

## **SCOPING REPORT FOR THE CONSTRUCTION AND OPERATION OF THE GRUNAU WIND MAST NAMPOWER SITE 4 (//KARAS REGION)**



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## EXECUTE SUMMARY

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. The wind measurement period will be conducted for 3 years.

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.

The construction phase is estimated to last between 10 and 20 days and operational phase will include quarterly access to the site for data collection and annual maintenance. Though the activities to be undertaken are not specifically listed in the Environmental Management Act (no 7 of 2007), this project does share elements with the following listed activities land use and transformation, resources removal including natural living resources, television and radio transmission masts and alternate energy programmes.

As per the Environmental Impact Assessment (EIA) Regulations, construction of the this nature and some of the operational activities NamPower will be undertaking require clearance from the Ministry of Environment and Tourism (MET). The purpose of this document therefore is, to provide an indication of the anticipated impacts as a result of the construction and operational activities that will take place at the envisaged Wind Mast site.

A signed land lease agreement between NamPower and the land owner is in place for the period of 3 years up to 2023. In addition Namibia Civil Aviation Authority was also notified.

**DETAILS OF PROJECT STAFF**

This scoping report was generated by staff permanently employed by NamPower within the Transmission Business Unit.

**Environmental Assessment Practitioner**

The Environmental Assessment Practitioner (EAP) for this site was Calvin Sisamu, a fulltime employee of NamPower for the past 4years and 7 months as a Senior Environmentalist. Calvin , has a Batchelor's Degree level in Environmental Engineering, National Diploma in Land Management and MPhil in Environmental Management. He has been working in the environmental field since 2005, including being a Research Technician at Gobabeb Training and Research Centre, Environmental Control Officer and Radiation Safety Officer for Reptile Uranium Namibia a uranium exploration company and Environmental Compliance Officer for Swakop Uranium (Husab Mine) in the Namib Desert. The EAP has no vested interest in the outcome of the process.

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## 1. INTRODUCTION

NamPower intends to construct and commission a wind resource measurement station utilising a 100 m high steel tower. This application to the MEFT is for the proposed erection of a wind meteorological mast which is required for the development activities of the 40MW NamPower Wind Power Project. The proposed wind meteorological mast will consist of a steel lattice tower/mast with several measurement sensors (to measure temperature, humidity, wind speed and wind direction). The data captured from this wind meteorological mast is required to confirm the feasibility of the project and to assist with the design of the final wind turbines. Once the proposed wind meteorological mast has been erected and sufficient data has been measured, NamPower will make a full Environmental and Social Impact Assessment application to MEFT for the erection of the final wind farm which will include multiple wind turbines.

The wind resource measurement station is required to enable development of a commercial wind farm in future. It is important to state that this project to construct the wind mast is not for power generation purposes but a data collection mast to aid in quantifying the bankable wind resource in the area. The data for this environmental assessment was sourced from EIAs conducted in the area and was supplemented by a site visit in September 2019 and March 2020.

The purpose of this document therefore is, to provide an indication of the anticipated impacts as a result of the construction and operational activities that will take place at the envisaged Wind Mast site.



**Figure 1:** Proposed site indicating Wind Mast in the map in relation to the surrounding area and existing access track.

## 2. PROPOSED PROJECT ACTIVITIES

### (a) CONSTRUCTION PHASE

The Wind Resource Measurement Station will comprise of a lattice tower, stabilized by anchored guy-wires and mounted with the listed measurement sensors at heights. The lattice will be assembled and fitted with the sensor assemblies prior to erection. The data acquisition system, power supply and satellite communication module will be installed closer to the base of the lattice tower.

Civil works will be carried using standard digging equipment depending on the soil conditions at the site. Materials and equipment will be delivered to site using tri-axle heavy duty vehicles and stored at the site, where necessary. The base of the mast will be fenced, while the guy rope anchors won't be enclosed.

**Table 1:** Anticipated construction phase activities.

General Identifiers	Description
Location	<ul style="list-style-type: none"> <li>Latitude: -27.365194</li> <li>Longitude: 18.714496</li> </ul>
Site elevation	<ul style="list-style-type: none"> <li>±120 m</li> </ul>
Wind Mast Footprint ( Land Size)	<ul style="list-style-type: none"> <li>1.4 ha ( Mast and Guy wire anchors included)</li> </ul>
Type of Infrastructure	<ul style="list-style-type: none"> <li>Electronic and mechanical sensors mounted on a steel tower with steel wire supports in concrete anchors.</li> </ul>
Duration of project	<ul style="list-style-type: none"> <li>Site works and commissioning will be done within 20 Days.</li> </ul>
Estimate of Number of people to be involved.	<ul style="list-style-type: none"> <li>Approximately 15 including NamPower and contractor employees.</li> </ul>
Activities to be carried out on site	<ul style="list-style-type: none"> <li>Existing access track to be used.</li> </ul>

	<ul style="list-style-type: none"> <li>• Minor excavations for guy wire anchors.</li> <li>• Concrete pouring into excavations.</li> <li>• Assembly of the mast tower.</li> <li>• Installation of sensors.</li> <li>• Commissioning and testing of the measurement station.</li> <li>• No crane shall be used for the erection of the tower.</li> </ul>
Needs and desirability of the project.	<ul style="list-style-type: none"> <li>• The wind resource measurement station is required to enable development of a commercial wind farm.</li> </ul>
Site Rehabilitation	The site will be left tidy and area reinstated where necessary as per the Environmental Management Plan.

**Table 2 :** The main equipment to be installed for the wind resource measurement station is as follows:

<b>Offered Item</b>	<b>Purpose /</b>
Temperature Sensor: NRG 110S	<b>Ambient Temperature measurement</b> (at a height within 10 m of the primary anemometer and a back-up sensor at 2 m above ground level.)
Relative Humidity Sensor: RH5X	<b>Relative humidity measurement</b> (at a height within 10 m of the primary anemometer and a back-up sensor at 2 m above ground level.)
Anemometers: NRG Class I, incl. IEC 61400-12 Calibration	<b>Wind speed measurement (including wind gust)</b> at minimum 4 levels (i.e. 100 m (x2), 80 m, 60 m, 40 m) as per IEC 61400-12-1
Pyranometer: HUKSEFLUX SR11	<b>Global Horizontal Irradiance (GHI) measurement</b> (at a height of approximately 2 m above ground level)

Wind Vanes: NRG 200M, incl. IEC 61400-12 Calibration	<b>Wind direction measurement</b> (at minimum 3 levels at a height within 10 m of the primary anemometer (i.e. 90 m (x2), 70 m, 50 m) as per IEC 61400-12-1)
Barometric Pressure Sensor: NRG BP20	<b>Barometric pressure measurement</b> (at a height within 10 m of the primary anemometer and at a height of approximately 2 m above ground level)
Data Logger: NRG Symphonie PRO, with USB Cable and 2G SD Card	<b>Data acquisition and storage</b> (at the base of the mast tower)
Enclosure: NRG Symphonie Shelter Box	<b>Protection and security</b> (at the base of the mast tower)
Symphonie iPackACCESS \ BGAN M2M Satellite	<b>Data Transmission</b> (at the base of the mast tower)
Camera Surveillance System	<b>Visual Surveillance</b> (at the base of the mast tower)
Solar Module SD030	<b>Battery charging</b> (at the base of the mast tower)
Charging Regulator 12V	<b>Battery charging control</b> (at the base of the mast tower)
Batteries, 12 V 33Ah Sealed Lead Acid	<b>Electricity storage and supply</b> (at the base of the mast tower)

After the electro-mechanical assembly and the erection of the tower are complete, commissioning and testing of the Wind Resource Measurement Station will be conducted.

#### **(b) OPERATIONAL ACTIVITIES PHASE**

The following **operational activities** will be carried out on site and have also been considered for the purpose of this document:

- (a) Data collection and download.
- (b) Maintenance of the Wind Mast , NamPower will maintain the s Wind Mast Station to ensure its reliability of data collected.



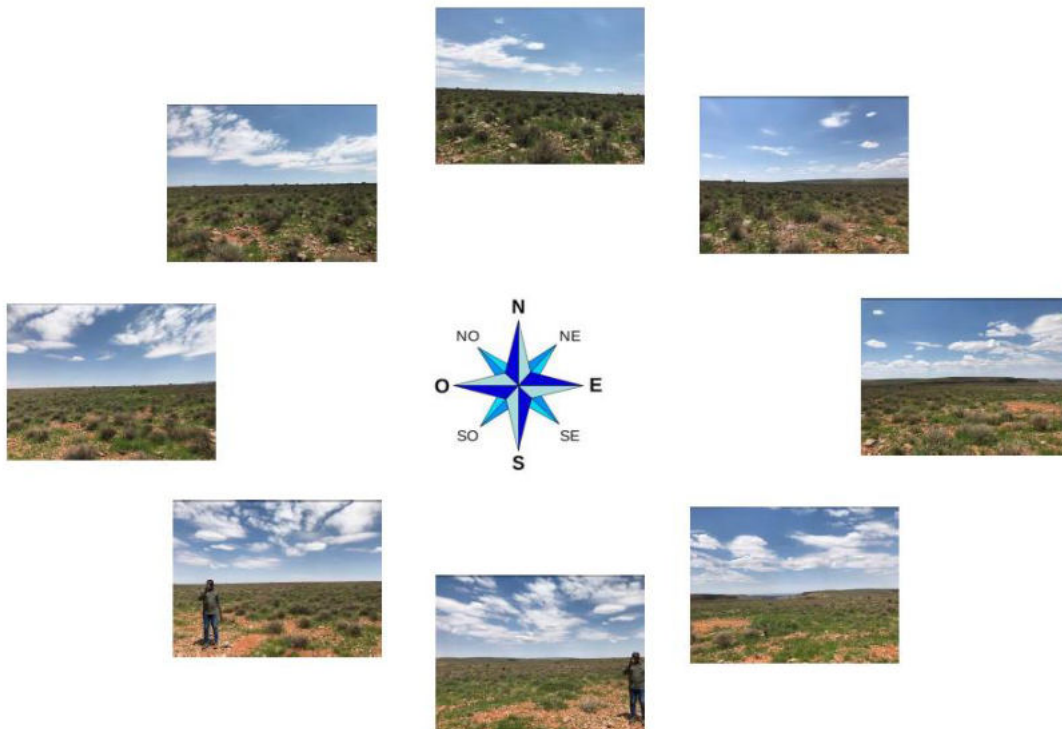
- (c) General site inspection to be carried out by the technical and Safety ,Health , Environment and Wellness Departments in line with the Environmental Management Plan quarterly to annual basis.

It is important to note that all environmental issues will be taken into account from the onset of the project to ensure environmental best practice is incorporated during the construction and operational phase.

### 3. SITE DESCRIPTION

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. Farming activities are taking place on the farm and a lease agreement is in place between NamPower and the farm owner.

Grunau is a small settlement at the side of a rail track. The location of Grunau makes it a convenient and popular overnight location for travellers. It's also serves as a good springboard for visiting the Fish River Canyon.



**Figure 2** : Surrounding area of the proposed site.

### 3.1 Existing Infrastructure in the area

Access is proposed be gained via the the B1 Road , along the D203 road and farm access track and there is a Telecom Microwave tower on the farm.



**Figure 3** : Existing tracks on the farm and Telecom Microwave Tower within farm Dishon 365 farm boundaries.



**Figure 4 and 5 :** Example of the NamPower Meteorological Wind Mast near Elizabeth Bay (67% complete at 67 m of 100 m).

### **3.2 Soil and topography**

The study area is undulating in nature. The potential soil impacts in the study area is that the soils in the area are susceptible to erosion and compaction, therefore the disturbance of the soil surface in the vicinity of the wind mast, must be minimised to prevent wind erosion.

The footprint of the construction area must be kept small as much as possible and existing access road are to be utilised at all times to avoid off road tracks. The project footprint area should not be cleared entirely and the guy wire anchors must be placed in such a way that surface disturbance is minimised and the site should be rehabilitated after the construction phase.

### **3.3 Biodiversity**

Grunau area falls within Succulent Karoo Biomes Environmentally sensitive sites include, but are not limited to: areas with high conservation value due to the presence of important plant specimens, pristine habitats and high biodiversity. To minimise impacts precaution must be taken and only existing track must be utilised.

Mortality through bird collision with the guy wires supporting meteorological mast, this can occur when the bird flies into the wire and killed either from impact, from hitting the ground or injuries sustained in the process. According to the US Federal Aviation Administrative guidelines that allows towers to turn off those solid red lights and replace them with flashing red lights which does not attract birds the same way. As the flashing flight used for aviation warning lights reduces the number of bird fatalities around towers by between 50 to 70 percent. Therefore the flashing on the tower will save two purposes for aviation warning and ( preventing plane collisions ) and mitigating birds collisions.

Additionally , the Guyed mast will be checked/monitored for signs of bird collisions every quarter or in line with the mast 's maintenance schedule ; the findings will be recorded as with collision-victim surveys in the post-construction phase. Furthermore incidental sightings of priority species, particularly if suggestive of breeding, important feeding or roosting sites, or flight paths, should be recorded.

### **3.4 Climate**

The Grünau area has a typical semi-desert climate and the average annual rainfall ranges between 100 and 200 mm and Most of the rain occurs during the months of February and March. Temperature During the hot summer months (October - March) temperatures can rise up to 40°C during the day and cools down to about 30 C at night. During the short winters, temperatures can go down below zero at night.

The footprint of the construction area must be kept small as possible to minimise surface distance. The bigger the disturbed area the more dust can be generated onsite due to loose soil or surface. Wind speed during construction must be monitored onsite, to ensure that during high wind no work activities should be conducted on site for personnel safety reasons and environmental factors such dust.

### **3.5 Visual resource**

The natural landscape , when viewed from the perspective of a tourist, can be associated with a serene sense of place. The proposed Wind mast will change the visual environment given the height of the Wind Mast tower at 100m and the aviation warning light may cause some disturbance at night. The distance from the proposed to the main road and undulating nature of the surrounding area might mitigate visual impacts to some extent. Therefore the visual impact is largely dependent on the sensitivity of the views and related perspective of visual receptors. The weather conditions in the area also might play a role in reducing the visual impact of the tower.

### **3.6 Archeology**

Archaeological sites provide a snapshot of the past with regards to the way humans lived and interacted with their environments. Archaeological objects include material remains resulting from human activity which are older than 50 years and which are in a state of disuse, such as tools, artefacts, human and hominoid remains and artificial features and structures. Therefore chance finds procedures should be implemented in case of any chance find as no artefacts were recorded as part of the site visit.

### 3.7 Socio-Economic Environment

Economic activities in the Grunau area is mainly small-stock farming and the population of Grunau settlement is estimated to be 521 persons. . The proposed site is approximately 55km from Grunau and it is farmland. Social issues should be adequately managed to ensure that the project is implemented successfully and local people should be considered for unskilled jobs as part of the project.

## 4. PROJECT RATIONAL AND ALTERNATIVES

The Environmental Management Act no 7 of 2007, requires that alternatives for each proposed project needs to be evaluated in order to provide assurance that the decision to develop made by the proponent was carefully considered. Alternative sites were considered . The no build option has implications on the ability of Namibia to diversify its electricity generation base and capacity and may hinder the country from embarking on wind generation projects. The true extent of this hindrance can only be determined once the full potential for wind generation in Namibia is understood.

## 5. LEGAL REQUIREMENTS

All actions going forward should take cognisance of the relevant laws in order to ensure that the project remains within the scope of the law. The following legislation applies as it pertains to the rezoning of any property within Namibia:

The *table 1* provides a summary of the main pieces of national legal requirements which needs to be taken into consideration when the impacts of this proposed project is evaluated and the Environmental Management Plan is developed.

**Table 4: Legislation applicable to the proposed development .**

<i>Legislation:</i>	<i>Section applicable:</i>	<i>Implications:</i>
Environmental Management Act no 7 of 2007	<ul style="list-style-type: none"> <li>Section 3</li> </ul>	<ul style="list-style-type: none"> <li>All activities performed should be in line with the following principles:</li> </ul>

<i>Legislation:</i>	<i>Section applicable:</i>	<i>Implications:</i>
	<ul style="list-style-type: none"> <li>• Section 27</li> <li>• Section 33 onwards</li> <li>• Section 57</li> </ul>	<ul style="list-style-type: none"> <li>○ Interested and affected parties should have an opportunity to participate in decision making</li> <li>○ Listed activities should be subject to an EIA</li> <li>○ Polluter should pay for rehabilitation</li> <li>○ Pollution should be minimised</li> <li>• 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"> <li>○ Land use and transformation</li> </ul> </li> <li>• These sections details the process to be followed in order to obtain a clearance certificate</li> <li>• All existing listed activities must obtain a clearance certificate within one year of the law coming into affect (February 2013). Therefore, all existing activities which can be considered a listed activity should apply for clearance.</li> </ul>
<p>EMA Regulations GN 28-30 (GG 4878) (February 2012)</p>	<ul style="list-style-type: none"> <li>• Listed activity: 5.1</li> <li>• 6 – 9; 13; 15; 21 -24</li> </ul>	<ul style="list-style-type: none"> <li>• This activity can be considered a rezoning of property from Undetermined to civic</li> <li>• 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</li> </ul>
<p>Civil Aviation Act 6 of 2016</p>	<ul style="list-style-type: none"> <li>• 55(c)</li> </ul>	<ul style="list-style-type: none"> <li>• Regulations relating to Safety and Security.</li> </ul>
<p>Labour Act no 11 of 2007</p>	<ul style="list-style-type: none"> <li>• Section 3</li> <li>• Section 4</li> <li>• Section 9</li> </ul>	<ul style="list-style-type: none"> <li>• Children under the age of 16 may not be employed</li> <li>• Forced labour may not be used during any construction activities</li> <li>• Basic conditions of employment, as stipulated by the law, must be met</li> </ul>

<b>Legislation:</b>	<b>Section applicable:</b>	<b>Implications:</b>
	<ul style="list-style-type: none"> <li>• Section 39 - 42</li> </ul>	<ul style="list-style-type: none"> <li>• 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.</li> </ul>
Water Act no 54 of 1956	<ul style="list-style-type: none"> <li>• Section 21 and 22</li> <li>• Section 23</li> </ul>	<ul style="list-style-type: none"> <li>• Conditions in terms of the disposal and management of effluent are to be adhered to</li> <li>• Any person causing pollution to a water source shall be guilty of an offence</li> </ul>
Soil Conservation Act no 76 of 1969	<ul style="list-style-type: none"> <li>• Section 4</li> </ul>	<ul style="list-style-type: none"> <li>• Institutions may be ordered by the relevant Minister to construct soil conservation works when and where necessary.</li> </ul>
Public Health Act no 36 of 1919	<ul style="list-style-type: none"> <li>• Section 122</li> </ul>	<ul style="list-style-type: none"> <li>• It is an offence to cause any form of a nuisance</li> </ul>
Water Resources Management Act no 24 of 2004	<ul style="list-style-type: none"> <li>• Section 56</li> </ul>	<ul style="list-style-type: none"> <li>• No discharge of effluent may take place without a permit <ul style="list-style-type: none"> <li>○ Effluent is defined under this Act as any liquid discharge that occurs as a result of domestic, commercial, industrial or agricultural activities</li> </ul> </li> </ul>
Fertilizer, farm feeds, agricultural remedies and stock remedies act 36 of 1947	<ul style="list-style-type: none"> <li>• Section 9 and 18</li> </ul>	<ul style="list-style-type: none"> <li>• To regulate or prohibit the importation, sale, acquisition, disposal or use of fertilisers, farm feeds, agricultural remedies and stock remedies.</li> </ul>
National Heritage Act 27 of 2004	<ul style="list-style-type: none"> <li>•</li> </ul>	<ul style="list-style-type: none"> <li>• All archaeological and paleontological objects belongs to the State.</li> </ul>
Forestry Act 12 of 2001	<ul style="list-style-type: none"> <li>• Section 22:</li> </ul>	<ul style="list-style-type: none"> <li>• A person must have the authority in terms of this Act, except for surveyed erven as defined in section 1 of the Local Authorities Act, to cut, destroy or remove: <ul style="list-style-type: none"> <li>• i) vegetation which is on a sand dune, drifting sand or on any gully unless the</li> </ul> </li> </ul>

<i>Legislation:</i>	<i>Section applicable:</i>	<i>Implications:</i>
		<p>reason for doing so is done for the purpose of stabilizing the sand or gully; or</p> <ul style="list-style-type: none"> <li>• ii) any living tree, bush or shrub growing within a hundred meters of a river, stream or water course.</li> </ul>

## 6. PUBLIC CONSULTATION

Following the identification of site, the following stakeholders were identified, notified and consulted:

- Namibian Civil Aviation Authority
- Land Owner ( Lease agreement was signed between the proponent and the farm owner) .

Copies of the communication documentation between the proponent and the relevant stakeholders are contained in the appendixes . It is the responsibility of NamPower to work closely with the stakeholders throughout the construction and operation to minimise any impacts and manage cordial relations with stakeholders.

## 7. IMPACT ASSESSMENT AND PRIORITISATION

During the preconstruction and construction phases, it does offer direct and indirect employment opportunities in the receiving communities. However, minor negative impacts in the form of visual intrusion, loss of biodiversity ,dust and noise pollution especially during the preconstruction, construction, operation and rehabilitation phases.

The construction phase will take up to 20 Days . As per standard practice, it is expected that the existing access roads will be used.

**Table 5** : below provides a list of the anticipated aspects and impacts for this project during construction and operation as well as the type of impacts, duration of these impacts and extent of the listed impacts.



Aspect	Impacts	Type of impact	Duration	Extent
Construction Phase				
Increased vehicle movement and off tract	<ul style="list-style-type: none"> <li>Soil surface disturbance and visual integrity of the area</li> <li>Disturbance of animals and vegetation</li> </ul>	Negative	Long term	Local
Habitat fragmentation	<ul style="list-style-type: none"> <li>Animal movement may be restricted</li> </ul>	Negative	Long-term	Local
Ecological and biodiversity loss	<ul style="list-style-type: none"> <li>Loss of biodiversity.</li> </ul>	Negative	Long term	Local
Waste generation	<ul style="list-style-type: none"> <li>Increased amount of general and hazardous waste to be managed by NamPower.</li> </ul>	Negative	Short term	Local
	<ul style="list-style-type: none"> <li>Potential visual impacts as a result of littering and windblown material</li> </ul>	Negative	Short term	Local
Dust	<ul style="list-style-type: none"> <li>Increased nuisance and health impacts as a result of dust.</li> </ul>	Negative	Short term	Local
Noise pollution	<ul style="list-style-type: none"> <li>Low noise levels</li> </ul>	Negative	Short term	Local

Aspect	Impacts	Type of impact	Duration	Extent
Health and safety	<ul style="list-style-type: none"> <li>Injuries to employees</li> </ul>	Negative	Short term	Local
Periodic short term influx of people	<ul style="list-style-type: none"> <li>Inflow of money to the area</li> </ul>	Positive	Short term	Local
Periodic and short term influx of People				
Periodic and short term influx of people in the area	<ul style="list-style-type: none"> <li>Increased poaching</li> <li>Possible HIV/AIDS infections</li> </ul>	Negative	Short/Long term	Local
<i>Operational Phase</i>				
Interference with air traffic	<ul style="list-style-type: none"> <li>Airplane collisions with the tower</li> </ul>	Negative	Long term	National
Generation of credible national and commercial weather data	<ul style="list-style-type: none"> <li>Potential of identifying opportunities for wind resource</li> </ul>	Positive	Long term	National
Bird collisions with guy ropes	<ul style="list-style-type: none"> <li>Loss of biodiversity</li> </ul>	Negative	Long term	Local
Waste generation	<ul style="list-style-type: none"> <li>Waste to be managed by NamPower throughout phases.</li> </ul>	Negative	Short term	Local

Aspect	Impacts	Type of impact	Duration	Extent
Creation of jobs	<ul style="list-style-type: none"> <li>Maintenance of Wind mast equipment.</li> </ul>	Positive	Long/short term	Local
Inflow of investment	<ul style="list-style-type: none"> <li>Growth in the economy of Grunau If data to be collected is bankable</li> </ul>	Positive	Long term	Regional/National
	<ul style="list-style-type: none"> <li>Diversify farmer source of income (lease agreement).</li> </ul>	Positive	Long-term	Local

## 8. MANAGEMENT AND MITIGATION

The mitigation measures for the impacts listed above have been discussed in detail in the Environmental Management Plan for this project.

## 9. TERMS OF REFERENCE-DETAILED ASSESSMENT

Based on the impacts identified in this document, it is the opinion of the author that a detailed impact assessment is not required for this project. Changes to the environment and impacts will be minimal and fleeting in nature and therefore do not warrant the expense of further assessments.

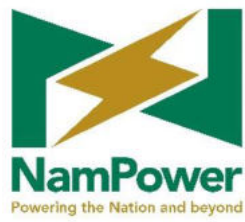
Therefore, detailed assessments have not been planned for this specific development at this present time, but if required by the relevant authorities it is recommended that the recommended specialist assessments be carried out for technical purposes only.

Based on the findings stated previously, current conditions on site and the size of the project, no other specialist input is deemed necessary for this project.

## 10. CONCLUSION

Based on the evidence produced during the scoping process, it is very unlikely that this project will have significant adverse impacts on the environment. NamPower is confident that this

high level scoping report and Environmental Management Plan for the Wind Mast meets the requirements of the Environmental Management Act and will enable the Ministry of Environment and Tourism to make an informed decision on the acceptability of the proposed Wind Mast at the proposed site.



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



**UPDATED JANUARY 2021**

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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 :

<b>Site location</b>	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.
<b>Region</b>	Grunau, Karas Region
<b>Site Coordinates</b>	Latitude: -27.365194 Longitude: 18.714496
<b>Foot print area of the Mast including guy wire/ropes</b>	1.5 Hectare
<b>Wind Mast Height</b>	100m Wind Mast
<b>Duration of project</b>	Site works and commissioning will be done within 20 Days.
<b>Estimate of Number of people to be involved.</b>	Approximately 15 including NamPower and contractor employees.
<b>Activities to be carried out on site</b>	<ul style="list-style-type: none"><li>• Existing access track to be used.</li><li>• Minor excavations for guy wire anchors.</li><li>• Concrete pouring into excavations.</li><li>• Assembly of the mast tower.</li><li>• Installation of sensors.</li><li>• Commissioning and testing of the measurement station.</li></ul>

	<ul style="list-style-type: none"> <li>• Data collection and maintenance during operation phase.</li> </ul>
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## 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.

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



<b>Restoration</b>	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.
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#### 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.

<b>Legislation:</b>	<b>Section (s) applicable:</b>	<b>Implications:</b>
<b>Environmental Management Act no 7 of 2007</b>	Section 3	<ul style="list-style-type: none"> <li>- All activities performed should be in line with the following principles:</li> <li>- Interested and affected parties should have an opportunity to participate in decision making</li> <li>- Polluter should pay for rehabilitation</li> <li>- Pollution should be minimized</li> </ul>
<b>EMA Regulations GN 28-30 (GG 4878) (February 2012)</b>	Listed activity: 5.1  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.
<b>Labour Act no 11 of 2007</b>	Section 3 Section 4  Section 9  Section 39 – 42	<ul style="list-style-type: none"> <li>- Children under the age of 16 may not be employed Forced labour may not be used during any construction activities.</li> <li>- Basic conditions of employment as stipulated by the law must be met.</li> <li>- 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.</li> </ul>
<b>Water Act no 54 of 1956</b>	Section 21 and 22  Section 23	<ul style="list-style-type: none"> <li>- Conditions in terms of the disposal and management of effluent are to be adhered to.</li> </ul>
<b>Public Health Act no 36 of 1919</b>	Section 122	<ul style="list-style-type: none"> <li>- It is an offence to cause any form of a nuisance which includes water pollution.</li> </ul>

<b>Water Resources Management Act no 24 of 2004</b>	Section 56	<ul style="list-style-type: none"> <li>- No discharge of effluent may take place without a permit.</li> <li>- Effluent is defined under this Act as any liquid discharge that occurs as a result of domestic, commercial, industrial or agricultural activities.</li> </ul>
<b>Nature Conservation Ordinance no 4 of 1975</b>	Section 74	<ul style="list-style-type: none"> <li>- Protected plants may not be removed or damaged without a permit.</li> </ul>
<b>National Heritage Act No 27 of 2004</b>	Section: 46, 48, 55	<ul style="list-style-type: none"> <li>- 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</li> <li>- A chance find procedure should be followed in case of discovery of a heritage resource.</li> </ul>
<b>Civil Aviation Act 6 of 2016</b>	Section 55	<ul style="list-style-type: none"> <li>- Regulation relating to safety and security .</li> </ul>

## 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
<b>Site Establishment and clearing</b>	<ul style="list-style-type: none"> <li>• <b>Increased vehicular movement</b></li> </ul>	<ul style="list-style-type: none"> <li>• Loss of biodiversity</li> <li>• Soil and water contamination</li> <li>• Creation of deep tracks or additional tracks in the area</li> <li>• Employment opportunities</li> </ul>
<b>Guy support ropes to hold mast in position.</b>	<ul style="list-style-type: none"> <li>• <b>Bird collision on guy ropes.</b></li> </ul>	<ul style="list-style-type: none"> <li>• Loss of biodiversity</li> </ul>

<p><b>Construction</b></p>	<p>Construction include the following activities:</p> <ul style="list-style-type: none"> <li>• Access road grading</li> <li>• Minor excavations for support guy ropes/ wire.</li> <li>• Excavation for foundation of the Mast.</li> <li>• Packaging material of the mast</li> </ul>	<p>Noise emissions</p> <p>Dust emissions</p> <p>Increased interaction between people and biodiversity in this area.</p> <p>Introduction of new people in the area leading to the spread of diseases such as HIV/AIDS</p> <p>Waste generation</p> <p>Employment of casual workers</p> <p>Loss of biodiversity</p> <p>Support local economy</p>
<p><b>General functioning</b></p>	<p>Physical presence and functional characteristics of the Wind Mast.</p> <p>Height of the tower</p>	<p>Visual impact</p> <p>Bird collision on the guy support wire and Mast Tower.</p> <p>May interfere with safe movement of air traffic in the area by introducing a potential obstacle to pilots flying at low levels.</p> <p>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.</p>
<p><b>Maintenance of the Wind Mast.</b></p>	<p>The maintenance of the Wind Mast entails:</p> <ul style="list-style-type: none"> <li>• General equipment repairs</li> <li>• Data download.</li> <li>• Servicing batteries</li> <li>• Construction or repairing of access roads</li> </ul>	<p>Soil and water contamination</p> <p>Waste generation</p> <p>Loss of biodiversity</p> <p>Social issues related to the introduction of new workers in the area, e.g. HIV/AIDS spreading</p>

<b>General site inspection</b>	Site inspection conducted by the technical and SHEW teams	Waste generation  Improve compliance  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:**

<b>Responsible person</b>	<b>Responsibilities</b>	<b>Phase/Activity</b>
Project Manager	<ul style="list-style-type: none"> <li>• Is responsible for the enforcement of the EMP.</li> <li>• To ensure that environmental requirements are adequately covered in any external service providers contracts.</li> <li>• 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.</li> <li>• To ensure that corrective actions are implemented for non-compliances</li> <li>• To ensure that appropriate records and information regarding compliance with environmental requirements are maintained.</li> </ul>	Construction and Operation of the Wind Mast

	<ul style="list-style-type: none"> <li>• To ensure that the Wind Mast remains in compliance with the requirements of this EMP, through regular communication and monitoring.</li> <li>• 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.</li> <li>• Must ensure that the contractor remains in compliance with the requirements of this EMP, through regular communication and monitoring.</li> </ul>	
NamPower SHEW	<p>To ensure that all requirements with regards to this EMP are fulfilled.</p> <ul style="list-style-type: none"> <li>• To assist the Project Manager in ensuring that the contractor remains in compliance with this EMP.</li> <li>• Provides SHEW inductions to NamPower and contractor employees as well other stakeholders working or visiting the site.</li> <li>• Organize and implement monitoring and audit functions, in consultation with the Project Manager.</li> <li>• Document and communicate monitoring, audit and inspection findings to project manager.</li> <li>• 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.</li> </ul>	All phases of the project

Contractor	<ul style="list-style-type: none"> <li>• Is responsible for the implementation of the EMP</li> <li>• To appoint as SHE officer responsible for the implementation of this EMP.</li> <li>• 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.</li> <li>• Ensure staff members are regularly trained and awareness built relating to environmental and social management.</li> <li>• 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.</li> <li>• Ensuring that all employees receive a SHEW induction before the start of the project.</li> <li>• Ensuring that the work being done does not create a nuisance within the immediate surroundings of the site.</li> </ul>	
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## 7. CONSTRUCTION AND OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN (EMP)

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RESPONSIBLE PERSON
Personnel and Environmental awareness	<ul style="list-style-type: none"> <li>• All employees both internal and external to receive environmental awareness training and refresher environmental awareness training to be available when required.</li> <li>• All contractor employees to receive induction before any</li> </ul>	All phases	Project manager  Contractor  Safety Health ,Environment and Wellness Department representative(SHEW)

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RESPONSIBLE PERSON
	<p>work is commenced on the power line.</p> <ul style="list-style-type: none"> <li>• All employees are to be made aware of their individual roles and responsibilities in achieving compliance with the EMP.</li> <li>• Environmental toolbox talks to be conducted by the contractors and records to be kept onsite.</li> <li>• The Contractor shall take all necessary precautions against trespassing on private properties;</li> <li>• Warning signs must be placed on and around the site as per the Occupational, Health and Safety requirements;</li> <li>• Adequate first aid services must be provided by the contractor at the contractor's camp;</li> <li>• The contractor will be responsible for his own security arrangements and shall comply with all site security instructions;</li> <li>• Basic firefighting equipment must be available on site;</li> <li>• PPE to be provided and well maintained at contractor's camp; and</li> <li>• All incidents should be reported to ECO, investigated, documented and kept in safety file.</li> </ul>		
Vegetation	<ul style="list-style-type: none"> <li>• Plant material may not be collected and removed from site</li> <li>• Areas with a high density of vegetation growth shall be avoided when access routes are planned.</li> <li>• Herbicides may not be used on site</li> <li>• Rehabilitation must be carried out prior to the contractor leaving the site and in the manner prescribed in this document</li> <li>• A speed limit of 30 km/h shall be maintained on site</li> </ul>		<p>Contractor</p> <p>Safety Health, Environment and Wellness Department representative.</p>

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RESPONSIBLE PERSON
	<ul style="list-style-type: none"> <li>Trucks and larger vehicles shall have a designated turning point</li> </ul>		
Health and Safety Management	<ul style="list-style-type: none"> <li>All staff should undergo a general health and safety induction.</li> <li>Only medically fit personnel to be employed.</li> <li>Enforce general health and safety rules onsite</li> <li>Develop and implement an occupational health and safety system that comprises key elements such as risk assessment and safe working procedure.</li> <li>All work activities to be done under the supervision of a competent person.</li> <li>Personal protective equipment must be worn by all employees and contractors.</li> <li>Employees must receive proper training before receiving PPE.</li> <li>Erect physical barriers to ensure there is no unauthorised access to site.</li> <li>Maintain an incident and complaint register.</li> <li>All unattended open excavations shall be adequately demarcated (fencing shall consist of a minimum of three strands of wire and made clearly visible).</li> <li>Adequate protective measures must be implemented to prevent unauthorised access to and climbing of partly constructed towers and protective scaffolding.</li> <li>No firearms shall be permitted on Site.</li> <li><b>Airplane warning lights to be in place on the tower.</b></li> </ul>	All phases	Project manager  Contractor  Safety Health ,Environment and Wellness Department representative.
Additional Radar Installations to	<ul style="list-style-type: none"> <li>The proposed wind meteorological mast will be</li> </ul>	All phases	Project manager



ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RSEPONSIBLE PERSON
deter Aircraft Collisions	<p>marked with aviation obstruction lights as per ICAO standards.</p> <ul style="list-style-type: none"> <li>• The wind meteorological mast's installation and proposed aviation controls have been approved by the Namibia Civil Aviation Authority (NCAA) (see attached approval letter). As such, the wind meteorological mast will be registered by the NCAA as a permanent structure and included in a Notice to Airmen (NOTAM) upon commencement of the installation Works.</li> <li>• No radar installations are required for this type of structure.</li> <li>• Comply with Namibia Civil Aviation Authority approval conditions.</li> </ul>		Contractor
Dust Management	<ul style="list-style-type: none"> <li>• Control dust in the during construction e.g by wetting the surface if necessary.</li> <li>• Excavation, handling and transport of erodible materials shall be avoided under high wind conditions or when a visible dust plume is present.</li> <li>• Dust generation from all activities will be minimised wherever possible.</li> <li>• A maximum speed limit of 20 - 30km/h will be enforced to control dust emissions, and minimize incidents onsite.</li> <li>• Transport of construction material will ensure measures to prevent fugitive dust emissions.</li> <li>• Dust suppression measures shall be implemented if necessary. Dust may be controlled by damping of the road with water when</li> </ul>	All phases	Project manager  Contractor

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RESPONSIBLE PERSON
	<p>necessary to minimise nuisance dust.</p> <ul style="list-style-type: none"> <li>• Construction machinery and equipment will be maintained in good working order in order to minimise exhaust fumes</li> </ul>		
Resources Efficiency	<ul style="list-style-type: none"> <li>• Minimise water use</li> <li>• Avoid wasteful use of materials</li> <li>• Source goods and services locally where possible</li> <li>• Minimise the generation of waste by applying the waste hierarchy.</li> </ul>	All phases	Project manager  Contractor
Waste Management	<ul style="list-style-type: none"> <li>• The site to be kept free of waste.</li> <li>• No burning, burying or dumping of any waste materials, vegetation, litter or refuse shall be permitted onsite.</li> <li>• 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.</li> <li>• Ensure that waste segregation is done at source.</li> <li>• Hazardous waste shall be disposed of at a registered waste disposal site.</li> <li>• Safe disposal certificates for hazardous waste must be kept in the SHE file.</li> <li>• No material shall be left on site that could be of harm to humans and animals.</li> <li>• Broken, damaged and unused nuts, bolts and washers shall be picked up and removed from site.</li> <li>• Waste shall be removed from site on a daily basis and disposed of at the appropriate waste management site</li> <li>• Hazardous waste shall be disposed of at approved dump site. Record shall be kept of all hazardous waste disposed of.</li> </ul>	All phases	Project manager  Contractor

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RSEPERSONIBLE PERSON
	<ul style="list-style-type: none"> <li>• No waste material shall remain on site once the project has been completed.</li> <li>• Surplus concrete may not be dumped indiscriminately on site, but shall be removed from site when nearing completion of the different stages of work.</li> <li>• Concrete trucks shall not be washed on site unless adequate washing and concrete collection facilities be introduced to site.</li> <li>• Bins and containers must be made available by the contractor for the storage of construction waste.</li> <li>• No burning of cleared vegetation shall be allowed on site.</li> </ul>		
Wastewater management	<ul style="list-style-type: none"> <li>• Water containing environmental pollutants shall be collected and removed from site.</li> <li>• No waste water runoff or uncontrolled discharges from the site/working areas shall be permitted.</li> <li>• Mobile toilets or septic tanks should be used and be regularly emptied.</li> </ul>	All phases	Project manager Contractor
Cultural resource	<ul style="list-style-type: none"> <li>• Any chance finds must be reported to NamPower environmental section.</li> <li>• 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.</li> </ul>	All phases	Project Manager SHEW Contractor
Protection and handling of fauna on site.	<ul style="list-style-type: none"> <li>• 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.</li> </ul>	All phases	Project Manager  Contractor  SHEW

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RESPONSIBLE PERSON
	<ul style="list-style-type: none"> <li>• The contractor must report problem animals or vermin to the SHEW.</li> <li>• Ensure that domesticated and livestock animals belonging to the local community are kept away from the construction works.</li> <li>• The contractor may under no circumstances make use of pesticide or poison to control unwanted animals.</li> <li>• Workers should be educated so as not to kill any fauna found onsite.</li> <li>• The footprint of disturbance should be kept to a minimum</li> <li>• No hunting or trapping is permitted along the alignment.</li> <li>• Excavations must be checked on a regular basis for any signs of wildlife which may have fallen in.</li> </ul>		
Bird collisions with Guy support wire.	<ul style="list-style-type: none"> <li>• According to the US Federal Aviation Administrative guidelines that allows towers to turn off those solid red lights and replace them with flashing red lights which does not attract birds the same way. As the flashing light used for aviation warning lights reduces the number of bird fatalities around towers by between 50 to 70 percent. Therefore the flashing on the tower will serve two purposes for aviation warning and ( preventing plane collisions ) and mitigating birds collisions.</li> <li>• Additionally , the Guyed mast will be checked/monitored for signs of bird collisions every quarter or in line with the mast 's maintenance schedule ; the findings will be recorded as with collision-victim surveys in the post-construction phase.</li> <li>• Furthermore incidental sightings of priority species,</li> </ul>	Construction and Operation phases	Project Manager and SHEW

ASPECT	MANAGEMENT AND MITIGATION MEASURES/COMMITMENTS	Phase/ Activity	RSEPONSIBLE PERSON
	<p>particularly if suggestive of breeding, important feeding or roosting sites, or flight paths, should be recorded.</p>		
Noise	<ul style="list-style-type: none"> <li>• Given the remote location of the proposed site, noise level will not be a concern as the mast is for wind measurements purposes, therefore noise levels will be insignificant onsite.</li> <li>• Should conditions change, NamPower must update the EMP accordingly.</li> </ul>	Construction and operation	Project Manager  SHEW
Site Rehabilitation	<ul style="list-style-type: none"> <li>• A post construction inspection 1 week before the Contractor has moved off site.</li> <li>• SHEW to sign site close off or take over certificate once remedial corrective action is implemented.</li> </ul>	Construction and Decommissioning Phase	Project Manager  SHEW  Contractor
Decommissioning	<ul style="list-style-type: none"> <li>• 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.</li> <li>• 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.</li> </ul>		Project Manager  SHEW  Contractor

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## **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.



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NCAA:AGA:184

27 November 2020

Namibia Power Corporation (Pty) Ltd  
Assistant Engineer  
Generation Capital Projects  
P.O. Box 2864  
Windhoek

Dear Mr Chivala,

**SUBJECT: APPLICATION TO ERECT STRUCTURES NEAR LUDERITZ AIRPORT AND KEETMANSHOOP AIRPORT**

I refer to your letter dated 15 October 2020, requesting guidance on the erection of permanent structures outside the vicinity of Luderitz Airport and Keetmanshoop Airport.

Pursuant to NAMCARs 139.11.6, the NCAA has no objection to the erection of the wind resources measurement stations (wind high masts). We further wish to inform you that, the review of your application concluded that, the proposed erection of the **100m high wind masts** at the following locations does not infringe the Obstacle Limitation Surfaces for the **Luderitz Airport and Keetmanshoop Airport**:

- **27°10'47.46"S, 15°28'55.45"E**, 60 km from Luderitz Airport
- **27°21'55.07"S, 18°42'52.27"E**, 109.49 km from Keetmanshoop Airport

Furthermore, NamPower must ensure that the **100m high wind masts** remain within the limits specified above and ensure that they are marked and/or lighted as per the requirements.

Finally, the Namibia Civil Aviation Authority reserves the authority to initiate the removal of any obstruction within the vicinity of an aerodrome where it is in the interest of aviation safety (NAMCARs 139.11.7).

Your usual cooperation is highly appreciated.

Yours sincerely,

  
30/11/2020

Mr. Reinhard Gärtner

**Interim Executive Director of Civil Aviation**



CC: Mr. Bisey /Uirab

Chief Executive Officer: Namibia Airports Company

**Board Members:** Mr. Bethuel T. Mujetenga (Chairperson), Mrs. Kadiva D. Hamutumwa (Deputy Chairperson), Ms. Josephine N. Amukwa, Ms. Martha N. Hitenyanye, Mr. Fernando Somaeb, Mr. Melkisedek Uupindi, Mr. Reinhard Gärtner (Interim Executive Director)



# **GRUNAU SITE 4**

# **METEOROLOGICAL WIND**

# **MAST**

Supporting Information Report for  
the Ministry of Environment,  
Forestry and Tourism (MEFT)

29 April 2019 (original)

18 January 2020 (updated)

**Namibia Power Corporation Pty (Ltd)**

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## DOCUMENT ISSUE AND REVISION RECORD

Rev	Date	Originated by:	Distribution
1.0	29/04/2019	NamPower	Namibia Civil Aviation Authority, Namibia Airports Company
1.0		NamPower	Ministry of Environment, Forestry and Tourism (MEFT)
1.1	18/01/2021	NamPower	Ministry of Environment, Forestry and Tourism (MEFT)

## 1 INTRODUCTION

This application to the MEFT is for the erection of a wind meteorological mast which is required for the development activities of the 40MW NamPower Wind Power Project.

The wind meteorological mast will consist of a steel lattice tower/mast with several measurement sensors (to measure temperature, humidity, wind speed and wind direction). The data captured from this wind meteorological mast is required to confirm the feasibility of the project and to assist with the design of the final wind turbines.

Once the wind meteorological mast has been erected and sufficient data has been measured, NamPower will make a full Environmental and Social impact Assessment application to MEFT for the erection of the final wind farm which will include multiple wind turbines.

In order to erect the wind meteorological mast, NamPower has procured the services of a contractor for the supply, installation, and commissioning of a wind resource measurement station in the Lüderitz area.

This application for the Environmental Clearance Certificate (ECC) to the Ministry of Environment, Forestry and Tourism (MEFT) is for the erection of one (1) meteorological wind mast (steel lattice tower) at the location detailed below

For avoidance of doubt, this application is not for the wind farm which includes multiple wind turbines.

## 2 PROJECT DESCRIPTION

The best wind resource in Namibia is located in the coastal area surrounding Lüderitz and the Elizabeth Bay area. A desktop site selection study was conducted to identify the ideal site for the assessment of the wind resource in the area. Considering the environmental impacts, the preferred site could be located as indicated in Figure 1 and described in Table 1, with coordinates at 27°21'55.07"S; 18°42'52.27"E.



**Figure 1: Preferred location of the Project Site**

The final position of the measurement station will be identified by the NamPower and verified on site, in conjunction with the Contractor and in adherence with the statutory approvals. This will be done before the commencement of any civil or foundation preparation work.

**Table 1: Description of the Wind Resource Measurement Station Site**

General Identifiers	Description
NamPower's Preferred Site	27°21'55.07"S; 18°42'52.27"E
Description of Project Area	The area can best be described as undulating hills of metamorphic rock with sandy inlays, with variations slighter than can be represented by the 20 meter contour intervals of a topographic sheet. The site consists of an expansive flat plateau, with low undulations.
Elevation	± 1868 m.a.s.l.
Structural Details	Steel lattice tower with a width of 470 mm erected to a height of 100 m, supported by steel wires. See Error! Reference source not found..



**Figure 2 NamPower Meteorological Wind Mast near Elizabeth Bay (67% complete at 67 m of 100 m)**

### 3 WORK PLAN

The on-site works are expected to have a duration of 6 days and will largely be completed with standard construction equipment related to the Scope of Works. The activities to be undertaken on site are described in this section and are, namely, the:

- Site visit and inspection
- Site establishment and civil works
- Delivery and storage of the tower lattice components and equipment
- Electro-mechanical assembly to complete the installation
- Commissioning and testing
- Inspections and training

The project will begin with a site visit of the mast location selection, by the Contractor and NamPower, in order to inspect the site and finalise the ideal position for the mast within the approved project area. The inspection will include basic visual surveying of the terrain and soil conditions on foot, with the measurement of coordinates and photographs to be taken.

Once the exact position of the measurement station is finalised the site establishment and civil works will be undertaken by the Contractor.

The site establishment will include demarcation and fencing of the wind mast Site and preparation of facilities for storage of materials and equipment. The civil works will include the excavations for the mast lattice tower and anchoring system foundations, and the subsequent construction of those foundations. The main equipment used for the civil works will be an excavator and a cement mixer. Cranes will not be used in the works.

The wind meteorological mast will be fitted with aviation obstruction lights as per International Civil Aviation Organisation (ICAO) standards and finished in alternating bands of aviation orange (red) and white paint. (ICAO lighting system 48 VDC at the top of the mast and, 2 single lights at the middle of the mast). A drawing of the wind meteorological mast layout and details is contained in Appendix A.

The Contractor will take delivery of the wind mast components and related equipment at the Site. The electro-mechanical assembly will include the assembly of components and equipment for the mast structure including the anchoring and electrical earth grounding, the measurement sensors, data acquisition system, power supply, satellite communication module, lighting and surveillance installations.

The works on site will conclude with the commissioning and testing of the Wind Resource Measurement Station assembly. NamPower staff will also receive training on site, presented by the contractor, regarding the operation all the systems installed at the site. The intended schedule for the on-site works are as follows:

Details of Activities			On-Site					
No	Description	Duration (days)	1	2	3	4	5	6
1	Site establishment and civil works	2	■	■				
2	Delivery of wind mast and related equipment to site	2	■	■				
3	Completion of electromechanical assembly	2			■	■		
4	Commissioning and testing	1					■	
5	Final documentation, manuals, as-built drawings	1						■
6	Training	1						■

**Table 2 Schedule for the On-site Works**



## 4 CONSTRUCTION METHODOLOGY

The Wind Resource Measurement Station will comprise of a lattice tower, stabilized by anchored guy-wires and mounted with the listed measurement sensors at heights as indicated in Table 3. The lattice will be assembled and fitted with the sensor assemblies prior to erection. The data acquisition system, power supply and satellite communication module will be installed closer to the base of the lattice tower.

Civil works will be carried using standard digging equipment depending on the soil conditions at the Site. Materials and equipment will be delivered to site using tri-axle heavy duty vehicles and stored at the Site, where necessary. After the electro-mechanical assembly and the erection of the tower are complete, commissioning and testing of the Wind Resource Measurement Station will be conducted.

The wind mast will be fenced and the Site will then be cleared of all debris and waste.

## 5 EQUIPMENT

The main equipment to be installed for the wind resource measurement station is as follows.

Offered Item	Purpose /
Temperature Sensor and Relative Humidity Sensor: Galltec KPC 1/5	<b>Ambient Temperature measurement</b> (at a height within 10 m of the primary anemometer and a back-up sensor at 2 m above ground level.)
Anemometers: Thies Class I, incl. IEC 61400-12 Calibration	<b>Wind speed measurement (including wind gust)</b> at minimum 4 levels (i.e. 100 m (x2), 80 m, 60 m, 40 m) as per IEC 61400-12-1
Pyranometer: HUKSEFLUX SR11	<b>Global Horizontal Irradiance (GHI) measurement</b> (at a height of approximately 2 m above ground level)
Wind Vanes: Thies Class I, incl. IEC 61400-12 Calibration	<b>Wind direction measurement</b> (at minimum 3 levels at a height within 10 m of the primary anemometer (i.e. 90 m (x2), 70 m, 50 m) as per IEC 61400-12-1)
Barometric Pressure Sensor: Kintech K611P	<b>Barometric pressure measurement</b> (at a height within 10 m of the primary anemometer and at 98 m above ground level)
Data Logger: Kintech Orbit 360, with USB Cable and 2G SD Card	<b>Data acquisition and storage</b> (at the base of the mast tower)
Enclosure: NRG Symphonie Shelter Box	<b>Protection and security</b> (at the base of the mast tower)

Kintech Satellite Module for Orbit 360 Data Logger	<b>Data Transmission</b> (at the base of the mast tower)
Solar Module 335W	<b>Battery charging</b> (at the base of the mast tower)
Bluesolar MPPT 100/50 and 75/15 Charging Regulator 12/24V	<b>Battery charging control</b> (at the base of the mast tower)
Batteries, 12 V 220Ah Sealed Lead Acid	<b>Electricity storage and supply</b> (at the base of the mast tower)

**Table 3 Main Equipment to be installed at the Wind Mast**

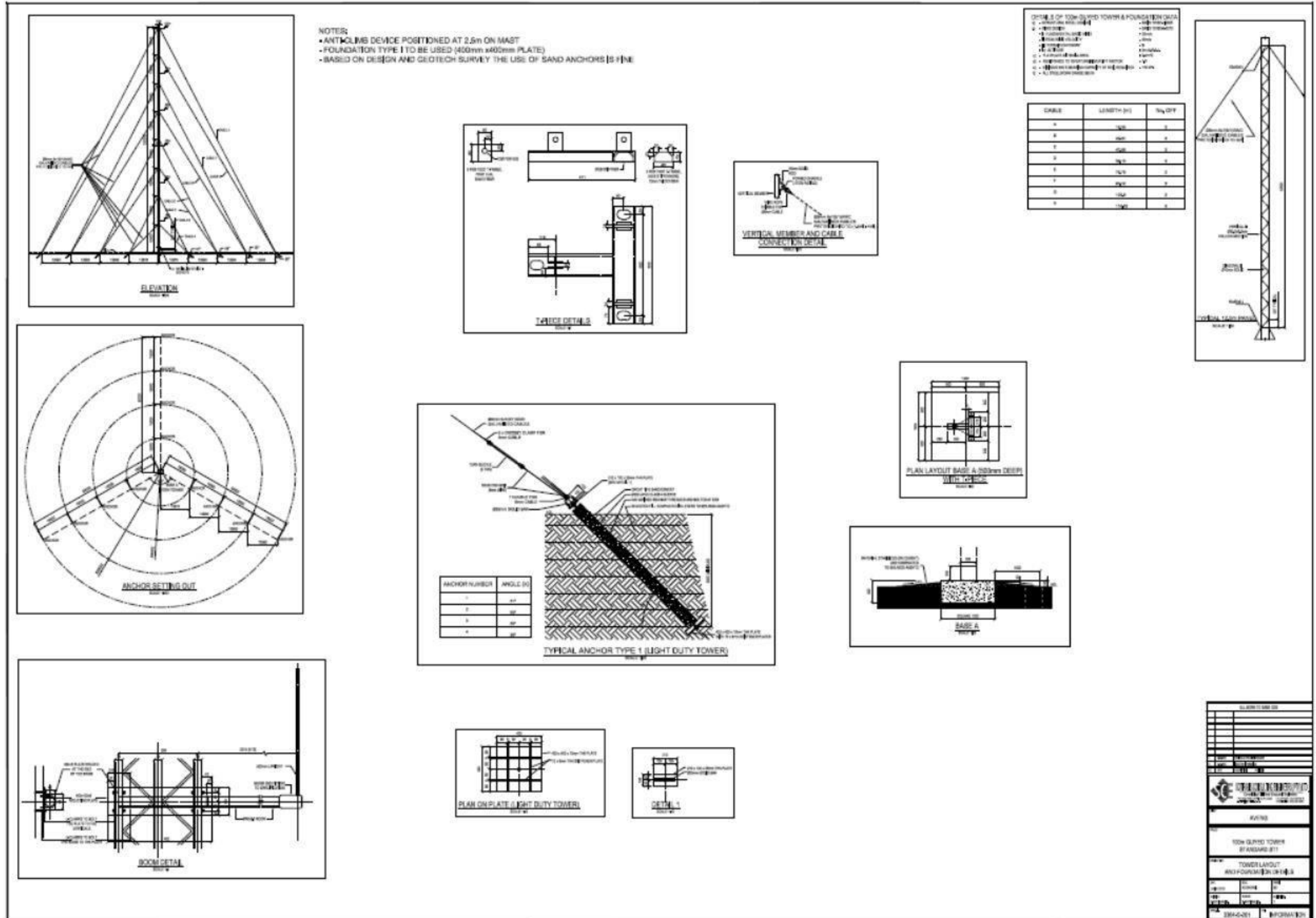
## 6 MITIGATIONS

This wind meteorological mast is a static structure with the only moving parts being the small sensors (anemometers and wind vanes) indicated in Appendix B – Wind Mast Drawing. These small sensors will not create any noise.

To reduce the probability of avian collisions, a narrow mast profile has been selected with a width of 470 mm across the entire height.

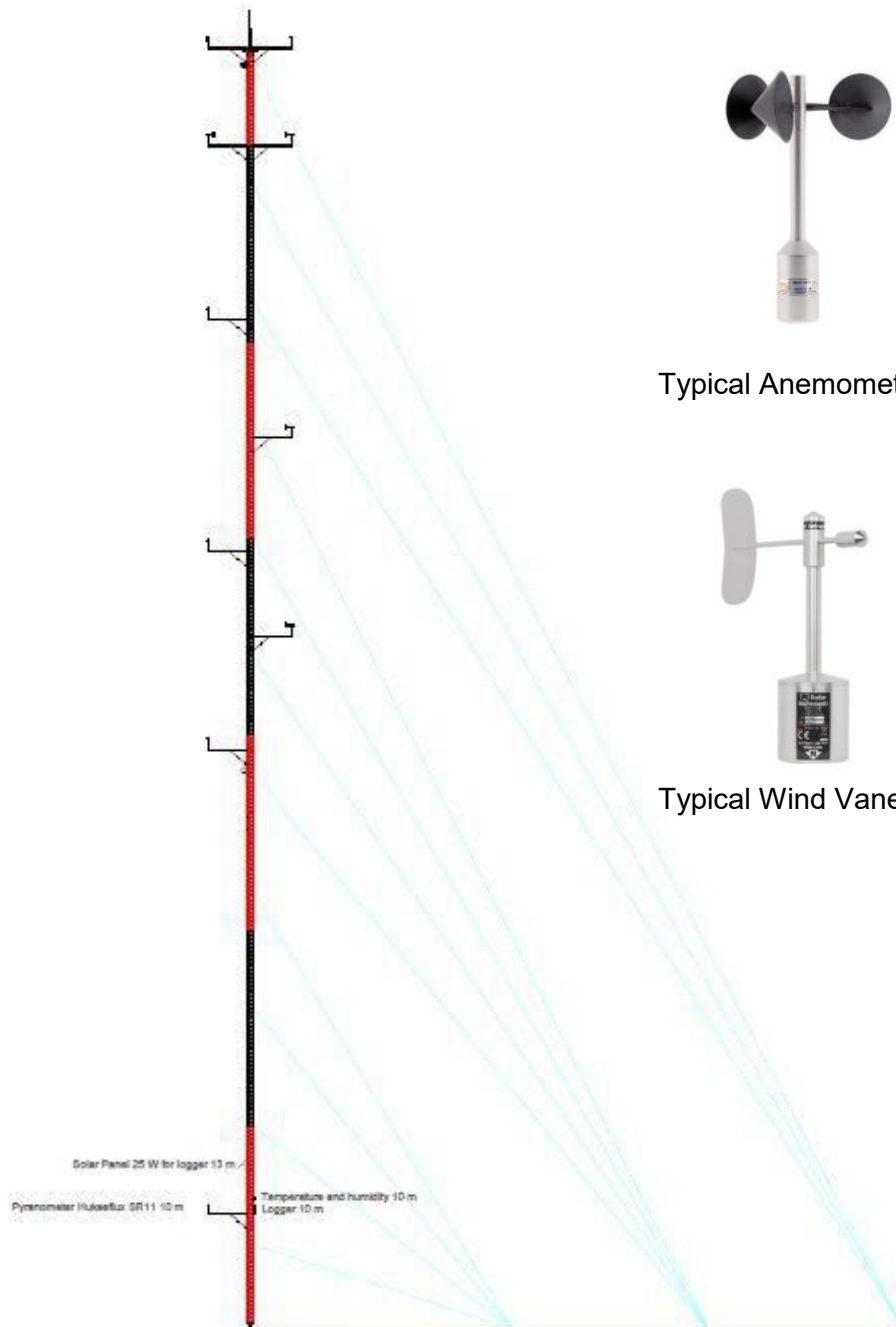
The wind meteorological mast will be marked with aviation obstruction lights as per ICAO standards. The wind meteorological mast's installation and proposed aviation controls have been approved by the Namibia Civil Aviation Authority (NCAA) (see attached approval letter). As such, the wind meteorological mast will be registered by the NCAA as a permanent structure and included in a Notice to Airmen (NOTAM) upon commencement of the installation Works. No radar installations are required for this type of structure.

## Appendix A – Meteorological Wind Mast Drawing



## Appendix B – Meteorological Wind Mast Drawing

# GRUNAU TOWER



Project: W/OIB/NPWR-01/2020	Position:	
Customer: NAMPOWER	Country:	
Drawing: GRUNAU TOWER	Scale: -	
Author: ALEJANDRO TOVAR	Date: 08/03/2020	Measurement Unit: -
Contractor: NAMPOWER	Comments: -	