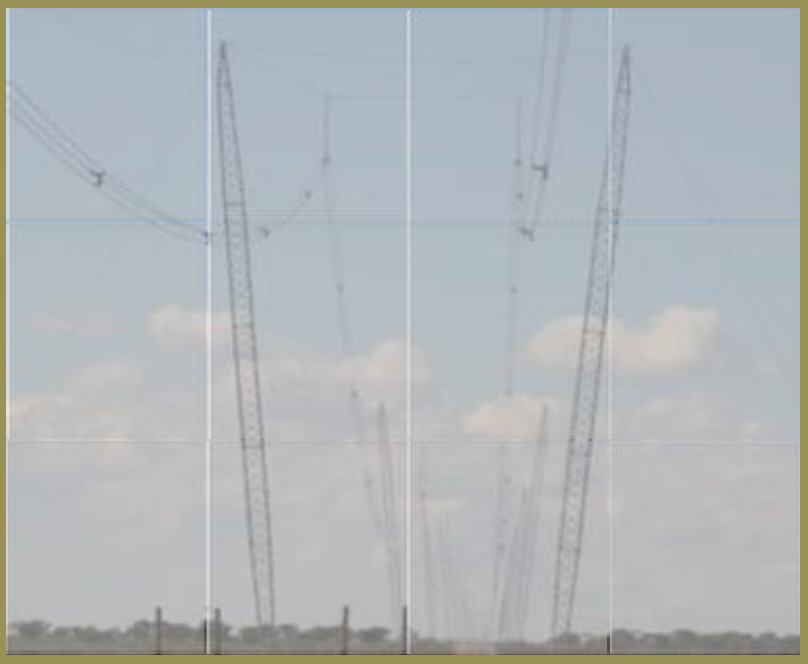
2023

Environmental Impact Assessment for the Proposed 400 kV Transmission Line from Kokerboom Substation to Auas Substation

Environmental Management Plan



NamPower
Powering the Nation and beyond

ENVIRO DYNAMICS

PROJECT NAME	Environmental Specific Environmental Management Plan for the Proposed 400 kV Transmission Line from Kokerboom Substation to Auas Substation
STAGE OF REPORT	Final EMP
CLIENT	**NamPower** Enquiries: Kondjeni Nghitevelekwa (Pr.Eng, MEng) Senior Engineer | Transmission Projects: PSD Tel: 264 61 205 2128 E-Mail: kondjeni.nghitevelekwa@nampower.com.na
LEAD CONSULTANT	**Enviro Dynamics** Enquiries: Stephanie van Zyl Tel: (061) 223-336 E-Mail: stephanie@envirod.com
DATE OF RELEASE	September 2020
CONTRIBUTORS TO THE REPORT	Stephanie van Zyl

1 SCOPE

The purpose of this document is to provide regulations, regarding the environment, to any contractor whom NamPower appoints for any construction activity (this includes outside contractors as well as NamPower's own construction people).

This document is to form part of the contract, and all recommendations and constraints laid out in this document are enforceable under the general conditions of contract.

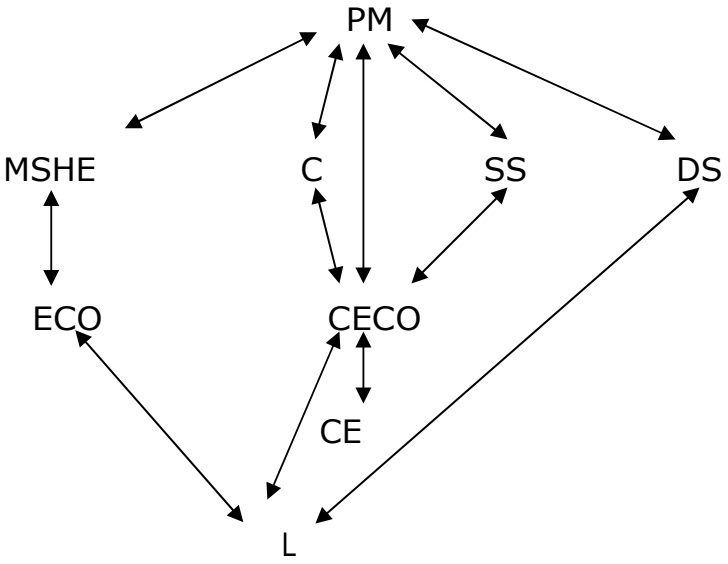
This management plan has a long-term objective to ensure that:

- Environmental management considerations are implemented from the start of the project.
- Precautions against damage and claims, arising from damage, are taken promptly.
- The completion of the project is not delayed due to problems with land owners arising during the course of construction.

NamPower needs a commitment from the NamPower Project Manager and contractor on the following issues:

- To take into consideration the landowners and their rights.
- To always behave professionally on and off site.
- To ensure quality in all work done – technical and environmental.
- To resolve problems and claims arising from damage immediately, in order to ensure a smooth flow of operations.
- To underwrite NamPower's environmental policy at all times.
- To use this Environmental Management Plan for the benefit of all involved.
- To preserve the natural environment by limiting destructive actions on site.

1.1 REPORTING STRUCTURE



PM : NamPower project manager

MSHE : Manager: SHE

C : Contractor

DS : District supervisor

SS : NamPower site supervisor

ECO : NamPower environmental control officer

CECO: Contractor environmental control officerCE

: Contractor employees

L : Landowners

2 INTRODUCTION

Construction activities can have a major impact on the environment. It is thus crucial to take better precautions, in order to ensure that environmental damage is minimised. Though one cannot eliminate all damage, one can take certain steps to reduce the damage. These steps can only be successfulif the Contractor makes a concerted effort and if NamPower make use of proper planning and enforcement.

This document presents the General Environmental Management Plan (GEMP) for NamPower. The objective of this GEMP is to achieve sound safety, health, and environmental performance (SHE).

This document is not site specific. For this project there is an additional annexure, stating the special conditions for that area, and these conditions along with the GEMP contain the environmental regulations for this project. This document is an official NamPower document and the contractor is contractually obligated to fulfil all the conditions stipulated in it.

This document will only address those issues related to the social and natural environment. A document dealing with the technical specifications will also be drafted and this document will deal with all the technical aspects.

1. PROJECT MANAGER

- Is responsible for the enforcement of the EMP.
- Must make sure that SHE requirements are included in the tender documents sent to the contractor.
- Must ensure that a SHE clause is included in the contract document and communicated to the contractor before the inception of the project.
- Must ensure that the contractor remains in compliance with the requirements of this EMP, through regular communication and monitoring.

2. NAMPOWER SHE SECTION

- Assist the Project Manager in ensuring the contractor remains in compliance with this EMP through.

- Provides SHE inductions for the contractors and their employees.
- Organize and implement monitoring and audit functions, in consultation with the Project Manager.
- Report back to the Project manager on contractor compliance to the EMP before the project close-off and final payment is made to the contractor.

3. SURVEYOR

- Ensures route alignment for the proposed power line is as per route given in the final EIA (or after consultation with the SHE section if no EIA has been done).
- Ensures that the final alignment of the route be fine-tuned to keep at least 50m away from any farm infrastructure (such as reservoirs, cattle kraals, pumps etc.).
- Ensures that the servitude or power-line route, should it run in parallel to a stream or riverbed has a buffer of between 15 m between the servitude and the river.
- Ensures that the ECO accompanies the surveyor during site handover. The surveyor is to align the straight sections of the power line so that its centre line would avoid significant tree species (such as a valuable shade trees or endangered tree species) as far as possible.
- Documents the removal of any economically valuable trees or bushes (such as valuable shade trees) and clearly communicated to the ECO the reasons for removal.
- The Surveyor, together with the ECO, should carefully consider the need to remove large trees in the servitude, and specify this only where technically necessary.
- Rocky outcrops and inselbergs in the project area are sensitive from an ecological aspect; they harbour vegetation worthy of conservation, and the final power-line alignment must avoid all such sites.
- The Surveyor should ensure all coordinates given in the EMP of environmental or social sensitive areas are included on the spanning sheets for the power-line prior to construction.

4. CONTRACTOR

- Is responsible for the implementation of the EMP.
- Ensuring all tasks undertaken under the scope of work, are in accordance both with NamPower's SHE policy as well as to the requirements of this EMP.
- Putting in writing a system of communication, in which all incidents and accidents are reported to the SHE section.
- Ensuring that all employees receive a SHE induction before the start of the project.
- Ensuring that the work being done does not create a nuisance to the residents or animals on the property. If the contractor deems to continue work after the usual working hours, in the evenings and at night or over weekends, he must obtain the landowner's permission before proceeding with such work.

The contractor shall notify NamPower of the following:

- Conflicts arising with any landowner / representative.
- Any special conditions requested by a landowner / representative.

The employer[1] has the right to ban any employees from the site, which have not attended SHE induction, until the time that they receive induction. The employer also has the right to stop all construction activities if it is found that a gross violation of the EMP is taking place.

Lines of communication should always be open to ensure proper and timely reaction to complaints. The reputation of both the contractor and NamPower is at stake and should be the drive for everybody involved to perform in excellence.

The concept of sustainability, sustainable development and the Triple Bottom line should be kept in mind at all times during the project. This will ensure that the three main issues of each project, namely: environmental issues, social issues and financial issues, are always in balance and that not one of them

[1] *(Wherever the term employer is used, it should be assumed that the entity being addressed is NamPower.)*

takes precedent over the others.

All rehabilitation work to the environment, that needs to be done, will be done at the expense of the contractor.

3 LEGAL REQUIREMENTS

Summarized below (**Table 1**) are the activities associated with the construction and operation of the power line that have specific requirements in terms of national legislation (such as permits).

Table 1: Activities requiring permits in terms of National Legislation

LEGISLATION	REQUIREMENT
Labour Act 11 of 2007	• Regulations relating to the health and safety of employees at work are contained in GN 156/1997 (GG 1617). Must be complied with on this project.
Forestry Act No 27 of 2004	• Provision for the protection of various plant species. A **permit** will be needed for removal or destruction of protected species mentioned in Table 2. • The act also requires any removal of any living tree, bush or shrub growing within 100 metres of a river, stream or watercourse to be done under to auspices of a permit issued by an appropriate official from the Directorate of Forestry. • The forms can be obtained from Mr T. Uahengo in the permit office at the Ministry of Environment and Tourism, Windhoek or the Directorate of Forestry: Ministry of Agriculture, Water and Forestry, Government Office Park, P/Bag 13184 Windhoek, Tel +264 61 208 7555. A period of three months should be allowed for obtaining this permit. Species and numbers/quantities involved will need to be specified.
Nature Conservation Ordinance 4 0f 1975	• Permit needed for the removal or destruction of protected species (See the Vegetation Specialist study for a Complete list of species requiring a permit.)
National Heritage Act No 27 of 2004	• No archaeological/heritage site or cultural remains may be removed, damaged, altered or excavated. • Section 48 sets out the procedure for application and granting of **permits,** such as the permit required in the event of damage to a protected site occurring as an inevitable result of development. Section 51 (3) sets out the requirements for impact assessment. • Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council. Contact: **Karl Aribeb (061-244 375)**

Compensation Policy	• The Compensation Policy for commercial areas (Appendix A), with its applicable forms are applicable to this project.

4 SOCIAL ENVIRONMENT

4.1 INTERACTION WITH LANDOWNERS

4.1.1 Given the long delay between Environmental Authorisation and construction, NamPower will reconfirm the details of the affected landowners and users during the detailed planning phase.

4.1.2 All structures, infrastructure affected will be identified and where possible, the route will be moved to avoid these.

4.1.3 Where this is not possible, NamPower will negotiate fair compensation with the landowners and users; this should account for disruptions to livelihood activities and impact on infrastructure and assets on the farm (e.g. agriculture, hunting and tourism). This is a private negotiation that will be handled on an individual basis.

4.1.4 The construction schedule and process should be designed to avoid the high tourist and hunting seasons. The landowners and users involved in tourism activities should be requested to confirm this information as part of the detailed planning process prior to construction.

4.1.5 The construction schedule should be discussed with the commercial farmers to enable them to plan the rotation of livestock accordingly. Their limitations should be accommodated, where possible.

4.1.6 The schedule and approach to construction must be presented to the directly affected receptors and constituency leaders for input prior to finalisation.

4.1.7 Before work commences, NamPower should inform all affected landowners and authorities about the project, at least 14 days before the start of the project.

4.1.8 NamPower should secure all rights of way to cross over private properties. The contractors may not stray from the NamPower servitude. The contractor shall inform the owner or his legal

representative before entering onto any private property, of his intention to do so and shall make such arrangements with such owner or his legal representative as may be necessary to ensure free and unhampered entry to, and movement on or over the property concerned, for the duration of the project. This should be done at least one month in advance and written proof of such communication should be available at all times.

4.1.9 Whenever reasonably possible, the contractor shall meet with the landowner / representative of the property, introduce himself and the company he represents and explain the scope of the work. The landowner / representative must have knowledge of the planned route and duration of work on the property prior to the commencement of the work. This shall be done in due courtesy to the owner / representative.

4.1.10 The contractor must ensure that the owner or his legal representative fill in forms containing the following information, before and after the contractor has worked on the property (these forms must be presented by the contractor to NamPower, whenever the company requests it) and a copy shall be handed to NamPower at the end of the project.

Before entry, to be completed and signed by the farm owner:

- The state of their properties and assets prior to construction; the inclusion of photographs should be encouraged. Activities to be conducted on the farm (e.g. camping, construction etc.).
- Specific conditions to be met on the farm.
- Dates when entry is needed.
- Farmer's signature (if the farmer or his legal representative does not agree to sign the form, this must be noted on the form along with a list of names of all the people present at the meeting).
- Contractor's signature of commitment to adhere to the requirements.

Upon leaving the farm, to be completed and signed by the farm owner:

- Post-construction, the site should be reassessed to ensure that the farm is left in an acceptable state.
- Post-construction, the affected landowners or users should be invited to join NamPower and the appointed contractor for a 'walk down' the power line route to identify any outstanding issues.

- Remarks on compliance and misconduct
- Issues still to be resolved

4.1.11 The success of the project depends on good relations with the landowners. Thus, the landowners must have knowledge of any changes to the construction and maintenance programme that might occur, but only if they are affected by it.

4.1.12 A system of communication must be devised by the contractor and made available to NamPower, in order to inform NamPower about all incidents and accidents (including those affecting the environment) and injuries sustained.

4.1.13 Appropriate contact numbers shall be made available to the landowner, to ensure open channels of communication and prompt responses to any queries and claims.

4.1.14 The rights if the landowner shall be respected at all times and all staff shall be sensitised to the fact that they are working on private property.

4.1.15 Where lines cross an inhabited area, all the necessary precautions shall be taken by the contractor to safeguard the lives and property of the inhabitants.

4.1.16 The contractor shall not interfere, under any circumstances, with build infrastructure belonging to the landowners.

4.1.17 A register shall be kept of all complaints from landowners. All claims shall be handled immediately to ensure timely rectification.

The following management objectives have been identified in terms of interaction with landowners:

- Minimise complaints from landowners.
- Prevent litigation due to outstanding claims.
- Successful completion of the contract and all landowners signing release forms.
- Maintain good relations with landowners.

Measurable targets:

- All claims investigated and settled within one month.
- No litigation due to unsettled claims.

- All landowners signing release forms within one month after completion of the contract.
- No delays in the project due to landowner interference.

4.2 ACCESS TO PRIVATE PROPERTY

4.2.1 The movements of the Contractor, subcontractor, or their employees, are restricted to the areas of the servitude and any further encroaching on private property at any time are subject to the owner's permission.

4.2.2 Movement of construction vehicles across the fields during the erection of the towers and the stringing of the lines needs to be limited as far as possible. Existing tracks should be used to at least reach the tower sites rather than to drive through the fields. A detailed plan with routes to the poles should be produced and availed to the contractor.

4.2.3 Roads marked with no entry signs, shall not be used.

4.2.4 Fences or gates of landowners shall not be damaged when gaining access to the servitude.

4.2.5 Gates and locks shall be regularly monitored to ensure that they are secure.

4.2.6 Gates to be left as they are found. If found opened, they must be left open, and if closed, they must be closed again upon entry.

4.2.7 If no gates are available at crossing points, landowners shall be informed prior to the loosening and crossing of fences. Fences loosened and crossed shall be immediately restored to its original state and to the complete satisfaction of the landowner.

4.2.8 All gates shall be fitted with locks and kept locked at all times during construction. NamPower must be supplied with three copies of these keys. Once the contractor has left the site, all gates shall be fitted with NamPower locks.

The following management objectives have been identified in terms of access to private property:

- Properly installed gates to allow access to the servitude.
- Minimise damage to fences.
- Limit access to NamPower and contractor personnel with gate keys.

Measurable targets:

- No transgression of fencing procedures as mentioned above.
- No damage to fences and subsequent complaints from landowners.
- All gates equipped with locks and kept locked at all times to prevent unauthorised entry of people and the uncoordinated movement of animals.
- All fences properly tied of to gate posts.
- All gates properly and neatly installed according to specifications.
- No complaints about open gates.

4.3 SAFETY DURING CONSTRUCTION

4.3.1 The Health and Safety Regulations should be complied with as far as they are applicable to this project.

4.3.2 Excavations should be left open for an absolute minimum time.

4.3.3 Demarcate the following areas with danger tape:

- All excavation works;
- Soil and other building material stockpiles; and
- Temporary waste stockpiles
- Provide additional warning signage in areas of movement and in "no personnel" areas where workers are not active.

- Work areas must be set out and isolated with danger tape on a daily basis.
- All building materials and equipment are to be stored only within set out and demarcated work areas.

4.3.4 Only construction personnel will be allowed within these work areas.

4.3.5 The contractor should inform residents to stay away from construction machinery and activities and to ensure that their children are kept away or at least remain at a safe distance.

4.3.6 Only Roads Authority (RA) recognised access points may be used when turning off a RA proclaimed road (trunk, main, district and farm roads). Where a deviation from this is unavoidable, appropriate temporary warning signs should be erected and clearly visible to road users.

4.3.7 Warning spheres to be installed close to any landing strips.

4.3.8 NamPower must comply with all the civil aviation regulations and the line will be registered with the civil aviation authorities.

4.4 ARCHAEOLOGICAL AND CULTURAL SITES

4.4.1 Before construction, the contractor shall inspect the area for any heritage sites that may be of significance. These would include any mounds, walls packed of stones, gravesites etc. If any such site is found, the area shall be cordoned off, and NamPower must be informed, who will, in turn, inform the Monuments Council, MET or an Archaeologist.

4.4.2 All sites, discovered during construction activities, which appear to be of cultural or archaeological importance must be clearly marked and GPS readings taken. If the contractor or staff identify archaeological sites, they should immediately notify the National Heritage Council in terms of the National Heritage Act (27 of 2004). No artefacts shall be removed or damaged under any circumstances. NamPower must call in relevant experts to determine the significance of the sites.

4.4.3 All cultural sites should be clearly marked and left undisturbed during bush-clearing, construction and maintenance activities.

4.4.4 Graveyards may not be intruded upon during construction, operation and maintenance activities

4.4.5 No graves shall be moved, and the surveyor shall manoeuvre the line in such a way to prevent any removal of historic sites.

4.4.6 Sites of historical interest, in close proximity to the servitude, shall be protected and treated with respect.

4.4.7 The following chance-find procedures are applicable:

ACTION	WHO RESPONSIBLE
Should a heritage site or archaeological site be uncovered or discovered during the construction phase of the project, a "change find" procedure should be applied. The details of this procedure are highlighted below:	NamPower
• If operating machinery or equipment stop work • Identify the site with flag tape • Determine GPS position if possible • Report findings to foreman	Person identifying archaeological or heritage material
• Report findings, site location and actions taken to superintendent • Cease any works in immediate vicinity	Foreman
• Visit site and determine whether work can proceed without damage to findings • Determine and mark exclusion boundary • Site location and details to be added to project GIS for field confirmation by archaeologist	Super intendent
• Inspect site and confirm addition to project GIS • Advise the National Heritage Council (NHC) and request written permission to remove findings from work area • Recovery, packaging and labelling of findings for transfer to National Museum	Archaeologist
Should human remains be found, the following actions will be required: • Apply the chance find procedure as described above. • Schedule a field inspection with an archaeologist to confirm that remains are human. • Advise and liaise with the NHC and Police • Remains will be recovered and removed either to the National Museum or the National Forensic Laboratory.	Archaeologist NHC Police

4.4.8 The following important archaeological sites exist near the route (Figure 1)

- QRS 243/604 S26.14268 E18.30721: Pre-colonial burial cairn 2m diameter, slightly dispersed, on stream terrace.
- QRS 243/605 S26.14444 E18.30861: Colonial era grave, 2.2m long, unmarked, on stream terrace.
- QRS 234/615 S22.88937 E17.56039: Historic/modern farm cemetery >50 graves, fenced, 30m east of road centreline. Confirmation is required as to whether this is the site referred to by the I&AP Comments and Response Report (4th August 2016), Item B035, Mr Romeis. The site is an established cemetery and unlikely to be affected by the proposed Kokerboom to Auas transmission line corridor.
- These particular sites should be demarcated and no construction activities are to take place near them. No members of the team are to come near them.

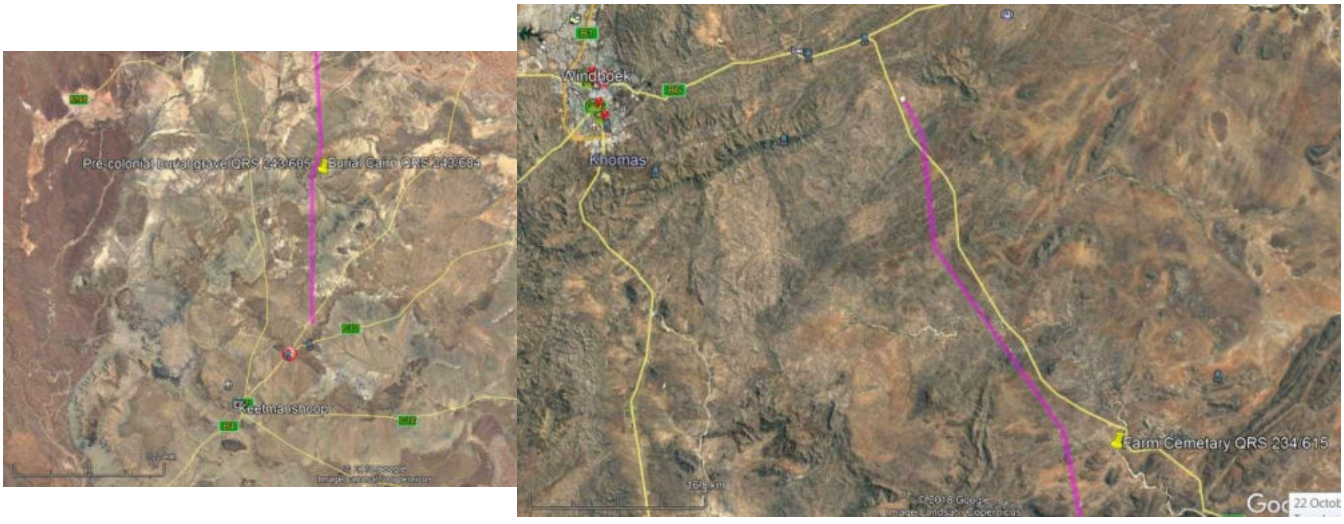


Figure 1: Archaeological sites near the proposed route

The following management objectives have been identified in terms of archaeological and cultural sites:

- Protection of archaeological sites and land considered to be of cultural value.
- Protection of known sites against vandalism, destruction, and theft.
- The preservation and appropriate management of new archaeological finds, should these be discovered during construction.
- Protection of sites and land considered to be of cultural value.

Measurable targets:

- No destruction of or damage to known sites.
- Management of existing sites and new discoveries.
- No litigation due to the destruction of sites.

4.5 SOCIAL IMPACTS

4.5.1 Personnel should limit their contact with farm workers and other permanent residents of the area.

4.5.2 Contractor staff should be subjected to an HIV/AIDS prevention programme and be made aware of the dangers of unprotected sexual relations with the local population. The risks of multiple and concurrent partnerships should be included in the prevention programme.

4.5.3 Authorities of the area should be sensitised and subjected to the prevention programme. They are then required to share this with the local community specifically where construction camps will be placed.

4.5.4 Any person making himself guilty of violence, harassment or any other activity deemed inappropriate by the landowner, must immediately be removed from the site.

4.5.5 The distribution or supply of intoxicating liquor or drugs of any kind by the employees of the contractor or any contractor is strictly prohibited.

The following management objectives have been identified in terms of social impacts:

- Minimise incidents involving contractor employees.

Measurable target:

- No complaints received by landowners concerning inappropriate behaviour of contractor employees.

4.6 RECRUITMENT MANAGEMENT

4.6.1 NamPower should strive to appoint a Namibian company to undertake the work, assuming that they are able to meet the tender requirements.

4.6.2 The EPC contractor will maximise the recruitment of local people, where possible. Preference to be given to people originating from the directly affected constituencies. Workers must be hired from all constituencies.

4.6.3 Identification and appointment of local people should be undertaken in consultation with the regional and constituency-level authorities at least 6-months prior to the commencement of construction.

4.6.4 No hiring is to take place 'at the gate', only specified recruitment channels will be followed.

4.6.5 The workforce should provide equal opportunities to a diversity of demographic characteristics for recruitment (e.g. sex, age, ethnicity, cultural/ religious affiliation).

4.6.6 All recruitment should be undertaken in terms of legislated basic conditions of employment, including appropriate health and safety measures.

4.6.7 The successful Tenderer should specify what percentage of the contract value will be assigned to capacity building (as per NEEP). The Tenderer should compile a capacity building plan that benefits all employees but specifically aims to enhance the skills of workers originating from the directly affected constituencies.

4.6.8 Goods and services should be procured locally, wherever possible. Where this is not possible, regional suppliers should be used. Only where it can be demonstrated that the goods and services are not available locally or regionally, national suppliers should be used.

4.6.9 Implement a procurement grievance procedure that is easily accessible, culturally appropriate and scaled to the potential risks and impacts of the Project. Complaints related to contractor or

employee behaviour will be lodged and addressed through this procedure. Key steps of the grievance procedure include:

4.6.10 circulation of contact details of 'grievance officer' or other key contact to all I&AP;

4.6.11 awareness raising among stakeholders regarding the grievance procedure and how it works;

4.6.12 establishment of an electronic grievance register which will be updated regularly, including all escalation actions, responses and response times;

4.6.13 grievance resolution to be signed off by the complainant; and

4.6.14 if the grievance is not addressed or closed out properly, there should be an avenue through which the matter is escalated to a higher level of authority for resolution.

4.7 WORKFORCE MANAGEMENT

4.7.1 The locations of the worker camps and laydown areas should be identified in consultation with the relevant local authorities. Agreement should be given by the landowner and all neighbouring landowners.

4.7.2 The worker camp should be fenced and access to and from the camp strictly controlled to prevent trespassing into unauthorised areas.

4.7.3 The worker camps should be established and managed in a manner that ensures that the workers have access to all basic services and occupational health and safety regulations are to be adhered to by the contractor. Workers should not need to exit the camp. Basic needs will include but may not be limited to food, water, sanitation, accommodation, recreation and medical care.

4.7.4 All construction staff will agree to a Code of Conduct (CoC) that outlines protocols and standards for working on the affected land. The CoC should address the following:

- respect for local residents;
- respect for existing livelihood activities and the environment;
- no hunting, snaring or unauthorised taking of any property belonging to someone else;
- compliance with the Traffic Management Plan and all

associated regulations;

- Disciplinary measures for not adhering to the Code of Conduct.
- If workers are found to be in contravention of the CoC, which they are to sign at the commencement of their contract, they will face disciplinary procedures that could result in dismissal. Damage to property, trespassing and theft should be noted as dismissible offences.

4.7.5 Workers from outside the area should be able to return home on a regular basis, as agreed in their contracts.

4.7.6 Contractors must supply their workers with sufficient amounts of fire wood; no live natural vegetation may be used for fire wood.

5 PHYSICAL ENVIRONMENT

Site establishment shall take place in an orderly fashion and all facilities shall be installed at campsites before the main workforce move onto the site.

A method statement is required from the contractors that include the layout of the camp, management of ablution facilities, and wastewater management.

5.1 WASTE MANAGEMENT

5.1.1 Separate waste containers must be provided for hazardous waste, potentially hazardous waste, general waste, and construction waste. Hazardous / harmful waste must be clearly distinguishable as such.

5.1.2 Containers shall be provided with lid or netting to prevent the waste from being removed by scavengers or wind. Waste containers should not be over-filled.

5.1.3 A waste pit for biodegradable materials may be used at the campsite. Upon leaving the site, this pit must be covered with at least one metre of soil.

5.1.4 No waste may be burned on site. All waste products must be moved to the nearest waste dump at regular intervals of at most two weeks.

5.1.5 Illegal dumping and littering shall not be tolerated.

5.1.6 Sites where waste is stored must be adequately protected from animals that might frequent the area.

5.1.7 No concrete waste may be left unburied at the site. Care should be taken to ensure that this buried waste is not an aesthetic problem to the landowner or a technical constraint during maintenance.

5.1.8 Ensure that the campsites, the work site, and the surroundings are kept in a neat condition at all times and that windblown litter is cleared on a daily basis.

The following management objectives have been identified in terms of waste management:

- To keep the servitude neat and clean.
- Disposal of rubble and refuse in an appropriate manner.

- Minimise litigation.
- Minimise landowner complaints.

Measurable targets:

- No rubble or refuse lying around on site.
- No incidents of litigation.
- No complaints from landowners.
- No visible concrete spillage on servitude.
- No signs of visible litter in the campsites or on the servitude.

5.2 HAZARDOUS MATERIAL

5.2.1 A register shall be kept on all hazardous substances and be available for inspection at all times.

5.2.2 Storage areas shall display the required safety signs.

5.2.3 Fuels must be stored in an adequate bunded area. Bundwalls may be made from sandbags. The area within the bundwalls should be lined with a plastic layer covered with a layer of at least 50 mm of sand. The bundwalls must be high enough to contain any major spills that may occur.

5.2.4 Hazardous substances should be stored in a well-ventilated area, and behind lock and key.

5.2.5 Used oils, fuel, paints, grease, and solvents should be stored in drums or other suitable containers, which must be labelled, sealed, and removed from the site to an appropriate disposal site or recycling facility.

5.2.6 Areas shall be monitored for spills and any spills shall be contained, cleaned, and rehabilitated immediately.

5.2.7 Oil contaminated soil must be collected, stored and removed for disposal at an appropriate waste storage facility. The area, from which the contaminated soil was taken, must be filled with new soil. The new soil must be free of contamination, and should not be taken from a spot within a 100-metre radius of where the spill occurred.

5.2.8 In the event of a hazardous spill on site or during transportation of these substances to or from the site, the followings actions must be

taken:

5.2.8.1 Stop the source of the spillage immediately.

5.2.8.2 Immediately contain the spillage by shovelling a soil bund wall with around it.

5.2.8.3 Absorb the oil spill as quickly as possible with the supplied spill kit.

5.2.8.4 Report the spill to the site supervisor.

5.2.8.5 In case of a major spill the Manager: SHE (NamPower) must be contacted and arrangements must be made for the implementation of the necessary clean-up activities.

5.2.8.6 Collect contaminated soil, water and other materials and dispose of it at an appropriate hazardous waste storage site.

5.2.9 Any rehabilitation activities needed because of an oil spill will be at the cost of the contractor.

5.2.10 Have sufficient fire fighting equipment available at the campsite.

5.2.11 Ensure that all staff are adequately protected and educated about the safe and proper handling and disposal of hazardous substances.

5.2.12 Hazardous substances should not be stored in an area that is situated within the migratory path of large mammals.

The following management objectives have been identified in terms of hazardous materials:

- Thorough management of hazardous waste materials.
- The protection of the natural integrity of the environment.
- Adequate staff awareness of procedures and Emergency Response Plans.

Measurable targets:

- Zero spills.
- No environmental pollution occurring.
- Management according to procedures.

5.3 TEMPORARY CAMPSITES

(**No Campsites may be constructed in the parks**)

5.3.1 Should the contractor wish to camp on private or public property, he will arrange the exact campsite , remuneration, dates of occupation and any special conditions with the relevant landowner at least one month prior to site establishment.

5.3.2 Campsites should not be located in an area that is situated within the migratory path of large mammals.

5.3.3 The location of campsites must be discussed with the landowner and the contractor may only use those areas indicated by the landowner, as campsites.

5.3.4 Care should be taken to protect campsites from large mammals, without causing harm or injury to the animal.

5.3.5 Temporary campsites are to be located close to existing tracks, preferably on already disturbed ground.

5.3.6 Throughout the period of the contract, activities are to be restricted to the designated area.

5.3.7 Adequate ablution facilities must be provided to the staff. These facilities may not be located within 100 m of any river, stream channel, pan, dam, or borehole (even if the water source is dry) and should be properly maintained in a hygienic and goodworking order.

5.3.8 The staff should be properly trained on the procedure that should be followed when no ablution facilities are available.

5.3.9 On site waste management facilities are to be provided.

5.3.10 Fire extinguishers, first aid kits and any other relevant safety equipment must be easily accessible at all times.

The following management objectives have been identified in terms of temporary campsites:

- Ensure that proper sanitation is achieved.
- Control over actions and activities are close proximity to inhabited areas.
- Campsites and toilet facilities maintained in a neat and hygienic condition.

Measurable target:

- No complaints from landowners regarding sanitation.
- No complaints from landowners.
- No damage to private property.

5.4 MAINTENANCE OF VEHICLES

5.4.1 Vehicle maintenance and refuelling activities must be conducted within a bunded area.

5.4.2 Vehicle maintenance and refuelling activities may not be carried out outside the campsite, except in cases of emergency.

5.4.3 During servicing of vehicles, especially during emergency veld repairs, a suitable drip tray shall be used to prevent oil spills.

5.4.4 In the event of a breakdown in the veld any oils spills shall be cleaned up immediately. The following shall apply:

5.4.4.1 All contaminated soil shall be removed and placed in containers. Contaminated soil can be taken to one central point, where soils can be treated or removed for disposal at an approved site.

5.4.4.2 Bigger spills can be treated on site with absorbent chemicals such as Peat-Sorb.

5.4.4.3 Major spills must immediately be reported to the project manager and the contractor shall employ a specialist contractor for the bio-remediation of contaminated soil.

The following management objectives have been identified in terms of vehicle maintenance:

- Prevention of pollution of the environment.
- Minimise chances of transgression of national legislation.

Measurable targets:

- No pollution to the environment.
- No litigation due to the transgression of national legislation.
- No complaints from landowners.

5.5 BUSH CLEARING

5.5.1 The objective of bush clearing is to trim out or clear the minimum number of trees and bush necessary for the safe electrical operation of the power line.

5.5.2 Vegetation shall only be cut to allow for the passage of the pilot-cables and headboard. No vegetation clearing shall be allowed across ravines and gullies, as this vegetation will very rarely interfere with the clearance to a strung conductor.

5.5.3 A strip, only wide enough to allow for vehicular movement, shall be cleared for access roads.

5.5.4 While clearing the trees near the power line route, falling distance of any tree or trees, which are likely to fall on the conductors of the power line, as has been identified by visual inspection, shall be considered. Such "high risk" trees, or its branches, shall be felled only under supervision of a NamPower representative.

5.5.5 It is imperative that while maintaining the specified clearances, all tree branches capable of producing off-shoots in due course shall be cleared in such a way that it will be impossible for any of the off-shoots of these trees to grow towards the power lines.

5.5.6 Near the power line, overhanging branches are impermissible.

5.5.7 Big trees with large root systems shall be cut manually and removed, as the use of a bulldozer will cause major damage to the soil when the root system is removed. Stumps shall be treated with an approved herbicide.

5.5.8 Environmental sensitivity shall be taken into account when clearing is done. Laws protect environmentally sensitive areas (such as wetlands, river crossings, areas of endemicity etc) and it is essential to obtain permits before the undertaking of any activities in such areas. The sketch plans should indicate existing or potential problem areas identified during site inspection of the power line route.

5.5.9 The contractor, NamPower and the landowner prior to bush clearing shall discuss all environmental factors. Should there be any changes to the route due to environmental factors, NamPower must first be consulted.

5.5.10 All the felled branches, cleared bushes/shrubs, and tree stubs etc. shall be removed from the line route and carted away in order to allow the free movement of maintenance vehicles and crews. This

plant material may however not remain in heaps and should be scattered over the terrain. When needed, this plant material can also be used to combat soil erosion.

5.5.11 If a cleared track is required along the route of the line (to allow for the free movement of vehicles) all protruding sharp rocks must be cut level or covered with imported gravel, levelled and compacted. Holes must be filled with gravel, levelled, and compacted.

5.5.12 No burning of vegetation is allowed as an alternative to cutting of vegetation.

5.5.13 To minimise soil erosion, vegetation should be trimmed as apposed to the complete removal of vegetation.

5.5.14 Manual bush clearing, as apposed to clearing using a bulldozer, is preferable, in order to minimise vegetation loss and hence reduce the risk of soil erosion.

5.5.15 Where there are no real obstacles, where vehicles can simply drive over an area, or where obstacles can simply be removed by hand, blading shall not be used.

5.5.16 When manual bush clearing is impractical, blading shall be used, but the blade shall be kept approximately ten centimetres from the soil surface to minimise the impacts to the soil surface and top layer, small plants and the root systems of larger plants.

5.5.17 Where clearing is done near a river, the contractor must ensure that no felled bushes/branches/shrubs are left behind in the riverbed.

5.5.18 No bush clearing shall be allowed on river- and stream banks unless the line crosses the river or stream and this vegetation poses a risk to the line. In such cases, NamPower should be consulted on the action to be taken.

5.5.19 A permit is required from the Ministry of Environment and Tourism for the removal of vegetation within 100m from a riverbed (in terms of the Forest Act of 2001). NamPower is responsible for applying for such a permit.

5.5.20 No bush clearing shall be allowed on river-and stream banks. Where the power line crosses river beds, an attempt should be made to prune riverine vegetation (over 4 m in height) as opposed to its removal.

5.5.21 The National Botanical Research Institute (NBRI) staff should be tasked to do rescue missions of any conservation worthy plants encountered while doing the final survey of the route.

5.5.22 No bush clearing is allowed outside the servitude.

5.5.23 Reasonable precautions shall be taken to avoid damage to land, crops, grazing fields, farm gates, or property.

5.5.24 No cultivated lands, fences, or structures (permanent or temporary) may be removed or damaged, unless NamPower's written consent for doing so has been obtained.

5.5.25 All damage to commercial crops shall be recorded immediately and a photographic record of such damage must be kept.

5.5.26 Alien species and declared weeds must be identified and eradicated during rehabilitation.

The following management objectives have been identified in terms of bush clearing:

- Minimise damage to vegetation.
- Keep servitude as natural looking as possible.
- Minimise interference by vegetation to flow of electricity.
- Minimise possibility of erosion due to removal of vegetation.
- Minimise removal of plant material on river and stream embankments.
- Eradication of alien invader species.

Measurable targets:

- Only 3 m vegetation cleared for the maintenance road.
- No trees and vegetation removed unnecessarily.
- No vegetation interfering with structures and statutory distances upon completion of the contract.
- No de-stumping of vegetation on river and stream embankments.
- No visible erosion scars three months after the completion of the contract due to vegetation removal.
- No litigation due to unauthorised removal of vegetation.
- All alien invaders eradicated from the servitude.

5.6 ACCESS ROADS

5.6.1 Movement of construction vehicles across the fields during the erection of the towers and the stringing of the lines needs to be limited as far as possible. Existing tracks should be used to at least reach the tower sites rather than to drive through the fields. A detailed plan with routes to the poles should be produced and availed to the contractor.

5.6.2 Off-road driving and the creation of tracks, other than those approved by the relevant landowner, are prohibited and will be regarded as unwanted tracks and unwarranted disturbed areas. All unwanted tracks and unwarranted disturbed areas must be rehabilitated at the cost of the contractor, before the contract will be considered complete.

5.6.3 All conditions that the landowner may have shall be noted and adhered to. All vehicle movement shall be along the existing roads and access tracks – where possible. Vehicles should be driven at moderate speeds and special care should be taken, especially in wet weather, to avoid eroding tracks. Multiple tracks (i.e. parallel tracks) are to be avoided at all times.

5.6.4 Damage to access roads due to the movement of vehicles must be reported to the Project Manager and the landowner. All repairs must be done immediately and to the satisfaction of the landowner.

5.6.5 No roads shall cut trough a river and stream banks as this may lead to erosion. If no other alternative is available, care should be taken to stabilise the bank.

5.6.6 Existing drifts and bridges may be used if the landowner gives his consent. Such structures shall then be thoroughly examined for strength and durability before they are used.

5.6.7 New drifts and bridges shall only be constructed with the approval of NamPower and the landowner.

5.6.8 No roads shall be constructed on slopes of more than 20% unless such roads follow contours. In such areas, the contractor shall use existing roads or alternative methods of construction.

5.6.9 The installation of concrete pipes and drifts, to facilitate access, shall be at the discretion of the project manager.

5.6.10 Dangerous crossings shall be marked and speed limits shall be enforced (refer to 5.7 for further details).

5.6.11 All agreements reached should be documented and signed and no verbal agreements should be made.

The following management objectives have been identified in terms of access roads:

- Minimise damage to existing access roads.
- Minimise damage to the environment due to construction of new access roads.
- Minimise loss of topsoil and enhancement of erosion.

Measurable targets:

- No claims from landowners due to damage on existing access roads.
- No erosion visible on access roads, three months after completion of construction.
- No loss of topsoil due to runoff on access roads.
- No unwanted parallel tracks and unwarranted disturbance.

5.7 INFRASTRUCTURE

5.7.1 No telephone lines shall be dropped during the stringing operations.

5.7.2 Where pipe lines are found along the route, the depth of the pipes under the surface shall be determined to ensure that proper protection is afforded to such structures.

5.7.3 Any damage to access roads must be reported immediately and any damage must be rectified as soon as possible.

5.7.4 Upon completion of the project all roads shall be repaired to their original state.

5.7.5 On gravel roads, the speed limit for trucks will be 40 km/h and for other vehicles, it is 60 km/h – 80 km/h depending on the condition of the road.

5.7.6 Power cuts to facilitate construction and especially stringing must be carefully planned. If possible, the disruptions must be kept to a minimum and should be well advertised and communicated to the landowners at least one month in advance.

5.7.7 Care must be taken not to damage irrigation equipment, lines channels and crops.

5.7.8 The location of airstrips should be carefully considered and the air safety laws should be kept in mind.

The following management objectives have been identified in terms of infrastructure:

- The control of temporary or permanent damage to plant and installations.
- Control of interference with normal operation of plant and installations.
- Securing of the safe use of infrastructure, plant, and installations.

Measurable targets:

- No unplanned disruptions of service.
- No damage to any plant or installations.
- No complaints from authorities or landowners.
- No litigation due to losses of plant, installations, and crops.

6 BIOLOGICAL ENVIRONMENT

6.1 RIVERS, VLEIS, AND PANS

6.1.1 Surface and ground water shall not be polluted under any circumstances. Storm water shall be managed to ensure that it does not become polluted.

6.1.2 All hazardous substances at the site shall be adequately stored and accurately identified, recorded and labelled.

6.1.3 Temporary toilet facilities (preferably chemical toilets) used at the camp site shall be sited away from any riverbed, vleis, or pan, even when dry.

6.1.4 Permanently wet areas should be shown on the spanning sheets. No vehicles shall be allowed in such areas. Only existing roads through such areas may be used with the approval of the landowner.

6.1.5 No equipment that can cause irreparable damage to wet areas shall be used.

6.1.6 There must be a buffer line of at least 15m between the servitude of the power line and any water-containing body (rivers, vleis and pans), if the power line happens to run parallel to it.

6.1.7 A stream or riverbed should not be obstructed with vegetation or any other materials cleared during bush clearing. (Also refer to point 4.5.16 and 4.5.17. Also refer to point 4.6.4 and 4.6.5).

The following management objectives have been identified in terms of rivers, vleis, and pans:

- Avoid permanently wet areas to prevent damage.
- Minimise damage to river and stream embankments.
- Minimise erosion of embankments and subsequent siltation or rivers and streams.

Measurable targets:

- No damage to wetland areas and river banks.
- No access roads through river and stream banks.
- No visible erosion scars on embankments once construction is completed.

6.2 WATER RESOURCES

6.2.1 Care must be taken to ensure that the pollution of water does not occur, as has been stated under previous points in this document.

6.2.2 Water must be used sparingly.

6.2.3 Naturally occurring water sources may not be used for any personal hygiene -, washing – or recreational activities.

6.2.4 Water may only be taken from private, communal, or government-owned property on a basis agreed upon between the Contractor and such owner.

6.2.5 Should the contractor be required to use water from a natural source, the contractor shall supply a method statement to that effect.

6.3 Fauna

6.3.1 Implement staggered power line mitigation along the existing 220kV power line. the routing will follow the existing 220 kV line from Auas to Kokerboom for the majority of its length; On order to ensure the staggering, the following has also been agreed:

i The new 400kV line will employ small pylon support towers to match the height, as far as possible, to that used on the existing 220 kV line

ii Throughout the route, the proposed 400kV line must run adjacent to and employ **staggered pylons,** such that the pylons of the proposed 400 kV line align with the midspan of the 220 kV line;

iii The routing follows that proposed from Auas south to the Kalkrand area to avoid the vulture-breeding areas north of Kalkrand.

iv Near Kalkrand (BP010) 14 km of the line requires bird diverters as it traverses a high-risk vulture area.

v The two lines (proposed 400kV and existing 220 kV) cannot deviate from each other for more than 2 km in any 100 km length as this will negate the staggered pylon mitigation.

6.3.2 Mark the high risk areas identified in the avian assessment, particularly at the following area:

Vultures A short section of the line intersects a previously identified high-risk vulture site (south of point BP014: Figure 2). White-backed Vultures *Gyps africanus* use this area and it has been agreed with NamPower that bird diverters must be added to this 14 km section on the earth wire of the proposed 400 kV line to reduce further any possible impacts by these large and relatively unmaneuverable species. It was also agreed that the 14 km section would have 7km of diverters (ideally spirals on the earth wires of the proposed 400 kV) and 7km without. We suggest 2km section with diverters, alternating with 2km sections with no diverters to test their efficacy in reducing vultures collisions These would then be searched for collision victims as set out in the monitoring section.

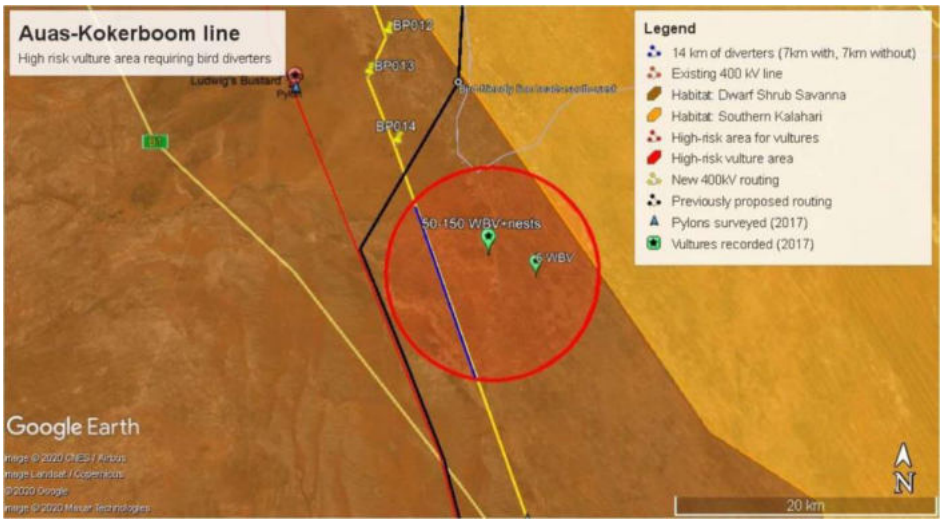


Figure 2: A 14-km section (= blue line) of the new routing that passes close to known vulture areas. This section south of the NamPower coordinate of BP014 requires extra mitigation in the form of bird diverters. The ideal configuration would be 2km of spirals, followed by 2km without spirals repeated down the line. This whole section will need to be included in the surveys described in the EMP below.

6.3.3 A specialist needs to mark the areas along the route that are a significant risk in terms of potential bird collision. ***The areas above are only vulture breeding areas but there are also other areas, e.g. near the Hardap Dam that should be considered for marking.*** The specialist needs to recommend the particular line markers (e.g. flappers) to be introduced to the line.

6.3.4 The specialist should also consider the need for perch dissuaders along the *route*.

6.3.5 Work on construction to be undertaken outside the winter breeding months where large vulture or raptors are found breeding

< 100 m from the line

6.3.6 Avoiding large tree nests or cliffs where raptors or vultures are breeding

6.3.7 Reducing the possibility of hunting, trapping or wilfully disturbing threatened red data birds, especially those breeding close to the line corridor.

6.3.8 The landowners must be sensitised to the fact that the feeding of vultures close to a power line may create a high-risk collision potential for threatened vultures, and the vulture restaurant moved away from the line.

6.3.9 Construction activities must be carefully planned so as not to interfere with the breeding seasons of sensitive species.

6.3.10 Breeding sites of raptors and other wild birds must not be disturbed. Nests may not be removed or damaged.

6.3.11 Young chicks and eggs may not be removed from the nests.

6.3.12 No birds may be shot or caught.

6.3.13 All bird-power line interactions must be reported to the project manager, who will notify the SHE section.

6.3.14 Construction activities must be planned carefully so as not to interfere with the breeding, calving and lambing season for most animal species.

6.3.15 Termite mounds should only be disturbed if they pose a significant technical constraint. Only termite mounds inside the construction corridor should be demolished.

6.3.16 Care should be taken when demolishing the termite mounds, since many other animals, other than termites, live inside these mounds. Some of which can threaten the safety of people.

6.3.17 Underground burrows must not be flushed, closed up, or destroyed, on purpose, even if within the servitude area.

6.3.18 Snaring, poaching, killing, taunting, collecting, smuggling, or abuse of animal wild or domestic animal is prohibited.

6.3.19 No domestic animals (such as cows, chickens, dogs, cats, goats or sheep) may be kept either at the campsite on the construction site since they can introduce diseases or interbreed with the animals occurring naturally in the area.

6.3.20 No domestic or wild animals belonging to the landowner, may be caught and killed, unless written consent was given by the owner of the animal.

The following management objectives have been identified in terms of fauna:

- Minimise disruption to farming activities.
- Minimise disturbance of animals.
- Minimise disruption of breeding patterns.
- Minimise destruction of habitat.

Measurable targets:

- No stock losses where construction is under way.
- No complaints from landowners or nature conservation.
- No litigation concerning stock losses and animal deaths.
- Bird flappers installed and staggering configuration arranged as agreed.

6.4 FLORA

Figure 3 below shoes the three vegetation zones the route has been divided into. The vegetation specialist in her Specialist Report (Mannheimer, 2016) describes the important biodiversity areas along the route as follows:

"Areas along the route east of Tsumis, as well as the southern parts of section C and the portion south and north of bend point 4 carry dense populations of *Acacia erioloba* (Camel thorn). However, there are scattered densities of this species over much of the route in sections B and C. This species, and other protected species, such as *Albizia anthelmintica*, often favour dune areas. It is thus virtually impossible to define a "critical" area regarding these species without including most of sections B and C.

Slopes of koppies and mountains in the Highland Savanna (Section C) carry numerous species of concern and should be avoided as far as possible. At present this habitat is almost untouched by the proposed route.

Pan verges and banks of rivers and drainage lines are known to harbour higher than average numbers and sizes of protected woody species, as well as sedges such as *Cyperus rehmii.* Although it is very likely that this species is severely undercollected (most sedges are in Namibia), and may be more widespread and common than is presently known, the precautionary principle should be followed by avoiding this habitat for pylon sites. This will

also favour the protected trees.

Dense stands of *Aloe dichotoma,* although rare, may be encountered in the southernmost extent of the route. They are very easy to identify and, if encountered, should be avoided for pylon placement. Service tracks should easily be able to circumvent the majority of individuals, which are usually sufficiently widely scattered.

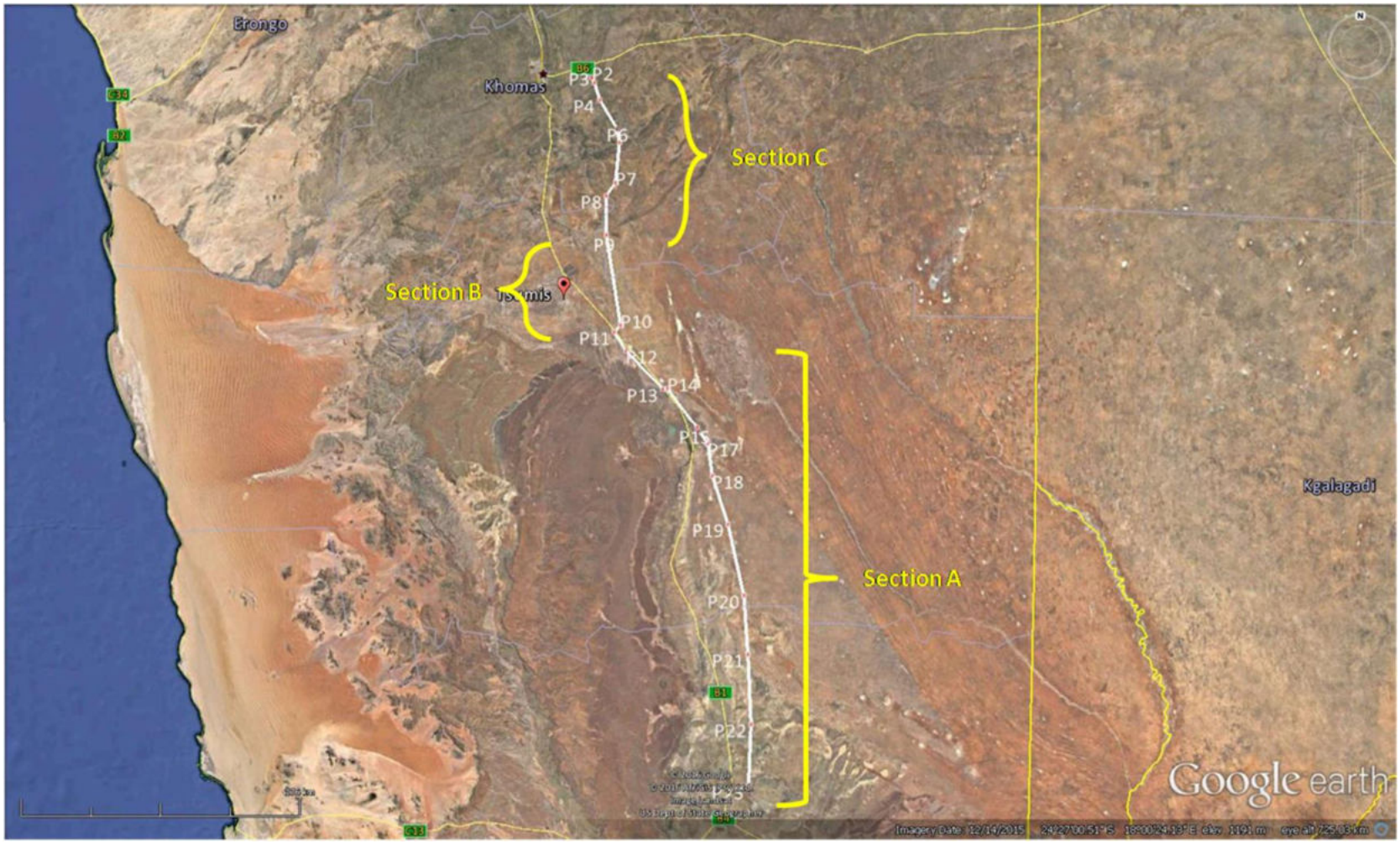


Figure 3: Vegetation sections along the route.

SPECIES	CONSERVATION STATUS	RANGE IN NAMIBIA	HABITAT IF RESTRICTED	OCCURRENCE IN VICINITY OF PROPOSED ROUTE IF OF POSSIBLE CONCERN	NOTES
Acacia erioloba	Protected	Widespread		Dense populations near Tsumis as well as scattered from just south of bend point 4 to the Hohewarte area, as well as in riparian areas alongside drainage lines and on dune areas.	
Albizia anthelmintica	Protected	Widespread			
Aloe dichotoma	Protected	Widespread, sometimes in dense stands			
Aloe littoralis	Protected	Widespread, sometimes in dense stands			
Boscia albitrunca	Protected	Widespread			
Cyperus rehmii	Endemic	Known distribution highly restricted but almost certainly undercollected	Pans, seasonally wet areas	Farm Binsenheim/ Rietfontein	Unlikely to be affected, but can mitigate
Euclea pseudebenus	Protected	Widespread			
Maerua schinzii	Protected	Widespread			
Ziziphus mucronata	Protected	Widespread			

The following management objectives have been identified in terms of flora:

6.4.1 Align route as far as is practically possible to avoid the trees listed in Table 2 above.

- Undertake careful and detailed route planning to avoid big trees, particularly trees mentioned in Table 2 above. Clearly mark trees that should be avoided and photograph them.
- Avoid koppies, river beds and other habitats where dense stands of

trees occur.

6.4.2 All trees that cannot be avoided are to be felled in collaboration with the Directorate of Forestry (DoF):

6.4.3 Minimal disturbance to vegetation, where such vegetation does not interfere with construction and operation of the line. Large trees outside the servitude may not be cut down.

6.4.4 Prevention of litigation concerning removal of vegetation.

- Permits should be acquired for protected trees species listed in Table 2 above.
- Large trees are to be felled using chain saws or other appropriate mechanical devices;
- Bulldozing is to be limited to the absolute minimum – only along the 12 m width strip of land underneath the transmission line route.

6.4.5 Prevent unnecessary collateral damage by controlling activities of construction vehicles.

6.4.6 Avoid any additional vehicular damage outside the servitude.

6.4.7 Training should be given by a specialist consultant concerning the application of herbicides before any vegetation is cleared. This training is to include safety aspects, as well as environmentally friendly herbicide application. See Appendix A.

6.4.8 Contractors must supply their workers with sufficient amounts of fire wood; no live natural vegetation may be used for fire wood.

6.4.9 Any plant material removed during bush clearing may not be used by the contractor as fire wood, unless this material was bought from the landowner.

6.4.10 All alien invasive plants and declared weeds that occur in the servitude should be identified and eradicated.

Measurable targets:

- No litigation due to removal of vegetation.
- No unplanned or unnecessary removal of trees, especially conservation worthy trees as well as vegetation.
- No public complaints with respect to vegetation removal.

Monitoring before construction:

- Individual trees of high concern (**Error! Reference source not found.** above) close to the route that can be spared should be mapped, clearly marked and pointed out to construction crews (i.e. Fixed point photography, done along sections where compliance is important.
- These points should regularly be reassessed by the environmental section of NamPower for compliance during the construction phase of the project.
- Penalties for damage to those trees should be predetermined, high and contractually stipulated.

6.5 VELD FIRE PREVENTION

6.5.1 Fires are to be limited to the campsite only, as this will reduce the fire hazard. Any cases of veld fires caused during the construction period must be reported immediately. Damage caused by these fires will be remedied by the contractor.

6.5.2 If the need to make a fire on route (along the line, at any place except the campsite) arises, such a fire must be made inside a container or on the ground, inside a shallow hole, surrounded by rocks.

6.5.3 All fires must be extinguished when there is not someone supervising it and all ash must be cleaned up.

6.5.4 Fire fighting equipment must be kept in close proximity to the where work is taking place, at all times during construction.

The following management objectives have been identified in terms of veld fire prevention:

- Minimise risk of veld fires.
- Minimise damage to grazing.

Measurable targets:

- No veld fires started by the contractor's workforce.
- No claims from landowners for damage due to veld fires.

6.6 AESTHETIC QUALITY

6.6.1 Utmost care should be taken to limit the visual impact of the project on the environment.

6.6.2 High lying areas should be avoided for the erection of structures.

6.6.3 Construction activities, camp sites, service roads and waste sites, should not be located within 1 kilometre (minimum for hilly areas) of tourist lodgings or frequented tourist areas.

The following management objectives have been identified in terms of aesthetic quality:

- Minimise the visual impact of construction activities on the locality.

Management target:

- Reduced complaints from landowners and visitors to the area about visual disturbances caused by power-lines.

6.7 SOIL CONSERVATION

6.7.1 There are a number of areas along the route which represent the 1:100 flood line and these areas should be avoided during pylon placement (see Muir, 2016). The following steps in this regard need to be adhered to:

Identify all areas that are prone to flooding, i.e. within the 1:100 flood line as described in Muir (2016).
Pylons must be placed outside the 1:100 flood line, as described in the Drainage Specialist study (Muir, 2016).
Where this is not possible the pylon bases must be designed to withstand erosion from flooding and be provided with flood protection. Without mitigation damage to pylons can be significant leading to high cost of repairs and power outages.
Access tracks for construction to be with as little disturbance to the stream bed as possible. The track surface should follow the stream bed level as closely as possible.
Construction activities within the streams should be stopped for the duration of flow.
Construction equipment and materials must be stored outside the 1 in 100 year floodline.

6.7.2 Utmost care should be taken to prevent erosion. Guidelines for service roads should be followed carefully.

6.7.3 In mountainous / rough terrain, the contractor shall be responsible for any reasonable prevention of soil erosion should either the landowner or NamPower require it.

6.7.4 Erosion and drainage problems must be minimised by avoiding tracks crossing contours at right angles.

6.7.5 Measures must be put in place to avoid erosion at river and stream channel crossings, and at places where existing erosion scars and dongas are encountered to avoid any further erosion at these points.

6.7.6 Deep ruts and inaccessible sections must be repaired to avoid vehicles having to drive around bad sections (i.e. mud, deep ruts, and loose sand) thereby creating new tracks.

6.7.7 Vehicle tracks, particularly in areas of low rainfall, must be restricted to the width of the servitude or recognised access routes. All unnecessary tracks should be rehabilitated at the contractor's expense.

6.7.8 After construction in sandy areas, the entire width of the servitude should be levelled. Dicing is a suitable means of achieving this. Levelling of the servitude width is required to ensure compaction by construction vehicle tracks is minimised as well as to reduce preferential flow paths during rainfall runoff.

6.7.9 Guidelines given previously in this document shall be closely followed to ensure that soil pollution does not occur.

6.7.10 Crossings of dongas and eroded areas shall be thoroughly planned. Water diversion berms shall be installed at donga crossings to ensure runoff water on the servitude does not run into dongas and cause an erosion hazard.

6.7.11 Disturbances of topsoil on tower sites with severe slopes shall be minimised at all costs. At any tower site, where conventional foundations are installed, the contractor shall remove the topsoil (the top 10 cm of soil) separately and store it for later used during rehabilitation of such tower sites.

6.7.12 The option of re-seeding should be investigated in disturbed areas

6.7.13 Slopes in excess of 2% must be contoured and slopes in excess of 12% must be terraced. Other methods of rehabilitation of tower sites may also be used. Contour banks shall be spaced according to the slope on tower sites.

The following management objectives have been identified in terms of soil management:

- Prevention of erosion.
- Scaring of the soil surface and land features must be minimised.
- The disturbance and loss of topsoil must be minimised.
- All disturbed areas along the servitude must be rehabilitated.
- Minimise erosion damage on donga crossings.
- Minimise impeding of natural water flow.
- Minimise initiation of erosion through donga embankments.
- Minimise damage to topsoil and the environment at tower positions.
- Successful rehabilitation of all damaged areas.

The following measurable targets are in place:

- Minimum loss of topsoil at any one site.
- No visible erosion scars three months after the completion of the project.
- No barren areas visible three months after the construction has taken place.
- All damaged areas successfully rehabilitated.
- No disturbance to donga embankments.
- No erosion visible on donga embankments due to construction activities.
- No interference with the natural flow of water.
- All disturbed areas successfully rehabilitated within three months of completion of the contract.
- All sandy areas levelled after construction.

7 MONITORING, AUDITING AND PROJECT HANDOVER (CONSTRUCTION)

The standard site documentation shall be used to keep records on site. All documents shall be kept on site and be available for monitoring and auditing purposes. The documentation shall be signed by all parties to ensure that the documents are legal.

Monthly reports shall be forwarded to the NamPower project manager, with all the information relating to the SHE matters. The following key performance indicators must be reported on a monthly basis:

- Complaints received from landowners and the actions taken to address these complaints.
- Environmental and safety incidents, such as oil spills, concrete spills accidents and incidents and the actions taken.
- Incidents possibly leading to litigation.
- Environmental damage that needs rehabilitation measures to be taken.

The following documentation shall be kept on site:

- Access negotiations and physical access plan.
- Training materials/topics covered during induction.
- Signed attendance register during induction.
- Complaints register.
- Site daily diary.
- Records of all remediation and rehabilitation activities.
- Copies of the monthly reports.
- Copy of the EMP.

7.1 MONITORING AND AUDITS

7.1.1 A monitoring programme shall be put in place in order to ensure compliance to the EMP, but also to monitor environmental issues and impacts that have not been accounted for in the EMP, that are, or could, results in significant environmental impacts for which

corrective actions are required.

7.1.2 The requirements for an audit shall be stipulated in the contract or work instruction. An audit shall be undertaken within the specified period, but must be undertaken before the contract is signed off. The audit shall be used to identify any non-conformances, for which corrective action is necessary. Corrective action shall take place before the contract is signed off.

7.1.3 The duration of the project should be taken into consideration when budgeting and planning for monitoring activities. Monitoring should be carried out every month.

7.1.4 Critical periods during which significant environmental impact could occur are to be identified, and the presence of the NamPower representative (who will co-ordinate with the ECO) during those periods to avoid unwanted impacts is essential.

7.1.5 An audit shall be undertaken during bush (i.e. at the start of the work) clearing as well as within a specified period after completion of the work but before the contract is signed off. The audit shall be used to identify non-conformance for which the Contractor shall take corrective action. The auditor may either be internal or external to NamPower.

7.1.6 The contractor shall arrange an inspection with the project manager, who will inform the ECO, for the final inspection of the works. A first inspection will be done on which NamPower will draw up a snag list. Should the same items on the snag list still not be according to NamPower's satisfaction on the second inspection, all direct costs incurred for re-inspection will be on the contractor's account.

7.2 CLOSURE AND REHABILITATION

7.2.1 All rehabilitation exercises shall be carried out at the expense of the contractor, unless he can prove (beyond a doubt) that his actions were not responsible for the damage.

7.2.2 All oils spills still visible after construction activities have ceased shall be cleaned up.

7.2.3 All maintenance equipment, surplus materials and temporary structures, fences and works of any kind must be removed form the site.

7.2.4 Break up all bunds and all other concrete slabs and remove these, together with all waste concrete, to a recognised waste site.

7.2.5 Remove all uncontaminated construction rubble (i.e. waste

concrete).

7.2.6 Remove all remaining waste to an established waste disposal site.

7.2.7 Damaged areas must be rehabilitated. Badly damaged areas shall be fenced to enhance rehabilitation.

8 ENVIRONMENTAL MANAGEMENT DURING OPERATION AND MAINTENANCE

8.1 Rehabilitation

In case the power line is decommissioned, the follow rehabilitation guidelines will apply.

Rehabilitation	• Rehabilitation should be carried out so as to facilitate the re-establishment of the affected area's pre-disturbance form and structure. • The concrete foundations should be dug up to a minimum depth of 500 mm below the surface of the ground. • The remaining concrete should be completely covered with soil and care should be taken to ensure that no areas that could lead to potential erosion remain (e.g. slopes or slightly exposed concrete. • As for the concrete that is removed from the foundations: Pieces of concrete may be used as back-fill when constructing the new pylons (if this is the case), i.e. the broken concrete may be used to fill up the holes for the new foundations. If no new line is being assembled and erected then all concrete should be transported to the nearest local authority's waste disposal facility. • Excavations may only be backfilled with soil or subsoil; • Rehabilitated areas need to match the contours of the existing landscape; • Take note of drainage channels in the vicinity of decommissioned areas. These areas should not be higher (or lower) than these drainage channels. This ensures the efficiency of revegetation and reduces the chances erosion; • Available topsoil should as far as possible be spread evenly across areas to be rehabilitated; • Deep ripping of areas to be rehabilitated is required, not just

	simple scarification, so as to enable rip lines to hold water after heavy rainfall; and • Ripping should be done along slopes, not up and down a slope, which could lead to enhanced erosion. • The option of re-seeding should be investigated in disturbed areas

8.2 Maintenance works during operation

In case construction and maintenance teams access the site, the EMP in Sections 1-7 will be applicable as relevant.

8.3 Bird monitoring

The monitoring of bird mortalities on the line is crucial. The line runs parallel to an existing 220kV line, therefore monitoring with that transmission line and others in the region should be coordinated and efforts combined. The following measures apply.

MITIGATION/MONITORING ACTION	RESPONSIBILITY	SCHEDULE
A Bird specialist should be appointed to devise a specific bird monitoring strategy for this project.	Nampower	ASAP.
The baseline monitoring of priority species abundance, started in various sections of line in September 2017 should continue along the same lengths of line to gather abundance data for the remainder of the seasons.	NamPower	
Any bird mortalities should be reported to the relevant NamPower staff member and to the coordinators of the Environmental Information Service (www.the-eis.com) so that the information is captured and available for future reference. The condition of the devices should be recorded over time so that any deterioration is noted. This information will be useful in refining the future design of the relevant devices, for maximum longevity. Also, it will alert NamPower staff of the need to replace devices that lose their functionality.	NamPower	During standard maintenance operations

MITIGATION/MONITORING ACTION	RESPONSIBILITY	SCHEDULE
Records should be kept by the relevant staff on how many nests are removed from which towers, and of what kind of birds (if they can be identified). This data should be forwarded to the relevant Environmental Officer in NamPower, as well as to the coordinators of the Environmental Information Service so the information becomes accessible to the public. This information should be collected so that it is possible in future to recommend specific actions that will deter or prevent birds from nesting on the towers. Hard data will then be available to show if there are 'hot spots' of this problem and where to concentrate any mitigation effort.	NamPower	During standard maintenance operations
Specific monitoring requirements: • known-distance surveys to be undertaken 3-months and 9-months before construction of the two lines. The first should be undertaken in the dry season (to clear the line of any carcasses) with a follow-up survey just after the rain season (Feb - March); • This should include (i) the existing 220 kV line in all four habitat types and (ii) the existing 400 KV line south to Kokerboom and include samples from all three habitats; • surveys to be undertaken again 3-months and 9-months *after construction* of the line, one survey must include the wet season; this must be repeated in a second year post-construction; • a minimum of 20% of the new line (20% of 461 km is 92 km) within all 4 habitats identified must be surveyed for bird carcasses along the same sections as surveyed along the adjacent 220 line in the previous surveys; this must be compared with 20% of the sampled 400 kV line west of the B1 in similar habitats; • he number of carcasses found per km (with each carcass photographed next to a GPS	NamPower	Prior to construction

MITIGATION/MONITORING ACTION	RESPONSIBILITY	SCHEDULE
with the point logged) should be compared with fatalities found along similar lengths of the other 400 kV line in similar habitats,; • Specific surveys must be undertaken of the 14 km of proposed line that occurs within the high risk vulture area near Kalkrand (Figure 2). This must be included in pre-construction surveys and post-construction surveys to assess the efficacy of the bird spirals along the earth wires. • ideally, the same sample areas as those detailed in the BBU (2017) report should be used for direct comparisons. • These data should be compared and analysed after the 3- and 9-month assessment periods, to determine the rate of fatalities occurring per km, the species involved, and if the mitigation measures (either staggered pylons or the use of bird diverters) are effective. These surveys should be undertaken with the support of NamPower officials to share and discuss all results and any challenges arising from the surveys. NamPower officials will also be required to access all the lines. • Should high risk areas be identified (numbers of bustards killed by the line exceeding 1 per km of line, or for vultures numbers killed exceed 1 per 7km of line) then additional mitigation measures must be enacted within 3 months of the survey results.		

8.4 Vegetation management

The vegetation management plan in Appendix B2 shall apply to this project.

9 APPENDICES

9.1 SPECIAL CONDITIONS FOR PROJECT

The following information must be stated in the special conditions of each project (blank spaces to be filled in upon issuing of tender/contract):

Servitude width

The building restriction is_____m. Construction is limited to the _____ m servitude in which the line will be constructed. A 6m strip shall be cleared, flush with the ground, to facilitate access and construction except where tower erection and stringing requires more space. Any extra space outside the servitude shall be negotiated with the relevant landowner and approved by NamPower. All areas marked as no go areas inside the servitude shall be treated with the utmost care and responsibility.

The special conditions should also, if possible, include an accurate summary of the climate of the area for the entire period of work.

This summary should include:

- Average rainfall per month for the entire planned duration of the project.
- Type of rain normally experienced (light drizzle, heavy thunderstorms).
- Prevailing wind direction.
- Average wind speed.
- Average day and night temperature.

Apart from an accurate climate summary, any other special conditions must be included in this appendix, which will make the EMP more project specific.

9.2 PHOTO PLATE OF IMPORTANT SPECIES

The photo plate must include photos, along with scientific and common names of all important plant, bird, and animal species.

This list must include all:

- Rare and endangered species that occur in the area.

- Species protected by national legislation.
- Large bird species that can pose a problem in terms of power line collisions.
- Species that are responsible for bush encroachment.
- Alien invasive species.
- All plant species that are poisonous to humans.
- All animal species that are dangerous to humans.