Excel Dynamic Solutions (Pty) Ltd

Environmental Scoping Assessment (ESA) Report:

The proposed Construction and Operation of a Telecommunication Tower in Otjiwarongo, Otjozondjupa Region: An Application for Environmental Clearance Certificate

ECC Application Reference: App-003806

Document Version: Final for Submission

Author: **Ms. Fredrika Shagama** Reviewer: **Ms. Rose Mtuleni** Company: **Excel Dynamic Solutions (Pty) Ltd** Telephone: **+264 (0) 61 259 530** Fax2email: **+264 (0) 886 560 836** Email: **info@edsnamibia.com**	Client: **PowerCom (Pty) Ltd** Contact person: **Mr. Mercutio Mowes** Telephone: **+264 (0) 61 201 2958** Postal Address: **P.O. Box 40799 Windhoek** Email: **mowesm@telecom.na**

April 2022

EXECUTIVE SUMMARY

PowerCom Pty Ltd (*The Proponent*) proposes to construct and operate a telecommunication tower (30-meter-high lattice structure) in the town of Otjiwarongo. The site is located at Orwetoveni Extension 2 (20°27'37.9"S 16°39'46.9"E).

Telecommunication towers and related infrastructure developments are among listed activities that may not be undertaken without an Environmental Clearance Certificate (ECC) under the Environmental Management Act (EMA) (2007) and its 2012 Environmental Impact Assessment (EIA) Regulations. The relevant listed activities as per EIA regulations are:

- 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.

To ensure that the proposed activity is compliant with the national environmental legislation, the project Proponent (PowerCom) appointed an independent environmental consultant to undertake the required Environmental Scoping Assessment (ESA) process and apply for the ECC on their behalf.

The application for the ECC was registered and lodged to the Competent Authority (Ministry of Information and Communication Technology (MICT)), and the reporting submitted to the MEFT's Department of Environmental Affairs and Forestry (DEAF) for consideration of ECC issuance.

Public Consultation

Regulation 21 of the EIA Regulations requires public notification and consultation to be carried out in order for project details to effectively reach the Interested and Affected Parties. Public consultation methods carried out for this project includes distribution of a background Information Document, Project Environmental Assessment notices in newspapers, Public site notices, Public meeting arrangements, and neighbouring house-to-house consultations.

Potential Impacts identified

The following impacts were identified:

Potential positive impacts:

- Telecommunications convenience: Current and future residents (mobile users) will have an improved infrastructure and will not have to struggle with network coverage.

- Employment creation: Creation of a few temporary jobs during the construction of the tower.
- General contribution to local economic development through reliable communications services.

Potential negative impacts anticipated:

- Physical land/soil disturbance: excavation activities to erect the tower could potentially lead to the disturbance of site soils.
- Noise and disturbance: During tower construction, the presence of the construction team and movement of heavy vehicles and machinery may disturb the immediate neighbours to the site.
- Visual impact: The presence of the tower in the neighbourhood may be a nuisance to locals.
- Health and Safety issues: Electromagnetic Radiation emitted from the antennae of cellular structures may affect human health.
- Potential occupational health and safety risks associated with mishandling of construction and operations equipment.
- Civil Aviation concerns: The proposed site designs and locations need to be verified to ensure that it meets the approval of the Directorate of Civil Aviation regarding the height of the masts and the position and stability of transmitters.
- Environmental pollution from improper disposal of waste generated during construction and maintenance phases.
- Vehicular traffic safety from increased number of vehicles moving around the project site and slow-moving trucks transporting project structures during construction, and
- Archaeological or cultural heritage impact through unintentional uncovering of unknown archaeological objects or sites by certain project activities such as excavation (the minimal site works).

The potential negative impacts were assessed, and mitigation measures provided accordingly.

RECOMMENDATIONS AND CONCLUSIONS

The potential impacts anticipated from the proposed construction of the telecommunication tower in Otjiwarongo were identified, described, and assessed. It is found that most of the identified potential negative impacts are rated as medium significant. For these significant adverse

(negative) impacts with medium rating significance, appropriate mitigation measures were recommended for effective implementation and continuous monitoring by the Proponent, their contractors and project related employees. The aim will be to reduce to low and maintain this impacts' significance in the long run and bring the impact under control. These management and mitigation measures are provided under chapter 7 of this ESA report, and as management action and in the Draft EMP.

The findings of this assessment were deemed sufficient and conclude that no further detailed assessments are required to the ECC application.

It is therefore recommended that in the case of issuance of an Environmental Clearance Certificate for the proposed construction and operation of a telecommunication tower, the recommendations provided herewith, may serve as suitable conditions of ECC issuance.

These recommendations are primarily aimed at improving environmental management, ensuring sustainability and promote harmonious co-existence of the project activities and the host biophysical and social environment.

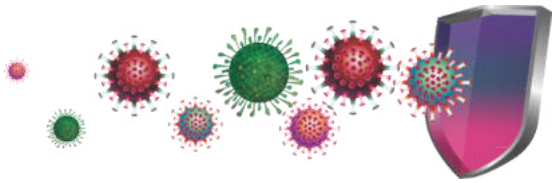
Limitations

EDS warrants that the findings and conclusion contained herein were accomplished in accordance with the methodologies set forth in the Scope of Work and Environmental Management Act (EMA) of 2007. These methodologies are described as representing good customary practice for conducting an Environmental Impact Assessment of a property for the purpose of identifying recognized environmental conditions. There is a possibility that even with the proper application of these methodologies there may exist on the subject property conditions that could not be identified within the scope of the assessment, or which were not reasonably identifiable from the available information. The Consultant believes that the information obtained from the record review and during the public consultation processes concerning the proposed tower construction activities/works is reliable. However, the Consultant cannot and does not warrant or guarantee that the information provided by the other sources is accurate or complete. The conclusions and findings set forth in this report are strictly limited in time and scope to the date of the evaluations. No other warranties are implied or expressed.

Some of the information provided in this report is based upon personal interviews, and research of available documents, records, and maps held by the appropriate government and private

agencies. This report is subject to the limitations of historical documentation, availability, and accuracy of pertinent records and the personal recollections of those persons contacted.

COVID-19 Influences:



COVID-19 has changed the way the world thinks, acts, and does business. The pandemic has forced a comprehensive review of business practices, a higher level of engagement with technology to offset the constraints due to social distancing, restrictive travel, and a focus on social responsibility. The Consultant had to change very little in the way they operate and provide public consultation services.

Although the Consultant operated with limited travel during the environmental assessment to comply with the measures and regulations put in place to curb the spread of Covid-19, various other platforms were used to communicate the project information. These platforms included emails, registered mails, notices, and newspaper adverts.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

Abbreviation	Meaning
3G/4G	Third and fourth generation of wireless mobile telecommunications technology.
AC	Alternating Current
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
BID	Background Information Document
CENORED	Central North Regional Electricity Distributor

Abbreviation	Meaning
CRAN	Communications Regulatory Authority of Namibia
CV	Curriculum Vitae
DEAF	Department of Environmental Affairs and Forestry
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EDS	Excel Dynamic Solutions
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMF or EME	Electromagnetic Fields or Electromagnetic Emission
EMP	Environmental Management Plan
ESA	Environmental Scoping Assessment
GG	Government Gazette
GN	Government Notice
IAPs	Interested and Affected Parties
ICAO	International Civil Aviation Organisation
ICNIRP	International Commission on Non-Ionizing Radiation Protection
MEFT	Ministry of Environment, Forestry and Tourism
MHSS	Ministry of Health and Social Services
MHz	Megahertz
MICT	Ministry of Information and Communication Technology
NCAA	Namibia Civil Aviation Authority
NRPA	National Radiation Protection Authority of Namibia
PPE	Personal Protective Equipment
Reg, S	Regulation, Section
TOR	Terms of Reference

Abbreviation	Meaning
WHO	World Health Organization

KEY TERMS AND DEFINITIONS

TERM	DEFINITION
Alternative	A possible course of action, in place of another that would meet the same purpose and need of the proposal.
Baseline	Work done to collect and interpret information on the condition/trends of the existing environment.
Biophysical	That part of the environment that does not originate with human activities (e.g., biological, physical and chemical processes).
Cumulative Impacts/Effects Assessment	In relation to an activity, means the impact of an activity that in it may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Decision-maker	The person(s) entrusted with the responsibility for allocating resources or granting approval to a proposal.
Ecological Processes	Processes which play an essential part in maintaining ecosystem integrity. Four fundamental ecological processes are the cycling of water, the cycling of nutrients, the flow of energy and biological diversity (as an expression of evolution).
Environment	As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.
Environmental Management Plan	As defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environments effects are to be mitigated, controlled, and monitored.

TERM	DEFINITION
Interested and Affected Party (IAP)	In relation to the assessment of a listed activity includes - (a) any person, group of persons or organization interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity. Mitigate - practical measures to reduce adverse impacts. Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity. Significant impact - means an impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.
Fauna	All the animals found in an area.
Flora	All the plants found in an area.
Mitigation	The purposeful implementation of decisions or activities that are designed to reduce the undesirable impacts of a proposed action on the affected environment.
Monitoring	Activity involving repeated observation, according to a pre-determined schedule, of one or more elements of the environment to detect their characteristics (status and trends).
Proponent	Organization (private or public sector) or individual intending to implement a development proposal.
Public Consultation/Involvement	A range of techniques that can be used to inform, consult, or interact with stakeholders affected by the proposed activities.
Protected Area	Refers to a protected area that is proclaimed in the Government Gazette, according to the Nature Conservation Ordinance number 4 of 1975, as amended
Scoping	An early and open activity to identify the impacts that are most likely to be significant and require specialized investigation during the EIA work. Can, also be used to identify alternative project designs/sites to be assessed, obtain local knowledge of site and surroundings, and prepare a plan for public involvement. The results of scoping are frequently used to prepare a Terms of Reference for the specialized input into full EIA.
Terms of Reference (ToR)	Written requirements governing full EIA input and implementation, consultations to be held, data to be produced and form/contents of the EIA report. Often produced as an output from scoping.

1 INTRODUCTION

1.1 Project Background

PowerCom Pty Ltd (hereinafter referred to as The Proponent) proposes to construct and operate a 30 m high lattice telecommunication tower at Orwetoveni Extension 2, in the town of Otjiwarongo (20°27'37.9"S 16°39'46.9"E). as indicated on the map in Error! Reference source not found..

Telecommunication towers and related infrastructure developments are among listed activities that may not be undertaken without an Environmental Clearance Certificate (ECC) under the Environmental Management Act (EMA) (2007) and its 2012 Environmental Impact Assessment (EIA) Regulations. The relevant listed activities as per EIA regulations are:

- 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.

The Proponent has appointed Excel Dynamic Solutions (Pty) Ltd (EDS Namibia), an independent team of Environmental Consultants to apply for the project ECC (through the Competent Authority, Ministry of Information and Communication Technology (MICT)), conduct the required Environmental Scoping Assessment (ESA) process and compile this ESA Report and Draft Environmental Management Plan (EMP) compiled). These two documents together with associated documents are submitted for evaluation and consideration of an ECC to the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF) of the Ministry of Environment, Forestry and Tourism (MEFT).

1.2 Proposed Site Ownership

The anticipated network shortfalls to mobile users in this area triggered this site selection, and the outcome of the selection criteria used provided the best potential position of the tower in Orwetoveni Extension 2.

The proposed site (location) is under the ownership of the Otjiwarongo Municipality and land use (leasehold) agreement to occupy the land for the purpose of constructing the tower has been granted to PowerCom by the Municipal Council. The approval to set up the tower was granted to PowerCom as per the letter dated 8 July 2021 – **Appendix H** (also as consent). The approval letter indicates that the land will be leased to PowerCom by the Council for a period of nine (9) years and eleven (11) months. The locality details of the site are in Error! Reference source not f ound. **b**elow.

Table 1: Proposed Tower Site Details

Site Name:	Orwetoveni Extension 2 (Erf 1514)
GPS Coordinates:	20°27'37.9"S 16°39'46.9"E
Exact Location:	Within a local children's playground (therefore, **it will need to be erected on the edge but not in the middle of the playground**).
Local Authority:	Municipality of Otjiwarongo
Regional Administration:	Otjozondjupa Regional Council

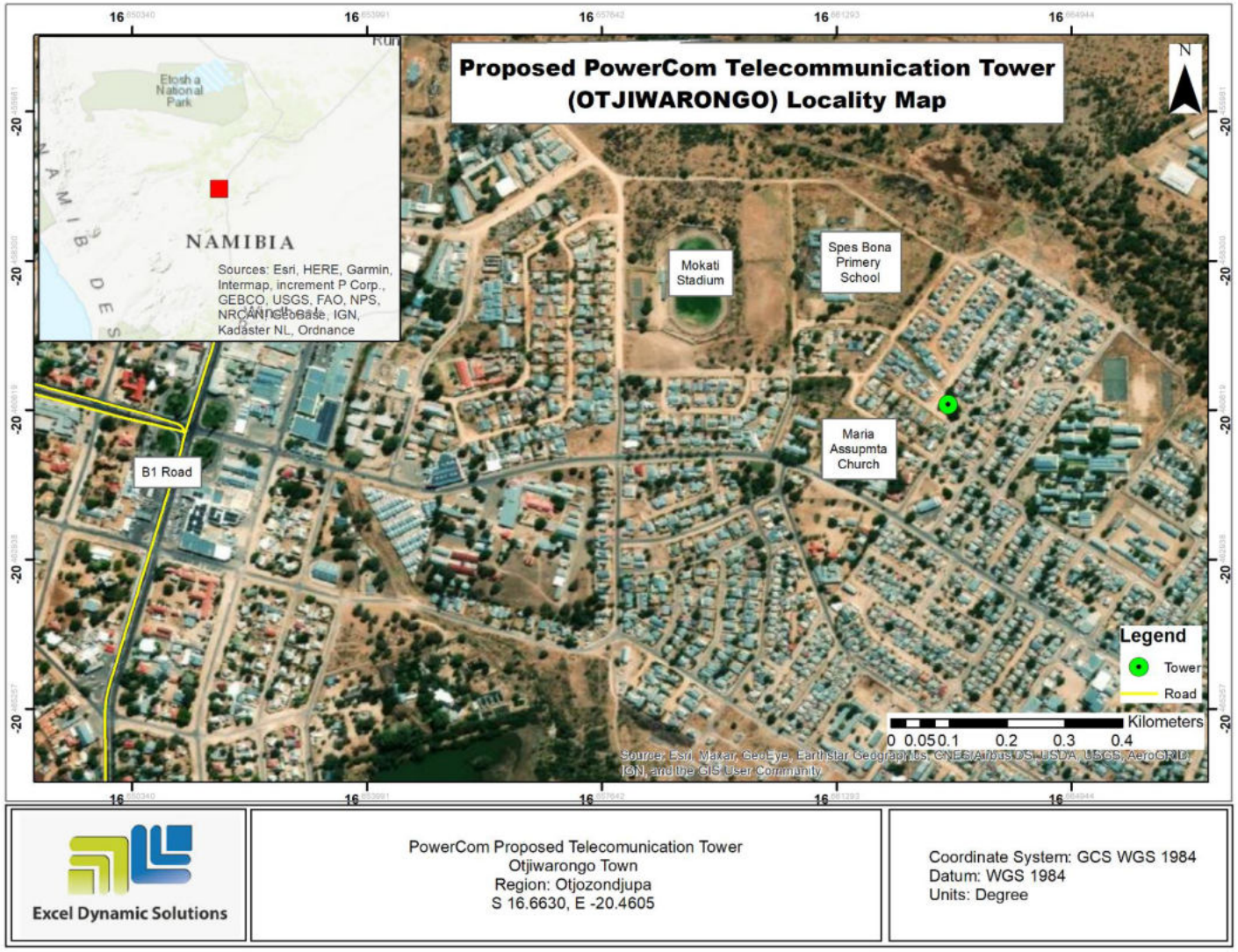


Figure 1: Locality map of proposed tower (Orwetoveni Ext. 2)

1.3 Terms of Reference (TOR), Scope of Work and Document Contents

There were no formal Terms of Reference (TOR) provided by the Proponent with regards to the required ESA Study. Therefore, this Study has been commissioned and conducted according to the Environmental Management Act (EMA) No. 7 of 2007, and its 2012 EIA Regulations, since the proposed tower construction and operation is one of the listed activities in these Regulations of the EMA that may not be undertaken without an ECC.

Subsequently, an application for the Environmental Clearance Certificate (ECC) accompanied by the Background Information Document (BID) and was hand delivered to the Ministry of Information and Communication Technology (MICT), the *Competent Authority* - **Appendix A**.

The purpose of the ESA and subsequent issuance of the ECC is to ensure that the proposed project activities are undertaken in an environmentally friendly and sustainably manner, through the effective implementations of recommended environmental management and mitigation measures to minimize the adverse identified impacts while maximizing the positive impacts.

This Report is compiled as a required output of an environmental assessment process after the ECC application has been submitted to the Competent Authority. The ESA Report, together with the Draft EMP and all associated documents are submitted to the DEAF for evaluation.

1.4 The Need for the Proposed Project (Motivation)

Due to the constant growth in the use of mobile communication services in Namibia, the pressure (on service providers) to continuously expand the communications network is increasing. PowerCom has foreseen a shortfall in mobile network access (poor network signal) in this part of Otjiwarongo Town. The proposed telecommunication tower will provide additional capacity, reducing the congestion problems and improve the coverage in the area. This will also ensure improved quality of the service provided to the mobile users in the Town.

1.5 Appointed Environmental Assessment Practitioner

To satisfy the requirements of the EMA and its 2012 EIA Regulations, the Proponent appointed an independent team of Environmental Consultants at Excel Dynamic Solutions (Pty) Ltd

(hereinafter referred to as EDS, The Consultant or Environmental Assessment Practitioner (EAP)) to conduct the required ESA process on their behalf.

The ESA project is headed by Mr. Nerson Tjelos, a qualified and experienced Geoscientist and experienced Environmental Assessment Practitioner with (EAP). The ESA process and this Report and the Draft EMP were conducted and compiled by Ms. Fredrika Shagama. Ms. Shagama is a qualified and experienced hydrogeologist & EAP with over 5 years of experience in water and environmental consulting and a member of the Namibian Hydrogeological Association and International Association of Hydrogeologists. She is also registered as a Practitioner with the Environmental Assessment Professionals of Namibia (EAPAN). The documents review was done by Mr. Tjelos. The curriculum vitae (CV) for Ms. Shagama is presented under **Appendix C.**

2 PROJECT DESCRIPTION AND PROPOSED ACTIVITIES

Upon issuance of the ECC and obtaining any other necessary and required documentations, the Proponent will prepare for the construction of the tower. This section presents the planned project activities/requirements in terms of services infrastructure and resources. The description of these project activities will ease the identification of the potential impacts, particularly the negative impacts, which are the focus of the ESA to be discussed under Chapter 7.

The project activities are presented below, based on implementation phases, i.e., planning & design phase, construction phase, post-construction site rehabilitation, operational and maintenance as well as decommissioning.

2.1 Planning and Design Phase

The Communications Act No. 8 of 2009, requires that service providers should first consider sharing existing infrastructure in the area before constructing new structures. PowerCom aims at erecting the tower as a base for other service providers to mount antennae and share the tower. There is no other infrastructure in the area, therefore, PowerCom will need to construct a new tower in the area.

There are criteria usually employed to optimise the positions of new structures in the telecommunication industry. These include coverage of existing network infrastructure, surrounding topography & built-up environment, established and future urban areas, required

footprint and the most appropriate design of the facility (GCS Water & Environmental Consultants, 2017).

Once the Proponent has been issued with an ECC and obtained all relevant and required permitting/licensing such as land use/leasehold agreements), and is ready to commence construction activities, the planned activities will commence at the site.

The planning and design phase is aimed at presenting some key concepts of the project alongside a general overview of the study area, the legal landscape to be considered, and a preliminary assessment of the main aspects that might affect the feasibility of the project and or its associated activities. Thereafter, the environmental, technical, and financial aspects of the project are assessed by identifying potential risks and proposing mitigation measures where possible. This would also include highlighting 'fatal flaws' wherever mitigation measures are unavailable or impractical with regards to the available finances and other resources.

Prior to commencement of any site work, all personnel (including fully employed, contracted, and casual) will be inducted on the Proponent's Environmental, Health and Safety Policy as well as procedures and processes to follow while conducting the work on site or offsite work related to the project.

2.1.1 Design and Technical Aspects

The proposed lattice tower (structure) will be used for 3G/4G coverage, and the coverage area will be a 1.5 km radius to have proper in-door and outdoor coverage. The site will consist of a tower, perimeter fence, outdoor cabinet as well as service provider antennae. The footprint (surface area) to be covered by the tower and associated accessories is anticipated to be about 80 m^2, with only less of that dedicated to the actual footprint of the tower.

The typical examples of lattice structures/towers for telecommunication purposes are shown in Error! Reference source not found..

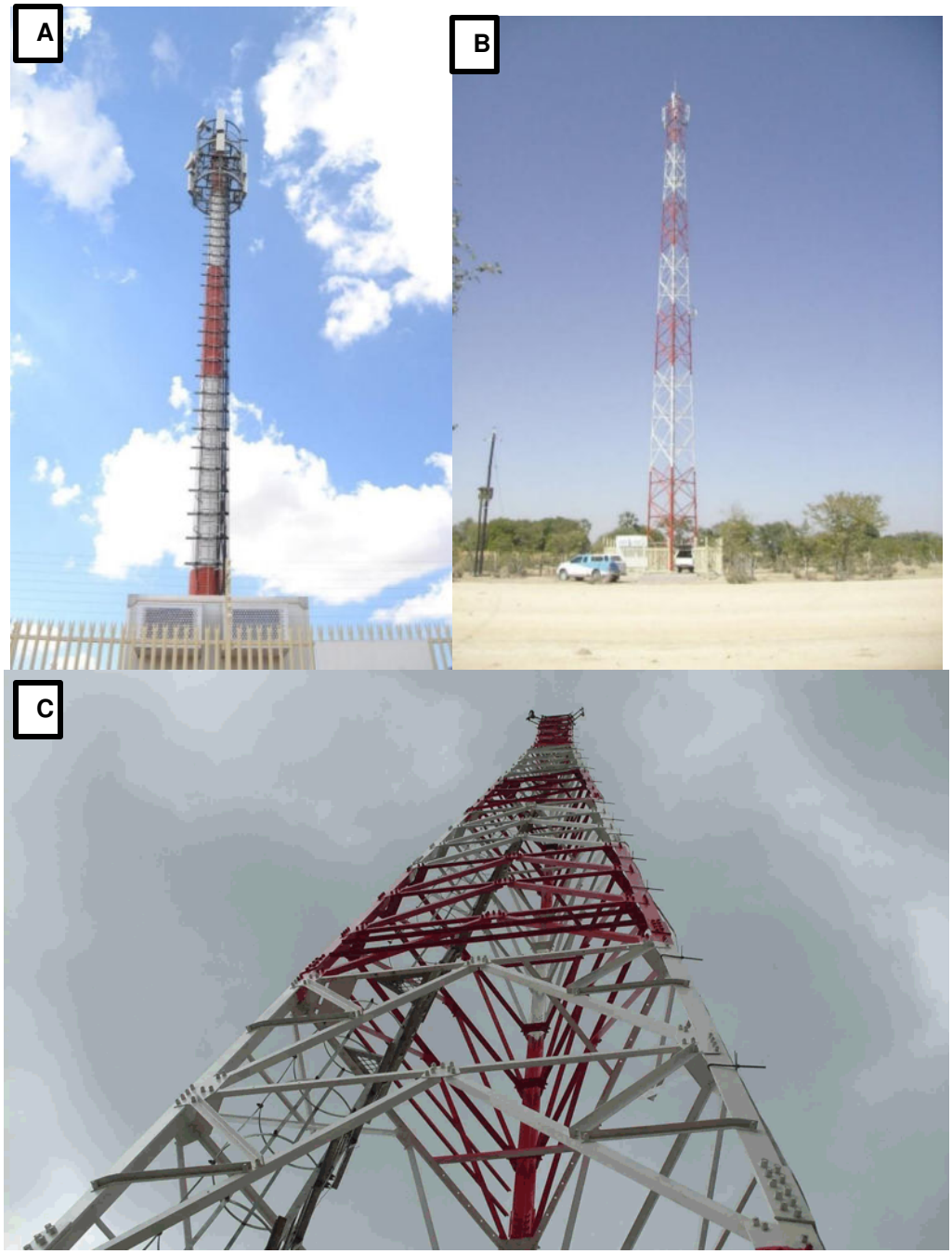


Figure 2: Typical telecommunication lattice structures

(Sources: (A) https://neweralive.na/posts/ict-infrastructure-expansion-a-national-development-imperative-simataa , (B) https://www.we.com.na/news/how-mtc-selects-tower-spots2020-11-03), (C) http://www.skyntwks.com/product-detail/telecom-lattice-mast-tower/)

2.2 Project Input and Resources Requirements

In terms of human resources and services infrastructure, the following will be required:

2.2.1 Project Personnel and Accommodation

The number of employees for the construction of the tower cannot be determined now, as this will be determined by the appointed contractor once the ECC is issued. The workforce will include both skilled and semi-skilled workers, as necessary to complete the works. Any non-skilled labour required will be sourced from residents (from Otjiwarongo, preferably within the vicinity of the tower site).

2.2.2 Water Supply

Minimal amount of water will be required during construction. This water will be used for drinking and efficiently used for in-situ concrete works, which will only be carried out for foundation casting. The required water will be sourced from the town. This will be upon agreement with the Municipality or relevant water supplier, who can be the nearest home or business owners.

2.2.3 Power Supply

No electricity is required during the construction of the tower. However, it will be required during the operational maintenance phase of the tower. The tower will be powered by an alternating current (AC) power via the Central North Regional Electricity Distributor (CENORED) supply lines (PowerCom will need to engage the power supplier CENORED directly).

2.2.4 Site Access (Roads)

The site is located within Otjiwarongo town, and can be accessed through existing access roads and streets. The site in **Orwetoveni Extension 2 Site** is accessed via the untarred single-track road from the northwest or from the Dr Libertina Amathila Avenue (tarred road) from the south.

2.2.5 Health and Safety

Adequate and appropriate Personal Protective Equipment (PPE) will be provided to every project personnel while on and working at site. A first aid kit will be readily available at the site.

2.2.6 Potential Accidental Fire management

A minimum of basic firefighting equipment, i.e., a fire extinguisher will be readily available in vehicles, at site

2.2.7 Waste Management

Waste management: there will be minimal waste generated on site. This will include general, solid, and possibly wastewater (sewage). This different waste will be handled as follows:

A. **General and domestic waste:** There will be enough different waste bins (containers) will be made available at site to manage the accumulation of general and domestic waste on site during construction. The waste bins will be emptied disposed of at the Otjiwarongo landfill site.
B. **Sewage:** Portable ablution facilities will be provided on site and emptied according to manufacturers' instructions. Any wastewater will then be transported offsite to the wastewater treatment facility in Otjiwarongo. Prior agreement/arrangements to transport and dispose of the wastewater to the Municipal facilities will be made between the Proponent and the Municipal Council of Otjiwarongo.

2.2.8 Site Fencing

For safety and security reasons, the tower site will be fenced off. This will also be done to ensure that access to the tower is limited to authorised personnel (such as maintenance team) only and to prevent vandalism of the tower and its associated accessories/structures.

2.3 Site Clearing and Construction Phase

This phase entails minimal site clearing of some shrubs (site is located close to the playground with some trees), and earth levelling in preparation for tower construction, and installation of services infrastructure and erection of supporting structures.

The construction work is expected to be completed within 3 months. The structure of the tower will be mounted to a concrete foundation and will not require any supporting cables. The physical assembling of the network structure and the construction of the foundations will take place on the site by using manual labour as far as possible.

The equipment for the tower and associated accessories is required to meet certain international standards for communications infrastructures, hence the equipment will be provided by PowerCom or in collaboration with their construction contractor (engineer). Other materials required for construction will be sourced from relevant material suppliers in Otjiwarongo.

This work will be carried during weekdays only and between 08h00 and 17h00. Preference for the construction works will be given to locals, i.e., contractors from Otjiwarongo.

The appointed construction contractors will not be housed on site but in their homes (for the locals) and in available accommodation facilities in Otjiwarongo for out-of-town technical staff (if necessary). Therefore, no campsites related to the proposed projects will be set up on site or within the vicinity of the site.

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

2.4 Operational and Maintenance Phase

This is the phase during which the tower and their associated infrastructure will be operational and provide telecommunication signal to the area. The maintenance of the tower will be done by the Proponent's Maintenance Personnel, as and when required. No onsite accommodation will be required during this phase, as maintenance works are expected to only last a couple of hours during the day.

Similar to the construction phase, the Proponent will ensure that all employees involved in this phase' works are provided with appropriate Personal Protective Equipment (PPE). The Maintenance team will also be required to ensure that all onsite precautions and measures which includes occupational health and safety, as well as waste management are effectively implemented. The Proponent is to ensure that all employees carrying out maintenance works on site are provided with appropriate Personal Protective Equipment (PPE).

During this phase, radiation concerns might arise and for this reason community requires radiation knowledge that should be implemented by the proponent through awareness campaigns. Compliance with the national and international regulations are also strongly advised. Furthermore, regular radiation monitoring to assess the radiation health and safety conditions during the tower's operational phase is recommended to ensure compliance with national and international regulations.

2.5 Post-Construction Site Rehabilitation and Decommissioning

Once the construction phase is complete and associated works cease, the site is cleaned up in preparation for the next phase (operations). The Proponent will need to properly decommission

the construction works and rehabilitate disturbed sites. The aim is to ensure that the project related disturbed site area is left close to its pre-works state as much as possible.

The activities to be carried out to clean up and rehabilitate the site post-construction are as follows:

- Dismantling and removal of all temporary infrastructures and structures (erected or set up to support construction) that will no longer be required for the operational and maintenance phases. These will be transported to designated storage facilities offsite.
- Removal of all construction related vehicles, machinery, and equipment from site to designated parking and storage sites off site.
- Carrying away the waste storage containers and disposal of waste to the designated local approved waste management site in Otjiwarongo.
- If any, closure of all onsite access roads that may have been created for the construction phase and no longer required for operational phase.
- Levelling of all stockpiled topsoil and where possible, backfilling of all construction excavated pits and trenches, respectively.

3 PROJECT ALTERNATIVES

Alternatives are defined as the "*different means of meeting the general purpose and requirements of the activity*" (EMA, 2007). This section will highlight the different ways in which the project can be undertaken and to identify the alternative that will be the most practical, but least damaging to the environment is identified.

Once the alternatives have been established, these are examined by asking the following three questions:

(a) What alternatives are technically and economically feasible?

(b) What are the environmental effects associated with the feasible alternatives?

(c) What is the rationale for selecting the preferred alternative?

3.1 Types of Alternatives Considered

3.1.1 The "No-go" Alternative

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, the status quo of the proposed site remains unchanged with poor to no network/communication signal. Should the proposed project be discontinued, the poor network coverage in this part of Otjiwarongo will continue and there will be no improvement in local socio-economic development, in terms of communications services.

In considering the proposed activity and its benefits to the local communities, the no-go option is not a preferred option.

3.1.2 Locations of the Telecommunication Tower

The tower location is strategically chosen due to poor network coverage experienced in the area, with the planned expansion of the site area and according to the results of technical site optimization. Most importantly, the site is chosen to provide the much-needed better coverage in this part of the town. Moreover, the proposed tower is located at a site with relatively low vegetation density 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 close proximity to an existing electricity line and roads for power and easy accessibility, respectively.

3.1.3 Infrastructure sharing as per the Communications Act of 2009: Tower Sharing

The Communications Act No. 8 of 2009 requires that service providers consider sharing existing infrastructure in the area first, before constructing new structures to avoid cumulative impacts. There are no other telecommunications towers within the vicinity of the new proposed project site that could have been used by the Proponent and service providers to mount their communications antenna on to serve the affected communities. Therefore, the distance from the existing structures will not allow compliance with the Communications Act regarding the sharing/using of existing structures in an area (Town).

The proposed tower, therefore, needs to be erected so that it could potentially be used (shared) in future with similar services providers, thus promoting infrastructure sharing as per the Communications Act.

3.1.4 Site Accessibility

The proposed tower site can be accessed both by foot and vehicle via access routes off the main town roads and streets. Therefore, access to the proposed site is excellent for both the construction and operational & maintenance phases.

The above presented project activities and associated resources are governed by certain polices, laws, regulations, etc. (legal framework). These are in terms of local, regional, national and at some extent, international. The applicable legal framework to the proposed project and its activities are provided under Chapter 4. The legal framework that requires permitting and or licensing prior to project implementation are provided as such under the Draft EMP.

4 LEGAL FRAMEWORK: LEGISLATION, POLICIES AND GUIDELINES

A review of applicable and relevant Namibian legislation, policies, and guidelines to the proposed development is given in this section. This review serves to inform the project Proponent, Interested and Affected Parties, and the decision-makers at the DEAF, of the requirements and expectations, as laid out in terms of these instruments, to be fulfilled to establish the proposed tower construction and operational activities.

4.1 The Environmental Management Act (No. 7 of 2007)

The Act aims at promoting sustainable management of the environment and use of natural resources. The Environmental Management Act (EMA) is broad; it regulates land use development through environmental clearance certification and/or Environmental Impact Assessments. The Act provides for the clearance certification for telecommunication towers and structures. It further stipulates requirements to complete the required documentation to obtain an Environmental Clearance Certificate (ECC) for permission to undertake this activity. The following Section of the EIA Regulations that are relevant to this project are:

- ***''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.*

4.2 The 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.

Applicability to the Proposed Project: The Proponent is required to comply with the relevant Sections and Parts of the Act, and of importance is Part 5 of the Act. This Part (Special Rights of Carriers) states the following in relation to the project:

- ***''Applicability of this Part: Section 59(1)*** *The rights granted by this Part are granted to all holders of technology and service neutral licences and to other licensees to whom and in so far as it has been made applicable to them in terms of section 38(12) or 38(13).*

- ***(3)*** *Subject to subsection (4) and (5), the rights granted by this Part, to install telecommunications facilities, only relate to wires, fibres, or any other form of telecommunication's line as well as facilities used to protect or support such wires, fibres or lines (including poles, stays, ducts and pipes), but do not relate to masts, antennas, towers, pay telephones and other similar equipment.*
- ***Entry upon and construction of lines across any land: Section 60****. A carrier may, for the purposes of provision of telecommunications services, enter upon any land, including any street, road, footpath or land reserved for public purposes, and any railway, and construct and maintain a telecommunications facility upon, under, over, along or across any land, street, road, footpath or waterway or any railway, and alter or remove the same, and may for that purpose attach wires, stays or any other kind of support to any building or other structure.*
- ***Fences****:* ***Section 64(1)*** *If any fence erected or to be erected on land over which a telecommunications facility, pipe, tunnel or tube is constructed or is to be constructed by a carrier, renders or would render it impossible or inconvenient for the carrier to obtain access to that land the carrier may at its own expense erect and maintain gates in that fence and must provide duplicate keys therefor, one of which must be handed to the owner or occupier of the land.*

- ***Section 64(2)*** *Any person intending to erect any such fence must give not less than six weeks' notice in writing to the carrier of his or her intention.*
- ***Height or depth of cables and facilities: 66(1)*** *Aerial telecommunication wires or cables along any railway or public or private street, road, footpath, or land must be at the prescribed height above the surface of the ground.*
- ***Section 66(2)*** *Underground telecommunication facilities, pipes, tunnels, and tubes must be placed by a carrier at the prescribed depth below the surface of the ground*
- ***Section 66(3****) If the owner of any private land is obstructed in the free use of his or her land by reason of the insufficient height or depth of any telecommunications wire, cable or other facility, pipe, tunnel or tube constructed by that carrier, the carrier must take such steps as are necessary for giving relief to that owner".*

Other applicable legal obligations to the proposed tower constructions and related activities are presented in **Table 2**.

Table 2: The list of applicable national and international legislations governing the proposed project and related activities

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
NATIONAL, REGIONAL AND LOCAL		
The Constitution of the Republic of Namibia, 1990 as amended	The Constitution of the Republic of Namibia (1990 as amended) addresses matters relating to environmental protection and sustainable development. Article 91(c) defines the functions of the Ombudsman to include: *"…the duty to investigate complaints concerning the over-utilisation of living natural resources, the irrational exploitation of non-renewable resources, the degradation and destruction of ecosystems and failure to protect the beauty and character of Namibia…"* *Article 95(l) commits the state to actively promoting and maintaining the welfare of the people by adopting policies aimed at the:* *"…Natural resources situated in the soil and on the subsoil, the internal waters, in the sea, in the continental shelf, and in the exclusive economic zone are property of the State."*	By implementing the environmental management plan, the establishment will be in conformant to the constitution in terms of environmental management and sustainability. Ecological sustainability will be main priority for the proposed development.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
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 construction of the tower requires the assessment of all possible environmental and social impacts to avoid, minimise or compensate environmental damage associated with the activities.
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 Interested &Affected Parties and must be consulted during the Environmental Assessment (EA) process. The project site fall under the Otjozondjupa Regional Council; therefore, they should be consulted.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Atomic Energy and Radiation Protection Act No. 5 of 2005	To provide for adequate protection of the environment and of people in current and future generations 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, and controlling and regulating prescribed non-ionising radiation sources; to establish an Atomic Energy Board and to provide for its composition and functions; to establish a National Radiation Protection Authority; to amend the Hazardous Substances Ordinance, 1974 (Ordinance No. 14 of 1974); and to provide for related matters. Under Section 43(1) of the Act, the Non-ionising Radiation Regulations have been made in 2019.	To determine the "safe distance" around the site. The Proponent should comply with the Regulations and requirements of the Act throughout the project life cycle.
The Aviation Act, Act No. 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/ Guideline	Relevant Provisions	Implications for this project
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 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).
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.	Duty of care must be applied for soil conservation management measures must be included in the EMP.
Forestry Act No. 12 of 2001	The Act provides for the management and use of forests and related products / resources. It offers protection to any living tree, bush or shrub growing within 100 metres of a river, stream or watercourse on land that is not a surveyed erven of a local authority area. In such instances, a licence would be required to cut and remove any such vegetation. These provisions are only guidelines.	Should there be trees within the actual footprint of the site that need to be removed; the Proponent should notify the nearest Department of Environmental Affairs and Forestry (Forestry Division in Otjiwarongo (DEAF)). The number and/or type of trees to be removed to allow the construction of the tower should also be submitted to DEAF.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
		Should these trees be of a protected species, the permit to remove them should be applied from the DEAF office.
Public Health Act (No. 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."	The Proponent and all its employees or contractors should ensure compliance with the provisions of these legal instruments.
Health and Safety Regulations GN 156/1997 (GG 1617)	Details various requirements regarding health and safety of labourers.	
Public and Environmental Health Act No. 1 of 2015	The Act serves to protect the public from nuisance and 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.	The Proponent and their contractors should ensure that the project infrastructure, vehicles, equipment, and machinery are designed and operated in a way that is safe, or not injurious or dangerous to public health and that the noise which could be considered a nuisance remain at acceptable levels. The Proponent should ensure that the public as well as the environmental health is preserved and remain uncompromised.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
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/ Guideline	Relevant Provisions	Implications for this project
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; and for matters incidental thereto. Should the Proponent wish to undertake activities involving road transportation or access onto existing roads, the relevant permits will be required.	Mitigation measures should be provided for since the project activities will make use of the public roads.
National Heritage Act No. 27 of 2004	The Act makes provision for the protection and conservation of places and objects of heritage significance and the registration of such places and objects. Part V Section 46 of the Act prohibits removal, damage, alteration, or excavation of heritage sites or remains, while Section 48 sets out the procedure for application and granting of permits such as might be required in the event of damage to a protected site occurring as an inevitable result of development. Part VI Section 55 Paragraphs 3 and 4 require that any person who discovers an archaeological site should notify the National Heritage Council. Section 51 (3) sets out the requirements for impact assessment.	The Proponent should ensure compliance with this Acts' requirements. The necessary management measures and related permitting requirements must be taken. This done by consulting with the National Heritage Council of Namibia.
The National Monuments Act (No. 28 of 1969)	The Act enables the proclamation of national monuments and protects archaeological sites.	

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Labour Act (No. 6 of 1992)	The Ministry of Labour, Industrial Relations and Employment is aimed at ensuring harmonious labour relations through promoting social justice, occupational health and safety and enhanced labour market services for the benefit of all Namibians. This ministry insures effective implementation of the Labour Act no. 6 of 1992.	The Proponent should ensure that the project construction and operations and maintenance, do not compromise the safety and welfare of workers.
APPLICABLE INTERNATIONAL POLICIES, PRINCIPLES, STANDARDS, GUIDELINES AND CONVENTIONS		
Statue	**Provision**	**Implication for the project and its activities**
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/ Guideline	Relevant Provisions	Implications for this project
"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 legal requirements above have been listed and explained as per their relevance to the project. The project is being carried in a specific environment that may be affected in terms of its biophysical and social features. Thus, the environmental and social baseline (receiving environment) of the project area is presented under the next chapter.

5 ENVIRONMENTAL BASELINE (The Receiving Environment)

The proposed tower will be constructed and operated in specific environmental and social conditions, and it is crucial to understand these pre-project conditions of the environment. This will aid in providing background "information" of the status quo and future projections of environmental conditions after the implementation of the project. This also aids in identifying the sensitive environmental and social features that may need to be protected through the effective implementation of impact specific management and mitigation measures.

The baseline information has also been complemented by review of existing different and relevant data sources conducted in the Region and immediate surroundings of the site. The information has been complemented by raw data obtained from observations made on the site on the 2nd of September 2021.

The summary of selected biophysical and social baseline information about the project site area is given below.

5.1 Climate and Topography

The Otjozondjupa Region is characterized with a semi-arid highland savannah climate typified as very hot in summer and moderate dry in winter. The highest temperatures are measured in December with an average daily temperature of maximum 31ºC and a minimum of 17ºC. The coldest temperatures, conversely, are measured in July with an average daily maximum of 20ºC and minimum 6ºC (Weather - the Climate in Namibia, 1998 – 2012). The area therefore has low frost potential (Green Earth Environmental Consultants, 2019).

The maximum, minimum and average temperatures for Otjiwarongo as well as the monthly average temperate are presented in Error! Reference source not found..

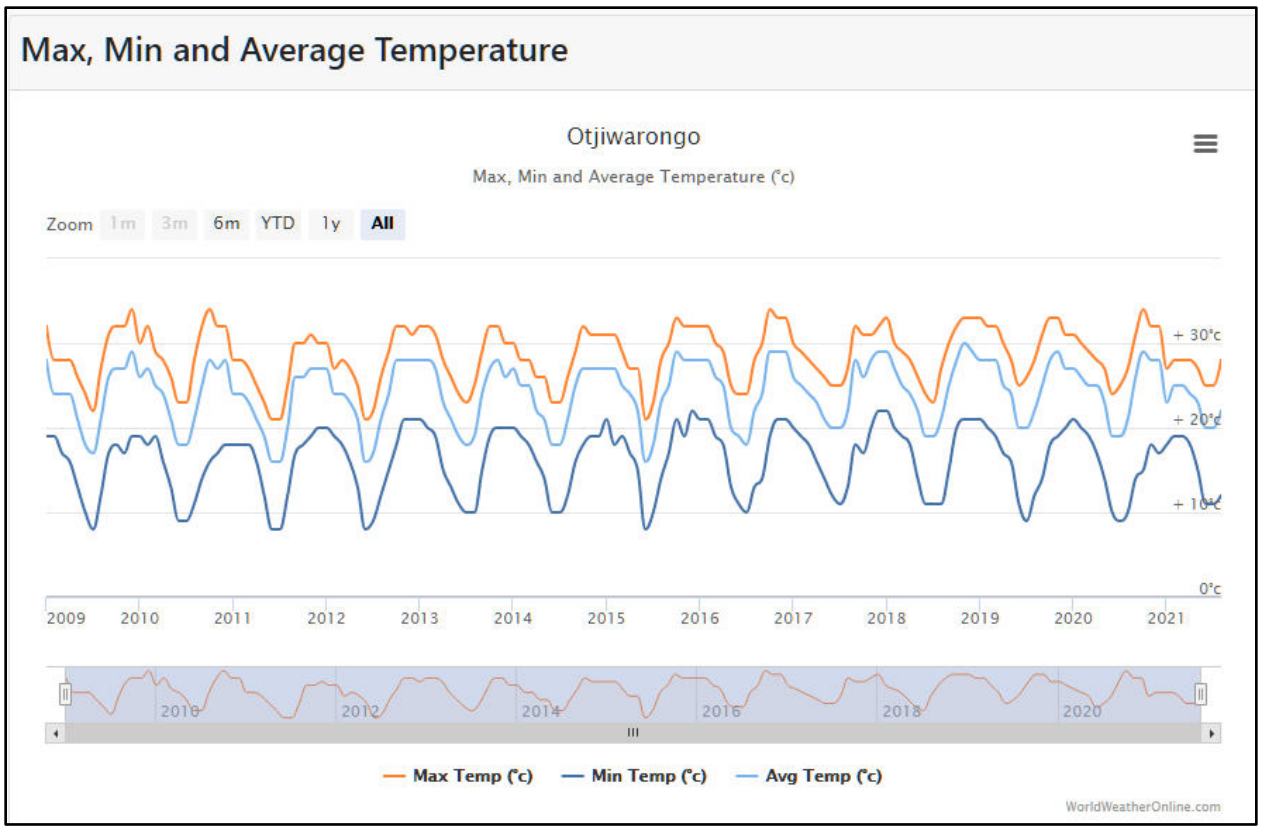


Figure 3: Max, Min, Average and Monthly average temperatures for Otiwarongo (World Weather Online, 2021)

5.1.1 Rainfall

Rainfall in the form of thunderstorms is experienced in the area during the summer months between October and April. The annual average rainfall is 350mm to 400mm however the average evaporation rate is 3 400mm a year (Weather - the Climate in Namibia, 1998 – 2012). Over 70% of the rainfall occurs in the in the summer months' period between November and March (Green Earth Environmental Consultants, 2019). Rainfall in the area is typically sporadic and unpredictable however the average highest rainfall months are January to March. Error! R eference source not found. below shows the rainfall graph for Otjiwarongo and the monthly average rainfall is shown in Error! Reference source not found..

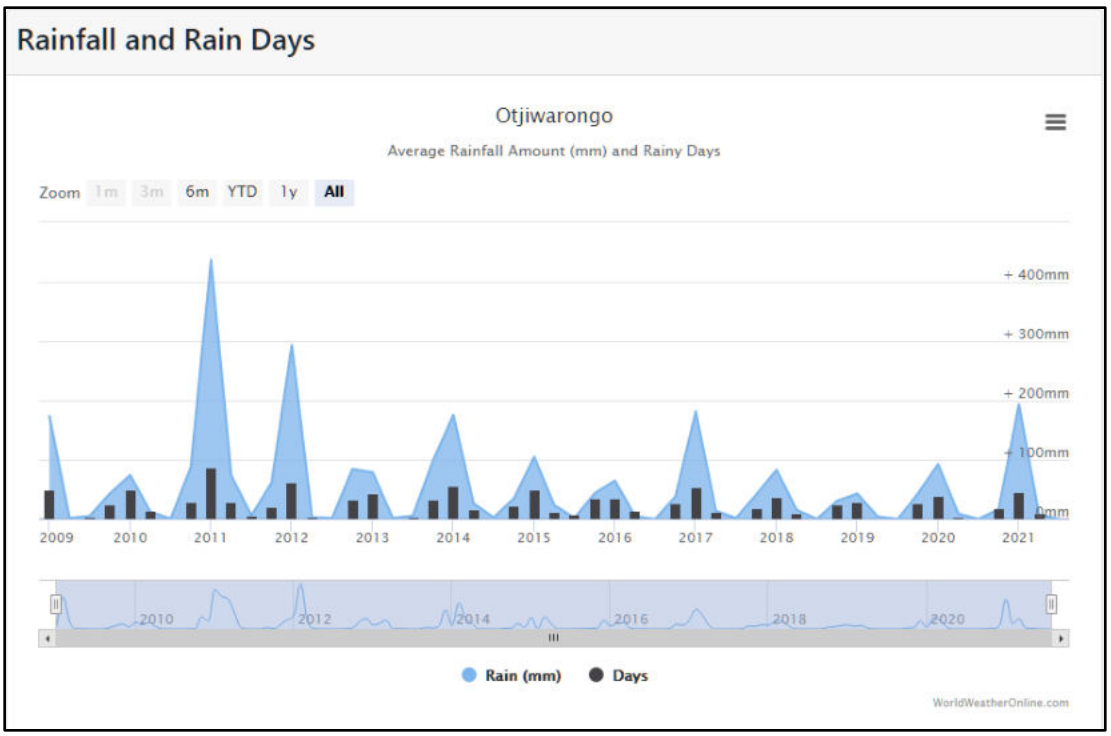


Figure 4: Average rainfal and rain days for Otjiwarongo (World Weather Online, 2021)

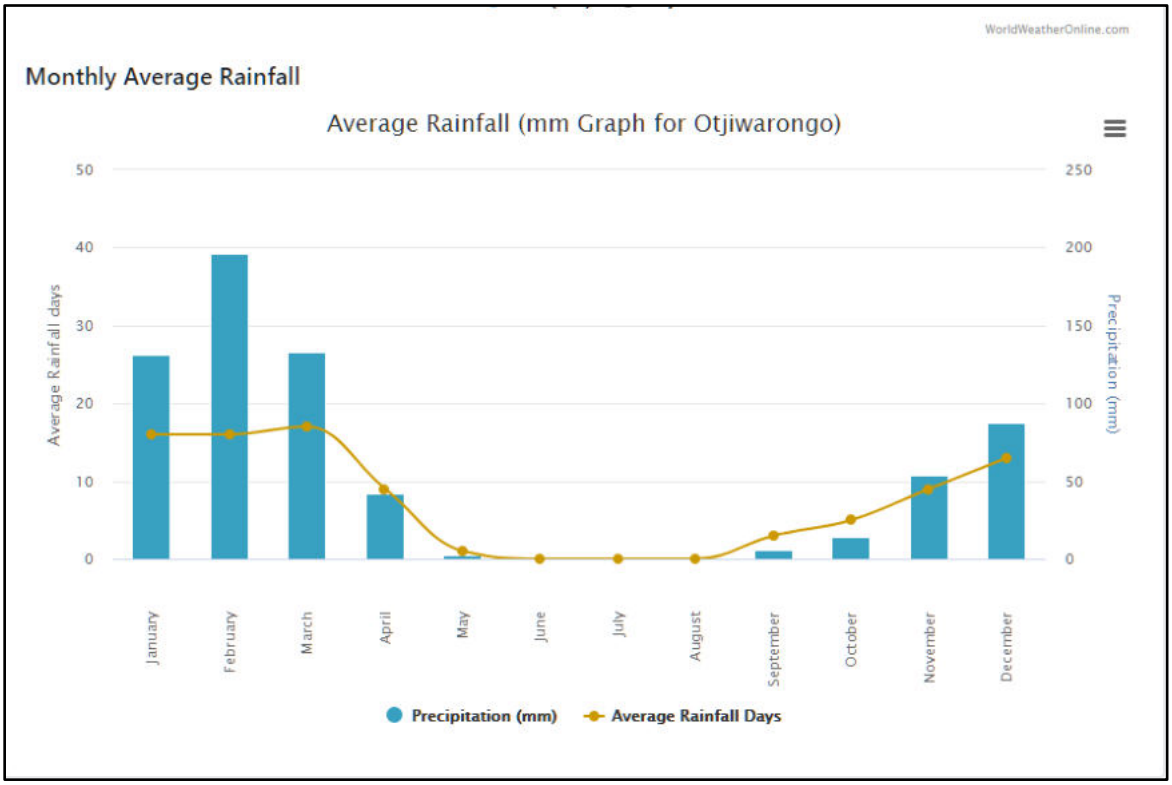


Figure 5: Monthly average rainfall for Otjiwarongo (World Weather Online, 2021)

5.1.2 Topography

The Otjozondjupa Region hosts a variety of landscapes namely, Karstveld, Kalahari Sandveld, Central Western Plains, Khomas Hochland Plateau and Pans. The significant mountain ranges and inselbergs include the Otavi Mountains and Waterberg Plateau (GCS Water & Environmental Consultants, 2018).

The elevations of the Otjiwarongo Town range between 1 471 and 1 504 and meters above sea level (FloodMap, 2021). The elevation of the project site and general Town itself is shown on the map in Error! Reference source not found. and Error! Reference source not found., respectively.

Figure 6: Elevation 3D Model of Otjiwarongo

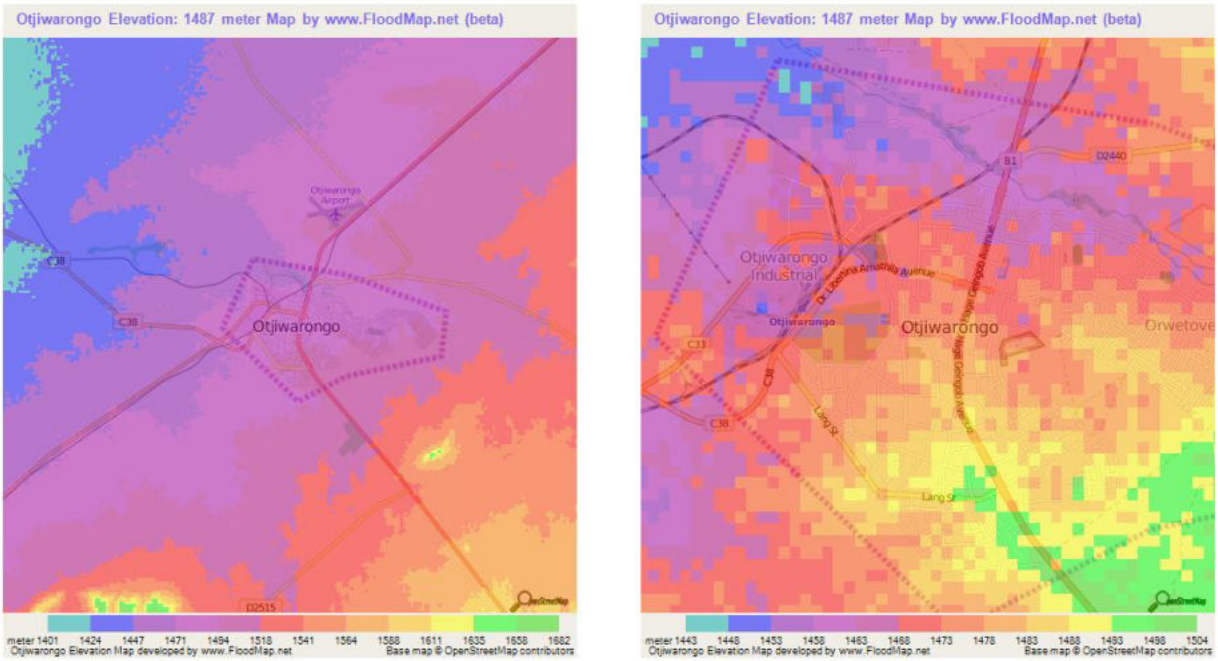


Figure 7: Elevation Map for Otjiwarongo (FloodMap, 2021)

5.2 Geology and Soils

The geology of Otjiwarongo area is characterized by Damara Supergroup and Gariep Complex comprising of rock units such as granites, marbles, schists and quartzites.

The typical geology of Otjiwarongo and project site as shown in Error! Reference source not f ound. below comprises rock types such as granites for Orwetoveni Extension 2.

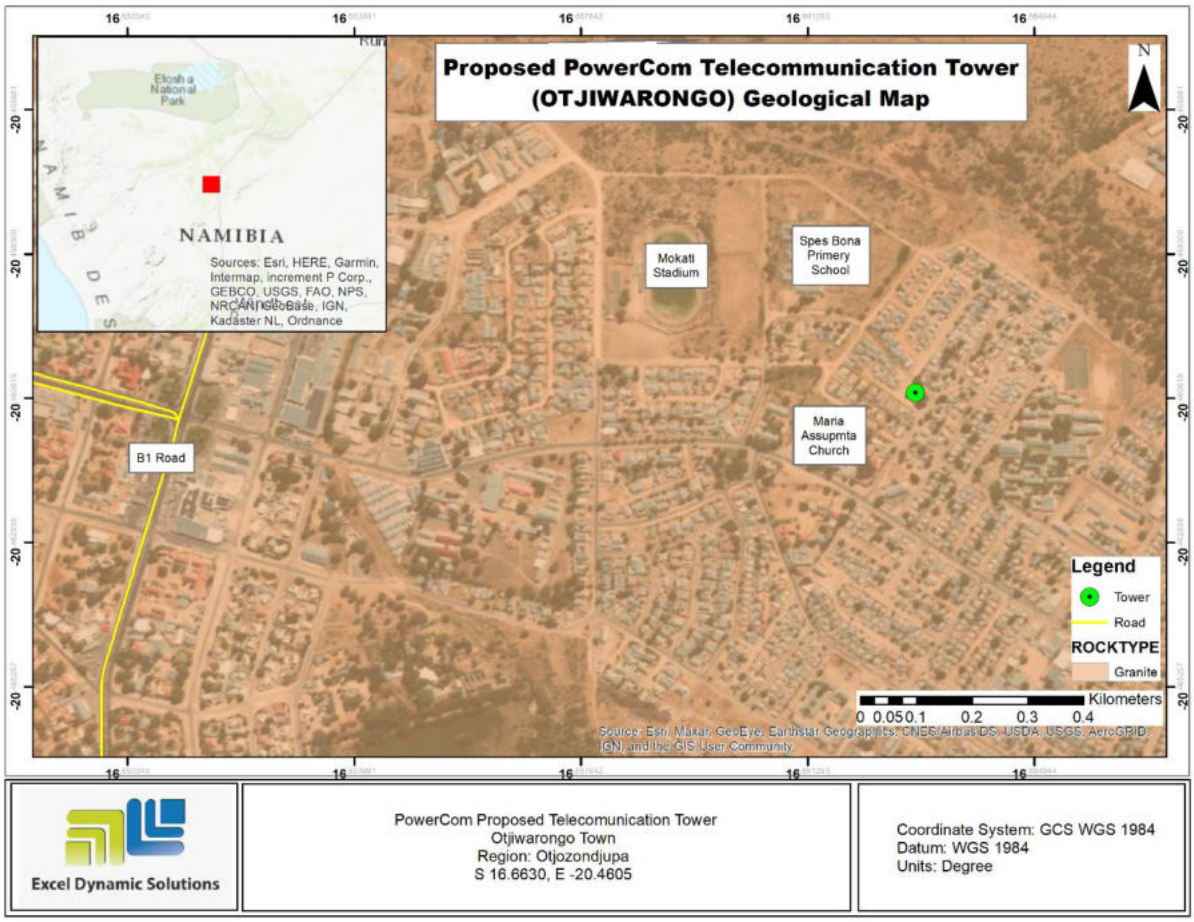


Figure 8: General Geology map for Otjiwarongo

In terms of soil, The Otjozondjupa Region is overlain by the Kalahari sediments (gravel, sand and calcrete). The Otjiwarongo soils are classified as Leptic-Skeletic Regosols. According to the International Soil Reference and Information Centre (ISRIC), regosols are very weakly developed mineral soils in unconsolidated materials that have only an ochric surface horizon and that are not very shallow (Leptosols). Regosols are extensive in eroding lands, arid and semi-arid areas and in mountain regions. The project site soil map is shown in Error! Reference source not found..

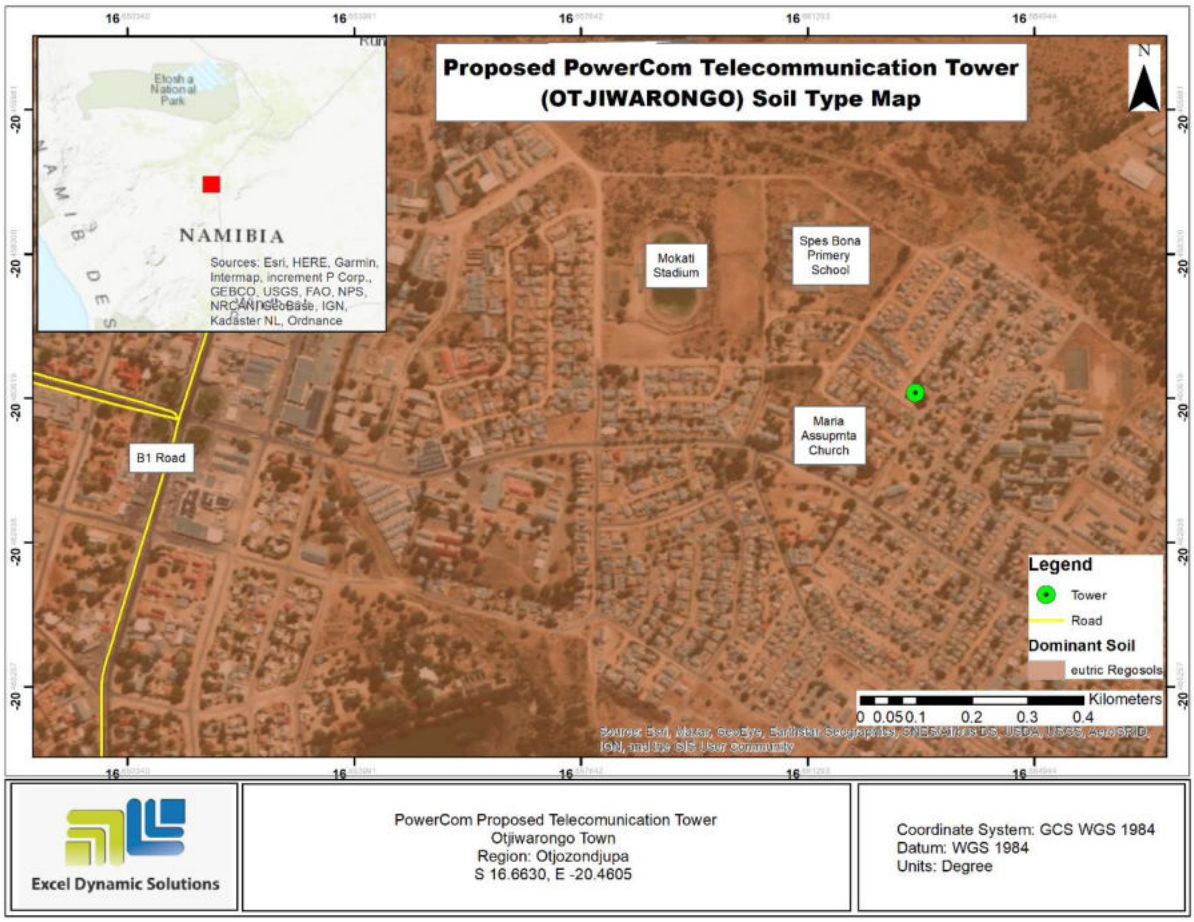


Figure 9: Soil map for Otjiwarongo

The Orwetoveni Extension 2 site (Error! Reference source not found.**)** is covered by light brown s andy loam soil that seem to be influenced by surrounding construction of buildings (houses) and access roads as well as by some solid waste dumped close to the proposed site.

Figure 10: Typical soils found at site

5.2.1 Water Resources

Surface water: The Region is home to one ephemeral river system, namely, the Large Omuramba-Omatako drainage line. On the northern side of the town is a creek that runs in a western-eastern side. The creek is dry most of the year and only flows during rainy seasons.
Groundwater: The Town of Otjiwarongo is situated in the karst environment (dolomite aquifers) of the Otavi Mountain Land groundwater basin.

There were no visible surface water bodies in the vicinity of the site.

5.3 Flora

According to Green Earth Environmental Consultants (2019), the area is home to Prosopis Trees especially near water courses namely small rivers/streams. In some areas of the Town and around, the typical vegetation includes *Acacia Mellifera* (Black Thorn), *Acacia erioloba* (Camelthorn), *Boscia Albitrunce*, *Albicia antihelmintica*, *Aloe Littorallis*, *Commiphera spp*. and *Acacia erubescens*.

The project site is in town where a lot of vegetation may have been cleared in the past to make way for infrastructure establishment. Therefore, the site is already disturbed. There are about six camelthorn trees (Error! Reference source not found.) that have been spared from the previous a ctivities and these should be retained as far as possible to promote conservation.

Figure 11: Camelthorn trees at the Orwetoveni Ext. 2 site

5.4 Heritage and Archaeology

At the time of this assessment, there was no nationally, or locally recognized archaeological sites recorded within the proposed project site.

There might be a possibility that unrecorded or undiscovered archaeological features or artifacts may be discovered during the construction phase (while carrying out earthworks). In the event of an archaeological during construction works, the procedures outlined in the National Heritage Act, No. 27 of 2004 are to be followed. Section 55 (4) of the National Heritage Act, No. 27 of 2004, requires that any archaeological or paleontological object or meteorite discovered are reported to the National Heritage Council as soon as practicable.

5.5 Surrounding Land Uses

The proposed site is surrounded by existing land uses as presented below.

5.5.1 Orwetoveni Extension 2

The site is bordered on both directions by houses, i.e., three to the east, three to the south, two to the west and two to the north (**Figure 12**). To the immediate east is a tarred road and unpaved/gravel roads on both west, south and northern sides of the site.

Figure 12: Surrounding land uses at Orwetoveni Ext. 2

\

5.6 Socio-Economic Status

5.6.1 Demography

According to National Housing and Population Census in 2011, the population for Otjozondjupa Region was 143 903 (70 001 females and 73 902 males). The Otjiwarongo urban constituency population was recorded at 28 163 (Namibia Statistics Agency, 2011).

5.6.2 Economy

According to Saayman (2014), agriculture is a key land-use activity in the Region consisting of both commercial and communal farming. Consequently, the economics of the town, which is the capital of the Otjozondjupa Region, mainly revolves around agriculture as most of the businesses are related to this sector. Other key economic activities include the Pharmacy factor, the global polyemer and toilet factory as well as retail and petroleum.

In terms of mining activities, the B2Gold Otjikoto Gold, Okorusu Fluorspar and Okanjande mines contribute to job creation and simulate the local economic development in the Region. Furthermore, the Ohorongo Cement Plant in the Region also contributes to the job creation and local economic development.

The Region is also a tourist destination for areas like Waterberg Plateau Park.

According to the Namibia Statistics Agency (2011), the main household income was from the following components:

- Farming (10%),
- Wages & Salaries (60%),
- Cash remittance (6%),
- Business, non-farming (10%), and
- Pension (9%).

5.6.3 Infrastructure and Services

In terms of infrastructure, the Otjiwarongo Town is well equipped, and the following crucial services are as follows:

- **Road network:** The town is accessed by the main roads (B1) that connects the town to the northern and southern parts of the country. The surrounding areas are accessed from the town via the B1 or local gravel roads.

- **Electricity supply**: The electricity system in the town is run and distributed by the Central North Regional Electricity Distributor (CENORED).
- **Water Supply:** The Municipality of Otjiwarongo is responsible for the provision of services such as water, sanitation, and waste removal. Water is supplied by the Namibian water utility, NamWater, to the municipality who is then responsible for distribution to the town. The average monthly water consumption of the town amounts to 110-120 m^3. This is being done by increasing the number of water connections and installation of pre-paid water meters.

  There are currently 21 boreholes from where water for the towns is sourced, with an additional five boreholes on standby. No pressures are currently experienced in terms of the available volumes of both water and electricity (Saayman, 2014).
- **Sewage management:** The sewerage system infrastructure was upgraded and expanded in 2011, prior to this it functioned at 130 % of its capacity. The system is currently running at 100 % capacity treating about 1,200-1,500 m^3 of sewer daily. Any increase in population will place the system under further pressure. Sewerage facilities are not provided to the informal settlement areas (Saayman, 2014).
- **Telecommunication services:** The Otjiwarongo Town is well connected to the rest of the country and world via local network service providers. The main providers of this service in the town are Telecom Namibia and Mobile Telecommunications Company (MTC Namibia).
- **Aerodromes (airports/strips):** There is an aerodrome point (Otjiwarongo airport) located 3.5 km north of Orwetoveni Extension 2.

6 PUBLIC CONSULTATION PROCESS

The Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878) detail requirements for public consultation within a given environmental assessment process (GN 30 S21). Public consultation forms an important component of an Environmental Assessment (EA) process. It provides potential Interested and Affected Parties (IAPs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and to what extent further investigations are

necessary. Public consultation can also aid in the process of identifying possible mitigation measures. Public consultation for this project has been done under the EMA and its EIA Regulations.

6.1 Registered Interested and Affected Parties (IAPs)

The Consultant identified relevant and applicable national, regional, and local authorities, local leaders, and other interested members of the public. Pre-identified IAPs were contacted directly, while other parties who contacted the Consultant after project advertisement notices in the newspapers, were registered as IAPs upon their request. Newspaper notices of the proposed tower construction activities were placed in two widely read national newspapers in the region (*The Namibian* and *New Era* Newspapers). The project advertisement/announcement ran for two consecutive weeks inviting members of the public to register as IAPs and submit their comments. The summary of pre-identified and registered IAPs is listed below and the complete list of IAPs is provided in **Appendix D**.

- National/government ministries (Ministry of Environment, Forestry and Tourism, Ministry of Information and Communication Technology, Mnistry of Health and Social Services, Ministry of Urban and Rural Development, Ministry of Agriculture, Water & **Land Reform**, Ministry of Works, and Transport, etc.),
- Regional government (Otjozondupa Regional Council and Otjiwarongo Constituency),
- Local Authority (Municipality of Otjiwarongo)
- Parastatals/Services Providers and regulators (CENORED, Communications Regulatory Authority of Namibia (CRAN), National Radiation Protection Authority, Namibia Civil Aviation Authority (NCAA)), and
- Members of the public which includes the directly affected neighbours within proximity of the site.

6.2 Communication with I&APs

Regulation 21 of the EIA Regulations details the steps to be taken during a public consultation process and these have been used in guiding this process. Communication with IAPs with regards to the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing brief information about the proposed facility was compiled (**Appendix E**) and circulated to relevant pre-identified authorities (stakeholders), and upon request to all new registered IAPs,

- Project Environmental Assessment notices were published in *The Namibian newspaper* and *New Era* in August 2021) - **Appendix F**, briefly explaining the activity and its locality, inviting members of the public to register as IAPs and submit their comments/concerns.
- Public site notices (size A3) were placed at the project site (**Figure 13**) as well as at the Otjozondjupa Regional Council (**Figure 14**), Orwetoveni Municipality and CENORED's Technical Department notice boards in Otjiwarongo (**Figure 15**) to inform members of the public of the EIA process and register as IAPs, as well as submit comments..

Figure 13: Public notices placed at site (Orwetoveni Ext. 2)

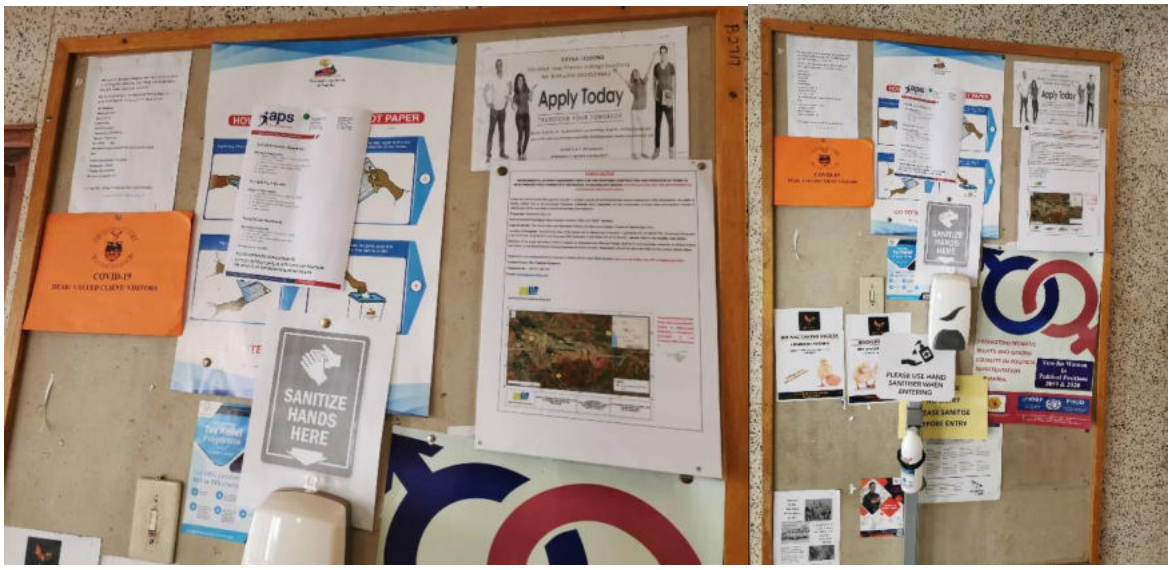


Figure 14: Public notices placed at Otjozondjupa Regional Council

Figure 15: Public notices placed at Otjiwarongo Municipality and CENORED Technical dept. notice boards

6.3 Public Consultation Meeting & Immediate Neighbours' Survey (Forms)

A public consultation meeting is one of the most important components of public consultation process as it brings the consultant and affected members of the public (particularly from the affected site area) together. The meeting is usually done in an interactive session form so that the community members or members of the public can express their opinions, give their concerns, and make suggestions to the proposed project.

Given the lack of interest in registration as IAPs by the public and experience with previous similar projects where the public shows little to no interest especially attending public meetings of such nature, no public meeting was held.

Subsequently, the Environmental Consultant arranged for a direct or neighbouring property/house-to-property/house or institution/office survey on the 2nd of September 2021 (**Figure 16**) in the project area to introduce the immediate neighbours to the proposed projects as well as the ESA/EIA process. This was done as follows:

- **Orwetoveni Extension 2:** A house-to-house survey was undertaken by explaining the EIA process and importance of public consultation to the available residents. The hard copies of the BID and Comments sheet were than circulated to the immediate nine (9) houses bordering the planned site (playground) and the BID delivery registry was signed as proof of delivery.

The signed BID and Comments Sheet delivery forms are attached hereto as **Appendix G.**

Figure 16: Field/site photos of house-to-house survey in Orwetoveni Ext. 2

6.4 Stakeholders and Public Consultation Feedback

The only feedback received by EDS as a response to newspaper adverts, emails sent to pre-identified letters with BIDs sent to the relevant national and regional authorities was an acknowledgement letter of receipt from the Ministry of Information and Communication Technology and notification to submit the ECC application to MEFT. This letter is attached as **Appendix J.**

The following chapter entails the potential impacts that are anticipated to be associated with the construction of the tower and associatied activities, their description (for the negative/adverse impacts only), assessment and management/mitigation thereof to minimize their significance to the potentially affected environmental features.

7 IMPACT IDENTIFICATION, ASSESSMENT AND MITIGATION MEASURES

7.1 Identification of Potential Impacts

The proposed activities are usually associated with potential positive and negative impacts. For an environmental assessment, the focus is mainly placed on the negative impacts. This is done to ensure that these impacts are addressed by providing adequate mitigation measures such that an impact's significance is brought under control, while maximizing the positive impacts of the project to promote sustainable development and environmental and social protection. The potential positive and negative impacts that have been identified are listed as follows:

Positive impacts:

- Telecommunications convenience: Current and future residents (mobile users) will have an improved infrastructure and will not have to struggle with network coverage.
- Employment creation: Creation of a few temporary jobs during the construction of the tower.
- General contribution to local economic development through reliable communications services.

Negative impacts:

- Physical land / soil disturbance: excavation activities to erect the tower could potentially lead to site soils' disturbance.
- Noise: During tower construction, the presence of the construction team and movement of heavy vehicles and machinery may disturb the immediate neighbours to the site.
- Visual impact: The presence of the tower in the neighbourhood may be a nuisance to locals.
- Health and Safety issues: Electromagnetic Radiation emitted from the antennae of cellular structures may affect human health.
- Potential occupational health and safety risks associated with mishandling of construction and operations equipment.
- Civil Aviation concerns: The proposed site designs and location need to be verified to ensure that it meets the approval of the Directorate of Civil Aviation regarding the height of the masts and the position and stability of transmitters.
- Environmental pollution from improper disposal of waste generated during construction and maintenance phases.

- Vehicular traffic safety from increased number of vehicles moving around the project site and slow-moving trucks transporting project structures during construction, and
- Archaeological or cultural heritage impact through unintentional uncovering of unknown archaeological objects or sites by certain project activities such as excavation (the minimal site works).

7.2 Impact Assessment Methodology

The Environmental Assessment is primarily a process used to ensure that potential impacts that may occur from project activity are identified and addressed with environmentally cautious approaches and legal compliance. The impact assessment method used for this project is in accordance with Namibia's Environmental Management Legislation (Environmental Management Act No. 7 of 2007) and its EIA Regulations of 2012.

7.2.1 Impact Assessment Criteria

The identified impacts were assessed in terms of probability (likelihood of occurring), scale/extent (spatial scale), magnitude (severity) and duration (temporal scale) as 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 following criteria (**Table 3**) were applied in this impact assessment:

Table 3: Impact Assessment Criteria employed to assess the potential negative impacts

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
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.

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

7.2.2 Impact Significance

After the impact has been assessed, its significance is then determined. The impact significance 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. 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: 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

Positive (+) – Beneficial impact

Negative (-) – Deleterious/ adverse Impact

Neutral – Impacts are neither beneficial nor adverse.

For an impact with a significance rating of high (-ve), mitigation measures are recommended to reduce the impact to a medium (-ve) or low (-ve) 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 construction and operational phases is done for pre-mitigation and post-mitigation.

The risk/impact assessment is driven by three factors:

- **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.**

The potential negative impacts stemming from the proposed activities are described, assessed and management/mitigation measures provided thereof. Further mitigation measures in a form of management action plans are provided in the Draft EMP.

7.3 Assessment of Potential Negative Impacts: Construction & Operations

The main potential negative impacts associated with the construction, operation and maintenance phases of the tower is identified and assessed below:

7.3.1 Soil Disturbance (Land Degradation) and Pollution

The excavations and land clearing to enable erection of project structures and installation of services will potentially result in soil disturbance which will leave the site soils exposed and vulnerable to erosion. This impact would be probable at the site area, with little to no vegetation cover to hold the soils in place. The movement of heavy vehicles and equipment may lead to compaction of the soils during construction phase. This will however be short-term and localized impact.

There is also a potential of soil pollution from accidental spills or leaks of fuel from project vehicles and machinery.

The potential impact can be rated as medium if no mitigation measures are implemented. However, with the effective implementation of mitigation measures and monitoring, the impact significance will be reduced to low. The impact is assessed in **Table 5**.

Table 5: Assessment of the impacts of construction activities on site and surrounding soils

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

Mitigations and recommendation to minimize soil disturbance and pollution

- The topsoil that was stripped from certain site areas to enable construction works and can be returned to its initial position, should be returned. This is to avoid unnecessary stockpiling of site soils which would leave them prone to erosion.

- All possible trenches excavated for construction on site should be rehabilitated and returned to their pre-excavation state as far as possible.
- Soils that are not within the intended footprints of the site area should be left undisturbed and soil conservation implemented as far as possible.
- Project vehicles/machinery should stick to temporary access roads provided and or meant for the project works but not to unnecessarily create further tracks on and around the site by driving everywhere which would result in compaction of site' and surrounding 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.

7.3.2 Potential Impact on Human Health: Radiation

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 will be in proximity to some of community members (houses and school).

According to Carstens and Kuliwoye (2012), electromagnetic radiation is emitted from electrical appliances commonly used in most homes today, such as televisions, radios, cell phones, microwave ovens, electrical blankets, and computers. Studies have shown that transceiver base stations emit weaker electromagnetic radiation than most household daily appliances i.e. microwave or cell phone used close to your body.

The 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 signal transmitting 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) under the Ministry of Health and Social Services (MHSS) 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 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 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.

It is also very crucial that the Proponent to familiarize themselves with the soon to be gazetted Non-ionising Radiation Regulations, 2019: Atomic Energy and Radiation Protection Act, 2005 attached under Appendix I of this Report.

Table 6: Assessment of the impact of the tower 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

Mitigations and recommendation to minimize the potential radiation impact on human health

- 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.

7.3.3 Potential Impact on Civil Aviation

Potential impact on civil aviation is attributed 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 (Carstens and Kuliwoye, 2012).

According to GCS Water & Environmental Consultants (2017), 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. The Civil Aviation Standards of the ICAO dictate that all obstructions to be erected within 8 km from an airport need to be approved by the applicable Civil Aviation Authority.

According to Mafuta Environmental Consultants (2020) citing Excel Dynamic Solutions (2019), the 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.

The proposed height of the tower is 30 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. The height of the tower is well within the height limit, therefore complies with the NAMCARS. 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.

In terms of tower heights, 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 should be authorized. The proposed Otjiwarongo site (obstruction) is located within 8 km from the Otjiwarongo Airstrip. Therefore, an approval from the NCAA (Appendix I) is required. Additionally, the Civil Aviation Authority will need to be consulted throughout the project lifetime.

The project site is located from the airstrip as follows:

- Orwetoveni Extension 2 – located about **3.5 km** north northeast of the Airstrip,

The Proponent has applied for the approval or permit to erect the tower, from the NCAA, especially that it is less than 8 km distance from the Otjiwarongo Airstrip located on the northwestern side of the Town (as per ICAO requirements). **Although initially rejected under the condition that the tower site infringes on the Obstacle Limitation Surfaces of Otjiwarongo Airport with 37 metres, further evaluation was conducted by the NCAA, and approval given for the tower to be erected (Appendix I).**

On the other hand, the proposed tower will probably not have a significant impact on civil aviation, in terms of height, due to the fact there are already other existing high structures in other areas of a well-established/developed Town such as Otjiwarongo, thus the potential impact from the new tower in this regard would be considered cumulative.

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.

Without the implementation of any mitigation measures, the impact will receive a medium significance rating, and upon implementing the measures, this significance will be reduced to low. This impact is assessed in **Table 9** below.

Table 7: Assessment of the impact of the tower on civial avitation (aerodromes)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L/M – 2	L/M – 2	L/M – 4	L/M – 2	L - 16

Mitigations and recommendation to minimize the impact on civil aviation safety

- The designs and locations of the proposed tower should be verified to ensure that it meets the approval of the Namibia Civil Aviation Authority regarding the tower heights and the positions in the area.
- Civil Aviation Standards of the International Civil Aviation Organisation (ICAO) pertaining to the network tower structure should be adhered to.
- The Regulations of Namibian Aviation Act No. 74 of 1962 for setting up cellular towers in Namibia should be complied with.

- The Proponent **should apply for the approval or permit to erect the tower, especially that it is less than 8 km distance from the Otjiwarongo Airstrip** located on the northwestern side of the Town (as per ICAO requirements).

7.3.4 Visual Impact

Telecommunication towers usually cause a visual impact on the social environment. PowerCom intends to camouflage the network tower to make it less of a nuisance. If not planned properly, the network tower's presence will contrast the surrounding landscape and thus potentially become a visual nuisance to residents and travellers in the area. Currently and with no 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 8.**

Table 8: Assessment of the impact of the tower on sense of place (visual)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

Mitigations and recommendation to minimize visual impact

- The Proponent should use a camouflaged tower to blend in with their surroundings, thus reducing visual nuisance.
- 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 public.

7.3.5 Loss of Biodiversity (Flora)

The earthworks done to prepare the site for project structures and services infrastructure could result in clearing of vegetation especially the protected species leading loss of flora. The site is already disturbed due to the current surrounding land use, therefore there will be very little to no vegetation clearing for the construction of the tower.

Under the status, the impact can be of a low to slightly medium significance rating. With the implementation of appropriate mitigation measures, the rating will be reduced to a low significance rating. The impact is assessed in **Table 9** below.

Table 9: Assessment of the impacts of construction activities on biodiversity (flora)

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	M - 6	M - 3	M – 39
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

Mitigations and recommendation to minimize the loss of flora

- The Proponent should avoid unnecessary removal of vegetation, to promote a balance between biodiversity and project activities.
- Important and protected Plant species (i.e., *Acacia Mellifera*) found on the site, specifically but not within the actual site areas planned for the erection of the tower should not be removed but are to be left to preserve biodiversity on the site.
- Shrubs or trees found along site boundaries should not be unnecessarily removed.
- Environmental awareness on the importance of biodiversity preservation should be provided to the project contractors, workers as well as visitors including site inspectors.

7.3.6 Loss of Biodiversity (Avifauna/Migratory Birds)

The most potentially affected fauna in these kinds of projects (towers) is 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 tower sites in the vicinity of open water systems such as the *iishana* and the water canal within meters of site would mean night-migratory birds flying over the area from time to time in search for water and breeding/nesting grounds. The site in Otjiwarongo is located in an already developed area with a lot of human activities, and no nearby open water sources where birds would fly over. Therefore, the impact is minimal. However, this does not rule out the possibility of the Town and its surrounding being a migratory route for birds. In that case, the presence of the tower may impact such birds.

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 as medium, but on implementation of measures, the significance can be reduced to low, followed up with sufficient monitoring – please refer to **Table 10** for assessment and mitigation measures below.

Table 10: Assessment of the impacts of the tower on avifauna

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

Mitigations and recommendation to minimize the impact on avifauna

- Although there are already other structures in the Town that could already be contributing to the impact (such as existing towers and powerlines), the cumulative impacts of the new tower in relation to the existing powerlines and associated structures in the area are an important consideration to minimize the impact on birds.
- Migratory bird attraction and energy costs can be further minimized by eliminating continuously burning security lights under the tower. 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 telecommunication tower should be developed and implemented.

7.3.7 Generation of Dust (Air Quality)

Dust emanating from site access roads when transporting project equipment, materials, and supply to and from site (time-to-time) may compromise the air quality in the area. Vehicular movements create dust even although it is not always so severe. Not only dust but also the possible emissions of gases from heavy vehicles and machinery. These sources of dust and emissions may lead to air pollution, thus decreasing the air quality in the local project area. This could contribute to short-term decrease in air quality around the working site area.

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, can be rated as low to slightly medium (significance) if no mitigation measures are implemented. However, once this is done, the impact significance can be reduced to low - please refer to the assessment below (**Table 11**).

Table 11: Assessment of the impacts of construction activities on air quality

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	M - 6	M - 3	M – 39
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

Mitigations and recommendation to minimize dust generation.

- Construction and delivery vehicles should not drive at a speed more than 40 km/h on unpaved/untarred roads to avoid dust generation around and within the site areas.
- The Proponent should ensure that the construction work schedule is limited to the given number of days of the week to keep the vehicle-related dust level minimal in the area.
- Dust control measures such as reasonable amount of water spray should be used on gravel roads and near specific exposed areas of work on site to suppress the dust that may be emanating from certain project activities on site.
- Dust masks, eye protective glasses and other respiratory personal protective equipment (PPE) such as face masks should be provided to the workers carrying out potential dust generating activities such as excavation, where they are exposed to dust.

7.3.8 Waste Generation

The two significant project phases (construction and operations and maintenance) will be associated with the generation of different waste, ranging from domestic, sewage, general waste to hazardous. If the generated waste is not disposed of in a responsible way, land pollution may occur not only within the site boundary but also the surroundings. Improper handling, storage and disposal of hydrocarbon products and hazardous materials for instance may lead to soil and groundwater contamination, in case of spills and leakages.

Without any mitigation measures, the general impact of waste generation has a medium significance. The impact will reduce to low significance, upon implementing the mitigation measures. The assessment of this impact is given in **Table 12**.

Table 12: Assessment of waste generation impact

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M/H - 4	L/M - 4	M/H - 4	M - 44
Post mitigation	L - 1	L - 1	L - 2	L/M - 2	L - 8

Mitigations and recommendation to waste management

- Biodegradable and non-biodegradable wastes must be stored in separate containers and collected regularly for disposal at a recognized landfill/dump site (in Otjiwarongo, upon reaching an agreement with the Municipality of Otjiwarongo).
- Any hazardous waste that may have an impact on the physical and social environment should be handled cautiously and disposed of carefully at the nearest approved waste management facilities of the Town.
- Workers should be sensitized to dispose of waste in a responsible manner and not to litter.
- After each daily works, the Proponent should ensure that there is no waste left on the site.
- No waste may be buried or burned on site or anywhere else in the environment, apart from authorized and approved waste management sites.
- There should be separate waste bins for hazardous and general/domestic waste in both construction as well as the operational and maintenance phases until such that time it will be transported to designated waste sites.
- Sewage waste should be managed as per the portable chemical toilets' manufacturer's instructions and regularly disposed of at the nearest treatment facility.

7.3.9 Occupational Health, and Safety

The project construction but also operational activities can be associated with some health and safety risks. This is possible when personnel (workers) involved in the project activities are exposed to health and safety risks. These are in terms of accidental injury, owing to either minor (i.e., superficial physical injury) or major (i.e., involving heavy machinery or vehicles) accidents.

The use of heavy equipment, especially during excavation, and erection of the tower structures may result in accidental tripping and falling of such structures. This could pose a safety risk to the project personnel, equipment, and vehicles.

If machinery and equipment are not properly stored and packed, there would be risks of this machinery or equipment falling and injure the project workers or visitors on site at the time.

The impact can be rated as medium significant if no mitigation measures are implemented, but upon implementation, the impact will be of low significance. This impact is assessed in **Table 13** below and mitigation measures provided thereof.

Table 13: Assessment of the impacts of the project activities on health and safety

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	M - 3	M - 3	M - 6	M/H - 4	M – 48
Post mitigation	L/M - 2	L/M - 2	L - 2	L/M - 2	L - 12

Mitigations and recommendation to minimize health and safety issues

- As part of their induction, the workers should be provided with an awareness training of the risks of mishandling equipment and materials on site.
- The heavy vehicle, equipment and fuel storage area should be properly secured to prevent any harm or injury to the Proponent's personnel and surrounding residents.
- When working on site, employees should be properly equipped with personal protective equipment (PPE) such as coveralls, masks, gloves, safety boots, earplugs, safety glasses, and hard hats.
- No employee should be allowed to consume alcohol or other intoxicants prior to and during working hours as this may lead to mishandling of equipment which results into injuries and other health and safety risks.
- Employees should not be allowed on site if under the influence of alcohol or any other intoxicants.

7.3.10 Vehicular Traffic Use and 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 be noted that the site is already located along busy streets in the Town and the movement of project related for a limited time of that month of works would not have a significant impact on the roads.

Pre-mitigation, the impact can be rated medium and with the implementation of mitigation measures, the significance will be low as assessed in **Table 14** below.

Table 14: Assessment of the impacts of project activities on road use (vehicular traffic)

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

Mitigations and recommendation to minimize impact on road safety and related vehicular traffic issues.

- The transportation of construction materials, equipment and machinery should be limited to once or twice a week only, but not every day to reduce the pressure on local roads.
- The heavy truck loads should comply with the maximum allowed limit while transporting materials and equipment/machinery on the public and access roads.
- Drivers of all project phases' vehicles should be in possession of valid and appropriate driving licenses and should adhere to the road safety rules.
- Drivers should drive slowly (40km/hour or less) and be on the lookout for residents, especially children within proximity of the site.
- The Proponent should ensure that the site access roads are well equipped with temporary road signs condition to cater for vehicles travelling to and from site throughout construction.
- Project vehicles should be in a road worthy condition and serviced regularly to avoid accidents owing to mechanical faults.
- Vehicle drivers should only make use of designated site access roads provided and as agreed.
- Vehicle's drivers should not be allowed to operate vehicles while under the influence of alcohol.
- Sufficient parking area for all project vehicles should be provided for and clearly demarcated on site.
- The Proponent should make provision for safe materials and equipment offloading and loading areas on site.
- To control traffic movement on site, deliveries from and to site should be carefully scheduled. This should optimally be during weekdays and between the hours of 8am and 5pm.
- The site access roads should be equipped with road safety signs.

7.3.11 Heritage/Archaeological resources

During construction works, historical resources may be impacted through inadvertent destruction or damage. This may include the excavation of subsurface graves or other archaeological objects when preparing the site for tower foundation laying and erection. There was no information provided about either known heritage or site(s) of significant cultural values within or near the proposed site. Therefore, the project activities will not have an impact of great significance on these and potentially other archaeological remains, at least on surface and visible resources if any. However, this does not mean rule out the possibility of finding some of these objects during the construction phase. With that said, the potential impact significance is slightly medium if no mitigation measures, are implemented. However, after the implementation of the measures provided below, this impact significance will be low. The assessment of the impact is shown in **Table 15** below.

Table 15: Assessment of the impacts of project activities on archaeological resources

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

Mitigations and recommendation to minimize impact on archaeological resources.

- Contractors working on the site during consrtcution should be made aware of items protected under the National Heritage Act, 2004 (Act No. 27 of 2004). Therefore, caution should be exercised when carrying out excavations/earthworks associated with the construction activities if archaeological/heritage remains are discovered.
- Any items protected under the definition of heritage found during unearthing for construction works should be reported to the National Heritage Council.
- Identification of any archaeological significant objects or sites (such as graves) on the site should not be disturbed but are to be reported to the project Environmental/Safety officer or National Heritage Council office for further instructions and actions.
- The Proponent should familiarise themselves with the National Heritage Council's Chance Finds Procedure and if uncertain about the procedure should receive training by a suitably qualified archaeologist with respect to the identification of archaeological/heritage remains and the procedures to follow if such remains are discovered particularly during construction. The Chance and Finds Procedure is attached to the EMP.

7.3.12 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 three months of works (for construction) 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 16** below.

Table 16: Assessment of noise impact

Mitigation Status	Extent	Duration	Intensity	Probability	Significance
Pre mitigation	L/M - 2	L/M - 2	M - 6	M/H - 3	M – 30
Post mitigation	L - 1	L/M - 2	L - 2	L/M -2	L - 10

Mitigations and recommendation to noise

- Noise from vehicles and equipment on site should be reduced to acceptable levels.
- Construction and operational hours should be restricted to between 08h00 and 17h00 to avoid noise by vehicles and equipment before working or after hours to avoid noise generated by equipment and the movement of heavy vehicles, thus affecting neighbours.
- When operating noise generating machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce exposure to excessive noise.

8 RECOMMENDATIONS AND CONCLUSIONS

8.1 Recommendations

The potential impacts (both positive, and negative) that are anticipated from the proposed construction of the telecommunication tower and related activities were identified, described, and assessed. It was found that most of the identified potential negative impacts are rated as medium significant. For these significant adverse (negative) impacts with medium rating significance,

appropriate mitigation measures were recommended for effective implementation and continuous monitoring by the Proponent, their contractors and project related employees. The aim is to reduce to low and maintain this impacts' significance in the long run and bring the impact under control. These management and mitigation measures are provided under chapter 7 of this ESA report, and as management action and in the Draft EMP.

The public was consulted as required by the EMA and its 2012 EIA Regulations (Section 21 to 24). This was done via the two newspapers used for this environmental assessment (*New Era* and *The Namibian* newspapers in August 2021); site/public notices were placed at strategic locations in Otjiwarongo and possible one-on-one surveys done on the 2nd of September 2021.

The findings of this assessment were deemed sufficient and conclude that no further detailed assessments are required to the ECC application.

It is therefore recommended that an Environmental Clearance Certificate be issued for the proposed telecommunication tower construction, subject to the following recommendations:

- All required permits, licenses and approvals for the proposed activities should be obtained as required.
- The Proponent complies with the legal requirements governing this type of project and its associated activities.
- All mitigations provided in this Report and the management action plans in the Draft EMP should be implemented and monitoring conducted as recommended.
- All the necessary environmental and social (occupational health and safety) precautions provided should be adhered to.
- Excavated/trenched and other project related disturbed areas on the site, where construction activities have been completed, should be rehabilitated, as far as practicable, to their original state.
- The monitoring of the implementation of mitigation measures should be conducted, applicable impact's actions taken, reporting done and recorded.
- Environmental (EMP) Compliance Monitoring should be conducted on a weekly basis during the construction phase by the project Safety, Health and Environmental Officer or an independent Environmental Consultant and bi-annually during the operational phase. Environmental Compliance monitoring reports should be compiled and submitted to the DEAF as per provision made on the MEFT/DEAF's Portal.

These recommendations are primarily aimed at improving environmental management, ensuring sustainability and promote harmonious co-existence of the project activities and the host biophysical and social environment.

8.2 Conclusion

The potential positive and negative impacts stemming from the proposed project and its associated activities were identified, described, assessed and management as well as mitigation measures made thereof.

Excel Dynamic Solutions (Pty) Ltd (EDS) is therefore, confident that these measures are sufficient to avoid and/or reduce (where impact avoidance impossible) the risks to acceptable levels. Thus, EDS recommends that if the DEAF decides to issue the Proponent an ECC, it should be granted on condition that the EMP is implemented and that all the legal requirements pertaining to this development are complied with; and the provided management and mitigation measures are effectively implemented and monitored on the site.

Monitoring of the environmental components described in the impact assessment should be conducted by the Proponent and applicable Competent Authority. This is to ensure that all potential impacts identified in this study and other impacts that might arise during implementation are properly identified in time and addressed. Lastly, should the ECC be issued, the Proponent will be expected to be compliant with the ECC conditions as well as legal requirements governing the project and its related activities.

9 LIST OF REFERENCES

1. Carstens, E. and Kuliwoye, E. (2012). Environmental Scoping Report and Management Plan for the proposed construction of a MTC Base Transceiver Station in Goreangab Ext. 3, Windhoek. Windhoek: Unpublished.
2. FloodMap. (2019). Elevation of Otjiwarongo, Namibia Elevation Map, Topo, Contour. https://www.floodmap.net/Elevation/ElevationMap/?gi=3353811
3. GCS Water & Environmental Consultants. (2017). Environmental Scoping Assessment for the Proposed Construction of MTC Antennae in Rehoboth, Hardap Region. Windhoek. Unpublished.

4. GCS Water & Environmental Consultants. (2018). Impact Assessment Baseline MTC Namibia 100% Population Coverage Project: Otjozondjupa Region. Windhoek. Unpublished.
5. Green Earth Environmental Consultants. (2019). Environmental Impact Assessment for a Tyre Pyrolysis Plant for the Recycling of End of Life/Used Tyres to Produce Fuel Oil, Carbon Black Gas and Steel on a Portion (Portion A) of Prtion 15 of Farm Otjiwarongo Townlands South No. 308, Otjozondjupa Region. Windhoek. Ministry of Environment, Forestry and Tourism.
6. Mafuta Environmental Consultants. (2020). Environmental Assessment (EA) for the Proposed Construction and Operation of a Radio Transmission Tower in the Omindamba B Village of the Ruacana Constituency, Omusati Region. Windhoek. Ministry of Environment, Forestry and Tourism Namibia.
7. Namibia Statistics Agency. (2011). 2011 Population and Housing Census: Otjozondjupa 2011, Census Regional Profile. Windhoek: Namibia Statistics Agency.
8. National Radiation Protection Authority. (Unknown date). Atomic Energy Board of Namibia: Directive Issued Under Section 33 (3) of the Atomic Energy & Radiation Protection Act (No 5 of 2005) Relating to the Regulation of Sources of Non-Ionizing Radiation. Windhoek: National Radiation Protection Authority.
9. Partners in Flight. (2020). Reduce Bird Mortality: Reducing Bird Collisions with Towers. Accessible at https://partnersinflight.org/what-we-do/reduce-bird-mortality/bird-collisions/.
10. Saayman, C. (2014). EIA for the Proposed Okanjande Graphite Mine and Exploration activities: Socio-Economic Specialist Report. Windhoek. Unpublished.
11. World Weather Online. (2021, June 22). World Weather Online: Otjiwarongo. Retrieved from https://www.worldweatheronline.com/otjiwarongo-weather/otjozondjupa/na.aspx.

APPENDICES AND SIGNIFICANT COMMENTS THERETO

Appendix A: Copy of the Environmental Clearance Certificate (ECC) Application Form – **Attached hereto**

Appendix B: Draft Environmental Management Plan (EMP) – **uploaded separately on the Portal as required**

Appendix C: Curricula Vitae (CV) for the Environmental Assessment Practitioner (EAP) - **uploaded separately on the Portal as required**

Appendix D: List of Interested and Affected Parties (I&APs) - **uploaded separately on the Portal as required (under the ''Proof of Public Consultation'' file)**

Appendix E: Background Information Document (BID) - **uploaded separately on the Portal as required (under the ''Proof of Public Consultation'' file)**

Appendix F: ESA Process Notification in the newspapers (*New Era* and *The Namibian*) - **uploaded separately on the Portal as required (under ''Proof of Public Consultation'' file)**

Appendix G: Proof of Consultation of IAPs (direct neighbours to the site) by hand delivery of BIDs - **uploaded separately on the Portal as required (under ''Proof of Public Consultation'' file)**

Appendix H: Consent letter or support doc from relevant Authority - **uploaded separately on the Portal as required**

Appendix I: Non-ionising Radiation Regulations, 2019 of the Atomic Energy and Radiation Protection Act No. 5 of 2005 by the Ministry of Health & Social Services - **Attached hereto**

Appendix J: Acknowledgement of Receipt and notification of ECC application submission from the Ministry of Information and Communication Technology - **uploaded separately on the Portal as required (under ''Proof of Public Consultation'' file)**

APPENDIX A: Copy of the Environmental Clearance Certificate (ECC) Application Form 1 Submitted to the Mnistry of Information and Communication Technology

APPENDIX I: Non-ionising Radiation Regulations, 2019 of the Atomic Energy and Radiation Protection Act No. 5 of 2005 by the Ministry of Health & Social Services