ENVIRONMENTAL SCOPING ASSESSMENT (ESA) FOR THE PROPOSED CONSTRUCTION AND OPERATION OF A RADIO TRANSMISSION TOWER IN THE OMINDAMBA B VILLAGE OF THE RUACANA CONSTITUENCY, OMUSATI REGION

ENVIRONMENTAL SCOPING REPORT (ESR)

MAY 2020

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SHALOM MESSENGER MINISTRIES

MAFUTA
Environmental Consultants

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PROJECT NAME	**PROPOSED CONSTRUCTION AND OPERATION OF A RADIO TRANSMISSION TOWER IN THE OMINDAMBA B VILLAGE OF THE RUACANA CONSTITUENCY, OMUSATI REGION**
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ACRONYMS

TERMS	DEFINITION
ARPANSA	including Australian Radiation Protection and Nuclear Safety Agency
BID	Background Information Document
BTS	Base Transceiver Station
COVID-19	Coronavirus disease (COVID-19) an infectious disease caused by a newly discovered coronavirus.
CRAN	Communications Regulatory Authority of Namibia
DEA	Directorate of Environmental Affairs
EAP	Environmental Assessment Practitioners

TERMS	DEFINITION
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMF	Electromagnetic Field
ESA	Environmental Scoping Assessment
ESR	Environmental Scoping Report
ICAO	International Civil Aviation Organisation
ICNIRP	International Commission on Non-Ionizing Radiation Protection
I&APs	Interested and Affected Parties
MEC	Mafuta Environmental Consultants
MEFT	Ministry of Environment, Forestry and Tourism
MICT	Ministry of Information Communication and Technology
NAMCARS	Namibia Civil Aviation Regulations
NCAA	Namibia Civil Aviation Authority
NEMA	Namibia Environmental Management Act
NHC	National Heritage Council
NORED	Northern Regional Electricity Distributor
NRPA	National Radiation Protection Authority of Namibia
RF EME	Radio Frequency Electromagnetic Emission
SEAR	Specific Energy Absorption Rate
WHO	World Health Organization

DEFINITION OF TERMS

The '**Consultant**' – this refers to the team that is conducting the ESA, compiling the ESR and developing the draft EMP for the proposed project (development).

The '**Proponent** – this refers to the institutions/departments that are directly involved in the implementation of the project, i.e. Shalom Messenger Ministries.

The '**Stakeholders**' – this refers to the people, organisations, NGOs that are directly or indirectly affected and interested by the project.

The '**Environment**' – this refers to the ecology, economy, society, and politics.

i. Purpose of this Environmental Scoping Assessment Report

This Environmental Scoping Report (ESR) was compiled based on the regulatory requirements of the Environmental Management Act No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations pertaining to the construction and operation of the radio transmission tower. Existing information and input from authorities, Interested and Affected Parties (I&APs) as well as observations of the Environmental Consultant were used to identify and evaluate potential environmental impacts (both social and biophysical) stemming from the proposed project.

Environmental flaws associated with the proposed project were identified during the environmental assessment process and presented in this document. A conscious decision was made based on the national Environmental Management Regulations, Guidelines, and best practices to assess both significant and less significant environmental impacts stemming from the project activities. The Environmental Management Plan (EMP) developed for this proposed project will need to be effectively implemented by the Proponent (and appointed contractors), to ensure that adverse environmental impacts are avoided and minimized if avoidance is not possible.

This ESR will also be used to motivate and define the previously identified, project alternatives (i.e. site choice, technology and layout) based on the findings of the environmental baseline study and the suitability of the site to the type of development.

The ESR aims to:

- Provide an overall assessment of the social, physical, and biophysical environments of the area affected by the proposed tower activities.
- Undertake a concise environmental assessment, in terms of environmental criteria and impacts (direct, indirect, and cumulative), and recommend a preferred location for the proposed tower (based on environmental sensitivity), if found to be necessary.
- Identify and recommend appropriate mitigation measures for potentially significant environmental impacts.
- Undertake an inclusive Public Participation Process (PPP) – dispute limitations owing to the global pandemic (COVID-19) at the time of the ESA process; and

- A systematic approach was adopted for the successful completion of the ESA in line with the regulated process.

ii. Assumptions and Limitations

The following assumptions and limitations underpin the approach to this EIA study:

- The information received from the stakeholders, desktop surveys and baseline assessments are current and valid at the time of the study.
- A precautionary approach was adopted in instances where baseline information was insufficient or unavailable.
- Mandatory timeframes will apply to the review and adjudication of the reports by the competent authority (Ministry of Information Communication and Technology (MICT)), environmental custodian (Ministry of Environment, Forestry and Tourism (MEFT)) and other relevant government departments; and
- It is assumed that the information provided by the Proponent is correct and that all necessary information has been disclosed.
- It is assumed that there will be no significant changes to the proposed project (please refer to Chapter 2) or the receiving environment (as presented Chapter 5) between the compilation of this report and implementation of the proposed project that could substantially influence findings and recommendations with respect to mitigation and management.

NB: The EAP does not accept any responsibility if additional information comes to light at a later stage of the environmental process. All data from unpublished research utilised for the purposed of this project is valid and accurate. The scope of this investigation is limited to assessing the potential biophysical and social impacts associated with the proposed project.

iii. Report Summary

This document serves an Environmental Scoping Report for the proposed construction and operation of a radio transmission tower by Shalom Messenger Ministries in Omindamba B Village, Uukolonkadhi sub-tribal area of the Omusati Region. Therefore, content revealed in this report best describe the site conditions during the time, an environmental assessment was undertaken, and the document was compiled.

EXECUTIVE SUMMARY

Shalom Messenger Ministries proposes to construct and operate a 300 m high free-standing radio frequency transmission tower (or in short, radio transmission tower) at the Oshetu No. 5 local shebeens (*cuca* shops) in the Omindamba B Village of the Uukolonkadhi Traditional Authority, Omusati Region. The proposed site is located about 30 km east of the Ruacana Town in the Ruacana Constituency along the Ruacana-Outapi road (C46) in northern Namibia. The land planned for the tower (and its associated structures) and as approved by the local traditional authority (headman) is 16 by 19 m^2. This allocated land (within the demarcated site boundary) will be used for the tower and storing operational and maintenance equipment.

The need for the proposed tower was identified by the project Proponent due to poor radio frequency coverage in this area. In other words, this also came after realizing that the area has no radio station broadcasting full time frequency modulation (FM) modulation and related services.

The proposed project (erection and operation of a radio transmission tower) is however one of the listed activities in the National Environmental Management Act (NEMA) No.7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations that cannot be undertaken without an Environmental Clearance Certificate (ECC). The ECC would be applied for and obtained from the Department of Environmental Affairs (DEA) of the Ministry of Environment, Forestry and Tourism (MEFT). As part of the ECC application process, an environmental assessment (identifying and assessing the potential risks and impacts associated with the project activities) needs to be conducted and an Environmental Management Plan (EMP) developed (to avoid and or mitigate the risks).

The proposed development/project is a listed as per the following EIA Regulation:

- *10.1 (g) The construction of masts of any material or type and of any height, including those used for telecommunication, broadcasting, and radio transmission.*

PUBLIC CONSULTATION

As required by Regulation 21 to 24 of the EIA Regulations on public consultation process, the public was consulted through the following means:

- **Background Information Document (BID):** a BID was drafted at the onset of the ESA process to act as a useful information handout about the proposed project. In addition, the BID provided details on the public consultation process with contact details for further information. This document was advertised for availability through various means of newspaper articles, electronic mail and upon request via mobile phones (cellphones).
- **Newspaper Advertisements**: Newspaper adverts about the proposed project and related EA processes were circulated in the *New Era* newspaper for two weeks (on the 7th and 16th of April 2020).
- **Public meeting:** It should be noted that, no public meeting was held for this ESA due to the global outbreak of the coronavirus (COVID-19) that led to the banning of public gatherings, in order to prevent further spreading of the virus (new infections). To make up for this limitation, the Environmental Consultant had to ensure that the public, specifically the neighbouring property owners, letters were compiled and delivered to them. The public was further afforded two weeks from the date of letter receipts to send their comments through email and/or short mobile messages to the Environmental Consultant for incorporation into the ESA report.
- **Consultation letters for the locals:** Consultation letters with a brief background of the proposed project and explain the need and importance of I&APs involvement was compiled in Oshiwambo (to accommodate the locals who may not be English literate). The letters were hand delivered to the Omindamba B Village Headman (received by his Secretary) and property owners (local *cuca* shops and homesteads) neighbouring the proposed site on the 6th of May 2020.
- **Consultation letters for the relevant authorities**: Similarly, consultation letters prepared in English with the hard copies of the BID were also delivered to the relevant national governmental institutions in Windhoek on the 7th of May 2020. The BID copies were also emailed to the Omusati Regional Council (addressed to the Chief Regional Officer) and Ruacana Constituency Council (addressed to the Constituency Councillor) for comments and inputs.
- **Site notices:** A site notice translated into Oshiwambo language was placed at the project site on the 6th of May 2020. The notice provided information about the project

and related EA while providing contact details of the project team for project communication purposes.

- **Comments Period and Feedback:** From the onset of the public consultation process and the initial information sharing through the BID, newspaper, consultation letters and site notices, various stakeholders have been registered for the ESA process. After the hand delivery of consultation letters to the project site neighbours and headman on 6 May 2020, the Environmental Consultant contacted them again (as per contacts number provided in the delivery registry form) on 21 May 2020 to find out if they had any comments or an input they would like to share. Those who were reachable on their phones indicated that they had no comments nor objections to the proposed radio tower as they also believed that it will be beneficial to the community's communications services.

IMPACT IDENTIFICATION AND ASSESSMENT

The potential beneficial and adverse impacts stemming from the proposed tower during the two vital phases (construction and operations) are listed below. These potential impacts are described and assessed further in the report.

Positive impacts: Radio frequency convenience in the area, **short-term employment creation** and general contribution to **local economic development through reliable communications services.**

Negative impacts: Potential soil disturbance and impact on water resources, health concerns electromagnetic radiation, general Health and safety associated with mishandling of project equipment, impact on Civil aviation, impact on avifauna (birds): potential collision of birds into the tower (flying over the site). Further impacts include, waste generation (environmental pollution), noise, dust generation and decrease in surrounding air quality (construction), vehicular traffic safety, Visual (during operations) and archaeological impact.

CONCLUSIONS AND RECOMMENDATIONS

The proposed radio transmission tower will primarily positively contribute towards the improved communication services in the area as well as few temporary job opportunities to the locals during the construction and possibly maintenance phase. However, the proposed project is potentially associated with some negative impacts that were identified, described,

and assessed during the environmental process. The significance rating of the impacts was found to be medium. Where it is anticipated that the potential impact cannot be practically avoided altogether, appropriate mitigation measures were recommended for implementation during respective phases of the project. Should the recommendations included in this report and the EMP be implemented, the significance of these impacts can be reduced to low rating and promote a biophysical and social sustainable environment.

Furthermore, for an impact rating to remain low throughout the project life cycle, the implementation of mitigation measures needs to be monitored and reported. Implementation and monitoring will need to be done by either the Proponent themselves or through an appointed Environmental Consultant or Environmental Control Officer (ECO)) and report to the applicable Competent Authority (MEFT). Monitoring will not only be done to maintain the low significant rating but also to ensure that all potential negative impacts identified in this study and new impacts that may arise during project implementation are properly identified in time and addressed (mitigation measures provided for immediate implementation).

The effective implementation and monitoring of the mitigation measures, would ensure environmental sustainability at site and surrounding areas. Therefore, the proposed radio tower may be granted an Environmental Clearance Certificate, but provided that:

- All mitigations provided in this Scoping Report and the management action plans in the EMP are implemented as stipulated.
- All required permits, licenses and approvals for the proposed radio tower are obtained as required (please refer to the Permitting and Licensing Table in the Environmental Management Plan (EMP)).
- The Proponent and all their engineers and contractors comply with the legal requirements governing this type of project and its associated activities; and
- All the necessary environmental and social (occupational health and safety) precautions provided are adhered to.

1. CHAPTER ONE: INTRODUCTION

The need to constantly cater for services such as access to communication is ever increasing everywhere in the world. Telecommunication and radio communications are one of these services required to ensure timely and efficient information dissemination for both rural and urban areas. The need for these services has pushed both the cellular/mobile and radio operators to establish infrastructures in these areas. Although radio services are vital in both urban and rural areas, their significance in rural areas may at times surpasses that of urban areas. This is true because people that live in urban areas have better access to several options of communication due to proximity to communications services providers, that in cases where one device is not functioning, they could use the other. An example of this scenario is access to internet via personal computers (PCs) or desktops, cellular phones, telephones and then radios in towns and cities. As for communities living in villages far from towns and cities, in remote areas where the communications services and devices are limited, their only reliable form of communication services is the radio and in some cases, basic mobile phones, that may also be just owned by some of the rural residents. The radios can only work if the radio transmission towers are well-within these areas to pick up the frequency for transmission. This is where the need to establish radio towers comes in, to cater for rural areas with limited communication resources compared to urban areas.

It is for the reason mentioned above that the project Proponent realized a ripe opportunity to establish a radio tower in the Uukolonkadhi sub-tribal group area near the Ruacana Town in the Omusati Region. This also came after realizing that the entire area has no radio station broadcasting full time frequency modulation (FM) modulation and related services.

The proposed project (constructing and operating a radio transmission tower) is however one of the listed activities in the National Environmental Management Act (NEMA) No.7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations that cannot be undertaken without an Environmental Clearance Certificate (ECC). The ECC would be applied for and obtained from the Department of Environmental Affairs (DEA) of the Ministry of Environment, Forestry and Tourism (MEFT). As part of the ECC application process, an environmental assessment (identifying and assessing the potential risks and impacts associated with the project activities) needs to be conducted and an Environmental Management Plan (EMP) developed (to avoid and or mitigate the risks).

The proposed development/project is a listed as per the following EIA Regulation:

- *10.1 (g) The construction of masts of any material or type and of any height, including those used for telecommunication, broadcasting, and radio transmission.*

In order to fulfil the requirements of the Environmental Management Act, Shalom Messenger Ministries appointed Mafuta Environmental Consultants cc (MEC), as the Environmental Assessment Practitioner (EAP) to conduct the Environmental Assessment process on their behalf and submit the ECC application with the required documents to the Environmental Commissioner.

1.1. Project Background and Location

Shalom Messenger Ministries (hereinafter referred to as the Proponent) proposes to erect and operate a 300 m high free-standing radio transmission (frequency) tower (or in short, radio transmission tower) at the Oshetu No. 5 local shebeens (*cuca* shops) in the Omindamba B Village of the Uukolonkadhi Traditional Authority, Omusati Region. The proposed site is located about 30 km east of the Ruacana Town in the Ruacana Constituency along the Ruacana-Outapi road (C46) in northern Namibia. The land planned for the tower (and its associated structures) and as approved by the local traditional authority (headman) is 16 by 19 m^2. This allocated project land will be used for the tower and storing operational and maintenance equipment. The approximate site coordinates are presented in **Table 1** and the location of the site is shown in **Figure 1** below.

Table 1: Site boundary coordinates of the proposed tower site

Site Point	Latitude	Longitude
Point A	17°26'21.729"S	14°41'23.078"E
Point B	17°26'22.177"S	14°41'23.073"E
Point C	17°26'22.362"S	14°41'23.648"E
Point D	17°26'21.693"S	14°41'23.645"E

Cuca shop *- a Southern African term for a "Shebeen"—an unlicensed house selling alcoholic liquor. The term is used in Namibia and Angola and is derived from a Portuguese make of Cuca beer, which was available in Angola (a Portuguese colony) during the 1960s and the 1970s (Wikipedia).*

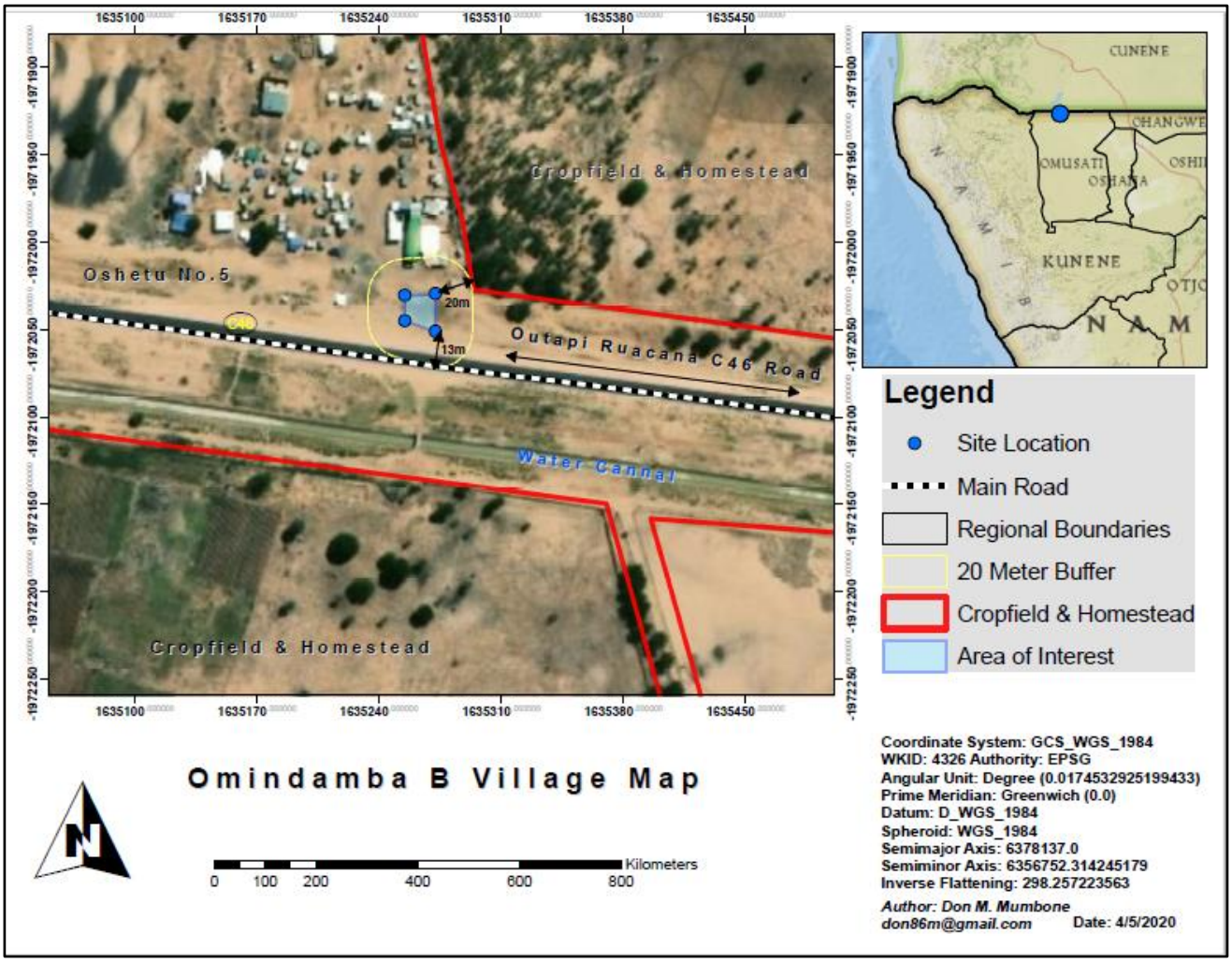


Figure 1: Location of the radio tower site in the Omindamba B Village near Ruacana, Omusati Region

1.2. Need and Desirability

The constant growth in communication services demand and the need to share information worldwide (Namibia included) and the need to deliver and receive information by the intended audience has become a pressing matter in most rural areas of Namibia where communication means are limited due to their remoteness. The project site is one of these known areas that need improved communications (radio) services. The Proponent has identified the need for a radio tower in the site area, which will provide radio frequency, and improve radio signal and information sharing in this area. This proposed development will ensure access to radio transmission services to the local community and neighbouring communities is improved. By setting up the proposed tower and eventual radio station, this will greatly help the affected communities in the area to stay connected to the rest of the country and even the world, through information sharing (via news and advertisements. To put up radio antenna, the Proponent will need to construct / set up a completely

new infrastructure in the Omindamba B village. Therefore, the proposed project will change many lives not only through improved radio services, but also through temporary income generation to some locals during the construction phase and when required, during the operational phase (tower maintenance and upkeeping of the site area).

The aim of the proposed project is to contribute towards Namibian's development plans, namely the National Development Plan 5 (NDP5), Harambee Prosperity Plan (HPP) and Vision 2030.

It is for the above-given reasons that the proposed project is needed and a desirable project in the area.

1.3. The Need for Environmental Scoping Assessment

As mentioned in the introductory chapter, for the proposed structure to be established and operated, it has to comply with the domestic environmental legislation (Environmental Management Act (EMA) No. 7 of 2007) and its 2012 EIA Regulations (GN 30 in GG 4878 of 6 February 2012). An environmental assessment (EA) is required to obtain an Environmental Clearance Certificate from the MEFT before the proposed project can proceed.

It is for that reason that Shalom Messenger Ministries, as the project Proponent appointed Mafuta Environmental Consultants (MEC) to conduct the required Environmental Impact Assessment (EIA) and develop an Environmental Management Plan (EMP) for the proposed project in an application for the Environmental Clearance Certificate (ECC) to the MEFT: Directorate of Environmental Affairs (DEA). The project ECC will then be issued upon approval of the documents produced from the EA, i.e. Environmental scoping report and the EMP. The draft EMP as described in the EMA is attached as **Appendix A**.

This Environmental assessment and reporting were conducted and done by MEC' team. The Curricula Vitae (CV's) of the responsible Environmental Assessment Practitioners (EAPs) are provided under **Appendix B**.

The description of the project and its associated activities are presented under Chapter 2.

2. CHAPTER TWO: PROJECT DESCRIPTION AND ACTIVITIES

This chapter presents the activities and services infrastructure for the proposed project. These processes are presented in terms of activities to be undertaken in the main project phases, namely, the construction and operational and maintenance.

The project shall involve the erection of an eco-friendly 70 m elevated transmission tower at. The tower is designed to provide sufficient height aimed at overcoming high vegetation in the surrounding area to provide better coverage to the intended communities. The system will have a tower that provides the necessary height to give better coverage, and the transceivers and antennae which sit atop the tower. The antennae emit Radio Frequency (RF) electromagnetic energy (also called radio waves) in beams that are typically very narrow in the vertical direction (height), but quite broad in the horizontal direction (width). The system will be transmitting the radio waves to the receivers who are the local radio listeners through a wireless system where airborne communications transmissions shall be facilitated. The system shall involve the use of electromagnetic field propagation to link solar electrical energy from transmitter aerial to receiver aerial, which is then converted into sound.

The activities to be undertaken for the facility construction and its eventual operation are presented under the following subchapters.

2.1. Description of Project Activities

According to the Communications Act of 2009, service providers should consider sharing existing infrastructure in the area first, before constructing completely new structures. However, there is no other possible telecommunication tower / existing infrastructure within the vicinity of the selected tower location.

The erection of the tower will involve vegetation clearing, excavation, setting up, casting, or binding layers, casting of concrete bases, erection of stub column, backfilling, and compaction of soil over the base and around the stud column. The works shall also include the mounting of the tower directly for reinforcements. The components of the tower are platform, antenna, and other necessary structures to enable full functionality of the tower. The tower shall be connected to the existing power grid next to the site and if deem necessary, back-up generators or solar panels may be installed on site in cases of load shedding.

2.2. Site Selection

Radio signal shortfalls experienced by the locals in the area triggered the selection of this site. The outcome of the selection criteria used provided the best potential positions of the tower for a specific area. The following criteria are usually used to optimize the positions of new transmission structures:

- Coverage of existing communications (BTS) infrastructure (if any).
- Surrounding topography and vegetation cover.
- The required footprint.
- The most appropriate design of the structure.

2.3. Land Ownership

The project area is under the Ruacana Constituency of the Omusati Regional Authority which traditionally is under the Uukolonkadhi Traditional Authority. The area is communal and surrounded by subsistence farming activities conducted at homestead level. The proposed project has been granted permission to go ahead and the consent letter for land use has been issued on behalf of the Uukolonkadhi Traditional Authority by the Omindamba B Village Headman. The letter of Land Availability and Allocation for the project by the Traditional Authority is shown as **Appendix C** of this report.

2.4. Tower Design

The tower to be constructed will be 300 m high. The height of the tower was selected to compensate for tree heights (high vegetation) that may be found in some parts of the area, which would interrupt signal during the tower's operational phase. The tower will be painted red and white for civil aviation purposes (good contrast for visibility).

The operating radio frequency (hertz) of the tower antenna is unknown at this stage. Temporary employment opportunities will be created during construction. Construction work will be outsourced to contractors (to be appointed by Proponent), but the Proponent cannot provide information on the exact number of people to be employed during this phase. However, the Proponent will need to enforce the hiring of locals (by contractors) to carry out general work and work that can be done by locals.

2.5. Planning and Design

As part of the planning and design phase which also accommodates an ESA study, a preliminary tower layout is developed and drawn in this phase. This is also the phase during which the construction and operational costs are determined. The planning phase is aimed at presenting some key concepts of the project in terms of the selected project site, the legal framework, alternatives, technical aspects, and overall tower feasibility as such flaws are identified in time and mitigated and alternatives considered. Planning is also crucial to ensure that operational efficiency is maximised while minimising initial capital and subsequent operational and maintenance costs for both the project structure and the general environment.

The preliminary layout/drawings of the proposed tower are not yet available.

Once the technical and administrative documentations of the planning and design phase are approved, construction activities will follow as planned by the project Proponent and their construction engineers/contractors.

2.6. Construction Work and Activities

During construction phase, minimal earth works will be carried out in certain areas of the project site to install the tower and its associated equipment. This will require soil excavation within the construction site. There will be minimal heavy construction vehicles and equipment moving around the site. There is no vegetation within the proposed footprint of the tower. Only vegetation) observed within the actual footprint of the tower site (during site visit) are grass cover. The surrounding vegetation in the general site area will be left undisturbed.

The equipment to be established for the tower are required to meet certain international standards for communications infrastructures, hence the equipment will be provided by the Proponent communications supplier. Other required materials required for construction will be sourced from relevant material suppliers in Outapi or Ruacana or wherever they will need to be obtained from.

The total surface area of the site dedicated to tower footprint is quite small, that only part of it will be used for the tower and the rest will be used for storing operational and maintenance equipment.

An experienced and competent contractor will be appointed by the Proponent to carry out the construction works. This work will be carried during weekdays only and between 08h00 and 17h00. From similar projects, the number of workers expected for this kind of work would be between five and ten people. Preference for the construction works will be given to locals, i.e. contractors from nearest local towns of Outapi and Ruacana. Outside contractors can only be considered if there are

no capable contractors from the mentioned two towns. The Proponent will need to enforce the hiring of locals (by contractors) to carry out general work and work that can be done by locals, i.e. non-skilled labour will be given to residents from Omindamba B Village.

2.6.1. Construction Period, Employment Opportunities and Workers Accommodation

The construction of towers usually takes one to three weeks (from tower foundation laying, drying to tower erecting the tower). Project specialists (skilled) workers for construction may be sourced from outside the Village but will not be accommodated on site. This is true because the project is for low scale and construction work will not be undertaken over a long period of time, therefore no need for onsite accommodation. If necessary, then construction workers (technical staff) from outside Omindamba B Village will be housed in temporary camps at an appropriately selected area near the site. Employed locals will be coming from their homes daily, and therefore there will no need to set up a campsite for construction team (workers).

Temporary employment opportunities will be created during the construction of the facility. The number of people to be employed cannot be provide at the moment as construction works will be outsourced to contractors (to be appointed on tender), and therefore they (contractors) will determine the exact figure of the workers required. However, employment of locals for works that can be done by locals will have to be prioritized.

2.6.2. Safety, Security and Health

For safety and security reasons, the tower site will be fenced off with a palisade fence. This will also be done to ensure that access to the tower is only limited to authorised personnel and to prevent vandalism and theft of the tower accessories throughout the project life cycle.

A 24-hour onsite personnel (probably on shifts) will need to be appointed to guard the equipment and project vehicles against possible vandalism and theft as well as for community safety reasons.

The appointed contractor will be required to provide appropriate Personal Protective Equipment (PPE) to all its employees while carrying out the construction works on site.

2.7. Operational and Maintenance

This is the phase during which the tower and its associated infrastructure will be operational and provide radio frequency to the area. Maintenance of the tower will be done by the Proponent's

appointed maintenance contractor, as and when required. No onsite accommodation will be required during this phase, as the maintenance works would only last a couple of hours during the day.

Similarly, to the construction phase (works), the Proponent will ensure that all employees involved in this phase' works are provided with appropriate Personal Protective Equipment (PPE).

2.1. Project Services Infrastructure

For the construction and operation of the proposed radio tower, the following services will be required:

- **Water** – Minimal amount of water will be required during construction. The direct water use by the project will be for in-situ concrete mixture when laying tower foundation. Construction water will be sourced from local water supplies upon agreement with the local authority or private supplier. Drinking water for the construction team/workers will also be sourced from the local drinking (potable) water source or some workers may choose to bring their own water containers to site.
- Fuel (construction phase) – diesel that may be required for temporary power sources such as generators will be on site for the equipment as required.
- **Power/Electricity (operational phase)** – the site is located within the Northern Regional Electricity Distributor (NORED) power grid and therefore will be connected to this grid and provides electricity for the tower operations upon agreement between the Proponent and NORED.
- **Roads (site accessibility)** - The site is situated next to the C46 main road; therefore, accessibility is excellent. The C46 and local single-track roads then connect the site to Ruacana, Outapi and surrounding areas such as villages, respectively.
- **Solid waste management** - The waste generated on site during construction and maintenance phases will be stored and transported to the appropriate (waste type) landfill sites in Ruacana.
- **Liquid waste** - The wastewater collected from the portable chemical toilets and washing facilities is transported to the nearest suitable local authority wastewater treatment facility. Fuels and oils that spilled on the site grounds will be cleaned up and stored in designated site waste containers and discarded to the nearest approved facility.
- **Sanitation** – In terms of sewerage management during the construction phase, the Proponent will enforce the availability of portable toilets for the construction team (contractors) while

on site. During maintenance, the maintenance team may either bring their own portable toilet or can request for permission to use the locals' existing facilities.

2.2. Decommissioning of the Tower

In the fast-changing world, the need for radio services is expected remain on the increase and the need for better services will require the existence of this proposed tower. Therefore, the decommissioning of the tower is not anticipated. Despite that, recommendations will be provided in the EMP should it come to light that the radio tower may need to be decommissioned.

The proposed project has been evaluated based on different aspects. These aspects have been evaluated in terms of alternatives that need to be considered to ensure that the proposed project and its associated activities are environmentally friendly while maintaining the intended purpose, technical side, and efficiency of the project. The alternatives weighed for the proposed project are presented in the following chapter.

3. CHAPTER THREE: PROJECT ALTERNATIVES ANALYSIS

Alternatives in relation to a proposed activity, is defined (as per Environmental Management Act No. 7 of 2007 and its 2012 EIA Regulations) as "*different means of meeting the general purpose and requirements of the activity, which may include alternatives to -*

a) *the property on which or location where it is proposed to undertake the activity*
b) *the type of activity to be undertaken*
c) *the design or layout of the activity*
d) *the technology to be used in the activity; and*
e) *the operational aspects of the activity"*

This chapter will highlight the different ways in which the project can be undertaken and to identify the alternatives that will be the most practical but least damaging to the environment. Once the alternatives have been established, these are examined by asking the following three questions:

- What alternatives are technically and economically feasible?
- What are the environmental effects associated with the feasible alternatives?

- What is the rationale for selecting the preferred alternative?

The alternatives considered for this project were in terms of; locality (two options considered), alternative project type, services infrastructure as well as the no-go alternative.

3.1. No-Go Alternative vs. Continuation of the Project

The “No-go” alternative is the option of not proceeding with the activity, which typically implies a continuation of the status quo. In this case, this would mean, to not use the site for the radio transmission tower. Should the proposed project be discontinued, the poor radio coverage in this part of the country will continue and no improvement in local socio-economic development, in terms of communications services. The 'No-Go' option would also mean that there will be no short-term employment opportunities for the locals intended to work on the tower construction.

In considering the proposed activity, the no-go option is not a preferred option.

3.2. Radio Tower Location

The location is strategically chosen due to poor radio coverage experienced in the area and according to the results of technical site optimization. Most importantly, provide the much-needed better radio frequency coverage in the area. Moreover, the proposed tower being located at the site with low little to no dense vegetation to allow the transmission and receiving antennae to be in a clear “line of sight” and above any possible obstructions. The tower site is also located within proximity of the existing electricity line and roads for power and easy accessibility, respectively.

3.3. Tower Sharing (Communications Act No. 8 of 2009)

The National Communications Act No. 8 of 2009 require communications service providers to consider using other existing structures first before constructing new ones. This is done to avoid cumulative impact. There is no communications tower within the vicinity of the proposed project site that could have been used by the Proponent to mount their radio antenna on to serve the targeted/affected community. The only nearest towers to the project site area are those in Outapi and Otjorute that are tens of kilometres away from the site. Therefore, the distance from the existing structures (the afore-mentioned towers) will not allow compliance with the Communications Act regarding the sharing/using of existing structures in an area.

It is for this reason that the proposed tower (new structure) needs to be erected (constructed) so that it can be used (shared) in future with similar services providers, thus promoting infrastructure sharing as per the Communications Act.

3.4. Site Accessibility

The proposed tower site can be accessed both on foot and by vehicle when turning off from the main road (C46). There Therefore, access to the proposed site is excellent for both the construction and operations.

The proposed radio tower and its associated activities, including analysed alternatives are governed by certain national legislations and policies and these are given under Chapter 4.

4. CHAPTER FOUR: APPLICABLE LEGAL, POLICY AND ADMINISTRATIVE FRAMEWORK

4.1. Introduction

A review of applicable Namibian (and international) legislation, policies and guidelines and their implications on the proposed project are represented under this chapter. This is to ensure that the proposed development comply with the legal requirements for good practice and preservation of the environment. This review serves to inform the project Proponent, Interested and Affected Parties and the decision makers at the DEA of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled with regards to the development. The development of the radio tower triggers the legislations, policies and legal framework outlined in Table 2 with the leading Acts given under section 4.2 and 4.3 below.

4.2. Environmental Management Act No. 7 of 2007

This EIA was carried out according to the Environmental Management Act (EMA) and its Environmental Impact Assessment (EIA) Regulations (GG No. 4878 GN No. 30).

The Act details requirements for public consultation within a given environmental assessment process (GN No 30 S21). It further details the requirements for what should be included in an Environmental Scoping Report (GN No 30 S8) and an EIA report (GN No 30 S15).

The EMA has stipulated requirements to complete the required documentation to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities. These activities are listed under the following Regulations:

- ***10.1 (g) The construction of masts of any material or type and of any height, including those used for telecommunication, broadcasting, and radio transmission.***

Implication: The nature of the tower operation activities can potentially cause significant environmental impacts with some impacts that may be revisable and avoided. Therefore, proper assessments should lead and advise the project before implementation. The ESA study considered full stakeholder participation, despite the global health crisis (pandemic) of the COVID-19 (coronavirus outbreak) at the same time the environmental assessment was still ongoing.

The implementation of the proposed project triggers the need for consultation of all affected and interested stakeholders regarding the development at all project development phases from planning to operation of the structure. **A public consultation meeting was however not held due to the global pandemic that forced the government of the Republic of Namibia to ban public gatherings to limit infections. The public was however informed to submit their comments via email and/or short message services (SMSs) on the provided email address and mobile number, respectively. Consultation letters were also hand delivered to the property owners neighbouring the project site.**

4.3. Communications Act No. 8 of 2009

The Act provides for the regulation of telecommunications services and networks, broadcasting, postal services and the use and allocation of radio spectrum; for that purpose the establishment of an independent Communications Regulatory Authority of Namibia; to make provision for its powers and functions; the granting of special rights to telecommunications licensees; the creation of an Association to manage the ".na" internet domain name space and for matters connected therewith.

Implication: Provides the standards for setting up cellular, wireless and satellite services.

The full list and description of all the legislations (policies, guidelines, Acts, Regulations and Conventions) are presented under **Table 2.**

Table 2: Applicable legislation, policies, and guidelines to the proposed radio transmission tower

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
The Constitution of the Republic of Namibia (1990)	The articles 91(c) and 95 (i) commits the state to actively promote and sustain environmental welfare of the nation by formulating and institutionalising policies to accomplish the Sustainable objectives which include: • Guarding against overutilization of biological natural resources, • Limiting over-exploitation of non-renewable resources, • Ensuring ecosystem functionality, • Maintain biological diversity.	Ecological sustainability should guide the tower operations.
Environmental Assessment Policy of Namibia 1994	The Environmental Assessment Policy of Namibia states Schedule 1: Screening list of policies/ plans/ programmes/ projects subject to environment must be accompanied by environmental assessments. “The Proposed tower activities" are on that list.	The establishment of the proposed project triggers the need for environmental assessments prior commencement of civil works as they may alter the environment which could result on the damage of the environment.
	The policy provides a definition to the term “Environment” broadly interpreted to include biophysical, social, economic, cultural, historical, and political components and provides reference to the inclusion of alternatives in all projects, policies, programmes, and plans.	The development of the tower requires the assessment of all possible environmental and social impacts to avoid, minimise or compensate environmental damage associated with the activities.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
The Regional Councils Act (No. 22 of 1992)	This Act sets out the conditions under which Regional Councils must be elected and administer each delineated region. From a land use and project planning point of view, their duties include, as described in section 28 "to undertake the planning of the development of the region for which it has been established with a view to physical, social and economic characteristics, urbanisation patterns, natural resources, economic development potential, infrastructure, land utilisation pattern and sensitivity of the natural environment." The main objective of this Act is to initiate, supervise, manage, and evaluate development.	The relevant Regional Councils are IAPs and must be consulted during the Environmental Assessment (EA) process. The Omusati Regional Council is the applicable regional authority for this project
Local Authorities Act (No. 23 of 1992)		The Uukolonkadhi Traditional Authority (under local authority of the Omindamba B Village Headman) is the responsible Authority of the area in which the proposed tower will be located, and they should be consulted for this EA.
Communal Land Reform Act 5 of 2002	To provide for the allocation of rights in respect of communal land; to establish Communal Land Boards; to provide for the powers of Chiefs and Traditional Authorities and boards in relation to communal land; and to make provision for incidental matters.	The Proponent should ensure that the proposed development complies with the regulations provided in the Act with regards to operations in a communal land.
The Atomic Energy and Radiation Protection Act, Act 5 of 2005	Provides for the adequate protection of the environment and of people against the harmful effects of radiation by controlling and regulating the production, processing, handling, use, holding, storage, transport and disposal of radiation sources and radioactive materials,	To determine the "safe distance" around the site.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	and controlling and regulating prescribed non-ionising radiation sources according to the standards set out by the ICNIRP.	
"Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300GHz)" (April 1998 developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP))	Provides international standards and guidelines for limiting the adverse effects of non-ionising radiation on human health and well-being, and, where appropriate, provides scientifically based advice on non-ionising radiation protection including the provision of guidelines on limiting exposure. ICNIRP exposure limits for non-ionizing radiation is 4.5W/m².	Justifies the need for assessing the impact of electromagnetic radiation from the tower, on the nearby residents or community members.
The Aviation Act, Act 74 of 1962	Gives effect to certain International Aviation Conventions and makes provision for the control, regulation, and encouragement of flying within the Republic of Namibia and for other matters incidental thereto.	Provides the regulations for setting up cellular as well as other masts structures in Namibia.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Civil Aviation Act No. 6 of 2016	''……; to establish the Air Navigation Services in the Authority; to provide for a civil aviation regulatory and control framework for maintaining, enhancing and promoting the safety and security of civil aviation for ensuring the implementation of international aviation agreements; to establish the Directorate of Aircraft Accident and Incident Investigations. **Section 6(1) The Minister may, by issuing a directive, require the removal of any building structure, tree or other object whatsoever on any land or water which, in the opinion of the Minister on the advice of the Executive Director, may constitute a danger to aircraft flying** in accordance with normal aviation practice.	The applicable part of the Act is the establishment of the Directorate of Aircraft Accident and Incident Investigations and to provide for its powers and functions. The height of the proposed radio tower might be a threat to the nearest aerodrome site. Therefore, the Proponent should verify these prior to construction with the Namibia Civil Aviation Authority (NCAA).
Convention on International Civil Aviation, Annex 14	• Annex 14 to the Convention on International Civil Aviation. • Chapter 4: Obstacle restrictions and removal • Chapter 6: Visual aids and donating of obstacles	The proposed new structures may be obstacles to some aerodromes in Namibia. Those that are close to existing aerodromes need to be assessed in accordance with the document. Visual aids to the new structures to make them visible to aircraft need to be applied in accordance with this Convention.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Health and Safety Regulations GN 156/1997 (GG 1617)	• Details various requirements regarding health and safety of labourers to be involved in the construction and operation.	Contractors involved in the construction of various units of the tower should complying with this Act and its regulations
Public Health Act 36 of 1919	• Section 119 states that "no person shall cause a nuisance or shall suffer to exist on any land or premises owned or occupied by him or of which he is in charge any nuisance or other condition liable to be injurious or dangerous to health."	Provision of community labour, the input of the local communities is usually in the form of labour for the construction and operational phases. The safety of these people is crucial particularly women, who do not knowledge of handling dangerous, risk and strenuous jobs.
Public and Environmental Health Act 1 of 2015.	• To provide a framework for a structured uniform public and environmental health system in Namibia; and to provide for incidental matters.	
Soil Conservation Act (No 76 of 1969)	The Act makes provision for the prevention and control of soil erosion and the protection, improvement and conservation of soil, vegetation and water supply sources and resources, through directives declared by the Minister.	The construction of the structure should prevent soil erosion, mitigation measures proposed in the EMP to conserve and prevent erosion during construction and operation of the tower should be implemented.
Road Traffic and Transport Act, No. 22 of 1999	The Act provides for the establishment of the Transportation Commission of Namibia; for the control of traffic on public roads, the licensing of drivers, the registration and licensing of vehicles, the control and regulation of road transport across Namibia's borders;	Mitigation measures should be provided for if the roads and traffic impact cannot be avoided. The Proponent should obtain the relevant permits from the Ministry of Works and Transport (Roads Authority) to

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
	and for matters incidental thereto.	undertake activities involving road transportation or access onto existing roads.
Pollution Control and Waste Management Bill	The bill aims to "prevent and regulate the discharge of pollutants to the air, water and land" Of particular reference to the Project is: Section 21 "(1) Subject to sub-section (4) and section 22, no person shall cause or permit the discharge of pollutants or waste into any water or watercourse."	The construction and operation/maintenance activities trigger section 21 and 22 of the Bill, activities like construction works generates lots of waste that require good management practices.
	Section 55 "(1) No person may produce, collect, transport, sort, recover, treat, store, dispose of or otherwise manage waste in a manner that results in or creates a significant risk of harm to human health or the environment."	Contractors of the construction works, and maintenance of the project should make it mandatory that they manage their waste in a manner that do not cause environmental threat and risk both to the surroundings and the local communities.
National Solid Waste Management Strategy	The Strategy ensures that the future directions, regulations, funding, and action plans to improve solid waste management are properly co-ordinated and consistent with national policy, and to facilitate co-operation between stakeholders. The Strategy listed priorities for the strategy to address for effective solid waste management.	The construction and operation/maintenance of the tower can potentially generate significant amount of solid waste that might need proper management by contractors to avoid pollution. Waste management plans should be compiled and implemented prior the commencement of civil works and during tower maintenance.

LEGISLATION/POLICY	PROVISION/SUMMARY	PROJECT APPLICABILITY
Labour Act 11 of 2007.	Empowers the minister responsible for labour to publish regulations pertaining to health and safety of labourers (S135). Details requirements regarding minimum wage and working conditions (S39-47).	The tower construction and operation/maintenance will create some work. Therefore, there is need to make sure that the workers participate are protected and that they are from the locals especially unskilled labour.
National Heritage Act 27 of 2004	Section 48(1) states that "A person may apply to the (Heritage) Council for a permit to carry out works or activities in relation to a protected place or protected object". It protects and conserves cultural heritage and cultural resources with special emphasis on places and sources of National heritage including graves, artefacts, and any objects older than 50 years.	The project will be located on a small piece of land. however, if heritage resources (e.g. human remains etc.) discovered during constructions, it will require the Proponent to have a permit from the National Heritage Council of Namibia for relocation.

The proposed project will be undertaken in specific biophysical and social environment. Understanding the pre-existing environmental settings will assist in identifying sensitive components as well as understanding how the project environment was before and would be after project's operations. The pre-existing environmental features of the project area and site are therefore presented under Chapter 5.

5. CHAPTER FIVE: THE RECEIVING ENVIRONMENT

5.1. Introduction

The baseline information of the project area presented below has been sourced from a site visit undertaken by the Consultant from 5 to 6 April 2020. Other baseline information have been obtained from different reports of studies conducted near the project area and/or the Omusati Region at large – specifically the recently compiled EIA report for the proposed Etunda Feedlot (located about 6 km west of the tower site) by Mafuta Environmental Consultants. This information is very crucial to Environmental Consultants as it aids them in identifying the sensitive environmental features that may require protection through the recommendation and effective implementation of appropriate mitigation measures or management action measures.

5.2. Physical and Biological Environment

5.2.1. Climate and Topography

The climate of the project area can be described as semi-arid. Average annual temperatures are usually more than 22°C, with average maximum temperatures between 34°C and 36°C and average minimum temperatures between 6°C and 8°C. The subject area generally experiences more rainfall than the south and west of the country with an average rainfall of 350 to 550 mm (GCS Water and Environmental Consultants, 2019).

The topography of Omusati Region is mostly flat (with the exemption of Ruacana area towards the Angolan border that is punctuated by mountains and rolling hills). According to Omusati Regional Council (2016), the landscape of the Region is made up of a successive series of sand dunes of varying depths, separated by waterways. The project area is relatively flat and is overlain by relatively flat soils.

5.2.2. Geology and Soils

The project area is overlain by the Kalahari semi-consolidated to unconsolidated sediments (sand and gravel. These sediments are underlain by intrusive and extrusive rocks of Karoo Age. However, the gravel observed on site was probably brought here by road and shebeen construction works (**Figure 2**).

The site is covered by light brown loamy sand soil (**Figure 2**). The dark brown soil colour indicates that these soils are rich in organic matter content and this could explain the flourishing crop farming in the area.

Figure 2: Anthropogenic gravel deposit (left) and light brown loamy sandy soils on site

5.2.3. Water Resources (Hydrology)

The Omusati Region does not have any perennial rivers. The only surface water bodies in the project area are open *iishana* that are usually filled with water during good rainy seasons.

The Cuvelai Basin which hosts the project area consists of thousands of drainage channels or *oshanas* which flow during the rainy season. These *iishana (***Figure 3***)* are shallow, often vegetated and poorly defined, interconnected flood channels and pans through which surface water flows slowly or may form pools depending on the intensity of the floods ("*efundja*")" (GCS Water and Environmental Consultants, 2019).

Oshana = Local name for the system of interconnected drainage channels that flow through the central Owambo basin (pl.: iishana).

Figure 3: Open *oshana* close to the project site

To the south of the site is the water canal that is filled by rainwater during rainy seasons and in dry season water is pumped from the Calueque Dam in Angola. The canal water is primarily meant for livestock. However, at areas along the cana;l that may not have access to other clean water sources, some communities use this water for other domestic purposes.

5.2.4. Fauna and Flora

Livestock: Omusati Region is a home to 332 584 cattle and 295 780 goats (Namibian Sun Newspaper, 2018) and different species of domestic animals. Further domestic animals kept by the locals in the area include donkeys, sheep, and pigs. In terms of wildlife, there is not much of wildlife occurring within the area as most wildlife is located within the Etosha National Park, far from the project area.

Flora: According to GCS Water and Environmental Consultants (2019), the project area forms part of the Cuvelai Drainage vegetation type within the Acacia Tree-and shrub Savanna biome which is dominated by floodplain grasslands and woodlands. The subject area can be grouped as plains in which woodlands are known to occur. Within north-central Namibia, Mopane is a very common tree species in the Cuvelai Drainage where grassy channels of oshana carry floodwater during heavy rains from the higher areas in the north of Angola. Other common vegetation is *Hyphanene petersania*, commonly known as palm or Makalani and locally known as "*omulunga*", camelthorn trees and shrubs (*Acacia erioloba*), etc.

The major vegetation types occurring within three landscapes namely valleys, highlands and plains and typical vegetation on and around the site are shown in **Figure 4**, respectively.

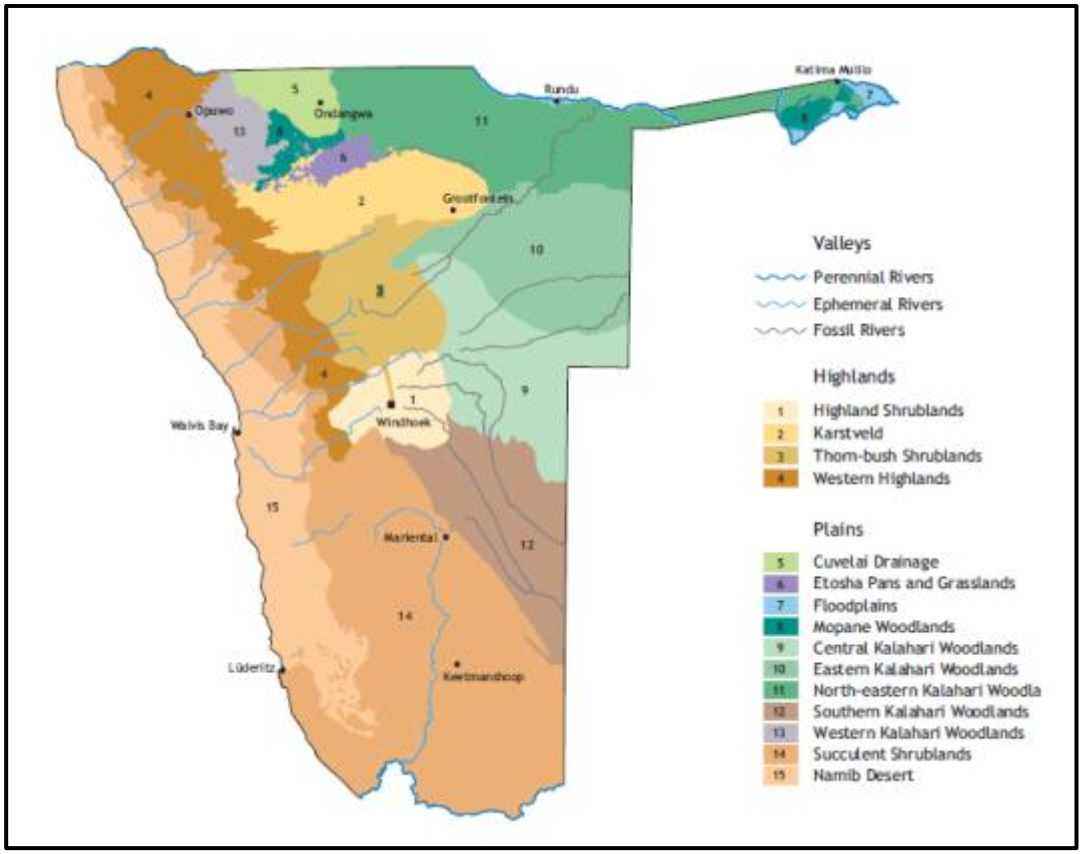


Figure 4: Major vegetation types grouped by landscape with the project site found in zone 5 (edited after GCS Water and Environmental Consultants, 2019)

The typical vegetation observed around the project site during site visit is shown in **Figure 5** below.

Figure 5: Mopane trees (left) and Palm shrubs (right) at the around the site

5.3. Socio-Economic Environment

5.3.1. Population Census of the Omusati Region and Project Constituency

The population Omusati Region was recorded at 243 166 (133 521 females and 109 545 males) according to National Housing and Population Census conducted in 2011 (2011a), with the Ruacana (rural) constituency population at 28 081. The population density for the Region was 9.2 persons per km^2.

5.3.2. Land Ownership and Use

The project site and surrounding areas are mostly communal, under the Uukolonkadhi Traditional Authority. As mentioned earlier in this document, the proposed land for the tower establishment is within the Omindamba B Village, therefore under Village Headman's authority. The land required for the tower is relatively small, currently not in use and thus has been approved for the proposed use.

As it is typical for the northern regions of the country, the Omusati Region like the rest of the other three ''O'' regions (Oshikoto, Oshana and Ohangwena) predominantly practises agricultural

activities with both crop and livestock farming taking place. The Region is made up of 5 sub-owambo ethnical groups, namely the; Mbalantus, Mbandjas, Kolonkadhis, Kwaluudhis, Ngandjeras and part of Kwambis. The project area is under the Kolonkadhi ethnical group.

5.3.3. Surrounding Land Users

As it is with any rural area, the main land use around the project site is subsistence farming (crop and livestock) with local small businesses. The common crops cultivated in the area fields are *mahangu* (pearl millet), sorghum, maize, beans, and watermelons. Livestock include cattle, goats, sheep, and donkeys.

The site is bordered to the; north by local shebeens (*cuca* shops) -**Figure 6**, east by homesteads, south by the main road C46, water canal and homesteads.

Figure 6: Oshetu No. 5 *cuca* shops at the project sit

5.3.4. Economic Development

The Regional main sources of income are farming (22%), wages and salaries (25%), old-age pensions (31%) and business activities (non-farming) at 10% (Namibia Statistics Agency, 2011a).

The Regional unemployment rate per sex was 34.95% and unemployment for youth aged 15 to 34 years was recorded at 24.39%. The unemployment rate was higher for females than males for all regions except in Ohangwena and Omusati where the rate for females was lower than that of males (Namibia Statistics Agency, 2016b).

There are plenty of places with exceptional beauty and interest in the region ranging from game viewing, camping to waterfalls (Omusati Regional Council, 2016). Outapi Town in Ombalantu is the capital and economic center of the Region. The project site is about 20 km southeast of Ruacana, where the Waterfall is located. The Falls attract several tourists, making site area one of the connecting points to Ruacana. Not only connecting to Ruacana, but to the Uukwaluudhi Conservancy, one of the tourist destinations in the area. Further tourist destinations in Omusati Otjipahuriro Community Camp Site, Omugulugwoombashe National Heritage, Ombalantu Baobab Tree, Okahao Baobab Tree, Outapi, etc.

In terms of income, some young and middle-aged people are either employed in nearby or far-away towns. Some locals sell some of their livestock and/or excess produces from their crops to make a living.

5.3.5. Heritage and Archaeology

There may be some archaeological sites in the further areas from the site or other parts of the Region, but none have been reported to the Consultant nor observed near or on site during the site visit.

5.3.6. Services and Infrastructure

The Omusati Region is one of the regions with well-established services infrastructures. The Region has good tarred and good-graded gravel road links and an airport (in Ruacana), health centres, educational institutions, malls, and shops (in towns and settlements) and hospitality facilities, etc. Some of these services are well-placed around the project site area and nearby areas.

Roads: The Omusati Region is connected to other regions and the rest of the country by the C46 trunk road. The site area is accessed from the main road by a short turn-off single-track access road used by locals to access the *cuca* shops.

The surrounding areas to the site are then accessed by the local rural single-sand tracks and in some areas, gravel roads. The C46 and these local roads connect the site to the nearby villages, towns, and settlements.

Power Supply: The Omusati Region urban and in some parts of the rural areas, including the project site are supplied with electricity by the Northern Regional Electricity Distributor Company (NORED).

Water Supply: Water in the Region is supplied in bulk to municipalities by NamWater. NamWater extracts water directly from boreholes, which is then pumped to several reservoirs that provide water to the local authorities. The local authorities then distribute water to their residents, (homes and businesses) through water connections. Water in the rural areas of the Region is either supplied by NamWater or the Directorate of Rural Water Supply through community water supply line. Some residents may choose to take private water supply lines from community water supply line to their homes, depending on personal affordability. For most livestock in the Region, drinking water is either supplied from natural water bodies such as *iishana* during rainy season, or pumped water into canal that is fed by the Calueque Dam in Angola. This canal runs via the project site area towards the central part of the Omusati Region and provide livestock during dry seasons. Alternatively, in bad drought years, some farmers provide water to their livestock from either communal rural water supply or privately owned hand-dug water holes.

Telecommunication Services: The Region and the project site area are well connected to the rest of the country and world via local network service providers. The main providers of this service in the area are Mobile Telecommunications Company (MTC Namibia).and in some instance, Telecom Namibia as well landlines in urban areas and in some rural residences.

The Region also has good radio coverage in most areas provided and run by the Namibia Broadcasting Corporation (NBC). This service is crucial to most communities in deep rural areas as this is how they mainly get vital information, such as constituency councillors' public announcements, old-age pension monthly schedules and local community gatherings/meetings. **However, the project site and surrounding areas experience difficulties in radio frequency transmission, which is why the Proponent intends to improve this service.**

Aerodromes (airports/strips): The nearest aerodrome point (airport) from the project is the Ruacana Airport located about 36 km west of the site.

5.3.7. Waste Management

The proposed project site is in a rural set up were domestic waste is managed per household and dumped in small hand dug pits or selected open area within homesteads' crop fences. In other words, waste management in rural areas is not done the same way as in urban areas. This practice can be explained by the fact that in rural areas (villages), the amount of waste produced is mostly domestic (organic) waste and in smaller volumes compared to urban waste. However, this does not imply that rural waste has no environmental impact (MZ-Fifteen Environmental, Health & Safety Consultants, 2019). The Scheme waste is collected, stored, and frequently transported to the nearby municipal landfill site.

The proposed project will adopt acceptable ways to deal with its waste generated from construction and operational/maintenance works. Proper waste management measures of an urban set up/standard will be taken into consideration and effectively implemented for the proposed tower.

Public Participation (Consultation) is a crucial requirement of any ESA/EIA process. The public consultation process followed for this ESA is presented under the next chapter.

6. CHAPTER SIX: PUBLIC CONSULTATION

Public and Stakeholder Public is an important aspect of an Environmental Assessment (EA) process. This process entails the sharing of information through the recommended means by the EMA as well as other means that are considered efficient to get the notifications to the public. The consultation provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process.

The consultation process has been undertaken in accordance with the Environmental Management Act No. 7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations: Section 21-24 (Public Consultation). **However, because the ESA process was already ongoing before the**

Namibian President declared a national lockdown due to the global pandemic (COVID-19), some consultation means had to be cancelled. The cancelled consultation mean/way was the public meeting which would have been in contravention of the State of Emergency Regulations (banning of public gatherings). Despite this limitation MEC went an extra mile to ensure inclusion of the directly affected parties. This was done by compiling letters in Oshiwambo (for the property owners neighbouring the proposed site and Village Headman) and letters in English for the Omusati Regional and Ruacana Constituency Council offices for comments and inputs.

The public consultation process assisted the Environmental Consultant in identifying all potential impacts and aided in the process of identifying possible mitigation measures. Potential impacts that may stem from the proposed development were pre-identified prior to the consultation process and additional impacts were identified upon public feedback. Public Consultation with Interested and Affected Parties (I&APs) allows for a transparent decision-making with regards to the ECC. The consultation was conducted as per the following sections.

6.1. Registration of Interested and Affected Parties (I&APs)

The relevant and applicable national, regional, and traditional authorities and other interested members of the public were identified and consulted by the Consultant. The (pre-identified) I&APs were contacted directly, and some were registered as I&APs upon their request. The list of registered I&APs is attached under **Appendix D**.

The newspaper adverts of the proposed project were placed in two widely read national newspaper in the Region (The *New Era* newspaper). The project advertisement / announcement ran for two consecutive weeks as per the EIA Regulations.

6.2. Public Consultation Activities

Regulation 21 of the EIA Regulations details steps to be taken during a public consultation process and these have been used in guiding this process. Communication with I&APs about the proposed tower was done through the following means and in this order:

6.2.1. Background Information Document

A Background Information Document (BID) was drafted at the onset of the ESA process to act as a useful information handout about the proposed project- **Appendix E**. In addition, the BID provided details on the public consultation process with contact details for further information. This

document was advertised for availability through various means of newspaper articles, electronic mail and upon request via mobile phones (cellphones).

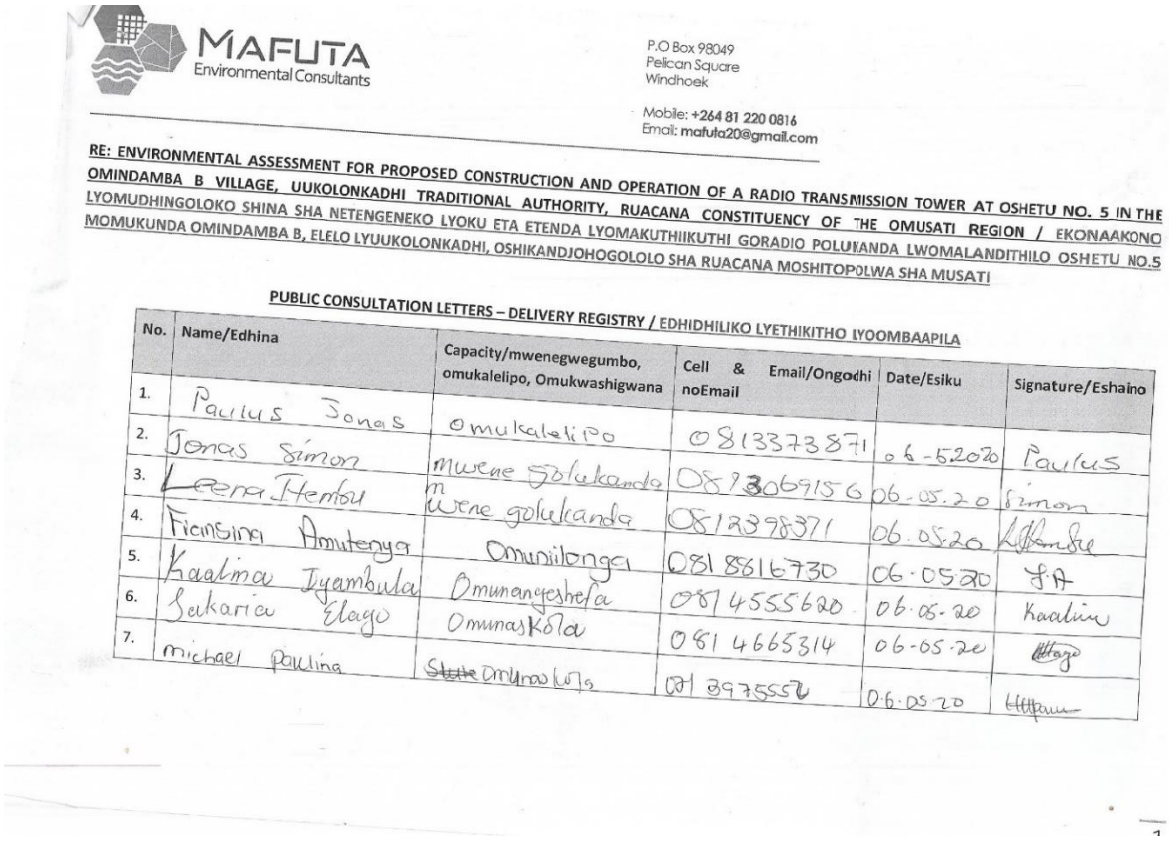
6.2.2. Newspaper Advertisements

Newspaper adverts about the proposed project and related EA processes were circulated in the *New Era* newspaper for two weeks on 7 and 16 April 2020. These notices appeared in the newspaper is shown in **Appendix F.**

6.2.3. Notification and Consultation Letters

Consultation letters with a brief background of the proposed project and explain the need and importance of I&APs involvement was compiled in Oshiwambo (to accommodate the locals who may not be English literate). The letters were hand delivered to the Omindamba B Village Headman (received by his Secretary) and property owners (local *cuca* shops and homesteads) neighbouring the proposed site on the 6th of May 2020.

The signed Proof of Consultation letters delivered to site neighbours/headman is shown **Figure 7**.



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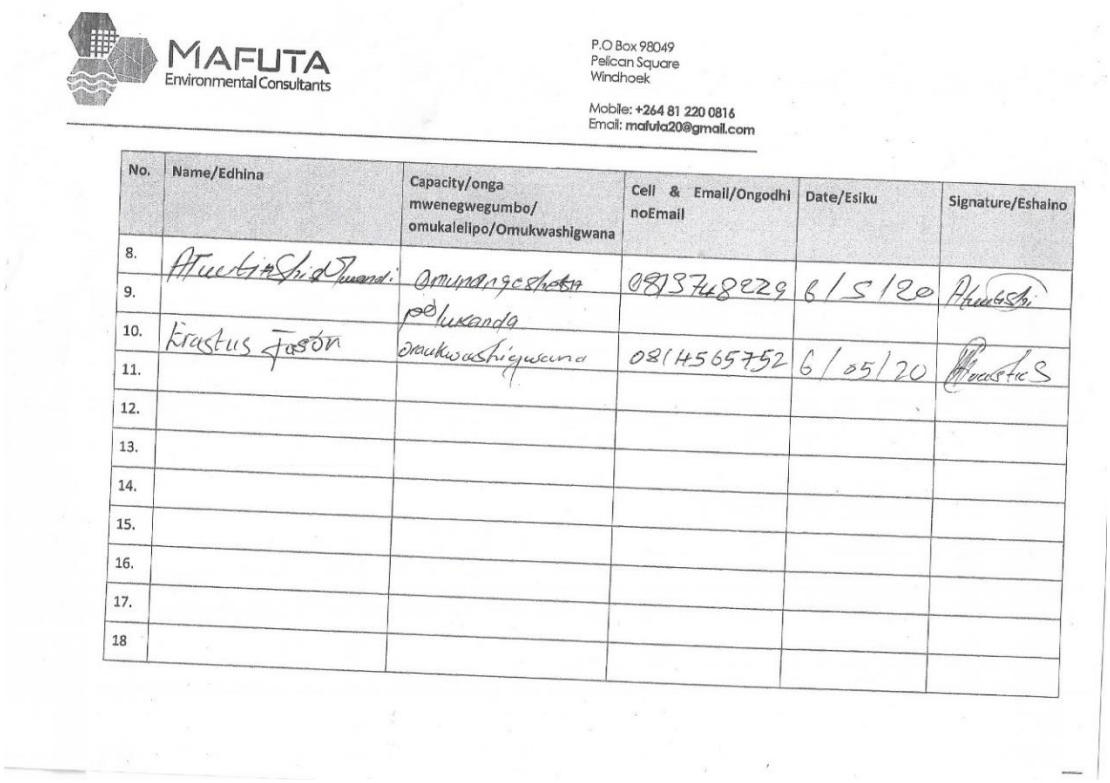
RE: ENVIRONMENTAL ASSESSMENT FOR PROPOSED CONSTRUCTION AND OPERATION OF A RADIO TRANSMISSION TOWER AT OSHETU NO. 5 IN THE OMINDAMBA B VILLAGE, UUKOLONKADHI TRADITIONAL AUTHORITY, RUACANA CONSTITUENCY OF THE OMUSATI REGION / EKONAAKONO LYOMUDHINGOLOKO SHINA SHA NETENGENEKO LYOKU ETA ETENDA LYOMAKUTHIIKUTHI GORADIO POLUTANDA LWOMALANDITHILO OSHETU NO.5 MOMUKUNDA OMINDAMBA B, ELELO LYUUKOLONKADHI, OSHIKANDJOHOGOLOLO SHA RUACANA MOSHITOPOLWA SHA MUSATI

PUBLIC CONSULTATION LETTERS – DELIVERY REGISTRY / EDHIDHILIKO LYETHIKITHO LYOOMBAAPILA

No.	Name/Edhina	Capacity/mwenegwegumbo, omukalelipo, Omukwashigwana	Cell & Email/Ongodhi noEmail	Date/Esiku	Signature/Eshaino
1.	Paulus Jonas	Omukaleli Po	0813373871	06-5.2020	Paulus
2.	Jonas Simon	mwene Gokukanda	0813069156	06.05.20	Simon
3.	Leena Hemfou	mwene gokukanda	0812398371	06.05.20	
4.	Ficnsina Amutenya	Omuniilonga	081 8616730	06.05.20	
5.	Kaalima Iyambula	Omunangeshefa	081 4555620	06.05.20	Kaalima
6.	Zekaria Elago	Omunaskola	081 4665314	06-05-20	
7.	michael Paulina	Stole Omunaskola	081 3975552	06.05.20	



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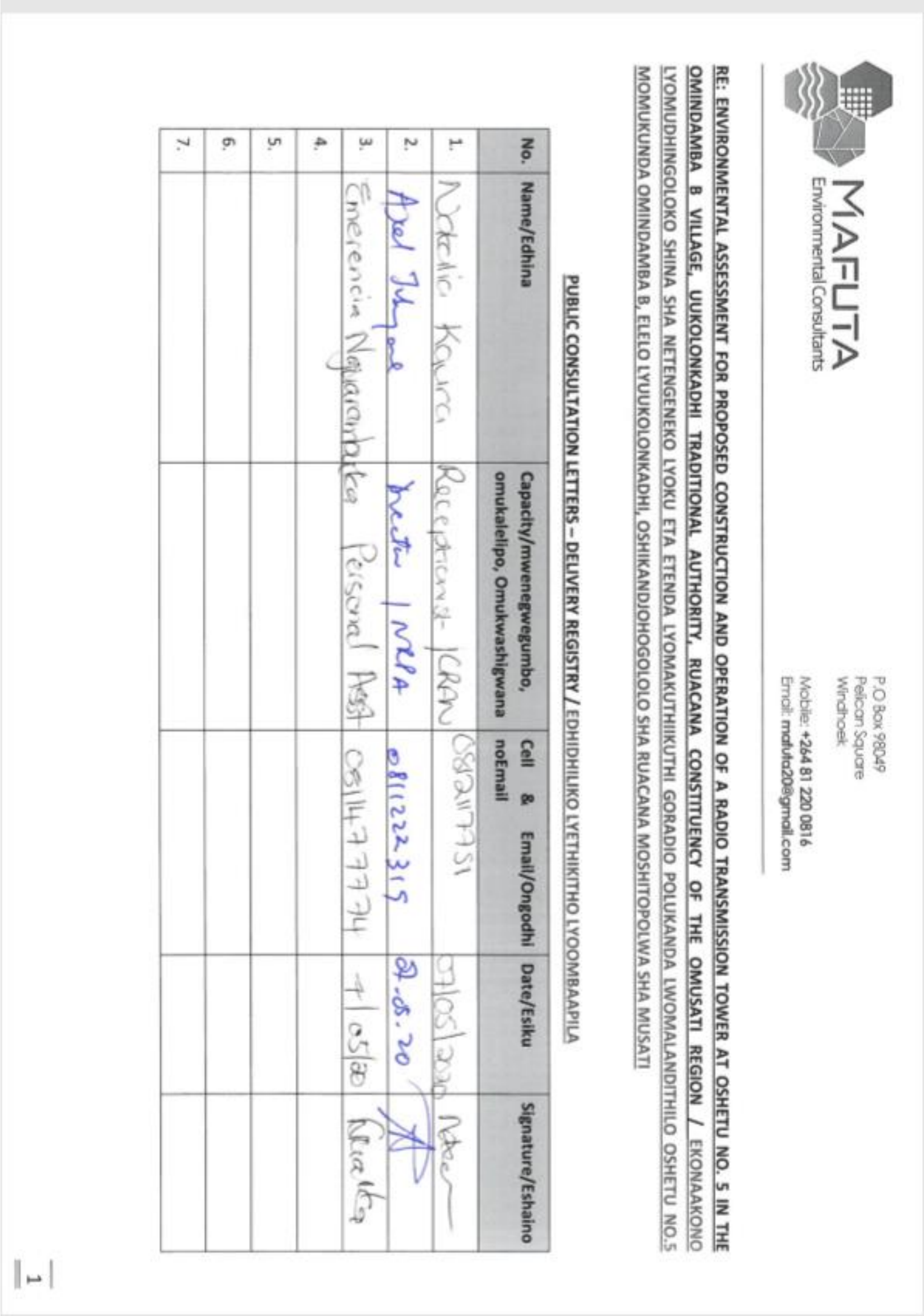
No.	Name/Edhina	Capacity/onga mwenegwegumbo/ omukalelipo/Omukwashigwana	Cell & Email/Ongodhi noEmail	Date/Esiku	Signature/Eshaino
8.	[illegible]	[illegible]	0813748229	6/5/20	[illegible]
9.		pe luxanda			
10.	Kristus Jason	omukwashigwana	0814565752	6/05/20	[illegible]
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18					

Figure 7: Proof of consultation letters' delivery to the site neighbours and Village Headman

Similar consultation letters prepared in English accompanied by hard copies of the BID were delivered to the relevant national governmental institutions in Windhoek for comments and inputs on the 7th of May 2020. The BID was also emailed to the Omusati Regional Council (addressed to the Chief Regional Officer) and Ruacana Constituency Council offices (addressed to the Constituency Councillor). The signed Proof of Consultation letters delivered to relevant authorities in Windhoek is shown in **Figure 8**.



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RE: ENVIRONMENTAL ASSESSMENT FOR PROPOSED CONSTRUCTION AND OPERATION OF A RADIO TRANSMISSION TOWER AT OSHETU NO. 5 IN THE OMINDAMBA B VILLAGE, UUKOLONKADHI TRADITIONAL AUTHORITY, RUACANA CONSTITUENCY OF THE OMUSATI REGION / EKONAAKONO LYOMUDHINGOLOKO SHINA SHA NETENGENEKO LYOKU ETA ETENDA LYOMAKUTHIIKUTHI GORADIO POLUKANDA LWOMALANDITHILO OSHETU NO.5 MOMUKUNDA OMINDAMBA B, ELELO LYUUKOLONKADHI, OSHIKANDJOHOGOLOLO SHA RUACANA MOSHITOPOLWA SHA MUSATI

PUBLIC CONSULTATION LETTERS – DELIVERY REGISTRY / EDHIDHILIKO LYETHIKITHO LYOOMBAAPILA

No.	Name/Edhina	Capacity/mwenegwegumbo, omukalelipo, Omukwashigwana	Cell & Email/Ongodhi noEmail	Date/Esiku	Signature/Eshaino
1.	Ndeitia Kaura	Receptionist /CRAN	0812117751	07/05/2020	[signature]
2.	Abel Tuhyne	Director / NEPA	0811222315	07.05.20	[signature]
3.	Emerencia Nganjambaka	Personal Asst	0811477774	7/05/20	[signature]
4.					
5.					
6.					
7.					

1

Figure 8: Proof of consultation letters' delivery to relevant authorities in Windhoek

6.2.4. Site Notices

A site notice translated into Oshiwambo language was placed at the project site on the 6th of May 2020. The notice provided information about the project and related EA while providing contact details of the project team for public communication purposes with regards to the study – **Figure 9**.

It should be noted that, no public meeting was held for this ESA due to the global outbreak of the coronavirus (COVID-19) that led to the banning of public gatherings to prevent new infections.

Figure 9: Project site notice at the site (Oshetu No.5 *cuca* shops) in Omindamba B Village

6.2.5. Building a Stakeholder Database

A stakeholder database for the project was collected through a variety of means, ranging from pre-identified Interested & Affected Parties (I&APs) of the project and updated upon requests on the appearance of the ESA advert in the newspapers. The list has also been updated with the names of the property owners neighbouring the site**.**

6.2.6. Comments Period and Feedback

From the onset of the public consultation process and the initial information sharing through the BID, newspaper, consultation letters and site notices, various stakeholders have been registered for the ESA process.

After the hand delivery of consultation letters to the project site neighbours and headman on 6 May 2020, the Environmental Consultant contacted them again (as per contacts number provided in the delivery registry form) on 21 May 2020 to find out if they had any comments or an input they would

like to share. **Those who were reachable on their phones indicated that they had no comments nor objections to the proposed radio tower as they also believed that it will be beneficial to the community's communications services.**

7. CHAPTER SEVEN: ENVIRONMENTAL AND SOCIO-ECONOMIC IMPACTS

7.1. Overview

Communications frequency transmitting towers (both cellular and radio waves) are associated with different environmental impacts, whether positive or negative. The positive are assessed to ascertain the significance of their extent and magnitude. The potential negative impacts are assessed to ensure that their significance on the biophysical and social environments are adequately addressed so that they are brought under control, while maximizing the positive impacts.

The potential positive and negative impacts that have been identified from the proposed tower activities are as follows:

7.2. Impact Identification (Positive and Negative) and Asessment Methodology

The potential beneficial and adverse impacts stemming from the proposed tower during the two vital phases (construction and operations) are listed below and assessed under section 7.3 and 7.4.

Positive impacts

- **Radio frequency convenience:** improved in radio communication services in the area.
- **Employment creation:** Creation of few temporary jobs during the construction of the tower.
- **General contribution to local economic development** through reliable communications services.

Potential negative impacts

- Potential **soil disturbance and impact on water resources** (during construction)
- **Health concerns: electromagnetic radiation** emitted from the tower antenna may affect the health of those in its proximity (during operation).
- **General Health and safety** associated with mishandling of project equipment (both phases)

- **Impact on Civil aviation**: The location of BTS within prohibited distances from airports or aerodrome points may lead to civil aviation issues.
- **Impact on avifauna (birds):** potential collision of birds into the tower (flying over the site).
- **Waste generation** (environmental pollution) in both phases.
- Noise (both phases).
- **Short-term disturbance of locals**: during the tower construction, the presence of the construction team may disturb the immediate neighbours to the site.
- **Dust generation** and decrease in surrounding air quality (construction works).
- **Vehicular traffic safety** (both phases); and
- **Visual** (during operations) and **archaeological** impact.

7.2.1. Impact Assessment Methodology

The methodology employed for this project was adopted from environmental reports compiled by the Environmental Consultant based on research and analysis of other consultants' reports on the suitable project assessment methodology.

The proposed radio transmission tower activities will likely to some scale/extent (spatial scale), magnitude (severity) and duration (temporal scale) have impacts on certain biophysical and social components. The potential impacts were assessed as per methodology presented in **Table 3**.

To enable a scientific approach to the determination of the environmental significance, a numerical value is linked to each rating scale. This methodology ensures uniformity and that potential impacts can be addressed in a standard manner so that a wide range of impacts are comparable.

It is assumed that an assessment of the significance of a potential impact is a good indicator of the risk associated with such an impact. The following process will be applied to each potential impact:

- Provision of a brief explanation of the impact.
- Assessment of the pre-mitigation significance of the impact; and
- Description of recommended mitigation measures.

The recommended mitigation measures prescribed for each of the potential impacts contribute towards the attainment of environmentally sustainable operational conditions of the project for various features of the biophysical and social environment. The impact assessment criteria used is presented in **Table 3**.

Table 3: The criteria for impacts assessment

Nature	Description	Rating
Extent (Spatial scale)	An indication of the physical and spatial scale of the impact.	**Low (1)**: Impact is localized within the site boundary: Site only. **Low/Medium (2)**: Impact is beyond the site boundary: Local. **Medium (3)**: Impacts felt within adjacent biophysical and social environments: Regional. **Medium/High (4)**: Impact widespread far beyond site boundary: Regional **High (5)**: Impact extend National or over international boundaries.
Duration	The timeframe, over which the impact is expected to occur, measured in relation to the lifetime of the project.	**Low (1)**: Immediate mitigating measures, immediate progress **Low/Medium (2)**: Impact is quickly reversible, short term impacts (0-5 years) **Medium (3)**: Reversible over time; medium term (5-15 years). **Medium/High (4)**: Impact is long-term. **High (5):** Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

Nature	Description	Rating
Intensity, Magnitude / Severity (Qualitative criteria)	The degree or magnitude to which the impact alters the functioning of an element of the environment. The magnitude of alteration can either be positive or negative	**Medium/low (4)**: Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers. **Low (2)**: Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.
Probability of occurrence	Probability describes the likelihood of the impacts occurring. This determination is based on previous experience with similar projects and/or based on professional judgment	**Low (1)**: Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards. **Medium/low (2):** Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards. **Medium (3)**: Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards. **Medium/High (4**): Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards. **High (5)**: Definite (regardless of preventative measures), highly likely, continuous.

Nature	Description	Rating
		High risk or vulnerability to natural or induced hazards.

7.2.1. Impact Significance

This is determined through a synthesis of the above impact characteristics (in **Table 3** above). The significance of the impact "without mitigation" is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this chapter, for this assessment, the significance of the impact without prescribed mitigation actions was measured.

Once the above factors (**Table 3**) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

SP = (magnitude + duration + scale) x probability

The maximum value per potential impact is 100 significance points (SP). Potential impacts were rated as high, moderate, or low significance, based on the following significance rating scale (**Table 4).**

Table 4: Impact significance rating scale

Significance	*Environmental Significance Points*	*Colour Code*
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

For an impact with a significance rating of high, mitigation measures are recommended to reduce the impact to a low or medium significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation measures. To

maintain a low or medium significance rating, monitoring is recommended for a period to enable the confirmation of the significance of the impact as low or medium and under control.

The assessment of the project impacts is done for both pre-mitigation (before implementing any mitigation) and post-mitigation (after mitigations are implemented).

The risk/impact assessment is driven by three factors and these are:

- **Source:** The cause or source of the contamination.
- **Pathway:** The route taken by the source to reach a given receptor
- **Receptor:** A person, animal, plant, eco-system, property, or a controlled water source. If contamination is to cause harm or impact, it must reach a receptor.

A pollutant linkage occurs when a source, pathway and receptor exist together (Booth, 2011). The objective with the mitigation measures is to firstly avoid the risk and if the risk cannot be avoided, mitigation measures to minimize the impact are then recommended. Once the mitigation measures have been applied, the identified risk will be of low significance, provided there is sufficient monitoring of measures' implementation.

The description of potential impacts identified for the construction and operational and maintenance phases of the proposed tower are given under the following sections (7.3 and 7.4). The assessment of these impacts and where necessary, mitigation measures to avoid or minimize the impacts are provided in the respective tables.

7.3. Description and Assessment of Positive Impacts (Qualitative Assessment)

7.3.1. Employment creation

The project activities specifically the construction works will lead to the creation of job opportunities providing temporary semi- and unskilled employment for the locals. Few jobs may be created during operations for maintenance and taking care of the site. The income generated will benefit the individuals' households. The impact significance is of medium. The assessment of this impact is presented below:

- **Impact type:** Positive, **Extent:** Local
- **Duration:** Short-term for construction and long-term for few jobs in the operational/maintenance phase, **Probability:** Probable

- **Significance (no mitigation):** Low, **Significance (post-mitigation):** medium
- **Mitigation measures:** (a) Locals should be employed for the unskilled labour preferentially to out-of-area people (outsiders) where possible and (b)Equal opportunity should be provided for both men and women, where do-able.

7.3.2. The Convenience of Comunication (Radio) Services and Contribution to Local Economy

Upon commissioning and operations of the tower, the local and neighbouring communities will experience an improvement in communication services and have better access to information.

- **Impact type:** Positive, **Extent:** Local to regional
- **Duration:** Long-term during the operational phase, **Probability:** Probable
- **Significance:** Medium to high
- **Mitigation measures:** None.

7.4. Description and Assessment of Negative Impacts

Some of the potential negative impacts are anticipated to only occur in one phase, while others occur in both phases. To avoid repetition, impacts that occur in more than one phase will be described and assessed once. In other words, if for instance health and safety impact occurs in both the construction and operational phase, it will only be described and assessed once under the construction phase (since construction phase precedes the operational and maintenance phase) and mitigation measures clearly provided.

7.4.1. Soil and Water Resources

Physical impact of surrounding soils would be from disturbance during site excavations. The valuable topsoil may also be lost during the construction process. The loss of topsoil can however be minimised through the storage of topsoil in designated small stockpiles on site and then re-used for backfilling. Potential soil pollution during the construction works would be caused by spills and leaks of hydrocarbons and other materials from project vehicles and machinery. However, the impact of soil pollution is likely to be very minimal.

Water resources is impacted by project developments in two ways. This is either through pollution (water quality) or over-abstraction (water quantity) or at times both. However, in terms of water

use, the project activities will not use a significant amount of water that would impact the resources. The only water required for the construction works such as tower foundation laying (concrete) and drinking purposes will be very minimal. Therefore, this impact is low.

For medium to large project scales, water resources pollution would be likely. However, the proposed tower activities will not require the use of large amount of liquid (hazardous) materials that would be washed into the nearby *iishana* during construction or operations. Therefore, pollution is very minimal, and can be considered of low significance (**Table 5**).

Table 5: Assessment of the project impact on site soils and water resources

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	L/M - 4	M - 3	L – 12
Post mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

Mitigation measures

- Site areas that have been excavated but not used for construction activities should be rehabilitated to their pre-excavation state to avoid erosion.
- Soils around the site should not be disturbed.
- Where hydrocarbons and other chemicals are used during the project activities on site, impermeable liners should be laid on such sites to capture possible spills and prevent these substances from reaching the site soils.
- In an event that any of the substances mentioned above, spill on the soil, the contaminated soil should be cleaned up immediately and dispose of in a designated hazardous waste bin and transported to the nearest approved landfill site. The contaminated and removed soil should be replaced with clean soil.
- No waste, of any form should be disposed of on the soils or in the nearby open *iishana* (drainage systems).

7.4.2. Potential Radio Frequency Radiation on Human Health

Although tower operational phase health concerns were not specifically raised as a concern during the public participation process, it is a national and international topic that requires investigation, as the tower is in proximity to some of community members, the Oshetu No. 5 and homesteads.

Health authorities around the world, including Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the World Health Organization (WHO), have examined the scientific evidence regarding possible health effects from broadcast towers. Current research indicates that there are no established health effects from the low radio frequency electromagnetic emission (RF EME) exposure encountered by the public from broadcast towers (Australian Radiation Protection and Nuclear Safety Agency, 2015)

Despite the above information from ARPANSA, the International Commission on Non-Ionizing Radiation Protection (ICNRP) provides guidance on protecting against the adverse health effects associated with electromagnetic fields (EMF) or electromagnetic emission (EME). These guidelines are based on short-term, immediate health effects such as stimulation of peripheral nerve muscles, shocks and burn caused by touching conducting objects, and elevated tissue temperatures resulting from absorption of energy during exposure to EMF/EME.

The National Radiation Protection Authority of Namibia (NRPA) is the responsible or regulatory authority that is tasked with the administration of the Atomic Energy and Radiation Protection Act (Act 5 of 2005). The Act specifically requires that account be taken of any guidelines published by ICNIRP regarding the radiation risks associated with Base Transceiver Station (BTS) structures (National Radiation Protection Authority, Unknown date). The health impacts of radiation are explained for both short- and long-term in the Energy Board of Namibia Directive. These effects are summarized (as per the afore-mentioned Directive) as follows:

A. Short-term Radiation (Health) effects

The basic restrictions on the effects of exposure are based on established health effects. Different scientific bases were used in the development of basic exposure restrictions for various frequency ranges. Depending on the frequency, the physical quantities used to specify the basic restrictions on exposure to EMF are current density, SAR (Specific Energy Absorption Rate), and power density. For further information on the short-term effect.

The significance of this impact can be regarded as medium to high, but can be reduced to a low significance rating by ensuring that the sufficient mitigations measures governed by the national and international legal standards such as International Commission on Non-Ionizing Radiation Protection (ICNIRP) on infrastructure EMR emissions are adequately implemented.

B. Long-term Radiation (Health) Effects

In the case of potential long-term health effects of exposure, such as an increased risk of cancer, ICNIRP conducted that the available data are insufficient to provide a basis for this setting exposure restriction. Thus, the ICNRIP guidelines alone should not be used as a basis for protection against non-thermal effects or long-term biological effects.

The significance of this impact is considered medium to high because the long-term effect is unknown. In the context of the above, a cautionary approach is adopted, and in particular the Precautionary Principle, which states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action. The effective implementation of measures, the impact significance can be significantly reduced to medium and eventually low. The assessment is shown in **Table 6**.

Therefore, ICNIRP uses a reduction factor of 10 to derive at occupational limits for workers and a factor of about 50 to arrive at exposure limits for the public. This factor serves as a precautionary buffer to compensate for uncertainties in the research. By adhering to the threshold levels of ICNIRP, the precautionary measures should be sufficient to adequately address this impact. However, the risk will not be abolished, and it is recommended that the Proponent keep up to date with regards to any new literature published by ICNIRP.

Table 6: Assessment of tower presence on human health (short – and Long-term radiation)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M – 3	H – 5	M/H – 8	M/H – 4	M – 64
Post mitigation	L/M – 2	L/M – 2	L/M – 4	L/M – 2	L - 16

Mitigation measures

- The Proponent should ensure that the tower construction and its EMR are within the international standards of The Atomic Energy and Radiation Protection Act, Act 5 of 2005 and Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (April 1998 developed by the International Commission on ICNIRP).
- The design standards to be applied for the tower should comply with the internationally accepted public exposure guidelines.
- The National Radiation Protection Authority should be involved during the operational phase to assess the possible emissions from the tower.

7.4.3. Civil Aviation Concerns

Potential impact on civil aviation is due to the height and location of the site. Generally, the effective utilisation of an aerodrome can significantly be influenced by natural features and man-made constructions inside and outside its boundary. These features may result in limitations on the distance available for take-off and landing and on the range of meteorological conditions in which take-off and landing can be undertaken. For these reasons, certain areas of the local airspace are regarded as integral parts of the aerodrome environment (Excel Dynamic Solutions, 2019).

A decrease in aviation safety could have severe impacts on third parties considering the potential for injury, death or damage/loss of third-party property associated with aviation accidents. In this regard, the consequences of potential incidents would affect families and communities beyond the project boundary and lifespan (Excel Dynamic Solutions, 2019). The national civil aviation authority (Namibia Civil Aviation Authority (NCAA)) and Civil Aviation Standards of the ICAO dictate that all obstructions to be erected within 15 km and 8 km from an airport / aerodrome reference point, respectively. Given, the distance from the site to the Ruacana Airport (36 km), the impact is very minimal.

The proposed height of the tower is 300 m and the Namibia Civil Aviation Regulations (NAMCARS) require that erected structures/obstacle should not be higher than 150 feet (45 m) above the mean level of the landing area. Although the tower height is that high, it is anticipated that it will still comply with the NAMCARS, given the fact that there are no airports nor known aerodromes in proximity of the site. Without the implementation of any mitigation measures can be considered slightly medium and upon the implementation of the mitigation measures, the impact will receive a low significance rating. This impact is assessed in **Table 7** below.

The proposed site designs and location need to be verified to ensure that it meets the approval of the NCAA Directorate regarding the height of the masts and the position and stability of transmitters.

Table 7: Assessment of project impact on civil aviation

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M - 3	M – 36
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M -2	L - 16
Mitigation measures					

- The proposed tower designs and locations need to be verified to ensure that it meets the approval of the Namibia Civil Aviation Authority's Regulations (NAMCARS) regarding the tower height and the position in the area.
- The Civil Aviation Act No. 6 of 2016 for setting up mast structures in Namibia should be complied with.
- Civil Aviation Standards of the International Civil Aviation Organisation (ICAO) pertaining to the radio tower structure should be adhered to.
- The nearest aerodrome point to the site is located 36 km away (in Ruacana Town), therefore does not require a permit from the NCAA to erect the tower. According to NAMCARS and ICAO requirements only structures erected within less than 15 km and 8 km distance, respectively require permitting. However, the local civil aviation authority (NCAA) should be kept up to date with any new proposed changes to the tower.

7.4.4. Biodiversity: Avifauna (Migratory Birds)

The impact on other flora in the area is very minimal to none, therefore insignificant for the assessment. The most potentially affected fauna in this project are birds. Birds may fly over the site area.

According to Partners in Flight (2020), each year, approximately 7 million birds collide with communication towers in North America. Migrating songbirds are attracted to and disoriented by non-flashing obstruction warning lights on towers, especially on foggy and cloudy nights. Birds attracted to lights fly close to towers and often suffer collisions with guy wires or tower structures. However, birds are much less attracted to flashing tower lights and elimination of the non-flashing tower lights reduces the numbers of bird collisions by as much as 70%.

The location of the tower site close to open water systems such as the *iishana* and the water canal within meters of the site would mean night-migratory birds flying over the area from time to time in search for water and breeding/nesting grounds.

In the absence of mitigation measures, this could lead potential birds' collision and possible mortalities, resulting in loss of avifauna. The significance of the impact is rated medium to high, but on implementation of measures, the significance can be reduced to low, followed up with sufficient monitoring – please refer to **Table 8** below.

Table 8: Assessment of the tower on birds

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M – 3	M/H – 4	M/H – 8	M – 3	M – 45
Post mitigation	L/M – 2	L/M – 2	L/M – 4	L/M – 2	L - 16

Mitigation measures

- Although there are already other structures that could already be contributing to the impact (existing powerlines), the cumulative impacts of the new tower in relation to the existing powerlines and associated structures in the area are an important consideration in order to minimize the impact on birds.
- Migratory bird attraction and energy costs **can be further minimized by eliminating continuously burning security lights under towers. Many tower operators use down-shielded, motion sensor-triggered security lighting, which promotes tower safety, reduces energy costs, and reduces the possibility of attracting migratory birds.**
- Flashing lights would not only minimize migratory bird collisions but also maintain aircraft safety while decreasing tower lighting costs and maintenance costs.
- Other proper measures on minimizing bird mortalities by the radio tower should be developed and implemented

7.4.5. Air Quality

The tower footprint is significantly small, and the tower components will be manufactured at the relevant facility offsite and only assembled on site. The anticipated source of air pollution would be some dust from the excavation of the hole to erect the tower and potential emissions from one or two trucks that will be delivering the tower and its associated materials during construction. The tower site is relatively small and period for construction works is quite short and localized. Therefore, given the relatively limited footprint size and short construction timeframe, dust, and gas emissions during the tower construction would be minimal and short-term in nature.

Therefore, the impact can be rated as low to slightly medium significant. Upon implementation of mitigation measures, the impact will be of low significance during construction and insignificant during the operational phase. The assessment is presented in **Table 9** below.

Table 9: Assessment of project activities on surrounding air quality

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	L/M - 4	M - 3	L – 24

Post mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

Mitigation measures

- If construction works is carried out in dry months of the year, it is advised that in extremely windy days, a reasonable amount of water should be used to suppress the dust that may be emanating from the excavated site areas and access road.
- Project vehicles should not be left idling when not in use so that they do not emit harmful gases into the air.

7.4.6. General Health and Safety

Project workers carrying out the construction and maintenance works may be exposed to health and safety risks when they are not properly inducted or trained on how to use certain machinery or equipment. The health and safety risk are not only for the workers, but the local community too. This is true because, if the site is not fenced off during construction and during operational phase, local children may try to access the site and play with dangerous materials and equipment.

With no mitigation measures in place, this impact will receive a "medium" significance rating. However, the implementation of applicable safety measures, the impact can significantly be reduced to a low rating. The assessment of this impact is presented in **Table 10**.

Table 10: Assessment of project activities on general health and safety

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 3	M/H - 8	M/H - 4	L – 56
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

Mitigation measures

- The contractor(s) should ensure that all personnel are always provided with personal protective equipment (PPE), such as gloves, safety boots, safety glasses and hard hats when carrying out construction and maintenance works on site.
- No workers should be allowed to drink alcohol during working hours.
- No workers should be allowed on site if under the influence of alcohol.
- Site workers should be properly trained on how to operate site machines and equipment.
- The Labour Act's Health and Safety Regulations should be complied with.

- All personnel should be trained in/sensitised to the potential health and safety risks associated with their respective jobs.
- The site should remain fenced off during construction and operational phase to protect both the tower and the local community (children playing in the vicinity).

7.4.7. Waste Generation

The generation of waste from any project is likely. Improper handling, storage and disposal of wastes may lead to environmental degradation/pollution. If these are not disposed of in a responsible manner, it will result in the pollution of the site and the surrounding environment (including soils and water). The assessment of this impact is shown in **Table 11**.

Table 11: Waste generation assessment

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	M – 6	M - 3	M – 30
Post mitigation	L - 1	L - 1	L – 2	L -1	L - 4

Mitigation measures

- The site workers (contractors) should be provided with portable toilets (i.e. easily transportable). Alternatively, the Proponent could decide with the local *cuca* shop owners and/or homesteads owners for the workers to make use of their existing sewage facilities.
- The site should always be kept tidy during construction and maintenance phases.
- All domestic and general construction waste produced daily should be cleaned and contained.
- Waste containers (bins) should be emptied after completion of construction and maintenance works and removed from site to a municipal waste disposal site.
- Separate waste containers (bins) for hazardous and domestic / general waste must be provided on site.
- No waste may remain or buried on site after the completion of construction and subsequent maintenance works.

7.4.1. Noise

Noise generated by project related vehicles and equipment during construction and operational phase can be a nuisance to the neighbours. This impact is regarded as of minimal significance given the fact that even construction work will only be limited to certain days of the first two weeks and noise will be limited to few hours in a day or two. Furthermore, construction related noise will be limited to only some working hours, i.e. between 8am and 5pm and will only last for so long during that duration. Therefore, the noise level is bound to be limited to the site only.

The impact can be rated as low to medium significant if no mitigation measures are implemented, but upon implementation, the impact will be of low significance. This impact is assessed in **Table 12** below.

Table 12: Assessment of noise on the locals

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M - 3	M – 36
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M -2	L - 16

Mitigation measures

- Noise from vehicles and equipment on site should be reduced to acceptable levels.
- The site construction activities' times should be set such that, no activity is carried out during the night or very early in the mornings, i.e. between 08h00 and 17h00 to avoid noise generated by equipment and the movement of heavy vehicles.
- Based on the planned activities on site during construction, the Proponent should inform the Village Headman and neighbouring property owners of the days when abnormal (excessive) noise is expected on site so that they are prepared for such events.

7.4.2. Vehicular Traffic Safety

The project works will involve the movement of one or two heavy trucks during construction of the tower and this may potentially cause short-term increase in traffic in the area. However, only so many times a week of the three weeks of construction that the tower construction works will be

done, and materials and equipment will be transported to site. It should eb noted that the site is located along an already busy C46 and the movement of project related for a limited time of that month of works would not have a significant impact on this road. The impact is however, rated as medium during the construction phase, if not measures are put in place and implemented. The assessment is done as per **Table 13** below.

Table 13: Assessment of vehicular traffic safety impact

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	L/M - 2	M - 6	M/H - 4	M – 44
Post mitigation	L - 1	L - 1	L/M - 4	L/M -2	L - 12

Mitigation measures

- Drivers of the project vehicles should be in possession of valid and appropriate driving licenses.
- Vehicles drivers should not be allowed to operate vehicles while under the influence of alcohol.
- The Proponent should make provision for safe offloading and loading zones on site.
- No heavy trucks or project related vehicles should be parked outside the project site boundary or demarcated site areas.
- To control traffic movement on site, deliveries of materials to site should be carefully scheduled. This should optimally be during weekdays and between the hours of 08h00 and 17h00.

7.4.3. Visual impact

Communications towers can cause a visual impact on the environment due to their contrasting colours, height, and design. If not properly designed, the tower will contrast the surrounding landscape and thus potentially become a visual nuisance to locals. This may initially be an unpleasant sight for the locals, but with time they will get used to it and appreciate the tower presence for the sake of their community's improved services. Without any measures implemented,

the visual impact can be rated as of medium significance. However, upon effectively implementing the measures, it will be significantly reduced to low. The impact is assessed **Table 14**.

Table 14: Visual impact assessment

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	L/M - 2	M - 6	M/H - 4	M – 44
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M -2	L - 16
Mitigation measures • All the necessary options to improve the aesthetic of the site should be considered so that it blends in with the surrounding area or at least enhance it for a better appeal to the locals and neighbours. The tower and equipment storage parameters to be considered here are colour, scale, design, and height.					

7.4.4. Archaeology

The project site is in a Region that has many archaeological sites, that despite the absence of such sites on or around the project site, potential impact on unknown archaeological objects can still be expected. During construction (excavation) works, historical resources may be impacted through inadvertent destruction or damage. This may include the excavation of subsurface graves or other archaeological objects. There was no information provided about neither known heritage nor site of cultural values within the site nor in the vicinity of the project site area. However, this does not mean rule out the possibility of finding some of these objects during the construction phase. The assessment of the impact is presented in **Table 15** below.

Table 15: Assessment of the project impacts on archaeological sites and objects

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M - 3	M – 36
Post mitigation	L/M - 2	L/M - 2	L/M - 4	L/M -2	L - 16

Mitigation measures

- Identified of any archaeological significant objects on the site should not be disturbed but are to be reported to the project Environmental officer or National Heritage Council offices for further instructions and actions.
- Workers should be educated to not destroy or throw away but report (to the environmental officer) of any unknown object found/discovered on site during earthworks during construction.

8. CHAPTER EIGHT: CONCLUSIONS AND RECOMMENDATIONS

The proposed radio transmission tower will primarily positively contribute towards the improved communication services in the area as well as few temporary job opportunities to the locals during the construction and possibly maintenance phase. However, the proposed project is potentially associated with some negative impacts that were identified, described, and assessed during the environmental process. The significance rating of the impacts was found to be medium. Where it is anticipated that the potential impact cannot be practically avoided altogether, appropriate mitigation measures were recommended for implementation during respective phases of the project. Should the recommendations included in this report and the EMP be implemented, the significance of these impacts can be reduced to low rating and promote a biophysical and social sustainable environment.

Furthermore, for an impact rating to remain low throughout the project life cycle, the implementation of mitigation measures needs to be monitored and reported. Implementation and monitoring will need to be done by either the Proponent themselves or through an appointed Environmental Consultant or Environmental Control Officer (ECO)) and report to the applicable Competent Authority (MEFT). Monitoring will not only be done to maintain the low significant rating but also to ensure that all potential negative impacts identified in this study and new impacts that may arise during project implementation are properly identified in time and addressed (mitigation measures provided for immediate implementation).

The effective implementation and monitoring of the mitigation measures, would ensure environmental sustainability at site and surrounding areas. Therefore, the proposed radio tower may be granted an Environmental Clearance Certificate, but provided that:

- All mitigations provided in this Scoping Report and the management action plans in the EMP are implemented as stipulated.
- All required permits, licenses and approvals for the proposed radio tower are obtained as required (please refer to the Permitting and Licensing Table in the Environmental Management Plan (EMP)).
- The Proponent and all their engineers and contractors comply with the legal requirements governing this type of project and its associated activities; and
- All the necessary environmental and social (occupational health and safety) precautions provided are adhered to.

9. CHAPTER NINE: LIST OF REFERENCES

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APPENDIX A: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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THE PROPOSED CONSTRUCTION AND OPERATION OF A RADIO TRANSMISSION TOWER IN THE OMINDAMBA B VILLAGE OF THE RUACANA CONSTITUENCY, OMUSATI REGION

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

MAY 2020

APP-001382

SHALOM MESSENGER MINISTRIES

MAFUTA
Environmental Consultants

DOCUMENT DATA SHEET

DOCUMENT VERSION 001

PROJECT NAME	**PROPOSED CONSTRUCTION AND OPERATION OF A RADIO TRANSMISSION TOWER IN THE OMINDAMBA B VILLAGE OF THE RUACANA CONSTITUENCY, OMUSATI REGION**
REPORT TITLE	**ENVIRONMENTAL MANAGEMENT PLAN: (EMP)**
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MET PROJECT NO.	**APP-001382**
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APPROVAL	**NAME:** **SIGNATURE:**
DATE OF SUBISSION	**23 May 2020**

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ACRONYMS

TERMS	DEFINITION
ARPANSA	including Australian Radiation Protection and Nuclear Safety Agency
BTS	Base Transceiver Station
DEA	Directorate of Environmental Affairs
EAP	Environmental Assessment Practitioners
ECC	Environmental Clearance Certificate
ECO	Environmental Control Officer
EMP	Environmental Management Plan
ESA	Environmental Scoping Assessment
ESR	Environmental Scoping Report
ICAO	International Civil Aviation Organisation
ICNIRP	International Commission on Non-Ionizing Radiation Protection
MEC	Mafuta Environmental Consultants
MEFT	Ministry of Environment, Forestry and Tourism
NAMCARS	Namibia Civil Aviation Regulations
NCAA	Namibia Civil Aviation Authority
NHC	National Heritage Council
NRPA	National Radiation Protection Authority of Namibia

1. INTRODUCTION

1.1. Project Background and Location

Shalom Messenger Ministries (hereinafter referred to as the Proponent) proposes to erect and operate a 300 m high free-standing radio transmission (frequency) tower (or in short, radio transmission tower) at the Oshetu No. 5 local shebeens (*cuca* shops) in the Omindamba B Village of the Uukolonkadhi Traditional Authority, Omusati Region. The proposed site is located about 30 km east of the Ruacana Town in the Ruacana Constituency along the Ruacana-Outapi road (C46) in northern Namibia. The land planned for the tower (and its associated structures) and as approved by the local traditional authority (headman) is 16 by 19 m^2. This allocated project land will be used for the tower and storing operational and maintenance equipment. The approximate site coordinates are presented in **Table 1** and the location of the site is shown in **Figure 1** below.

Table 1: Site boundary coordinates of the proposed tower site

Site Point	Latitude	Longitude
Point A	17°26'21.729"S	14°41'23.078"E
Point B	17°26'22.177"S	14°41'23.073"E
Point C	17°26'22.362"S	14°41'23.648"E
Point D	17°26'21.693"S	14°41'23.645"E

Cuca shop *- a Southern African term for a "Shebeen"—an unlicensed house selling alcoholic liquor. The term is used in Namibia and Angola and is derived from a Portuguese make of Cuca beer, which was available in Angola (a Portuguese colony) during the 1960s and the 1970s (Wikipedia).*

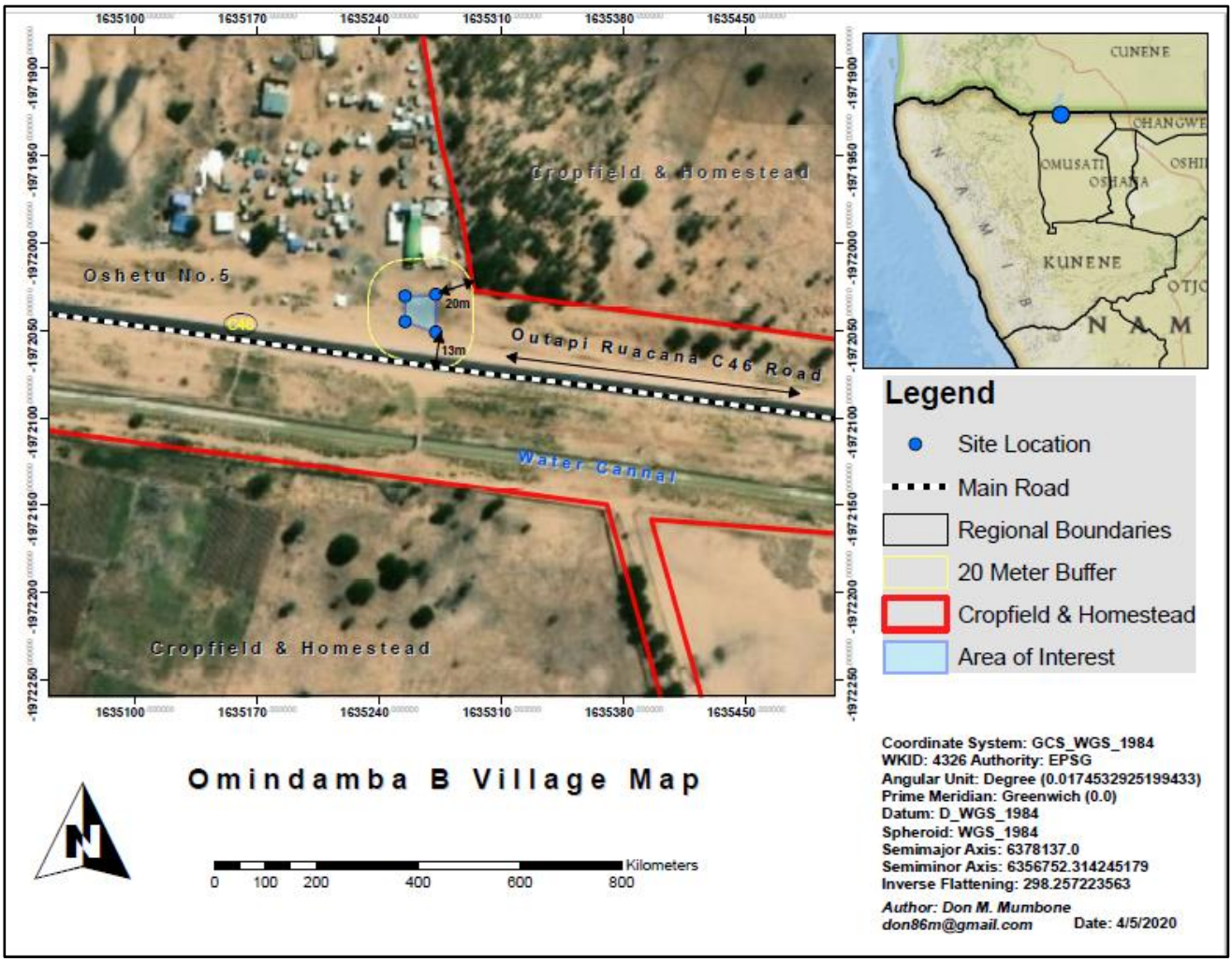

Figure 1: Location of the radio tower site in the Omindamba B Village near Ruacana, Omusati Region

1.2. Aim of the EMP

This document has been compiled as required by Regulation 8 of the Environmental Management Act (EMA) (No. 7 of 2007)'s Environmental Assessment Regulations (2012) to be included as part of the Scoping Environmental Assessment (EA) process. A 'management plan' is defined as:

"…a plan that describes how activities that may have significant environments effects on the environment are to be mitigated, controlled and monitored."

An EMP is one of the most important outputs of the EA process as it synthesises all the proposed mitigation and monitoring actions, set to a timeline and with specific assigned responsibilities. It is important to note that an EMP is a legally binding document and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine. This EMP is a living document and

should be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The purpose of this document is therefore to guide environmental management throughout the different phases of the proposed development, namely, planning and design, construction, and operational phases.

The following phases are addressed in this EMP:

- **Planning and Design Phase**: the period, prior to the construction phase, during which preliminary legislative, technical and administrative arrangements are carried out in preparation of the project's construction activities.
- **Construction Phase**: the phase during which earth works will be carried out on demarcated site areas to erect the planned tower, its associated structures and for the installation of the necessary services infrastructure such as electricity cables.
- **Operational and maintenance phase**: the phase during which the radio tower will be operational, and maintenance is conducted by the Proponent or their appointed maintenance contractors.

1.3. Appointed Environmental Consultant

The proposed project (constructing and operating a radio transmission tower) is however one of the listed activities in the National Environmental Management Act (NEMA) No.7 of 2007 and its 2012 Environmental Impact Assessment (EIA) Regulations that cannot be undertaken without an Environmental Clearance Certificate (ECC). The ECC would be applied for and obtained from the Department of Environmental Affairs (DEA) of the Ministry of Environment, Forestry and Tourism (MEFT). As part of the ECC application process, an environmental assessment (identifying and assessing the potential risks and impacts associated with the project activities) needs to be conducted and an Environmental Management Plan (EMP) developed (to avoid and or mitigate the risks).

The proposed development/project is a listed as per the following EIA Regulation:

- *10.1 (g) The construction of masts of any material or type and of any height, including those used for telecommunication, broadcasting, and radio transmission.*

Subsequently, to fulfil the requirements of the Environmental Management Act, Shalom Messenger Ministries appointed Mafuta Environmental Consultants cc (MEC), as the Environmental

Assessment Practitioner (EAP) to conduct the required Environmental Assessment process on their behalf and submit the ECC application with the required documents to the Environmental Commissioner. The ECC application process will entail assessing the potential impacts associated with the project, compile an environmental scoping report, and develop an Environmental Management Plan (EMP) for the proposed project. The documents are to be submitted to the MEFT: Directorate of Environmental Affairs (DEA). The project ECC will then be issued upon approval of the documents produced from the EA, i.e. Environmental scoping report and the EMP.

1.4. Assumptions and Limitations of the EMP

This EMP has been drafted with the acknowledgment of the following limitations:

- This document has been compiled at a scoping-level Environmental Assessment (EA) conducted for the proposed radio tower and related activities. No specialist study conducted, nor report compiled for this Scoping Assessment; and
- The mitigation measures recommended in this EMP document are based on the impacts in the environmental scoping report identified based on the project description and site investigation/assessment and stakeholders' input. Should the scope of the proposed project change, the impacts will need to be reassessed and mitigation measures provided accordingly.

The following chapter presents the project roles and responsibilities to be assigned as deemed necessary by the Proponent pertaining to the implementation of this EMP.

2. EMP IMPLEMENTATION: ROLES AND RESPONSIBILITIES

The responsible persons expected to implement the management action measures provided in this EMP are presented under this chapter. The roles and responsibilities of these individual or persons are as follows.

2.1. The Proponent

The project Proponent is responsible for the implementation of the EMP by everyone involves on site. The Proponent may choose to carry out EMP implementation from construction to operational phase or they could delegate this to a Representative referred to as the Environmental Control Officer (ECO) described under the following section. The Representative can also be an appointed independent Environmental Consultant with a very good understanding of the Environmental Management Act and experience in Environmental management.

2.2. The Environmental Control Officer (ECO)

The ECO will be responsible for the following activities:

- Planning and carrying out site inductions to the workers on-site, specifically during construction.
- Management and monitoring of individuals and/or equipment on-site in terms of compliance with this EMP.
- Ensure that the requirements of the EMP are carried out during applicable activities throughout the project life span.
- Monitoring the overall implementation of the EMP during construction and operation; and
- Managing the implementation.

2.3. The Contractor (Engineer)

The contractor representatives or site project manager (as appropriate) will:

- Ensure that the relevant commitments contained in the EMP Action Plans are adhered to.
- Compile relevant procedures and method statements for approval by the applicable phase site manager prior to initiation of activities.
- Ensure relevant staff is trained in procedures; and
- Maintain records of all relevant environmental documentation.

3. ENVIRONMENTAL AND SOCIAL MANAGEMENT ACTION PLANS

This chapter presents the recommended management actions to be implemented by the Proponent and or other responsible project parties to avoid and/or reduce the negative environmental and social impacts, if avoiding is not possible.

3.1. Applicable Legal requirements and Permits

The legal obligations that govern the proposed development in terms of required permits / licenses are presented in **Table 2** below. The detailed legal framework is presented in the environmental scoping report.

Table 2: List of permits required for the proposed tower as per applicable legislation

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Environmental Management Act EMA (No 7 of 2007)	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). Details principles which are to guide all EAs.	The EMA and its regulations should inform and guide this EA process. Should the ECC be issued to the Proponent, it should be renewed every 3 years, counting from the date of issue. Contact details at the **Department of Environmental Affairs (DEA):** **Tel: +264 61 284 2701**
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (GN 30 S21). Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
Communications Act No. 8 of 2009	All the relevant communications operations' permit and license (broadcasting) should be applied for and obtained from the relevant regulatory authorities.	**Contact: Communications Regulatory Authority of Namibia (CRAN)** Tel.: +264 61 222 666

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
The Atomic Energy and Radiation Protection Act, Act 5 of 2005 "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300GHz)" (April 1998 developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP))	To determine the "safe distance" around the site. These provisions justify the need for assessing the impact of electromagnetic radiation from the antennae, on the nearby residents.	For the determination of possible exposure, the Proponent should consult with the Ministry of Health and Social Services' National Radiation Protection Authority. **Mr Josephh Eiman (Deputy Director)** Tel: 061 203 2415 Joseph.Eiman@mhss.gov.na
Civil Aviation Act No. 6 of 2016	The height of the proposed radio tower might be a threat to the nearest aerodrome site. Therefore, the Proponent should verify these prior to construction with the Namibia Civil Aviation Authority (NCAA).	The contact details at the NCAA to verify and advice on the construction of the tower in the are with regards to the aviation sector are as follow: **Mr. Golden Siteketa (Senior Manager: Aerodromes and Ground Aids Section)** Tel.: +264 83 235 2361 Email: siteketag@ncca.com.na
Convention on International Civil Aviation, Annex 14	• Annex 14 to the Convention on International Civil Aviation. • Chapter 4: Obstacle restrictions and removal • Chapter 6: Visual aids and donating of obstacles	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
National Heritage Act No. 27 of 2004 The National Monuments Act (No. 28 of 1969)	Discovered heritage resources should be reported to the National Heritage Council of Namibia.	**Dr Alma Nankela (Chief Archaeologist & Rock Art Specialist)** National Heritage Council: Archaeology Unit Tel: +264 61 301 903 Email: archeology@nhc-nam.org
Road Traffic and Transport Act, No. 22 of 1999	Provides for the control of traffic on public roads (access) and the regulations pertaining to road transport, including the licensing of vehicles and drivers.	Site access permit from the main road should be applied for and obtained from the Roads Authority. **Contact: Mr. Eugene de Paauw (Specialist Road Legislation, Advice & Compliance)** Tel: +264 61 284 7027 Email: dePaauwe@ra.org.na

3.2. Main Potential Negative Impacts Identified

The following potential negative impacts have been identified:

- Health concerns from electromagnetic radiation, General health, and safety.
- Impact on avifaunal (birds).
- Physical disturbance to site soils.
- Impact on civil aviation.
- Environmental pollution, and Dust generation (short-term decrease in air quality).
- Noise (nuisance).
- Vehicular traffic safety; and
- Visual and archaeological impacts.

3.3. Aim of Enviromental Management Action Plans

The aim of the management actions of the EMP is to avoid potential negative impacts where possible. Where impacts cannot be avoided, measures are provided to reduce the significance of these impacts. The management actions recommended to address the potential negative impacts rated in the ESA are presented in **Table 3**. The management actions were compiled based on the three project phases, Planning, Construction and Operational and maintenance phases.

Table 3: Management Action Plans: Planning & Design, Construction and Operational & Maintenance

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
PLANNING AND DESIGN PHASE				
EMP training	Lack of EMP awareness and the implications thereof	• All personal should be educated about the necessary health, safety, and environmental considerations applicable to their respective works. • The Proponent and Contractor's responsibilities should be executed in compliance with relevant legislation and this EMP.	ECO	Ongoing
Radio Broadcasting permit	Lack of necessary project authorization	• A Radio Broadcasting licence and other relevant communications authorisations should be applied for and obtained from the Communications Regulatory Authority of Namibia (CRAN).	Proponent	Post-ECC issuance and Pre-Construction
Structure Design	Tower design failure	• The design standards to be applied for the radio tower and its support structures should comply with the internationally accepted public exposure guidelines.	Planning & Design Engineers	Pre-construction

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
Visual (sense of place)	Visual	• All the necessary options to improve the aesthetic of the site should be considered so that it blends in with the surrounding area or at least enhance it for a better appeal to the locals and neighbours. The tower and equipment storage parameters to be considered here are colour, scale, design, and height.	Planning & Design Engineers	In this phase
Civil aviation	Potential civil aviation issues owing poor planning and design	• The proposed tower designs and locations need to be verified to ensure that it meets the approval of the Namibia Civil Aviation Authority's Regulations (NAMCARS) regarding the tower height and the position in the area. • The Civil Aviation Act No. 6 of 2016 for setting up mast structures in Namibia should be complied with. • Civil Aviation Standards of the International Civil Aviation Organisation (ICAO) pertaining to the BTS (towers) should be adhered to.	Proponent: Technical / Design / Planning Team In consultation with the Namibia Civil Aviation Authority.	In this phase

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• The nearest aerodrome point to the site is located 36 km away (in Ruacana Town), therefore does not require a permit from the NCAA to erect the tower. According to NAMCARS and ICAO requirements only structures erected within less than 15 km and 8 km distance, respectively require permitting. However, the local civil aviation authority (NCAA) should be kept up to date with any new proposed changes to the tower.		
Employment	Labour recruitment	• Preference for both casual works during construction and operational & maintenance work should be given to locals.	Construction contractor	Pre-construction
Construction works	Appointment of construction contractor	• Preference for construction works should be given to Ruacana and/or Outapi based companies. • This work can only be given to companies out of the two towns if there is no capable company in the area (in Ruacana and Outapi).	Proponent: Procurement	Pre-construction

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
Construction schedule	Appointment of contractors	• A convenient construction work / schedule should be prepared and be shared with the neighbouring property owners through the community leader (Village Headman). This will ensure that the locals/neighbours are aware of when to expect the construction team on site. • Construction activities should be restricted to weekdays i.e. Mondays to Fridays and during working hours (8:00 - 17:00) only.	Appointed Contractors	Pre-construction
CONSTRUCTION PHASE				
EMP training	Lack of EMP awareness and the implications thereof	• Employees appointed for construction work on respective infrastructure must ensure that all personnel are aware of necessary health, safety, and environmental considerations applicable to their respective work. • Comprehensive induction forms a critical component during the construction and operational period. This includes the following:	Proponent / ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		○ Ensuring that all employees are aware of their individual impact on the environment. ○ Ensuring that preventative measures and procedures are undertaken to reduce the risk of a potential impact.		
Monitoring	EMP non-compliance	• The implementation of this EMP should be monitored. • The ECO(s) should inspect the site throughout the construction period and after completion.	Proponent / ECO	Ongoing
Soils	Physical disturbance	• Site areas that have been excavated but not used for construction activities should be rehabilitated to their pre-excavation state to avoid erosion. • Soils around the site should not be disturbed. • Where hydrocarbons and other chemicals are used during the project activities on site, impermeable liners should be laid on such sites to capture possible spills and prevent these substances from reaching the site soils.	ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• In an event that any of the substances mentioned above, spill on the soil, the contaminated soil should be cleaned up immediately and dispose of in a designated hazardous waste bin and transported to the nearest approved landfill site. The contaminated and removed soil should be replaced with clean soil. • No waste, of any form should be disposed of on the soils or in the nearby open *iishana* (drainage systems).		
Biodiversity	Loss of biodiversity (Avifauna / birds)	• Migratory bird attraction and energy costs **can be further minimized by eliminating continuously burning security lights under towers. Many tower operators use down-shielded, motion sensor-triggered security lighting, which promotes tower safety, reduces energy costs, and reduces the possibility of attracting migratory birds.**	Proponent Planning & Design Engineers	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• Flashing lights would not only minimize migratory bird collisions but also maintain aircraft safety while decreasing tower lighting costs and maintenance costs. • Although there are already other structures that could already be contributing to the impact (existing powerlines), the cumulative impacts of the new tower in relation to the existing powerlines and associated structures in the area are an important consideration in order to minimize the impact on birds. • Other proven measures on minimizing bird collisions and mortalities by the radio tower should be developed and implemented		
	Flora (vegetation)	• Vegetation within proximity of site must not be disturbed nor damaged in any way.	ECO	Ongoing
Health and Safety	Health and safety of the workers	• Construction workers should be trained on how to handle materials and equipment on site to avoid injuries.	Contractor ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• Construction equipment and materials transported to site should be securely fastened to the vehicles (trucks and cars). This is to ensure that the materials and equipment do not fall off the vehicles and cause injuries to anyone while transporting them. • The contractor(s) should ensure that all personnel are provided with appropriate personal protective equipment (PPE), such as gloves, safety boots, safety glasses and hard hats always while performing work on or moving within the site. • The construction site should be equipped with "danger" or "cautionary" signs for any potential danger or risk area identified on site during construction works. • No employee should be allowed to drink alcohol prior to and during working hours as this may lead to mishandling of equipment which results into injuries and other health and safety risks.		

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
	Public health	• The site should remain fenced off during construction and operational phase to protect both the tower and keep the local community off site (especially curious children who may be playing in the vicinity).	Contractor ECO	Once-off
Air Quality	Dust generation	• If construction works is carried out in dry months of the year, it is advised that in extremely windy days, a reasonable amount of water should be used to suppress the dust that may be emanating from the excavated site areas and access road. • Project vehicles should not be left idling when not in use so that they do not emit harmful gases into the air.	ECO	As and when required during this phase
Neighbours to the site	Disturbance	• Construction works schedule should be limited to weekdays only and between 08h00 and 17h00. This will keep the vehicle-related dust level minimal in the area.	ECO Construction contractor	Ongoing
	Noise (Nuisance)	• Noise from vehicles and equipment on site should be reduced to acceptable levels.	ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• The site construction activities' times should be set such that, no activity is carried out during the night or very early in the mornings, i.e. between 08h00 and 17h00 to avoid noise generated by equipment and the movement of heavy vehicles. • Based on the planned activities on site during construction, the Proponent should inform the Village Headman and neighbouring property owners of the days when abnormal (excessive) noise is expected on site so that they are prepared for such events.		
Waste	Environmental Pollution	• **Sewage:** The site workers (contractors) should be provided with portable toilets (i.e. easily transportable). Alternatively, the Proponent could decide with the local *cuca* shop owners and/or homesteads owners for the workers to make use of their existing sewage facilities. • The construction site should always be kept tidy.	ECO Construction contractor	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• All domestic and general construction waste produced daily should be cleaned and contained daily. • No waste may be buried or burned on site or anywhere else. • Waste containers (bins) should be emptied after the construction and removed from site to the Municipal waste disposal site upon completion of works, or when necessary. • Separate waste containers (bins) for hazardous and domestic / general waste must be provided on site. • No waste may remain or buried on site after the completion of construction and subsequent maintenance works. • Construction labourers should be sensitized to dispose of waste in a responsible manner and not to litter.		
Visual (sense of place)	Visual	• The structure should not cause too much of a visual nuisance when constructed.	ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
Vehicular traffic safety	Increase in local traffic flow	• Drivers of the project vehicles should be in possession of valid and appropriate driving licenses to operate vehicles. • The Proponent should make provision for safe offloading and loading zones on site. • No heavy trucks or project related vehicles should be parked outside the project site boundary or demarcated site areas. • To control traffic movement on site, deliveries of materials to site should be carefully scheduled. This should optimally be during weekdays and between the hours of 08h00 and 17h00. • Vehicle drivers should adhere to the road safety rules. • Project vehicles should be in a road worthy condition and serviced regularly to avoid accidents because of mechanical faults of vehicles.	Proponent ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
Archaeological or heritage objects and sites	Unearthing and damaging of archaeological resources	• Identified of any archaeological significant objects on the site should not be disturbed but are to be reported to the project Environmental officer or National Heritage Council offices for further instructions and actions. • Workers should be educated to not destroy or throw away but report (to the environmental officer) of any unknown object found/discovered on site during earthworks during construction.	ECO	On occurrence / encounter
OPERATIONAL AND MAINTENANCE PHASE				
EMP training	Lack of EMP awareness and the implications thereof	• The Proponent employees/Maintenance team should be made aware of all necessary health, safety, and environmental considerations applicable to maintenance works.	ECO	Ongoing
Monitoring	EMP non-compliance	• The ECO or the Proponent should monitor the implementation of this EMP. • The ECO should inspect the site operation throughout the operational phase on a bi-annual basis **(every 6 months)**.	ECO	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
		• An EMP non-compliance penalty system should be implemented on site.		
Health and Safety	Electromagnetic Radiation (EMR) emission	• The radio tower construction and its EMR should be within the international standards of The Atomic Energy and Radiation Protection Act, Act 5 of 2005 and Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (April 1998 developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP)). • The design standards to be applied for the structure should comply with the internationally accepted public exposure guidelines. • The National Radiation Protection Authority should be involved during the operational phase to assess the possible emissions from the tower.	Proponent, ECO in consultation with the National Radiation Protection Authority (NRPA)	Ongoing
		• The National Radiation Protection Authority should be involved during this phase (operational) to assess the possible emissions from the tower.	National Radiation Authority of Namibia	Ongoing

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
Health and Safety	Health and safety of the workers and public	• Projected equipment and materials for maintenance should be securely fastened to the vehicles to ensure that they do not fall off the vehicles and cause injuries to anyone. • **Other management action plans provided under the construction phase apply during this phase.**	ECO Maintenance team	Ongoing As required
Civil aviation	Civil aviation impact	• No other high projections/extensions will be added on top of the tower that may compromise the aerodrome (civil aviation) safety without prior consultation with the NCAA.	Proponent Maintenance team	Ongoing
Waste generation	Environmental Pollution	• **Please refer to management action plans provided under the Construction Phase**	Proponent: ECO / SHE Officer	Ongoing
Visual (sense of place)	Visual nuisance	• When carrying out regular maintenance, the team should ensure that they do not in any way alter the physical appearance of the tower such that it goes against its initial design shape, height, or colour.	Proponent Maintenance Team	As required (when maintaining the site)

ENVIRONMENTAL FEATURE	IMPACT	MANAGEMENT ACTIONS	RESPONSIBLE PERSON(S) / IMPLEMENTATION RESPONSIBILITY	TIMEFRAME (WHEN?)
Waste	Environmental pollution	• The maintenance team should ensure that no waste is left nor buried on site after completion of works, but to be carried away and disposed of at the nearest approved landfill site. • **Please refer to management action plans provided under Construction Phase**	ECO Maintenance Team	Ongoing
DECOMMISSIONING PHASE				
Structure Decommissioning	Waste generation	• The tower components and all its physical units, including security fence are to be disassembled and taken away to approved waste sites or depending on the nature of the material, recycled • All the buried components of the tower and storage units should be unearthed, and all rubbles cleaned up and carried to approved waste sites. The site is to be rehabilitated to its pre-tower state.	Proponent / Contractor	And Pre-site abandonment

3.4. Environmental Monitoring and Reporting

To reduce the "medium" and maintain the "low" significance ratings of impacts identified and assessed in the ESA report, the following monitoring activities are recommended:

- **Bi-annual Environmental Monitoring:** An EMP compliance monitoring should be undertaken throughout the project cycle. The **first bi-annual monitoring exercise** should be done counting 6 months from the date of ECC issuance.
- Monitoring reports are to be compiled and submitted to the Department of Environmental Affairs (DEA) for archiving. This practice will make it easy for the ECC renewal when it is about to expire as the DEA will have continuous data update about the project operations. Therefore, the Proponent should effectively monitor and submit the reports to the DEA. The submission is not only done for record keeping purposes, but also in compliance with the environmental legislation.

4. CONCLUSIONS AND RECOMMENDATIONS

Mafuta Environmental Consultants are confident that the potential negative impacts associated with the proposed radio transmission tower and associated activities can be adequately mitigated by implementing the recommended management action plans. Therefore, it is recommended that the project be issued with an Environmental Clearance Certificate. This will be on condition that the EMP is implemented and actions contained therein are monitored to maintain low significance and ensure medium rating impacts get to a low rating. Monitoring will ensure that newly arising impacts during the project phases are identified on time and addressed accordingly. The Proponent is also required to ensure that their project activities comply with the legal requirements governing the development and its associated activities.