



**ENVIRONMENTAL MANAGEMENT PLAN FOR THE OPERATION AND
MANAGEMENT OF THE 132KV OTJIKOTO – ASIS WEST
TRANSMISSION LINE IN OSHIKOTO – OTJOZONDJUPA REGIONS.**



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1 LIST OF TERMS, ACRONYMS AND ABBREVIATIONS

EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act no 7 of 2007
EMP	Environmental Management Plan
ISO	International Organization for Standardization
MET	Ministry of Environment and Tourism
OEMP	Operational Environmental Management plan
SHEW	Safety, Health, Environment and Wellness

2 INTRODUCTION

2.1 Background

The 132kV Otjikoto – Asis West powerline is part of NamPower’s transmission and distribution network across all regions countrywide. The continuous operation of powerlines allow NamPower to provide uninterrupted supply of electricity to regions in order to improve the living conditions of Namibian citizens and to enable economic development.

The 132kV Otjikoto – Asis West powerline was constructed in 2002. The powerline is 72.7km in length and falls within the vegetation type known as the Mountain Savannah and Karstveld. This powerline runs between Otjikoto Substation to the Asis West Substation (see figure 1).



Figure 1: Map showing the 132 kV Otjikoto – Asis West transmission line

The 132kV Otjikoto – Asis West transmission line passes through farm land from the Otjikoto Substation eastwards to the Kombat area with anthropogenic disturbances (e.g. tracks, roads, rail line, fences, etc.) with the dominant tree/shrubs being *Dichrostachys cinerea* (sickle bush) and *Terminalia prunioides* (purple-pod Terminalia).

The route passes through 9 “hotspot” areas with 8 and 1 areas each classified as “high” and “medium” sensitivity, respectively. The area of “medium” sensitivity is viewed as fields not planted while the areas of “high” sensitivity are viewed as all the karst mountainous terrain and ground dam.

Nine protected tree species – *Acacia erioloba*, *Combretum imberbe*, *Ficus cordata*, *Erythrina decora*, *Maerua schinzii*, *Pachypodium lealii*, *Sclerocarya birrea*, *Spirostachys africana* *Ziziphus mucronata* – are located below the line. The main ephemeral rivers draining the

general area flow westwards e.g. Omaramba Owambo – or towards the northeast – e.g. Omuramba Omatako (Cunningham, 2019).

The operation of this transmission line can have both positive and negative impact on the environment. However, the negative impacts are limited to the access route following the 132kV Otjikoto – Asis West transmission line within the NamPower servitude and is contained and limited. It is thus important that good management measures are implemented to ensure that environmental damage is minimised. This Environmental Management Plan (EMP) seeks to manage and keep to a minimum the negative impacts associated with these transmission lines and at the same time, enhance the positive and beneficial impacts.

The scope of this EMP include all activities associated with the operation of this transmission line. It is necessary to highlight that the EMP is a living document that should be periodically reviewed and updated. It must also be noted that the EMP should be read in conjunction with laws and regulations outlined in Table 1.

3.2 Objectives of this Environmental Management Plan (EMP)

The purpose of this EMP is to provide specific environmental guidance for the operation phase for the 132kV Otjikoto – Asis West powerline and is intended to manage and mitigate operational activities so that preventable environmental impacts do not occur. The Operational Environmental Management Plan (OEMP) is further aimed at ensuring continuous improvement of environmental performance and reducing negative impacts.

This EMP has the following objectives:

- To outline mitigation measures to be implemented during the operation phase of the transmission line, in order to minimise the extent of environmental impacts and manage environmental impacts associated with the project.
- To ensure that the operation activities associated with the transmission line do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- To ensure that all relevant legislation is complied with during the operation of the transmission line.
- To identify key personnel who will be responsible for the implementation of the measures and outline functions and responsibilities
- To propose mechanisms for monitoring compliance, and preventing long term or permanent environmental degradation.

4 POLICY AND LEGISLATIVE FRAMEWORK

Table 1 below outlines the legislative requirements which are applicable to the operation for the 132kV Otjikoto - Asis West powerline. All the operational activities of the transmission line should be in line with legislations outlined below.

Table 1: Legislation applicable to the operation for the 132kV Otjikoto - Asis West powerline.

Legislation:	Section (s) applicable:	Implications:
Environmental Management Act no 7 of 2007	<ul style="list-style-type: none"> • Section 3 • Section 27 • Section 33 onwards 	<ul style="list-style-type: none"> • All activities performed should be in line with the following principles: <ul style="list-style-type: none"> ○ Interested and affected parties should have an opportunity to participate in decision making ○ Listed activities should be subject to an EIA ○ Polluter should pay for rehabilitation ○ Pollution should be minimized • Environmental assessments should be carried out for listed activities. The proposed activity can be classified under the following range of activities: <ul style="list-style-type: none"> ○ Generation of electricity ○ Transmission of electricity • These sections details the process to be followed in order to obtain a clearance certificate. • All existing listed activities must obtain a clearance certificate within one year of the law coming into effect (February 2013). Therefore, all existing activities which can be considered a listed activity should apply for clearance.
EMA Regulations GN 28-30 (GG 4878) (February 2012)	<ul style="list-style-type: none"> • Listed activity: 5.1 • 6 – 9; 13; 15; 21 -24 	<ul style="list-style-type: none"> • This activity can be considered as electricity generation and transmission. • These sections details the process to be followed in terms of producing an Environmental Assessment and this process should be adhered to during the generation of information for this document.
Labour Act no 11 of 2007	<ul style="list-style-type: none"> • Section 3 • Section 4 • Section 9 • Section 39 - 42 	<ul style="list-style-type: none"> • Children under the age of 16 may not be employed • Forced labour may not be used. • Basic conditions of employment as stipulated by the law must be met. • The employer shall ensure the health and safety of all employees and non-employees on site. Employees must fulfil their duties in order to ensure their own health and safety and that of other employees and persons. Employees may leave the work site if reasonable measures to protect their health are not taken.

	<ul style="list-style-type: none"> • Section 39 - 42 	<ul style="list-style-type: none"> • The employer shall ensure the health and safety of all employees and non-employees on site. Employees must fulfil their duties in order to ensure their own health and safety and that of other employees and persons. Employees may leave the work site if reasonable measures to protect their health are not taken.
Electricity Act no 4 of 2007	<ul style="list-style-type: none"> • Section 33 	<ul style="list-style-type: none"> • Installations used for the provision of electricity should be operated with due compliance with the requirements of laws relating to health, safety and environmental standards. Therefore – any company involved within the Electricity Supply Industry must adhere to the laws covering the previously stated aspects or stand to lose their licenses to operate.
Water Act no 54 of 1956	<ul style="list-style-type: none"> • Section 21 and 66 • Section 23 	<ul style="list-style-type: none"> • Conditions in terms of the disposal and management of effluent are to be adhered to. • Any person causing pollution to a water source shall be guilty of an offence.
Public and Environmental Health Act no 1 of 2015	<ul style="list-style-type: none"> • Section 52 • Section 53 	<ul style="list-style-type: none"> • A person generating waste must ensure that the waste generated is kept and stored under conditions that causes no harm to human health or damage to the environment. • Waste must only be disposed of at a waste disposal site, including an incinerator approved by the local authority concerned.
Water Resources Management Act no 24 of 2013	<ul style="list-style-type: none"> • Section 89 	<ul style="list-style-type: none"> • The owner or occupier or other person in control of land wherean incident that causes or is likely to cause a water resource to be polluted must take all reasonable measures to contain and minimize the effects of the incident; and to clean up polluted areas and remedy the effects of the incident.
Hazardous Substances Ordinance 14 of 1974	<ul style="list-style-type: none"> • Section 27 	<ul style="list-style-type: none"> • To provide for the control of substances which may cause injury or ill-health to or death of human beings, by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances; • to provide for the division of such substances into groups in relation to the degree of danger; • to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances; and • to provide for matters connected therewith.
Forest Act no 12 of 2001	<ul style="list-style-type: none"> • Section 66 • Section 41 	<ul style="list-style-type: none"> • Vegetation may not be removed within 100 m of a river, stream or water course

		<ul style="list-style-type: none"> • A person shall be liable for damage caused by any fire which arises as a result of activities carried out on site without having taken reasonable measures to prevent a fire.
Fertilizers, farm feeds, agricultural remedies and stock remedies Act no 36 of 1947	<ul style="list-style-type: none"> • Definitions • Section 7 • Section 10 	<ul style="list-style-type: none"> • Arborocide application is defined as an agricultural remedy under this Act • Only registered herbicides may be used. • May only buy herbicides in a container that complies with the prescribed requirements and is sealed and labelled. • Only allowed to use herbicides in the prescribed manner. • Land owners must be notified about applications, and the following information must be supplied: <ul style="list-style-type: none"> ○ Purpose of administration ○ Registered name and number of the product • Precautions to be taken before, during and after each administration.
Nature Conservation Ordinance no 4 of 1975	<ul style="list-style-type: none"> • Section 74 	<ul style="list-style-type: none"> • Protected plants may not be removed or damaged without a permit.
Soil Conservation Act no 76 of 1969	<ul style="list-style-type: none"> • Section 4 • Section 13 • Section 21 	<ul style="list-style-type: none"> • Institutions may be ordered by the relevant Minister to construct soil conservation works when and where necessary. • Fire protection schemes may be implemented to regulate the prohibition of veld burning as well as the prevention, control and extinguishing of veld and forest fires. • It is illegal to damage, destroy / fail to maintain any soil conservation works; fire belts; works constructed in terms of a fire protection scheme.
National Heritage Act No 27 of 2004	<ul style="list-style-type: none"> • Section: 46, 48, 55 	<ul style="list-style-type: none"> • All heritage resources are to be identified and either protected or removed/mitigated with a permit from the National Monuments Council, before any development may take place • A chance find procedure should be followed in case of discovery of a heritage resource.

5 ROLES AND RESPONSIBILITIES

It is the responsibility of NamPower to ensure that all the environmental management actions are carried out effectively and timeously. It is important to note that the successful implementation of the EMP is, however dependent on clearly defined roles and responsibilities by several stakeholders. Below are the key employees that are responsible for the management of environmental and social issues during the operation of the power line:

The Area Superintendent shall ensure that:

- This EMP is enforced
- Environmental requirements are adequately covered in any external service providers' contracts.
- SHE requirements are included in the tender documents sent to the contractors. A copy of this EMP should also form part of the tender documents.
- Corrective actions are implemented for non-compliances
- Appropriate records and information regarding compliance with environmental requirements are maintained.
- The power line remains in compliance with the requirements of this EMP, through regular communication and monitoring.

The NamPower SHEW Section shall:

- Ensure that all requirements with regards to this EMP are fulfilled.
- Assist the Area Superintendent in ensuring the station remains in compliance with this EMP.
- Provide SHEW inductions for the external service providers and awareness training for the employees
- Organize and implement monitoring and audit functions, in consultation with the District Superintendent
- Audit the implementation of this EMP.
- Advise the district employees on actions or issues impacting the environment and provide appropriate recommendations to address these issues.

In case an external provider has been sourced to conduct work on the power line, the project manager and contractor has the following responsibilities:

Project Manager shall:

- Enforce this EMP
- Ensure that SHE requirements are included in the tender documents sent to the contractor.
- Ensure that a SHEW clause is included in the contract document and communicated to the contractor before the inception of the project.
- Ensure that the contractor remains in compliance with the requirements of this EMP, through regular communication and monitoring.

The Contractor shall:

- Shall adhere to all tender and contractual requirements
- Implement this EMP
- Ensure all tasks undertaken under the scope of work, are in accordance both with NamPowers' SHEW policies and procedures as well as to the requirements of this EMP.

- Put in writing a system of communication, in which all incidents and accidents are reported to the SHEW section
- Ensure that all employees receive a SHEW induction before the start of the project.
- Ensure that the work conducted does not contribute to environmental degradation, affect human health and safety as well as create a nuisance to any being working, residing or living on adjacent properties or within the immediate surroundings of the site.

6 OPERATIONAL PHASE ACTIVITIES, MANAGEMENT AND MITIGATION MEASURES

6.2 Description of activities related to the operation of the transmission line

The following activities are associated with the operation of these powerlines and their associated potential impacts:

Table 2: Description of the activities related to the operation of this transmission line.

Activity	Description	Associated potential impacts
General functioning of the transmission line (live power lines)	Physical presence and functional characteristics of the line	<ul style="list-style-type: none"> ▪ Bird mortalities through collisions with powerlines. ▪ Visual impact. ▪ Community impacts in a form fatalities or injuries caused by electrocution. ▪ Provision of electricity to the communities
Periodic inspections, monitoring, maintenance of the line	Replacement, cleaning and maintenance of line components	<ul style="list-style-type: none"> ▪ Soil and ground water contamination as a result of oil spills ▪ Soil contamination as a result of improper waste handling and disposal. ▪ Loss of biodiversity if existing access roads are not put to use. ▪ Veld fires.
Installation of Optic Fibre networks	Design, Supply, Delivery, Installation, and Commissioning of Optic Fibre networks	<ul style="list-style-type: none"> ▪ Loss of biodiversity if existing access roads are not put to use or there will be a need to do bush clearing. ▪ Soil contamination as a result of improper waste handling and disposal.
Vegetation management within the servitude	Selective herbicide application, mechanical and manual bush clearing	<ul style="list-style-type: none"> ▪ Loss of biodiversity due to clearing operation. ▪ Soil and groundwater contamination.

		<ul style="list-style-type: none"> ▪ Water pollution ▪ Loss of sensitive habitat. ▪ Loss of archaeological resources. ▪ Possible employment opportunities if bush clearing is outsourced.
Safety, Health and Environmental monitoring	Periodic environmental monitoring and audits to assess compliance to management procedures, and EMP requirements.	<ul style="list-style-type: none"> ▪ Littering

6.3 MANAGEMENT AND MITIGATION MEASURES

In order to ensure that the potential impacts are eliminated and/or minimised, it is necessary to ensure that the various activities related to the operation of this powerline are adequately managed and monitored. Table 3 below outlines mitigation measures as well as objectives to be achieved. A responsible person (s) have been assigned to each mitigation measure (s).

Table 3: Proposed mitigation measures for the general operational activities

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Responsible person (s)
Environmental Awareness	<ul style="list-style-type: none"> ▪ All employees both internal and external to receive environmental awareness training and refresher environmental awareness training to be made available when required. ▪ All contractor employees to receive induction before any work is commenced on the power line. ▪ All employees are to be made aware of their individual roles and responsibilities in achieving compliance with the EMP. 	<ul style="list-style-type: none"> ▪ SHEW ▪ Area Superintendent ▪ Project Manager
Loss of biodiversity	<ul style="list-style-type: none"> ▪ Existing access routes and disturbed areas should be utilised as far as possible to access power line route. ▪ Vegetation clearing must be kept to the absolute minimum servitude required for safe operation of the power line. ▪ Maintenance vehicles should be restricted to drive only on designated access roads to limit the ecological footprint of the power line. ▪ No faunal species must be harmed by maintenance staff during any routine or/and emergency maintenance on the transmission line. ▪ Avoid use of machinery in the vicinity of watercourses; 	<ul style="list-style-type: none"> • Area Superintendent • Project Manager • All NamPower employees • Contractor
General and Hazardous waste Management	<ul style="list-style-type: none"> ▪ Minimal waste will be produced during the operation of the transmission line. However, any solid waste produced during maintenance operations must be disposed of at an approved and licensed waste disposal site. ▪ During maintenance, should any oils spills or leaks occur from maintenance vehicles, the contaminated soil must be removed, remediated or transported to hazardous waste disposal site. ▪ Ensure that no waste material is left behind on site ▪ Monitor site for observable waste 	<ul style="list-style-type: none"> ▪ Area Manager ▪ All NamPower employees ▪ Area Superintendent ▪ Contractor

Electric shock hazards	<ul style="list-style-type: none"> ▪ Anti-climbing devices should be installed on transmission towers and be maintained. ▪ Appropriate warning signs must be placed on the facilities 	<ul style="list-style-type: none"> ▪ Area Superintendent
Heritage resource	<ul style="list-style-type: none"> ▪ Any chance finds must be reported to NamPower environmental section. ▪ In the case of an chance find of a site or material of archaeological or cultural significance, the following procedure shall be adhered to: <ul style="list-style-type: none"> ✓ Person identifying archaeological or heritage material If operating machinery or equipment stop work ✓ Identify the site with flag tape ▪ In an event of discovery of human remains or other artefacts the work shall cease. A professional archaeologist is to be consulted and carry out investigation. ▪ Any new sites discovered shall be reported to the National Heritage Council and relevant experts in the field ▪ Known archaeological and cultural sites shall be demarcated and damage to the sites avoided. ▪ Any damage which may occur shall be reported immediately and the relevant experts contacted to provide remediation advice 	<ul style="list-style-type: none"> ▪ Area Superintendent ▪ Project Manager ▪ All NamPower employees ▪ Contractor
Bird collisions along sensitive areas of the line	<ul style="list-style-type: none"> ▪ Carry out inspections for bird collisions. ▪ Compile report on any collisions observed. ▪ Submit reports on collisions to SHEW section ▪ Develop and implement additional mitigation measures where required ▪ Monitor success of mitigation measures 	<ul style="list-style-type: none"> ▪ Area Superintendent ▪ District personnel
Veld fires	<ul style="list-style-type: none"> ▪ Ensure that all cars are equipped with fire extinguishers ▪ Ensure that all fire extinguishers are regularly inspected and serviced ▪ Ensure that any veld fire is immediately extinguished, reported and investigated 	<ul style="list-style-type: none"> ▪ Area Superintendent ▪ Project Manager ▪ Contractor

Table 4: Proposed mitigation measures related to vegetation management

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	RESPONSIBLE PERSON (S)
Social Impact	<ul style="list-style-type: none"> ▪ Personnel should be properly educated about the impact of HIV/AIDS and other communicable diseases ▪ Any person making themselves guilty of violence, harassment or any other activity deemed inappropriate by the landowner, must immediately be removed from site. ▪ Intoxicating liquor or drugs of any kind may not be used or supplied on site by any person or any member of public. ▪ The site Supervisor shall at any site meeting report on the status of the implementation of all provisions of the EMP. ▪ The contractor shall inform NamPower District personnel at least 21 days before starting work on site <p><u>Interaction with landowners and other interested and affected parties</u></p> <ul style="list-style-type: none"> ▪ NamPower District Personnel shall take the responsibility of communicating with landowners and neighbours at least 14 days prior to applying herbicides on site. ▪ The following information shall be communicated to landowners and other interested and affected parties: <ul style="list-style-type: none"> ✓ Time of application ✓ Duration of application 	<ul style="list-style-type: none"> ▪ Project manager ▪ Contractor

	<ul style="list-style-type: none">✓ Type of herbicide to be used✓ Reasons for application✓ Persons responsible for application▪ All conditions and requirements stated by the landowners shall be documented and adhered to by NamPower employees and contractors and should be incorporated into the specific conditions for applications of this EMP prior to work starting on site.▪ Ensure that all queries and complaints are documented and dealt with.▪ All communication received from landowners shall be responded to within 3 days of the complaint or query being received.▪ Existing infrastructure may not be tampered with or damaged during vegetation management.▪ Any complaints from landowners be noted, interpreted, evaluated and acted on <p><u>Access to Site</u></p> <ul style="list-style-type: none">▪ Established access routes shall be used to gain entry to a site.▪ Only individuals with the necessary training and induction shall be allowed to operate on site▪ Landowners and asset owners shall have sufficient warning prior to any work starting on site▪ Camp sites may only be established on sites if prior permission was received from the landowner	
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- All other parts of the property shall be considered as private property and off limits to any person involved with vegetation management other than the servitude to be cleared; established access routes and camp site.

Temporary Campsites

- Should the contractor wish to camp on site, the exact campsite location, remuneration, approximate dates of occupation and any special conditions with the relevant landowner should be arranged at least two weeks prior to site establishment.
- The location of campsites must be discussed with the landowner and the contractor may only use those areas indicated by the landowner.
- Care should be taken to protect campsites from large mammals, without causing harm or injury to animal
- Throughout the period of the contract, activities are to be restricted to the designated area.
- Adequate ablution facilities must be provided to the staff. These facilities may not be located within 100m 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 good working order.
- Toilet facilities should be available in the following ratio: one (1) toilet for every 15 females and one toilet for every 20 males
- The staff should be properly trained on the procedure that should be followed when no ablution facilities are available such as when employees are working in the within the servitude.

	<ul style="list-style-type: none"> ▪ Fire extinguishers, first aid kits and any other relevant safety equipment must be easily accessible at all times. 	
Waste Management	<ul style="list-style-type: none"> ▪ On site waste management facilities are to be provided by the contractor. ▪ Separate waste containers must be provided for hazardous and general waste ▪ Waste containers shall be provided with lid or netting to prevent waste from being removed by scavengers or wind and should not be over-filled. In areas with a high frequency of animals, the area should also be cordoned off ▪ Illegal dumping and littering shall not be tolerated ▪ The workforce must be sensitised to dispose of waste in a responsible manner and not to litter. ▪ No waste may be burned on site ▪ No waste may remain on site after completion of the project ▪ A temporary storage site shall be established on site in order to ensure that waste management can be done in a consolidated manner. ▪ Temporary storage must be managed in such a manner as to ensure that no runoff or leachate from site can occur. ▪ All waste management requirements as stipulated in the Arborocide application procedure shall be adhered to and inspections and audits shall be carried out accordingly 	<ul style="list-style-type: none"> ▪ Project Manager ▪ Contractor
Water Resources	<ul style="list-style-type: none"> ▪ Herbicides shall not exceed the recommended volume and concentration of application. 	<ul style="list-style-type: none"> ▪ Project Manager

	<ul style="list-style-type: none"> ▪ Application shall be done within the period specified in the specialist reports ▪ The type of herbicide to be used shall be specified in the specialist report. ▪ Herbicides shall not be applied within 50 metres of a water body including boreholes etc. ▪ Surface and ground water shall not be polluted under any circumstances. Storm water shall be managed to ensure that it does not become polluted. ▪ Water quality (open surface water encountered along the line after chemical application) be tested for the presence of the active ingredient. ▪ Water must be used sparingly. ▪ Naturally occurring water resources may not be used for any personal hygiene, mixing herbicides or for washing equipment used for herbicide application. ▪ Water may only be taken from a private or government property based on an agreement between the Contractor and custodian of the water source. 	<ul style="list-style-type: none"> ▪ Contractor
Fauna and Flora	<ul style="list-style-type: none"> ▪ No herbicide shall be used that can bio-accumulate in any animal product to be used either personally or that is destined for local or international markets ▪ Herbicides which pose a significant risk to any animal or organism, as indicated by the label of the project, may not be used. ▪ Poaching or capturing of any animal (wild or domestic) shall be prohibited. ▪ Bird nests may not be disturbed. ▪ Only the herbicides specified in the applicable specialist reports shall be used on site given that these herbicides are registered in Namibia 	<ul style="list-style-type: none"> ▪ Project Manager ▪ Contractor

	<ul style="list-style-type: none"> ▪ Herbicide application shall be in accordance with the labelled instructions of the herbicide in question. ▪ Regular monitoring of the site shall be done in order to identify potential non-target species affected by the application process. ▪ Daily site reports shall be kept of the application process, as specified in the NamPower herbicide application procedure 	
Hazardous Materials	<ul style="list-style-type: none"> ▪ All waste generated through any process related to the application of herbicides, including left-over herbicide mix that will not be used later and empty herbicide containers, shall be treated as hazardous waste. ▪ A register shall be kept of all hazardous substances and must be available on site ▪ Storage areas shall display the required safety signs as stipulated on the labels of the chemicals to be used ▪ Herbicides shall be stored in their original containers where possible. ▪ Storage containers for herbicides shall always be labelled according to its content and safety, health and environmental hazards. ▪ Storage of herbicides shall be done in accordance with the MSDS and / or label of the herbicide in question. ▪ Avoid cleaning spray canisters/packs on site or close to sensitive areas, especially water sources and human settlements. ▪ Herbicides should be stored in a cool, dry area where food and drinks are never stored or prepared. 	<ul style="list-style-type: none"> ▪ Project Manager ▪ Contractor

	<ul style="list-style-type: none"> ▪ The storage area for herbicides and hazardous waste should be lined with plastic or impermeable material to prevent leaks from reaching the soil. ▪ Liquid waste must be stored in leak-proof containers which should be closed with a lid when not in use. ▪ No herbicide shall be stored on site for a period exceeding the expiry date of the product. ▪ Storage sites shall be inspected on an annual basis. ▪ Access to storage sites shall be regulated and controlled. ▪ The staff should be properly trained on how to respond to accidental spillages of herbicides. ▪ Accidental spillages shall be cleaned up immediately. In case of a spillage, the MSDS and / or label should be consulted for spillage clean-up measures. ▪ A spill kit and/or absorbent materials should be on site for spill containment and clean-up – under no circumstances should straw or any similar material be used to manage herbicide spills ▪ All hazardous waste shall be disposed of at a hazardous waste disposal facility. 	
Herbicide Use	<p>Prevent the application of selected herbicide(s) in sensitive areas – e.g. “high and medium” sensitivity areas. Sensitive areas are known/expected to have higher biodiversity – e.g. Karst mountains, ground dams, etc. .</p> <ul style="list-style-type: none"> ▪ Avoid the spraying of protected tree species – i.e. <i>Acacia erioloba</i>, <i>Albizia anthelmintica</i>, <i>Combretum imberbe</i>, <i>Erythrina decora</i> [also endemic spp.], <i>Ficus cordata</i>, <i>Maerua schinzii</i>, <i>Sclerocarya birrea</i>, <i>Spirostachys africana</i> and <i>Ziziphus mucronata</i> not directly affecting the transmission line during the line clearing 	<ul style="list-style-type: none"> ▪ Project Manager ▪ Contractor

operation. These species – especially larger specimens often have cavities and loose bark which serves as habitat to a variety of vertebrate fauna species.

- Protected tree species, especially larger specimens, within the affected area – i.e. 12m from centre line in either direction – not expected to affect the transmission lines could be avoided. Some tree species – e.g. *Erythrina decora*, *Maerua schinzii* – are not expected to reach heights potentially interfering with the transmission lines although within the 12m section.
- Eradicate all invasive alien species potentially associated with the lines. This would indicate overall environmental commitment.

Target only problematic species – i.e. bush thickening species and species potentially affecting the power lines – within the servitude area.

- Avoid spraying herbicide during windy days/periods – See the general product requirements for herbicide used. This could affect non-target areas and species.
- Avoid spraying, removing and/or approaching trees with vulture (and other larger raptors) nests along the route.
- Herbicide should be applied directly to the plant – stem or leaves – as a spray.
- Manual vegetation removal should be encouraged.
- Herbicide will be handled in accordance with the requirements outlined in the NamPower Herbicide and Pesticide Management procedure.
- Drainage lines areas all be cleared manually limited sensitive areas – with chemical follow-up.

<p>Manual and Mechanical Vegetation Removal</p>	<ul style="list-style-type: none"> ▪ Obtain a permit from the Ministry of Agriculture, Water and Forestry to remove protected trees as per Forest Act No. 12 of 2001 (Licence conditions for bush control). ▪ Measures must be put in place to avoid erosion at rivers, stream channel crossings, and at places where existing erosion scars and dongas are encountered to avoid any further erosion at these points ▪ Where manual bush-clearing is impractical, mechanical bush clearing shall be used, but an effort must be made to preserve the topsoil structure. ▪ Do not remove wood cut on site as this would affect the recycling of nutrients locally as well as lead to a potential industry in firewood targeting the better quality tree species e.g. <i>Acacia erioloba</i> etc. ▪ Where clearing is done near a river, the contractor/NamPower must ensure that no felled bushes/branches/shrubs are left behind in the riverbed. ▪ No burning of bush cleared materials is allowed onsite. ▪ When blading, the blade should be kept above the soil surface to minimize erosion and impacts to small plants, and root of larger plants ▪ Cut vegetation to a height close to ground level ▪ No hand-made tools allowed on site ▪ Manual and mechanical vegetation removal should be done in accordance with NamPower Servitude Management and Bush Clearing Procedure. 	<ul style="list-style-type: none"> ▪ Project Manager ▪ Contractor
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Table 5: Herbicide application guideline

Management requirement
Recommended herbicide: Access 240 SL or any similar product with picloram or tricopyr as active ingredients should be used
Recommended Application method: Foliar application – spray or paint-on-stump –is recommended as this is target specific. Access mixed with water and Actipron (wetting agent).
Technique: The herbicide can be applied directly to the plant – stem or leaves – as a spray. Trees and shrubs with a stem diameter <10cm can be sprayed directly, but trees with a stem diameter >10cm should be felled before treatment of the cut surface for best results. Treatment should be done as soon as possible after felling and the entire cut surface and stump should be wetted. Coppice growth can also effectively be controlled.
Use: Active growing season – i.e. September to April (best in early growing season – September to November – before main rains) has best results.
Concentration Foliar application = 350ml/100l water + Actipron Super 500ml/100l spray mix. Cut stump application = 2l/100l water + Actipron Super 2l/100l spray mix.
Application repeatability <ul style="list-style-type: none">▪ Year 1: Apply herbicide (early growing season)▪ Year 2: Follow-up to target any regrowth and coppicing (early growing season)▪ Thereafter: As required – i.e. dependent on coppicing potential of various species. This could be determined during routine line inspections.

7 REPORTING, MONITORING AND AUDITING

Environmental monitoring and audits must be conducted during the operational phase of the transmission line. The environmental monitoring and audits conducted along the power line will cover all management procedures, the requirements of this plan and will be carried out by the NamPower SHEW section. Monitoring and audit reports detailing the monitoring and audit results shall be prepared by the SHEW section and communicated to the Area Manager and Superintendent. Records of monitoring and auditing report shall be kept and will be made available during inspection and audits.

The following general monitoring indicators and guidelines are recommended should herbicides be used to do vegetation management along the line:

Table 6: General monitoring indicators and guidelines recommended after herbicide application

Monitor trees adjacent the cleared area after herbicide application	A survey in year 1 (i.e. 6 months after application of herbicide) should be conducted along the affected route to determine the effect of the herbicide on non-target areas – i.e. adjacent vegetation. Focus on protected tree species along the route
Monitor coppicing and regrowth after herbicide application	A survey in year 2 (i.e. 1 year after application of herbicide) should be conducted along the affected route to determine the effect of the herbicide on bush clearing. This would indicate the success of the herbicide used as well as indicate the necessity of follow-up treatment.
Sample any open surface water after herbicide application	Very few open water sources are located along the route and although it is recommended that herbicides not be used in “high” and “medium” sensitivity areas, monitoring this would be viewed as a good practice. Take water samples from any surface water encountered and have these analysed to determine if herbicide used has entered these sources.

Table 7. Monitoring checklist for bush clearing and herbicide application

Activity: Bush clearing	Compliance	
	Yes	No
Manual clearing conducted – Otjikoto - Asis West		
Mechanical clearing conducted – Otjikoto - Asis West		
Area adequately cleared – i.e. 12m from centre line		
Protected tree species on 12m boundary only trimmed		
Protected tree species not affecting line left <i>in situ</i>		
Raptor and vulture nesting sites left undisturbed		
Overall access improved		
Activity: Chemical application		
Active ingredient used = Triclopyr		
Application method used = spray		
Application technique used = spray leaves/cut stumps		
Application season = Sep to April (Sep to Nov = best)		
Application conditions = no wind		
Application procedures = protective masks/equipment used		
Application knowledge = certified users only		
Storage = safe/secure		
Storage = chemical register maintained		
Storage = equipment clean/functional		
Concentration: Foliar application = 350ml/100l water + Actipron Super 500ml/100l spray mix		
Concentration: Cut stump application = 2l/100l water + Actipron Super 2l/100l spray mix		
Repeatability: Year 1		
Repeatability: Year 2		
Repeatability: Year 3		
Sensitive “hotspot” areas avoided		
Water – open surface water encountered		
Water – open surface water samples taken		
Collateral damage observed (i.e. non target areas/species affected)		
Any complaints from landowners		

8 NON-COMPLIANCE PROCEDURES DURING OPERATION

The Area Superintendent shall ensure that the employees and external service providers comply with the requirements outlined in this EMP. In the event of non-compliance the following recommended process shall be followed:

- Non – compliances will be identified during inspections or audits carried out by the SHEW Section and reported to the Area manager and Superintendent for corrective actions.
- Area Superintendent shall notify the employees about the non-compliance
- Corrective and preventative actions must be implemented on an agreed timeframes
- Follow – up inspections shall be conducted to assess whether the corrective and preventative actions were implemented effectively

9 RECORD KEEPING

Record keeping is important for the effective functioning and implementation of an EMP. EMP documentation must be kept in both the hard copy and electronic format for safe keeping. These must include:

- Copy of the Environmental Clearance Certificate
- A copy of an EMP
- EMP implementation activities
- Induction records
- Audit and Inspection reports

In case vegetation management is conducted and is done using herbicides, the following records should be kept:

- Date of application
- Herbicide applied
- Persons responsible for application
- Supervisor
- Type of herbicide used
- Method of application
- Timing of application
- Equipment used
- Concentration of herbicide used

10 CONCLUSION

All management measures and legal requirements outlined in this EMP should be implemented in order to ensure environmental compliance by all parties undertaking the operational activities. This will ensure that potential negative impacts are identified, avoided or mitigated.