SERJAHGE CONSULTANTS
'Sustainability is Tomorrow's Usage Assurance'
CC/2020/0010007

Draft Environmental Management Plan (EMP)

The Proposed Construction and Operation of a New Lattice Telecommunication Tower at Havana High School in Windhoek, Khomas Region

ECC Application No.: **APP-005806**

Document Version: **Draft as prescribed by Regulation 8(j) of the EIA Regulations (2012) – It is a living document that can be updated throughout the project cycle, as deemed necessary**

Proponent: **Mobile Telecommunications Limited**

P. O. Box 23051 Windhoek, Namibia

make the connection mtc

June 2025

DOCUMENT INFORMATION

Title: Draft Environmental Management Plan (EMP) for the Proposed Construction and Operation of a New Lattice Telecommunication Tower at Havana High School in Windhoek, Khomas Region

Prepared by:

Author / Environmental Assessment Practitioner (EAP):	Fredrika N. Shagama
Qualifications:	Ph.D. Student: Civil Engineering (Geotechnics & Environmental Hydrogeology), VSB - Technical University of Ostrava, Czech Republic; Post Graduate Diploma in Environmental Studies, International University of Management (IUM), Namibia; MSc. Geological Engineering (*cum laude*) with a focus in Hydrogeology, VSB - Technical University of Ostrava, Czech Republic; BSc. Geological Engineering, VSB - Technical University of Ostrava, Czech Republic
Professional Affiliations:	Environmental Assessment Professionals of Namibia (EAPAN) - Practitioner (Membership No. 183); Geoscience Council of Namibia (GSCN) – Geoscientist, Registration No. GSCN/G-057; International Association of Hydrogeologists (IAH) - Full Member, Membership No.139790; Namibian Hydrogeological Association (NHA) – Member
Contact Details:	Mobile No: +264 81 749 9223 eias.public@serjaconsultants.com Postal Address: P.O. Box 27318 Windhoek, Namibia
Signature:	
Date:	09 June 2025

EAP* - *Environmental Assessment Practitioner*

SERJA'S STATEMENT OF INDEPENDENCE

As the Appointed Environmental Consultant to undertake the EIA Study and prepare this Draft Environmental Management Plan (EMP) for the Proposed Construction and Operation of a New Lattice Telecommunication Tower at Havana High School in Windhoek, Khomas Region, Serja Hydrogeo-Environmental Consultants cc declare that we:

- do not have, to our knowledge, any information or relationship with Mobile Telecommunications Limited (*MTC Namibia* or Proponent), the Ministry of Environment, Forestry and Tourism (MEFT)'s Department of Environmental Affairs and Forestry (DEAF) that may reasonably have potential of influencing the outcome of this EIA Study (EMP) and the subsequent Environmental Clearance Certificate applied for.
- have knowledge of and experience in conducting environmental assessments, the Environmental Management Act (EMA) No. 7 of 2007, and its 2012 Environmental Impact Assessment (EIA) Regulation, as well as other relevant national and international legislation, guidelines, policies, and standards that govern the proposed project as presented herein.
- have performed work related to the ECC application in an objective manner, even if the results in views and findings, or some of these may not be favorable to the Proponent.
- have complied with the EMA and other relevant regulations, guidelines, and other applicable laws as listed in this document.
- declare that we do not have and will not have any involvement or financial interest in the undertaking/implementation of the proposed project, other than remuneration (professional fees) for work performed to conduct the EIA and apply for the ECC in terms of the EIA Regulations' requirement as an Environmental Assessment Practitioner (EAP).

Disclaimer: Serja Hydrogeo-Environmental Consultants will not be held responsible for any omissions and inconsistencies that may result from information that was not available at the time this document was prepared and submitted for evaluation.

……

Signature:

Fredrika N. Shagama: Principal Environmental Assessment Practitioner & Hydrogeologist

Date: June 2025

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

3G/4G:	Third and Fourth Generation of Wireless Mobile Telecommunications Technology
AC:	Alternating Current
AERPA:	Atomic Energy & Radiation Protection Authority
ARPANSA:	Australian Radiation Protection and Nuclear Safety Agency
BTS:	Base Transceiver Station
CRAN:	Communications Regulatory Authority of Namibia
DEAF:	Department of Environmental Affairs and Forestry
EA:	Environmental Assessment
EAP:	Environmental Assessment Practitioner
EAPAN:	Environmental Assessment Professionals of Namibia
ECC:	Environmental Clearance Certificate
EIA:	Environmental Impact Assessment
EMA:	Environmental Management Act
EMF or EME:	Electromagnetic Fields or Electromagnetic Emissions
EMP:	Environmental Management Plan
GG:	Government Gazette
GN:	Government Notice
I&APs:	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
MICT	Ministry of Information and Communication Technology
NAC	Namibia Airports Company

NCAA:	Namibia Civil Aviation Authority
NHC:	National Heritage Council (NHC) of Namibia
NRPA:	National Radiation Protection Authority of Namibia
PPE:	Personal Protective Equipment
Reg, S:	Regulation, Section
WHO:	World Health Organization

1 INTRODUCTION

1.1 Project Background and Location

Mobile Telecommunications Limited (*MTC Namibia or the Proponent*) proposes to construct and operate a 25m high lattice telecommunication tower within the premises of the Havana High School at these coordinates -22.492685, 17.012255. The school is on the northwestern edge of Windhoek, along the Monte Christo Road (now known as the Peter Nanyemba Road). The lattice tower will cover a 12m x 12m surface area and host 3x dual-band antennas and 1x microwave dish. The site is internally referred to by MTC as the Havana High School (HS) Tower Site. The proposed tower site falls within the Moses ǁGaroëb Constituency of the Khomas Region. The locality maps are shown in Figure 1-1 and Figure 1-2.

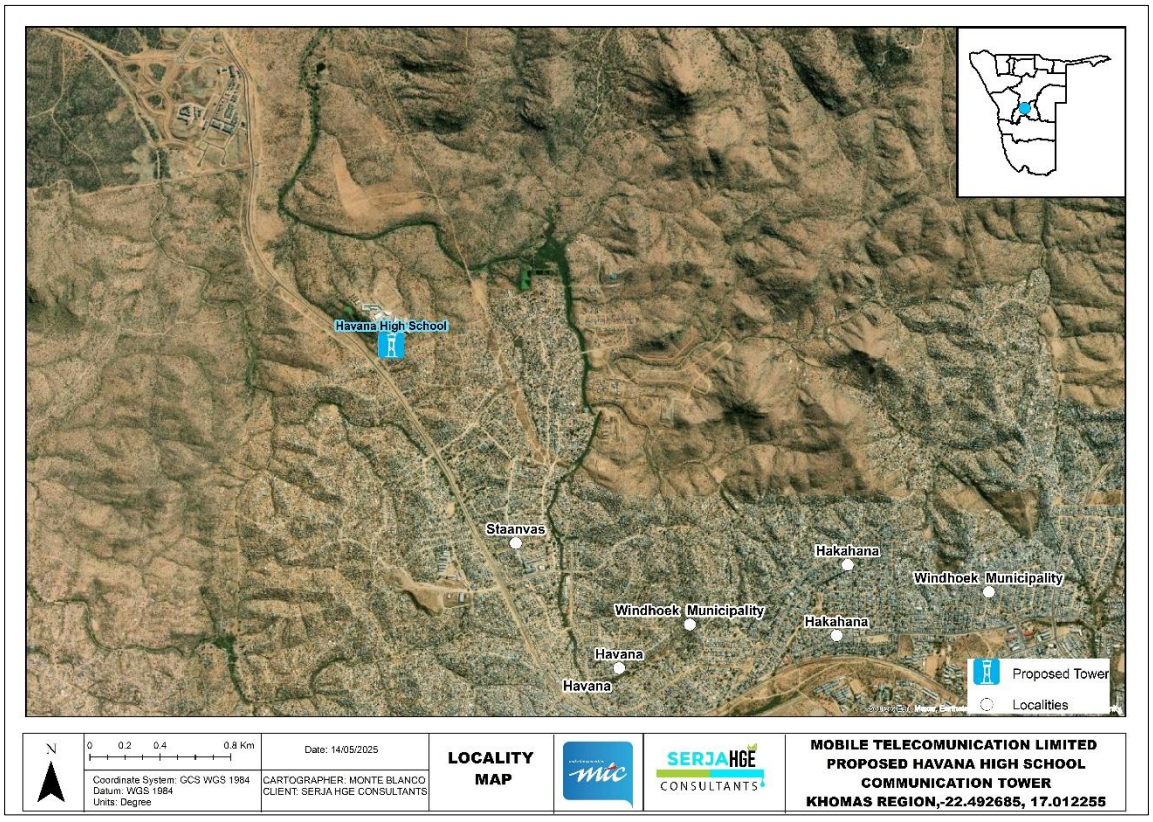

Figure 1-1: Locality map of the proposed MTC Tower at the Havana High School in Windhoek

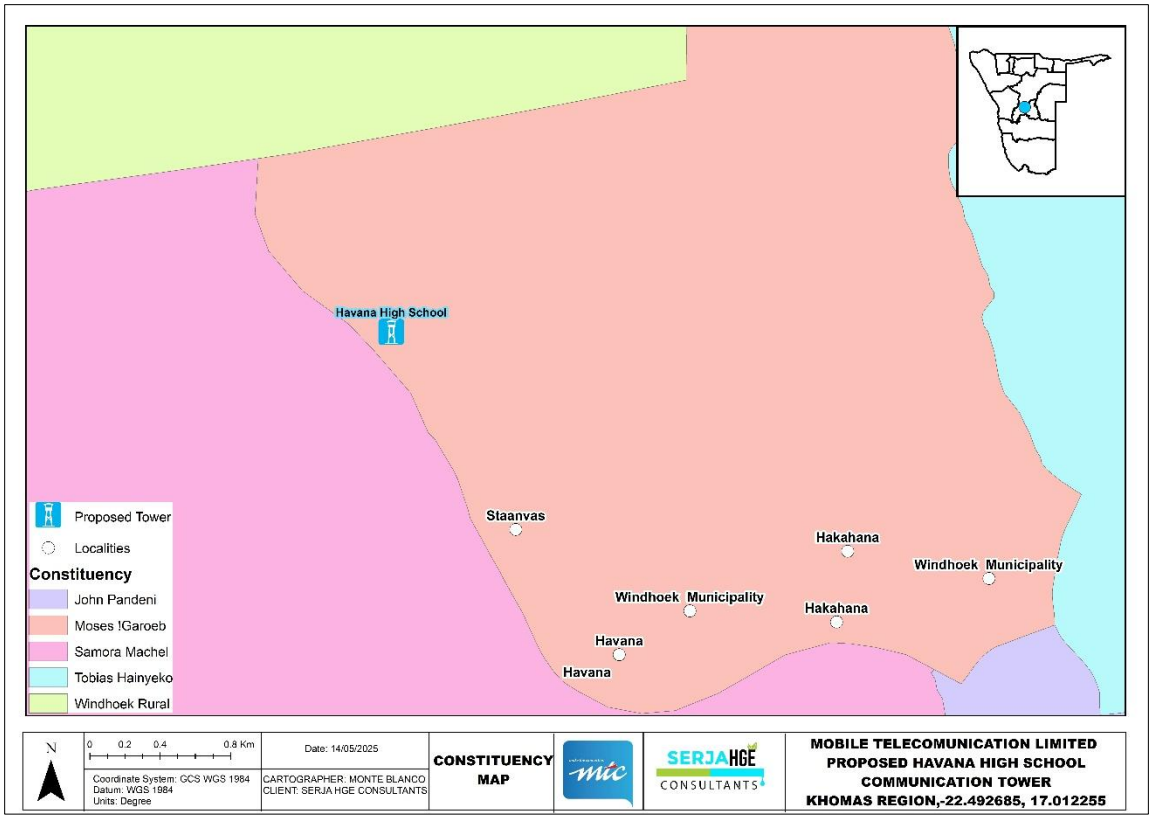

Figure 1-2: Havana High School Site Constituency Map

1.2 Purpose of the Draft Environmental Management Plan (EMP)

The Draft EMP is developed per Regulation 8(j) of the EIA Regulations (2012) that it should be included as part of the Environmental Assessment (EA) Scoping report. A '**Management Plan**' is defined as:

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

An EMP is one of the most important outputs of the EA process as it synthesizes all the proposed management & mitigation, and monitoring actions, set to a timeline and with specific assigned responsibilities. It provides a link between the impacts identified in the EA process and the required mitigation measures to be implemented to manage project impacts. It is important to note that an EMP is a statutory document, and a person who contravenes the provisions of this EMP may face imprisonment and/or a fine. This EMP is a living document and can be amended to adapt to address project changes and/or environmental conditions and feedback from compliance monitoring.

The EMP is therefore aimed at guiding environmental management throughout the three main phases of the proposed project activities, namely: planning and design, construction, operational, and maintenance phases.

- **Planning and Design phase** – Preparation of all the administrative and technical requirements needed for the construction works. The planning would entail obtaining the necessary permitting and authorization from relevant national and local stakeholders, facilitating the recruitment and procurement processes, etc.
- **Site preparation and construction phase –** The stage during which the site is prepared for construction activities and actual construction works are carried out onsite (erection of the tower structure and associated installation of supporting services and infrastructure).
- **Operation and maintenance phase –** the stage during which the tower will be in operation, and maintenance is carried out under the supervision of MTC Namibia.

2 BRIEF DESCRIPTION OF THE PROPOSED PROJECT ACTIVITIES

The project phases anticipated for the proposed tower establishment and operation are presented below.

2.1 Planning and Design

2.1.1 Proposed Design and Network Structure

The structure proposed for the Havana High School site is a 25m high lattice telecommunication structure that will host 3x dual-band antennae and 1x microwave dish. According to the Proponent, the selection of the tower site was based on radio access network urban coverage for both voice and data services. Access to the site will be limited to authorised personnel only.

The structure 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. To protect the network structure from lightning, it will be earthed. The typical lattice antenna is shown in Figure 2-1. Lattice towers are self-supporting structures that are generally made out of steel and usually painted in red and white colours. The design details of the proposed site are in Table 2-1.

Figure 2-1: Typical red and white painted lattice tower structures in Namibia (source: MTC Namibia and The Namibian newspaper, 2024)

Table 2-1: Design details for the Havana High School Site

Site	Tower Height	Antenna Type	Power supply during operation
Havana High School (HS)	25m	3x Panels (the tower will have a microwave dish for transmission)	3-phase alternating current (AC) power from the City of Windhoek's power grid

2.1.2 Antennae

Telecommunication antennae come in different shapes and sizes, depending on the specific need. As mentioned above, the tower will host 3x dual-band antennae and 1x microwave dish.

The three antennae will be attached to the lattice structure and are designed to operate in the 900MHz, 1800MHz, and 2100MHz frequency bands and are typically mounted approximately 15 to 50m from the ground on masts. Each antenna is between 20 to 30cm wide and approximately 160cm high and contains two feeders that relay Radio Frequency (RF) signals to and from the antenna. The typical antenna panel is as shown in Figure 2-2.

Figure 2-2: Different types of panel-type antennae

2.1.3 Site Selection Criteria

MTC selected this site to provide reliable network coverage in this part of Windhoek.

2.1.4 Sharing of Sites (Structures)

In compliance with the Communications Act of 2009, which encourages or requires service providers to consider sharing existing infrastructure in the area first before constructing new structures. The sharing of infrastructure by service providers reduces the uncontrolled construction of infrastructure, and the cost of construction and operation can be shared between service providers. The Proponent has considered sharing infrastructure in the area, however, there is no other network structure within the intended site's proximity to meet the need. Thus, a need to erect a completely new structure in the area.

2.1.5 Site Preparation and Construction

A contractor will be appointed to carry out the tower construction/installation. Construction works for this project will include excavation, concrete civil works, and tower rigging. There will be minimal earthworks required to prepare the sites for the tower construction and installation. The construction of the concrete foundation for the tower will take place onsite by using manual labor as far as possible. The construction work is anticipated to take 2 to 3 months, and the construction activities will be limited to normal working hours, i.e., 08h00 and 17h00.

For security purposes, the tower site will be fenced off to restrict access to authorized personnel (such as the maintenance team) only and prevent vandalism. In addition to the security and safety aspect, the tower site will be fenced off to prevent curiosity access by some of the school learners, which may compromise their safety while at school.

The appointed contractor will have to make arrangements for their logistics (including transportation of workers and materials to the site). Since the site will be in an urban setup, all workers will be commuting from their homes (for local general laborers). The specialized workers from outside the city (if any) will rent or book existing accommodation establishments in Windhoek. Therefore, no on-site accommodation is required.

MTC and their appointed contractor for construction will be required to adhere to health, safety, and environmental requirements for construction and operation (as well as maintenance) to be presented in the Draft EMP for the project.

2.1.6 Required Resources and Services

The following services and infrastructure will be required for the project activities:

- Human Resources and Accommodation: The number of workers required for the construction of the tower and all logistics related to the workers will be determined by the contractor to be appointed for construction works once the ECC is issued. The construction workforce will be commuting from their homes. Therefore, no on-site accommodation will be required.
- Water and Power Supply: Although an insignificant amount of water is required during tower construction, minimal water will still be needed for in-situ concrete mixture (foundation casting) as well as drinking. This water will be sourced from the nearest water point, either by purchasing from the school premises (upon getting consent from the school management) or the contractor will opt to bring their own water.

  Electricity is not required during the construction stage of the tower, but only during the operational phase. The tower will be connected to the City of Windhoek's power grid for the operational phase.
- Fuel Supply (Machinery and Equipment): There will be no onsite refueling of project vehicles, as this will be required to be done at the nearest fuel service station within or close to the Havana area.
- Site Accessibility (Roads): The site is accessible via the Monte Christo Road (now known as the Peter Nanyemba Road), and the existing school access road will be utilized to reach the tower site. Should this be considered unsafe for the school learners and workers sharing the same access/gate with tower construction vehicles, the contractor will reach an agreement with the school for an alternative temporary access to the site.
- Waste Management: The different waste will be handled as follows:
  - Sewage: A portable toilet will be provided on-site and emptied according to the manufacturer's instructions.
  - General and domestic waste: Solid waste containers will be made available onsite for waste storage and later proper disposal at the Kupferberg landfill site.
  - Hazardous waste: All vehicles, machinery, and fuel-consuming equipment on site will be provided with drip trays to capture potential fuel spills and waste oils. The waste fuel/oils will be carefully stored in a standardized container to be disposed of at the approved hazardous waste management facility in Windhoek.

- Health and Safety: Adequate and appropriate Personal Protective Equipment (PPE) will be provided to all project personnel while on and working at the site. A fully-equipped first aid kit will be readily available on-site.
- Potential Accidental Fire Outbreaks: A minimum of two well-serviced fire extinguishers will be readily available on-site throughout the project.

2.2 Operations and Maintenance Phase

During this phase, the tower is operational and providing telecommunication signals to the communities on this part of Windhoek (to serve the school, business, and residents) and the surrounding areas that can be serviced by the new tower.

Telecommunication sites (towers) usually require very little maintenance; for instance, any software upgrading will be done mainly from MTC's head offices in Windhoek. For the upgrading of hardware (when required), this will be done on site by the MTC maintenance team/department according to maintenance schedules, when and as necessary. A minimum of two people will be required to carry out hardware maintenance onsite, particularly for tower climbing (safety concerns such as fall arrest).

MTC is required to adhere to environmental, health, and safety measures to be provided in the Draft EMP.

2.3 Decommissioning and Rehabilitation of Disturbed Areas Onsite

Once construction works are completed, the contractor will be required to ensure that the site is left in a responsible and environmentally friendly state. Therefore, the contractor will do the following:

- Dismantle and remove all infrastructures from the project site that will no longer be needed for operations,
- Carry away all construction equipment and vehicles,
- Clean up of site working areas and remove all generated solid waste to the municipal waste management facility (as per agreement with the Windhoek Municipal Council/City of Windhoek with an approved waste management facility),
- Backfill of all trenches excavated as part of construction activities and no longer required further, thus ensuring that they do not pose a risk to people onsite, and
- Level stockpiled topsoil to ensure that the disturbed land sites are left as close to their original state as possible.

It is not anticipated that the tower will be decommissioned in the future due to the constant need to have access to good network coverage in the area.

3 LEGAL FRAMEWORK: PERMITTING AND LICENSES

The Proponent has the responsibility to ensure that the proposed project activities, as well as the EA process, conform to the principles of the EMA and must ensure that employees act per such principles. Table 3-1 below lists the requirements of an EMP as stipulated by Section 8 (e) of the EIA Regulations, primarily on specific approvals and permits that may be required for the project activities.

Table 3-1: List of legal requirements and permits for the project activities

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 of the principles that are to guide all EAs.	The EMA and its regulations should inform and guide this EA process. Should the ECC be issued to the Proponent, it should be renewed every 3 years, counting from the date of issue. For any amendments to the EMP (and subsequent ECC) or transfer of the ECC to another Proponent, an appropriate application should be submitted to the Office of the Environmental Commissioner at the Department of Environmental Affairs (DEAF) and Forestry of the MEFT. The contact details are: **Mr. Timoteus Mufeti:** Environmental Commissioner **Tel: +264 61 284 2701**
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (GN 30 S21). Details the requirements for what should be included in a Scoping Report (GN 30 S8) and an Assessment Report (GN 30 S15).	
Communications Act No. 8 of 2009	All the relevant communications operations' permits and licenses (broadcasting) should be applied for and obtained from the relevant regulatory authorities. The Proponent should comply with the relevant Sections of Part 5 of the Act.	Contact: Communications Regulatory Authority of Namibia (CRAN), **Mrs. Emilia Nghikembua: Chief Executive Officer** **Tel.: +264 (0) 61 222 666**

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
	This Part (Special Rights of Carriers). The Sections that will apply to the proposed project are Section 59(1) and (3), 60: Entry upon and construction of lines across any land, 64(1): Fences, 64(2), 66(1): Height or depth of cable and facilities, and 66(2) and 66(3).	
Atomic Energy and Radiation Protection Act o. 5 of 2005	The Proponent should ensure that they have applied for and obtained all the required licenses for operating the tower following the Non-ionising Radiation Regulations (2019).	For the determination of possible exposure, the Proponent should consult with the MHSS' Atomic Energy & Radiation Protection Authority (AERPA). **Dr. Gideon Amakali (PhD): Chief Radiation Physicist: AERPA** **Tel: +264 (0) 61 203 2420**
"Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300GHz)" (April 1998 developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP).	To determine the "safe distance" around the site. These provisions justify the need for assessing the impact of electromagnetic radiation from the antennae on the nearby residents.	
Civil Aviation Act No. 6 of 2016	The heights of the proposed telecommunication towers might be a threat to the nearest aerodrome reference point. Therefore, the Proponent should verify these prior to construction with the Namibia Civil Aviation Authority (NCAA).	The proposed site (obstruction) is over 15km from the Eros Airport (about 18km away). Therefore, the approval from the Namibia Airports Company (NAC) would not be required. Regardless, the NAC contact details are as follows for further enquiries: **Mr B. /Uirab: Chief Executive Officer** **Mr. Uys Mwanawina: Safety officer** **Tel: +264 61 295 5000**

Legislation/Policy/ Guideline	Relevant Provisions	Implications for this project
National Heritage Act No. 76 of 1969	Call for the protection and conservation of heritage resources and artefacts.	Should any archaeological material, such as bones, unknown graves, old weapons/equipment, etc., be found onsite, work should stop immediately, and the National Heritage Council of Namibia must be informed as soon as possible. The Heritage Council will then decide whether to clear the area or decide to conserve the site or material. Contact Details at the National Heritage Council (NHC) of Namibia **Mrs. Erica Ndalikokule – NHC Director** **National Heritage Council of Namibia** **Tel: +264 61 301 903**

4 EMP IMPLEMENTATION RESPONSIBILITIES

MTC Namibia (the Proponent) is ultimately responsible for the implementation of the EMP. However, the Proponent may delegate this responsibility or part of it at any time, as they deem necessary. The roles and responsibilities of all delegates/parties involved in the effective implementation of this EMP are set in. Table 4-1.

Table 4-1: The EMP implementation responsibilities for the construction and operation of the tower

Role	Responsibilities
Mobile Telecommunications Limited (MTC Namibia) and or their Representative	-Managing the implementation of this EMP and updating and maintaining it when necessary. -Management and monitoring of individuals and/ or equipment on-site in terms of compliance with this EMP and issuing fines for contravening EMP provisions.
Project / Site Manager	This individual will be responsible for ensuring that the project activities are completed on time. The Manager's duties and responsibilities will include: -Ensure that relevant commitments contained in the EMP are adhered to.

Role	Responsibilities
	-Ensure relevant staff are trained in procedures entailed in their duties. -Maintain records of all relevant environmental documentation for the project. -Reviewing the EMP annually and amending the document when necessary. -Issuing fines to individuals who may be in breach of the EMP provision and, if necessary, removing such individuals from the site. -Cooperate with all relevant interested and affected parties/stakeholders. -Development and management of schedules for daily activities
Construction Contractor	The Contractors' representative or site supervisors (as appropriate) will be required to: -Ensure that the relevant commitments contained in the EMP Action Plans are adhered to. -Compile relevant procedures and method statements for approval by the applicable phase site manager before initiation of project activities on the sites. -Ensure that all relevant staff are trained in procedures. -Maintain records of all relevant environmental documentation applicable to their work
Health, Safety, & Environmental (HSE) Officer	The Proponent may assign the responsibility of ensuring EMP compliance throughout the project life cycle to a designated member of staff or an external qualified and experienced person, referred to in this EMP as the HSE Officer. This officer will have the following responsibilities: -Management and facilitation of communication between the Proponent and Interested and Affected Parties (I&APs)/stakeholders regarding this EMP. -Conducting site inspections of all areas concerning the implementation of this EMP (monitor and audit its implementation). -Advising the Proponent or Project/Site Manager on the removal of person(s) and/or equipment not complying with the provisions of this EMP. -Making recommendations to the Manager with respect to the issuing of fines for contraventions of the EMP. -Undertaking an annual review of the EMP and recommending additions and/or changes to this document.

Role	Responsibilities
	-Ensuring that the construction and operations onsite are conducted following the International Organization (ISO) standard 14001: 2015.

5 ENVIRONMENTAL MANAGEMENT MEASURES

5.1 Key Identified Potential Negative Impacts

The key potential negative impacts identified, described, and assessed in the Scoping Report and for which the management measures (action plans) have been provided, are listed below:

Potential Positive impacts (although temporary):

- Creation of temporary jobs during the tower installation phase.
- Increase access to telecommunications by enhancing communications capabilities in the area.
- Promotes the technical expansion of businesses and institutions such as schools and local social services due to improved access to reliable communication services in that part of Windhoek.
- Contributes to local economic development through increased access to telecommunications services for local amenities and social infrastructure in the area

Potential negative (adverse) impacts:

- Physical land/soil disturbance resulting in compaction and erosion
- Environmental pollution (littering)
- Impact on archaeological and cultural heritage resources in the case of any archaeological and heritage finds onsite (inadvertent unearthing during site preparation/excavations).
- Potential health and safety risks associated with the mishandling of construction and operations (and maintenance) equipment.
- Health and Safety issues related to Electromagnetic Radiation emitted from the antennae of cellular structures may affect human health.
- Civil Aviation concerns may arise regarding the height of the tower and the position and stability of transmitters concerning any civil aviation facilities in the tower's vicinity.
- Visual impact associated with the presence of the tower in the surroundings may be a nuisance to locals.

5.2 Environmental Management and Mitigation Measures

The management actions are aimed at avoiding the above-listed potential negative impacts, where possible, and where it is impossible to avoid these impacts, measures are provided to reduce the impacts' significance.

The Management action plans (management and mitigation measures) recommended for the potential impacts rated in the EIA Study were based on the following project stages (phases):

- Planning and Design Phase (Table 5-1),
- Construction Phase (Table 5-2), and
- Operational and maintenance Phase (Table 5-3).

Table 5-1: Planning and design Phase management, and mitigation measures

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
EMP implementation and training	Lack of EMP awareness and implications thereof	-A Comprehensive Health and Safety Plan for the project activities should be compiled. -An EMP non-compliance penalty system should be implemented on-site. -The Proponent should appoint an HSE Officer to be responsible for managing the EMP implementation and monitoring.	-All required EMP implementation Plans and Systems are compiled and in place.	-MTC Namibia	Pre-construction
Communication between the Proponent and the landowner	Lack of communication between the landowner and the Proponent	The landowner should be notified on time of the commencement of the project activities and any expected delays in the progress. -Continual engagement with the landowner and, where necessary, with neighbours should be maintained.	-Ongoing Consultation throughout the project, when and as required.	-MTC Namibia	Pre-construction and throughout the project life cycle (as needed)
Employment and procurement	Empowerment of local businesses and their staff	-Where possible, preference for construction works should be given to a local contractor (from Windhoek). Out-of-region/area procurement of a construction contractor should be justified, for example, by the unavailability of local businesses.	-The contractor from the Windhoek/Khomas Region, otherwise, justification for an out-of-region contractor is provided	-MTC Namibia	Pre-construction (during planning and design)
Authorizations	Lack of Permits/ Licenses	-All the required agreements and licenses, or permits should be applied for and obtained The permits, agreements referred to herein include: *-Environmental Clearance Certificate (ECC)* *-Power supply agreement with the City of Windhoek* *-Finalizing leasehold agreement/land use consent (in addition to the consent letter, if necessary)* *-Construction and maintenance of solid waste disposal authorization from the Windhoek Municipal Council/City of Windhoek management.*	-Applicable permits and licenses to be obtained from relevant authorities and kept on site for record-keeping and future inspections	-MTC Namibia	Pre-construction (during planning and design) and throughout the project life cycle (based on the stage of permit requirement)

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Telecommunication permit	Lack of necessary project authorization	-A telecommunication licence and other relevant communications authorisations should be applied for and obtained from the Communications Regulatory Authority of Namibia (CRAN).	-All the relevant licenses obtained and documented	-MTC Namibia	Pre-construction (during planning and design)
Tower design	Tower design failure during operations and public exposure	-The design standards to be applied for the towers and support structures should comply with the internationally accepted public exposure guidelines. Please ensure continued engagement with the Atomic Energy & Radiation Protection Authority (AERPA) of Namibia.	-The design is according to the internationally approved standards	-MTC Namibia (Planning & Design Engineer) With the guidance or recommendations from the AERPA of Namibia	Pre-construction (during planning and design)
Visual (sense of place) and aesthetics	Visual nuisance	-Consider all the necessary options (colour and overall design) to improve the aesthetic of the tower and associated accessories to blend in with the surroundings for a better appeal to neighbours and travellers near the site. -If possible, consider camouflaging the tower to blend in with its surroundings, thus reducing visual nuisance.	-The parameters of the towers are considered and designed to reduce the visual impact	-MTC Namibia (Planning & Design Engineer)	Pre-construction (during planning and design)
Civil aviation	Impact on aerodrome or aeronautical facilities (reference points)	-Verify the tower designs and locations with the NCAA to ensure that they meet the approval of the Namibia Civil Aviation Authority's Regulations (NAMCARS) in terms of tower height and position. -Ensure compliance with the Civil Aviation Act No. 6 of 2016 for setting up mast structures in Namibia. - Ensure compliance with the Civil Aviation Standards of the International Civil Aviation Organisation (ICAO) on towers.	-Sufficient consultations done with the NCAA and approval/consent provided (if needed)	-MTC Namibia (Planning & Design Engineer)	Pre-construction (during planning and design)

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
	Tower colour: safety	-The tower should be painted in alternating bands of international red and white and light markers to make them more visible at night and in bad weather conditions.	-The colour of the tower is designed and implemented based on the civil aviation safety	-MTC Namibia (Planning & Design Engineer)	Pre-construction (during planning and design)
Construction works	Construction schedules and notifications	-A construction schedule should be prepared and shared with the landowner (Havana High School management) and direct neighbours so that they are aware of the construction vehicle movement and presence on-site. -Construction activities should be done during weekdays only, i.e., Mondays to Fridays, and during working hours (8:00 am - 5:00 pm).	-Timely submission of notifications to the landowner and neighbours -Clear posters erected onsite	-MTC Namibia -Construction contractor	Pre-construction (during planning and design)

Table 5-2: Construction Phase management and mitigation measures

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMP training should be provided to all workers onsite. -All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work. -The implementation of this EMP should be monitored. The site should be inspected, and a compliance audit done throughout **the project activities, monthly and biannually, for overall EMP implementation.** -The EMP non-compliance penalty system should be implemented.	-Records of EMP compliance/monitoring conducted biannually -The ECC is renewed every 3 years -Records of EMP training conducted.	-Site Manager -Construction Contractor -HSE Officer	Throughout the construction phase, and when deemed necessary (for certain activities such as ECC renewal)

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Soils	Physical soil/land disturbance and loss of topsoil	-Stockpiled topsoil and excavated materials should be used to backfill the excavated and disturbed site post-construction. -Soils that are not within the intended footprints of the site should be left undisturbed, and soil conservation implemented as far as possible. -Project vehicles/machinery should stick to the access route provided and not unnecessarily create further tracks onsite by driving everywhere, causing soil compaction and erosion.	-No proliferation of informal vehicle tracks created by project activities. -No new erosion gullies. -No signs of soil compaction -No disturbance to unmarked areas onsite.	-Site Manager -Construction Contractor -HSE Officer	Throughout the construction phase
Biodiversity: Flora	Loss of Flora	-Avoid unnecessary removal and or disturbance of site vegetation. -Vegetation found on the site, but not in the actual footprint, should not be disturbed, therefore, it should be avoided. -Avoid leaving equipment or machinery leaning on vegetation. -Environmental awareness on biodiversity preservation (both plants and even small animals encountered onsite) should be provided to the workers and contractors during EMP induction	-No complaints of unauthorised vegetation removal associated with project personnel. -No intentional disturbance and destruction of site vegetation -Barricading tape (to indicate working areas)	-Site Manager -Construction contractor -HSE Officer	Throughout the construction phase
Vehicular traffic safety	Presence of heavy vehicles on-site construction	-Vehicle drivers and equipment operators should have valid and appropriate driving licenses and adhere to the road safety rules. -Drivers should drive slowly (40km/hour or less) while on-site while looking out of school children (learners). -Project vehicles should be in a roadworthy condition and serviced regularly to avoid accidents owing to mechanical faults. -Vehicle drivers should only make use of the designated site access roads provided and as agreed. -Vehicle drivers should not be allowed to operate vehicles while under the influence of alcohol.	-No complaints from members of the public regarding vehicular traffic issues related to the project activities. -All personnel operating the project vehicles and machinery are appropriately licensed and possess valid driving licenses.	-Site Manager -Construction contractor	Throughout the construction phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		-Project vehicles should be parked within the boundary or demarcated areas for such purpose onsite and not just anywhere in the area. -Deliveries from and to the site should be done optimally during weekdays and between the hours of 8 am and 5 pm.	-Demarcated areas for parking, offloading, and loading zones onsite.		
Occupational and locals' health and safety	General health and safety associated with project activities during construction and maintenance	-During induction, personnel should be provided with an awareness training of the risks of mishandling equipment and materials on site. -Appropriate and written warning signage should be placed on-site, where visible. -Projected loads should be securely fastened to vehicles to avoid falling and injuring people. -Heavy vehicles and equipment should be properly secured to prevent any harm or injury to both project personnel and locals moving near the site. -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. -Personnel should not be allowed to consume alcohol or other intoxicants before and during working hours, as this may lead to mishandling of equipment, resulting in health and safety risks.	-A comprehensive health and safety plan for the activities is compiled. -Availability of fully-furnished first aid kits -Trained workers to administer first aid	-Site Manager -Construction contractor -HSE Officer	Throughout the construction phase
	Accidental fire outbreak	-Portable and serviced fire extinguishers should be availed on-site. -No open fires should be created by project personnel on-site. -Make provision for smoking areas for crew members who smoke. This is to ensure that the cigarettes' fire is completely put out and disposed of in allocated bins onsite	-No site related fires recorded (due to the presence of project personnel) -Fire extinguishers (1 per vehicle)	-Site Manager -Construction contractor -HSE Officer	Throughout the construction phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Littering and waste management	Environmental Pollution	-Responsibly dispose of waste and do not litter. -After each day's work, ensure that there are no wastes left on-site or scattered around the site. -All domestic and general operational waste produced daily should be contained on-site until such time that it will be transported to designated waste sites. -No waste may be buried or burned on site or anywhere else. -The site should be equipped with separate waste bins for solid and general/domestic waste. -A penalty system for the irresponsible disposal of waste onsite and anywhere in the area should be implemented.	-No visible litter around the project area -Provision of sufficient waste storage containers -Waste management awareness -Waste disposal permits to the nearest waste site -Environmental, Health, and Safety Statements and Policy	-Site Manager -Construction contractor -HSE Officer	Throughout the construction phase
	Sewage generated by construction and maintenance workers	-Provide sufficient toilet facilities for workers while onsite (portable chemical toilet, if possible). -No open defecation is allowed on and around the site. Use the provided portable toilets for the construction workers. -Sewage waste should be stored as per the portable chemical toilets supplied on site and regularly disposed of at the nearest treatment facility.	-Adequate toilet and basic ablution facilities on site -Chemical toilets Sewage removal operator -Waste treatment agents/chemicals.	-Construction contractor -HSE Officer	Throughout the construction phase
Noise	Noise from construction activities	-Noise from vehicles and equipment on sites should be reduced to acceptable levels. -Construction hours should be between 08 AM and 5 PM to prevent noise generated by equipment and movement of heavy vehicles on-site. -When operating excavators and other noise-generating machinery onsite, workers should be equipped with personal protective equipment (PPE) such as earplugs to reduce exposure to excessive noise.	-No complaints of noise associated with the project	-Construction contractor -HSE Officer	Throughout the construction phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Archaeology and heritage	Accidental disturbance of archaeological or heritage objects	-If any archaeological materials or human burials, or skeletal remains are uncovered during construction earthworks, the work in the immediate area should be halted, and the finds would need to be reported to the NHC may require inspection by an Archaeologist. The ECO should have the area fenced off and contact NHC (Tel: +264 61 244 375), National Forensic Laboratory (+264 61 240 461) immediately. -Avoid direct damage to archaeological or heritage such that may be encountered during excavations. -All accidental discoveries shall be reported immediately to an archaeologist/heritage practitioner so that an investigation and evaluation of the finds can be made, and, acting upon advice, the HSE Officer will advise the necessary actions to be taken. -MTC Namibia and its Contractor should adhere to the provisions of Section 55 of the National Heritage Act in the event significant heritage and cultural features are discovered in the course of developmental works and implement the Chance Finds Procedure under Annexure 1.	-Preservation of all artefacts and objects that are discovered onsite -Salvage equipment -Flag tapes -GPS (site marking)	-Site Manager -Construction contractor -HSE Officer	As and when required, i.e., before site set up, and during construction.

Table 5-3: Operations and Maintenance Phase management and mitigation measures

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
EMP implementation and training	Lack of EMP awareness and implications thereof	-EMP training should be provided to workers on-site. -All site personnel should be aware of necessary health, safety, and environmental considerations applicable to their respective work. -The implementation of this EMP should be monitored.	-Records of EMP compliance/monitoring conducted biannually -The ECC is renewed every 3 years -Records of EMP training conducted.	-Site / Maintenance Manager -HSE Officer	Throughout the maintenance phase, and when deemed necessary (for certain activities such as ECC renewal)

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
		The site should be inspected, and a compliance audit **biannually for overall EMP implementation.** -The EMP non-compliance penalty system should be implemented.			
Soils	Physical soil/land disturbance and loss of topsoil	*-Please refer to the construction phase management and mitigation measures.*	-No new erosion gullies. -No signs of soil compaction	-Site / Maintenance Manager	Throughout the maintenance phase
Impact on Human Health: Radiation	The health impacts of radiation for both short and long-term exposure in the Energy Board of Namibia Directive.	-The Proponent should ensure that the tower has been constructed and its EMR is 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 towers should comply with the internationally accepted public exposure guidelines. -The National Atomic Energy & Radiation Protection Authority should be involved during the operational phase to assess the possible emissions from the towers.	-Monitoring is conducted by the AERPA when needed or if requested by the stakeholders.	-Site / Maintenance Manager	Throughout the operational phase (when and if required to monitor emissions) All designs are considered and taken care of during the planning and design phase.
Vehicular traffic safety	Presence of heavy vehicles on-site construction	-Vehicle drivers and equipment operators should have valid and appropriate driving licenses and adhere to the road safety rules. -Drivers should drive slowly (40km/hour or less) while on-site. -Vehicle drivers should not be allowed to operate vehicles while under the influence of alcohol. -Project vehicles should be parked at the site and not just everywhere in the area. -Deliveries from and to the site should be done optimally during weekdays and between the hours of 8 am and 5 pm.	-No complaints from members of the public regarding vehicular traffic issues related to the project activities. -All personnel operating the project vehicles and machinery are appropriately licensed and possess valid driving licenses.	-Site / Maintenance Manager	Throughout the maintenance phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
Occupational and local health and safety	General health and safety associated with project activities during construction and maintenance	-Projected loads should be securely fastened to vehicles to avoid falling and injuring people. -A minimum of two (2) people should be sent to the site for maintenance. -Heavy vehicles and equipment should be properly secured to prevent any harm or injury to project personnel and locals moving around the site. -Personnel should be properly equipped with personal protective equipment (PPE) such as coveralls, masks, gloves, safety boots, earplugs, safety glasses, and hard hats. -Personnel should not be allowed to consume alcohol or other intoxicants before and during working hours, as this may lead to mishandling of equipment, resulting in health and safety risks.	-A comprehensive health and safety plan for the activities is compiled. -Availability of a fully-furnished first aid kit in the maintenance vehicle -Trained workers to administer first aid	-Site / Maintenance Manager	Throughout the maintenance phase
	Accidental fire outbreak	-Portable and serviced fire extinguishers should be availed on-site. -No open fires should be created by project personnel on-site.	-Fire extinguishers (1 per vehicle)	-Site / Maintenance Manager	Throughout the maintenance phase
Littering and waste management	Environmental Pollution	-Responsibly dispose of waste and do not litter. -After each daily work, ensure that there are no wastes left on-site or scattered around the site. -All domestic and general operational waste produced daily should be contained on-site until such time that it will be transported to designated waste sites. -No waste may be buried or burned on site or anywhere else. -The site should be equipped with separate waste bins for solid and general/domestic waste. -A penalty system for the irresponsible disposal of waste onsite and anywhere in the area should be implemented.	-No visible litter around the project area -Provision of sufficient waste storage containers -Waste management awareness -Waste disposal permits for the nearest municipality/local authority with an approved waste site	-Site / Maintenance Manager	Throughout the maintenance phase

Aspect	Impact	Management and Mitigation Measure(s)	Key Performance Indicator (KPI)	Implementation Responsibility	Timeline
			-Environmental, Health, and Safety Statements and Policy		
	Sewage generated by construction and maintenance workers	-Provide sufficient toilet facilities for workers (mobile/portable chemical toilet, if possible). -No open defecation is allowed on and around the site. -Make arrangements to use the (existing) community toilets during maintenance, as the time spent onsite is shorter compared to construction activities, where portable toilets were necessary.	-Arrangements made with the local community for personnel to utilize the toilets during maintenance	-Site / Maintenance Manager	Throughout the maintenance phase

5.3 Environmental Monitoring Actions

To ensure that the implementation of recommended environmental management measures is working and produces the desired results (minimizing the "medium" and upholding the "low" significance ratings of impacts), certain key impacts will need to be monitored and reported on. The ‘’Observation*, compliance status, and ‘’Recommended Action*’’ columns will be completed for every monitoring done on site.

Monitoring reports are to be compiled by the project HSE Officer, audited by an Independent Environmental Consultant, and submitted to the DEAF for archiving on a bi-annual basis (every 6 months throughout the project operations) or as required by the Environmental Commissioner (as per the ECC conditions). The environmental components or features provided in the Table will be updated accordingly once the project commences.

ANNEXURE 1: CHANCE FINDS PROCEDURE (AFTER KINAHAN, 2020)

Areas of project activities are subject to heritage survey and assessment at the planning stage. These surveys are based on surface indications alone, and it is, therefore, possible that sites or items of heritage significance will be found during development (operations and decommissioning) works. The procedure set out here covers the reporting and management of such findings.

Scope: The "*chance finds*" procedure covers the actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person.

Compliance: The "chance finds" procedure is intended to ensure compliance with relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (4): "*A person who discovers any archaeological …. object ……must as soon as practicable report the discovery to the Council*". The procedure of reporting set out below must be observed so that heritage remains reported to the NHC and is correctly identified in the field.

The Project Manager must report the findings to the following competent authorities:

- **National Heritage Council of Namibia: Head Office: +264 61 244 375**

  Technical Office +264 61 301 903
- **National Museum (+264 61 276 800)**
- **National Forensic Laboratory (+264 61 240 461)**

Responsibility:

Operator:	To exercise due caution if archaeological remains are found
Foreman:	To secure the site and advise management timely manner
Superintendent	To determine the safe working boundary and request an inspection
Archaeologist	To inspect, identify, advise management, and recover remains

Procedure:

<u>Action by a person identifying archaeological or heritage material</u>

a) If operating machinery or equipment, stop work

b) Identify the site with a flag tape

c) Determine the GPS position if possible

d) Report findings to the foreman

Action by the foreman

a) Report findings, site location, and actions taken to the superintendent

b) Cease any works in the immediate vicinity

Action by the superintendent

a) Visit the site and determine whether work can proceed without damage to the findings

b) Determine and mark the exclusion boundary

c) Site location and details to be added to the project GIS for field confirmation by an archaeologist

Action by Archaeologist

a) Inspect the site and confirm the addition to the project GIS

b) Advise NHC and request written permission to remove findings from the work area

c) Recovery, packaging, and labelling of findings for transfer to the National Museum

In the event of discovering human remains

a) Actions as above

b) Field inspection by an archaeologist to confirm that the remains are human

c) Advise and liaise with NHC and Police

d) Recovery of remains and removal to the National Museum or National Forensic Laboratory, as directed.