting sustainable natural resource management. The EWT furthermore communicates the principles of sustainable living through awareness programmes to the broadest possible constituency for the benefit of the region.

As a leading high-profile player amongst the large number and variety of conservation organisations in South Africa (governmental and civil society), the EWT fills the key niche of conservation action, through applied field-work, research and direct engagement with stakeholders. With specialist Working Groups and a large team of skilled field staff deployed throughout southern Africa, the EWT's work supports the conservation of threatened species and ecosystems. Priority interventions focus on identifying the key factors threatening biodiversity and developing mitigating measures to reduce risk and reverse the drivers of species extinction and ecosystem degradation. Through a broad spectrum of partnerships and networks, the EWT responds to the key threats driving species and ecosystem loss by developing innovative methodologies and best practice guidelines which support reduced impact, harmonious co-existence and sustainable living for all.

1.1 Vision of the EWT-RRWG

The vision of the Endangered Wildlife Trust's Riverine Rabbit Working Group (EWT-RRWG) is an ecosystem and socio economic conditions in the Karoo that support a stable population of Riverine Rabbits *Bunolagus monticularis* along the seasonal river courses of the Karoo region. The group aims to conserve the biodiversity of the Karoo and to promote integrated land management practices that can sustain the Riverine Rabbit, its habitat and many other species while ensuring social-economic benefits to landowners and communities – the species functions as the Flagship Species of the Karoo.

1.2 Mission of the EWT-RRWG

It is the EWT-RRWG's aim to conserve the Riverine Rabbit by undertaking field surveys, habitat evaluation and mapping exercises, habitat management and rehabilitation, environmental education and awareness, population monitoring, research and conservation stewardship programmes within the distribution range of the species.

2 RIVERINE HABITAT AND REHABILITATION

The EWT-RRWG rehabilitation project will focus on the rehabilitation of degraded riverbanks and floodplains along seasonal rivers of the Central and Upper Karoo. Evidence of degradation in these open, semi-arid rangelands is clearly visible and characterized by large bare and denuded areas that will not recover by natural succession processes alone. Some sort of active intervention has therefore become necessary in order to avoid desertification.

The degraded areas along the river courses where the Riverine Rabbit occurs have an important biodiversity function as well as an economic value in the Karoo. At present, none of the Riverine Rabbit habitat is protected within a provincial nature reserve or national park and the species only occurs on private Karoo farmland. As a habitat specialist, the Riverine Rabbit is not able to survive outside the riparian areas, and thus functions as an indicator species, reflecting the presence or absence of specific environmental conditions. Approximately two-thirds of *Bunolagus*' original range, and consequently its population, have already been lost due

to the habitat changes, and the originally naturally discontinuous, has consequently become even more fragmented.

The rehabilitation project aims to improve and ensure a natural system that will be ecologically functional. To re-vegetate degraded riverine areas on private Karoo land, a rehabilitation nursery is being established that will provide the necessary indigenous vegetation (plants, seeds and seedlings). The Karoo Plant Nursery will initially run as a non-profit project and will provide skills training and employment opportunities to the local, economically depressed Karoo community.

2.1 Rehabilitation Needs

As the proposed Eskom Substation and power line development will take place adjacent to riverine habitat, it will be important to start to rehabilitate these areas as soon as possible. This is especially crucial where vegetation cover is removed or destroyed at a large scale and where top soils are compacted during the construction phase. Degraded sites recover very slowly and are sensitive to erosion. Compacted soil takes even longer to recover due to the fact that water infiltration into the soil decreases and raindrop impact on bare soil leads to crust formation that limits the potential for seed germination. As a result of soil surface disturbances, soil surfaces erode into gullies and an inhospitable environment is created, limiting the potential for plant growth.

The rehabilitation process will include a vegetation survey to determine the ground cover and number of each plant species per hectare. Seeds need to be collected from the plants and some plants will need to be removed to prevent their destruction. The removed vegetation will be used in future rehabilitation work and where mature plants are used to combat erosion. Seeds collected will also be used for rehabilitation work.

2.2 Regarding the interaction between Eskom and EWT a few options are available:

The first and preferred option would be that the EWT-RRWG removes the plants and collects the seeds, hosts them at the nursery in Loxton and is then responsible for rehabilitating the area along the substation and sites of the power line in identified riverine habitat in accordance with the specialist study. This option would ensure good quality control and that the plants are effectively and completely removed, and not damaged or lost.

A second option exists where Eskom would remove the plants, and put them in the care of the EWT-RRWG nursery in Loxton. Plants and seeds can then be obtained from the nursery after the development has been finalized and where rehabilitation work is needed.

Thirdly, Eskom establishes a temporary nursery at the development site of the substation in coordination with the EWT-RRWG.

3. ESKOM INVOLVEMENT

It is extremely important that rehabilitation along the developed power line and substation takes place. This is not a process that should start after the development has been completed as the involvement of the rehabilitation team is crucial even before the development commences. Through this rehabilitation project, Eskom can play a crucial role in contributing to social upliftment in the communities, as the EWT-RRWG will provide job opportunities to the local communities and build capacity amongst them.

Many thanks for your support
Yours sincerely
Petro Botha

28 June 2007

Marietjie Landman hereby accepts professional responsibility for producing this Ecological and Biodiversity Assessment: Faunal Specialist Study Draft Report.

M. Landman