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CONTENTS

Page

| | |
|--|-------------|
| National Communications Authority: Guidelines for Deployment of Communication Towers and Antennas | 5898 |
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NATIONAL
COMMUNICATIONS
AUTHORITY

GUIDELINES FOR
**THE DEPLOYMENT
OF COMMUNICATION
TOWERS AND
ANTENNAS**
2023



TABLE OF CONTENTS

| | |
|--|------|
| PART I | 5901 |
| PRELIMINARY MATTERS | 5901 |
| INTRODUCTION | 5901 |
| UNDERLYING LEGAL PRINCIPLES | 5901 |
| PART II | 5902 |
| APPLICATION AND OBJECTIVES | 5902 |
| 1.1 SCOPE OF APPLICATION | 5902 |
| 1.2 OBJECTIVES | 5902 |
| 1.3 LEGAL REGIME | 5903 |
| 1.4 INTERPRETATIONS | 5903 |
| 1.5 PUBLIC CONSULTATION | 5905 |
| PART III | 5906 |
| PROCEDURAL MATTERS | 5906 |
| 2.0 APPLICATION PROCEDURE | 5906 |
| 3.0 PERMITTING AGENCIES | 5906 |
| 3.1 GHANA CIVIL AVIATION AUTHORITY (GCAA) | 5906 |
| 3.2 RADIATION PROTECTION INSTITUTE OF THE GHANA ATOMIC ENERGY COMMISSION (GAEC-RPI) | 5907 |
| 3.3 ENVIRONMENTAL PROTECTION AGENCY (EPA) | 5907 |
| 3.4 GHANA NATIONAL FIRE SERVICE | 5909 |
| 3.5 METROPOLITAN, MUNICIPAL AND DISTRICT ASSEMBLIES (MMDAs) | 5909 |
| 3.6 APPLICATION PROCESSING TIMELINES | 5911 |
| 3.7 GRIEVANCE PROCEDURE | 5911 |
| PART IV | 5912 |
| TECHNICAL SPECIFICATIONS | 5912 |
| 4.0 GENERAL SPECIFICATIONS | 5912 |
| 4.1 LOCATION | 5912 |
| 4.2 PROXIMITY TO POWER LINES | 5912 |
| 4.3 STRUCTURAL SPECIFICATIONS | 5912 |
| 4.4 MODIFICATION OF EXISTING TOWERS | 5914 |
| 4.5 REMOVAL OF TOWERS | 5915 |

| | | |
|-----|--|------|
| 4.6 | INSURANCE AND COMPENSATION | 5915 |
| | PART V | 5916 |
| | CO-LOCATION AND TOWER-SHARING | 5916 |
| 5.0 | CO-LOCATION | 5916 |
| | PART VI | 5917 |
| | INSPECTION AND MAINTENANCE | 5917 |
| 6.0 | INSPECTION OF TOWER SITES AND STRUCTURES | 5917 |
| 7.0 | MARKINGS | 5917 |
| 8.0 | LIGHTING OF AERIAL TOWER | 5718 |
| 9.0 | INSPECTION OF TOWER LIGHTS | 5718 |
| 10 | RADIATION EMISSION | 5718 |
| 11. | WASTE MANAGEMENT | 5719 |
| 12. | TOWER AUDITS | 5719 |
| | PART VII | 5720 |
| | REMEDIAL MEASURES | 5720 |
| 13. | PENALTIES FOR NON-COMPLIANCE | 5720 |
| | PART VIII | 5721 |
| | MISCELLANEOUS | 5721 |
| 14 | REPEAL AND SAVINGS | 5721 |
| 15 | EFFECTIVE DATE | 5721 |
| | PART IX | 5722 |
| | ANNEXURES AND DOCUMENT ADMINISTRATION | 5722 |
| | APPLICATION FLOWCHART | 5722 |
| | APPENDIX 1 | 5923 |
| | APPENDIX 2 | 5924 |
| | APPENDIX 3 | 5926 |
| | APPENDIX 4 | 5929 |
| | APPENDIX 5 | 5931 |
| | APPENDIX 6 | 5936 |
| | APPENDIX 7 | 5940 |
| | APPENDIX 8 | 5941 |
| | APPENDIX 9 | 5947 |



PART II
APPLICATION AND OBJECTIVES

1.1 SCOPE OF APPLICATION

- 1.1.1 These Guidelines apply to electronic communications cellular network operators, tower owners, and/or entities which install, intend to install, operate, or contract or arrange for the installation and maintenance of tower, antenna, base station and/or alternative structure/ facility which is used or intended to be used, or capable of being used to supply cellular phone or radio communication services, broadcasting and broadband services.
- 1.1.2 They provide standards to be adhered to by all electronic communication service providers, tower operators/owners, fabricators and installers and maintenance technicians/engineers of communication towers and/or antennas, in order to ensure environmental and public safety.
- 1.1.3 Such entities shall be solely responsible for compliance with these Guidelines whether acting by themselves or by any contractor, agent or person working on their behalf for the purpose of:
- 1.1.3.1 Planning, designing and installing;
 - 1.1.3.2 Operating and maintaining; and
 - 1.1.3.3 Contracting or arranging for the deployment of towers/antennas used, intended to be used, or capable of being used to supply broadcasting and/or telecommunication services.
- 1.1.4 Non-compliance with these Guidelines constitutes an offence punishable under the applicable and relevant legislations.

1.2 OBJECTIVES

The objectives of these Policy Guidelines are:

- 1.2.1 To protect the environment by optimising land use, tower and antenna installations;
- 1.2.2 To encourage owners of towers and antenna to locate them, as far as practicable, in areas where adverse impact on the community is minimal;
- 1.2.3 To ensure that relevant stakeholders are informed and consulted before siting/construction of tower or related facility;
- 1.2.4 To ensure that operators, tower/antenna owners or managers comply with other State Permitting Agencies' Standards and Procedures, including all relevant laws;
- 1.2.5 To follow proper technical and legal processes when erecting tower and/or alternate structure/facility or installing antenna;
- 1.2.6 To ensure community understanding of the issues involved in the design and construction of towers or installation of antennas and provide opportunities for community input in the decision making process;
- 1.2.7 To encourage owners of towers and antennas to configure them in a way that minimises the adverse visual impact of towers and antennas;
- 1.2.8 To encourage co-location to reduce the proliferation of towers in achieving the most efficient use of communications facilities;
- 1.2.9 To enhance the ability of operators to provide their services to the public more effectively and efficiently; and
- 1.2.10 To protect the general public, workers and the environment from any adverse effects of radiation exposure from towers and antennas.

3 LEGAL REGIME

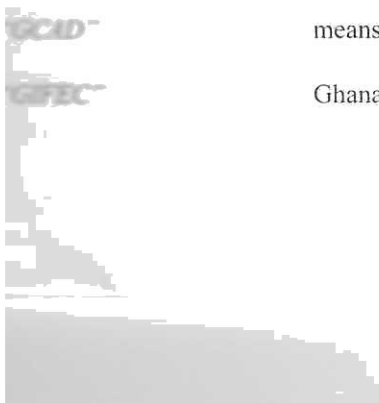
These Guidelines shall be read in conjunction with all relevant applicable legislations, including the:

- 1.3.1 Electronic Communications Act, 2008 (Act 775);
- 1.3.2 Electronic Communications Regulations, 2011 (LI 1991);
- 1.3.3 Environmental Protection Agency Act, 1994 (Act 490);
- 1.3.4 Environmental Assessment (Amendment) Regulations, 2002 (LI 1703)
- 1.3.5 Local Governance Act, 2016 (Act 936);
- 1.3.6 Ghana Civil Aviation (Aerodromes) Directives PART 27 – Aerodrome Safeguarding and Maintenance;
- 1.3.7 Atomic Energy Commission Act, 2000, Act 588;
- 1.3.8 Land Use and Spatial Planning Act, 2016 (Act 925);
- 1.3.9 Land Use and Spatial Planning Regulations, 2019 (LI 2384); and
- 1.3.10 Such other applicable laws that may be in force from time to time.

4 INTERPRETATIONS

In this document, the terms shall have the same meaning as contained in the relevant legislations unless the context requires otherwise.

- 'Act'* means the National Communications Authority Act, 2008, (Act 769) and any amendments thereto;
- 'Antenna'* means any apparatus that is designed, and used for radio communications in sending and/or receiving signals by electromagnetic waves;
- 'Co-location'* means the provision of physical space and communications facilities necessary to reasonably accommodate and connect the relevant equipment of a requesting operator;
- 'Communications Tower'* means a structure on which transmitting and/or receiving antenna (e) are located;
- 'Communications facilities'* means passive and active infrastructure used for the operation of communications network;
- 'Cells on Wheels'* means a portable base station used to provide temporary cellular network coverage for high-profile events and emergency situations where existing base stations become damaged, or during natural disasters such as bushfires and floods;
- 'General Mount Towers'* means any structure that is designed and constructed primarily for supporting one or more antennas, classified as a monopole or self-supporting or guyed mast, based on the structural action;
- 'GCAA'* means Ghana Civil Aviation (Aerodromes) Directives
- 'GIFEC'* Ghana Investment Fund for Electronic Communications



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| “Guyed Tower” | means slender steel structures stabilised by tethered wires and may be in lattice, triangular or square, tapered or straight, as well as monopole structural forms; |
| “Infrastructure” | includes base tower station, microwave radio equipment, switches, antennas transceivers for signal processing and transmission; |
| “LUSPA” | Land Use and Spatial Planning Authority; |
| “Monopole” | means a self-supporting telecommunications tower which consists of a single vertical pole fixed into the ground and or attached to a foundation or rooftop; |
| “Non-electronic Infrastructure” | means tower, shelter, air-conditioning equipment, diesel electric generator, battery, electricity supply, technical premises and easement; |
| “Operator” | means any person to whom a licence has been granted to construct, deploy, maintain, own and operate a communications network or to offer, provide or authorised to provide a telecommunications or broadcasting service; |
| “Passive Infrastructure Sharing” | means the sharing of non-electronic infrastructure elements which include, but are not limited to, air conditioning, buildings, distribution frames/points, ducts, electric power supply and battery backup, physical sites, poles, right of ways, shelters, towers/masts, security arrangement, trenches and way leaves |
| “Roof Mount Towers” | means an antenna directly attached or affixed to the roof of an existing building or any other structure other than a telecommunications tower. This type of installation is sometimes called a freestanding antenna; |
| “Self Supporting / Lattice Towers” | means free-standing structure with a stem pattern tower which is compiled and connected to form a self-supporting frame without any other subvention; |
| “Site” | means the area consisting of electronic infrastructure (active and passive); |
| “Sway” | means the angular rotation of the antenna beam path in a vertical plane from the no-wind load position at a specified elevation; |
| “Tower Height” | means the distance measured from ground level to the highest point of any and all components of the structure including antennas, hazard lights and other appurtenances or accessories; |
| “Twist” | means the angular rotation in a horizontal plane between any two elevations; |



PUBLIC CONSULTATION

- 1.5.1 Prior to the submission of an application to any of the Permitting Agencies for the construction of a tower, be it new or planned modification or replacement of an existing tower, the applicant shall hold community consultations with the principal leaders and residents of the area or location where the tower is to be sited.
- 1.5.2 Public consultations shall be carried out in all cases where the application involves construction of a new tower or variations to the tower compound, size or location of an existing tower.
- 1.5.3 Evidence of such an exercise in the form of a Written Report (dated and signed), showing meetings held, names and contacts of persons in attendance, value proposition on the need for the tower, its structural dimensions (height, type, location, parcel number and coordinates), impact analysis, and memoranda of understanding reached with the community, shall be submitted with the Application.



PART III
PROCEDURAL MATTERS

2.0 APPLICATION PROCEDURE

- 2.1 An applicant shall be required to obtain all necessary approvals, permits and licences from all relevant Government Agencies and Local Authorities before commencement of construction work.
- 2.2 An application for the requisite approvals, permits and licences shall be made to each of the relevant Permitting Agencies in accordance with their application and approval procedure simultaneously; save where a permit from one agency is condition precedent for approval from another. The Permitting Agencies include the Ghana Civil Aviation Authority (GCAA), the Radiation Protection Institute of the Ghana Atomic Energy Commission (GAEC-RPI), the Environmental Protection Agency (EPA), the Ghana National Fire Service (GNFS), the Metropolitan, Municipal, and District Assemblies (MMDAs).
- 2.3 Where an application is for the construction of a tower or provision of service coverage beyond a District capital, the applicant shall, in addition to clause 2.2 above, obtain an authorization from the Ghana Investment Fund for Electronic Communications (GIFEC) prior to the commencement of construction. The authorization shall be processed at no cost to the applicant.

3.0 PERMITTING AGENCIES

3.1 GHANA CIVIL AVIATION AUTHORITY (GCAA)

- 3.1.1 A person who intends to construct a communication tower shall obtain a statement from the Ghana Civil Aviation Authority certifying that the proposed construction will not constitute hazard to air navigation.
- 3.1.2 The requirement for an **Airspace Safety Permit** is mandatory where:
- 3.1.2.1 The overall height of the proposed structure above the ground is more than 10metres and is within 5000meter radius of an existing or proposed aerodrome;
 - 3.1.2.2 The proposed structure is within 18,520metres radius of an existing or proposed aerodrome;
 - 3.1.2.3 The proposed structure is beyond 18,520metres radius of an existing or proposed aerodrome and is 46metres or higher above ground level;
 - 3.1.2.4 The proposed structure is within low level flying routes or close to major highways;
 - 3.1.2.5 The proposed structure is of greater height than an obstacle limitation surface in accordance with the criteria specified in the Ghana Civil Aviation Regulations;
 - 3.1.2.6 The proposed structure is within an instrument approach area; and
 - 3.1.2.7 The proposed structure is within the distances above an existing airport, an airport under construction or planned airport.

3.1.3 Application Procedure

- 3.1.3.1 The procedure for obtaining an Airspace Safety Permit begins with the submission of a written application to the GCAA together with a completed GCAA Form/SRD/ASAS-01 and payment of the required fees. Where inspection of the proposed site is necessary, the applicant shall provide transportation to and from the site.
- 3.1.3.2 The GCAA shall communicate the results of its evaluation to the applicant within fourteen (14) working days from the date of submission.

3.1.4 Annual Inspection

In accordance with GCAD Parts 27.25 and 26, the Authority is required to conduct an annual inspection and report for each site in order to maintain its aeronautical database, which is used for aircraft safety and operational purposes.

3.2 RADIATION PROTECTION INSTITUTE OF THE GHANA ATOMIC ENERGY COMMISSION (GAEC-RPI)

- 3.2.1 A person who intends to construct a communications tower and or install an antenna shall obtain a **Compliance Certificate** from the GAEC-RPI to ensure that the public as well as workers of the applicant, and the environment are protected from any effect of radiation.

3.2.2 Application Procedure

An applicant shall notify the GAEC-RPI of its intention to install an antenna by submitting a completed RPI Form for non-ionising radiation supported by all relevant technical information to enable GAEC-RPI carry out a safety assessment of the antenna and issue an Assessment Report to the applicant not later than fourteen (14) days from submission of an application.

3.3 ENVIRONMENTAL PROTECTION AGENCY (EPA)

A person who intends to construct a communications tower shall undertake an Environmental Assessment and obtain an Environmental Permit certifying that such an activity will not have any adverse impact on the environment.

3.3.1 Application Procedure

An applicant shall be required to:

- 3.3.1.1 Obtain environmental permits before construction; and
- 3.3.1.2 Pay the requisite fees and charges stipulated in the Fees and Charges (Miscellaneous Provisions) Act in force at the time.



3.3.2 Assessment Requirement

A copy of the application shall be submitted to the local EPA Office for evaluation together with the following documents:

- 3.3.2.1 Site plan;
- 3.3.2.2 Block plan;
- 3.3.2.3 Lease/licence/right of entry;
- 3.3.2.4 GPS Coordinates of all tower locations in decimal units on all proposed towers;
- 3.3.2.5 Site photographs;
- 3.3.2.6 Evidence of Consultation with neighbours (Evidence of consultation forms to be attached), see Appendix 6; and
- 3.3.2.7 Design of the Structure showing its effective height, foundation, guys used, masts, ladders, rest and work platforms, earthing, lighting protection and aviation light generator and switch unit, among others.

3.3.3 Validity of EPA Permit and Renewal Process

- 3.3.3.1 All EPA permits shall be valid for eighteen (18) or twenty-four (24) months indicated in the permit, and shall be renewed in accordance with the conditions set out in the permit.
- 3.3.3.2 A renewal application, which must commence thirty (30) days prior to the expiry of the current permit, must be accompanied with:
 - 3.3.3.2.1 A Completed Annual Environmental Report;
 - 3.3.3.2.2 Copy of the current permit;
 - 3.3.3.2.3 Noise and air quality monitoring report;
 - 3.3.3.2.4 Radiation certificate;
 - 3.3.3.2.5 Insurance certificate; and
 - 3.3.3.2.6 A Structural integrity report.
- 3.3.3.3 The EPA shall renew an EPA permit within twenty-five (25) working days from the submission of the necessary documents subject to compliance with all the relevant conditions precedent.

3.3.4 Decommissioning of Existing Tower

- 3.3.4.1 Where a tower has to be decommissioned, refurbished or modified, EPA requires a detailed decommissioning plan that indicates the method, duration and waste management procedures from the owner before an environmental permit may be issued.

3.4 GHANA NATIONAL FIRE SERVICE

- 3.4.1 A person or entity who intends to construct a communication tower shall obtain a Fire Safety Certificate from the Fire Safety Directorate of the Ghana National Fire Service. This is to ensure that the development does not pose any fire risk to the tower and the facilities within the immediate environment.



- 3.4.2 The Fire Permit shall be granted upon the basis that the applicant shall implement proposed fire safety recommendations spelt out in the Fire Safety Protection Proposal Report and the Fire Safety Engineering Drawing.

3.4.3 Procedure for Acquiring Fire Permit

- 3.4.3.1 An applicant shall obtain and complete application Form B from offices of the Ghana National Fire Service in any District, Municipal and Metropolitan Fire Stations, or Regional office across the country.
- 3.4.3.2 The completed Form shall be submitted with the following documents:
- 3.4.3.2.1 Fire Safety Protection Proposal Report and the Fire Safety Engineering Drawing; and
 - 3.4.3.2.2 Relevant document from other Permitting Agencies, where applicable.
- 3.4.3.3 A Fire Safety Inspector shall inspect and assess the suitability of the proposed site for the construction of the communication tower.
- 3.4.3.4 Upon approval of the site, the applicant shall pay the appropriate review and processing fees as enshrined in the Fees and Charges (Miscellaneous Provisions) Act in force at the time.
- 3.4.3.5 A Fire Permit shall be processed and issued to an applicant within fourteen (14) working days from the date of submission of a duly completed application Form.

3.4.4 Validity Period of a Fire Permit and Renewal Process

- 3.4.4.1 All Fire Permits shall be valid for twenty-four (24) months from the date of issue.
- 3.4.4.2 Where construction of a tower is not likely to be completed within the validity period, an applicant may apply for renewal of the Fire Permit thirty (30) days before the validity period elapses, subject to payment of the required fees.
- 3.4.4.3 During application for renewal, any variation in design should be brought to the attention of the Service.
- 3.4.4.4 A new Fire Permit, valid for another twenty-four (24) months, shall be issued after re-inspection of site by a Fire Safety Inspector and payment of all relevant fees.

3.5 METROPOLITAN, MUNICIPAL AND DISTRICT ASSEMBLIES (MMDAs)

- 3.5.1 An applicant for the construction of a communications tower shall submit a Developer Permit Application Form to the Physical Planning Department of the Metropolitan, Municipal or District Assembly within whose jurisdiction the communications tower is to be sited, upon payment of the requisite Processing and Development Fees specified in the Fee Fixing Resolution of the District Assembly.

- 3.5.2 The application shall be in accordance with Regulations 44 and 45 of the Land Use and Spatial Planning Regulations, 2019 (L.I. 2384) and supported with:
- 3.5.2.1 **A site plan** to the scale of 1:2500 showing the location of the proposed structure in relation to adjoining structures together with the geographical coordinates and dimension of plot. These should be submitted in four (4) hard copies and one (1) digital copy to the Physical Planning Department of the Assembly;
 - 3.5.2.2 **A Block Plan** to a scale of 1:50 showing the position of the tower and ancillary facilities with the mandatory setbacks or dimensions indicated. The Block Plan shall also show all existing or proposed structures within the plot. These should be submitted in four (4) hard copies and one (1) digital copy to the Physical Planning Department of the Assembly;
 - 3.5.2.3 **The Design** of the structure showing its effective height, foundation, guys used, members, ladders, rest and work platforms, earthing, lighting protection and aviation lighting generator, and switch unit, among others. Four (4) hard copies of each prototype should be submitted for group applications together with one (1) digital copy to the Physical Planning Department of the Assembly;
 - 3.5.2.4 **Evidence of ownership** of the property and/or the property on which the structure is to be installed in the form of an executed lease or licence agreement between the tower owner and the land owner or a right of entry letter from the landowner;
 - 3.5.2.5 **Confirmation of Accident Insurance policy** in the form attached hereto as Appendix 9;
 - 3.5.2.6 **Evidence of neighbourhood** consultation conducted in the immediate area where the tower is to be mounted in accordance with the Standard Consultation Form in Appendix 8 (E). The evidence may be certified by the Assembly Member or Local Chief in charge of the area;
 - 3.5.2.7 **Structural Engineer's Certification** by an Engineer accredited by the Ghana Institution of Engineering (GhIE) that the structure will support and not be adversely affected by the proposed mast, tower, antenna and associated equipment in cases where the tower is to be mounted on an existing structure;
 - 3.5.2.8 **Geo-technical investigation report** duly certified by an Engineer accredited by the GhIE where the proposed tower is ground-based; and
 - 3.5.2.9 Statutory permits obtained from the EPA, GNFS, GAEC-RPI and GCAA.

3.5.3 Permitting Procedure for MMDAs

- 3.5.3.1 Submission of Development Application Form with required documents
- 3.5.3.2 Payment of Processing Fees;
- 3.5.3.3 Joint Site Inspection by Technical Sub-Committee (led by the Physical Planning Officer and Works Engineer);

- 3.5.3.4 Technical Sub-Committee meeting to assess the application and recommend to Spatial Planning Committee;
- 3.5.3.5 Spatial Planning Committee meeting to make a decision (approval or deferment or rejection) on the application;
- 3.5.3.6 Payment of Permit Fees upon approval of permit; and
- 3.5.3.7 Issuance of Development Permit Certificate and Signed Drawings.

3.6 APPLICATION PROCESSING TIMELINES

3.6.1 Subject to submission of all the relevant documents, including a co-location statement, where applicable, and the applicable fees, processing of application shall not, as far as practicable, exceed the following timelines:

- 3.6.1.1 Ghana Civil Aviation Authority - Fourteen (14) working days;
- 3.6.1.2 Radiation Protection Institute - Fourteen (14) working days;
- 3.6.1.3 Environmental Protection Agency -Twenty-Five (25) working days;
- 3.6.1.4 MMDAs - Thirty (30) working days;
- 3.6.1.5 Fire Permit - Fourteen (14) working days;
- 3.6.1.6 GIFEC- Fourteen (14) working days.

3.6.2 Subject to these timelines, the Permitting Agency shall promptly notify an applicant of its decision and in accordance with its internal application procedures; provided always that an applicant reserves the right to demand written explanations for a refusal decision and to re-apply for consideration.

3.7 GRIEVANCE PROCEDURE

3.7.1 Where an application is declined by any Permitting Agency, the applicant may submit a request to the National Communications Authority, which shall mediate a resolution in accordance with the Dispute Resolution mechanisms outlined in the Electronic Communications Act, 2008 (Act 775), or such other applicable legislation for the time being in force;

3.7.2 A Permitting Agency which declines an application shall provide an applicant reasons for the decline, recommend remedial measures, if any, and provide an opportunity to re-apply; and

3.7.3 An applicant that is dissatisfied with the grounds for refusal may submit a request to the National Communications Authority, which shall mediate a resolution in accordance with the Dispute Resolution mechanisms outlined in the Electronic Communications Act, 2008 (Act 775) or such other applicable legislation for the time being in force.

PART IV
TECHNICAL SPECIFICATIONS

4.0 GENERAL SPECIFICATIONS**4.1 LOCATION**

The location of a tower shall conform to the requirements stipulated under Appendix 6 of these Guidelines.

4.2 PROXIMITY TO POWER LINES

- 4.2.1 A tower shall not be constructed close to High Voltage electrical power transmission lines of 11Kv and above. The nearest distance of a tower to a High Voltage electrical power transmission line shall be the equivalent of 120% of the height of the tower.
- 4.2.2 The owner of a tower installed in contravention of the above requirements shall bear the cost of its removal.
- 4.2.3 Once an applicant has complied with all requirements, no liability shall be imposed on the applicant where electrical power transmission lines are sited subsequently in breach of these Guidelines.

4.3 STRUCTURAL SPECIFICATIONS

The structural specifications for construction of towers shall conform to the dimensions stipulated in Appendix 5 of these Guidelines. Nonetheless, the design of structures for towers shall take into account the following:

4.3.1 THE TERRAIN

The design of structures for masts and towers shall be determined by the "terrain" and for this purpose, terrain is classified into three broad geographical zones. These are:

- 4.3.1.1 The Exposed smooth terrain with virtually no obstructions and in which the height of any obstructions is less than 1.5meters. This category includes open sea coasts, lake shores and flat, treeless plains with little vegetation other than short grass;
- 4.3.1.2 The open terrain with widely spaced obstructions (100meters apart) having heights and plan dimensions generally between 1.5meters and 10meters. This category includes large airfields, open parkland or farmlands and undeveloped outskirts of towns and suburbs with few trees; and
- 4.3.1.3 The terrain having numerous closely spaced obstructions generally the size of domestic and high-rise buildings. This category includes wooded areas and suburbs, towns and industrial areas, fully or substantially developed.

4.3.2 WIND LOAD AND SPEED

- 4.3.2.1 In designing towers, wind loading shall be the predominant dynamic loading to be considered outside dead weights, since severe environmental conditions that lead to additional seasonally variable loads are non-existent.
- 4.3.2.2 Wind load rating shall be based on the height of the tower and the location.
- 4.3.2.3 The design of towers shall provide for specific conditions that might exceed the given standard values specified in these Guidelines.
- 4.3.2.4 The design philosophy shall be based on the strength limit, which considers the loading of a tower under extreme conditions and serviceability limit, which ensures that the tower will provide the proper service under normal conditions.
- 4.3.2.5 The loading on a tower shall be analysed under wind, soil and seismic conditions.
- 4.3.2.6 The wind effect on a tower shall take cognisance of a number of external conditions that may change the dynamics of the wind, such as terrain, gusts, the method of wind-speed determination and the value of safety factors needed for a specific tower type.
- 4.3.2.7 A proportionate amount of over design must be applied to take care of the safety issue, which defines the impact a failure would have on the operational integrity of a tower, human life and property.
- 4.3.2.8 Such designs shall take cognisance of the fact that wind velocities constitute the measured data generally available and a conversion has to be made from wind velocity to wind pressure.
- 4.3.2.9 The formula used to convert these velocities to pressure produce results that can vary as much as 25%, which may translate into a 25% difference in design loads that will produce different foundation sizes.
- 4.3.2.10 The use of basic wind speeds shall be encouraged. The Basic wind speed approach assumes given wind speeds, from meteorological measurement to be at 10meters above ground level, and Basic wind speed design escalates the wind load from 10metres above ground level to the top of the structure.
- 4.3.2.11 A structure shall be designed to withstand forceful wind speeds that occur on the average of once every thirty (30) to fifty (50) years, considering that wind speed escalates with height.
- 4.3.2.12 The design of the structure shall incorporate the gust factor to account for the varying nature of wind.
- 4.3.2.13 The calculation of wind speed shall be based upon information provided in the Wind Flow Map of Ghana from the Ghana Meteorological Service and/or Survey Department.

4.3.3 SERVICE LIFE

- 4.3.3.1 The design, fabrication materials and methods, installation accessories, safety factor and tower loadings shall conform to standards and last for the expected service life of a tower.
- 4.3.3.2 The expected service life of a tower shall be a minimum of fifteen (15) years.

4.3.4 SECONDARY POWER SOURCE

- 4.3.4.1 A base station, in built-up areas, may have a solar power **and/or a generator**, as a secondary source of power.

4.3.5 GENERATOR INSTALLATION AND NOISE MITIGATION

- 4.3.5.1 Where a generator is used as a secondary source of power, **it must** be sited ten (10) meters away from the fence wall of adjoining properties.
- 4.3.5.2 The generator set should be:
 - 4.3.5.2.1 soundproof and comply with all permissible sound **levels** prescribed in the Ghana Standard for Health Protection- Requirements for Ambient Noise Control (GS 1222:2018). The tower owner **shall carry out** noise monitoring every two (2) years;
 - 4.3.5.2.2 installed on good shock absorbers to minimise vibrations **to the barest** minimum;
 - 4.3.5.2.3 installed with its exhaust directed away from any adjoining **property**; and
 - 4.3.5.2.4 installed with the appropriate mufflers and silencers **as indicated** in Appendix 7.
- 4.3.5.3 At the construction stage of a tower, the tower owner shall:
 - 4.3.5.3.1 Erect an acoustic barrier around the construction site;
 - 4.3.5.3.2 Ensure that the maximum noise level during the **construction** and operation of the site shall comply with the Ghana Standard for Health Protection-Requirements for Ambient Noise Control (GS 1222: 2018).

4.4 MODIFICATION OF EXISTING TOWERS

- 4.4.1 Requests for modification of an existing tower arising from considerations **such as** improved technology, public safety or co-location arrangements without any changes to the initial height shall receive Administrative Approval from the NCA within seven (7) working days of submission of an application.
- 4.4.2 Where the modification involves tower replacement resulting from end of service life, damage or structural defect, the request shall be supported with an Investigative Report by the applicant and a Structural Certification report by a certified Engineer in good standing with the Ghana Institution of Engineers (GhIE).

4.5 REMOVAL OF TOWERS

Any tower which is not operated for a continuous period of twelve (12) months shall be considered abandoned. In such circumstances, the following shall apply:

- 4.5.1 For towers subject to Airspace Safety Permits, the owner of such site, antenna or mast and the property owner upon which the site is located shall remove the said antenna and/or mast within thirty (30) days of receipt of notice from the GCAA of such abandonment. If satisfactory removal does not occur within the specified thirty (30) days, the GCAA may order removal at a cost to the tower owner(s).
- 4.5.2 For any other tower, the owner shall file a written notice of an intent to discontinue the use of the tower indicating the date of the said discontinuance to the respective Metropolitan, Municipal or District Assembly (MMDA), and shall proceed to remove the tower within thirty (30) days from the date of discontinuance.
- 4.5.3 Failure of a tower owner to comply with 4.5.2 above, the MMDA within whose jurisdiction the tower is sited shall, in consultation with the EPA and on notice to the NCA, order removal of the structure at a cost to the tower owner.

4.6 INSURANCE AND COMPENSATION

- 4.6.1 Owners of communication towers shall maintain relevant insurance policies, including:
 - 4.6.1.1 Workmen Compensation Policy in line with the Workmen Compensation Act, 1987 (PNDCL 187); and
 - 4.6.1.2 An All Risk Insurance Policy from a reputable insurance company licensed by the National Insurance Commission to cover liabilities arising from third party claims.

**PART V
CO-LOCATION AND TOWER-SHARING**

0 CO-LOCATION

1 A person who intends to construct a tower must demonstrate to the Permitting Agencies that all reasonable steps have been taken to explore the possibility of tower sharing before applying to construct a new tower within a specified radius of 200m, if the proposed site is in the built-up area, and 300m if it is in a non-built-up area (as indicated in Appendix 6).

5.1.1 Where tower heights are shorter, a smaller search radius can be used as follows:

5.1.1.1 300meter radius for two towers above 46meters; and

5.1.1.2 200meters for two towers below 46meter towers.

5.1.2 Where either of the above is not technically feasible, the site owner shall within five (5) working days of a NO decision submit to the applicant a co-location statement giving reasons why co-location is not possible. The applicant shall submit the co-location statement to the Permitting Agencies on application for a new site.

2 REQUIREMENTS FOR CO-LOCATION

5.2.1 Tower Operators shall:

5.2.1.1 Ensure the use of approved existing sites for the development of new installations;

5.2.1.2 Solicit the help of the EPA and NCA, where necessary, in negotiating co-location agreement issues relating to site access, security access, insurance, rates and compensation; and

5.2.1.3 Co-operate with each other to construct a new tower as per these Guidelines for joint usage.

5.2.2 Notwithstanding the above, the option for co-location may be waived for:

5.2.2.1 Lack of structural capacity to support weights, orientation, heights and wind loads from additional equipment; and/or

5.2.2.2 Lack of ground space to accommodate shelter for base stations and other equipment.

5.2.3 However, where an existing tower is incapable of supporting co-location, the option of decommissioning the old tower and the erection of a new one capable of accommodating other antennas may be considered.

3 REPORTING OBLIGATION

5.3.1 The owner(s) of a tower shall provide information to the EPA, NCA and MMDAs on an annual basis to maintain a database of towers that are available for co-location.

4 DISPUTE RESOLUTION ON CO-LOCATION

5.4.1 Where there are disputes arising out of co-location on towers, the areas of contention shall be identified and referred to the NCA for resolution.

5.4.2 The NCA shall establish within five (5) working days, a dispute resolution process in accordance with provisions for dispute resolution under Section 84 of the Electronic Communications Act, 2008, Act 775 and Regulation 120 of the Electronic Communications Regulations, 2011 (L.I. 1991).

PART VI**INSPECTION AND MAINTENANCE****INSPECTION OF TOWER SITES AND STRUCTURES**

- 6.1 Upon issuance of a Development Permit from the relevant Metropolitan, Municipal or District Assembly, subject to compliance with the requirements of all the other Permitting Agencies, an applicant shall notify and invite the NCA for an on-site pre-installation visit;
- 6.2 Upon completion of construction, the Tower owner shall again notify and invite the NCA for an on-site post installation inspection. Post installation inspection will be based on the checklist on Appendix 8, Form B;
- 6.3 Other relevant **Authorised Agencies** may conduct similar site inspections during the construction of a tower and the installation of the antenna before its operation begin(s) in accordance with the applicable legislative procedures;
- 6.4 The owner of a tower shall notify the GCAA and MMDA on completion of its construction;
- 6.5 The owner of a tower, who fails to meet the required standards upon inspection, will be notified and ordered to remedy the breach as follows:
- 6.5.1 Issues relating to structural integrity shall be remedied by the tower owner within ninety (90) days of notification of the defect; failing which the owner shall pay to the EPA and MMDA charges prescribed in the relevant applicable legislation;
- 6.5.2 For all other shortfalls, the tower owner shall remedy such shortfalls within sixty (60) days of being notified; failing which the owner shall pay to the EPA charges prescribed in the relevant legislation; and
- 6.5.3 For defects likely to cause threat to life and property, such as foundation defects, cracks, loss of structural members, and risk of tower yielding to collapse, the tower owner shall remedy such defects as soon as possible, but not exceeding a period of thirty (30) days or such time as the Permitting Agency may direct to forestall any disaster.

.0 MARKINGS

- 7.1 The GCAA shall also carry out periodic inspections of towers to ensure compliance with lighting and marking requirements.
- 7.2 An approved aerial tower shall be painted as prescribed in Part 14 of the Ghana Civil Aviation Regulations, 2005, L.I 1818 and the related Guidance Material (ASAS TP-02 Guidance on Lighting and Marking Obstacles).

J) LIGHTING OF AERIAL TOWER

- 8.1 The lighting system of an aerial Tower shall conform to the following requirements:
- 8.1.1 Installation of a lamp as per GCAA requirement, enclosed in aviation red obstruction light globe, at the top of the tower;
 - 8.1.2 The light shall be so positioned as to ensure unobstructed visibility from aircraft at any normal angle of approach and shall be on from sunset to sunrise;
 - 8.1.3 An intermediate light or lights shall be provided for each additional 46metres or fraction of the 46metres, where the tower is more than 46metres above the level of the ground, and these shall be spaced as equally as practicable between the top light and ground level.

0 INSPECTION OF TOWER LIGHTS

The owner of a tower, equipped with obstruction lights, shall:

- 9.1 Inspect the tower lights at least once every twenty-four (24) hours to ensure that the lights function properly as required under Regulation 85 of the Electronic Communications Regulations, 2011 (L.I. 1991);
- 9.2 Report immediately to the GCAA or to the nearest flight service station any observed improper functioning of the lighting system which cannot be corrected within twenty-four hours;
- 9.3 When the fault referred to above is corrected, maintain sufficient quantity of lamps for immediate replacement; and
- 9.4 Inspect at intervals of not more than ninety (90) days all automatic or manual control devices, indicators and the alarm system connected with the tower lighting system.

0. RADIATION EMISSION

- 10.1 Antenna System owners must ensure that radiation exposure conform to basic limits of the International Commission on Non-Ionizing Radiation Protection (ICNIRP), which are adopted as national standards to protect workers and the public against excessive exposure to RF fields.
- 10.2 The following Technical Standards and Specifications must be complied with to mitigate any adverse effects of human exposure to Radiofrequency (RF) (Electromagnetic) Fields:
 - 10.2.1 Reference Levels for public and occupational exposures as set out in Appendix 3;
 - 10.2.2 Basic Restrictions for public and occupational exposure as set out in Appendix 2 shall apply where the Reference Levels (Appendix 3) are exceeded; and
 - 10.2.3 Relevant national limits and reference levels.
- 10.3 Measurement/modelling/computations may be carried out in accordance with adopted national and or international measurement/modeling standards recommended by and not limited by any of the following organisations:
 - 10.3.1 International Electrotechnical Commission (IEC);
 - 10.3.2 International Telecommunication Union (ITU);

- 10.3.3 Institute of Electrical and Electronics Engineers (IEEE);
 - 10.3.4 European Committee for Electrotechnical Standardization (CENELEC); and
 - 10.3.5 World Health Organisation (WHO).
- 10.4 All measurements/modelling or computations to establish compliance with these radiation exposure limits and reference levels shall be made and/or authorised by the GAEC-RPI in consultation with the National Communications Authority.
- 10.5 GAEC-RPI shall in consultation with the National Communications Authority determine the appropriate measures to be undertaken in areas where radiation exposure levels are exceeded. Such measures may include:
- 10.5.1 Extending the boundaries of the areas;
 - 10.5.2 Using appropriate signs, warnings and public notices;
 - 10.5.3 Using Engineering or Administrative controls, and Personal control measures; and
 - 10.5.4 Training of “potentially exposed” RF workers, that is all workers likely to be exposed to RF radiation or occupationally exposed workers.
- 10.6 GAEC-RPI shall conduct routine monitoring of radiation emissions of antennas **once a year in urban areas** (built-up areas) and **once every two years in rural areas** to ensure continuous compliance with radiation exposure levels.
- 10.7 The routine monitoring will be conducted in collaboration with the NCA and EPA; and it shall commence on 1st February of every year.

I. WASTE MANAGEMENT

Used batteries and other hazardous and electronic waste shall be disposed of in accordance with the Hazardous and Electronic Waste Control and Management Act, 2016 (Act 917) and the Hazardous Electronic and Other Wastes (Classification), Control and Management Regulations, 2016 (L.I. 2250).

II. TOWER AUDITS

- 12.1 Tower owners shall commission a Structural integrity assessment on each tower, at least once every five (5) years, by a certified structural or civil engineer in good standing with the Ghana Institution of Engineers who shall issue a Structural Certification Report for submission by the tower owner to the EPA, NCA and MMDAs.
- 12.2 Noise and air emission monitoring shall be conducted on each tower every two (2) years and the report from such monitoring shall be submitted to the EPA, the NCA and the respective MMDAs in those jurisdictions the tower is sited.

PART VII**REMEDIAL MEASURES****3. PENALTIES FOR NON-COMPLIANCE**

- 13.1 In the event that a communications structure is not compliant with these Guidelines, the following actions shall be taken:
- 13.1.1 The respective permitting Agency shall provide notice to the tower owner or operator to rectify such non-compliance within thirty (30) days or such reasonable time as agreed with the Permitting Agency, if the rectification work does not involve tower decommissioning;
- 13.1.2 In the event that the non-compliance is not rectified within the stipulated period, it shall attract a penalty of 100 penalty units per each day of default;
- 13.1.3 Where the rectification work involves tower decommissioning, the respective permitting Agency shall provide notice to the operator to remove the communications tower within the specified period;
- 13.1.4 In the event that such communications tower is not removed within the stipulated period, it shall attract a penalty of 1000 penalty units per each day of default;
- 13.1.5 If the operator should have a reason for the non-compliance, the Operator should show cause to the Permitting Agencies in consultation with NCA why the communication tower should not be removed;
- 13.1.6 For towers and tower sites that have been identified as not compliant with these Guidelines, the tower owner or operator shall submit structural integrity and noise reports once every year (on or before 31st January of the following year) on all such towers and tower sites in order to continue operating such towers and tower sites;
- 13.1.7 The structural integrity and noise reports shall be prepared by a certified structural engineer from the Ghana Institution of Engineers; and
- 13.1.8 Failure to comply with 13.1.6 or 13.1.7 shall attract a penalty of 1000 penalty units for every day of default; and the Permitting Agencies in consultation with the NCA shall remove such facility and place a lien upon the property and surcharge the owner or operator with the cost of removal.

PART VIII
MISCELLANEOUS

14. REPEAL AND SAVINGS

These Guidelines supersede any other guidelines or specifications made by the NCA for the regulation of the Deployment of Communications Towers and Antennas.

15. EFFECTIVE DATE

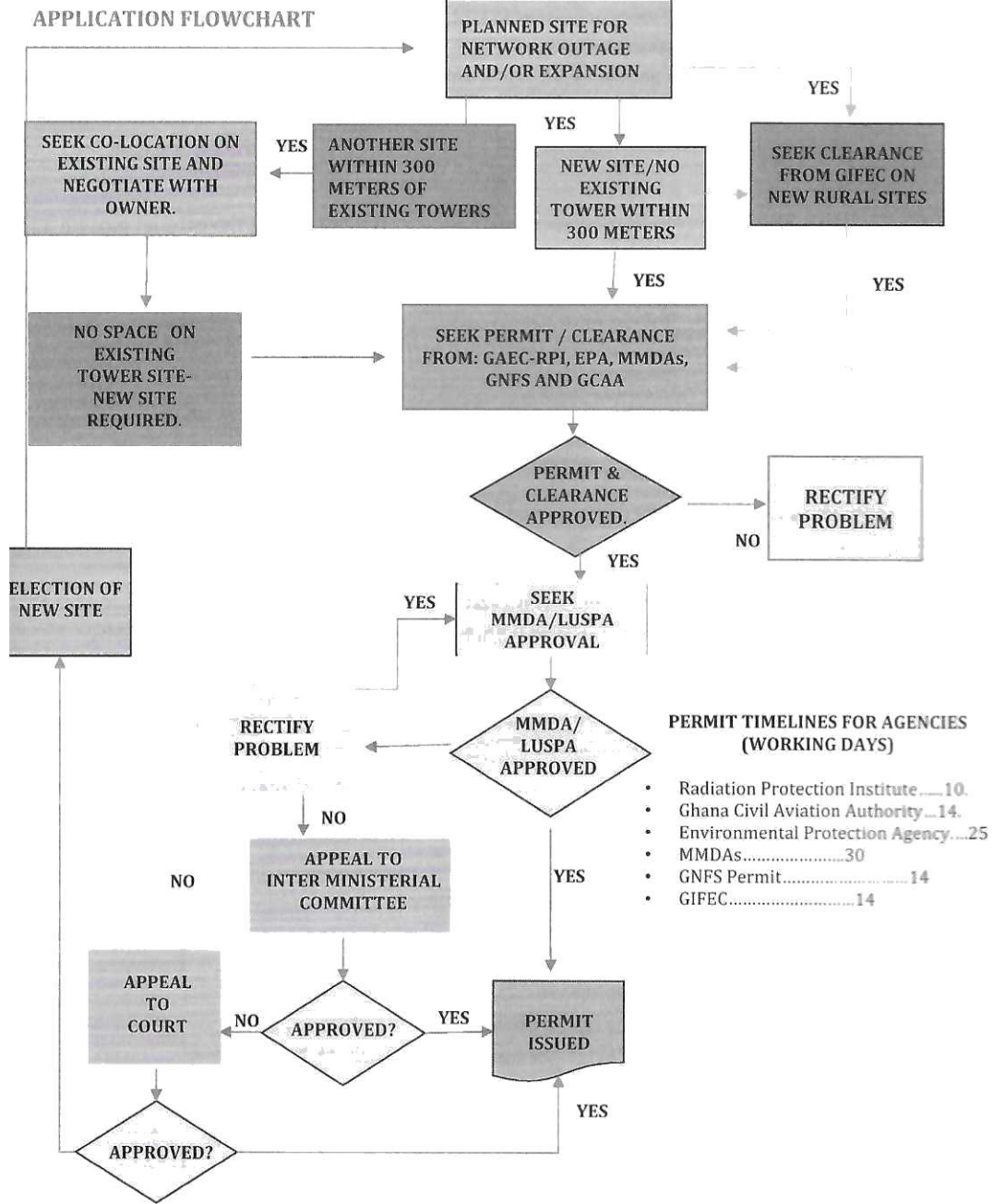
These Guidelines shall come into force immediately upon date of publication in the official gazette and shall remain effective until otherwise reviewed.

DATE OF GAZETTE NOTIFICATION



PART IX

ANNEXURES AND DOCUMENT ADMINISTRATION



APPENDIX 1

Relationship between Frequency Range, Established Adverse RF Health Effects and Applicable Basic Restrictions

| Frequency Range | Adverse health effect | Relevant basic restriction |
|-----------------|--|--|
| 100kHz to 10GHz | Whole body heating | WBA SAR: Specific Absorption Rate averaged over the entire body |
| 100kHz to 10GHz | Localised tissue heating | Localized SAR: Specific Absorption Rate averaged over a localized mass of tissue |
| 300MHz to 10GHz | Microwave hearing effect | SA: Specific Absorption of RF energy per pulse in a defined mass of tissue |
| 3kHz to 10 MHz | Electro stimulation and electric shock | J : internal current density averaged over a specified area |
| 10GHz to 300GHz | Surface heating | $Sinc$: incident power flux density averaged over a specified area |

The following is a summary of each of the basic restrictions and the health effects:

1. Limits on current density (J) induced in the head and torso of the body from RF exposure to protect against electro stimulatory effects, such as nerve and muscle stimulation caused by electric currents induced in the body by RF fields.
2. Limits on whole body average specific absorption rate (WBA SAR) to protect against whole body heating effects that can begin to appear when the whole body temperature increases by more than 1°C.
3. Limits on localised SAR to protect against localised tissue heating effects. The basic restrictions for the torso and head (except the ear lobe) are lower than those for the limbs to provide greater protection for the eyes, brain and other vital organs.
4. Limits on specific absorption (SA) in the head are specifically for pulsed RF exposures. These limits protect against the buzzing and clicking sounds that can occur when experiencing microwave hearing.
5. Limits on power flux density incident at the surface of the body ($Sinc$) at RF frequencies exceeding 10 GHz to protect against excessive surface heating of the body.

APPENDIX 2**Basic Limits for Public and Occupational Exposure from 100 kHz – 300 GHz (ICNIRP, 2000)**

| Exposure Scenario | Frequency range | Whole body average SAR (W/kg) | Localised Head and Trunk SAR (W/kg) | Localised Limb SAR (W/kg) | Localised S_{ab} SAR (W/m²) |
|--------------------------|------------------------|--------------------------------------|--|----------------------------------|---|
| Occupational | 100 kHz – 6 GHz | 0.4 | 10 | 20 | NA |
| | >6 GHz- 300 GHz | 0.4 | NA | NA | 100 |
| General Public | 100 kHz – 6 GHz | 0.08 | 2 | 4 | NA |
| | >6 GHz- 300 GHz | 0.08 | NA | NA | 20 |

NOTE:

“NA” means “not applicable” and is not considered when determining compliance.

Whole body average SAR is to be averaged over 30 min.

Local SAR and Absorbed Power Density (S_{ab}) exposures are to be averaged over 6 min.

Local SAR is to be averaged over a 10g cubic mass.

Local SAR S_{ab} is to be averaged over a square 4cm² surface area of the body. Above 30 GHz, an additional constraint is imposed, such that exposure averaged over a square 1 cm² surface area of the body is restricted to two times that of the 4cm² restriction.

Basic Limits for Public and Occupational Exposure to time-varying Electric and Magnetic fields (ICNIRP, 2010)

| Exposure Scenario | Frequency range | Whole body average SAR (W/kg) |
|----------------------------------|-----------------|-------------------------------|
| Occupational Exposure | | |
| CNS tissue of the head | 1 Hz – 10 Hz | $0.5/f$ |
| | 10 Hz – 25 Hz | 0.05 |
| All tissues of the head and body | 25 Hz – 400 Hz | $(2 \times 10^{-3})f$ |
| | 400 Hz – 3 kHz | 0.8 |
| | 3 kHz – 10 MHz | $(2.7 \times 10^{-4})f$ |
| | 1 Hz – 3 kHz | 0.8 |
| | 3 kHz – 10 MHz | $(2.7 \times 10^{-4})f$ |
| General Public | | |
| CNS tissue of the head | 1 – 10 Hz | $0.1/f$ |
| | 10 Hz – 25 Hz | 0.01 |
| | 25 Hz – 1000 Hz | $(4 \times 10^{-4})f$ |
| | 1000 Hz – 3 kHz | 0.4 |
| | 3 kHz – 10 MHz | $(1.35 \times 10^{-4})f$ |
| All tissues of the head and body | 1 Hz – 3 kHz | 0.4 |
| | 3 kHz – 10 MHz | $(1.35 \times 10^{-4})f$ |

NOTE:

f is the frequency in Hertz.

All values are root mean square (rms).

In the frequency range above 100 kHz, RF specific basic restrictions need to be considered.

APPENDIX 3

Reference Levels for Public and Occupational Exposure from 100 kHz to 300 GHz averaged over 30 minutes for Whole Body (ICNIRP, 2020)

| Exposure Scenario | Frequency Range | Incident E-field strength E_{inc} (Vm^{-1}) | Incident H-field strength H_{inc} (Am^{-1}) | Incident power density S_{inc} (Wm^{-2}) |
|---------------------|-----------------|---|---|--|
| Occupational | 0.1 – 30 MHz | $660/f_M^{0.7}$ | $4.9/f_M$ | NA |
| | >30 – 400 MHz | 61 | 0.16 | 10 |
| | >400 – 2000 MHz | $3f_M^{0.5}$ | $0.008f_M^{0.5}$ | $f_M/40$ |
| | >2 – 300 GHz | NA | NA | 50 |
| Public | 0.1 – 30 MHz | $300f_M^{0.7}$ | $2.2/f_M$ | NA |
| | >30 – 400 MHz | 27.7 | 0.073 | 2 |
| | >400 – 2000 MHz | $1.375f_M^{0.5}$ | $0.0037f_M^{0.5}$ | $f_M/200$ |
| | >2 – 300 GHz | NA | NA | 10 |

Notes:

1. “NA” signifies “not applicable” and does not need to be taken into account when determining compliance.
2. f_M is frequency in MHz.
3. S_{inc} , E_{inc} , H_{inc} are to be averaged over 30 minutes, over the whole-body space. Temporal and spatial averaging of each of E_{inc} and H_{inc} must be conducted by averaging over the relevant square values.
4. For frequencies of 100 kHz to 30 MHz, regardless of the far-field / near-field zone distinctions, compliance is demonstrated if neither E_{inc} or H_{inc} exceeds the above reference level values.
5. For frequencies of >30 MHz to 2 GHz:
 - 5.1 within the far-field zone: compliance is demonstrated if either S_{inc} , E_{inc} , or H_{inc} does not exceed the above reference level values (only one is required); S_{eq} may be substituted for S_{inc} ;
 - 5.2 within the radiative near-field zone, compliance is demonstrated if either S_{inc} , or both E_{inc} and H_{inc} , does not exceed the above reference level values; and
 - 5.3 within the reactive near-field zone: compliance is demonstrated if both E_{inc} and H_{inc} do not exceed the above reference level values; S_{inc} cannot be used to demonstrate compliance, and so basic restrictions must be assessed.
6. For frequencies of >2 GHz to 300 GHz:
 - 6.1 within the far-field zone: compliance is demonstrated if S_{inc} does not exceed the above reference level values; S_{eq} may be substituted for S_{inc} ;
 - 6.2 within the radiative near-field zone, compliance is demonstrated if S_{inc} does not exceed the above reference level values;
 - 6.3 within the reactive near-field zone, reference levels cannot be used to determine compliance, and so basic restrictions must be assessed.

Reference Levels for Occupational and Public to time varying Electric and Magnetic Unperturbed rms fields (ICNIRP, 2010)

| Exposure Scenario | Frequency Range | Electric field strength (kVm ⁻¹) | Magnetic-field strength (Am ⁻¹) | Magnetic flux density (T) |
|---------------------|-----------------|--|---|---------------------------|
| <i>Occupational</i> | 1 Hz - 8 Hz | 20 | $(1.63 \times 10^5)/f^2$ | $0.2/f^2$ |
| | 8 Hz - 25 Hz | 20 | $(2 \times 10^4)/f$ | $(2.5 \times 10^{-2})/f$ |
| | 25 Hz - 300 Hz | $(5 \times 10^2)/f$ | 8×10^2 | 1×10^{-3} |
| | 300 Hz - 3 kHz | $(5 \times 10^2)/f$ | $(2.4 \times 10^5)/f$ | $0.3/f$ |
| | 3 kHz - 10 MHz | 1.7×10^{-1} | 80 | 1×10^{-4} |
| <i>Public</i> | 1 Hz - 8 Hz | 5 | $(3.2 \times 10^4)/f^2$ | $(4 \times 10^{-2})/f^2$ |
| | 8 Hz - 25 Hz | 5 | $(4 \times 10^3)/f$ | $(5 \times 10^{-3})/f$ |
| | 25 Hz - 50 Hz | 5 | 1.6×10^2 | 2×10^{-4} |
| | 50 Hz - 400 Hz | $(2.5 \times 10^2)/f$ | 1.6×10^2 | 2×10^{-4} |
| | 400 Hz - 3 kHz | $(2.5 \times 10^2)/f$ | $(6.4 \times 10^4)/f$ | $(8 \times 10^{-2})/f$ |
| | 3 kHz - 10 MHz | 8.3×10^{-2} | 21 | 2.7×10^{-5} |

Notes

- › f is in Hertz.
- › In the frequency range above 100 kHz, RF specific reference levels need to be considered additionally.

Simultaneous Exposures to Different RFFrequencies

In situations where simultaneous exposures occur from different RF frequency sources, the possibility that these exposures will be additive in their effects has been assumed to occur by these Guidelines. Thus, a cumulative evaluation of the basic restrictions and reference levels for simultaneous exposure to multiple frequencies has to be performed separately for both electrostimulatory and thermal effects on the body. The equations for performing these calculations are as provided below:

Simultaneous exposure to multiple sources

For simultaneous exposure to fields at different frequencies, the compliance with the exposure limits is evaluated using the equations below. All conditions for the appropriate frequency ranges are to be satisfied.

$$\sum_{i=1}^{1 \text{ MHz}} \frac{E_i}{E_{li}} + \sum_{i>1 \text{ MHz}}^{10 \text{ MHz}} \frac{E_i}{a} \leq 1$$

$$\sum_{j=1}^{1 \text{ MHz}} \frac{H_j}{H_{lj}} + \sum_{j>1 \text{ MHz}}^{10 \text{ MHz}} \frac{H_j}{b} \leq 1$$

Where E_i is the electric field strength at frequency i

E_{li} is the reference limit at frequency i

H_j is the magnetic field strength at frequency j

H_{lj} is the reference limit at frequency j

$a=610\text{V/m}$ for occupational exposure and 87 V/m for general public exposure $b= 24.4$

A/m for occupational exposure and 5A/m for general public exposure

$$\sum_{i=100}^{1 \text{ MHz}} \left(\frac{E_i}{c} \right)^2 + \sum_{i>1 \text{ MHz}}^{300 \text{ GHz}} \left(\frac{E_i}{E_{li}} \right)^2 \leq 1$$

$$\sum_{j=100}^{1 \text{ MHz}} \left(\frac{H_j}{d} \right)^2 + \sum_{j>1 \text{ MHz}}^{300 \text{ GHz}} \left(\frac{H_j}{H_{lj}} \right)^2 \leq 1$$

Where E_i is the electric field strength at frequency i

E_{li} is the reference limit at frequency i

H_j is the magnetic field strength at frequency j

H_{lj} is the reference limit at frequency j

$c=610/f \text{ V/m}$ (f in MHz) for occupational exposure and $87/f^{1/2} \text{ V/m}$ for general public exposure

$d= 1.6/f \text{ A/m}$ (f in MHz) for occupational exposure and $0.73/f$ for general public exposure

APPENDIX 4**RF Awareness Signs**

Below are typical examples of signs used to caution RF radiation hazards at transmitter sites. RF warning signs are used to identify areas which may exceed the general public exposure limits.

RF Signage



RF HAZARD SIGNS



APPENDIX 5

TYPES OF TOWERS

Communication tower and mounts includes the following:

1. MONOPOLE TOWERS OR POST MASTS:

- 1.1 Monopole Tower consists of tapered steel tubes with slipped joint or flanged joint that fit over each other or bolted together to form a stable pole.
- 1.2 A monopole tower should be guyed or self-supported and are fitted with climbing rungs where necessary. It should have the following features:
 - 1.2.1 Section of the tower should be made from hallow, heavy duty, thick steel tubes, flanged steel tubes or low-alloy, high-strength steel;
 - 1.2.2 Each shaft section should be a constant-tapered hallow steel section;
 - 1.2.3 Slip joints should be designed with a minimum of 1.5 times the pole diameter at the splice;
 - 1.2.4 Pipe diameter should decrease from bottom to top;
 - 1.2.5 Monopole are to be made from galvanised hollow steel pipes or high strength steel and designed for a variety of multi-user configurations and finishes to meet local aesthetic requirements;
 - 1.2.6 For a slip jointed tower, the pipes shall be tapered to ensure that one pipe base fits into the top of another until the desired height is achieved. A joint in the arrangement should have an overlay between the two adjacent pipes. For a flange jointed tower, the pipes shall be tapered to ensure that one pipe base flange is bolted onto the top flange of another until the desired height is achieved; and
 - 1.2.7 The depth of the overlay, the base width and the number of pipes in a particular monopole shall be determined by expected height of a tower, the thickness of the pipe walls, the base diameter and whether the tower shall be guyed or not.

2. GUYED TOWERS:

- 2.1 These are towers that are stabilised by tethered wires.
- 2.2 Guyed towers shall be designed and installed in the manner illustrated by the Ghana Civil Aviation guidelines and shall take cognisance of the following specifications and recommended practices:
 - 2.2.1 Guyed towers may be in lattice, triangular or square, tapered or straight, as well as monopole structural forms;
 - 2.2.2 Guyed towers shall be supported and held in position by guy wires or ropes.
 - 2.2.3 Mast Guy Ropes shall be made from pre-stretched steel only. For every tower, the specified minimum strength of the guy wire shall be the maximum tension likely to occur in the worst loading condition;
 - 2.2.4 All sections must be straight square or triangular sections to eliminate potential problems associated with twisting or the need to shim the legs;
 - 2.2.5 Typical tower section are to have brace configuration with horizontals (z, x or k) and pivot base sections. These tower- structures should be wholly of steel, modular and hot-dip galvanized;
 - 2.2.6 Guyed towers should have tube or solid legs with solid bracing which increases the tower

- rigidity to allow for the twist and sway;
- 2.2.7 Guyed wires must not be over tightened in the installation of guy towers in order to avoid excessive tension which may cause alignment problems, cable rupture and permanent wrapping of tower structural parts;
 - 2.2.8 As a general rule, guyed wires should be planted in three directions at 120 degrees apart from each other for 3-sided towers. For 4-sided towers, guy wires should be planted in four directions at 90 degrees apart from each other;
 - 2.2.9 The choice of each guy earth screw anchor would be dependent on its holding power in the soil, which is a function of its diameter and length to be used to compute the minimum number of guys required; and
 - 2.2.10 The design, based on the load calculations would determine working load and the break strength required of the guyed wire and ultimately the choice of the size and grade of the wire.

3. ROOF MOUNTS:

- 3.1 Roof mounts are an inexpensive way of elevating signals above roof interference or any other obstruction.
- 3.2 The design and installation of roof mounts illustrated by GCAA shall take cognisance of the following specifications and recommended practice:
 - 3.2.1 Structural checks must be made to ascertain the capability of a chosen roof to withstand the additional loading being imposed on it by the structure and the entire antenna array it will support.
 - 3.2.2 All Roof mounted towers must be certified by the building's structural engineer before installation.
 - 3.2.3 All Roof mounted towers must have a barrier erected around it. However, Monopoles can be mounted on roof tops without barriers erected around it.
 - 3.2.4 As a general rule, roof mounts should be limited to light weight structures of low heights and support minimal dead and dynamic loads.

4. SELF-SUPPORTING / LATTICE TOWERS:

- 4.1 Self-Supporting towers are free-standing lattice structures.
- 4.2 The use of self-supporting towers with tapered sections, and face width that vary according to height and load capacity is recommended when land availability is limited provided that it is technically feasible to install them.
 - 4.2.1 Self-supporting towers shall be designed and constructed as lattice structures in the manner illustrated by the Ghana Civil Aviation Authority and shall have the following features.
 - 4.2.2 Triangular or square structure.
 - 4.2.3 Tube legs, angle legs, lattice legs or solid round legs.
 - 4.2.4 Sections in steel angle or steel or steel tubes.
 - 4.2.5 Steel angle cross bracing.
 - 4.2.6 Tapered sections; However, for shorter towers on roof tops with small foot print, straight sections should be used to ensure rigidity at the top.
 - 4.2.7 Face widths vary according to height and load capacity.
 - 4.2.8 Rest platforms provided every 20metres of height.
 - 4.2.9 Work platforms provided at all height where antennas are to be installed.
 - 4.2.10 Fitted with climbing ladder.

5. GENERAL MOUNTS:

- 5.1 In constructing tower legs, schedule 80 pipes or angle steel should be used although hollow aluminum pipes or angle may be used for towers below 10metres.
- 5.2 When a tower is made from angle steel, sections should be joined to each other through appropriately sized flanges, bolts, washers and lock nuts.
- 5.3 Lock nuts must be used, nuts on bolts may be clinched if lock nuts are not utilised.
- 5.4 Lock washers and lock nuts should be used on antenna support steel work and dish panning arm in order to avoid loss of signals.
- 5.5 Gussets should be used in the strengthening of the weld joint between the base plate and the tower section.
- 5.6 When a tower is made from angle steel, sections should be joined to each other through appropriately sized flanges, bolts, washers and lock nuts.
- 5.7 Tower sections, when made from steel pipes, should be joined to each other through joint plates welded to the base of each section. The width of the tower section joint plates should be double the width of the wall of the pipe they are supporting.
- 5.8 There should be adequate application of bracing to prevent towers being exposed to torque that may result in loss of signal during strong wind speeds.
- 5.9 Each plate should have four (4) 20mm diameter holes to accommodate four (4) 18mm bolts, nuts and washers.
- 5.10 When bolting sections together, bolts should be placed upside down with washers and nuts on top side of plates, the connecting face of plates should not be painted.

6. SMART SOLUTIONS

- 6.1 **Signposts with Antenna Installations:** These are self-supporting structures generally used as billboards or advertising structures falling within the street furniture category. Signposts are typically 10 to 20metres high with concealed macro antennas of 10dBi to 16dBi of antenna gain. Signposts are generally used as standalone macro cells for urban densification or as part of an outdoor distributed antenna system (ODAS).
- 6.2 **Street Lamps:** Telecommunications grade street lamps are another class of street furniture typically 4m to 12m in height used as street lights. Antenna gain is typically 11dBi or less depending on the antenna height and packing (omnidirectional or directional). They are typically used as part of an outdoor distributed antenna system or a standalone microcell.
- 6.3 **Wall Mounts:** Wall mounts are a very useful telecom infrastructure solution that are diverse in their application and equipment type. Antenna types range from micro to macro RF antennas and are typically directional or panel antennas mounted on the walls of high-rise buildings.
- 6.4 **Small Cell:** Small cells are essentially physically small and low-powered radios that provide operators with a means to densify cellular network in order to add capacity. Small cell technologies include picocells, femtocells, metrocells, microcells and indoor/outdoor distributed antenna systems (IDAS and ODAS). Outdoor small cells typically use infrastructure types already defined above such as street lamps, sign posts and wall mounts.

TEMPORARY BASE STATIONS

Cells on Wheels (COW): also known as a Site on Wheels is a portable mobile cellular site that provides temporary network and wireless coverage to locations where cellular coverage is minimal or compromised. COWs provide fully-functional service, via vehicles such as trailers, vans and trucks, to areas affected by natural disaster or areas with large user volume, such as major events.

- 7.1 A service provider may install a temporary base transceiver station known as Cell on Wheels (COW) for any of the following reasons:
 - 7.1.1 Provide temporary cellular network coverage during the maintenance or replacement of an existing facility to minimise service disruption;
 - 7.1.2 Provide additional capacity for high-profile events (festivals, rallies, sporting events, etc); and
 - 7.1.3 Provide additional capacity during emergency situations where existing base stations be come damaged, or during natural disasters such as bushfires and floods.
- 7.2 The service provider shall notify residents within a 150m radius locus about the base of the COW if:
 - 7.2.1 It will be in operation at that location for more than a month; and
 - 7.2.2 Someone resides within the immediate vicinity of the proposed location.
- 7.3 No notification of residents shall be required if the COW is intended to be used temporarily for a few days or for the provision of an emergency service.
- 7.4 COW cannot be used at a particular location beyond one (1) year.
- 7.5 A Temporary Authorisation from the NCA would be required for a COW for a maximum of three (3) calendar months, renewable upon an extension request with justification to the NCA. This request must be made by the service provider to the NCA one (1) month prior to the expiration of the initial Temporary Authorisation.

STAND ALONE DECKER TOWERS / DOUBLE DECKER TOWERS / TRIPLE DECKER TOWERS AND DOUBLE/SINGLE DECKER TOWERS ON A BUILDING

- 8.1 **Determination of Setbacks**
 - 8.1.1 Setback on Power Lines shall be the same as in 4.2.1.
 - 8.1.2 Setback for Generator Set shall be the same as in 4.3.5.
 - 8.1.3 Set to adjoining buildings/structure - the mast should comply with the Ghana Building Code which states that it shall be 10ft/3.04m away from the fence wall/building.
- 8.2 **Determination of Dimensions for Land Size** - the land size for construction of a tower shall be at least 3x3m column by column for Stand Alone Towers. The conditions for normal Rooftop Towers shall be applied for a Double, Triple or Single Decker Towers on an existing building.

8.3 Maximum Height for the Structure and the Tower

- 8.3.1 Height of Structure - the maximum recommended height should not be more than 10m for the structure;
- 8.3.2 Tower Height -the maximum recommended height for the tower shall be 25m.

NB: the allowable height of the structure and the tower shall not exceed 35 meters from the ground

- 8.4 **Neighbourhood Consultative Requirements** – this shall be in accordance with Appendix 6 of this document.
- 8.5 **Aesthetics and Visual Intrusion** - to improve the aesthetics of a structure and minimise visual intrusion, about 1.5m cladding with design blocks or material must be done on at least three (3) sides of the structure to allow for air circulation.
- 8.6 **Towers attached to an existing building** - All conditions herein stated shall be applied with the exception of the setback conditions. This permit can only be granted after approval has been given by all the permitting agencies.

APPENDIX 6

Zoning and General Land Use

| Type of Mast/Tower | Commercial | | | Industrial | | | Residential | | |
|-----------------------|--|-----|-----------|------------|------|-----------|-------------|-----|-----------|
| | SB | H | LS | SB | H | LS | SB | H | LS |
| Ground Based Lattice | 10m | 60m | 10m x 10m | 6m | 100m | 10m x 10m | 12m | 35m | 10m x 10m |
| Ground Based Monopole | 5m | 40m | 8m x 8m | 5m | 40m | 8m x 8m | 5m | 40m | 10m x 10m |
| Camouflaged | 3m | 40m | 6m x 6m | 3m | 40m | 6m x 6m | 3m | 40m | 10m x 10m |
| Lamppost/ Bill Boards | 0.5m | 18m | 1m x 1m | 0.5m | 18m | 1m x 1m | 0.5m | 18m | 1m x 1m |
| Rooftop | <p>i. Roof mounts can be installed in the penetrating or non-penetrating modes and can be self-support or guyed. However, non-penetrating roof mounts are most suitable for flat surfaces.</p> <p>ii. For rooftop tower, the minimum height for the active element from the ground level shall be 15 metres (i.e. the height of the building and the roof mount).</p> <p>iii. Rooftop mast should be on a minimum of three-storey building or 10 metres high structure. No setback requirement needs to be met if this condition is met in the case of the three-storey building.</p> <p>iv. Roof mounts may include special, or shell structures engineered and designed purposely to provide a mount to affix tower structures by the tower owner.</p> <p>v. The minimum setback requirement shall be measured from the base of the tower to the nearest adjoining structure (excluding boundary fence).</p> | | | | | | | | |

| Type of Mast/Tower | Mixed Use | | | Civic and Cultural | | | Health Facility | | | Basic Schools | | |
|-----------------------|---|-----|-----------|--------------------|-----|-----------|-----------------|-----|-----------|---------------|-----|-----------|
| | SB | H | LS | SB | H | LS | SB | H | LS | SB | H | LS |
| Ground Based Lattice | 12m | 60m | 10m x 10m | 12m | 35m | 10m x 10m | 150m | 35m | 10m x 10m | 150m | 35m | 10m x 10m |
| Ground Based Monopole | 5m | 40m | 10m x 10m | 5m | 40m | 10m x 10m | 150m | 40m | 12m x 12m | 150m | 40m | 12m x 12m |
| Camouflaged | 3m | 40m | 8m x 8m | 3m | 40m | 8m x 8m | 150m | 40m | 10m x 10m | 150m | 40m | 10m x 10m |
| Lamppost/ Bill Boards | 0.5m | 18m | 1m x 1m | 0.5m | 18m | 1m x 1m | 0.5m | 18m | 1m x 1m | 0.5m | 18m | 1m x 1m |
| Rooftop | <p>i. Roof mounts can be installed in the penetrating or non-penetrating modes and can be self-support or guyed. However, non-penetrating roof mounts are most suitable</p> | | | | | | | | | | | |

| | |
|--|--|
| | <p>for flat surfaces.</p> <p>ii. For rooftop tower, the minimum height for the active element from the ground level shall be 15 metres (i.e. the height of the building and the roof mount).</p> <p>iii. Rooftop mast should be on a minimum of three-storey building or 10 metres high structure. No setback requirement needs to be met if this condition is met in the case of the three-storey building.</p> <p>iv. Roof mounts may include special or shell structures engineered and designed purposely to provide a mount to affix tower structures by the tower owner.</p> <p>v. The minimum setback requirement shall be measured from the base of the tower to the nearest adjoining structure (excluding boundary fence).</p> |
|--|--|

Note:

- **SB** means Set Back
- **H** means Height
- **LS** means Lands Size

| Neighbourhood Requirement | |
|----------------------------------|---|
| Zoning | Consultative Requirements |
| Residential | <ul style="list-style-type: none"> • Tower may be solar and/or generator powered. • Home owners or Residents Associations shall be consulted where a tower is to be sited within a 150metre radius of residential properties. This requirement shall be waived where there are no residential facilities within the 150metre radius. • Co-location must be the first option. |
| Commercial | <ul style="list-style-type: none"> • For commercial properties, consultation shall be with each property owner, where a property is within a 50-metre radius, and at a Group or Association level for properties within a 100metre radius. |
| Industrial | <ul style="list-style-type: none"> • Immediate neighbours within 50meter radius (Residence where appropriate) should be consulted individually. |
| Civic & Cultural | <ul style="list-style-type: none"> • Immediate neighbours within 100meter radius shall be consulted individually. |
| Educational | <ul style="list-style-type: none"> • Not allowed on school compounds (sites*) or • At least 150meters from the nearest classroom or dormitory Structure or • Consent from the School Authorities. |
| Health facilities | <ul style="list-style-type: none"> • Not allowed on premises of clinic, polyclinic, chip Compounds, Health facilities etc. (sites*) • However, for Hospitals, it should be at least 150m from the nearest ward and sensitive equipment facilities. • Consent from the Health Authorities. |
| Aviation facilities | <ul style="list-style-type: none"> • Not allowed* or • Subject to determination by GCAA. |
| Mixed Use | <ul style="list-style-type: none"> • Immediate neighbours within 100m radius shall be consulted individually. |

NEIGHBOURHOOD CONSULTATION FORM FOR EPA PERMIT

DATE: DAY/MONTH/YEAR:

A: COMPANY PROFILE

Name:

Address:

Location:

Contact Tel/Fax No.:

E-mail:

Contact Person:

B: PROJECT PROFILE

The type of undertaking:

Proposed Location:

Landmarks in the area: (a brief description)

.....

Surrounding activities:

Distances to adjacent facilities in N, S, E and W directions.

.....

.....

C: ADJOINING FACILITY / PERSON CONSULTED:

Name:

Address:

Location:

E-mail:

Issues of concern, if any:

.....

Contact Tel. No.

Signature and date:

APPENDIX 7

Health Protection-Requirements for Ambient Noise Control, GSS 1222: 2018 Classification
 Classification of zones for ambient noise shall be as designated in the Table below:

| ZONE | DESCRIPTION OF AREA |
|------|--|
| A | Residential areas |
| B | Educational (school) and health (health, clinic) facilities, office and law courts |
| C | Mixed used (Residential areas with some commercial or light industrial activities) |
| D | Areas with some light industry, places of entertainment or public assembly and places of worship |
| E | Commercial areas |
| F | Light industries areas |
| G | Heavy industrial areas |

Requirements for Ambient Noise Control Level based on categorized zones

CLASSIFICATION OF AREA NOISE DESCRIPTION INTO ZONES

| No. | ZONE | DESCRIPTION OF AREA | PERMISSIBLE NOISE LEVEL IN dB | |
|-----|------|--|-------------------------------|--------------------------|
| | | | DAY (6:00am - 10:00pm) | NIGHT (10:00pm - 6:00am) |
| 1. | A | Residential Areas. | 55 | 48 |
| 2. | B | Educational (School) and Health (Hospital, Clinic) facilities, office and Law Courts. | 55 | 50 |
| 3. | C | Mixed Used (Residential Areas with some commercial or light industrial activities). | 60 | 55 |
| 4. | D | Areas with some light industry, places of entertainment or public assembly, and places of worship. | 65 | 60 |
| 5. | E | Commercial Areas. | 75 | 65 |
| 6. | F | Light Industrial Areas. | 70 | 60 |
| 7. | G | Heavy Industrial Areas. | 70 | 70 |

APPENDIX 8

FORM A- COMMUNICATIONS TOWER - PRE-INSTALLATION FORM

| PRE-TOWER INSTALLATION FORM | |
|--|-----------|
| DATE: DAY/MONTH/YEAR: | |
| INSPECTION OFFICER(S) - | NAME |
| i. NCA | SIGNATURE |
| ii. TOWERCO | |
| TASK (PRE TOWER INSTALLATION) | |
| SITE DETAILS | |
| Proposed Site ID | |
| Proposed Site Name | |
| Site Latitude | |
| Site Longitude | |
| Site Altitude | |
| GPS Coordinates | |
| Region | |
| Metropolitan / Municipal / District Assembly | |
| Location | |
| PERMITS | |
| GCAA Permit | |
| EPA Permit | |
| Metropolitan/Municipal/ District Assembly Permit | |
| Fire Inspection Report | |
| Evidence of Neighbourhood Consultation | |
| DISTANCE | |
| Distance to the nearest building | |
| Proposed Generator Shelter to the nearest building | |
| Distance from the base of the proposed tower to the nearest building | |
| TOWER | |
| Type | |
| Height | |
| Width | |
| Land Size | |

FORM B- COMMUNICATION TOWER-POST INSTALLATION FORM

| POST-TOWER INSTALLATION FORM | |
|---|--|
| SITE INFORMATION | |
| Operator Site ID | |
| Operator Site Name | |
| Tower Owner | |
| Site Longitude | |
| Site Latitude | |
| Site Altitude | |
| District | |
| Region | |
| Site Location | |
| Tower type | |
| If other, please specify | |
| Foundation type (if visible) | |
| TOWER DESCRIPTION | |
| Number of tower legs | |
| Number of anchor bolts per tower leg | |
| Size of anchor bolts in mm | |
| Terrain | |
| If site is on a hill/escarpment: Elevation at crest (m) | |
| Clutter/Settlement Type | |
| General Comments | |

| SITE ACCESS | |
|---|--|
| Is site properly fenced and locked to prevent access of unauthorized persons? | |
| Is site access remote or local? | |
| Stopped by Security and identification checked | |
| Is a Visitor log book present? | |
| General Comments | |
| GENERAL SITE CONDITIONS | |
| Are signs posted as required? | |
| Is the security fences intact and locks operational? | |
| Are there signs of soil erosion that may weaken tower and anchor bases? | |
| Is the site clean and well maintained | |
| Has any spillage taken place on site | |
| General Comments | |
| TOWER STUBS AND FOUNDATION INCLUDING CONCRETE EQUIPMENT PLINTHS | |
| Is the concrete that is visible in a good overall condition? (tower stubs and foundation) | |
| Is the concrete that is visible in a good overall condition? (all equipment plinths) | |
| Is there grout applied to the tower base | |
| Are there any signs of rust or corrosion on anchor bolts? | |
| Are any of the nuts and/or anchor bolts missing? | |
| General Comments | |
| TOWER | |
| Are the RF exposure signs mounted to the tower? | |

| | |
|---|--|
| Tower painting in overall good condition? | |
| Any rusted or missing members? | |
| Any missing bolts and nuts on the tower? | |
| Navigation lights installed and in working order? | |
| Climbing ladder installed and in good condition? | |
| Safety cage or fall arrest installed and in good condition? | |
| Is the tower level and plumb? | |
| <i>Is there a visible twist in the tower?</i> | |
| What is the distance of the tower to the nearest inhabited building? | |
| Is there a lightning spike fitted to the top of the tower and all earth connections terminated? | |
| Is there space available on the ladder to accommodate additional feeder cables? | |
| Climbing ladder installed and in good condition? | |
| Is the tower crowded with RF or MW antennas? | |
| General Comments | |
| SHELTER AND ENCLOSURES | |
| Is there a shelter or brick enclosure on site? (specify type in comments) | |
| Is the shelter or brick enclosure in a good condition? | |
| Have all earthing connections been terminated? | |
| Is an intrusion system fitted? | |
| General Comments | |
| UPS BATTERY AND RECTIFIERS | |
| Are there traces of acid on the UPS battery and rectifier installation? | |
| Is the UPS battery array maintained on a regular basis? | |

| | |
|--|--|
| General Comments | |
| CABLING | |
| RF cables secured properly in cable tray/ladder? | |
| Is the overall condition of feeder cables and waterproofing good? | |
| Are there any unused cables? | |
| Do you note any cables that have not been terminated? | |
| General Comments | |
| FIRE AND INTRUSION ALARM SYSTEM | |
| Is there a fire alarm present? | |
| Is there an intrusion alarm installed? | |
| Is a fire extinguisher present? | |
| General Comments | |
| STANDBY POWER | |
| Is there a generator installed on site? | |
| Is the overall condition of the generator and fuel tank/piping acceptable? | |
| Type of generator/s | |
| Capacity of the generator if shown | |
| Noise level if shown on ID plate? | |
| Note the distance from generator to closest buildings or structures | |
| General Comments | |
| COMMERCIAL POWER | |
| Are the power cables in a good condition? | |
| Are the cables properly insulated and terminated? | |

| | |
|---------------------------------------|------------------|
| Are utility meters installed on site? | |
| General Comments | |
| INSPECTION OFFICERS | |
| DATE: DAY/MONTH/YEAR | |
| NAME | SIGNATURE |
| i. NCA | |
| ii. TOWERCO | |

APPENDIX 9

PERMIT APPLICANT INSURANCE DETAILS SHEET (PAIDS)

| Applicant Site Reference Details | |
|--|--|
| Site Id: Ghana Post GPS: | |
| Site Name: | |
| Locality Name District: Electoral Area: Town/Community: | |
| MMDA Name: | |

| Applicant Insurance Information | | |
|--|------------------------------|-----------------------------|
| Applicant has insurance cover for the above-mentioned site? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| If "YES": Please indicate the name of the Insurance Company and Address: | | |
| Insurance Holder Name | | |
| Insurance Policy Value | | |
| Insurance Policy Number | | |
| Insurance Holder Contact Details | | |
| Policy Cover Type: | | |
| Name of Insurer | | |
| Address/Contact Details of Insurer | | |

| | |
|---|--|
| Certification: I/We certify that the information provided above is true and correct as of the date set forth under my/our signature(s) | |
| Applicant Full Name: | |
| Title/Position | |
| Signature: | |
| Date: | |

- Note:** 1. To be endorsed by company's **Head of Legal** or their duly authorized official.
2. Please attach copy of **Certificate of Insurance**.



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National Comm. Authority



National Communications Authority

