AIR TRAFFIC AND NAVIGATION SERVICES SOC. LTD
REPUBLIC OF SOUTH AFRICA

REQUEST FOR PROPOSAL NO:

ATNS/TPQ/RPF19/2024/25/ VDF REPLACEMENT

VDF for FARB, FAVG and FAPN Project

VOLUME 2

TECHNICAL SPECIFICATIONS

October 2024

TABLE OF CONTENTS

ABBREVIATIONS

ANSP	Air Navigation Service Providers
ATC	Air Traffic Controller
ATA	Aviation Training Academy
ATNS	Air Traffic and Navigation Services SOC. Ltd.
ATSU	Air Traffic Service Units
BITE	Built-In Test Equipment
COTS	Custom Of The Shelf
FAT	Factory Acceptance Test
FAGC	Grand Central Airport
FAPN	Pilanesberg Airport
FARB	Richards Bay Airport
FAVG	Viginia Airport
HMI	Human Machine Interface
ICAO	International Civil Aviation Organisation
IEEE	Institute of Electrical and Electronics Engineers
QDM	Magnetic bearing
QDR	Magnetic bearing
SACAA	South African Civil Aviation Authority
SANS	South African National Standards
UPS	Uninterrupted Power Supply
VDF	VHF Direction Finder
VHF	Very High Frequency
VPN	Virtual Private Network

DEFINITIONS

Within this document:

Workstation	is defined as the generic term for a computer with an associated monitor, keyboard, and mouse.
QDM	is defined as being the magnetic bearing from the aircraft to the VDF station.
QDR	is defined as being the magnetic bearing from the VDF station to the aircraft.

1 GENERAL INSTRUCTIONS TO TENDERERS

The Tenderer shall submit all responses, diagrams, project management documentation and drawings according to the GENERAL INFORMATION AND INSTRUCTIONS TO TENDERERS 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 Tenderer'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 in the column labelled "Compliance" 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 additionally supply supporting information in the space provided to demonstrate how the proposal meets the needs of ATNS.

For paragraphs marked "(M)", indicates that the requirement is mandatory and proposals not compliant with the requirement shall be disqualified for further evaluation.

Paragraphs marked "(D)", indicates that the requirement is desirable, and the Bidder is expected to comply. The Bidder shall declare their level of compliance, provide a formal response and reference to 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.

2 INTRODUCTION

2.1 Project Overview

The VDF (VHF Direction Finder) is a ground-based radio aid used by the Operator of a ground station and consist of a directional antenna system and VHF radio receiver(s) (118MHz – 136MHz). Each time the aircraft transmits on the frequency to which the VDF is tuned, its display indicates the magnetic direction of the aircraft from/to the station.

VDF installations are required at Richards Bay airport (FARB), Viginia airport (FAVG) and Pilanesberg airport (FAPN) to ensure compliance with the ICAO SARPs and SACAA regulations.

FARB, FAVG and FAPN have similar site limitations, which are the airfield size and obstacles on and around the airfield. These limitations make it difficult to deploy a fully compliant and operational VDF, as the airports environment do not meet the minimum VDF siting criteria. A VDF capable of operating under those conditions will be required to meet the airports' requirements.

The FARB and FAVG airports do not have existing VDF systems deployed. FARB and FAVG falls under the King Shaka International airport (FALE) maintenance centre.

The FAPN airport has an existing VDF deployed. FAPN falls under the O.R Tambo International Airport (FAOR) maintenance centre.

2.2 Project Scope

This project calls for the procurement, supply, installation and commissioning of a replacement VDF at Pilanesberg airport (FAPN) and a new VDF's at Richards Bay airport (FARB) and Viginia airport (FAVG) during the 2024/2025 financial year with associated maintenance and support contract and subsequent decommissioning and disposal of the old systems.

2.3 Project Deliverables

The project deliverables can be defined as:

A. Three (3) VDF systems shall be procured, installed, and commissioned at FARB, FAVG and FAPN. The Project shall replace one existing VDF with a new VDF (FAPN) and install two new VDF facilities (FARB and FAVG) in compliance with the international Civil Aviation Organisation (ICAO) requirements.
B. One (1) VDF system shall be included as an option to be deployed at Grand Central (FAGC) airport.

C. The Project shall identify suitable positions for the VDF at all three (3) airports. – ATNS recommendation is for the VDF antenna to be mounted on top of the control tower roof at FAPN, FARB and FAVG, due to space limitations and obstructions on the airfields. An analysis shall be conducted to ensure that the placement of the VDF antenna on the airfield or on top of the tower will meet the performance requirements.

D. The Project shall decommission and dispose of the existing VDF system at FAPN. The decommissioning and disposal should be in line with ATNS Waste Management Policy.

E. The Project shall replace the supporting auxiliaries (Rack Uninterrupted Power Supply (UPS), Equipmentrack, etc.), where required and specified.

F. The Project shall provide training to ATNS personnel.

G. The system and its components shall be supported for 15 years.

The Bidder shall confirm that the deliverables defined has been incorporated in the proposed VDF solution. (I)

COMPLIANCE (C/PC/NC/Noted)	
[THE BIDDER MAY INSERT A RESPONSE WHERE APPLICABLE]	

3 REFERENCES

A. ICAO Annex 10, Volume II

B. ICAO Doc 9426: Air Traffic Services Planning Manual, Part 3, Chapter 6

C. SA-CARS: 171.03.3.

D. SA-CATS139.01.30.

E. SABS 0142: SABS Standard for the Building Industry (Wiring of premises)

CHAPTER 1: GENERAL SPECIFICATIONS

4 SYSTEM DEPLOYMENT

4.1 System Overview

4.1.1 System Description

The VHF Direction Finder (VDF) is a ground-based radio navigation aid used by the operator of a ground station/Air Traffic Controller and consists of a directional antenna system and a VHF radio receiver. Each time the aircraft transmits on the VHF frequency to which the VDF is tuned, the VDF display indicates the magnetic direction of the aircraft with respect to the station, thus providing the ATC with situational awareness.

4.1.2 Intended Use

The VDF system is used by the Air Traffic Controllers (ATC) to determine the aircraft bearing from the ground station. VDF is intended as a positional awareness aid to ATCs in the absence of surveillance facilities and is not intended to support approach procedures. This further improves the ATCs situational awareness of the area they are controlling to improve safety of the aircraft approaching the airfield. The Bidder shall confirm that the proposed VDF is in support of the intended use as defined. (D)

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

4.1.3 System Restrictions

As defined by the SACAA-CARS and CATS 171.03.3 the safeguarding of a VDF site is defined by a circle radius of 120 metres centred on the aid, and 2% (1:50) slope from ground level at the aid out to a radius of 450 metres. The Bidder shall confirm that the minimum criteria as defined has been considered in the proposed VDF solution design. (D)

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

4.2 Layout and Design

The VDF system is normally divided in five components. These components could be combined based on the manufacturers design. The five components are:

- Antenna System
- VHF Receiver
- Evaluation or Control Unit
- Operational Workstation or Display Unit
- Technical Workstation

The Bidder shall clearly indicate the main components of the proposed VDF system. (D)

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

4.3 Deployment Locations

A. The deployment of the solution shall take into consideration and cater for the space limitations in the equipment rooms at the ATSU's, in the tower cabs and on the ATC consoles. The Bidder shall provide the physical dimensions of the VDF equipment proposed and indicate how they have catered for the space limitations in their solution design. (D)

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

B. The solution design and final deployment shall take existing and future antenna structures into consideration. (D)

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

C. The installation of the operational workstations or display units shall not impact on the ATC line of sight of the manoeuvring areas. The Bidder shall indicate that the ATC line of sight is not impacted by the installation of the VDF system proposed. (D)

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

D. The VDF solution shall be deployed at: (I)

Airport	**Airport Indicator**	**Location (Approximate)**
Richards Bay airport	FARB	28°44'11.40"S 32° 5'39.12"E
Viginia airport	FAVG	29°46'24.18"S 31° 3'21.30"E
Pilanesberg airport	FAPN	25°20'6.70"S 27°10'12.61"E
Grand Central airport (Option)	FAGC	25°59'22.51"S 28° 8'23.00"E

COMPLIANCE (C/PC/NC/Noted)	
[THE BIDDER MAY INSERT A RESPONSE WHERE APPLICABLE]	

5 IT REQUIREMENTS

A. The VDF System design shall incorporate the principle of least functionality by identifying any unused/ unnecessary operating system and OS functionality, including protocols, ports, and services that could potentially be disabled or uninstalled in order to meet the ATNS Cyber Security Policy requirements. The disabling or uninstallation shall only be done in consultation with ATNS. (D)

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

B. The following principles shall be incorporated on the VDF System where relevant and applicable:

a. The VDF System shall utilise Secure Services and ports, including, DNS over port 53.
b. The VDF System shall implement Secure Network protocols; including, NetBIOS, IPv6 and network interfaces; including, Bluetooth, IEEE 802.11, and infrared.
c. The VDF System shall implement secure methods of remote access via SSL, SFTP, SCP, VPN, SSH, and IPSEC.
d. The VDF System shall implement access control to control permissions to files, directories, registry keys, and restricting user activities such as modifying system logs or installing applications.
e. The VDF System shall implement Secure Management of identifiers/accounts; including, changing default account names, determining length of time until inactive accounts are disabled, using unique usernames, establishing user groups.
f. The VDF System shall implement Secure Authentication controls: including, password length, use of special characters, minimum password age, multifactor authentication/use of tokens.
g. The VDF System shall implement Secure Audit settings, including, capturing key events such as failures, logons, permission changes, unsuccessful file access, creation of users and objects, deletion and modification of system files, registry key and kernel changes.
h. The VDF System shall implement Secure System settings, including, session timeouts, number of remote connections, session lock.
i. The VDF System shall use Cryptography - use only FIPS 140-3 validated cryptographic protocols and algorithms to protect data in transit and in storage.
j. The VDF System shall allow for vendor-released patches in response to identified vulnerabilities, including, software updates to be installed.
k. The VDF System shall use approved, signed software, if supported.
l. The VDF System shall implement safeguards through software to protect end-user machines against attack, including, antivirus, antispyware, anti-adware, personal firewalls, host-based intrusion detection systems.
m. The VDF System shall apply network protections, including, TLS, IPSEC.
n. The network installation security requirements: for example, within a DMZ, on a specific subnet, as required, shall be defined for the VDF System.
o. The technical specification and design documentation, system security documentation, system procedures, etc. shall be maintained and updated throughout the life of the VDF System.
p. Data loss prevention requirements shall be defined for the VDF System, i.e., Classify the data traversed across the LAN as Public or Private. This will allow ATNS Security to ensure that Private information is not shared outside the network.
q. The VDF System design shall cater for and ensure that, the installation is behind the firewall and Intrusion prevention systems.

r. If access from mobile devices are catered for, the VDF System shall incorporate mobile device security.
s. The VDF System design shall ensure that remote access to the application is only accessible via the VPN.
t. The VDF System design shall ensure that all applications are only accessible publicly via the firewall.
u. The VDF System shall implement access rights to enable role-based access control at application and device level.

6 GENERAL SPECIFICATIONS

6.1 Environmental Conditions

A. The system and its auxiliary components shall withstand and operate continuously within specifications under the following environmental conditions without any degradation in performance.

	Parameter	**Value**
Indoor Conditions		
1	Temperature	0°C to +40°C
2	Relative Humidity	10% to 90% (non-condensing)
Outdoor Conditions		
3	Wind Speed	Up to 186 km/h
4	Operating Temperature	-10°C to +55°C, with temperature variations of up to 20°C within 24 hours
5	Relative Humidity	0% to 100%

The Bidder shall provide supporting documentation to confirm that the proposed VDF system complies with the environmental parameters specified. (D)

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

B. All outdoor elements, structures and other auxiliary components shall withstand the effects of rain, snow, storms. The equipment will not be affected by weather phenomenon such as heavy rain, frost, hail, sandstorms etc. The Bidder shall indicate what pre-cautions has been taken to ensure that the outdoor elements can withstand the weather phenomenon and outdoor environmental conditions. (D)

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

C. All outdoor elements, structure and other auxiliary components shall withstand effects of animals (e.g. birds sitting on it). The Bidder shall indicate what precautions will be implemented. (D)

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

D. The outdoor elements, structures and other auxiliary components shall be hermetically sealed. The Bidder shall provide supporting information and documentation. (D)

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

E. All structures, outdoor elements and other auxiliary components shall be corrosion resistant or shall be protected against corrosion. The Bidder shall provide supporting information and documentation. (D)

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

F. All protective casings/enclosures shall have a minimum IP65 International Protection Rating. The Bidder shall provide supporting information and documentation to confirm compliance to the specification. (D)

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

G. The system shall have been installed and shall be successful operating in other ANSPs or/and airports with similar climate and obstructions conditions as specified. The Bidder shall provide supporting information to confirm that the proposed solution has been successfully deployed under similar limiting obstruction conditions. (D)

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

6.2 Power and Electrical Requirements

A. The system shall operate from the mains power supply as defined below:

- 230 VAC ±15%
- 50 Hz ± 5%

The Bidder shall provide supporting documentation to confirm compliance to the specification. (D)

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

B. The VDF system shall be provided with under and over voltage and current protection. The Bidder shall provide supporting documentation to confirm compliance to the specification. (D)

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

C. In the event of a power failure, the VDF system shall automatically restart in ready mode for normal operations on the restoration of power. The Bidder shall provide supporting documentation to confirm compliance to the specification. (D)

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

D. The VDF cabinets shall cater for a static switch to seamlessly switch between two power feeds where available. The Bidder shall provide details on the static switch offered. (D)

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

E. The system shall be delivered and installed with all required circuit breakers and cables. The Bidder shall provide details on the proposed circuit breakers and cables proposed. (D)

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

F. A Certificate of Compliance (CoC) shall be issued for each of the ATSU for the electrical work done. The Bidder shall confirm that a CoC shall be issued. (D)

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

G. All electrical works shall comply with the South African National Standards (SANS) 10142-1 The wiring of premises – Part 1: Low-voltage installations (Edition 3: 2020). The Bidder shall confirm that all electrical works will be performed in compliance to the standards. (D)

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

6.3 Lightning Protection

A. The system shall be provided with suitable lightning protection to protected it from lighting strikes. The antenna and the equipment shall be protected against lightning strikes. The Bidder shall confirm that lightning protection shall be provided for both the antenna and equipment. (D)

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

B. The VDF system shall be supplied with suitable lightning and surge protection devices (in accordance with SANS 10313:2012 and SANS 10142:2012) on the main power supply and power cables. The Bidder shall provide details on the protection devices offered. (D)

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

C. The VDF system shall be supplied with suitable lightning protection devices (in accordance to SANS 10313:2012) on all communication cables and all RF cables without impacting on the RF signal quality. The Bidder shall provide details on the protection devices offered. (D)

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

6.4 Equipment Rack

A. The VDF system shall be delivered with suitable equipment rack(s). The Bidder shall provide full details of the proposed equipment rack, including dimensions. (D)

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

B. The VDF equipment racks shall cater for natural heat dissipation. The Bidder shall provide supporting documentation. (D)

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

C. The VDF equipment racks shall incorporate cable management. The Bidder shall provide supporting documentation. (D)

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

D. The VDF equipment racks shall be delivered and fitted with:

[a] PDU supply (IEC320 C13)

[b] Static switch

The Bidder shall provide a schematic diagram indicating the layout of the equipment racks and confirm the locations of the PDU and static switch. (D)

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

6.5 General Requirements

A. The system shall be based on Commercial Off-the-Shelf (COTS) components as far as possible. Bidders shall indicate which components are not COTS. (D)

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

B. The system shall be modular, as far as possible, to simplify the maintainability of the system. Bidders shall provide supporting documentation. (D)

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

C. The system shall be designed using solid state technology. Bidders shall submit supporting documentation. (D)

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

6.6 Solution Design and System Installation

A. The Bidder shall provide a detailed solution design and installation proposal based on the analysis as defined under paragraph 2.3 B.

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

B. The solution design and installation proposal shall cater for the antenna installation, cables cable routes and auxiliaries. Bidders shall provide supporting documentation. (D)

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

C. The detailed solution design and installation proposal shall include a simulation or equivalent proof that the VDF will operate within Class C parameters at the identified airports. Bidders shall provide supporting documentation. (D)

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

6.7 Decommissioning and Disposal

A. The existing VDF at Pilanesberg shall be decommissioned and transported to a designated location in Gauteng area. ATNS will manage the disposal in line with the ATNS Integrated Waste Management Policy. (D)

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

6.8 System Commissioning

A. There shall be four surveyed test points installed, one in each quadrant of the VDF antenna where practical and feasible, to facilitate for external testing, verification of the accuracy of the VDF and for future maintenance actions. These test points should be clearly indicated by means of concrete blocks placed in the ground. The bearing of that block with respect to the antenna will be clearly indicated on the block. (D)

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

B. The successful installation and commissioning of the VDF system shall be performed according to the requirements for flight and ground inspection is defined in SACAA-CARS 171.03.8. The Bidder shall be responsible for the cost associated with the commissioning flight check. (D)

COMPLIANCE (C/PC/NC/Noted)	
[THE BIDDER MAY INSERT A RESPONSE WHERE APPLICABLE]	

CHAPTER 2: SYSTEM FUNCTIONS AND PERFORMANCE

7 VDF SYSTEM

7.1 Frequency Range

A. The VDF system shall operate in the range from 118.5MHz to 136.9757MHz. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

B. The reception frequency of the equipment shall be from 118MHz to 136.975MHz, with steps of at least 0.025 MHz. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

C. The VDF shall be programmable w.r.t the frequencies from 118MHz to 136.975MHz and shall be capable of storing at least 3 frequencies. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

D. All of the stored frequencies shall be available as a selection at any of the display positions. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

E. The system shall be able to identify aircraft within the communications range transmitting on the selected frequency. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

F. The system shall implement 25 kHz and 8.33 kHz channel spacing. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

G. The system shall monitor the emergency frequency while operating in the normal mode. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

7.2 System Accuracy

A. The system shall be of Class C accuracy according to the ICAO, ATS planning Manual, Doc 9426, Part 3, Chapter 6.

[a] bearing accuracy of ±10° (ten degree)

[b] position accuracy within 92 km (ninety-two kilometres)/ 50 NM (fifty nautical miles)
Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

7.3 Antenna System

A. The antenna shall have an omni-directional coverage. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

B. The antenna shall be vertical polarised. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

C. The system shall operate using the doppler principle or equivalent to provide the accuracy required. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

D. The antenna placement on the airport shall conform to the regulations stipulated in SA-CATS 139.01.30. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

E. The antenna shall not cause interference on nearby radio frequency facilities. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

F. Based on the detailed solution design and installation proposal, the antenna system shall include and cater for lightning protection (lightning arrestor) and obstruction lights as applicable and shall include consideration of PANS/OPS obstacle limitations. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

7.4 VHF Receiver

A. The VDF Receiver shall have a sensitivity of ≤2 µV/m without an antenna amplifier installed to ensure it covers the Control Zone and the Terminal Manoeuvring Area (TMA). Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

7.5 Evaluation or Control Unit

A. The evaluation or control unit shall provide the following information as defined by ICAO Annexure 10, Volume 2.

a. True bearing of the aircraft
b. True heading to be steered by the aircraft, with no wind, to head for the VDF station.
c. Magnetic bearing of the aircraft
d. Magnetic heading to be steered by the aircraft.

Bidders shall provide supporting documentation to show compliance with each of the requirement stipulated above. (D)

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

B. The information shall be displayed according to the following Q-codes:

a. QDM – Magnetic bearing to a station
b. QDR – Magnetic bearing from a station
c. QUJ – True bearing to a station
d. QTE – True bearing from a station

Bidders shall provide supporting documentation to show compliance with each of the requirement stipulated above. (D)

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

C. The system shall cater for True North and Magnetic North as a reference. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

D. The system shall allow the user to select either True North or Magnetic North as reference. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

E. The system shall indicate the aircraft bearing using magnetic North as a reference as default. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

F. The system shall display the frequency tuned into. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

G. When two or more aircrafts are transmitting simultaneously on the same frequency, the bearing indication shall be based on the strongest of the two signals received. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

H. The system shall include the option to suppress the ground signal (ATC transmission). Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

I. The system shall allow the ATC to recall or re-display the last bearing indication received by the VDF or a shall cater for a store and recall function of the last bearing received. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

7.6 VDF Display Unit

A. The VDF display unit shall provide a bearing indication on a digital display. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

B. The VDF system shall support more than one display unit operating off a single antenna. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

C. The VDF display unit shall have a QDM / QDR selector. The VDF display unit shall clearly indicate which function has been selected. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

D. The VDF display unit shall cater for the adjustment of the brightness and contrast of the display to accommodate the ambient light conditions (high brightness or poor lighting) associated with a control tower. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

E. In the event that the VDF display unit consist of an operational workstation, the workstations shall:

a. The operational workstation shall be a standalone all-in one desktop computer located in the control tower cab with a maximum screen size of 22 inch.
b. The operational workstation shall preferably use a Windows operating system.
c. The Windows operating system shall use the Windows 10 or latest.
d. The operational workstation shall have a display screen to present the VDF information.
e. The display screen shall be position in a way that does not limit the ATC's view of the runway.
f. The display screen shall be clearly visible both in bright light and night operations using adjustable back lighting.

g. The operational workstation audio shall be outputted through the desktop speaker or headphone jack.
h. The operational workstation's volume shall be adjustable.
i. The operational workstation software shall be compatible with Windows-based computers.
j. The operational workstation software shall support the functionality as defined above.
k. The HMI of the operational workstation shall be intuitive to guide the user in operating the system.

Bidders shall provide supporting documentation to show compliance with the requirements stipulated above. (D)

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

7.7 Technical Workstation

A. The technical workstation shall be installed in the equipment room for all the ATSU's.

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

B. The VDF system (antenna, control unit, receiver, operational workstation) shall be configured from the technical workstation. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

C. The technical workstation shall monitor the performance status of the VDF system and shall display warnings and alarms for out of tolerance parameters and system or component failures. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

D. The system shall have a Built-In Test Equipment to perform system tests on each component of the VDF system. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

E. The technical workstation shall enable the ATNS technician to perform maintenance actions on each component of the VDF system. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

F. The technical workstation shall enable the ATNS technician to check antenna performance, monitor antenna status and perform diagnostics on the antenna. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

G. The technical workstation software shall be compatible with Windows-based computers. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

H. The HMI of the technical workstation shall be intuitive to guide the user in operating the system. Bidders shall provide supporting documentation to show compliance with the requirement. (D)

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

7.8 Security

A. The system shall incorporate mechanisms to eliminate spoofing. Bidders shall provide supporting documentation. (D)

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

B. The system shall incorporate mechanisms to eliminate frequency interference. Bidders shall provide supporting documentation. (D)

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

8 TRAINING SYSTEM

A. The training system for the ATA shall be independent but identical to the operational system described herein. (I)

COMPLIANCE (C/PC/NC/Noted)	
[THE BIDDER MAY INSERT A RESPONSE WHERE APPLICABLE]	

THE END