**AIR TRAFFIC AND NAVIGATION SERVICES SOC. LTD**

**REPUBLIC OF SOUTH AFRICA**

****

**REQUEST FOR BID/TENDER: ATNS/RFP043/22/23/VHF COASTAL COVERAGE**

**VHF COASTAL COVERAGE PROJECT**

**Replacement of VHF Infrastructure and equipment shelters**

**VOLUME 2**

**Technical Specifications**

**Version 1**

**September 2022**

**The information contained within this document is confidential to ATNS in all respects and it is hereby acknowledged that the information as provided shall only be used for the preparation of a response to this document. The information furnished will not be used for any other purpose than stated and that the information will not directly or indirectly, by agent, employee or representative, be disclosed either in whole or in part, to any other third party without the express written consent by the Company or its representative.**

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| ABBREVIATIONS |

AC Alternating Current

ACC Area Control

APP Approach Control

ATC Air Traffic Controller

ATIS Automatic Terminal Information Service

ATM Air Traffic Management

ATNS Air Traffic and Navigation Services SOC Ltd

ATS Air Traffic Service

CMP Configuration Management Plan

COTS Commercially off the Shelf

DB Distribution Board

DC Direct Current

DSB Double Side Band

EIA Environmental Impact Assessment

EMC Electromagnetic compatibility

FAT Factory Acceptance Test

FIR Flight Information Region

FIS Flight Information Service

FRS Forward Relay Station

ICAO International Civil Aviation Organization

KPIs Key Performance Indicators

LCCP Life Cycle Cost Plan

LRU Line Replaceable Units

LSP Logistics Support Plan

MDF Main Distribution Frame

OEM Original Equipment Manufacturer

PBU Period of Beneficial Use

P, H, S & T Packaging, Handling, Storage and Transportation

RAMP Reliability, Availability and Maintainability Plan

RF Radio Frequency

RCMMS Remote Control Monitoring and Maintenance System

RSE Remote Switching Equipment

RX Receiver

SACAA South African Civil Aviation Authority

SANS South African National Standards

SAT Site Acceptance Test

SLA Service Level Agreement

TCP/IP Transmission Control Protocol/Internet Protocol

TWR Tower

TX Transmitter

URS User Requirement Statement

VHF Very High Frequency

V-SAT Very Small Aperture Terminal

VoIP Voice over Internet Protocol

1. **GENERAL INSTRUCTIONS TO BIDDERS**

The Bidder shall submit all responses, diagrams, documentation and drawings according to the GENERAL INFORMATION AND INSTRUCTIONS TO BIDDER’S document and in the English language.

To assist Bidders only, each paragraph or article has been appended throughout with the letters “(M)”, “(D)”, “(O)” or “(I)”, to indicate whether the requirement is **M**andatory, **D**esirable, **O**ptional or for **I**nformation only.

**ALL RESPONSES TO THE REQUIREMENTS IN THIS DOCUMENT SHALL BE PROVIDED AS FOLLOWS:**

BIDDERS SHALL RESPOND IN FULL TO EACH ITEM IN THE FORMAT PROVIDED AND REFERENCES (CHAPTER, SECTION, PAGE NUMBER, PARAGRAPH NUMBER) TO DOCUMENTS AND RELEVANT INFORMATION SUPPORTING THE RESPONSES SHALL BE INDICATED IN THE SPACE PROVIDED. THIS INFORMATION WILL BE THE **ONLY RESPONSE USED FOR THE EVALUATION AND ASSESSMENT**.

Responses, provided in the space allowed, that are not clear or inadequate or the lack thereof shall be interpreted as **“Not Compliant”** even though the compliance column is declared as “Comply” and/or the Bidder’s offer meets the requirement. Bidders shall ensure that each response correctly addresses the requirement stated. Responses not addressing the requirement of the specific paragraph shall be interpreted as **“Not Compliant”**.

Bidders shall declare compliance to each and every paragraph of this document, based on the paragraph classification, in the response block provided opposite the column labelled “Compliance”. Bids will be evaluated as follows:

C: fully compliant = 2 points:

PC: partly compliant = 1 point;

NC: not compliant = 0 points.

Noted: Noted and accepted (applicable to paragraphs marked as “I”, not containing requirements)

Bidders shall, for paragraphs declared “PC” or “NC”, include a statement as to the nature of the variation and may supply additional supporting information in the space provided to demonstrate how the proposal may still meet the needs of ATNS.

**Paragraphs marked “(M)”**, indicates that the requirement is mandatory and Bidders that do not comply with the requirement **shall** be disqualified for further evaluation.

**Paragraphs marked “(D)”**, indicates that the requirement is desirable, and the Bidder is expected to declare their level of compliance, provide a formal response and reference supporting documents.

**Paragraphs marked “(I)”**, indicates that the requirement is for information, however the Bidder is still expected to respond and provide information if requested. Any information gathered herein may form part of the contractual terms.

**Paragraphs marked “(O)”**, indicates that the requirement is optional, and the Bidder may decide how to respond.

# CHAPTER 1 – GENERAL SPECIFICATIONS FOR VHF COASTAL COVERAGE EQUIPMENT AND SITES

GENERAL SPECIFICATIONS FOR VHF EQUIPMENT

# INTRODUCTION

All the specification in this section is applicable to each of the VHF equipment and sites specified in this document.

# GENERAL

## Environmental Conditions

1. The VHF system and all its auxiliary components shall withstand and operate within specifications under the environmental conditions as tabulated below. Bidders shall include data sheets for each system to indicate compliance to the values and tolerances in the table below. (D)

**Table 1: Climatic conditions**

|  |  |  |
| --- | --- | --- |
| **Indoor Conditions** | Ambient Temperature | -5 °C to +55 °C |
|  |  |
| Relative humidity | 10% to 90%. |
|  |  |  |
| **Outdoor Conditions** | Ambient Temperature | -20 °C to +55°C |
|  |  |
| Altitude tolerance | 0 to 2000 meters |
|  |  |
| Relative humidity | 0% to 100%. |
|  |  |
| Annual rainfall range | 400 mm to 2000 mm |
|  |  |
| Wind speed | ≤200 km/h |

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All outdoor elements, structures and other auxiliary components shall withstand the effects of rain, snow, storms and attacks of animals, as well as the outdoor climatic conditions stated herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Ice breakers shall be installed (where required) on antenna towers to prevent damage to antennae due to falling ice. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The outdoor elements, structures and other auxiliary components shall be hermetically sealed and protected against corrosion. Their protective casings/enclosures shall be at minimum International Protection Rating IP65. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Power Supply

1. The VHF system and supporting infrastructure shall be compatible with the mains power supply as defined below and the Bidder shall include data sheets for each system indicating the design values and tolerances. (D)
* Single phase 230 V AC, Tolerance: ± 10%
* Frequency: 50 Hz, Tolerance: ± 2 Hz

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Standby Power Source

1. The Bidder shall supply and install a suitable standby power source for the supplied VHF system and supporting infrastructure per site. If the backup power supply is a battery backup, these batteries shall comply with the requirements as defined in Chapter 4 section 2.1 and if the backup power supply is a UPS, the UPS shall comply with the requirements as defined in Chapter 4 section 2.2. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall confirm and provide supporting documentation that all the components of the offered system can operate from a standby power source. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide an isolator switch to be installed between the equipment and the standby power source to allow disconnection of the VHF equipment from the standby power source. Bidders shall provide specifications of the isolator switch offered. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The backup power supply shall have sufficient capacity to provide power to the VHF system and supporting infrastructure excluding the air conditioning unit(s), on site for a minimum period of 12 hours from full capacity. Bidders shall include assumptions and calculations per site determining the capacity required. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The backup power supply shall, within 24 hours, be restored from the maximum depth of discharge to, 70-80% state of charge. The Bidder shall provide supporting documentation and calculations. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The input power to the VHF system and supporting infrastructure shall be regulated and managed, to eliminate any damage to electronics because of power fluctuations and instability. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The supplier shall propose a discharge voltage cut-off point for the proposed backup power supply to ensure that the backup power supply is not completely drained without allowing sufficient time for the VHF system to gradually shutdown. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. There shall be a means to gauge if this point has been reached and if this point is reached, while the mains power supply has not yet been restored, then shutdown of the VHF system and supporting infrastructure shall be initiated. The Bidder shall provide full details on this aspect. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The changeover between the mains power supply and the proposed backup power supply shall allow both seamless automatic and manual changeover. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The power consumption of the VHF equipment and all auxiliary equipment, operating under DC and AC conditions shall be stated. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Lifespan

1. The VHF system and auxiliary systems shall be designed to operate within specifications under the stated environmental conditions for a minimum period of 15 years. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall indicate to what extent the 15-year lifespan could be exceeded. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall provide the design life of all major VHF equipment components (e.g. radios, remote switching equipment, etc.), auxiliary equipment (e.g. air conditioner, batteries, etc.) and supporting infrastructure that will be supplied under this tender. (I).

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Modularity

1. Modular design and construction shall be used to the maximum extent. All hardware modules shall be removable from the system without the requirement for any disassembly other than a simple disconnection of connectors or release of simple locking devices. Bidders to provide supporting information. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All components shall be readily accessible to the maintenance personnel, easily disassembled and replaced. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All cooling fans shall be external and shall require minimal effort to change or replace. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Technology

1. The design and construction of the VHF equipment shall be modern and based on transistor technology and integrated circuits (ICs). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall already have existing VHF systems and supporting infrastructure that have been deployed elsewhere for the purpose of ATM service provision. Bidders shall provide detailed proof of their systems’ deployment. (D)

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall provide contactable customer references where offered systems have been successfully deployed. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The submitted response shall include technical details and design information of the proposed VHF system and all supporting infrastructure. This includes all required devices and associated software and hardware for all the sites listed for optimum performance. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Frequency Assignment

1. The assignment of an operational frequency to the VHF system shall comply to all the requirements stipulated in the following:
	1. South African Civil Aviation Regulations, 2011, Part 171, Aeronautical Service Providers (Electronic Services Organisations), Communication, Navigation, Surveillance and Meteorological Equipment.
	2. ICASA, The Radio Frequency Spectrum Regulations March 2015
	3. ICAO Handbook on Radio Frequency Spectrum Requirements for Civil Aviation, Vol II – Frequency assignment planning criteria for aeronautical radio communication and navigation systems, Chapter 2.

The Bidder shall provide either certification or supporting documentation to prove compliance (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall ensure that all currently allocated operational frequencies for ATNS’ VHF radios, as provided in APPENDIX A – SITES INFORMATION, shall be maintained. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Cabling

1. All power and communication cabling shall be installed in separated ducts and labelled. (I)

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall include with their response a proposed interconnection diagram depicting the flow of communication, power and the various system equipment components. (D)

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Labelling of cables shall be colour coded and include a numerical identifier, cable type, source (unit name, port, location) and destination (unit name, port and location). An example of the labelling shall be included in the Tender response. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Equipment Cabinet

1. The VHF system shall be installed in a suitable equipment cabinet(s). The equipment cabinet(s) shall account for natural heat dissipation and a proper cable management system. Details of the equipment cabinet shall be included in the Bidder response. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Where the site configuration dictates more than one cabinet, the main and standby equipment shall be installed in separate cabinets otherwise the main and standby equipment shall be housed in one cabinet. The Bidder shall provide the cabinet layout per site in support of this requirement (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The equipment cabinet shall be fitted with an IDF, preferably mounted at the back of the cabinet, sized to the communication requirements of the cabinet and spare capacity for future expansion. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The equipment cabinet shall make provision for access to the VHF system for maintenance purposes. Bidders shall indicate how this requirement will be met in their equipment cabinet design. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall deliver a detailed equipment rack layout and equipment placement scheme. The placement of all equipment (transmitters, receivers, multi-couplers, remote control system…etc.) shall be clearly visible on the provided layout. (D)

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| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. If any additional equipment cabinets are required to accommodate auxiliary equipment, the cabinets shall: (D)
* be 19 inch based,
* provide front and back access,
* cater for sliding trays if required,
* cater for bottom access for power cables,
* top access for communication cables.

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Lightning Protection

1. The Supplier shall install suitable lightning protection devices (in accordance to SANS 10313:2012) on all RF cables without impacting on the RF signal quality. The Bidder shall provide full detail of the proposed protection devices. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Supplier shall install suitable lighting protection devices (in accordance to SANS 10313:2012) on all communication cables. The Bidder shall provide full detail of the proposed protection devices. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Supplier shall install suitable lighting protection devices (in accordance to SANS 10313: 2012) on the main power supply. The Bidder shall provide full detail of the proposed protection devices. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Supplier shall install suitable surge protection (in accordance to SANS 10142:2012) on the power cables to the VHF equipment. The Bidder shall provide full detail of the proposed protection devices. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Company reserves the right to approve the offered devices or revert to the Company favoured devices. (I)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Software

1. All software shall be supplied on Compact Disk (CD) and Universal Serial Bus (USB). (D)

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| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall confirm that all contents of CD’s and USB’s supplied may be copied by the Company for backup purposes and internal distribution. (D)

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| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All software delivered shall be placed under configuration control. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall provide the Company with the minimum specification for laptops and desktop computers to run the software provided under this project. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Equipment Related Software

1. At the time of the first site acceptance, under the project, the Contractor shall provide a full set of all equipment related software to be installed, excluding site specific equipment related software. A list of this software shall be provided as part of this tender response. (D)

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. At the time of each site acceptance, the Contractor shall provide a set of site-specific equipment related software relevant to the specific site as backup. A list of this software shall be provided as part of this tender response. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All equipment related software must be kept current and updated throughout the entire 15-year lifespan of the VHF system and shall be included as part of the maintenance and support contract. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## RCMMS Related Software

1. At the time of the first site acceptance, under the project, the Contractor shall provide a full set of all RCMMS related software to be installed, excluding site specific RCMMS software. A list of this software shall be provided as part of this tender response. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. At the time of each site acceptance, the Contractor shall provide a set of site specific RCMMS related software relevant to the specific site as backup. A list of this software shall be provided as part of this tender response. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The current ATNS Network applies multiple measures to enhance access and security. The current ATNS applications in place are, the Blue Coat Unified Agent as well as System Center endpoint protection anti-virus. The proposed RCMMS software shall be compatible with these Commercial Off-the-Shelf (COTS) virus protection software. The Bidder shall confirm and provided full details on the compatibility of their RCMS system with these products and provide full details of any known compatibility issues with other COTS products. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Built-in Test Equipment

1. The VHF equipment shall be equipped with a suitable BITE function, which can be used to isolate faults to Printed Circuit Board (PCB)/ Line Replacement Unit (LRU) level and test the performance of the hardware and software. The Bidder shall provide details of the VHF equipment BITE functions. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The BITE functions must be kept completely independent from the VHF equipment monitoring operation. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The results of the fault-locating BITE programs shall be easily comprehensible and accessible through the local and remote interface and display unit. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

##  Test Equipment

1. Any special tools required for installation and commissioning of the VHF equipment shall be listed and included by the Bidder in the offer. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall provide a list of all the test equipment required for the installation and commissioning of the VHF system, as well as any associated supporting infrastructure, and shall clearly indicate in which phase and for which system it is used. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Burn-In

1. Bidder shall provide a list of tests performed on the components and sub-units during the production process. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Each of the VHF equipment shall be subjected to a “burn‑in" test for a period of at least 48 hours, the results of which shall be presented at the Factory Acceptance Test. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Equipment Installation

1. The installation of the VHF equipment shall be straightforward and shall be accomplished with a minimum number of specialized tools. Bidders shall indicate the average time for the installation, setup and commissioning for each site and provide a list of the specialized tools required. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Project Manager reserves the right to attach ATNS Company officials to the Supplier’s installation party during installation, set-up and commissioning of the equipment for the purpose of gaining practical experience and On-the-Job Training (OJT) on the equipment. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The final set-up and commissioning of the VHF equipment shall only take place once all the site works have been completed. The project schedule, as defined in Volume 3, should clearly indicate how this will be achieved. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall be responsible for the installation, set-up and commissioning of the VHF equipment and all adjustments required during the site acceptance test. The project schedule, as defined in Volume 3, should clearly indicate how this will be achieved. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The final parameters and settings on the VHF equipment shall be recorded by the Contractor on the successful completion of the site acceptance test and will be made available to the Company as part of the As-Built document. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Electrical Work

### Building and shelter sites

The following electrical work shall be completed at all sites

1. The Contractor shall be responsible for reconnecting the mains supply to the building or shelter Distribution Board (DB). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All mains power wiring will be done in accordance with the WIRING OF PREMISES (SANS 10142) requirements. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The distribution board will be provided with an earth leakage facility for the auxiliary equipment and circuit breakers for all equipment to be installed in the building/shelter. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall be responsible for the supply of an Electrical Compliance Certificate (ECC) as issued by a certified electrical contractor for each site. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Building sites

The following electrical work shall be done at all building sites

1. The Contractor shall be responsible for replacing the existing mains DB. The Contractor shall provide a wiring diagram and labelling for the new DB. Full details of the proposed DB capacity and dimensions shall be provided as part of the Bidder’s proposal. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall (where applicable) inspect and replace (if required) the existing generator manual change-over switch. ATNS preference is for the switch to be located in the mains DB. The Bidder to include a provision in the price schedule. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall (where applicable) inspect and replace (if required) the existing emergency generator inlet socket and weather cap. The Bidder to include a provision in the price schedule. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall be responsible for supplying, installing and connecting power cables from the mains DB to the equipment. The power cables shall be labelled and installed neatly in cable trays and cable ducts. The Contractor shall provide a wiring diagram showing the proposed layout of the power cables. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall be responsible for supplying and replacing existing plug points with four standard South African three pin plug points. Two plug points shall be installed on the wall behind the equipment cabinets and the other two plug points shall be installed above the work bench. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall supply and replace existing light fittings with two dual tube light fittings with LED tubes. The light emitted by the supplied LED tubes shall be bright white and shall illuminate the room during zero natural light conditions. The Contractor shall provide a design indicating the dimensions, specifications and installation location of these light fittings. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# CHAPTER 2 – SPECIFICATIONS FOR VHF EQUIPMENT

# VHF TRANSMITTER

## Design

1. The VHF transmitter design shall comply to all the requirements stipulated in the following:
	1. ICAO Annex 10, Volume 3, Part II, Chapter 2: Aeronautical Mobile Service
	2. ICAO Doc 9896, Chapter 7: Voice Over IP (VoIP) in ATM
	3. EUROCAE ED136: VoIP ATM System Operational and Technical Requirements
	4. EUROCAE ED137B Part 1: Radio, Addition Feb 2012

Compliance to the above shall be reflected in the Technical Datasheet and where applicable certification shall be submitted. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]*  |

## Basic Functions

### Transmitting Function

1. The Transmitter output power shall be 50 Watt (+17dBW) into 50 Ohms, excluding any external isolators or cavity filters, with the exception of the transmitter for the FAOR ACC-EAST service in King Shaka Int’l Airport (FALE) which require a 100 Watt (+20 dBW) power output. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The transmitters shall operate with 25 kHz and 8.33 kHz channel spacing. Bidders shall submit referenced documentation to support compliance. (M)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The transmitters shall operate in the range of 117.975MHz – 137MHz with pre-settable band edges. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The audio input (AF input) impedance shall be 600 Ohms, balanced. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The transmitter shall be capable of 100% duty cycle at full power and modulation across the full temperature range of at least -5 to +55 °C, without any degradation of RF parameters. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The frequency error shall be within ± 1 x 10-6 over the whole VHF range and under the environmental conditions stated herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The equipment shall be tunable over the frequency range of 117.975 to 137 MHz without any change of elements. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The transmitter shall have a multichannel feature allowing up to 20 frequency channels to be programmed, sorted and recalled by channel number. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The type of emission shall be Double Side Band (DSB) Amplitude Modulation (AM), full carrier A3E for speech. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The VHF Transmitters shall support at least 4 carrier frequency offset for 25 kHz spacing and at least 2 carrier frequency offset for 8.33 kHz spacing. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The modulation depth shall be adjustable up to 95 %. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The VHF Total Harmonic Distortion (THD) shall not exceed 10 % when measured with a test tone of 1000 kHz at modulation depths of 90 % and below. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Harmonics of the carrier frequency shall not exceed 5 x 10-7 watts. (D)

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| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Any other radiation as measured at a 50-Ohm load directly at the transmitter output of up to 1200 MHz shall not exceed 5 x 10-7 watts. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Monitoring and Control Function

1. The transmitters shall be capable of being controlled, monitored and operated either locally or remotely with full status indications being available locally and at the remote-control position. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The front panel lights (status indication) shall indicate the following: (D)
2. Power on
3. Equipment transmitting
4. Alarm Indication

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The front panel controls shall include: (D)
2. Scroll/Select function

|  |  |  |
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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The front panel shall display the following measurements: (D)
2. All AC and DC voltages necessary for fault location
3. All RF levels necessary for tuning and fault location
4. Output power / reflected power
5. Modulation depth
6. VSWR monitor

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Interfaces shall be provided for the remote operation and signalling via LAN or analogue or digital telephone lines. The following functions, at minimum, shall be supported: (D)
2. Transmit (TX) ready
3. Push-to-talk (PTT)
4. Power on/off signaling
5. Power on/off switching
6. General alarm signaling

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Built-in-test equipment (BITE) facilities enabling immediate fault location in case of failure shall be available. These BITE facilities shall be accessible via the RCMMS computer software. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# VHF RECEIVER

## Design

1. The VHF Receiver design shall comply to all the requirements stipulated in the following:
	1. ICAO Annex 10, Volume 3, Part II, Chapter 2: Aeronautical Mobile Service
	2. ICAO Doc 9896, Chapter 7: Voice Over IP (VoIP) in ATM
	3. EUROCAE ED136: VoIP ATM System Operational and Technical Requirements
	4. EUROCAE ED137B Part 1: Radio, Addition Feb 2012

Compliance to the above shall be reflected in the Technical Datasheet and where applicable certification shall be submitted. (D)

|  |  |  |
| --- | --- | --- |
| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The receiver shall have the SCT (Simultaneous Call Transmission) detection functionality built in within the radio and have the capability to send alert messages when simultaneous ATC/Pilot transmissions are detected.

Compliance shall be reflected in reference documents provided by the Bidder. (M)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The alert messages shall be sent via the receiver’s IP interface in accordance with ED136/7B specifications for interpretation by a complaint Voice Communication System: (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Basic Functions

### Receiving Function

1. Receiver sensitivity shall be -107dBm for a SINAD of 12 dB or better, with the RF input modulated at 30%. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The receivers shall operate with 25 kHz and 8.33 kHz channel spacing. Bidders shall submit referenced documentation to support compliance. (M)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The receivers shall operate in the range of 117.975MHz – 137MHz with pre-settable band edges. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The equipment shall be tunable over the frequency range of 117.975 to 137 MHz without any change of elements. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The analog audio output (AF output) impedance shall be 600 Ohms, balanced and be suitable to direct connection to communication lines. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The receiver shall have a multichannel feature allowing up to 20 frequency channels to be programmed, sorted and recalled by channel number. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The type of reception shall be Double Side Band Amplitude Modulation, full carrier A3E for speech. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The audio output level variation shall not exceed 3 dB for an input voltage between 1.5 μV and 200 mV. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The receiver shall incorporate a means to suppress the noise output by at least 70 dB in the absence of a wanted signal. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The squelch shall open at all RF inputs above 1 μV, in less than 20 msec when the input signal exceeds the set threshold by 3 dB. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The receiver shall incorporate means of disconnecting the squelch operation. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The squelch operation shall be accompanied by the illumination of a front panel lamp or any other suitable indicator. (D)

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| 1. **COMPLIANCE (C/PC/NC/Noted)**
 | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Monitoring and Control Function

1. The front panel lights (status indication) shall indicate the following: (D)
2. Power on
3. Equipment receiving
4. Squelch indication
5. Alarm indication

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The front panel controls shall include: (D)
2. Power on/off indication
3. A jack for headset connection

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Measuring instruments shall provide the following measurements: (D)
2. All AC and DC voltages necessary for fault location
3. Received signal level

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Suitable Interfaces shall be available for remote operation and signaling via LAN or analogue or digital telephone lines. The following functions shall be available to be performed remotely: (D)
2. Rx-ready indication
3. Squelch
4. Power on/off switching
5. Power on/off signaling
6. General alarm signaling

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. BITE facilities enabling immediate fault location in case of failure shall be available. These BITE facilities shall be accessible via the RCMMS computer software. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# RADIO EQUIPMENT INTERFACE REQUIREMENTS

## Audio interfaces

1. The radios shall have the following audio interfaces (for both the transmitter and receiver): (D)
2. An analog 4W E&M interface
3. An ED137B Compliant IP interface

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. For the purpose of legal recording each receiver shall have a dedicated recording output. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The analog audio line input (AF input) on transmitters shall be designed for a direct connection to communication lines at a nominal level between -30dBm and +10dBm adjustable by 1dBm steps. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The analog audio line output (AF output) on receivers shall be designed for a direct connection to communication lines at a nominal level between -30dBm and +10dBm adjustable by 1dBm steps. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Contact signaling interfaces

1. Radios shall be able to operate using contact signaling for PTT activation and Squelch indication. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Contact signaling interfaces shall be wired to the main distribution frame (MDF). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The contact interfaces shall have over-voltage and over-current protection. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Push-to-talk (PTT) interfaces

1. Transmitters shall be capable of both local and remote keying. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Squelch indication interfaces

1. Receivers shall have squelch indication interface to enable systems connected to this interface to track when a squelch circuit on the receiver is closed. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The squelch indication signal shall be sent to external systems such as the Voice communication and control system (VCCS) via: (D)
2. 4 wire E&M signaling lead in case of an analogue audio interface
3. IP

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Serial or USB Interfaces

1. Each radio shall have at least a dedicated RS232 or RS422 or USB to enable local configuration of the radio equipment. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Ethernet Interfaces

1. Each VHF radio shall have a dedicated integral Ethernet interface for VoIP connection in accordance to EUROCAE ED 137B and EUROCAE ED 138 to enable connection to the VCCS. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## RF Interfaces

1. The Bidder shall provide details of the RF interfaces used for connecting antennas to the radios. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The impedance of the RF interfaces shall be 50 Ohm, unbalanced. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. RF input and output connectors shall be a coaxial type N female. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Transmitters shall not be damaged if the RF interface is open (impedance Z= ∞) or short circuited (impedance Z=0). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Protection against antenna transmitter mismatch shall be provided and damage due to any type of mismatch shall be prevented. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# ANTENNA AND RF REQUIREMENTS

## Antenna Specification

1. The antennas offered shall have an Omni-directional relative gain of at least 2 dBi without adversely affecting the polar pattern required to provide the services at the flight levels as indicated. Antennas with relative high elevation angle radiation properties with narrow nulls in the “direct overhead position” shall be preferred. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The antenna VSWR shall be less than 2.0. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The antennas must have a 15-year life span and be corrosion resistant as these installations are required at coastal areas. Details to be included in the tender response. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. New antenna coaxial cables including fly leads (interconnecting radios to the antenna coaxial termination point – cable tray bulk head) shall be provided for all sites that are part of this project. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Coaxial cables shall be low loss, typically 7/8” foam dielectric or equivalent. An LMR400DB cable or equivalent will be acceptable as a fly lead. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RF cable operating temperature shall be at least in a range of -20˚C to +55˚C. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RF cable impedance shall be 50Ω. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All antennas shall be fitted with N-Type coaxial connectors. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Mounting flanges shall be made from anticorrosive material or shall be hot dip galvanized steel. All screws and nuts shall be made from stainless steel. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All antenna coaxial cables installed on the masts shall be earthed with an appropriate antenna cable earthing system. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Each antenna cable shall be earthed at two positions on the antenna mast. One earth position as close to the antenna feed point as possible and one earth point at the bottom of the mast, at a point on the mast where the antenna coaxial cable is fed to the equipment shelter. Bidders shall provide full detail of the method of antenna coaxial cable earthing proposed. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The antenna system shall operate in the VHF frequency range of 117.975 MHz to 137 MHz (VHF Air band). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The antenna shall be VHF Omni directional with radiating elements which have a high radiation efficiency of at least 100W. The radiating elements should be equally spaced on the antenna pattern. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The antenna shall withstand a wind velocity of at least 200 km/h. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The antenna shall have a high stability to obtain the coverage requirements given in ICAO Annex 10, Volume I. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## VHF Multicouplers and Cavity Filters

1. The cavity tuning range shall be within 117.975-137 MHz (VHF airband). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall provide one cavities per channel as indicated in Appendix A. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The minimum power handling per channel shall be at least 50W. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The maximum channel insertion loss shall be less than 2 dB. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The minimum channel separation in the multicoupler shall be at least 200 kHz. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The isolator insertion loss shall be less than 0.5dB. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Earthing

1. The equipment earth system shall be installed when construction of the pre-cast concrete plinth or foundation for the base of the shelter takes place. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The earth system shall be based on a copper ring earth with a minimum of six earth rods surrounding the concrete plinth and bonded to the copper ring earth. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The equipment shelter earth shall be directly connected to the copper ring earth system at the common ground point. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All earth electrode rods, lightning down conductor and copper earth radials shall be bonded in accordance to SANS 10199.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Direct earth straps or copper earth conductors shall be provided and installed from the coaxial cable bulk head entry, the different equipment racks, the mains power entry and distribution board, the outside metal sheeting of the equipment shelter and the telecommunication line distribution frame or entry point to the common ground point in the equipment shelter. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide a full description and detail of the ring earth and lightning protection system offered. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Lightning Protection

1. The insertion loss shall be less than 0.15 dB. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The surge voltage and current shall be adequate for the system. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The lightning protector sparkover voltage shall be 230V. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The lightning protector operating temperature shall be at least -20 to +55˚C. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# TRAINING SYSTEMS

## Training Facility

1. A complete VHF system, comprising 6 transmitters and 6 receivers, with relevant auxiliary components shall be installed at ATNS’ Aviation Training Academy (ATA) for use as testbeds for maintenance personnel and, for research and training purposes. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The training VHF equipment shall comply with all system specifications as defined in Chapter 1, Chapter 2 and Chapter 3. Any deviation from the compliance statements as detailed in Chapter 1, Chapter 2 and Chapter 3 shall be clearly identified and motivated. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# CHAPTER 3 – SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF REMOTE-CONTROL MONITORING AND MANAGEMENT SYSTEM (RCMMS)

# GENERAL

1. The Bidder shall provide full details of the RCMMS offered in response to the specifications contained herein. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide a complete list of the functions available on the RCMMS as well as the parameters on the equipment that can be controlled and adjusted. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall clearly state what operating system will be provided for the maintenance laptop computers as well as any other workstation or server that forms part of the RCMMS infrastructure. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall describe all the features and performance details of the proposed RCMMS including any that are not specifically referred to in this document. This description should include a draft user manual for the RCMMS system. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All workstation display units shall be at least flat screen Liquid Crystal Display (LCD) technology with a screen size of 24”. Details shall be provided as part of the Bidders offer. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall ensure that the Company shall have the capability to change and reconfigure the system and add or remove facilities without requiring any intervention from the Original Equipment Manufacturer (OEM). (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All RCMMS equipment and supporting infrastructure, excluding the air conditioning unit(s), shall be connected to the standby power source. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall restore its configuration setting and ensure integrity of saved data, upon power restoration and without any operator intervention. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. A complete Interface Control Document (ICD) of the equipment status, monitoring and control shall be supplied by the successful Bidder in order to allow the Company to interface to other systems. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

#  RCMMS FUNCTIONALITY

1. The Contractor shall supply and install a new RCMMS to monitor and control all radio equipment (transmitters and receivers) installed at all sites that are part of this project. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall allow: (D)
2. Automatic switchover of radio equipment in the case of failure based on an alarm signal derived from the BITE information,
3. Manual switchover of radio equipment in the case of failure or maintenance/reconfiguration purposes available locally or from the maintenance room.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Malfunction of any part of RCMMS shall not have impact on the radio equipment functionality. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS status display shall distinguish between the VHF system equipment, and external systems. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS status display shall be presented on different functional levels as defined by the system design. The Bidder shall indicate the functional levels that status indication will be provided for each item of equipment. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall allow connecting a laptop to the RCMMS to monitor and control the operation of radio equipment installed on site during on-site maintenance. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall monitor and control all receivers and transmitters configured in the system and indicate their live status and failures. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall monitor temperature and AC power supply at all sites. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall provide user-defined multiple input/output (I/O) ports for control and monitoring of additional equipment (such as alarms and auxiliary switching), at least 4 inputs and 4 output functions for each radio site. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall use as a minimum the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol for communication with all radio equipment. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall, based on the information received from a remote radio equipment, display the status of the radio equipment as either normal, alert or alarm by using the following colour logic: (D)
2. Green – normal operation, no faults and failures;
3. Amber or yellow – alert condition, a fault or warning was encountered;
4. Red – alarm condition, service terminated due to performance downgrade; and
5. unknown condition – communication interrupted and radio equipment status unverifiable (Preferably Blue or Grey colour).

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS application shall be able to generate reports according to the user selection. It shall be possible to export reports into printable versions. Reports shall cover at least the following historic and current information: (D)
2. Radio equipment status and alarms;
3. Transmission and ancillary equipment status and alarms;
4. Radio equipment configuration (operational parameters and settings) for each unit and/or system.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall log all changes made to the VHF system through the RCMMS including the operator’s log-in details. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Access to history logs of the equipment as well as the RCMMS interface shall be available. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide a list of all the actions that are being logged. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall store and time stamp all radio equipment information, as received. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All reports and configurations shall be archived and recalled in the RCMMS application with a version date or number for a user defined storage period. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Remote access shall be password controlled with separate levels of access. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall provide an administrator with the capability to configure access levels and passwords for each user separately for each radio site. Security/access levels shall include: (D)
2. standard access – no control functions only viewing rights,
3. control access – all control functions,
4. administrator access – system configuration possibilities.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall allow for monitoring and maintenance activities on the VHF equipment under the responsibility of the relevant maintenance centre situated at, King Shaka, Port Elizabeth, and the support centres situated at East London and George. The status of the VHF equipment shall be made available to be presented at any position where it may be required. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Full control and adjustment of equipment parameters shall be available from the maintenance and support centres, as well as the standard equipment control such as, switch on, switch off and changeover shall be catered for. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide full details on the offered RCMMS: (D)
2. Functionality,
3. Capacity,
4. Capacity and capability to monitor and control the supporting infrastructure (e.g. air conditioners),
5. Capability to interface with other supplier’s equipment.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide the minimum performance criteria, between the maintenance centre and equipment on site, for the proposed RCMMS (excluding the impact of the communications medium), including but not limited to throughput, data transmission time, response time and latency. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidders shall provide full details on the communication requirements associated with the proposed RCMMS system. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall incorporate a Graphical User Interface (GUI) to present information and enable the user to interact with VHF equipment where applicable. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The RCMMS shall present received information from the remote radio equipment in the English language. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# CHAPTER 4 – SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF AUXILIARY SYSTEMS & EQUIPMENT

# AIR CONDITIONING SYSTEM

1. All supplied shelters and buildings (as specified) shall be fitted with invertor type air conditioning split units as defined herein. The Bidder shall provide full details on the offered air conditioning split units. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The air conditioning system shall incorporate two air conditioning split units per site, at least 12 000 BTU/h each, that shall provide cooling to compensate for the heat load generated by the VHF system and its supporting electronic equipment. The Bidder shall provide the BTU of the offered air conditioning system for shelters and buildings. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The air conditioning split units shall be configured as main and standby, fitted with a changeover controller that shall ensure that only one unit will be operating at any given time. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Bidder shall include a proposal for the supply and installation of protection against vandalism of the outdoor units at all sites that are part of this project. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The air conditioning system shall ensure that the room temperature is kept constant at the pre-set value. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Provision shall be made for the disposal of the water from the air conditioning system that is generated in the process of condensation. Bidders shall indicate how this will be achieved. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The air conditioning system shall be energy efficient and environmentally friendly. The air conditioning system shall not use refrigerants with high global warming potential and high ozone layer depleting potential. Bidders shall provide full details as to how this is achieved. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The air conditioning system’s outdoor units shall be protected against corrosion and the environmental conditions as stated herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The air conditioning system shall report its operational status, its temperature setting, and sensor detected room temperature to the RCMMS at regular intervals. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# BACKUP POWER SUPPLY

## Battery backup

1. The battery backup assembly with an inverter shall comply with the requirements as stated below. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The batteries shall be sealed and maintenance free. The batteries shall be environmentally friendly and not emit any poisonous gases during discharge. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The batteries shall withstand the environmental conditions as stated herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The batteries offered shall be approved to operate in a non-ventilated equipment shelter and shall be designed for a minimum life span of 5 years. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## UPS backup

1. The UPS backup system shall comply with the requirements stated below (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The UPS shall operate continuously at the rated capacity as an on-line double conversion backup system and, shall charge and discharge its batteries when required. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The UPS shall ensure that the batteries are not overcharged. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The UPS shall incorporate a static bypass switch for transitioning purposes and protection of the UPS against excessive overload. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The UPS shall also incorporate a manually controlled bypass switch for maintenance purposes. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The UPS shall further incorporate a control panel for enabling user interaction and monitoring of the UPS. The UPS shall communicate with the RCMMS and report on various parameters without limitations to the following: (D)
2. UPS system status;
3. Input Power;
4. Power factor;
5. Battery usage and remaining life; and
6. Load percentage.

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The UPS batteries shall be environmentally friendly and have a life expectancy of at least 5 years. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

#  MAINTENANCE COMPUTER

1. The Bidder shall include the detailed specifications for the RCMMS compatible COTS maintenance computers. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The supplier shall provide at least one maintenance computer to each of the four maintenance centres and the ATNS’ Aviation Training Academy. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All software for the maintenance computer shall be capable of operating on commercially off the shelf computers. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

#  PORTABLE FIRE EXTINGUISHER

1. The Contractor shall perform an inspection of existing fire extinguishers in buildings during site audits. Should the condition or capability of the fire extinguishers be found to be inadequate, the Contractor shall be responsible for the supply and installation of the new portable fire extinguishers in the buildings. The Bidder shall provide full details on the offered portable fire extinguisher. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The portable fire extinguisher shall be a squeeze grip operating type with a pressure indicator and a charge capacity of at least 2.5 kg for extinguishing of electrical fires. The portable fire extinguisher shall be installed as close as possible to the main access door for either a shelter site or a building site. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The portable fire extinguisher shall extinguish fire at a nominal minimum discharge time of 10 seconds and to a maximum discharge distance of 2 meters. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The fire extinguisher shall incorporate a nozzle for discharging of the charge and this nozzle shall be flexible and securely placed when the portable fire extinguisher is not in use. The portable fire extinguisher shall also incorporate a discharge horn for directing the discharged charge. Bidders shall provide details of the nozzle and the discharge horn. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall provide a mounting bracket, for the mounting of the portable fire extinguisher, installed as close practically possible to the entrance door for ease of access. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The portable fire extinguisher shall have minimal impact to the environment and be in accordance with SANS 60950-1. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

#  SECURITY SYSTEM

1. An **Intrusion Detection System** (IDS) shall be installed at each site to deter and detect unauthorized entry into the shelter. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The installed IDS shall not interfere with the operation of the VHF systems on site. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The IDS shall transmit a message immediately to the RCMMS when intrusion is detected. Upon detection of intrusion the IDS shall signal an audible alarm that shall continue until acknowledged. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The IDS shall incorporate a control panel that will serve as an interface for an operator to arm and disarm the system. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The IDS shall detect unauthorized opening of the shelter/building entrance door and shall provide a delayed response, that can be user defined to allow authorized personnel to disarm the system through the IDS control panel. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The IDS system shall have a high probability of detection to ensure discernment of true intrusion and ensure that false alarms are kept to a minimum. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The IDS components that will be exposed to the natural environment shall be corrosion resistant and shall survive the environmental conditions as stated herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# CHAPTER 5 – SPECIFICATION FOR THE SUPPLY AND INSTALLATION OF EQUIPMENT SHELTERS, BUILDING REFURBISHMENT AND FENCING

# GENERAL

## Design and Specification

1. The Bidder shall provide detailed shelter design and construction drawings based on the specifications provided herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Contractor Responsibility

1. The Contractor shall deliver and install the new shelters at the specified sites. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall connect the electrical supply to the new shelter. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Shelter Layout

1. A shelter with the following components shall be custom designed, for all sites currently using containers as indicated in APPENDIX A – SITES INFORMATION, to provide space for the VHF system and supporting infrastructure or auxiliary equipment: (I)
2. Workbench;
3. Storage compartment;
4. Outdoor air-conditioner units compartment;
5. Air conditioning system (as defined herein);
6. Portable fire extinguisher (as defined herein);
7. Access door;
8. Lighting;
9. Battery compartment;
10. Main AC distribution board (class 1 and class 2 arrestors);
11. DC distribution board (where applicable);
12. Power sockets;
13. Skirting and cable routing trays/ducts.
14. RF entry plate and arrestors

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The preferred layout of the components is shown in Figure 1 below. Bidders shall provide a diagram showing the layout of all the components. The access door shall be located on one of the short sides. Bidders may provide alternate layout options, provided all requirements are met. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |



Figure 1: Preferred arrangement of components within a container

## Shelter Dimensions

1. The shelter shall be at least 6 x 2.6 x 2.5 (length x depth x height) m and all materials used for the construction of the shelter shall be corrosion resistant and withstand stated environmental conditions for the life span of the VHF system. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Shelter Foundation

1. The typical existing shelter foundation has dimensions of 5m x 7m with approximate depth of 250mm varying with site terrain conditions. Bidders shall indicate if the dimensions fulfil the offered shelter requirements. The Bidder shall make provision for the replacement or extension of existing shelter foundations to cater for any structural damages or size alterations to accommodate the offered shelters. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Shelter Specification

### Material and Construction

1. The shelter shall be manufactured from a minimum 2 mm (colour-white) galvanized material. The shelter walls shall have a thickness of at least 55 mm. The internal layer shall consist of a minimum 0.5 mm chromadek. Bidders shall provide details of the materials used. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Bidder shall submit full details and drawings to demonstrate the techniques that have been applied to strengthen the facility and prevent unauthorized access. (D

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter sub-frame shall be hot dip galvanized as a minimum requirement. The shelter design shall provide complete details of the dimensions and galvanized thickness. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter design shall cater for the following: (D)
2. Insulation of both internal and external portions of the shelter walls;
3. Internal and external cladding of the container;
4. The grade of stainless-steel components used shall be 316 or better; and
5. Galvanized components shall have a zinc electroplating thickness of at least 25 µm (350 g/m2).

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall cater for both roof cable routing and floor cable routing. The shelter shall also make provision for wall skirting and cable entry or exit points. All cable entry and exit points leading to the exterior shall be sealed. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall prevent unauthorized access to its interior and all juncture points (e.g. corners, hinges, etc.) shall employ means to disallow forced entry into the container. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall be waterproof, and all components of the shelter exposed to the natural environment shall be protected against corrosion and withstand the environmental conditions as stated herein. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter floor shall be tiled and the floor beneath the tiles shall be air-tight sealed. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall have a single exterior light positioned above the shelter door to provide light to the front of the container. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter skirting shall make provision for two and three South African standard power receptacles in front of the equipment cabinets, at the back of the equipment cabinets and at the workbench. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall accommodate the installation of an AC distribution box and a communication box behind the equipment cabinet. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall incorporate a cabinet with drawers for storage of maintenance tools, spares and files. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall cater for a secure compartment to accommodate two outdoor air-conditioning units. This compartment shall cater for installation and access for the outdoor air-conditioning units. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall have adjustable supports that uplift the shelter off the concrete foundation. The minimum separation space between the shelter and concrete foundation shall be 80 mm. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall be designed to withstand the weight of the VHF system and auxiliary equipment it will accommodate as well as vibrations and shocks that might be exerted by transportation and forklifts. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Access Door

1. The shelter shall have a single main entrance heavy duty door located on one of the short sides. The design drawings shall indicate the position of the door. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The main entrance door shall be air tight and fitted with a dust proof and waterproof seal. Specifications of the seal shall be provided as part of the design drawings. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. A door stopper mechanism shall be fitted. When the door is opened, this mechanism shall prevent the door blowing shut in windy conditions. The door shall open more than 150 degrees. Specifications of the stopper shall be provided as part of the design drawings. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. All lock mechanisms shall be CLIQ® Cylinder with CLIQ® - Quartz + Key. The key system shall be universal per maintenance centre. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The security door shall be equipped with a locking mechanism that cannot be opened with a crowbar, bolt cutter or similar tools. Bidders shall submit a detailed design as part of their response. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Main Equipment Room

1. The shelter shall have adequate LED lighting at the workbench and behind and in front of the equipment. The specifications of the lighting layout shall be provided as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The shelter shall have an emergency DC LED light that can be switched on manually in the event of an AC failure. A detailed specification of the light shall be provided. The installation position shall be indicated as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. An AC power distribution box shall be installed in a suitable location. The position shall be indicated as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. A Communication box shall be supplied and installed in a suitable location. The position shall be indicated as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall provide detailed AC and communication wiring diagrams. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Battery Compartment

1. A separate battery compartment accessible only from the inside of the shelter shall be provided. It is recommended that the battery compartment form part of the workbench. The layout and details of the material shall form part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The battery compartment shall be fitted with an easily removable grid. Details of the material and design shall be provided as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The battery compartment shall have battery shelves that will accommodate and withstand the weight of all the batteries as required by the installation. Details of the shelves shall be provided as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The battery shelves shall be on heavy duty rollers for battery inspection purposes and adequate space for flexible battery cables and sensor cables shall be provided. Specifications of the heavy-duty rollers shall be provided. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Air Conditioner

1. Two split air conditioner units as defined in Chapter 4 section 1, shall be provided by the Contractor. The air conditioner inside unit will be installed in the most suitable, practical and efficient position. Position of the installation shall be indicated on the shelter drawings. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The position of the external unit shall cater for maintenance on the unit, including the removal of the external unit. All details shall be included and specified as part of the shelter design drawings. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. If the external units are fitted in a compartment which is part of the shelter, it shall only be accessible from the outside and shall be fitted with a tamperproof grid fixed by means of stainless-steel counter sink allen key type screws. The allen key shall be part of the tools provided with the shelter. Details of the tamperproof grid shall be provided as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The external units shall be installed in tamperproof grid frames if the external compressors are installed outside the shelter. The Contractor shall provide details of the installation if the external units are installed outside the shelter. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Storage Compartment

1. Provision shall be made for a cabinet and drawer space to store manuals, handbooks, site spares and any site tools as may be required. Details of the cabinet and drawer space shall be provided as part of the shelter design. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Workbench

1. The shelter shall have a workbench at a suitable height that is covered with a durable antistatic rubber mat. Details of the workbench and rubber mat shall be provided as part of the shelter design. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The top of the battery compartment and storage compartment could form the workbench. (I)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Fixtures and Miscellaneous

### Cable Duct Layout

1. The shelter shall have cable ducts for all the AC and DC cables to the various equipment cabinets. The cable ducts will provide easy cable access to the battery compartment, equipment cabinets and power distribution boards. Details of the cable ducts shall be provided as part of the shelter design. (D)

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| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The design of the ducts shall be such that there is physical separation between AC and DC cables. Bidders shall provide details of how this will be achieved. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Power and communication cables shall not be installed next to each other. Bidders shall indicate this on the wiring diagrams. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Cable Entry Points

1. The shelter shall have cable entry points for cables connected to the VHF antennas. Bidders shall provide a detailed design of the cable entry point. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The cable entry points shall be constructed in such a way that each cable is separated at the entry point by a minimum of 60mm. Bidders shall indicate this on the design of the cable entry point. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Provision must be made for additional cables for the floodlights, obstruction lights, etc. Bidders shall indicate this on the design of the cable entry point. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The cable entry point shall be made of corrosive resistant material and should be dustproof, waterproof and air tight sealed. Bidders shall provide details of this as part of the design of the cable entry point. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The cable entry point shall not be a weak point in the shelter with regards to security. Bidders shall provide details on how this will be achieved as part of the design of the cable entry point. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### Portable Fire Extinguisher

1. The shelter shall be equipped with a portable fire extinguisher that complies with the specifications as defined in Chapter 4 section 4. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

### OHAS Requirements

1. The design and construction of the shelters shall comply with the South African Occupational Health and Safety Act (85 of 1993). Bidders shall provide details on any other occupational health and safety standards that their design complies to. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall supply and install all relevant OHAS signage. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# Building

## Building Internal

1. Each building shall be assessed for structural integrity to ensure that the building can last for the next 15 years, for a list of sites with buildings refer to APPENDIX A – SITES INFORMATION. Should any building be regarded as not structurally stable to last the next 15 years, the contractor shall provide ATNS with a quote, for consideration, to improve the structural integrity of the building. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. Each building shall be refurbished to enhance its appearance and prolong its life span. The refurbishment may include interventions on the following items: (D)
2. Filling cabinets
3. Sealing of roof leaks;
4. Painting of walls;
5. Floor tiles;
6. Damaged doors and windows;
7. Cable ducts;
8. Cable skirting;
9. Light fittings and lights

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The Contractor shall supply and install all relevant OHAS signage. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Building Outside

1. The Bidder shall provide details on the materials and process to accomplish the following activities as well as the associated costs: (D)
2. Repair any cracks and damage to external building structure.
3. Buildings situated on airports (air side) will be painted in accordance to ICAO (Annex 14, Volume1) and SACAA (SA-CAR Part 139) requirements.

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The paint shall have a life guarantee of at least 10 years. Details will be included as part of the tender. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

## Burglar proofing

1. Burglar proofing shall be fitted to the interior of all windows and exterior of all doors of buildings. Burglar proofing shall be corrosion resistant, withstand the environmental conditions as stated herein and withstand forces exerted by crowbars, bolt cutters or equivalent tools. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# Fence

1. A fence (where applicable) shall be installed per site to demarcate the site and prevent unauthorized access to the site. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The fence shall be embedded in a concrete foundation that is at least 0.15 m wide and maximum 1 m deep and, protrudes at maximum 0.05 m above the ground. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The fence shall withstand cutting forces from hand held tools like pliers, saws or equivalent tools. (D)

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| **COMPLIANCE (C/PC/NC/Noted)** | *Only responding C/PC/NC/Noted will not be accepted without proof.* |  |
| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The fence shall withstand the environmental conditions as stated herein and the fence shall be corrosion resistant. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The fence shall incorporate a gate with secure locking as defined in Chapter 5 section 1.4.2.The fence gate shall be the same height as the fence, shall be corrosion resistant and shall survive the environmental conditions as stated herein. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

1. The fence gate shall accommodate pedestrians as a minimum and maintenance vehicle where space allows. The hinges for the fence and gate shall be secure to prevent forced entry. (D)

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| *[INSERT FULL RESPONSE FOR EVALUATION HERE]* |
| *[INSERT REFERENCE TO ADDITIONAL INFORMATION HERE]* |

# CHAPTER 6 – APPENDICES

# APPENDIX A – SITES INFORMATION

|  |  |  |
| --- | --- | --- |
| **Facility Name (Building Type)** | **Intended service** | **Frequency (MHz)** |
| **King Shaka Int’l Airport (FALE)** |
| FALE TX(RADAR building)(9 Main + 9 Standby = 18 TX) | Aerodrome (Tower) | 118.450 |
| Ground movement control | 121.650 |
| Approach | 125.750 |
| FAOR ACC-EAST | 129.100 |
| DATIS | 127.000 |
| Alternative | 131.000 |
| TIBA | 124.200 |
| Emergency | 121.500 |
| Spare | 123.400 |
| FALE RX(FALE Tower building)(8 Main + 8 Standby = 16 RX) | Aerodrome (Tower) | 118.450 |
| Ground movement control | 121.650 |
| Approach | 125.750 |
| FAOR ACC-EAST | 129.100 |
| Alternative | 131.000 |
| TIBA | 124.200 |
| Emergency | 121.500 |
| Spare | 123.400 |
| FALE EMR RADIOS (FALE Tower building)(7 RX + 7 TX) | Tower | 118.450 |
| Ground | 121.650 |
| Approach | 125.750 |
| Alternative | 131.000 |
| TIBA | 124.200 |
| Emergency | 121.500 |
| Spare | 123.400 |
| Pietermaritzburg (FAPM)(FAPM Tower building)(7 TX + 7 RX) | Aerodrome (Tower) | 122.000 |
| FALE APP | 125.750 |
| TIBA | 124.200 |
| GFA | 124.400 |
| Emergency | 121.500 |
| Virginia (FAVG)(FAVG Tower building)(5 TX + 5 RX) | Aerodrome (Tower) | 120.600 |
| TIBA | 124.200 |
| GFA | 124.400 |
| Emergency | 121.500 |
| Richards Bay (FARB) FRS (CVOR Container)(7 TX + 7 RX) | FALE APP | 125.750 |
| Aerodrome Tower | 120.600 |
| TIBA | 124.200 |
| GFA | 124.400 |
| Emergency | 121.500 |
| Louwsburg FRS(Brick building)(4 TX + 4 RX) | FAOR ACC-EAST  | 129.100 |
| FAOR ACC-S/E  | 132.150 |
| Mount Ayliffe FRS (Brick building)(2 TX + 2 RX) | FAOR ACC-EAST | 121.900 |
| **Port Elizabeth Airport (FAPE)** |
| FAPE TX (Brick building)(8 Main + 8 Standby = 16 TX) | Aerodrome (Tower) control | 118.100 |
| Approach control | 120.400 |
| Clearance delivery | 122.100 |
| FACT ACC-EAST | 124.700 |
| FACT FIS-EAST | 127.575 |
| DATIS | 126.800 |
| Emergency | 121.500 |
| Spare | 123.400 |
|  FAPE RX (Brick building)(7 Main + 7 Standby = 14 RX) | Aerodrome (Tower) | 118.100 |
| Approach control | 120.400 |
| Clearance delivery | 122.100 |
| FACT ACC-EAST | 124.700 |
| FACT FIS-EAST | 127.575 |
| FACT ACC-EAST EMR | 124.700 |
| Emergency | 121.500 |
| Spare | 123.400 |
| FAPE EMR RADIOS(FAPE Tower Building)(5 RX + 5 TX) | Aerodrome (Tower) | 118.100 |
| Approach control | 120.400 |
| Clearance delivery | 122.100 |
| Spare | 123.400 |
| Emergency | 121.500 |
| Humansdorp FRS(Brick building)(6 TX + 6 RX) | FAPE Approach | 120.400 |
| FACT ACC-EAST | 124.700 |
| FACT FIS-EAST | 127.575 |
| **East London Airport (FAEL)** |
| FAEL TX(Old container)(7 Main + 7 Standby = 14 TX) | Aerodrome (Tower) | 118.300 |
| FAEL Approach | 120.100 |
| FACT ACC-EAST | 124.700 |
| FACT FIS-EAST | 127.575 |
| FAEL ATIS | 126.650 |
| Emergency | 121.500 |
| Spare | 123.4 |
| FAEL RX (Old container)(6 Main + 6 Standby = 12 TX) | Aerodrome Control | 118.300 |
| FAEL Approach | 120.100 |
| FACT ACC-EAST | 124.700 |
| FACT FIS-E | 127.575 |
| Emergency | 121.500 |
| Spare | 123.4 |
| FAEL EMR RADIOS(FAEL Tower Building)(6 TX + 6 RX) | Aerodrome Control | 118.300 |
| FAEL Approach | 120.100 |
| Emergency | 121.500 |
| Spare | 123.4 |
| Mthatha FRS(Brick building)(4 TX + 4 RX) | Aerodrome (Tower) | 121.300 |
| Emergency | 121.500 |
| Queenstown FRS (Brick building)(4 TX + 4 RX) | FACT FIS-E | 127.575 |
| FACT Area East | 124.700 |
| **George Airport (FAGG)** |
| FAGG TX (Brick building)(6 Main + 6 Standby = 12 TX) | Aerodrome (Tower) | 118.900 |
| FACT ACC-WEST | 125.100 |
| ATIS | 126.225 |
| FAGG Approach | 128.200 |
| Emergency | 121.500 |
| Spare | 123.4 |
| FAGG RX (Brick building)(5 Main + 5 Standby = 10 RX) | Aerodrome (Tower) | 118.900 |
| FACT ACC-WEST | 125.100 |
| FAGG Approach | 128.200 |
| Emergency | 121.500 |
| Spare | 123.4 |
| FAGG EMR RADIOS(FAGG Tower Building)(4 RX + 4 TX) | Aerodrome (Tower) | 118.900 |
| FAGG Approach | 128.200 |
| Emergency | 121.500 |
| Spare | 123.4 |
| Potjiesberg FRS (Very Old Container)(2 TX + 2 RX) | FAGG Approach | 128.200 |
| **Aviation Training Academy** |
| ATA TX(Brick building)(6 X TX) | Training | Varied (118.000 – 136.975) |
| ATA RX(Brick building)(6 X RX) | Training | Varied (118.000 – 136.975) |