

**ESKOM TRANSMISSION
GAMMA SUB-STATION
EIA: 12/12/20/873**

ENVIRONMENTAL MANAGEMENT PLAN

ESKOM TRANSMISSION

Gamma Sub-Station

EIA: 12/12/20/873

Environmental Management Plan

Report prepared for:

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PREFACE

This Environmental Management Plan has been compiled for purposes of the construction of the Gamma Sub-Station that has been authorized by the Department of Environmental Affairs and Tourism (Authorization Register Number: 12/12/20/873).

The Department of Environmental Affairs and Tourism has approved this Environmental Management Plan (**ROD Condition 1.10**). However, the Environmental Management Plan should be viewed as a living document that will be revised periodically in response to new or changing technical information, environmental conditions, legislation and policy, and environmental best practice. However, all revisions will need to be submitted to the Department of Environmental Affairs and Tourism for approval and sign-off prior to their implementation on site (**ROD Condition 1.11**).

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1. SCOPE

The scope of this document is to give environmental management guidelines, to the Contractor doing construction work, in fulfilment of environmental authorisation and ISO 14001 requirements. This document is part of the overall contract and is supplementary to Eskom's technical specifications. Furthermore, this document is in support of the Environmental Record of Decision (Appendix 1) issued by the Department of Environmental Affairs and Tourism that stipulates conditions covering:

- The scope of the authorization.
- The appeal of the authorization.
- The management of the activity.
- Monitoring.
- Recording and reporting to the Department of Environmental Affairs and Tourism.
- Commissioning of the activity.
- Operation of the activity.
- Site closure and decommissioning.
- Specific conditions (that have been captured in this document).

Importantly, the recommendations and constraints, as set out in this document are enforceable under the general conditions of contract.

The EMP has a long-term objective to ensure that:

- Environmental management considerations are implemented from the design phase of the project.
- The Contractor is able to and shall include any costs of compliance with this EMP into the tender price.
- Precautions against environmental damage and claims arising from such damage are taken timeously.
- The completion date of the contract is not delayed due to environmental problems with landowners, Grid staff, communities or regulatory authorities arising during the course of the project execution.
- The assets created conform to the environmental standards required by ISO 14001 and Eskom's policies.

In order to give effect to the above, **Eskom requires a commitment from the Eskom Project Manager and the Contractor on the following matters:**

- To underwrite Eskom Transmission's Environmental Policy TRMPBAAX3 Rev 2 at all times.
- To ensure that environmental conditions stipulated in the Record of Decision (ROD) are implemented.
- To resolve problems and claims arising from damages immediately, to ensure a smooth flow of operations.
- To implement this EMP for the benefit of all involved.
- To preserve the natural environment by limiting destructive actions on site.

The Project Manager and Contractor must take into consideration that this EMP will be amended as required for the duration of the contract. The management of the environment changes over time and, therefore, this document shall be updated regularly to ensure environmental management is implemented during all phases of the project.

However, importantly, changes in the proposal resulting in significant environmental impacts are only permissible if approved by the Department of Environmental Affairs and Tourism (ROD Condition 1.20).

2. RESPONSIBILITY MATRIX

Function	Name and Contact Information	Responsibility
Project Manager (PM)	Tel: Fax: Cell: Email:	Overall management of project and EMP implementation
Contract Manager (CM)	Tel: Fax: Cell: Email:	Contract management
Site Supervisor (SS)	Tel: Fax: Cell: Email:	Site supervision
Environmental Control Officer (ECO)	Tel: Fax: Cell: Email:	Implementation of EMP and liaison between Eskom, Contractor and landowners
Contractor (C)	Tel: Fax: Cell: Email:	Implementation and compliance with recommendations and conditions of the EMP, Appoints/delegates a dedicated person to work with the ECO
Transmission Services Environmental Advisor (Eskom)	Tel: Fax: Cell: Email:	Environmental advice and monitoring

(Table to be completed upon contract award)

3. INTRODUCTION

The construction, refurbishment or upgrading of the Gamma Sub-station can have a major impact on the environment. It is, therefore, imperative that precautions are taken to ensure that environmental damage is minimised. This will take a concerted effort from Eskom and the Contractor, and detailed planning is of importance. *To give this effect, all proposed mitigation measures included in the Final EIR dated August 2007 must be implemented (ROD Condition 1.30).*

The Environmental Control Officer shall convey the contents of this document, the conditions of the Record of Decision from DEAT as well as Landowner Special Conditions to the Contractor site staff, and discuss the contents in detail with the Eskom Project Manager and Contractor at a pre-construction meeting. This formal induction is a requirement of ISO 14001 and shall be done with all main and sub-contractors. *In particular, the applicant must train safety representatives, managers and workers in workplace safety, and enforce applicable physical safety standards and regulations, including sub-contractors (ROD Condition 1.25).* The ECO shall keep a record of the training date, people who attended and discussion points.

Good relations with the landowner/legal occupier (hereafter referred to as the landowner), Grid staff and communities need to be established and sustained. This will help in the solving of problems and the prevention thereof. Lines of communication should always be open to ensure proper and timeous reaction to complaints. The contact numbers of the ECO and/or Eskom Site Supervisor shall be made available to landowners (for the new sub-station site) and Grid staff. The reputations of both the Contractor and Eskom are at stake and should be the drive for everybody involved to perform in excellence. *In particular, Eskom must stay within the agreement with the property owner of Schietkuil as signed on November 2006. No interference with his wild game will be tolerated. An alternative water source needs to be provided or developed for the herd of springbok that currently uses the waterhole on the site where the sub-station will be developed (ROD Condition 1.37).*

During the construction period for the new sub-station, environmental personnel shall monitor the works, to measure compliance with the recommendations of the EMP and conditions of the ROD. The Grid Environmental Advisor shall inspect the works when completed and, if satisfied, the works shall be taken over by the Grid.

4. DESCRIPTION OF THE PROJECT

4.1 Sub-station

The sub-station where the work will be performed is Gamma, located 40 km east of Victoria West (Figure 1).

4.2 Project execution area

Construction activities are limited to the area as demarcated by Eskom and shown on the site plans. Any area outside Eskom owned property, required to facilitate access, construction camps or material storage areas, shall be negotiated with the landowner and written agreements shall be obtained.

Figure 1 Map showing the new location of the proposed Gamma Sub-station, with turn-in lines

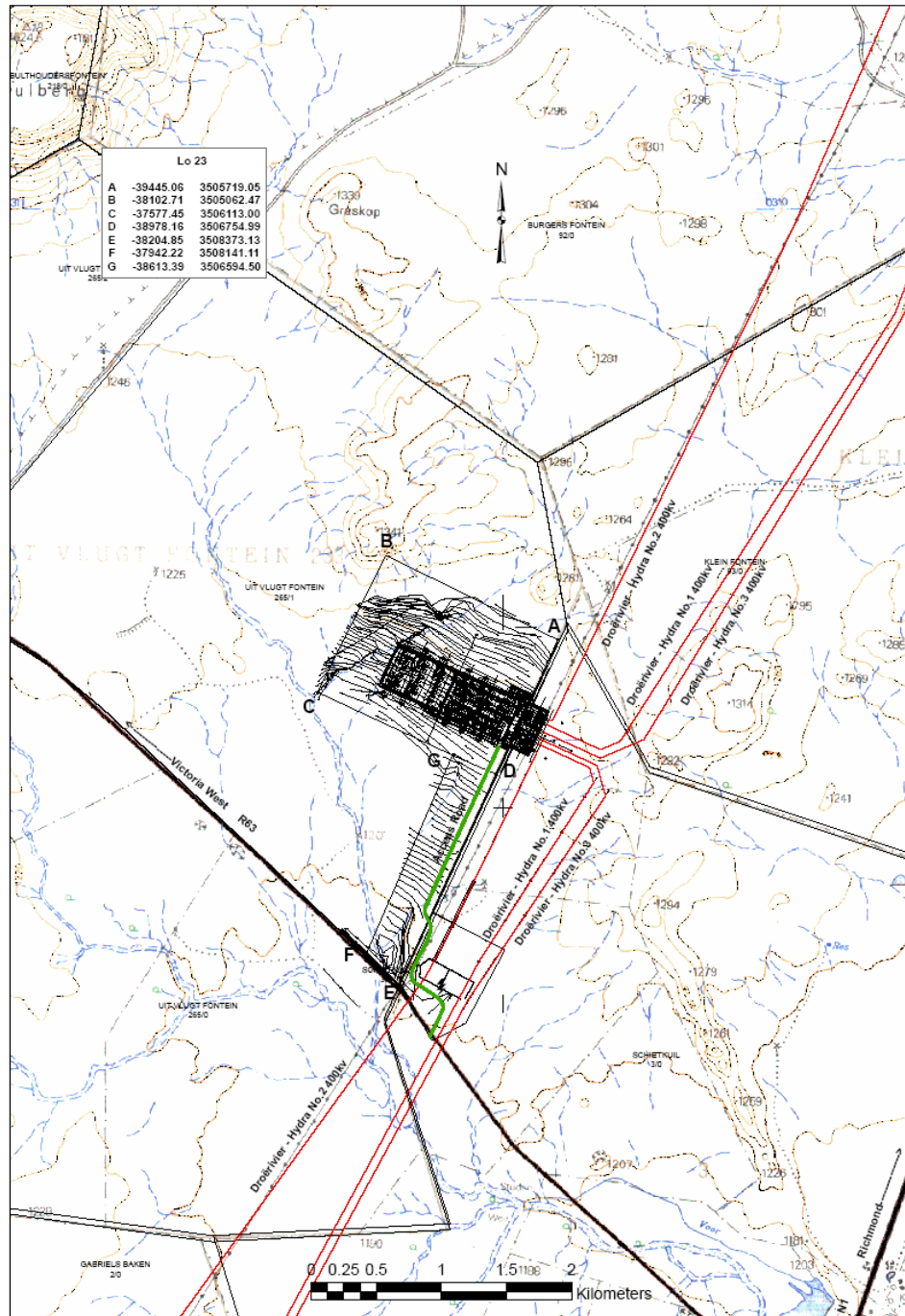


Figure 2 Gamma Sub-station layout drawing

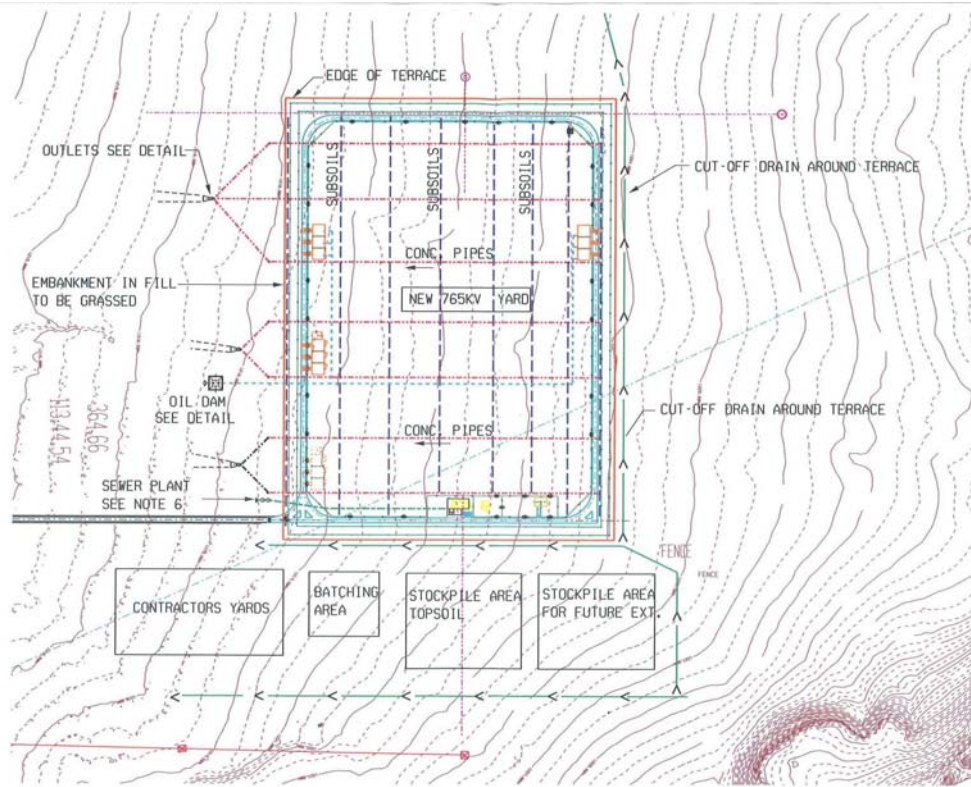
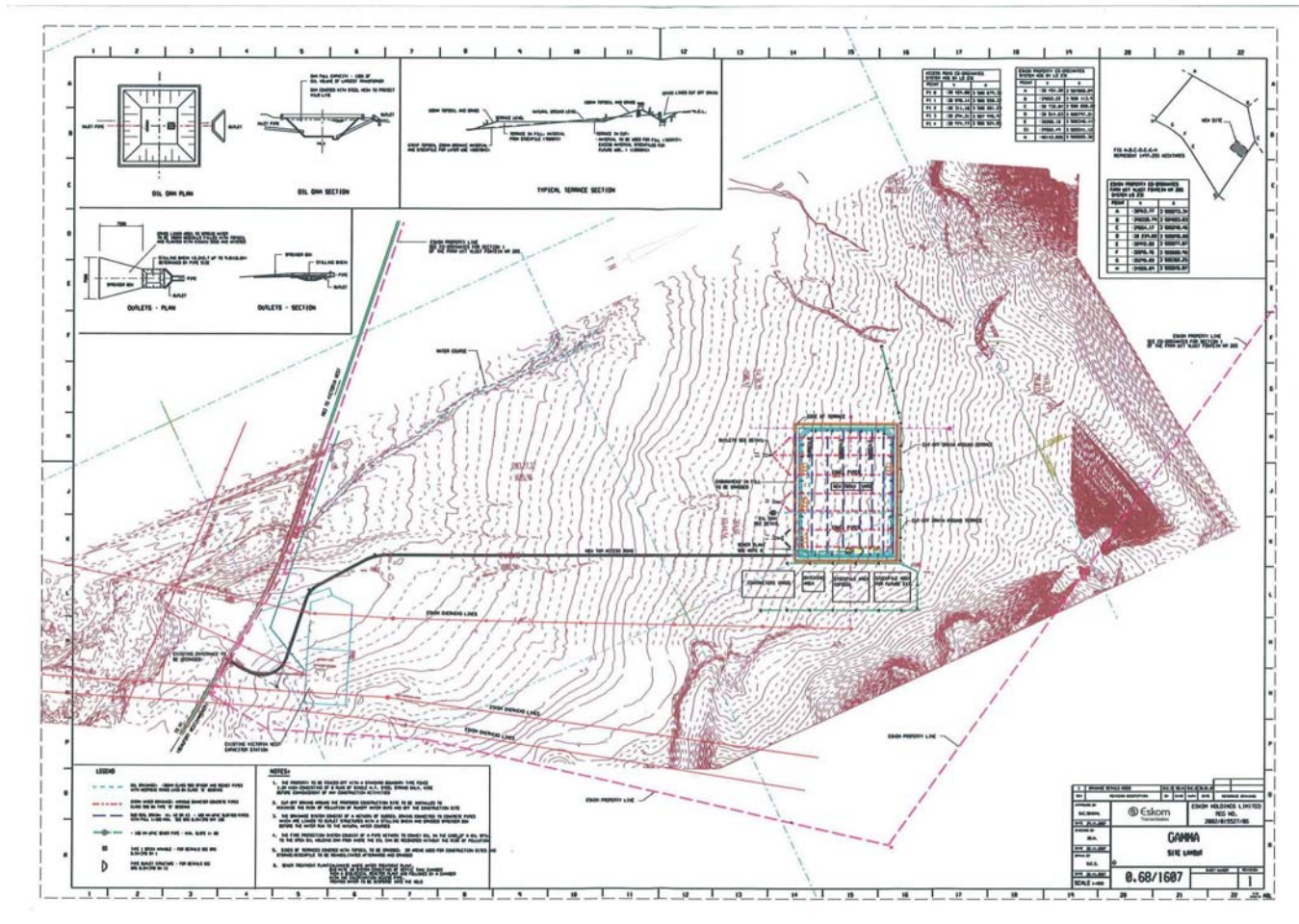


Figure 3 Gamma Sub-station site layout



Should water be required from sources other than Eskom supply, a written agreement shall be reached between the Contractor and the landowner in the presence of Eskom. Should the Contractor be required to use water from a natural source, the Contractor shall supply a method statement to that effect. Strict control shall be maintained and the ECO shall regularly inspect the abstraction point and methods used.

The quality of water that will be sourced from boreholes on the property for human consumption must be monitored on a regular basis (ROD Condition 1.29).

The works area shall be fenced to prevent livestock or local community members from wandering onto site and getting injured. All works shall be limited to the fenced area and the Contractor's workforce shall refrain from venturing outside this area onto private property. *Construction work must be confined to the construction site(s) as demarcated and interference with indigenous plant and animal species, particularly rare and threatened species and their habitats is prohibited (ROD Condition 1.23).*

No work shall commence until permission is granted from the Environmental Advisor from Transmission Services, and the ROD from DEAT has been obtained. The Project Manager shall ensure that all conditions in the ROD are fulfilled before the Contractor occupies the site. The Grid shall be kept informed of all developments on construction at all times. All the requirements from the Grid must be considered during the construction phase to ensure smooth transition.

4.3 Site establishment

The applicant must minimize habitat destruction and disturbance during all construction, maintenance and decommissioning activities. Vegetation must only be removed as required for construction and operation for the line. The applicant is responsible for avoiding the removal of trimming of any vegetation along the servitude during construction and operation. DWAF permits must be obtained for these individual plants before they are removed (ROD Condition 1.31).

Site establishment shall take place in an orderly manner and all amenities shall be installed at campsites before the main workforce moves onto site. The Contractor's camp shall have the necessary ablution facilities with chemical toilets where such facilities are not available at commencement of construction. The Contractor shall supply a wastewater management system that complies with legal requirements and is acceptable to Eskom. A septic tank system is recommended to ensure the best practice environmental solution.

Where Eskom facilities are available, the Contractor shall make use of such facilities where it is viable and negotiated with the Grid. The Contractor shall inform all site staff to make use of supplied ablution facilities and under no circumstances shall indiscriminate excretion and urinating be allowed other than in supplied facilities.

The Contractor shall supply waste collection bins where such are not available and all solid waste collected shall be disposed of at a licensed waste landfill. A certificate of disposal shall be obtained by the Contractor and kept on file. *All waste generated during the construction must be removed and disposed of at a waste disposal facility permitted in terms of Section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ROD Condition 1.21).* Where a licensed waste landfill site is not available close to the construction site, the Contractor shall provide a method statement with regard to waste management. The disposal of waste shall be in accordance with all relevant legislation. Under no circumstances may solid waste be burned on site unless a suitable incinerator is available.

An integrated waste management approach must be used that is based on waste minimization and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste shall be disposed of at a waste disposal facility permitted in terms of Section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989):

- ❑ *Refuse must be disposed of into scavenger and waterproof bins*
- ❑ *Chemical ablution facilities must be available for the use of construction staff at all times during the construction period. These facilities must be removed from the site when the construction phase is completed as well as associated waste to be disposed of at a registered waste site (ROD Condition 1.22). (See also Section 6.1 – Sanitation).*

The construction camp should be located at the old and currently vacant Uit Vlugt Fontein homestead where the basic infrastructure and services are available. The construction camp should be equipped with a quality canteen with an appetising menu, a games room, a television/video room and a small bar selling soft drinks, wine and beer.

4.4 Workshop and equipment storage areas

Where possible and practical all maintenance of vehicles and equipment shall take place in the workshop area. During servicing of vehicles or equipment, a suitable drip tray shall be used to prevent spills onto the soil, especially where emergency repairs are effected outside the workshop area. Leaking equipment shall be repaired immediately or removed from site to facilitate repair. All potentially hazardous and non-degradable waste shall be collected and removed to a licensed hazardous waste site. A certificate of disposal shall be obtained by the Contractor and kept on file.

Workshop areas shall be monitored for oil and fuel spills and such spills shall be cleaned and remediated to the satisfaction of the ECO. The Contractor shall be in possession of an emergency spill kit that must be complete and available at all times on site.

The following shall apply to hazardous substance spills:

- ❑ All contaminated soil/yard stone shall be removed and be placed in containers. Contaminated material can be taken to one central point where bio-remediation can be done.
- ❑ A clean up kit must be available so that smaller spills can be treated on site.
- ❑ A specialist Contractor shall be used for the bio-remediation of contaminated soil where the required remediation material and expertise are unavailable on site.
- ❑ All spills of hazardous substances must be reported to the ECO and appointed Transmission Engineering Environmental Advisor.

4.5 Storage areas for hazardous substances

All hazardous substances shall be stored in suitable containers and storage areas shall be bunded. This includes all carbon substances like fuel and oil as well as herbicides and battery acid. A register shall be kept on all substances and be available for inspection at all times. Areas shall be monitored for spills and any spills shall be contained, cleaned and rehabilitated immediately. Any leaking containers shall be repaired or removed from site.

Hazardous and flammable substances must be stored and used in compliance with the applicable regulations and safety instructions (ROD Condition 1.24).

Mitigation actions for the potential impacts on fauna of the temporary storage of hazardous wastes:

- ❑ Locate in transformed areas.
- ❑ Do not locate in sensitive areas.
- ❑ All cleared areas should be rehabilitated.
- ❑ Formulate and implement a system for the professional management of hazardous substances.
- ❑ Formulate and implement an invasive plant control programme.
- ❑ Fence off and secure storage areas and pits.
- ❑ Fill in and rehabilitate storage areas post construction.

5. PHYSICAL ISSUES AND THEIR CONTROL

5.1 Sub-station terrain

The construction site must be demarcated before the construction phase commences and disturbance to the surrounding area must be avoided through the following measures:

- ❑ *Access to the site must be obtained by making use of the existing road. Vehicles must be restricted to the clearly demarcated access route (See Section 5.3 – Access roads to the site).*
- ❑ *All activities (storage and off-loading of material, construction and installation) must be restricted to the demarcated area to minimize any potential disturbance to the surrounding area.*
- ❑ *Only construction and maintenance personnel must have access to the site.*
- ❑ *No fires must be permitted on the site (See Section 5.7 – Fire prevention).*
- ❑ *No concrete or cement mixing must take place on the soil or grass surfaces. Cement mixers must be placed in suitable trays to prevent spillage onto the soil surface. If possible, the use of ready-mix concrete should be considered (**ROD Condition 1.34**).*

Where terracing is required, topsoil shall be collected and retained for the purpose of re-use later to rehabilitate disturbed areas not covered by yard stone. Such areas include terrace embankments and areas outside the high voltage yards. Where required, all sloped areas shall be re-vegetated and stabilised to ensure proper rehabilitation is effected. These areas can be stabilised using design structures or vegetation as specified in the design to prevent erosion of steep embankments. The contract design specifications and EIR recommendations shall be adhered to and implemented strictly. *Importantly, drainage and storm water management on site must be carefully planned and properly implemented to ensure sound protection of the sub-station site against the affects of erosion and potential flooding during construction and unpredictable storm events (**ROD Condition 1.27**).*

The retained topsoil shall be spread evenly over areas to be rehabilitated and suitably compacted to effect re-vegetation of such areas to prevent erosion. Where required, re-vegetation can also be enhanced using a vegetation seed mixture.

Mitigation measures:

- ❑ The exposure of the soil due to bush clearing and land levelling should be timed to occur during the dry winter months of the year (as far as practically possible).
- ❑ As soon as is technically possible, the exposed surface area, which will not be covered in concrete, should be protected by a layer of crushed stone.
- ❑ Design drainage so that water accumulation across the ground surface is kept to below that volume which might cause erosion.

- All land-clearing, drainage and shaping must be conducted within the provisions of the Conservation of Agricultural Resources Act (Act 43 of 1983).

Management Objectives	Measurable Targets
Minimise scarring of the soil surface and land features other than on site	No visible erosion scars once construction is completed
Minimise disturbance and loss of topsoil from site	Topsoil remains intact and, if disturbed, is stored correctly for re-use
Rehabilitate all disturbed areas in the sub-station area	All disturbed areas successfully rehabilitated

5.2 Natural drainage

Under no circumstances shall the contractor interfere with any watercourses in the vicinity of the site. Should deviation of such watercourses be required as part of the contract design specification, the specifications shall be adhered to strictly. The ECO shall ensure that all watercourses are adequately protected to prevent downstream siltation due to erosion on site. Rubble from the construction process shall be removed from site and may under no circumstances be dumped into any natural drainage channels. The normal flow of runoff water must not be impeded, as this will enhance erosion.

Erosion of the surrounding area where the sub-station will be constructed must be prevented or minimised at all cost. The recommendations proposed in this respect, with particular reference to ground works must be strictly followed (ROD Condition 1.28).

Management Objectives	Measurable Targets
Avoid damage to natural drainage channels	No damage to natural drainage channels
Avoid damage to river and stream embankments	No damage to river and stream banks
Minimise erosion of embankments and subsequent siltation of rivers and streams	No visible erosion scars on embankments once construction is completed

5.3 Access roads to the site

Planning of access routes to the site for construction purposes shall be done in conjunction with the Contractor, Eskom and the landowner. All agreements reached should be documented and no verbal agreements should be made. The Contractor shall properly mark all access roads. Roads not to be used shall be marked with a " **NO ENTRY** " sign.

Where new access roads are constructed, this must be done according to design and contract specifications. Drainage channels shall be suitably designed to ensure erosion does not occur, especially at the outflows. The new access road shall be designed to allow for the natural flow of water where required. Crossing of dongas and eroded areas on access routes to the new sub-station shall be thoroughly planned and installed according to design and contract specifications. All areas susceptible to erosion shall be protected with suitable erosion control measures from the onset of the project. Prevention is the total aim as restoration is normally difficult and costly.

Where necessary, suitable measures shall be taken to rehabilitate damaged areas next to the newly constructed road.

Mitigation measures for the potential impacts of access roads:

- Minimise areas cleared for roads.
- Rehabilitate habitat where indicated.
- Formulate and implement an invasive plant control programme.

Management Objectives	Measurable Targets
Minimise damage to existing access roads	No claims from landowners due to damage on existing access roads
Minimise damage to environment due to construction of new access roads	No erosion visible on access roads three months after completion of construction
Minimise loss of topsoil and enhancement of erosion	No loss of topsoil due to runoff water on access roads
Minimise impeding the natural flow of water	No interference with the natural flow of water

5.4 Construction rubble disposal

The Contractor shall dispose of all excess material on site in an appropriate manner and at a licensed waste landfill site. All packaging material shall be removed from site and disposed of and not burned on site. Within the parameters of an agreed method statement, a negotiated landfill may be used but when it is closed up, the rubble shall be compacted and there shall be at least 1 m of soil covering the waste material. No landfill may be used without the consent from the landowner. No non-biodegradable materials shall be disposed of in any unregistered waste site.

No material shall be left on site that may harm humans or animals. Broken, damaged and unused spares such as porcelain, glass, nuts, bolts and washers shall be picked up and removed from site. Surplus concrete may not be dumped indiscriminately on site, but shall be disposed of in designated areas as agreed by the landowner. Concrete trucks shall not be washed on site after depositing concrete into foundations. Any spilled concrete shall be cleaned up immediately.

Management Objectives	Measurable Targets
To keep the site neat	No evidence of rubble or waste on site at any time
Disposal of construction rubble in an appropriate manner	No construction rubble left lying around on site
Minimise litigation	No incidents of litigation
Minimise landowner complaints	No complaints from landowners

5.5 Site clearing

Construction work must be confined to the construction site(s) and interference with indigenous plant and animal species, particularly rare and threatened species and their habitats is prohibited (ROD Condition 1.32).

Vegetation clearing to allow for site establishment as well as construction purposes will be required. Vegetation can be cleared mechanically with a bulldozer where terracing is required, but should be cleared by hand on other areas. All alien vegetation shall be eradicated from site during construction. Indigenous vegetation that does not pose any risks to the operation of the sub-station upon completion of the contract should be retained for aesthetic purposes. Such vegetation shall be identified during design and clearly indicated on the site plans.

Protected or endangered species of plants shall be retained where possible. Where such species have to be removed due to interference with structures, the necessary permission and permits shall be obtained by the ECO prior to the commencement of site works. Search, rescue and replanting of indigenous, valuable and protected species are highly recommended where possible and viable.

The use of herbicides shall only be allowed after a proper investigation into the type to be used, the long-term effects and the effectiveness of the agent. Eskom's guidelines regarding the use of herbicides (TRR/S91/032) shall be adhered to strictly. Application shall be under the direct supervision of a qualified technician. All surplus herbicide shall be disposed of in accordance with the supplier's specifications.

The Contractor for vegetation clearing shall comply with the following:

- The Contractor must have the necessary knowledge to be able to identify different species.
- The Contractor must be able to identify declared weeds and alien species that can be totally eradicated.
- The Contractor must be in possession of a valid herbicide applicators licence.

Natural features shall be taken into consideration during design and, where possible, these shall be protected unless they will interfere with the operation of the sub-station.

Mitigation measures for the impacts of site clearing:

- Clearing of areas of vegetation only when these areas are required for construction purposes.
- Rehabilitating and revegetating areas as soon as possible after the completion of construction.

Management Objectives	Measurable Targets
Minimise unnecessary damage to vegetation	Only vegetation cleared as required for site construction purposes
Keep site as natural looking as possible	No vegetation interfering with structures and statutory requirements upon completion of the contract
Minimise possibility of erosion due to removal of vegetation	No de-stumping of vegetation on river and stream embankments
Minimise removal of plant material on river and stream embankments	No visible erosion scars three months after completion of the contract due to vegetation removal
Minimise damage to natural features	No visible damage to the vegetation outside the site one year after completion of the contract due to herbicide leaching
	No litigation due to unauthorised removal of vegetation
	No unnecessary damage to natural features

5.6 Fencing

The site shall be fenced to prevent any loss or injury to persons or livestock during the construction phase. All Eskom gates shall be fitted with locks and be kept locked at all times during the construction phase, especially when works are stopped during weekends and holidays. All claims arising from gates left open shall be investigated and, if at fault, settled in full by the Contractor. If any fencing interferes with the construction process, such fencing shall be deviated until construction is completed. The deviation of fences shall be negotiated and agreed with the landowner in writing.

Management Objectives	Measurable Targets
Properly installed gates to allow access to the site	No transgressions of the Fencing Act and therefore no litigation
Minimise damage to private fences	No damage to fences and subsequent complaints from landowners
Limit access to Eskom and Contractor personnel	All gates kept locked at all times to limit access to construction staff

5.7 Fire prevention

No open fires shall be allowed on site under any circumstance. All cooking shall be done in demarcated areas that are safe and cannot cause runaway fires. The Contractor shall have operational fire-fighting equipment available on site, especially during the winter months.

The standing biomass of the Karoo grasses is too low to support fire and the shrubs are too far apart to provide sufficient fuel load for a run-away veld fire. Should fires occur they are likely to burn out quickly. Nevertheless, vigilance is required.

Management Objectives	Measurable Targets
Minimise risk of runaway veld fires	No veld fires started by the Contractor's work force
Minimise damage to private property	No claims from landowners for damages due to veld fires
	No litigation

5.8 Noise

The Contractor shall ensure that noise levels remain within acceptable limits, especially in this remote rural location where noise will travel easily. This applies especially after working hours and during the night.

Management Objectives	Measurable Targets
Prevention of noise pollution	No complaints from landowner or community
Minimise nuisance factor of construction activities	No litigation

5.9 Claims for damages

The ECO shall keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of damage and reason for the damage shall be recorded in full to ensure the responsible party is held liable. All claims for compensation emanating from damage should be directed to the ECO for appraisal. The Contractor shall be held liable for all unnecessary damage to the environment. A register shall be kept of all complaints from the landowner, Grid or community. All complaints/claims shall be handled immediately to ensure timeous rectification/payment by the responsible party.

Management Objectives	Measurable Targets
Minimise complaints from landowners and communities	No claims from the landowner or communities
Prevent litigation due to outstanding claims	All claims investigated and settled within one month
Completion of the contract on time	No litigation due to unsettled claims

5.10 Rehabilitation

All damaged areas shall be rehabilitated upon completion of the contract in accordance with design specifications. In accordance with the Conservation of Agricultural Resources Act (Act 43 of 1983), slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced. Extra seed shall be sown on disturbed areas as directed by the ECO. Other methods of rehabilitating disturbed sites may also be used at the discretion of the Project Manager to comply with the conditions of the ROD and EMP, for example, stone pitching, logging, etc. Contour banks shall be spaced according to the slopes. The type of soil shall also be taken into consideration.

A mixture of vegetation seed can be used provided the mixture is carefully selected to ensure the following:

- Annual and perennial species are chosen.
- Pioneer species are included.
- All the species shall not be edible.
- Species chosen will grow in the area under natural conditions.
- Root systems must have a binding effect on the soil.
- The final product should not cause an ecological imbalance in the area.

Re-seeding will always be at the discretion of the Project Manager, unless specifically requested by a landowner/Grid staff.

Management Objectives	Measurable Targets
Minimise damage to topsoil and environment	No loss of topsoil due to construction activities
Successful rehabilitation of all damaged areas	All disturbed areas successfully rehabilitated within one year of completion of the contract
Prevention of erosion	No visible erosion scars one year after completion of the contract

5.11 Material storage areas

Specifications require the protection of Eskom supplied material on site, especially conductor drums. This normally requires that a firebreak be created around a material storage area. Once construction has been completed on site and all excess material has been removed, the storage area shall be rehabilitated. If the area was badly damaged, re-seeding shall be done and fencing of the area shall be considered if livestock will subsequently have access to such an area.

Management Objectives	Measurable Targets
Minimise disturbance of topsoil	No loss of topsoil
Successful rehabilitation of disturbed areas	No remaining disturbance to vegetation outside the sub-station area
	All disturbed areas successfully rehabilitated one year after completion of the contract

5.12 Batching plants

In remote areas where batching plants have to be established, these sites shall be negotiated with the landowner/Grid staff depending on their location. These sites shall be cleared of all excess material upon completion of the contract. Such areas shall be rehabilitated to their natural state. Any spilled concrete shall be removed and soil compacted during construction shall be ripped, levelled and re-vegetated.

Management Objectives	Measurable Targets
Minimise complaints from landowners/Grid staff	No complaints from landowners/Grid staff
Successful rehabilitation of disturbed areas	All disturbed areas successfully rehabilitated one year after completion of the contract

5.13 Old equipment

All old equipment shall be stored in such a way as to prevent pollution of the environment. Oil containing equipment shall be stored to prevent leaking or be stored on drip trays should such equipment already be leaking. All scrap steel shall be stacked neatly and any disused and broken insulators shall be stored in containers.

Once material has been scrapped and a contract has been placed for removal, the Contractor shall ensure that any equipment containing pollution causing substances is removed in such a way as to prevent spillage and pollution of the environment. The Contractor shall also be equipped to contain and clean up any pollution causing spills. Disposal of unusable material shall be at a licensed waste and/or hazardous waste landfill site and a certificate of disposal shall be obtained and copied to Eskom.

Within six months of the telecommunications structure ceasing to be functional for the purpose for which it is now authorised, it must be removed at the expense of the applicant, and the site, including all associated infrastructure such as access roads, must be rehabilitated to the satisfaction of this Department (ROD Condition 1.35).

Management Objectives	Measurable Targets
To prevent pollution of the environment	No pollution of the environment
Prevention of litigation due to illegal dumping	No complaints from landowners/Grid staff/communities
	No litigation due to illegal dumping

5.14 Transport of equipment

All equipment moved onto site or off site during a project is subject to legal requirements as well as Eskom's specifications for the transport of such equipment. The Contractor shall meet these safety requirements under all circumstances. All equipment transported shall be clearly labelled as to their potential hazards according to specifications. All the required safety labelling on the containers and trucks used shall be in place.

The Contractor shall ensure that all the necessary precautions against damage to the environment and injury to persons are taken in the event of an accident.

Management Objectives	Measurable Targets
Safe handling and transport of equipment	All equipment delivered to site intact
Safe handling and transport of hazardous substances	No spillage of hazardous substances
Minimise environmental pollution and damage	No litigation due to environmental pollution

6. SOCIAL ISSUES AND THEIR CONTROL

The following measures must be implemented to mitigate potential social impacts:

- ❑ A rapid response plan must be formulated to deal with security matters.
- ❑ The contractors' camp must be fully fenced, with controlled access.
- ❑ During off-duty periods, contractors should be required to transport their staff to nearby towns where shopping and recreational activities can be undertaken.

The following mitigation/management measures were identified to manage the potential positive socio-economic impacts:

- ❑ Where applicable and as far as possible, employ local staff during construction.
- ❑ Ensure recruitment measures are aimed at construction workers classified as designated employees in terms of the Employment Equity Act.
- ❑ Prioritise sub-contracting to local SMEs and ABEs.
- ❑ The overall environmental management approach must include provision for the use of local contractors as far as possible.
- ❑ Provide a designated area for informal vendors with appropriate services such as refuse facilities, water and sanitation.
- ❑ Institute a system whereby vendors can apply to the camp manager for permission to sell their wares in the designated area.
- ❑ Give preference to local vendors when granting permission.
- ❑ Allow only vendors with permission to trade, in the designated area.
- ❑ Allow trading to only take place in the designated area, and nowhere else.

6.1 Sanitation

The Contractor shall install mobile chemical toilets on site. Staff shall be sensitised to the fact that they should use these facilities at all times. No indiscriminate excretion or urinating on site shall be allowed. Ablution facilities shall be within 100 m from workplaces but not closer than 50 m from any natural water bodies. *No surface or ground water may be polluted due to any activity on the property/site. The relevant requirements of the National Water Act, 1998 (Act No. 36 of 1998) must be complied with at all times (ROD Condition 1.33).* There should be enough toilets available to accommodate the workforce (minimum requirement 1: 20 workers). Toilets shall be serviced regularly and the ECO shall inspect toilets regularly to ensure compliance to health standards.

- ❑ It must be stipulated as a condition of contract that ablutions in the veld are unacceptable and will be considered in a serious light, leading to a substantial fine or dismissal.
- ❑ The wastewater from the chemical toilets must be disposed of at the wastewater treatment works in Victoria West.

Management Objectives	Measurable Targets
Ensure that proper sanitation is achieved	No complaints received from landowners or Grid staff regarding sanitation
Prevent spreading of disease	No litigation or compensation claims

6.2 Prevention of diseases

The Contractor shall take all the necessary precautions against the spreading of disease such as measles, sexually transmitted diseases such as HIV/AIDS etc, as well as diseases such as foot and mouth, etc. amongst livestock. A record shall be kept of drugs administered or precautions taken and the time and dates when this was done. This can then be used as evidence in court should any claims be instituted against Eskom or the Contractor.

Furthermore, there shall be no fraternisation between the Contractor's staff and local people.

Specific management interventions are required to police prostitution, particularly considering that long-haul delivery vehicles will be arriving and leaving the site on an on-going basis (there is a casual link between long-haul drivers and the spread of sexually transmitted diseases). Transgressions should be dealt with severely (fines and dismissals).

Management Objectives	Measurable Targets
Prevent litigation due to infestation of livestock	No complaints from landowners/communities
Prevent spreading of sexually transmitted diseases	No litigation

6.3 Interaction with affected parties

The success of any project depends mainly on the good relations with the affected landowner, communities and Grid staff. It is, therefore, required that the ECO and the Contractor establish good relations with all the affected parties at the sub-station site. An open channel of communication must be established between Eskom, the contractors and the neighbouring landowners.

All negotiations for any reason shall be between the ECO, the affected parties and the Contractor. No verbal agreements shall be made. All agreements shall be recorded in writing and all parties shall co-sign the documentation.

The affected parties shall always be kept informed about any changes to the construction programme should they be involved. If the ECO is not on site, the Contractor should keep the affected parties informed. The contact numbers of the Contractor and the ECO shall be made available to the affected parties. This will ensure open channels of communication and prompt response to queries and claims.

All contact with the affected parties shall be courteous at all times. The rights of the affected parties shall be respected at all times.

Management Objectives	Measurable Targets
Maintain good relations with affected parties	No delays in the project due to interference from affected parties

6.4 Littering

Littering by the employees of the Contractor shall not be allowed under any circumstances. The ECO shall monitor the neatness of the work sites as well as the Contractor campsite. Where possible, waste streams should be separated for purposes of recycling.

Management Objectives	Measurable Targets
Neat workplace and site	No complaints from affected parties

6.5 Dust

The Contractor shall be responsible for dust control on site to ensure no nuisance is caused to the landowner, neighbouring communities or Grid staff at the sub-station. Watering of access roads is recommended, as this is normally the greatest cause of dust pollution. Speed limits can also be effected, especially on private dirt roads leading to the site. Any complaints or claims emanating from the lack of dust control shall be attended to immediately by the Contractor.

Mitigation measures include:

- Limit the speed of construction vehicles on construction roads to 40 km/h.
- Clearing areas for construction only immediately ahead of when they are required.
- Apply dust suppression measures, mainly through the application of water via a fan bowser or using a soil-binding agent, as indicated by weather conditions on a day-to-day basis.
- Reshaping, rehabilitating and revegetating cleared areas immediately once construction has been completed.

Management Objectives	Measurable Targets
Site works does not cause a nuisance to other people in the area	No formal complaints or claims arising due to dust pollution

6.6 Aesthetics

The site shall be kept visually and aesthetically pleasing, especially in and around the Contractor's camp. The ECO shall regularly inspect the site to ensure that it is neat and clean. Where required, the campsite shall be screened by the Contractor to ensure that there is no unacceptable visual intrusion in the area of the site. Screening can be done by use of shade cloth or corrugated fencing.

Mitigation measures that are to be applied to reduce potential impacts, as described below:

- Vegetation stripping should be done in a manner where the edges are non-geometric or curvilinear rather than straight or sharp edged.
- The construction area must be rehabilitated and revegetated immediately after the completion of construction activities. Progressive reinstatement should be applied.

- Given that there are few indigenous plants that can be used for screening, it will be necessary to shape and sculpt the cut and fill slopes of platforms and access roads to angles and forms that are reflected in the adjacent landscape and that can reduce the visual impact.
- To reduce the visual intrusion, the colour selected for roofing and walls must be of a nature, which will help to visually break up the surfaces of the buildings. Matt finishes must be used. Importantly, the roofs of buildings must not reflect or deflect sunlight or artificial light during the day or night by their colour or texture. Roof material shall not be a silver colour or glossy.
- Colours should be complementary to the colours of the surrounding landscape, such as olive green with buff trim, light grey, grey green, blue grey, dark buff, rust, ochre or natural tones such as variations of tan and be matt in texture. It is important that the colour choices and patterns should be timeless in that they should not become dated.
- As night lighting (mainly construction) is one of the more objectionable forms of visual impact, it is important that selective and sensitive location and design of the lighting requirements for the construction camp and sub-station are developed, for example, reduce the height from which floodlights are fixed and identify zones of high and low lighting requirements with the focus of the lights being inward, rather than outward. It is also important to avoid uplighting of structures and rather to direct the light downwards and focussed on the object to be illuminated. Also, one should avoid directing the light towards the direction from where it would be most experienced (taking note that the sub-station will not be lit at night. Rather, lights will be triggered if the perimeter fence is breached).
- Light spill, particularly upwards, must be minimised. This can be achieved by implementing the following recommendations:
 - All external light fittings shall not allow light to shine upwards.
 - All security lighting shall have “blinkers” or be specifically designed to ensure light is directed downwards while preventing side spill. This may require that light pole numbers will increase to give the required illumination on the ground.
 - Lighting for safety and security must be directed downwards and towards the structures to reduce light spill beyond the property boundary.
 - Area lighting on tall masts should be confined to the lower landform elevations.
 - Tall structures, such as towers, will by law have to be fitted with a red flashing light if they exceed a height of 45 m.
- There is little that can be done on the location that will reduce the visibility of light. Therefore, the viewer will need to make provision for blocking views of these lights by screen planting, screens or orientation to keep the light out of the viewshed.

Management Objectives	Measurable Targets
Aesthetically pleasing works area, campsite and storage areas	No complaints from affected parties on or around the site

7. BIOLOGICAL ISSUES AND THEIR CONTROL

7.1 Fauna

The Contractor shall under no circumstances interfere with livestock without the landowner or community members being present. This includes the moving of livestock where they interfere with construction activities. Should the Contractor's workforce obtain any livestock for consumption, they must be in possession of a written note from the owner. The transportation of meat for consumption shall take into consideration any legal requirements regarding the spreading of disease. No poaching shall be tolerated under any circumstances.

Mitigation actions for potential impacts of the sub-station site:

- In collaboration with the EWT: Riverine Rabbit Working Group, rehabilitate riverine rabbit habitat on the sub-station site as well as in an off-set mitigation area.

Mitigation measures for the potential impacts of construction camps:

- Avoid vegetation clearing by locating construction camps in transformed habitats or at existing construction sites.
- Construction camps should not be located in sensitive habitats.
- All cleared areas must be rehabilitated.
- Construction camps must be fenced to control the movement of staff.
- Prohibit the collection of wood for fuel and provide alternative fuels.
- Manage solid waste and dispose at a registered landfill.
- Formulate and implement an invasive plant control programme.
- Implement the strict control of the movement of staff.
- Implement strict controls over poaching.
- Dogs should not be allowed on site.

Mitigation measures for the potential impacts of construction on local bird populations:

- All construction activities should be undertaken according to generally accepted environmental best practice, with care taken to destroy as little as possible of the natural vegetation, and to minimise unnecessary disturbance on site.
- Construction camps should be placed well away from koppies and the drainage line and dam on Uit Vlucht Fontein.
- Movements of off duty staff should be strictly managed at all times to minimise impacts on the local bird population.

In the case of disruption of farming and hunting activities, mitigation action will be financial compensation for the movement of livestock and game, as well as for the loss of income from hunting. If there is going to be a permanent loss of grazing land, as is expected on the land to be occupied by the proposed sub-station, financial compensation as part of the land acquisition will be required.

Management Objectives	Measurable Targets
Minimise disruption of farming activities	No stock losses where construction is underway
Minimise disturbance of animals	No complaints from landowners and communities
Minimise complaints and litigation	No litigation concerning stock losses and animal deaths

7.2 Flora

Protected or endangered species may occur on the site. Special care should be taken not to damage or remove any such species unless absolutely necessary. Permits for removal must be obtained should such species be affected by construction activities. All plants not interfering with the operation of the sub-station shall be left undisturbed, clearly marked and indicated on the site plan. Collection of firewood outside the site area is strictly prohibited.

The translocation site of the geophyte species (Boophone disticha or givbol) should be identified, prior to translocation and construction activities commencing to ensure proper protection of the plant species (ROD Condition 1.26).

Mitigation measures for the potential impacts of the project on the flora:

- ❑ Clear only the development footprint rather than the whole site.
- ❑ Clear and build areas for the permanent roads only to prevent additional loss of vegetation. For temporary haul roads, do not cut a road. Rather remove large rocks and drive over the veld in designated areas. This will be less damaging than the construction of a road.
- ❑ During construction, increased human activity will cause disturbance. Road construction also creates a disturbance along the edges. Disturbance to natural vegetation is a significant cause of infestations by exotic species. Edge disturbance due to construction will be short-term and much of this will be reversible. Fencing the site at the onset of the construction phase will reduce the extent of disturbance.
- ❑ Erosion due to clearing of the vegetation can be minimised by clearing the vegetation during the dry season and commencing construction immediately. The soils are prone to erosion and during construction remedial action should be implemented where erosion becomes evident (installation of gabions or some other revetment). Dust storms are rare and wind erosion is not predicted to be significant.
- ❑ Loss of protected plant species is inevitable where vegetation is to be cleared. All the protected plants are protected because of Family status. With the exception of *Boophone disticha* all protected species on the site are common in the area. *Boophone disticha* is a geophyte that will transplant easily. All individuals could be transplanted to the edges of the site before construction commences, as follows:
 - Plant removal. Removal of geophytes should be done by, firstly, loosening the soil with a geopick or similar pointed implement. This should be done a few centimetres away from the bulb as damage to the living portion of the bulb severely reduces the translocation success.
 - Plant storage. Removed Bulbs will benefit by a period of drying, but this should be no more than two weeks after which they should be potted. The soil mixture to be used for the geophytes should be two parts topsoil with one part coarse sand. When potting the plants, the bulbs must be planted to the same depth as they were when removed.
 - Planting. Once potted plants have stabilised, they should be placed at the site for a week. Flowers and fruits must be removed to avoid pollen being introduced at the target site from the nursery. Closed buds may be retained. Soil preparation should be by removal of a plug of soil the size of the pot and the plant inserted with its soil after removal from the pot. Water each individual for improved survival. Each individual or cluster of individuals must be clearly marked and a GPS reading noted. This is done to ensure that they can be found during monitoring.
- ❑ Appropriately designed storm-water drainage for constructed roads will alleviate the impact of high intensity runoff from the road surface during high rainfall events.

- The standing biomass of the Karoo grasses is too low to support fire and the shrubs are too far apart to provide sufficient fuel load for a run-away veld fire. Should fires occur they are likely to burn out quickly. Nevertheless, vigilance is required.

Management Objectives	Measurable Targets
Minimal disturbance to vegetation where such vegetation does not interfere with construction and operation of the sub-station	Vegetation is not unnecessarily disturbed
Prevention of litigation concerning removal of vegetation	No litigation due to removal of vegetation without the necessary permits

7.3 Herbicides

Herbicide use shall only be allowed with the approval of Eskom and according to contract specifications. The application shall be according to set specifications and under supervision of a qualified technician. The possibility of leaching into the surrounding environment shall be properly investigated and only environmentally friendly herbicides shall be used.

Management Objectives	Measurable Targets
Control over the use of herbicides	No signs of vegetation dying due to leaching of herbicides one year after completion of the contract
	No landowner complaints and litigation

8. CULTURAL HERITAGE RESOURCES AND THEIR CONTROL

8.1 Archaeology

The position of any known sites shall be shown on the final design plans. Such areas shall be marked as “no go” areas. Artefacts shall not be removed under any circumstances. Any destruction of a site can only be allowed once a permit is obtained and the site has been mapped and noted. Permits shall be obtained from the South African Heritage Resources Agency (SAHRA) should the proposed site affect any heritage sites which are to be destroyed or altered.

Should any archaeological sites be uncovered during construction, their existence shall be reported to Eskom immediately.

Management Objectives	Measurable Targets
Protection of archaeological sites and land considered to be of cultural value	No destruction of or damage to known archaeological sites
Protection of known sites against vandalism, destruction and theft	Management of existing sites and new discoveries in accordance with the recommendations of the Archaeologist
The preservation and appropriate management of new archaeological finds should these be discovered during construction	Management of existing sites and new discoveries in accordance with the recommendations of the Archaeologist

8.2 Monuments/historical sites

All monuments and historical sites shall be treated with the utmost respect. Any graves shall be clearly marked and treated as “no go” areas. No destruction of any site shall be allowed. Should it be necessary to remove any graves, the necessary procedures shall be followed and permits obtained.

Management Objectives	Measurable Targets
Protection of sites and land considered to be of cultural value	No destruction of or damage to known sites
Protection of known sites against vandalism, destruction and theft	Management of existing sites and new discoveries in accordance with legislation
The preservation and appropriate management of new finds should these be discovered during construction	No litigation due to destruction of sites

8.3 Farmhouses/buildings

Most landowners will see the construction period as interference with their daily activities. There will be a negative attitude towards the whole construction process. Landowners are always apprehensive toward changes they do not control and strangers on their properties. Where the sub-station is close to any inhabited area, the necessary precautions shall be taken by the Contractor to safeguard the lives and property of the inhabitants. The Contractor shall under no circumstances interfere with the property of landowners, Grid staff or nearby communities.

Management Objectives	Measurable Targets
Control over actions and activities in close proximity to inhabited areas	No complaints from landowners, Grid staff or communities
	No damage to private property

8.4 Infrastructure

No interruptions other than those negotiated shall be allowed to any essential services. Damage to infrastructure shall not be tolerated and any damage shall be rectified immediately by the Contractor. A record of any damage and remedial actions shall be kept on site.

All existing private access roads used for construction purposes, shall be maintained at all times to ensure that the local people have free access to and from their properties. Speed limits shall be enforced in such areas and all drivers shall be sensitised to this effect.

Any possible disruptions to essential services must be kept to a minimum and should be well advertised and communicated to landowners and surrounding communities. Care must be taken not to damage irrigation equipment, lines, channels and crops, as this could lead to major claims being instituted against Eskom and the Contractor. The position of all pipelines and irrigation lines in the vicinity of a site must be obtained from landowners or the local community and clearly marked. Where required such lines shall be deviated.

Alternative stock and game watering points will be provided if there is a loss of water source, or a loss of access to farm infrastructure.

Traffic safety measures to mitigate the potential impacts of increased pressure on existing infrastructure should include speed reductions on the N1 as well as rumble strips in combination with signage (heavy vehicles crossing/turning). *In particular, the South African National Roads Agency's letter dated 14 March 2007, attached to the EIR dated August 2007, must be strictly adhered to (ROD Condition 1.36).*

Management Objectives	Measurable Targets
The control of temporary or permanent damage to plant and installations	No damage to any plant or installations
Control of interference with the normal operation of plant and installations	No unplanned disruptions of services
Securing the safe use of infrastructure, plant and installations	No complaints from Authorities, landowners and communities regarding disruption of services
	No litigation due to losses of plant, installations and income

9. REQUIREMENTS DURING CONSTRUCTION

- ❑ Proper and continuous liaison between Eskom, the Contractor and landowners to ensure everyone is informed at all times.
- ❑ The landowners shall be informed of the starting date of construction as well as the phases in which the construction shall take place.
- ❑ The Contractor must adhere to all conditions of contract including the EMP and landowner special conditions.
- ❑ Proper planning of the construction process to allow for disruptions due to rain and wet conditions.
- ❑ Where existing private roads are in a bad state of repair, such roads' condition shall be documented before they are used for construction purposes. If necessary, some repairs should be done to prevent damage to equipment and plant.
- ❑ All manmade structures shall be protected against damage at all times and any damage shall be rectified immediately.
- ❑ The Contractor shall ensure that all damaged areas are rehabilitated to the satisfaction of Eskom and each and every property owner, and that outstanding claims are settled.
- ❑ Proper documentation and record keeping of all complaints and actions taken.
- ❑ Regular site inspections and good control over the construction process throughout the construction period.
- ❑ Appointment of an ECO on behalf of the Contractor to implement this EMP as well as deal with all landowner related matters.
- ❑ Environmental Audits are to be carried out during and upon completion of construction (at least two for the project).

10. SITE-SPECIFIC PROBLEM AREAS

Site-specific problems, if any, will be shown on layout plans (**Design**). No-go areas, for example, koppies and the drainage line and dam on Uit Vlucht Fontein, will also be shown on the layout plans (**Design**).

10.1 Estimated quantities for special works on site

If applicable, these will be provided once a ROD has been issued.

11. METHOD STATEMENTS FOR THE CONTRACT

The Contractor shall supply method statements for all works required as per specific contract requirement. All agreements regarding extra works for environmental compliance shall be in writing and well documented. Work shall only commence upon approval by Eskom.

The ECO shall ensure that all works are in accordance with method statements and contract specifications.

12. SITE DOCUMENTATION, MONITORING AND REPORTING

The standard Eskom site documentation shall be used to keep records on site. All documents shall be kept on site and be available for monitoring purposes. Site inspections by an Environmental Audit Team may require access to this documentation for auditing purposes. The documentation shall be signed by all parties to ensure that such documents are legal. Regular monitoring of site works by the ECO is imperative to ensure that all problems encountered are solved punctually and amicably. When the ECO is not available, the Contract Manager/Site Supervisor shall keep abreast of all works to ensure no problems arise.

Regular monthly environmental compliance reports shall be forwarded to the Transmission Engineering Environmental Advisor (appointed per project) with all information relating to environmental matters. The following Key Performance Indicators must be reported on a monthly basis by the ECO:

- Complaints received from affected parties and actions taken.
- Environmental incidents, such as oil spills, etc. and actions taken.
- Incidents possibly leading to litigation and legal contraventions.
- Environmental damage that needs specialised rehabilitation measures to be taken.

The following documentation shall be kept on site by the ECO:

- Site daily diary.
- Complaints register.
- Records of all remediation/rehabilitation activities.
- Copies of monthly reports to the Transmission Engineering Environmental Advisor for auditing purposes.
- Copy of the EMP.
- Copy of ROD.
- Minutes of site meetings including discussions on environmental issues.

13. APPENDICES

The following documents are applicable for implementation of this EMP:

- Record of Decision.
- Aspect and Impact Register for Project Activities.
- Eskom Transmission's Environmental Policy.

APPENDIX 1

Record of Decision

APPENDIX 2

Aspect and Impact Register for Project Activities

APPENDIX 3

Eskom Transmission's Environmental Policy