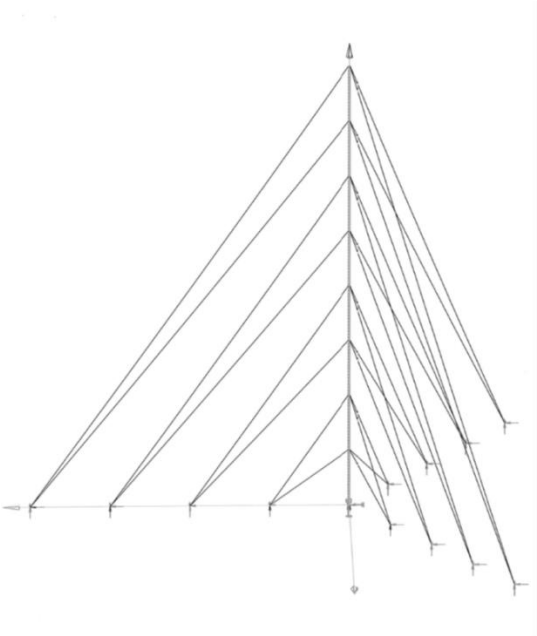
**ENVIRONMENTAL MANAGEMENT PLAN FOR THE CONSTRUCTION AND OPERATION OF THE GRUNAU WIND MAST NAMPOWER SITE 4, // KARAS REGION**



**SEPTEMBER 2020**

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## 1. INTRODUCTION

The purpose of this document is, to provide an indication of the anticipated impacts of the construction and operation of the Grunau Wind Mast on the receiving environment. NamPower intends to construct and commission a wind resource measurement station utilising a 100 m high steel tower. The erection of the wind mast will require 1.5 ha to accommodate the guy wire anchors that hold the mast in position and for stability. The wind resource measurement station as a meteorological mast is required to enable development of a commercial wind farm in future. This project is not for power generation but only for data collection mast to aid in quantifying the wind resource in the area.

This EMP document will ensure sound environmental performance by all contractors and NamPower employees during the construction and operation of the mast.

**Table 1:** Site and proposed project details :

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| **Site location** | The proposed wind mast site is approximately 55 km north-east of Grunau; 34 km from the B1 along the D203 road on farm Dishon 365. |
| **Region** | Grunau, Karas Region |
| **Site Coordinates** | Latitude: -27.365194<br>Longitude: 18.714496 |
| **Foot print area of the Mast including guy wire/ropes** | 1.5 Hectare |
| **Wind Mast Height** | 100m Wind Mast |
| **Duration of project** | Site works and commissioning will be done within 20 Days. |
| **Estimate of Number of people to be involved.** | Approximately 15 including NamPower and contractor employees. |
| **Activities to be carried out on site** | • Existing access track to be used.<br>• Minor excavations for guy wire anchors.<br>• Concrete pouring into excavations.<br>• Assembly of the mast tower.<br>• Installation of sensors.<br>• Commissioning and testing of the measurement station. |

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| | • Data collection and maintenance during operation phase. |

## 2. OBJECTIVES OF THE CONSTRUCTION AND OPERATIONAL EMP

The aim of this Construction and operation EMP is to detail the management actions required to implement the mitigation measures identified thereby ensuring that any operational phase activity is carried out in a manner that takes cognisance of environmental protection and is in line with National legislation. This EMP has the following objectives:

- To ensure that the activities associated with the construction and operation of the Mast do not result in undue or reasonably avoidable adverse environmental impacts.
- Minimise negative impacts
- Stipulate specific actions to assist in mitigating the environmental impact of the project.
- 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.

## 3. APPROACH TO IMPACT MANAGEMENT

**Table 2:** Approaches to impact management.

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| **Avoidance** | Avoiding activities that could result in adverse impacts and/or resources or areas considered sensitive. |
| **Prevention** | Preventing the occurrence of negative environmental impacts and/or preventing such an occurrence having negative impacts. |
| **Preservation** | The process of working to protect something valuable so that it is not damaged or destroyed (i.e. environmental resources) |
| **Minimization** | Limiting or reducing the degree, extent, magnitude or duration of adverse impacts through scaling down, relocating, redesigning and/or realigning elements of the project. |
| **Mitigation** | Measures taken to minimize adverse impacts on the environmental and social aspects. |
| **Enhancement** | Magnifying and/or improving the positive effects or benefits of a project. |
| **Rehabilitation** | Repairing affected resources to their original state. |

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| **Restoration** | Restoring affected resources to an earlier (possibly more stable and productive) state, typically 'background' condition, where identified to be appropriate and reasonable. These resources may include soils and biodiversity. |

## 4. POLICY AND LEGISLATIVE FRAMEWORK

Table 3: below outlines the legislative requirements which are applicable to the construction and operation of this project and a minimal.

| ***Legislation:*** | ***Section (s) applicable:*** | ***Implications:*** |
|---|---|---|
| **Environmental Management Act no 7 of 2007** | Section 3 | - All activities performed should be in line with the following principles:<br>- Interested and affected parties should have an opportunity to participate in decision making<br>- Polluter should pay for rehabilitation<br>- Pollution should be minimized |
| **EMA Regulations GN 28-30 (GG 4878) (February 2012)** | Listed activity:<br>5.1<br>6. – 9; 13; 15; 21 - 24 | 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** | Section 3<br>Section 4<br>Section 9<br>Section 39 – 42 | - Children under the age of 16 may not be employed Forced labour may not be used during any construction activities.<br>- Basic conditions of employment as stipulated by the law must be met.<br>- 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. |
| **Water Act no 54 of 1956** | Section 21 and 22<br>Section 23 | - Conditions in terms of the disposal and management of effluent are to be adhered to. |
| **Public Health Act no 36 of 1919** | Section 122 | - It is an offence to cause any form of a nuisance which includes water pollution. |

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| **Water Resources Management Act no 24 of 2004** | Section 56 | - No discharge of effluent may take place without a permit.<br>- Effluent is defined under this Act as any liquid discharge that occurs as a result of domestic, commercial, industrial or agricultural activities. |
| **Nature Conservation Ordinance no 4 of 1975** | Section 74 | - Protected plants may not be removed or damaged without a permit. |
| **National Heritage Act No 27 of 2004** | Section: 46, 48, 55 | - 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<br>- A chance find procedure should be followed in case of discovery of a heritage resource. |
| **Civil Aviation Act 6 of 2016** | Section 55 | - Regulation relating to safety and security . |

## 5. DESCRIPTION OF ACTIVITIES TO BE UNDERTAKEN

The following activities are associated with the Construction and operation of the Wind and their associated potential impacts:

| Activity | Activity description | Associated environmental aspects and impacts |
|---|---|---|
| **Site Establishment and clearing** | • **Increased vehicular movement** | • Loss of biodiversity<br>• Soil and water contamination<br>• Creation of deep tracks or additional tracks in the area<br>• Employment opportunities |
| **Construction** | Construction include the following activities:<br>• Access road grading | Noise emissions<br>Dust emissions |

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| | • Minor excavations for support guy ropes/ wire.<br>• Excavation for foundation of the Mast.<br>• Packaging material of the mast | Increased interaction between people and biodiversity in this area.<br>Introduction of new people in the area leading to the spread of diseases such as HIV/AIDS<br>Waste generation<br>Employment of casual workers<br>Loss of biodiversity<br>Support local economy |
| **General functioning** | Physical presence and functional characteristics of the Wind Mast.<br>Height of the tower | Visual impact<br>Bird collision on the guy support wire and Mast Tower.<br>May interfere with safe movement of air traffic in the area by introducing a potential obstacle to pilots flying at low levels.<br>If the collected data indicate the potential for the development of renewable energy in the area, this may result in increased investment in the area and the potential for job creation. |
| **Maintenance of the Wind Mast.** | The maintenance of the Wind Mast entails:<br>• General equipment repairs<br>• Data download.<br>• Servicing batteries<br>• Construction or repairing of access roads | Soil and water contamination<br>Waste generation<br>Loss of biodiversity<br>Social issues related to the introduction of new workers in the area, e.g. HIV/AIDS spreading |

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| **General site inspection** | Site inspection conducted by the technical and SHEW teams | Waste generation<br><br>Improve compliance<br><br>Enables identification of non – conformances and stakeholder complaints |

## 6. ROLES AND RESPONSIBILITIES

It is the responsibility of NamPower to ensure that all management actions are carried out. The successful implementation of the EMP is, however dependant on clearly defined roles and responsibilities by several stakeholders, each fulfilling a different but vital role to ensure sound environmental management during each phase of the project.

**The following roles and responsibilities have been identified as it pertains to this project:**

| Responsible person | Responsibilities | Phase/Activity |
|---|---|---|
| Project Manager | • Is responsible for the enforcement of the EMP.<br>• To ensure that environmental requirements are adequately covered in any external service providers contracts.<br>• To ensure that 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.<br>• To ensure that corrective actions are implemented for non-compliances<br>• To ensure that appropriate records and information regarding compliance with environmental requirements are maintained.<br>• To ensure that the Wind Mast remains in compliance with the requirements of this EMP, through | Construction and Operation of the Wind Mast |

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| | regular communication and monitoring.<br>• To ensure that all incidents, accidents and complaints are reported the project manager. The contractor to ensure that incidents and accidents are investigated to prevent re-occurrence.<br>• Must ensure that the contractor remains in compliance with the requirements of this EMP, through regular communication and monitoring. | |
| NamPower SHEW | To ensure that all requirements with regards to this EMP are fulfilled.<br>• To assist the Project Manager in ensuring that the contractor remains in compliance with this EMP.<br>• Provides SHEW inductions to NamPower and contractor employees as well other stakeholders working or visiting the site.<br>• Organize and implement monitoring and audit functions, in consultation with the Project Manager.<br>• Document and communicate monitoring, audit and inspection findings to project manager.<br>• Communicate the final inspection report to the Project manager on contractor compliance to the EMP before the project close-off and final payment is made to the contractor. | All phases of the project |
| Contractor | • Is responsible for the implementation of the EMP | |

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| | • To appoint as SHE officer responsible for the implementation of this EMP.<br>• To ensure that all tasks undertaken under the scope of work, are in accordance both with NamPower's SHEW policies and procedures as well as to the requirements of this EMP.<br>• Ensure staff members are regularly trained and awareness built relating to environmental and social management.<br>• To ensure that all incidents, accidents and complaints are reported the project manager. The contractor to ensure that incidents and accidents are investigated to prevent re-occurrence.<br>• Ensuring that all employees receive a SHEW induction before the start of the project.<br>• Ensuring that the work being done does not create a nuisance within the immediate surroundings of the site. | |

## 7. CONSTRUCTION AND OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN (EMP)

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| Personnel and Environmental awareness | • All employees both internal and external to receive environmental awareness training and refresher environmental awareness training to be available when required.<br>• All contractor employees to receive induction before any work is commenced on the power line.<br>• All employees are to be made aware of their individual roles | All phases | Project manager<br><br>Contractor<br><br>Safety Health ,Environment and Wellness Department representative(SHEW) |

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| | and responsibilities in achieving compliance with the EMP.<br>• Environmental toolbox talks to be conducted by the contractors and records to kept onsite.<br>• The Contractor shall take all necessary precautions against trespassing on private properties;<br>• Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements;<br>• Adequate first aid services must be provided by the contractor at the contractor's camp;<br>• The contractor will be responsible for his own security arrangements and shall comply will all site security instructions;<br>• Basic firefighting equipment must be available on site;<br>• PPE to be provided and well maintained at contractor's camp; and<br>• All incidents should be reported to ECO, investigated, documented and kept in safety file. | | |
| Vegetation | • Plant material may not be collected and removed from site<br>• Areas with a high density of vegetation growth shall be avoided when access routes are planned.<br>• Herbicides may not be used on site<br>• Rehabilitation must be carried out prior to the contractor leaving the site and in the manner prescribed in this document<br>• A speed limit of 30 km/h shall be maintained on site<br>• Trucks and larger vehicles shall have a designated turning point | | Contractor<br><br>Safety Health ,Environment and Wellness Department representative. |

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| Health and Safety Management | • All staff should undergo a general health and safety induction.<br>• Only medically fit personnel to be employed.<br>• Enforce general health and safety rules onsite<br>• Develop and implement an occupational health and safety system that comprises key elements such as risk assessment and safe working procedure.<br>• All work activities to be done under the supervision of a competent person.<br>• Personal protective equipment must be worn by all employees and contractors.<br>• Employees must receive proper training before receiving PPE.<br>• Erect physical barriers to ensure there is no unauthorised access to site.<br>• Maintain an incident and complaint register.<br>• All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands of wire and made clearly visible).<br>• Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding.<br>• No firearms shall be permitted on Site.<br>• **Airplane warning lights to be in place on the tower.** | All phases | Project manager<br><br>Contractor<br><br>Safety Health ,Environment and Wellness Department representative. |
| Dust Management | • Control dust in the during construction e.g by wetting the surface if necessary.<br>• Excavation, handling and transport of erodible materials | All phases | Project manager<br><br>Contractor |

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| | shall be avoided under high wind conditions or when a visible dust plume is present.<br>• Dust generation from all activities will be minimised wherever possible.<br>• A maximum speed limit of 20 - 30km/h will be enforced to control dust emissions, and minimize incidents onsite.<br>• Transport of construction material will ensure measures to prevent fugitive dust emissions.<br>• Dust suppression measures shall be implemented if necessary. Dust may be controlled by damping of the road with water when necessary to minimise nuisance dust.<br>• Construction machinery and equipment will be maintained in good working order in order to minimise exhaust fumes | | |
| Resources Efficiency | • Minimise water use<br>• Avoid wasteful use of materials<br>• Source goods and services locally were possible<br>• Minimise the generation of waste by applying the waste hierarchy. | All phases | Project manager<br><br>Contractor |
| Waste Management | • The site to be kept free of waste.<br>• No burning, burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted onsite.<br>• Labelled waste bins with lids must be provided onsite for all waste streams and ensure that waste is disposed at nearest approved waste disposal site.<br>• Ensure that waste segregation is done at source. | All phases | Project manager<br><br>Contractor |

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| | • Hazardous waste shall be disposed of at a registered waste disposal site.<br>• Safe disposal certificates for hazardous waste must be kept in the SHE file.<br>• No material shall be left on site that could be of harm to humans and animals.<br>• Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site.<br>• Waste shall be removed from site on a daily basis and disposed of at the appropriate waste management site<br>• Hazardous waste shall be disposed of at approved dump site. Record shall be kept of all hazardous waste disposed of.<br>• No waste material shall remain on site once the project has been completed.<br><br>• Surplus concrete may not be dumped indiscriminately on site, but shall be removed from site when nearing completion of the different stages of work.<br>• Concrete trucks shall not be washed on site unless adequate washing and concrete collection facilities be introduced to site.<br>• Bins and containers must be made available by the contractor for the storage of construction waste.<br>• No burning of cleared vegetation shall be allowed on site. | | |
| Wastewater management | • Water containing environmental pollutants shall be collected and removed from site.<br>• No waste water runoff or uncontrolled discharges from the site/working areas shall be permitted. | All phases | Project manager<br>Contractor |

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| | • Mobile toilets or septic tanks should be used and be regularly emptied. | | |
| Cultural resource | • Any chance finds must be reported to NamPower environmental section.<br>• 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. | All phases | Project Manager<br>SHEW<br>Contractor |
| Protection and handling of fauna on site. | • The contractor must ensure that the site is kept clean and free of rubbish that could potentially attract animal pests, and that rubbish bins are scavenger proof.<br>• The contractor must report problem animals or vermin to the SHEW.<br>• Ensure that domesticated and livestock animals belonging to the local community are kept away from the construction works.<br>• The contractor may under no circumstances make use of pesticide or poison to control unwanted animals.<br>• Workers should be educated so as not to kill any fauna found onsite.<br>• The footprint of disturbance should be kept to a minimum<br>• No hunting or trapping is permitted along the alignment.<br>• Excavations must be checked on a regular basis for any signs of wildlife which may have fallen in. | All phases | Project Manager<br>Contractor<br>SHEW |
| Site Rehabilitation | • A post construction inspection 1 week before the Contractor has moved off site.<br>• SHEW to sign site close off or take over certificate once remedial corrective action is implemented. | Construction and Decommissioning Phase | Project Manager<br>SHEW<br>Contractor |

| ASPECT | MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS | Phase/ Activity | RSEPONSIBLE PERSON |
|---|---|---|---|
| Decommissioning | • During decommissioning, especially at the time when the mast is dismantled, a member of the NamPower SHEW section as well as the NamPower District Personnel shall be on site for the entire duration of this activity.<br>• A revised decommissioning plan will be developed prior to decommissioning the project in order to ensure that the plan is in line with conditions at that time. | | Project Manager<br><br>SHEW<br><br>Contractor |

## 8. ENVIRONMENTAL MONITORING AND AUDITING

Environmental monitoring, audits and inspections must be conducted by SHEW personnel and SHE representatives during construction and operational phases. The environmental monitoring and audits conducted at the substation will cover all management procedures and the requirements of this plan. It is proposed that before and after construction photographic evidence is captured and recorded.

## 9. NON-CONFORMANCE PROCEDURES DURING OPERATIONS

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 superintendent or project manager for corrective actions.
- Area superintendent or project manager shall notify the both internal and external 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.

NamPower has the right to ban any employee from the site, which have not attended a SHEW induction, until the time that they receive induction. NamPower also has the right to stop all construction activities if it is found that a gross violation of the EMP is taking place.

## 10. SUB-CONTRACTOR MANAGEMENT

The contractor shall in writing inform its sub-contractors and issue them a copy of this EMP and SHE Plan. Sub-contractors shall indicate in writing their commitment to comply with these plans. The Contractor has the overall responsibility of ensuring that all its sub-contractors comply with both plans.

## 11. DOCUMENTATION, RECORD KEEPING AND REPORTING PROCEDURES

The following documents must be kept on site in an accessible place, and maintained by the Contractor and district personnel:

- Copy of the Environmental Clearance Certificate
- SHE file
- Induction records;
- Environmental monitoring and inspection reports
- Site Locality Plan
- Site instructions

- Records of the quantities of general and hazardous waste generated on site and disposal certificates or details of volumes of waste recycled

- Water consumption
- Incidents and accidents (spills, impacts, complaints, legal transgressions)
- Corrective and preventive actions taken to rectify incidents and accidents.

## 12. CONCLUSIONS AND RECOMMENDATIONS

The purpose of this document is to provide guidelines for environmental best practice during the Construction and operation of the Wind Mast. This document shall be seen as part of the all contracts related to the Wind Mast.