WAPA

WIRELESS HIGH SITE ENGINEERING CHECKLIST

CHANGE HISTORY

REVISION	DATE	DESCRIPTION OF CHANGE
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1. INTRODUCTION

1.1 PURPOSE

The purpose of this document is to provide WAPA members with a checklist to aid in the selection, design, construction, installation and maintenance of high sites.

This Checklist covers all of the aspects address in the WAPA Wireless High Site Engineering Guideline. The contents of the Checklist may therefore apply differently to High Site Owners and to Tenants. High Site Owners, such as property companies, for example, may not take an interest in engineering details but nonetheless have a responsibility for aspects such as compliance with safety and regulatory requirements, whether implemented by the High Site Owner or the Tenant. Conversely, Tenants may not have a responsibility for general site aspects such as site access, site access control, site security, site tidiness, etc, but nonetheless will most likely have a contribution to make towards these aspects, or would be significantly affected by the efficacy of aspects such as these. Therefore all aspects of the Checklist should be reviewed by both High Site Owners and Tenants. Overall, all aspects of the Checklist should be reviewed by either or both the High Site Owner and the Tenants.

2. REFERENCES

a) WAPA Wireless High Site Engineering Guideline, latest version.

3. HIGH SITE DEVELOPMENT *(GUIDELINE PARA 3)*

3.1 INTRODUCTION

In the selection of a site (ie the location) for the development of a new high site, it is critically important to consider all aspects of site selection and site layout and design. Poor site selection and design cannot necessarily be remedied with a realistic amount of equipment engineering. In the site selection process, the location of the intended service area, desired service parameters and service performance levels, the propagation characteristics of the frequencies to be used, various legal aspects and environmental considerations need to be taken into account. A similar situation applies when an operator wishes to consider the use of an existing high site for the expansion of an existing network or the development of a new network.

3.2 SITE SELECTION

No.	QUESTION	Y/N	COMMENT
a)	Does a potential site (mountain, hilltop, building or other structure) provide a clear line of sight to an identified area of interest (or a potential requirement for coverage)?		
b)	Have potential obstructions and clutter conditions been taken into account?		
c)	Are there natural obstructions that can be used to minimise co-channel interference?		
d)	Has consideration been given to the sharing of an existing site?		
e)	Have the propagation conditions for the proposed installation been checked?		
f)	Are there nearby sources of transmission or man-made electrical noise that could interfere with equipment on this site?		
g)	Is there the potential for equipment on this site to interfere with equipment on nearby locations?		
h)	Can the site be accessed on a 24x7 basis under all weather conditions, including extreme conditions of snow and swollen rivers (if applicable)?		
i)	Are there any potential cost implications of improving the road access?		
j)	Is any land owner or third party consent required for tenants to access the potential high site?		
k)	Is electrical power with sufficient excess capacity available at the site?		
l)	What is the potential cost (both capital cost and service cost) of providing electrical power at the site?		
m)	Are there likely to be any constraints on new structures on this site from the Commissioner for Civil Aviation?		
n)	Have the requirements of the NEMA Act in terms of affected		

	activities been taken into account?		
o)	Have alternative sites been evaluated?		

3.3 SITE LAYOUT DESIGN AND DEVELOPMENT

No.	QUESTION	Y/N	COMMENT
a)	Has a site layout design taken into account: i) The desired coverage areas? ii) The types of systems likely to be installed? iii) The nature of any natural obstructions or existing structures on or in the proximity of the site? iv) New or existing access roads? v) The topography of the site, clutter on or in the vicinity of the site? vi) The incorporation of a site synchronisation system?		
b)	Can the site be expanded?		
c)	Will a site mapping system be considered?		

4. SITE CONSTRUCTION *(GUIDELINE PARA 4)*

4.1 INTRODUCTION

Site construction involves the establishment of a suitable structure to support antennas and transceivers, a suitable shelter to house in-door equipment, a site electrical supply, a site earthing system and site lightning protection measures. The design of a site including its structural components and other features should take into account the present and future coverage requirements as well as give adequate attention to various regulatory requirements and health and safety aspects.

Ultimately the wireless performance of a high site is dependent upon the adoption of good site design and construction principles. The risk of mutual interference between systems on a high site or nearby site can be minimised at the design stage. The presence of significant intermodulation, and hence degradation of performance, can be mitigated by a combination of good design and good construction practices.

4.2 SUPPORT STRUCTURES

No.	QUESTION	Y/N	COMMENT
a)	Have the selection, design and proposed implementation of structures take the following into account: i) Fit for purpose? ii) Structural integrity and rigidity? iii) Compliance with regulatory requirements?		

	iv) Safety? v) Future possible requirements?		
b)	Has the design of a tower (and similarly for other structures) taken the following into account: i) Tower height? ii) Equipment to be supported? iii) Twist and tilt?		
c)	Has the wind loading of all the components on the structure been taken into account?		
d)	Have the following site aspects been determined and specified: i) Location in latitude and longitude? ii) Altitude of site above sea level (HASL)? iii) Roof height of building above ground level (HAGL)? iv) Terrain category? v) Artificial base height (m)? vi) Environmental conditions (eg coastal, industrial, etc)?		
e)	Has the selection and/or design of the support structure been carried out and certified by competent, qualified and registered structural engineers?		
f)	Has the selection and/or design of any structural additions or alterations been carried out and certified by competent, qualified and registered structural engineers?		
g)	Has due attention shall be paid to the selection and use of other items used in the construction of support structures including but not limited to the following: i) Use of lock nuts, spring washers and other locking devices? ii) Anodising of aluminium components? iii) Use of protective paints? iv) The cutting or drilling of protective coated items? v) Corrosive aspects in the use of dissimilar metals? vi) Products liable to degradation by ultraviolet light which should not be used in external situations where there is an acceptable alternative?		

4.3 EQUIPMENT TYPES

No.	QUESTION	Y/N	COMMENT
a)	Have the following considerations, when selecting, designing and implementing shelters and supporting structures been taken into account:		

	i) Fit for purpose? ii) Internal volume? iii) Structural integrity and weather proofing? iv) Compliance with regulatory requirements? v) Safety? vi) Future possible requirements?		
b)	Have the following requirements for equipment shelters been given full attention prior to implementation: i) Sufficient internal volume for current and anticipated future installed equipment requirements? ii) Requirements to secure the shelter against vandalism and casual attack by intruders have been assessed and well understood? ii) The provision of alarm systems on sites which warrant a high degree of security? iv) The equipment shelter will be kept at an ambient condition which never allows the temperature to fall below the dew point and which keeps within the specified temperature range of the equipment, or at an acceptable working temperature for personnel? v) The provision of heating, ventilation or cooling to achieve this condition? vi) The provision of lighting, storage and workspace as appropriate to the type of equipment to be installed on the site? vii)The provision for the ingress of cables for electrical power, earthing, communication cables, wireless interconnection cables from the tower or similar structure should be provided? viii) Precautions to exclude pests and vermin from the shelter?		
c)	Has the internal layout of the shelter been based on a number of requirements, identified hereafter: i) Current or anticipated future requirements for the partitioning of the internal space for individual operators? ii) A separate room, compartment, or dedicated area, close to the door for centralised power distribution, batteries, light switches, air conditioner controls, security systems, etc? iii) Adequate space for and access to equipment cabinets, racks, frames, distribution boards, etc? iv) Requirements for hot/cold passages to meet the air conditioning requirements? v) Adequate space and facilities for cable trunking purposes, such as false floors and/or overhead cable trays? vi) Facilities for access control, remote monitoring and alarms?		
d)	For the purpose of specifying and/or designing a suitable shelter, have the following site aspects been determined and		

	specified: i) Location in latitude and longitude? ii) Altitude of site above sea level (HASL)? iii) Terrain category? iv) Roof height of building above ground level (HAGL)? v) Structural strength of the rooftop of an existing building, or location of supported points? vi) Vehicular site access details? vii) Rooftop access details? viii) Environmental conditions (eg coastal, industrial, etc)?		
e)	Has the selection and/or design of a significantly-sized shelter been carried out and certified by competent, qualified and registered structural engineers in compliance with national and local authority design and building codes, as applicable?		
f)	Will the steel structures be manufactured in compliance with national and local authority codes, as applicable?		
g)	Has due attention been paid to the selection and use of other items used in the construction of shelters including but not limited to the following: i) Use of lock nuts, spring washers and other locking devices? ii) Anodising of aluminium components? iii) Use of protective paints? iv) The cutting or drilling of protective coated items? v) Corrosive aspects in the use of dissimilar metals?		

4.4 ELECTRICAL POWER SUPPLY

No.	QUESTION	Y/N	COMMENT
a)	Have the following aspects relating to an AC power supply been considered at the design stage including the following: i) The cost of an overhead or underground cable installation and 11kV stepdown transformer? ii) The security of such an installation? iii) The location of the transformer such that it is accessible for maintenance without gaining access to the high site itself? iv) The transformer earth system has been connected to the high site earth system?		
b)	Have the following aspects relating to a DC power supply been considered at the design stage including the following: i) DC power systems are usually designed for 12, 24 or 48VDC? ii) In coastal areas of South Africa, there is usually sunshine or wind or both but seldom neither?		

	iii) In inland areas of South Africa, there is usually sunshine and irregular wind? iv) Where batteries are used in a cyclic charging mode, the batteries have been dimensioned for a depth of discharge limited to about 20 to 25% in order to obtain a useful life of the batteries of at least three years? v) The installation location of wind generators to ensure that performance is not limited by obstructions such as buildings, trees or hills? vi) The design of a solar power system takes into account the insolation for the particular part of the country where the system is to be installed? vii) The installation location of solar panels such that performance is not limited by obstructions such as buildings, trees or hills. Solar panel arrays should be installed (in the southern hemisphere) facing north but adjusted for any obstructions in order to achieve maximum charging during daylight? viii) The inclination of solar panels to the ground level have been set at an angle of between that of the latitude of the site and latitude + 10°? ix) The design of a solar power system for a specific takes into account the lowest temperature likely to be experienced at that specific site?		

4.5 SITE EARTHING SYSTEM

No.	QUESTION	Y/N	COMMENT
a)	Has the earthing system been designed to comply with the regulatory requirements? Will the installation be carried out and certified by competent registered persons?		
b)	Has the lightning protection system been designed in accordance with the regulatory requirements?		
c)	Have the following keypoints been regarded in the design of the lighting protection and earthing: i) A lightning finial may be required to extend the zone of protection to protect equipment mounted on top of the structure. The finial should extend to at least 1m above the highest equipment? ii) All antenna feeders have been bonded to the tower at the upper and lower ends and earthed at the point of entry into the equipment shelter? iii) The shape and dimensions of a lightning protection earthing system have been considered when dealing with the safe dispersion of the lightning current into the ground? iv) In order to minimise any dangerous overvoltages, a low resistance earthing system has been considered, preferably less		

	than 10 Ohms? v) A single integrated earthing system on a site has been considered which is suitable for both a lightning protection system and for a safety earthing system. The resistance should then be less than 1 Ohm?		
d)	Has consideration been given to the implementation of galvanic isolation between the outdoor equipment and the indoor equipment?		

5. EQUIPMENT INSTALLATION *(GUIDELINE PARA 5)*

5.1 INTRODUCTION

In provisioning wireless access services to their clients, operators employ wireless access equipment to provide connectivity between the premises of clients and high sites in both point-to-point and point-to-multipoint configurations. Wireless backhaul equipment is employed to provide backhaul services between these high sites and various other points of presence, usually in a point-to-point (P-to-P) configuration but use can also be made of a point-to-multipoint (P-to-MP) configuration for backhaul.

5.2 EQUIPMENT TYPES

No.	QUESTION	Y/N	COMMENT
a)	Has the point-to-point equipment been selected in accordance with the requirements specified by ICASA?		
b)	Has the point-to-multipoint equipment been selected in accordance with the requirements specified by ICASA?		

5.3 ANTENNAS

No.	QUESTION	Y/N	COMMENT
a)	Have the appropriate antennas been selected?		
b)	Has the antenna siting been selected in accordance with the requirements?		
c)	Have the antennas been selected in accordance with the requirements?		

5.4 CABLING

No.	QUESTION	Y/N	COMMENT
a)	Have the most appropriate cables been selected?		
b)	In the selection of connectors, have the following precautions been taken: i) Connectors used for RF and IF connections should be of high quality and limited to N-type, F-type, SMA, TNC and DIN7/16. The use of such connectors produces maximum screening		

	effect and provides the best RF connection between the various components of the system? ii) For cabled connections using the RJ45 connector, only metal body cable-end connectors should be used? iii) All connectors must be fitted in conformity with manufacturers' instructions to ensure proper sealing and electrical uniformity and should be tightened to the manufacturer's recommended torque settings?		
c)	In the selection of cables and cable routes, have the following precautions been taken: i) For RF and IF connections and wherever possible, solid, semi-rigid or double-screened cables should be used. This is to ensure maximum screening between adjacent RF, IF, data and power cables and to reduce coupling between equipment? ii) The direct and shortest route is always the best for minimum radiation and minimum insertion loss? iii) Data connections should be made using only screened twisted pair cable? iv) Surge suppressors and earthing clamps should be fitted to RF, IF data and power cables, as per manufacturers recommendations? All such devices should be connected via the shortest path to a common site earthing system. v) All cables between entering a shelter should be installed via a common metallic bulkhead which should be earthed to the site earthing system? All such cables should pass through surge arrestors fitted to the bulkhead. vi) All cables should be installed in metallic cable trays which should be well-earthed? vii) All cables should be strapped neatly to cable trays and structures at regular interval using metallic cable clamps or UV-rated cable ties? viii) Provision for drip loops should be made where cables connect to outdoor equipment? ix) Care should be taken with all joints or connections with dissimilar metals, as these can become a source of corrosion? x) Additional attention should be given to sites where extreme weather conditions are possible? The presence of snow and ice can affect wireless performance and result in physical distortion of metallic antenna components. Extremely low temperatures can result in fractures in materials, leading to moisture ingress resulting in permanent damage. xi) On completion of cable installation, all external connectors and earthing connectors should be suitably sealed or protected against the ingress of moisture using self-amalgamating tape or other suitable moisture-proof solutions? xii) All cables, connectors, cable trays, cable clamps, earthing clamps, surge arrestors, etc should be securely fixed in order to protect the installation from damage due to vibration throughout the projected life of the installation?		

d)	Have feeder cables been uniquely and permanently identified at least at each end and at the point of exit from the shelter?		

6. MAINTENANCE *(GUIDELINE PARA 6)*

6.1 INTRODUCTION

Maintenance takes the form of corrective maintenance and preventive maintenance. Corrective maintenance relates to maintenance actions of a repair nature where actions are taken to return a system back to normal working conditions as soon as possible after a fault has occurred and service performance is affected or threatened. The ability to restore a service to required performance levels is a measure of the maintainability of the high site and its systems and is impacted by the degree of attention given to the matter during the design phase and by the degree of preventive maintenance that is carried out. Preventive maintenance should be carried out on a regular basis and to the level that is relevant for the various components of a high site implementation.

6.2 GENERAL HIGH SITE MAINTENANCE

No.	QUESTION	Y/N	COMMENT
a)	Is the high site area inspected at least once or twice a month, depending on the locality and criticality of the site, for any signs of degradation of the high site including illegal intrusion, malicious damage, theft, damage by pests and vermin, overgrown vegetation, other risks of fire, poor work practices by other installers and maintainers, littering, soil erosion, etc?		
b)	Are access roads inspected every quarter for indications of soil erosion, bad weathering of roads, rocks or other obstacles on the roads, any developments, illegal or unapproved activities that may affect access to the high site, etc?		
c)	Are facilities on site such as toilets, drinking water, fire extinguishers inspected and returned to the appropriate level of service?		
d)	Has a site logbook been established on the site in which observations and actions are recorded during each visit to the site?		

6.3 SUPPORT STRUCTURES

No.	QUESTION	Y/N	COMMENT
a)	Are the support structures such as towers, masts and custom-design structures inspected thoroughly as least once a year by staff trained and qualified to climb such structures?		
b)	Do inspections should address the following: i) General condition of structures? ii) Presence of rust or corrosion? iii) Guy rope tension?		

	iv) Presence of any loose items including nuts, bolts, locking devices, cabling, cable trays, antennas, etc? v) Recording of any of these shortcomings? vi) Adjustment of guy rope tensioners? vii) Greasing of guy rope tensioners? viii) Identification, removal and surface treatment of any areas of corrosion?		

6.4 EQUIPMENT SHELTERS

No.	QUESTION	Y/N	COMMENT
a)	Are equipment shelters thoroughly inspected externally every quarter and internally at least once or twice a month?		
b)	Do inspections address the following: i) Any external damage, deterioration, corrosion to the shelters? ii) Repairs to any damage, remediation of any deterioration and removal of any corrosion? iii) General tidiness inside and outside the shelters? iv) Clutter resulting from recent repairs, modifications, installations? v) Service levels and testing of access control systems, security systems and monitoring systems? vi) Servicing of fire extinguishers? vii) Removal of discarded materials, packaging, excess cables, faulty equipment, etc? viii) Stock levels of spares held on site?		

6.5 ELECTRICAL POWER SUPPLY

No.	QUESTION	Y/N	COMMENT
a)	With regard to the high site electrical power supply, have the following actions been carried out: i) Reticulated power supply installations should be inspected annually for any signs of damage or deterioration, particularly where high sites are in remote rural areas? ii) Voltages should be checked on a regular basis? iii) Any signs of hot spots in distribution boards or cabling should be noted and reported? iv) Earth leakage protection devices should be tested once a year (with alternative power activated)? v) Standby generators should be started at least once a month and run sufficiently to restore charge to the starting battery? vi) The automatic starting and loading testing of standby generators should be carried out once a quarter?		

	vii) Mechanical maintenance on standby generators should take place as specified by the manufacturer? viii) The automatic switchover and load testing of UPS's should be carried once a quarter? ix) UPS batteries should be individually tested once a year? x) In dry hot climates, solar panel tend to accumulate much dust and therefore should be cleaned on a regular basis, preferably during every site visit, depending upon the availability of water? xi) Solar batteries should be individually tested once a year?		
b)	With regard to the high site electrical power supply, have the following actions been carried out: i) Reticulated power supply installations should be inspected annually for any signs of damage or deterioration, particularly where high sites are in remote rural areas? ii) Voltages should be checked on a regular basis? iii) Any signs of hot spots in distribution boards or cabling should be noted and reported? iv) Earth leakage protection devices should be tested once a year (with alternative power activated)? v) Standby generators should be started at least once a month and run sufficiently to restore charge to the starting battery? vi) The automatic starting and loading testing of standby generators should be carried out once a quarter? vii) Mechanical maintenance on standby generators should take place as specified by the manufacturer? viii) The automatic switchover and load testing of UPS's should be carried once a quarter? ix) UPS batteries should be individually tested once a year? x) In dry hot climates, solar panels tend to accumulate much dust and therefore should be cleaned on a regular basis, preferably during every site visit, depending upon the availability of wate? xi) Solar batteries should be individually tested once a year?		

6.6 SITE EARTHING SYSTEM

No.	QUESTION	Y/N	COMMENT
a)	Is the earthing system checked once a year to ensure that it is still intact and that the earth impedance has not risen to an unreasonable figure?		

6.7 SITE LIGHTNING PROTECTION MEASURES

No.	QUESTION	Y/N	COMMENT

a)	Are all the earthing points and earth straps inspected for damage, arcing or corrosion and any such damage made good?		

6.8 EQUIPMENT, ANTENNA AND CABLING

No.	QUESTION	Y/N	COMMENT
a)	With regard to the equipment installed on a high site, are the following actions carried out: i) All wireless equipment, antennas and cabling installed outdoors should be thoroughly inspected once a year for signs of damage, deterioration, corrosion or UV-caused damage? ii) All items should be checked for tightness and tightened where necessary? iii) All forms of protection against moisture ingress, such as self-amalgamating tape should be inspected and replaced if necessary? iv) All indoor equipment should be thoroughly inspected once a year for signs of damage, deterioration or corrosion? v) Equipment performance figures obtainable from element management systems or other types of built-in test and monitoring equipment should be evaluated for any signs of deterioration in performance of the equipment?		

7. SITE ADMINSTRATION *(GUIDELINE PARA 7)*

7.1 INTRODUCTION

The success of a high site, particularly one that is made use of by several operators, is dependent upon efficient administration of the high site in terms of implementation of security measures, site access control, site maintenance, site tidiness, record keeping, change control, maintenance of technical standards, and preparation for site inspections.

7.2 SITE SECURITY AND ACCESS CONTROL

No.	QUESTION	Y/N	COMMENT
a)	Have suitable forms of perimeter security been established in order to prevent actions such as theft or malicious damage to high site infrastructure and installed equipment?		
b)	Have suitable access control systems been installed and maintained to enable authorised access to take place without adversely impacting site security?		

7.3 SITE MAINTENANCE

No.	QUESTION	Y/N	COMMENT
a)	Is regular maintenance carried out on the site?		

b)	Do all operators making use of the site prepare and undertake scheduled maintenance on their installations on the site?		

7.4 SITE TIDINESS

No.	QUESTION	Y/N	COMMENT
a)	Has a tidy work ethic been established on the site?		
b)	Do all operators at all times keep their work area in a neat, clean and safe condition, and remove from the premises and in the vicinity thereof and properly dispose of all debris, discarded materials and rubbish caused by their work on the site?		

7.5 RECORD KEEPING

No.	QUESTION	Y/N	COMMENT
a)	Are contact details of all operators (and their maintenance contractors) making use of a site available and displayed in a weatherproof form in a convenient location on the site? Have technical details of all equipment installed been made available and displayed for the benefit of other operators?		

7.6 CHANGE CONTROL

No.	QUESTION	Y/N	COMMENT
a)	Have operators ensured that all proposed on-site changes are appropriately and accurately documented in the relevant forms and/or formats and submitted to the relevant authorities?		

7.7 MAINTENANCE OF TECHNICAL STANDARDS

No.	QUESTION	Y/N	COMMENT
a)	Have all operators making use of a high site been encouraged and supported in maintaining a high level of technical standards and integrity?		

7.8 SITE INSPECTIONS

No.	QUESTION	Y/N	COMMENT
a)	Have operators on site prepared for ICASA inspection and prepared by ensuring that the following points are addressed: i) Equipment is in proper working order and operating fully within the limits as determined by ICASA? ii) Equipment is fully labelled in terms of type-approvals, operator's name, and contact details? iii) Subsites are safe, neat, clean and free of debris, discarded materials and rubbish?		

	iv) Documentation detailing type and details of the equipment installed is up to date? v) During site inspections, operators have copies of all their applicable licences in hand?		

8. HEALTH AND SAFETY *(GUIDELINE PARA 8)*

8.1 INTRODUCTION

The safety of the working environment on, and in the vicinity of high sites should always remain a consideration of high importance to all operators.

8.2 ON-SITE CONSIDERATIONS

No.	QUESTION	Y/N	COMMENT
a)	Do operations on site follow safe working practices and procedures?		
b)	Is a working policy enforced for site works, safeguarding the health and safety of all staff, especially those engaged on work external to the equipment shelter and at height?		
c)	Do all operators on site take steps to ensure that all their visitors and staff working on site wear the necessary personal protective equipment that mitigates or reduces exposure to identified hazards and risk to below set mandatory limits?		
d)	Is only competent and medically declared fit staff allowed to climb support structures?		
e)	Has staff had training on all aspects of fall arrest and rope access including the emergency procedures pertaining to these activities?		
f)	Is only one operator or contractor permitted work on a structure at a time?		
g)	Are arrangements for lifting equipment past working installations coordinated?		
h)	Has staff been instructed not to access exposed areas of the high site or to climb support structures when there is lightning or an expectation of extreme meteorological conditions in the area?		
i)	Does the structure design and site layout take into account the icing which could reasonably be expected to occur on structures and antennas in a particular location and the danger of falling ice in relation to staff and damage to shelters, equipment, antennas and feeders?		
j)	Inside the equipment shelter, has care been taken to ensure that sharp projections are avoided and that the common walkways remain clear and unhindered?		

k)	Where lead acid battery power supplies are installed has the first aid aspect of acid splashes been considered and in particular the requirement for eye wash solution in first aid cabinets?		
l)	Where soldering irons are in use has care been taken such that hot irons are not left unprotected, but are placed in suitable holders?		

8.3 ELECTRICAL SAFETY

No.	QUESTION	Y/N	COMMENT
a)	Does the design and construction of the electrical installation on the high site comply with the legal requirements, and has the work been carried out and certified by competent registered persons?		
b)	Is everyone who regularly works in the wireless site environment aware of the procedures for the first aid treatment of persons suffering electric shock?		

8.4 FIRE HAZARDS

No.	QUESTION	Y/N	COMMENT
a)	Are the number and type of extinguishers in accordance with the requirements as decided by consultation with the appropriate fire authority?		

8.5 EXPOSURE TO NON-IONISING RADIATION

No.	QUESTION	Y/N	COMMENT
a)	Do all operators on site take the responsibility to ensure that care is taken to avoid any inadvertent exposure to non-ionising radiation above both public- and occupational thresholds as defined and published from time to time by the Department of Health and the International Commission on Non-ionizing Radiation Protection, by being in close proximity of antennas?		

8.6 SYMBOLIC SIGNS

No.	QUESTION	Y/N	COMMENT
a)	Are symbolic safety signs attached to and visible on high sites?		
b)	Do these signs comply with the legal requirements?		

9. APPENDICES

9.1 APPENDIX A: ABBREVIATIONS

AC	Alternating Current
DC	Direct Current
HAGL	Height Above Ground Level
HASL	Height Above Sea Level
ICASA	Independent Communications Authority of South Africa
ICNIRP	International Commission on Non-ionizing Radiation Protection
kV	kilovolt
LPDA	Log Periodic Dipole Array
m	Metres
NEMA	National Environmental Management Act
P-to-MP	Point to MultiPoint
P-to-P	Point to Point
WAPA	Wireless Access Providers Association