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Environmental Impact Assessment for the Proposed Construction and Operation of a Telecommunication Tower in Kaisosi Proper Rundu, Kavango East Region

Scoping Report

APP-003872

Version - Final

20 May 2022



PowerCom (Pty) Ltd

GCS Project Number: 22-0177



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Telecommunication Tower in Kaisosi Proper, Rundu, Kavango East Region**

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EXECUTIVE SUMMARY

Introduction

PowerCom (Pty) Ltd (PowerCom hereafter) proposes to erect a telecommunication tower on Erf 328, Kaisosi Proper in Rundu which aims to strengthen the coverage for mobile and wireless services, inclusive of voice and data services within the subject area.

This report documents the assessment of potential impacts from the proposed activity. The preliminary findings within this Scoping Report indicate that potential impacts will be of a low significance. These potential impacts can be further mitigated by implementation of an effective Environmental Management Plan.

Project Description

PowerCom proposes to erect a telecommunication tower on Erf 328, Kaisosi Proper in Rundu. Network coverage predictions were used to determine the black holes in wireless and fixed-wireless services which drove to the selection of the proposed site. The proposed site is located within an existing urban area within the boundaries of Rundu town.

The proposed development will include the construction of a 30-meter-high lattice network tower. It will additionally include the construction of an equipment room which will house the communication equipment. The site will be fenced off in order to limit public access.

Public Participation

Communication with I&APs about the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing descriptive information about the proposed activities was compiled (**Appendix D**) and sent out to all identified and registered I&APs on 8 March 2022;
- Notices were placed in The Republikein and The Sun newspapers dated 8 March 2022 and 15 March 2022, briefly explaining the activity and its locality, inviting members of the public to register as I&APs (**Appendix E**);
- A site notice was fixed on the proposed site (See **Appendix G**);
- A meeting was held with the Rundu Town Council on 17 March 2022 at 11h00 (See **Appendix H**);
- A public meeting was held in Rundu on 17 March 2022 at Erf 328, Kaisosi Proper in Rundu at 17h30 (See **Appendix H**); and
- Letters were hand delivered to residents within the Kaisosi Proper area who were available on 17 March 2022 (**Appendix F**).

Public consultation was carried out according to the Environmental Management Act's EIA Regulations. After the initial notification, the I&APs were given two weeks to submit their comments on the project until **29 March 2022**.

The Draft Scoping Report was circulated from the **9th of May until the 17th of May 2022** for public review and comment. The overall commentary received from the public (if any) on the draft report is documented in the issues and responses trail document.

Conclusions and Recommendations

The key potential biophysical impacts related to the construction, operation/maintenance and decommissioning phases of the proposed project were identified and assessed. Suitable mitigation measures (where required and possible) were recommended, and the impacts can be summarised as follows:

- **Impacts on Surrounding Property Owners** (during construction): There is the possibility of disturbance of the surrounding property owners due to the presence of the construction team. The construction work will last for a scheduled period and is not expected to continue for an extended period. Therefore, the significance of this impact is low.
- **Impacts on Health and Safety** (during construction and decommissioning) Workers may be subject to issues of health and safety during construction on site. Improper handling of construction materials and equipment may cause injuries. With no mitigation measures in place, this impact will receive a “medium to high” significance rating. However, with the implementation of applicable safety measures, the impact can significantly be reduced to a low rating.
- **Impacts on Waste Generation** (during construction and decommissioning): Construction activities usually generates wastes which leads to environmental pollution, if not properly handled. This may pose a negative visual impact on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to a low rating.
- **Impacts on dust and noise** (during construction): Dust and noise generation may occur during construction. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating.

- **Impacts on Health and Safety** (Potential Radiation during operational phase): Health concerns as they relate to potential radiation from telecommunication sites is a national and international topic that requires investigation. The significance of this impact can be reduced to a low significance rating by ensuring that the sufficient mitigation measures governed by the national and international legal standards such as International Commission on Non-Ionizing Radiation Protection (ICNIRP) on infrastructure electromagnetic radiation (EMR) emissions are adequately implemented.
- **Impacts on Visual** (during operational phase): A visual disturbance is likely to be experienced by the surrounding property owners.
- **Impact on mobile users** (during decommissioning phase): The affected residents and businesses will lose good network coverage in the area, if the tower is decommissioned and no other alternative cellular service infrastructure is put in place. This is an unlikely case due to the fact that, the modern world is advancing on a daily basis, and there will always be a need for improved mobile and wireless services. Even if the tower is to be removed in the future, it will most likely be replaced by a better infrastructure for the same purpose.

Based on the information provided in this report, GCS is confident the identified risks associated with the proposed development can be reduced to acceptable levels, should the measures recommended in the EMP be implemented and monitored effectively. It is therefore recommended that the project receive Environmental Clearance, provided that the EMP be implemented.

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1 INTRODUCTION

PowerCom (Pty) Ltd (PowerCom hereafter) proposes to erect a telecommunication tower on Erf 328, Kaisosi Proper in Rundu which aims to strengthen the coverage for mobile and wireless services, inclusive of voice and data services within the subject area. The locality of the proposed site is shown in **Figure 1-1** below.

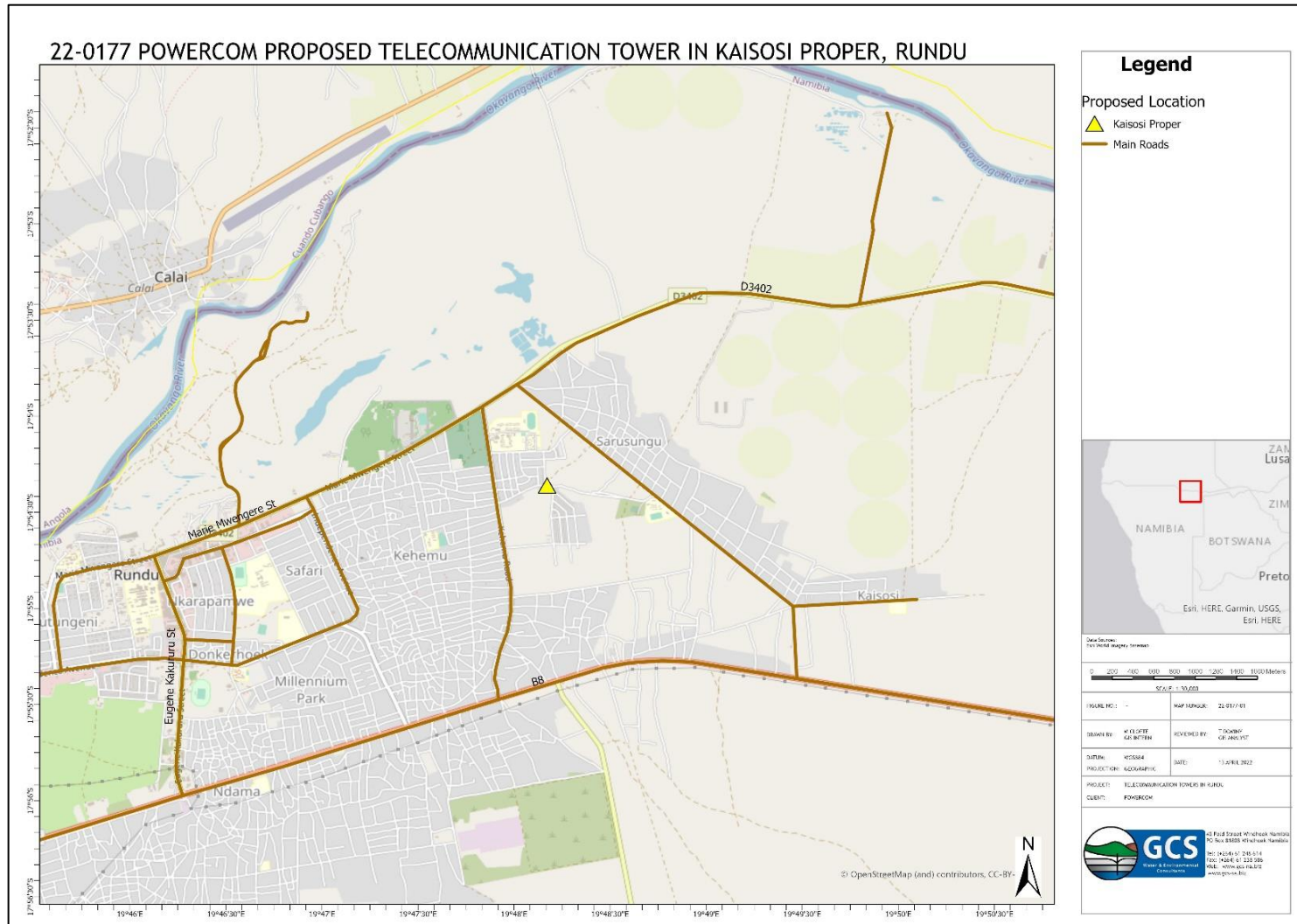


Figure 1-1: Locality of proposed telecommunication tower in Rundu

1.1 The Need for an Environmental Assessment (EA)

Under the 2012 Environmental Impact Assessment (EIA) Regulations of the Environmental Management Act (EMA) No. 7 of 2007, the proposed development is a listed activity that may not be undertaken without an Environmental Clearance Certificate (ECC). This activity is listed under the following relevant sections:

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

In order to fulfil the requirements of the EMA and its 2012 EIA Regulations, PowerCom (Pty) Ltd appointed GCS Water and Environmental Engineering Namibia (Pty) Ltd (GCS hereafter), an independent Environmental Consultant to conduct an Environmental Assessment (EA) (which includes public consultation) and submit the required documents as part of an application for an ECC in terms of the EMA and its EIA Regulations. The findings of the EA process are incorporated into an environmental scoping report (this report) and together with the draft Environmental Management Plan (EMP) will be submitted as part of an application for an ECC to the Environmental Commissioner at the Department of Environmental Affairs and Forestry (DEAF) within the Ministry of Environment, Forestry and Tourism (MEFT).

Victoria Shikwaya, a qualified Environmental Assessment Practitioner (EAP) conducted this EA process under the supervision of Stephanie Strauss, a qualified and experienced Environmental Assessment Practitioner. Michael Cloete an Environmental Intern further assisted with the assessment. The CV's of the consultants are attached as **Appendix A** at the end of this report.

1.2 Need and Desirability of the Project

Due to the constant growth in the use of mobile and wireless communication services in Namibia, the pressure to continuously expand the communications network is increasing. PowerCom identified the need for the new structure in Rundu, which will provide capacity and improve the coverage in this particular area. This proposed development will ensure that the quality of the service provided to the telecommunication users in the area is improved.

1.3 Scope of Work

This scoping study was carried out in accordance with the Environmental Management Act (EMA) (7 of 2007) and its 2012 EIA Regulations (GG No. 4878 GN No. 30).

After submitting an application for ECC to the DEAF, the first stage in the EA process is to submit a scoping report. This report provides the following:

Table 1-1: Sections within Scoping Report

Description	Section of the Report
The need and desirability of the proposed project	Subchapter 1.2
Project description and the need for it	Chapter 2
Alternatives considered for the proposed project in terms of no-go option and tower sharing	Chapter 3
The relevant laws and guidelines pertaining to the proposed project	Chapter 4
Baseline environment in which the proposed activity will be undertaken	Chapter 5
The public consultation process followed (as described in Regulation 7 of the EMA Act) whereby interested and affected parties (I&APs) and relevant authorities are identified, informed of the proposed activity and provided with a reasonable opportunity to give their concerns and opinions on the project;	Chapter 6
The identification of potential impacts, impacts description, assessment, mitigation measures and recommendations	Chapter 7
Recommendations and Conclusions to the report	Chapter 8

The next chapter will be focusing on the description of the proposed project and its associated activities.

2 PROJECT DESCRIPTION

The section below provides a description of the proposed activity and associated facilities.

2.1 Description of Activity

PowerCom proposes to erect a telecommunication tower on Erf 328 Kaisosi Proper in Rundu which aims to strengthen the coverage for mobile services, inclusive of voice and data services within the subject area.

2.1.1 Site Location

Network coverage predictions were used to determine the black holes in wireless and fixed-wireless services which drove the selection of the proposed site. This site will be used to improve coverage for mobile services, which include voice and data services. The proposed site is located within an existing urban area within the boundaries of Rundu town. The proposed site location is detailed in the table below.

Table 2-1: Site location details

Site Name	Kaisosi Proper
Erf number	328, Kaisosi Proper
GPS Coordinates	17°54'21.3"S 19°48'10.3"E
Local Authority	Rundu Town Council
Region	Kavango East Region

2.1.2 Site Design

The proposed development will include the construction of a 30-meter-high Lattice network tower. **Figure 2-1** below depicts an example of a Lattice tower which is proposed to be used for the subject tower.

Table 2-2: Site design details

Network Structure Type	Lattice Tower
Erf number	328, Kaisosi Proper
Height	30 meters



Figure 2-1: Example of the proposed tower
(<https://www.powercom.na/index.php/portfolio-details/item/2-lattice#portfolio-wrapper>)

It will additionally include the construction of an equipment room which will house the communication equipment. The site will be fenced off in order to limit public access.

2.1.3 Infrastructure and Services

Water will only be used during the construction period, more specifically for the foundation works. The contractor will be responsible for the sourcing of water.

Access to the site will be prohibited to anyone except the construction team and PowerCom.

AC power will be required for the operation of the tower and will be connected to the respective electricity provider's grid.

2.1.4 Resources and Working Team

Construction workers will be required for the following:

- excavation of the foundation;
- steel fixers for the fixing of reinforced steel;
- casting of concrete for both tower and equipment room; and
- riggers for the erection of the tower.

Materials for construction will be stored on site during the construction period. The workforce will not reside on site.

3 PROJECT ALTERNATIVES CONSIDERED

Alternatives are defined as: “different means of meeting the general purpose and requirements of the activity” (Environmental Management Act (2007) of Namibia (and its regulations (2012))). This chapter 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.

The alternatives considered for the proposed activity are discussed in the following subchapters.

3.1 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. This would mean that the proposed tower would not be installed at the proposed site in Rundu. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. Therefore, the network coverage for the area will remain unchanged and would not be improved.

In considering the purpose of the proposed project, the ‘no-go’ option cannot be considered as the preferred alternative.

3.2 Tower Location

Network coverage predictions were used to determine the black holes in wireless and fixed-wireless services which drove the selection of the proposed site. The following conditions deemed the site suitable for the proposed development:

- The site is located on a Public Open Space zoned erf which makes it a suitable land use for the erection of the tower
- The site is relatively flat and not environmentally sensitive as it is located in a developed area and as such is clear of any sensitive fauna or flora.
- The site is easily accessible via the internal street network of Kaisosi Proper, Rundu.

In light of the above the site is considered to be the preferred site.

3.3 Tower Sharing

In accordance with the Communications Act No. 8 of 2009, service providers should consider using other existing structures first before constructing new ones. This is done to avoid cumulative impact. However, the Proponent intends to construct a multi-user tower for future service providers to be able to mount their antennae onto this proposed tower.

3.4 Conclusions on the Considered Alternatives

The alternatives considered for the project are summarized as follow:

- **No-go vs. continuation of the proposed project:** The no-go alternative is not considered to be the preferred option. This would mean that the proposed tower would not be installed on the proposed site in Rundu. Should the proposed project be discontinued, none of the potential impacts (positive and negative) identified would occur. Therefore, the network coverage for the area will remain unchanged and would not be improved.
- **Tower location:** Network coverage predictions were used to determine the black holes in wireless and fixed-wireless services which drove the selection of the proposed site. The selected site is a viable location option for this kind of development due to the relevant zoning, topography, and accessibility.
- **Tower sharing:** The sharing of a tower in this case will not be a viable option since there is no other tower infrastructure near this location. The Proponent intends to construct a multi-user tower for future service providers to be able to mount their antennae onto this proposed tower.

The proposed development has legal requirements that need to be consulted and complied with. These legal requirements are discussed in the next chapter.

4 LEGAL FRAMEWORK

A review of applicable and relevant Namibian legislation, policies and guidelines to the proposed development are given in this chapter. This review serves to inform the Proponent (PowerCom (Pty) Ltd), 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 in order to undertake the proposed activities.

4.1 The Environmental Management Act No. 7 of 2007

This scoping assessment was carried out according to the Environmental Management Act (EMA) and its Environmental Impact Assessment (EIA) Regulations (GG No. 4878 GN No. 30). The EMA has stipulated requirements to complete the required documentation in order to obtain an Environmental Clearance Certificate (ECC) for permission to undertake certain listed activities.

4.2 The Constitution of Namibia Act (No 1 of 1990)

According to Legal Assistance Centre (LAC), there is no clear right to health in the Namibian Constitution. But under the Article 95 of the Namibian Constitution that deals with Principles of State Policy, the Namibian Constitution states that “the state shall enact legislation to ensure consistent planning to raise and maintain an acceptable standard of living for the country’s people” and to improve public health.

4.3 The Communications Act (No.8 of 2009)

This Act provides for the regulation of telecommunication 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.

The full list of all applicable legislation identified and conducted during the EA process are presented in **Table 4-1** below.

Table 4-1: Applicable and relevant Namibian and international legislation, policies and guidelines conducted during the EA process

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Environmental Management Act EMA (No 7 of 2007)	Requires that projects with significant environmental impacts are subject to an environmental assessment process (Section 27). Details principles which are to guide all EAs.	The EMA and its regulations should inform and guide the EA process.
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (GN 30 S21). Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
The Constitution of Namibia Act No. 1 of 1990	According to Legal Assistance Centre (LAC), there is no clear right to health in the Namibian Constitution. But under the Article 95 of the Namibian Constitution that deals with Principles of State Policy, the Namibian Constitution states “the state shall enact legislation to ensure consistent planning to raise and maintain an acceptable standard of living for the country’s people” and to improve public health.	The Proponent should ensure compliance with the conditions set in the Act.
Namibian Communications Act 8 of 2009	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.	Provides the standards for setting up cellular, wireless and satellite services.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Local Authorities Act (No. 23 of 1992)	Provides for the determination, for purposes of local government, of local authority councils; the establishment of such local authority councils; and to define the powers, duties, and functions of local authority councils; and to provide for incidental matters.	The Rundu Town Council is the responsible Local Authority of the area in which the proposed development will be located, and they should be consulted for this EA.
The Atomic Energy and Radiation Protection Act, Act 5 of 2005	Provides for the adequate protection of the environment and of people against the harmful effects of radiation by controlling and regulating the production, processing, handling, use, holding, storage, transport and disposal of radiation sources and radioactive materials, and controlling and regulating prescribed non-ionising radiation sources according to the standards set out by the ICNIRP.	To determine the “safe distance” around the site.
“Guidelines for Limiting Exposure to Electromagnetic Fields (100kHz to 300GHz)” (March 2020, 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.	Justifies the need for assessing the impact of electromagnetic radiation from the antennae, on the nearby residents.
The Aviation Act, Act 74 of 1962	Gives effect to certain International Aviation Conventions and makes provision for the control, regulation, and encouragement of flying within the Republic of Namibia and for other matters incidental thereto	Provides the regulations for setting up cellular structures in Namibia.

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
Namibian Civil Aviation Regulations, 2001	Section 139.01.34 outlines the obstacle limitations and marking outside aerodromes	The proposed project should adhere to the limitations outlined in the act.
Convention on International Civil Aviation, Annex 14	<ul style="list-style-type: none"> • 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.
Labour Act (No. 6 of 1992)	Ministry of Labour (MOL) 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.	PowerCom should ensure that construction, operation and maintenance of the towers, the safety and welfare of workers are not compromised.

The environmental baseline (features) of the project area and the surrounding areas are presented and discussed in the following chapter.

5 ENVIRONMENTAL BASELINE

The proposed project will be undertaken in a specific biophysical and social environment. The baseline conditions of these environmental features are described in the following subchapters.

5.1 Biophysical Environment

5.1.1 Climate

The Kavango East Region enjoys generally more rainfall than the rest of the country to the south and west. Annual average rainfall for the Kavango East Region varies between 450 mm and 600 mm, with a clear increasing trend from south to north. The mean annual temperature at Rundu is 22.2°C. Mean summer temperature (December to February) is 24.8°C and mean winter temperature (June to August) 17.1°C. (Mendelsohn *et al.*, 2002).

5.1.2 Topography, Soils and Geology

The area falls within the Okavango-Epukiro hydrogeological region. It lies at the margin of the much larger Kalahari Basin, which extends far across the Namibian-Botswana border. The bedrock that lie beneath this huge sand-filled basin consists of various rock types. Outcrops of carbonate and quartzite of the Damara Sequence are present in the area Gam and Tsumkwe. The Kalahari Sequence forms a blanket of unconsolidated to semi-consolidated sand covering most of the area. Specialists divide the Kalahari layers here into three main units. The uppermost consists mostly of unconsolidated wind-blown sand and sand deposited under fluvial conditions. The middle part is predominantly fluvial sand with minor aeolian deposits. The terrain of the area is relatively flat and has savannah forests, grassland and shrubs (Ministry of Agriculture, Water and Forestry, 2011).

Some volcanic rocks are exposed in the Okavango River at Rundu and between Mukwe and Bagani, at Dobe Pan and in the upper reaches of the Otjosondjo Omuramba (Mendelsohn, Jarvis, Roberts, & Robertson, 2002).

5.1.3 Fauna and Flora

The town of Rundu is situated on the wall of the Okavango River in the Okavango valley. The area is known to be of Namibia's most densely vegetated areas composed of floodplain grasslands and lush woodlands. The area is dominated by open woodlands with numerous hardwood species, including *Baikiaea plurijuga*, *Pterocarpus angolensis*, and *Guibourtia coleosperma* (Mendelsohn, Jarvis, Roberts, & Robertson, 2002).

5.2 Social Environment

5.2.1 Social Demographics

Based on the 2011 Namibia Population and Housing Census, the population of Rundu comprised 81 400 people. The total population of the two Kavango Regions were 222 500 (Namibia Statistics Agency, 2011).

5.2.2 Economy

The Kavango region is the poorest region in Namibia in terms of the Human Development Index (HDI). The HDI concentrates the three essential factors of human life; longevity, knowledge, and a decent standard of living. The HDI of the region is 0.4, but the town is geographically located at a strategic crossroad and has, since peace and stability returned to Angola, potential to develop to a significant border town. Wages and salaries are the main source of income in this region with 40%, while other income sources include pension with 19%, business and non-farming activities with 17%, farming with 13% and cash remittance with 5% (Namibia Statistics Agency, 2013).

5.2.3 Land Use

The proposed site is located within a built-up area in the town. The subject site is currently zoned as Public Open Space. The surrounding land uses are predominantly Residential with some General Residential, Institutional and Public Open Space zoned erven found in proximity of the site.

6 PUBLIC CONSULTATION

6.1 Objective:

Public consultation forms an important component of an Environmental Assessment (EA) process. Public consultation provides potential Interested and Affected Parties (I&APs) with an opportunity to comment on and raise any issues relevant to the project for consideration as part of the assessment process. Public consultation has been done in accordance with both the EMA and its EIA Regulations.

The public consultation process assists the Environmental Assessment Practitioner (EAP) in identifying all potential impacts and to what extent further investigations are needed. Public consultation can also aid in the process of identifying possible mitigations measures.

6.2 Approach:

6.2.1 Interested and Affected Parties (I&APs)

An I&AP is identified under the Environmental Management Act (2007) as:

- (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”.

GCS identified specific I&APs, who were considered interested in and/or affected by the proposed activities through the following means:

- Information for the applicable local authorities was obtained from the existing GCS stakeholder database;
- The neighbouring property owners were notified by hand delivered letters; and
- Notices were placed in the local newspapers requesting any potentially affected or interest members of the public to register as I&APs.

A summary of the I&APs identified are presented in **Table 6-1**. The complete list of I&APs is provided in **Appendix C**.

Table 6-1: Summary of Identified IAPs

List of IAPs	Description
	Ministry of Environment, Forestry and Tourism
	Ministry of Information and Communication Technology
	Rundu Town Council
	Neighbouring Property Owners

6.2.2 Communication with I&APs

Regulation 21 of the EIA Regulations details steps to be taken during a given public consultation process and these have been used in guiding this process.

Communication with I&APs about the proposed development was facilitated through the following means and in this order:

- A Background Information Document (BID) containing descriptive information about the proposed activities was compiled (**Appendix D**) and sent out to all identified and registered I&APs on 8 March 2022;
- Notices were placed in The Republikein and The Sun newspapers dated 8 March 2022 and 15 March 2022, briefly explaining the activity and its locality, inviting members of the public to register as I&APs (**Appendix E**);
- A site notice was fixed on the proposed site (**Appendix G**);
- A meeting was held with the Rundu Town Council on 17 March 2022 at 11h00 (See **Appendix H**);
- A public meeting was held in Rundu on 17 March 2022 at Erf 328, Kaisosi Proper in Rundu at 17h30 (See **Appendix H**); and
- Letters were hand delivered to residents within the Kaisosi Proper area who were available on 17 March 2022 (**Appendix F**).

Public consultation was carried out according to the Environmental Management Act's EIA Regulations. After the initial notification, the I&APs were given two weeks to submit their comments on the project until **29 March 2022**.

The Draft Scoping Report was circulated from the **9th May until the 17th May 2022** for public review and comment. The overall commentary received from the public (if any) on the draft report will be documented in the issues and responses trail document. The comment period will remain open until the final scoping report is submitted to MEFT.

7 IMPACTS IDENTIFICATION, DESCRIPTION AND ASSESSMENT

7.1 Impact Assessment Methodology

The proposed activities have impacts on certain biophysical and social features. 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 7-1**, **Table 7-2**, **Table 7-3** and **Table 7-4**. 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 were applied in this impact assessment:

7.1.1 Extent (spatial scale)

Extent is an indication of the physical and spatial scale of the impact. **Table 7-1** shows rating of impact in terms of extent of spatial scale.

Table 7-1: Extent or spatial impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Impact is localised within the site boundary: Site only	Impact is beyond the site boundary: Local	Impacts felt within adjacent biophysical and social environments: Regional	Impact widespread far beyond site boundary: Regional	Impact extend National or over international boundaries

7.1.2 Duration

Duration refers to the timeframe over which the impact is expected to occur, measured in relation to the lifetime of the project. **Table 7-2** shows the rating of impact in terms of duration.

Table 7-2: Duration impact rating

Low (1)	Low/Medium (2)	Medium (3)	Medium/High (4)	High (5)
Immediate mitigating measures, immediate progress	Impact is quickly reversible, short term impacts (0-5 years)	Reversible over time; medium term (5-15 years)	Impact is long-term	Long term; beyond closure; permanent; irreplaceable or irretrievable commitment of resources

7.1.3 Intensity, Magnitude / severity

Intensity refers to 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. These were also taken into consideration during the assessment of severity. **Table 7-3** shows the rating of impact in terms of intensity, magnitude or severity.

Table 7-3: Intensity, magnitude or severity impact rating

Type of criteria	Negative				
	H-(10)	M/H-(8)	M-(6)	M/L-(4)	L-(2)
Qualitative	Very high deterioration, high quantity of deaths, injury of illness / total loss of habitat, total alteration of ecological processes, extinction of rare species	Substantial deterioration, death, illness or injury, loss of habitat / diversity or resource, severe alteration, or disturbance of important processes	Moderate deterioration, discomfort, partial loss of habitat / biodiversity or resource, moderate alteration	Low deterioration, slight noticeable alteration in habitat and biodiversity. Little loss in species numbers	Minor deterioration, nuisance or irritation, minor change in species / habitat / diversity or resource, no or very little quality deterioration.

7.1.4 Probability of occurrence

Probability describes the likelihood of the impacts actually occurring. This determination is based on previous experience with similar projects and/or based on professional judgment. See **Table 7-4** for impact rating in terms of probability of occurrence.

Table 7-4: Probability of occurrence impact rating

Low (1)	Medium/Low (2)	Medium (3)	Medium/High (4)	High (5)
Improbable; low likelihood; seldom. No known risk or vulnerability to natural or induced hazards.	Likely to occur from time to time. Low risk or vulnerability to natural or induced hazards	Possible, distinct possibility, frequent. Low to medium risk or vulnerability to natural or induced hazards.	Probable if mitigating measures are not implemented. Medium risk of vulnerability to natural or induced hazards.	Definite (regardless of preventative measures), highly likely, continuous. High risk or vulnerability to natural or induced hazards.

7.1.5 Significance

Impact significance is determined through a synthesis of the above impact characteristics. The significance of the impact “without mitigation” is the main determinant of the nature and degree of mitigation required. As stated in the introduction to this chapter, for this assessment, the significance of the impact without prescribed mitigation actions was measured.

Once the above factors (Table 7-1, Table 7-2, Table 7-3 and Table 7-4) have been ranked for each potential impact, the impact significance of each is assessed using the following formula:

$$SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

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 7-5).

Table 7-5: Significance rating scale

<i>SIGNIFICANCE</i>	<i>ENVIRONMENTAL SIGNIFICANCE POINTS</i>	<i>COLOUR CODE</i>
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

For an impact with a significance rating of high, mitigation measures are recommended to reduce the impact to a low or medium significance rating, provided that the impact with a medium significance rating can be sufficiently controlled with the recommended mitigation measures. To maintain a low or medium significance rating, monitoring is recommended for a period of time to enable the confirmation of the significance of the impact as low or medium and under control.

The impact assessment for the proposed activities is given in subchapter 7.2, 7.3 and 7.4.

7.2 Construction Phase Impact Assessment

The potential impacts associated with the construction of the tower structures have been identified and assessed in this subchapter. The main potential impacts identified are; disturbance to neighbouring property owners, health and safety, waste generation and dust and noise.

7.2.1 Impact Assessment on Surrounding Property Owners

During the construction of the proposed tower, the presence of the construction team will disturb the surrounding property owners. The construction work is not expected to continue for an extended period. Additionally, the immediate neighbouring properties are currently not occupied. Therefore, the likelihood of this impact is low. The assessment of this impact is presented in **Table 7-6**.

Table 7-6: Assessment of the impacts on surrounding property owners

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L - 1	M/L - 4	M - 3	M - 21
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.2.1.1 Mitigations and recommendation to disturbance of surrounding property owners

- Construction work to take place during working hours only (08h00 - 17h00).
- Should construction need to be done outside of working hours, neighbouring property owners need to be informed in writing prior to construction commencing.

7.2.2 Impact Assessment on Health and Safety

Construction workers will be working at heights when constructing the proposed structure. A lack of safety measures will potentially lead to injuries (falling down). Improper handling of construction materials and equipment may cause injuries. With no mitigation measures in place, this impact will receive a “medium to high” significance rating. However, the implementation of applicable safety measures, the impact can significantly be reduced to a low rating. The assessment of this impact is presented in **Table 7-7**.

Table 7-7: Assessment of the impacts on health and safety

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

7.2.2.1 Mitigations and recommendation to health and safety

- The contractor(s) should ensure that all personnel are provided with the required personal protective equipment (PPE), such as gloves, safety boots, safety glasses and hard hats etc at all times during construction hours on site.
- No workers should be allowed to drink alcohol during working hours.
- No workers should be allowed on site if under the influence of alcohol.
- Construction workers should be trained on how to handle materials and equipment on site (if they do not already know how to) in order to avoid injuries.

7.2.3 Impact Assessment of Waste Generation

Construction activities usually generates wastes which leads to environmental pollution, if not properly handled. This may pose a negative visual impact on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The assessment of this impact is presented in Table 7-8.

Table 7-8: Assessment of the impacts of waste generation

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

7.2.3.1 Mitigations and recommendation to waste generation

- The construction site should be kept tidy at all times.
- All domestic and general construction waste produced on a daily basis should be cleaned and contained daily.
- No waste may be buried or burned on site or anywhere else.
- Waste containers (bins) should be emptied after the construction and removed from site to the municipal waste disposal site.
- Separate waste containers (bins) for hazardous and domestic / general waste must be provided on site.
- Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.
- No waste may remain on site after the completion of the project.

7.2.4 Impact Assessment of Dust

Dust generation may occur during construction. Dust suppression interventions need to be incorporated if dust levels are found to be significant. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The assessment of this impact is presented in Table 7-9.

Table 7-9: Assessment of the impacts of dust generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
Post-mitigation	L - 1	L - 1	M - 6	M/L - 2	L - 16

7.2.4.1 Mitigations and recommendation to dust generation

- Dust abatement techniques should be implemented e.g. Spraying of water.

7.2.5 Impact Assessment of Noise

Construction equipment and machinery may produce high levels of noise during operations. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to a low rating. The assessment of this impact is presented in Table 7-10.

Table 7-10: Assessment of the impacts of noise generation

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M/H - 8	M - 3	M - 36
Post-mitigation	L - 1	L - 1	M - 6	L/M - 2	L - 16

7.2.5.1 Mitigations and recommendation to noise

- Construction work to take place during working hours only (08h00 - 17h00) unless otherwise arranged with neighbouring property owners in proximity.
- Noise levels should adhere to the South African National Standards (SANS) regulations 10103.

7.3 Operational and Maintenance Phase Impact Assessment

The main potential impacts associated with operational and maintenance phases identified is health and safety and visual impacts.

7.3.1 Impact on Health and Safety (Potential Radiation)

Electromagnetic radiation is emitted from electrical appliances commonly used in most homes today, such as TV's, 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 (Carstens and Kuliwoye, 2012).

The International Commission on Non-Ionizing Radiation Protection (ICNRP) provides guidance on protecting against the adverse health effects associated with electromagnetic fields (EMF). 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.

The National Radiation Protection Authority of Namibia (NRPA) is charged with the administration of the Atomic Energy and Radiation Protection Act (Act 5 of 2005) that specifically require that account be taken of any guidelines published by ICNIRP regarding the radiation risks associated with Base Transceiver Stations (BTS) structures (National Radiation Protection Authority, Unknown date).

The following subchapters will assess the impact of short-term and long-term radiation.

7.3.1.1 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 reader is referred to the Atomic National Radiation Protection Authority: Energy Board of Namibia Directive referenced in this report.

The significance of this impact can be reduced to a low significance rating by ensuring that the sufficient mitigation measures governed by the national and international legal standards such as ICNIRP on infrastructure EMR emissions are adequately implemented. The impact is assessed in **Table 7-11**.

Table 7-11: Assessment of the impacts of the antennae on health and safety: Short term radiation

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

7.3.1.2 Mitigations and recommendation on health and safety: Short-term Radiation

- PowerCom should ensure that the proposed tower 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 Electromagnetic Fields (100kHz to 300GHz) (March 2020, developed by the ICNIRP)
- The design standards to be applied for the antennae should comply with the internationally accepted public exposure guidelines.
- PowerCom should ensure that the site is registered with the National Radiation Protection Authority once operational as required by regulation 4 of the non-ionising radiation gazetted in June 2020.
- PowerCom should ensure that all potential operations acquired pre-approval from the National Radiation Protection Authority.
- The National Radiation Protection Authority should be involved during this phase (operational) to assess the possible emissions from antennae.

7.3.1.3 Long-term Radiation (Health) Effects

In the case of potential long-term health effects of exposure, such as an increased risk of cancer, ICNIRP concluded that the available data are insufficient to provide a basis for this setting exposure restriction. Thus, the ICNIRP 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 high because the long-term effect is unknown. In the context of the above, a cautionary approach is adopted, and in particular the Precautionary Principle, which states that if an action or policy has a suspected risk of causing harm to the public or to the environment, in the absence of scientific consensus that the action or policy is harmful, the burden of proof that it is not harmful falls on those taking the action.

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. The impact is assessed in **Table 7-12**.

Table 7-12: Assessment of the impacts of the antennae on health and safety: Long term radiation

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

7.3.1.4 Mitigations and recommendation on health and safety: Long-term Radiation

- PowerCom should ensure that 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 Electromagnetic Fields (100kHz to 300GHz) (March 2020 developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP))
- The design standards to be applied for the antennae should comply with the internationally accepted public exposure guidelines.
- The National Radiation Protection Authority should be involved during this phase (operational) to assess the possible emissions from antennae.

7.3.2 Visual Impact

Network towers usually cause a visual impact on the environment. If not planned properly, the network tower presence will contrast the surrounding landscape and thus potentially become a visual nuisance, if not camouflaged to suit the surrounding environment. 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 a much lower rating of significance. This impact is assessed in **Table 7-14** below.

Table 7-13: Assessment of the visual impacts

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M - 6	M - 3	M - 30
Post-mitigation	L/M - 2	L - 1	L - 2	L - 1	L - 5

7.3.2.1 Mitigations and recommendation to visual impact

- 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.

7.4 Decommissioning Phase

7.4.1 Impact of the Decommissioning on Mobile Users

The affected residents and businesses will lose good network coverage in the area, if the antennae are decommissioned and no other alternative cellular service infrastructure is put in place. This is an unlikely case due to the fact that the modern world is advancing on a daily basis, and there will always be a need for improved mobile services. Even if the tower is to be removed in the future, it will most likely be replaced by a better infrastructure for the same purpose. Pre-implementation of the necessary mitigation measures, this impact can be rated as “low to medium” and with the implementation of the necessary mitigation measures, the impact significance will be low. This impact is assessed in Table 7-14 below.

Table 7-14: Assessment of the impacts of the antennae decommissioning

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L/M - 2	M - 6	M - 3	M - 30
Post-mitigation	L/M - 2	L - 1	L - 2	L - 1	L - 5

7.4.1.1 Mitigations and recommendation to antennae decommissioning impact

- The mobile services network provider should ensure that the mobile coverage is not compromised, by putting up an alternative cellular infrastructure.

7.4.2 Impact Assessment on Surrounding Property Owners

During the removal and destruction of infrastructure of the tower, the presence of the construction team will disturb the surrounding property owners. The construction work is not expected to continue for an extended period. Therefore, the likelihood of this impact is low. The assessment of this impact is presented in Table 7-15.

Table 7-15: Assessment of the impacts on surrounding property owners

	Extent	Duration	Intensity	Probability	Significance
Pre-mitigation	L/M - 2	L - 1	M/L - 4	M - 3	M - 21
Post-mitigation	L - 1	L - 1	L - 2	L - 1	L - 4

7.4.2.1 Mitigations and recommendation to disturbance of surrounding property owners

- Construction work to take place during working hours only (08h00 - 17h00).
- Should construction need to be done outside of working hours, neighbouring property owners need to be informed in writing prior to construction commencing.

7.4.3 Impact Assessment on Health and Safety

Improper handling of construction materials and equipment may cause injuries. With no mitigation measures in place, this impact will receive a “medium to high” significance rating. However, the implementation of applicable safety measures, the impact can significantly be reduced to a low rating. The assessment of this impact is presented in **Table 7-16**.

Table 7-16: Assessment of the impacts on health and safety

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

7.4.3.1 Mitigations and recommendation to health and safety

- The contractor(s) should ensure that all personnel are provided with personal protective equipment (PPE), such as gloves, safety boots, safety glasses and hard hats etc at all times during construction hours on site.
- No workers should be allowed to drink alcohol during working hours.
- No workers should be allowed on site if under the influence of alcohol.
- Construction workers should be trained on how to handle materials and equipment on site (if they do not already know how to) in order to avoid injuries.

7.4.4 Impact Assessment of Waste Generation

The demolition of infrastructure will result in the generates of waste which leads to environmental pollution, if not properly handled. This may pose a negative visual impact on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The assessment of this impact is presented in **Table 7-17**.

Table 7-17: Assessment of the impacts of waste generation

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

7.4.4.1 *Mitigations and recommendation to waste generation*

- The site should be kept tidy at all times.
- All domestic and general waste produced on a daily basis should be cleaned and contained daily.
- No waste may be buried or burned on site or anywhere else.
- Waste containers (bins) should be emptied after the construction and removed from site to the municipal waste disposal site.
- Separate waste containers (bins) for hazardous and domestic / general waste must be provided on site.
- Construction labourers should be sensitised to dispose of waste in a responsible manner and not to litter.
- No waste may remain on site after the completion of the project.

8 RECOMMENDATIONS AND CONCLUSION

8.1 Conclusion

The key potential biophysical impact related to the construction, operational and maintenance and decommissioning phases of the proposed project were identified and assessed. Suitable mitigation measures (where required and possible) were recommended, and the impacts can be summarised as follows:

- **Impacts on Surrounding Property Owners** (during construction): There is the possibility of disturbance of the surrounding property owners due to the presence of the construction team. The construction work will last for a scheduled period and is not expected to continue for an extended period. Therefore, the significance of this impact is low. However, the impact can be adequately addressed by the recommendations given under subchapter 7.2.1, 7.4.2 and management actions given in the EMP (Chapter 3).
- **Impacts on Health and Safety** (during construction and decommissioning) Workers may be subject to issues of health and safety during construction on site. Improper handling of construction materials and equipment may cause injuries. With no mitigation measures in place, this impact will receive a “medium to high” significance rating. However, the implementation of applicable safety measures, the impact can significantly be reduced to a low rating. The impact can be adequately addressed by the recommendations given under subchapter 7.2.2, 7.4.3 and management actions given in the EMP (Chapter 3).
- **Impacts on Waste Generation** (during construction and decommissioning): Construction activities usually generates wastes which leads to environmental pollution, if not properly handled. This may pose a negative visual impact on the surrounding environment. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The impact can be adequately addressed by the recommendations given under subchapters 7.2.3, 7.4.4 and also management actions given in the EMP (Chapter 3).
- **Impacts on dust and noise** (during construction): Dust and noise generation may occur during construction. Without any mitigation measures implemented, the impact can be rated as of a “medium” significance. After the implementation of the mitigations, the impact will be significantly reduced to low rating. The impact can be adequately addressed by the recommendations given under subchapter 7.2.4 and 7.2.5 and also management actions given in the EMP (Chapter 3).

- **Impacts on Health and Safety (Potential Radiation)** (during operational phase): Although health concerns were not specifically raised as a concern during the public participation process, it is a national and international topic that requires investigation due to the close proximity of the structure to neighbouring properties. The impact can be adequately addressed by the recommendations given under subchapters 7.3.1,7.4.3 and also management actions given in the EMP (Chapter 3).
- **Impacts on Visual** (during operational phase): A visual disturbance is likely to be experienced by the surrounding property owners. The impact can be adequately addressed by the recommendations given under subchapters 7.3.2 and also management actions given in the EMP (Chapter 3).
- **Impact on Mobile Users** (during decommissioning phase): The affected residents and businesses will lose good network coverage in the area, if the tower is decommissioned and no other alternative cellular service infrastructure is put in place. This is an unlikely case due to the fact that, the modern world is advancing on a daily basis, and there will always be a need for improved mobile services. Even if the tower is to be removed in the future, it will most likely be replaced by a better infrastructure for the same purpose. The impact can be adequately addressed by the recommendations given under subchapter 7.4.1 and also management actions given in the EMP (Chapter 3).

8.2 Recommendation

Based on the information provided in this report, GCS is confident the identified risks associated with the proposed development can be reduced to acceptable levels, should the measures recommended in the EMP be implemented and monitored. It is therefore recommended that the project receive Environmental Clearance, provided that the EMP be implemented.

9 REFERENCES

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Appendix A

**CV'S -STEPHANIE STRAUSS
AND VICTORIA SHIKWAYA**

APPENDIX B

ENVIRONMENTAL MANAGEMENT PLAN (EMP)

APPENDIX C

LIST OF INTERESTED AND AFFECTED PARTIES

APPENDIX D

BACKGROUND INFORMATION DOCUMENT

APPENDIX E

NEWSPAPER ADVERTS

APPENDIX F

NOTIFICATION EMAILS AND LETTERS

APPENDIX G

PROOF OF SITE NOTICES

APPENDIX H

**PUBLIC MEETING PRESENTATION
PUBLIC MEETING MINUTES
PUBLIC MEETING ATTANDECE LIST**

APPENDIX I

ISSUES & RESPONSE TRAIL AND COMMENTS RECIEVED

APPENDIX J

CONSENT LETTER FROM RELEVANT AUTHORITY