



# AIRCRAFT ACCIDENT REPORT

MAL/2022/04/26/F

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**Nigerian Safety Investigation Bureau**

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**Final Report on the ground collision incident involving an EMB-135BJ aircraft operated by Max Air Limited with nationality and registration marks 5N-BXK and a parked ATR 42 aircraft operated by Nigerian Air Force registered NAF 930 which occurred on the apron of the General Aviation Terminal of Nnamdi Azikiwe International Airport Abuja; Nigeria on 26 April, 2022.**



This report is produced by the Nigerian Safety Investigation Bureau, (NSIB) formerly the Accident Investigation Bureau, Nigeria (AIB), Nnamdi Azikiwe International Airport, Abuja.

The report is based on the investigation carried out by Nigerian Safety Investigation Bureau, in accordance with Annex 13 to the Convention on International Civil Aviation, Nigerian Safety Investigation Bureau (Establishment) Act, 2022, and Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2023.

In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of aircraft accident/serious incident investigations to apportion blame or liability.

Readers are advised that the Nigerian Safety Investigation Bureau, investigates for the sole purpose of enhancing aviation safety. Consequently, NSIB reports are confined to matters of safety significance and should not be used for any other purpose.

The Nigerian Safety Investigation Bureau believes that safety information is of great value if it is passed on for the use of others. Hence, readers are encouraged to copy or reprint for further distribution, acknowledging the Nigerian Safety Investigation Bureau, Nigeria as the source.

Safety Recommendations in this report are addressed to the Regulatory Authority of the State (NCAA) as well as other stakeholders, as appropriate. This authority ensures enforcement. © **Nigerian Safety Investigation Bureau Nigeria, 2024**



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## **GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT**

AIB	Accident Investigation Bureau, Nigeria
AMO	Approved Maintenance Organisation
AOC	Air Operator Certificate
ATC	Air Traffic Control
ATPL	Airline Transport Pilot Licence
ATS	Air Traffic Services
AW	Agusta Westland
C of A	Certificate of Airworthiness
CPL	Commercial Pilot Licence
CVR	Cockpit Voice Recorder
FDM	Flight Data Monitoring
FDR	Flight Data Recorder
NAF	Nigerian Air Force
NAMA	Nigerian Airspace Management Agency
NCAA	Nigerian Civil Aviation Authority
NiMet	Nigerian Meteorological Agency
Nig. CARs	Nigeria Civil Aviation Regulations
NSIB	Nigerian Safety Investigation Bureau
OM	Operation Manuals
PF	Pilot Flying
PIC	Pilot in Command



PM	Pilot Monitoring
SMS	Safety Management System
SOPs	Standard Operating Procedures
VMC	Visual Meteorological Conditions





5N-BXK

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<b>Aircraft accident report number:</b>	MAL/2022/04/26/F
<b>Registered owner:</b>	Max Air Limited
<b>Operator:</b>	Max Air Limited
<b>Aircraft type and model:</b>	EMB 135 BJ
<b>Manufacturer:</b>	Embraer
<b>Year of manufacture:</b>	2009
<b>Nationality and registration marks:</b>	5N-BXK
<b>Serial number:</b>	14501086
<b>Location:</b>	General Aviation Terminal (GAT) Nnamdi Azikiwe International Airport, Abuja (DNAA)
<b>Date and time:</b>	26 April, 2022 at 09:08 h

All times in this report are local time equivalent to UTC +1, unless otherwise stated.

## SYNOPSIS

The defunct Accident Investigation Bureau, Nigeria (AIB) (now Nigerian Safety Investigation Bureau - NSIB) was notified of the occurrence by Max Air Ltd. Investigators were dispatched to site and post occurrence assessment commenced under the provisions of the Civil Aviation (Investigation of Air Accidents and Incidents) Regulations 2019 and ICAO Annex 13.

On 26 January, 2022, at 09:02:13 h, an ERJ-135BJ aircraft with nationality and registration marks 5N-BXK and operated by Max Air Limited requested for Engine Start



5N-BXK

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clearance for a chartered flight from Nnamdi Azikiwe International Airport, Abuja (DNAA) to Margaret Ekpo Airport Calabar (DNCA) having fuel endurance of 6 hours. On board the aircraft were six passengers and three crew members, including the Pilot, Co-pilot and Cabin Crew. The Pilot was the Pilot Flying (PF) while the Co-Pilot was the Pilot Monitoring (PM). The aircraft was parked at an unmarked position on the Apron of General Aviation Terminal (GAT) the previous day.

At 09:06:18 h, the flight crew completed the AFTER START Checklist and at 09:06:26 h, requested for Taxi Clearance. ATC cleared 5N-BXK to taxi to Holding Point Runway 22 (RWY 22) and the flight crew acknowledged the clearance. At this moment, there was no Ground Handling Agent of Max Air to assist the flight crew with wingtip clear watch during the taxi and the only Marshaller on duty at the General Aviation Terminal (GAT)/Cargo Apron was attending to another aircraft which required marshalling services.

At 09:07:08 h, 5N-BXK commenced taxi from its parking spot at a Bay on the GAT/Cargo Apron to the Holding Point RWY 22.

At 09:08:22, the PF asked if right was clear and the PM responded "Yes sir, right is clear, you can go straight first then you turn. You are clear on this side. Go straight first".

At 09:08:29 h, as the PF commenced left turn to exit the apron, the left winglet of 5N-BXK struck the Tail Cone of the parked ATR 42 aircraft.

At 9:08:31 h, 5N-BXK came to a stop and the PF indicated that the flight was cancelled and instructed PM to stop the engines.

All persons on board 5N-BXK disembarked the aircraft normally without injury.

### **Causal factor**

The decision to embark on taxi in the congested GAT/Cargo Apron without recourse to the services of FAAN Marshallers and/or Wing-Walkers.



### **Contributory factors**

1. Continuing the taxi of 5N-BXK even when the flight crew were in desperate need of ground assistance to proceed.
2. Non-conduct of flight crew BRIEFING on Taxiing in a congested apron prior to commencing the taxi.
3. The inappropriate parking of the military aircraft NAF 930 with its tail section protruding into the Taxi Lane used by 5N-BXK on the congested apron.
4. The use of non-standard marshalling techniques together with the deployment of untrained personnel to marshal the NAF930 to that parking spot on the congested GAT/Cargo Apron.
5. Inadequate number of FAAN Marshallers to provide the required taxi and parking guidance to all traffic on the congested GAT/Cargo Apron.
6. Inability of the continual improvement process enshrined in the safety management system of the airport to timely detect as a safety hazard to other traffic, the inappropriate parking of the ATR 42 (NAF930) on the GAT/Cargo apron.

### **Eleven (11) Safety Recommendation were made**



## 1.0 FACTUAL INFORMATION

### 1.1 History of the flight

On 26 January, 2022, at 09:02:13 h, an ERJ-135BJ aircraft with nationality and registration marks 5N-BXK and operated by Max Air Limited requested for Engine Start clearance for a chartered flight from Nnamdi Azikiwe International Airport, Abuja (DNAA) to Margaret Ekpo Airport Calabar (DNCA) having fuel endurance of 6 hours. On board the aircraft were six passengers and three crew members, including the Pilot, Co-pilot and Cabin Crew. The Pilot was the Pilot Flying (PF) while the Co-Pilot was the Pilot Monitoring (PM). The aircraft was parked at an unmarked position on the Apron of General Aviation Terminal (GAT) the previous day.

At 09:03:00 h, Air Traffic Control (ATC) responded "5N-BXK QNH 1012 temperature 28° time 08:03 (UTC) squawk 0407 Runway 22 start is approved" and 5N-BXK acknowledged the clearance.

At 09:06:18 h, the flight crew completed the AFTER START Checklist and at 09:06:26 h, requested for Taxi Clearance. ATC cleared 5N-BXK to taxi to Holding Point Runway 22 (RWY 22) and the flight crew acknowledged the clearance. At this moment, there was no Ground Handling Agent of Max Air to assist the flight crew with wingtip clear watch during the taxi and the only Marshaller on duty at the General Aviation Terminal (GAT)/Cargo Apron was attending to another aircraft which required marshalling services.

At 09:07:08 h, 5N-BXK commenced taxi from its parking spot at a Bay on the GAT/Cargo Apron to the Holding Point RWY 22.

During the taxi out of the Apron, the Cockpit Voice Recorder (CVR) recording indicated that the flight crew discussed about the tightness of available space to taxi<sup>1</sup>. The PM

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<sup>1</sup> At the time of the taxi, the General Aviation Terminal/Cargo Apron was congested with several aircraft parked on both sides of the Apron Taxi Lane, so each of the flight crew had to maintain wingtip clear watch on his side.



5N-BXK

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watched the right side to ensure wingtip was clear of the several parked aircraft along the way and kept reporting to the PF that the right side was clear.

At 09:07:17 h, as 5N-BXK came close to where an ATR 42 (NAF930) was parked<sup>2</sup>, the PF expressed concern that the space available became tighter. At this point, the PM informed the PF that there was space on the right side and advised the PF to move towards the right. The PF acknowledged and asked if there was space on the right side and the PM responded "a little to the right sir, you have space in the right".

At 09:07:47 h, the flight crew expressed concern that, some people<sup>3</sup> on ground were just standing there and watching without rendering any assistance to 5N-BXK. Meanwhile, the Nigerian Airforce personnel revealed during post occurrence interview that, as they saw 5N-BXK approaching, they split into three groups to the right and left sides to watch the wingtip clear, and in front of the aircraft to attract the attention of the crew. According to them, when 5N-BXK came nearer to them, it was apparent to them that the left wingtip of 5N-BXK was not clear of the parked NAF ATR 42 tail. They passed signals to the flight crew to stop taxi. The flight crew did not respond to the signals to stop taxiing.

At 09:08:08 h, ATC advised 5N-BXK to exercise caution taxiing around traffic and the flight crew acknowledged it.

At 09:08:22, the PF asked if right was clear and the PM responded "Yes sir, right is clear, you can go straight first then you turn. You are clear on this side. Go straight first".

At 09:08:29 h, as the PF commenced left turn to exit the apron, the left winglet of 5N-BXK struck the Tail Cone of the parked ATR 42 aircraft.

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<sup>2</sup> ATR 42 NAF930 arrived GAT Apron at about 08:30 h was marshalled by NAF personnel to park at an unmarked spot at the edge of the active Apron. At the time of the incident there was no person on board the ATR 42.

<sup>3</sup> The Nigerian Air Force (NAF) always maintains a number of its personnel at the GAT/Cargo Apron to keep watch on NAF aircraft that are parked there.

At 9:08:31 h, 5N-BXK came to a stop and the PF indicated that the flight was cancelled and instructed PM to stop the engines.

All persons on board 5N-BXK disembarked the aircraft normally without injury.

The incident occurred at 09:08:30 h, in daytime Visual Metrological Condition (VMC).



**Figure 1:** NAF ATR 42 Parked at unmarked spot beyond the last designated parking position

## 1.2 Injuries to persons

Injuries	Crew	Passengers	Others	Total
Fatal	Nil	Nil	Nil	Nil
Serious	Nil	Nil	Nil	Nil
Minor	Nil	Nil	Nil	Nil
None	3	6	Nil	9
Total	3	6	Nil	9

## 1.3 Damage to the aircraft (5N-BXK)

The aircraft was slightly damaged.

## 1.4 Other damage

A section of the Tail Cone of the parked ATR 42 (NAF 930) sheared off.



**Figure 2:** Sheared off section of the Tail cone of the parked ATR 42 (NAF930)





**Figure 3:** Post occurrence aerial view of 5N-BXK and the parked ATR 42 (NAF930)

## 1.5 Personnel information

### 1.5.1 Pilot

Nationality:	Nigerian
Age:	40 Years
Licence type:	Airline Transport Pilot Licence (Aeroplane)
Licence:	Valid till 11 February, 2025
Aircraft ratings:	Part 1: EMB-135/145, Learjet-45
Medical certificate:	Valid till 21 February, 2023





5N-BXK

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Instrument rating:	Valid till 26 February, 2023
Proficiency check:	Valid till 26 February, 2023
Total flying time:	5000 hours
Total as PIC:	2000 hours
Total on type:	600 hours
Total on type PIC:	600 hours
Last 90 days:	200 hours
Last 28 days:	50 hours
Last 24 hours:	0:40 hours

#### **1.5.2 Co-Pilot**

Nationality:	Nigerian
Age:	32 years
Licence type:	Commercial Pilot Licence (Aeroplane)
Licence:	Valid till 10 February, 2024
Aircraft ratings:	Part 2: EMB-135/145
Medical certificate:	Valid till 13 February, 2023
Instrument rating:	Valid till 26 February, 2023
Proficiency check:	Valid till 26 February, 2023
Total flying time:	580 hours
Total on type:	370 hours



5N-BXK

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Last 90 days:	50 hours
Last 28 days:	20 hours
Last 24 hours:	0

During Pre-flight preparations, there were no Ground Handling Agents of Max Air to provide marshalling and Wing Clear guide to the aircraft for START-UP and TAXI; and the flight crew did not wait for the FAAN Marshaller on duty at the GAT to provide marshalling service. There was no Flight Crew Briefing on taxiing in a congested Apron prior to commencing the taxi out.

### **1.5.3 ATR 42 (NAF930) Flight crew**

The flight crew of the ATR 42 NAF930 indicated that, they have been operating into DNAA for several years and that, based on the availability of space on the GAT/Cargo Apron, the NAF Marshaller guides them to available parking spot. The GAT/Cargo Apron has become highly congested due to increasing traffic of corporate and private aircraft.

On 26 April 2022, the flight crew had an early departure from Nnamdi Azikiwe International Airport Abuja (DNAA) to Benin Airport (DNBN) and back to Abuja (DNAA). At 08:30 h, ATR 42 NAF930 landed DNAA and was marshalled to park at available spot by the military marshaller on duty at GAT/Cargo Apron. They stated that, Post-flight Walk-around was carried out and the ATR 42 NAF930 was aligned with a Challenger aircraft that was parked behind it. They also stated that they did not notice ATR 42 NAF930 was parked at an unmarked position and that its nose was aft of the Bombardier aircraft on its left side. The flight crew stated that they were not aware that the ATR 42 NAF930 Tail Section protruded into the Apron Taxi Lane.

### **1.5.4 NAF Marshaller on duty at GAT Apron**

The Nigerian Air Force (NAF) designated marshaller on duty at the GAT/Cargo Apron stated that he marshalled the ATR 42 (NAF930) to park at the available spot prior to the occurrence. According to the marshaller, he had been performing aircraft marshalling for



three months prior to the date of occurrence and had not received formal training on aircraft marshalling.

#### **1.5.5 Other three NAF personnel on duty at GAT/Cargo Apron**

The other three NAF personnel on duty at the GAT/Cargo Apron at the time of the occurrence stated that they were aircraft technicians whose duty was to provide maintenance and marshalling services to NAF aircraft. The three NAF personnel and the NAF marshaller on duty would normally stay on the GAT/Cargo Apron to ensure that the parked ATR 42 NAF 930 was protected (proper clearance) while other aircraft taxi pass through. All the three NAF aircraft technicians on duty at the GAT/Cargo Apron at the time of the occurrence did provide evidence of formal training on aircraft marshalling.

Post occurrence statements from the NAF personnel indicated that the taxiing 5N-BXK at first seemed clear from afar, but as it approached towards the parked ATR 42 (NAF930), it became apparent that the left wing of 5N-BXK was not clear of the parked ATR 42 NAF930 tail section. The four NAF personnel on the Apron immediately split themselves into three groups namely; one to the right side to watch right wing clear, two stayed on the left side to watch left wing clear and one moved to the front of 5N-BXK to attract the attention of the 5N-BXK flight crew. According to them, they signalled 5N-BXK to stop but there was no response.

### **1.6 Aircraft information**

#### **1.6.1 General information**

Type:	EMB-135BJ
Manufacturer:	Embraer
Year of manufacture:	2009
Serial number:	14501086
Registered owner/operator:	Max Air Limited



5N-BXK

Nationality and registration marks: 5N-BXK

Certificate of Airworthiness: Valid till 2nd December 2022

Certificate of Insurance: Valid till 17th August 2022

Certificate of Registration: Issued on 22nd October 2019

Airframe time: 4817:47 hours

Cycles since new (CSN): 4451

### 1.6.2 Power plant

Engine	Number 1	Number 2
Manufacturer	Rolls Royce, USA	
Model	AE 3007	
Serial number	CAE-31313	CAE-31316
Time Since New (TSN)	4817:47 hours	4817:47 hours
Cycles Since New (CSN)	4451	4451

Fuel type used: Jet A-1

### 1.6.3 Post occurrence inspection and rectification of defect

A report by SKYJET on behalf of Max Air Ltd, shows that on 1st May 2022, the following post occurrence aircraft inspection of the aircraft (5N-BXK) was completed based on the recovery recommendations provided by EMBRAER Technical Support:

- 1) Performed detailed visual inspection (DET) in affected regions (winglet area) and surroundings in accordance with (IAW) Aircraft maintenance manual (AMM) 57-52-00 Part II and EMBRAER case number [EEJ-0442047]. No major damage or abnormality, found only abrasions, abrasion cleaned, and new winglet leading edge erosion tape installed.



- 2) Performed DET in the wing-to-fuselage fairings IAW AMM 57-52-00 Part II and EMBRAER case number [0442047]. No damage or abnormality on fairings and seals.
- 3) Missing static dischargers recovered, inspected and found satisfactory. Static dischargers reinstalled IAW AMM 23-60-01-04 Part II.

### **1.7 Meteorological information**

Not applicable.

### **1.8 Aids to navigation**

Not applicable.

### **1.9 Communications**

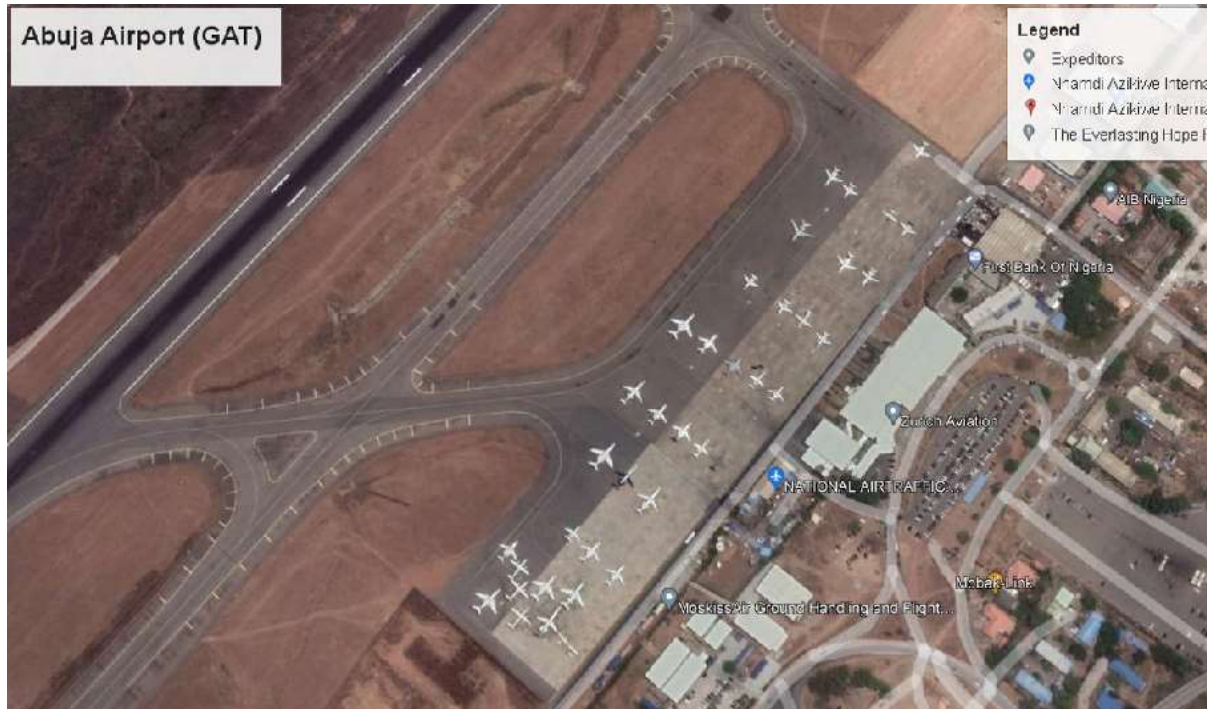
There was effective communication between the aircraft and air traffic control.

Verbal or visual communication was not established by the flight crew and the NAF marshaller.

Marshalling service was not requested from FAAN by the flight crew.

### **1.10 Aerodrome information**

The Nnamdi Azikiwe International Airport, Abuja (DNAA) has aerodrome reference points 09°00'25"N, 007°15'47"E and elevation 1123 ft with runway orientation 04/22. The runway has a length of 3610 m and a width of 60 m with asphalt/concrete surface and a blast pad of 65 m at both ends.



**Figure 4:** Aerial Satellite Imagery of the Congested GAT/Cargo Apron on a Typical Day (Not the Day of the Occurrence)

#### **1.10.1 Situation at the GAT/Cargo Apron**

DNAA has a General Aviation Terminal (GAT) dedicated to Cargo, private and corporate aircraft flight operations. There has been increasing scheduled and unscheduled traffic into the Abuja airport. The GAT/Cargo Apron has always been congested with parked private and corporate aircraft.

The requirement to park aircraft at approved parking stands was not followed. Aircraft are marshalled by the Federal Airports Authority of Nigeria (FAAN) Marshaller on duty to park at approved parking stands and also to park at unmarked spots on the GAT/Cargo Apron.

All the aircraft marshalled by FAAN Marshalls to their respective parking places on the GAT/Cargo Apron were found to be maintaining adequate wingtip clearance (7.5 m) and properly aligned with one another where consideration was given to each aircraft length and wing span.





**Figure 5:** Aerial view of congested GAT/Cargo Apron with aircraft parked at marked positions and at unmarked spots on both sides of the Apron Taxi Lane used by 5N-BXK.

As at the time of the occurrence, Link A2 which would have been normally used to taxi out to runway 22 was blocked by a parked large body aircraft (Airbus 350) on a Special Parking provisions.

A construction project to expand the GAT/Cargo Apron was ongoing as at the date of the incident.



**Figure 6:** Left- A350 blocking Link A2. Right- GAT Apron Expansion Construction Site

The 307 Executive Air-Lift Group (EAG) of the Nigerian Air Force (NAF) do from time to time park its aircraft on the GAT/Cargo Apron. The EAG deploys military personnel to marshal its aircraft to available parking positions at the GAT/Cargo Apron. Military personnel normally mount guard around EAG aircraft that are parked on the GAT/Cargo Apron to ensure clearance was maintained by any taxiing traffic.

During the occurrence, the ATR 42 (NAF930) was parked on the GAT/Cargo Apron at unmarked spot beyond the edge line of the active Apron and its tail section extended into the Apron Taxi Lane used by 5N-BXK. At the time of this incident, four military personnel were on GAT/Cargo Apron positioned to mount guard around the parked Nigerian Air Force ATR 42 (NAF 930).





### 1.11 Flight recorders

The aircraft is fitted with Solid-State Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) with the following particulars:

Recorders	Flight Data Recorder	Cockpit Voice Recorder
Manufacturer	Honeywell, USA	Honeywell, USA
Model	SSFDR	SSCVR
Part Number	980-4700-042	980-6022-001
Serial Number	SSFDR 16777	CVR 120-12411

The FDR and CVR were retrieved and taken to the Flight Safety Laboratory of the Nigerian Safety Investigation Bureau, Abuja for download, read-out and transcription.

The transcript of the relevant portions of the Cockpit Voice Recorder recordings is attached in Appendix A of this report.

### 1.12 Wreckage and impact information

According to the flight crew, after 5N-BXK was cleared for taxi, the aircraft commenced taxi with normal speed. While taxing, the crew discussed and assessed the situation in order to safely taxi out of the GAT/Cargo Apron. Thereafter, the ATC advised 5N-BXK to exercise caution considering the congestion of the GAT/Cargo Apron. As 5N-BXK commenced a left turn to exit the GAT/Cargo Apron, its left winglet impacted Tail Section of the parked NAF ATR 42. Post occurrence inspection of 5N-BXK showed that there was an abrasion on the left winglet and a static discharge wick was detached. A section of the Tail Cone of the parked ATR 42 (NAF930) sheared off.

5N-BXK



**Figure 7:** NAF ATR 42 parked at unmarked spot with its Tail Section protruding into the Apron Taxi Lane used by 5N-BXK. Other aircraft parked at unmarked spots on the GAT/Cargo Apron right side of 5N-BXK



**Figure 8:** Post occurrence aerial view of 5N-BXK and NAF ATR 42 (NAF930)



**Figure 9:** 5N-BXK Winglet abrasion and the broken discharge wick position



**Figure 10:** Damaged Section of the Tail Cone of ATR (NAF930)



### **1.13 Medical and pathological Information**

The 063 Nigerian Air Force Hospital Abuja reported that at about 15:45 h, urine and blood samples were taken from the flight crew by its. Laboratory Department for drug toxicology test.

The results of the drug toxicology tests reveal as follows:

- 1) The Pilot monitoring tested negative to all the drug substances contained in the test kit.
- 2) The Pilot flying tested positive to Morphine, Opiates (OPi), Marijuana (THC) and Cotinine.

### **1.14 Fire**

There was no pre or post impact fire.

### **1.15 Survival aspect**

Not applicable.

### **1.16 Test and research**

Not applicable.

### **1.17 Organizational and management information**

#### **1.17.1 Federal Airports Authority of Nigeria**

The Federal Airports Authority of Nigeria (FAAN) is a service organization established by CAP F5 FAAN establishment Act, Laws of Federation of Nigeria 2004. It is statutorily



charged with the responsibility to manage all Commercial Airports owned by the Federal Government of Nigeria and provide services to both passenger and cargo airlines. Generally, to create conditions for the development in the most economic and efficient manner of air transport and the services connected with it. Also, to develop and provide facilities such as terminal building(s), taxiway(s), runway(s), etc. for its airports.

Nnamdi Azikiwe International Airport Abuja (NAIA) is one of the airports managed by FAAN. NAIA has a total of 18 Marshallers on 6-hourly shift duty rosters who are deployed to serve traffic at the Domestic, International Terminals and the GAT/Cargo. Six of the 18 Marshallers are deployed to the GAT/Cargo Apron and one of them was assigned on each shift. At the time of the incident, the Marshaller on duty at GAT/Cargo Apron was attending to another aircraft.

#### **1.17.1.1 Airside Operations at Nnamdi Azikiwe International Airport Abuja**

Below are excerpts from Airside Operations Manual (AOM) of Nnamdi Azikiwe International Airport, Abuja (NAIA) version 1.0 of 26 May 2017.

##### *1.0 KEY AIRSIDE SAFETY REQUIREMENTS*

##### *1.1 INTRODUCTION*

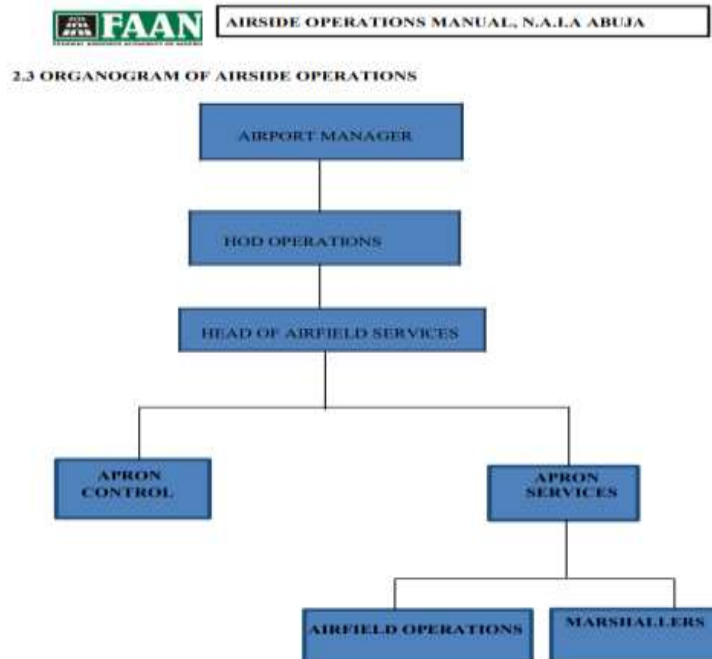
*This document, titled Airside Operations Manual establishes the guidelines for all persons entering the airside of Nnamdi Azikiwe International Airport (NAIA). These requirements have been developed as part of NAIA's Safety Management System, and endeavour to maintain a safe environment for the protection of aircraft, aerodrome infrastructure, personnel, passengers, contractors, and members of the general public.*

*The procedures set out in this document will be read prior to entering the airside area and will be followed at all times. The HOD Operations or his/her designate may alter these procedures at any time without prior notice.*

*The Airside Operations Officers or AVSEC will enforce these procedures. Failure to comply with a directive of any of these Officers will be referred to the Head of Airfield Services, HOD Safety or AVSEC Duty Officer for consideration.*

*Where an airside operator is unable to comply with any of these procedures, an application for exemption will be submitted to the address below and will be considered by the Head of Operations in collaboration with Safety department on case-by-case basis.*

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#### 4.10.2d Apron Management Services Unit

✈️ The Apron Management Services will be responsible for ensuring the safe movement of aircraft on the Apron. All rules and regulations applicable to aircraft movement on manoeuvring area are in close liaison between the Apron Management Services and ATC unit.





✈️ • The Airfield Operations Officers are responsible for conducting inspections of the movement area to ensure that the areas intended for aircraft movement are kept unobstructed and in good repair and the serviceability of the signage and all airfield lights for the use of the aircraft movement.

✈️ • The airfield officer and safety officer will monitor and ensure that all personnel working on the runway strip and essential safety area of the airside are vacated to prevent accident and pedestrian movement during the low visibility operation.

✈️ • Inspection will be completed before the initiation of low visibility procedures

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## 5.2 PROCEDURE FOR REPORTING THE CONDITIONS ON MOVEMENT AREA

The Airfield Operations Officers regularly carry out inspections on the movement area. The procedure for reporting the conditions of movement area and operational status of related facilities is as follows:

✈️ Unsafe conditions that can be addressed immediately are reported by direct Radio communication to Air Traffic Control and other departments that can effect immediate change.

✈️ The unsafe conditions include:

(a) Construction or maintenance work;

(b) Rough or broken surfaces on a runway, taxiway or an apron;

(c) Other temporary hazards, including parked aircraft;

(d) Failure or irregular operation of part or all of the aerodrome visual aids; and

(e) Failure of the normal or secondary power supply.

...

## 6 APRON MANAGEMENT



## 6.2 AIRCRAFT PARKING

### 6.2.2 Purpose

*This Section details the arrangements in place at the aerodrome for the safe and efficient parking of aircraft including arrangement between ATC and Apron Control Unit.*

*NAIA complies with the Nig. CARs Part 12.6.17 of which requires the certified aerodrome to have in place apron control and management services. The ASM provides information in regard to the design of aircraft parking positions and the associated clearance requirements.*

### 6.2.3 Responsibilities

*Airport Manager: The Airport Manager has overall responsibility for implementing aircraft parking control procedures at the airport.*

*Head of Department Operations: The HOD Operations is responsible for:*

- ✈ Coordination and approval of the design and implementation of the aircraft parking charts (and amendments) including utilisation chart.*
- ✈ Ensuring that aircraft parking charts and associated pavement markings comply with NCAA standards.*
- ✈ Approval of remote parking on taxiway.*
- ✈ Approval of explosive transfer aircraft parking.*
- ✈ Approval of airline ramp safety standard operating procedures to ensure compliance with NCAA regulations.*
- ✈ Actively promoting and managing ramp safety awareness*

*Head of Airfield Services: The Head of Airfield Services is responsible for:*

- ✈ The overall planning and coordination of aircraft parking position allocation.*
- ✈ Monitoring scheduling arrangements.*
- ✈ Ensuring parking areas and aircraft parking layout plans comply with ASM standards including audits of apron areas.*





- ✈ *Liaising with and monitoring airlines, ground handling companies, and other apron users to ensure the safe operation of aircraft and passengers on apron areas, including the storing and parking of ground handling equipment and vehicles.*
- ✈ *Ensuring that all marshallers are appropriately trained by NAIA to marshal aircraft.*

*Apron Control Officers: The Apron Control Officers' are responsible for:*

- ✈ *Liaising with ATC for the day to day allocation of parking bays on the International Aprons and the Cargo Aprons.*
- ✈ *Coordination (when necessary) of aircraft remote parking bay or the taxiway system.*
- ✈ *Liaise with AOO and ensure safety inspection on the manoeuvring areas, apron, and grass areas.*
- ✈ *Check aircraft allocation stands record and serviceability of avio-bridge*
- ✈ *Pass arrival time of schedule flight to information unit.*
- ✈ *Instruct Marshallers to direct aircraft on arrival to parking bay.*
- ✈ *Input airlines data and information for display on FIDs NAIA.*
- ✈ *Coordination of parking arrangements for all adhoc, itinerant aircraft and for aircraft types for which specific markings are not available.*

*NAIA Marshalling: The NAIA Marshallers are responsible for:*

- ✈ *allocating parking positions on the GAT/Cargo apron.*
- ✈ *providing an aircraft marshalling service for all aircraft parking operations.*

#### *6.2.4 Aircraft Parking Areas*

*There are three main apron areas at the NAIA, namely:*

- ✈ *International/Domestic Apron*
- ✈ *General Aviation/Cargo Apron*



✈ *Presidential/VIP Apron*

*NAIA Apron Management in cooperation with ATC provides appropriate Apron management service at all time. Each part of the Apron is capable of withstanding the traffic of the aircraft it is intended to serve. The slopes of each Apron including the aircraft stand taxi lane is about 1%, sufficient to prevent accumulation of water on the surface of the Apron and aircraft wing tip clearance of 7.5m is maintained in all the Aprons. All the aprons are within that part of the airport categorised as security restricted area.*

*...*

*6.2.6 GAT/Cargo Apron*

*The GAT/Cargo Apron provides for the bulk of arrivals and departures in respect of passengers using the main domestic services to and fro Nnamdi Azikiwe International Airport.*

*Any use of the GAT/Cargo Apron for international flight operations will be considered by NAIA, the Apron is also used for Pilgrim Operations. .*

*The apron pavement has been constructed of sufficient strength to accommodate all aircraft currently in service (i.e. up to and including Boeing 747-400 aircraft type).*

*Airlines and Ground Handling Companies are responsible for the correct parking and operation of GSE on the Apron areas. They will ensure that:*

- ✈ All GSE are operated and maintained in a safe and serviceable manner.*
- ✈ GSE parking on the Apron are restricted to the essential equipment.*
- ✈ All GSE when not in use is parked within the designated Apron staging areas.*

*Note: Ground services equipment parking area location: Gate3, ITZ by the grass verge area*

*6.2.6.1 Bay Allocation*

*Bay Allocation at GAT/Cargo are under the discretion of the Marshalls in conjunction with the airfield officers. Bay allocation details are passed directly to the pilot upon arrival*



*by the Marshallers. Strict security and passengers safety requirements will be adhered to when using this apron.*

#### *6.2.6.2 Engine Start and Push-back*

*Start-up and push-back approvals are provided by ATC. The aircraft operators and/or ground-handling agents are responsible for ensuring appropriate wing tip and jet blast clearances are maintained during push-backs and any subsequent pull forward.*

#### *6.2.7 Arrangement for Parking Over-Sized Aircraft at GAT/Cargo Apron*

*At the GAT/Cargo apron, due to limited availability of space for both General Aviation aircraft and Cargo aircraft, parking of oversized aircraft at the GAT/Cargo apron is basically on discretion. In the event of another aircraft in need of the space, the aircraft will be directed to park at the International Apron by the approval of ATC. The directed aircraft can be re-parked at the GAT/Cargo Apron upon availability of space.*

*Apron safety lines, wing tip clearance lines and service road boundary lines are provided on the Apron to ensure visual monitoring by Marshallers and Apron Control Officer.*

*...*

### *6.5 AIRCRAFT MARSHALLING SERVICES*

*Airport Marshalling services are provided where self-help guidance systems do not exist or are unserviceable and where guidance to aircraft parking is required to avoid a safety hazard or to make the most efficient use of available parking space.*

*Proper training arrangements are given on marshalling aircraft every two (2) years.*

*A distinctive high reflective orange/red colour jacket must be worn at all times.*

*Where aircraft marshalling is provided, the following comprehensive instructions are laid down for Marshallers:*

- ✈ the need to ensure that the stands are cleared of fixed and mobile obstruction*
- ✈ the need to ensure that the stands are cleared of fixed and mobile obstruction*



✈ *the circumstances in which single man marshalling may be used and occasions when assistance of wing-tip men should be employed.*

✈ *the action to be taken in the event of aircraft damage occurring during marshalling.*

#### **6.6 STANDARD OPERATING PROCEDURE FOR MARSHALLERS**

✈ *Read the log of the previous Marshallers' record and act on areas that need prompt action*

✈ *Check the aircraft stand areas to ensure that FOD and any obstruction are removed prior to arrival of an aircraft.*

✈ *Be positioned on a designated bay allocated to aircraft by Apron Control before the arrival of the aircraft.*

✈ *Use appropriate internationally recognized hand signals to give guidance to pilots.*

✈ *Ensure that the aircraft are parked only in approved parking stands with nose wheel on appropriate markings.*

✈ *Ensure that vehicles and equipment approach aircraft only after aircraft anti-collision light is off.*

✈ *Ensure that no person or vehicle enters the aircraft danger zone while aircraft is being pushed back.*

✈ *Assist in provision of aircraft traffic data.*

✈ *In case of any incident/accident, inform Airfield Operations Office/Apron Control and thereafter initiate a report to Head of Airfield Services.*

### **1.17.1.2 Safety Management System (SMS) Manual**

#### **1.17.1.2.1 Excerpts from the SMS Manual**

Below are excerpts from the Nnamdi Azikiwe International Airport Abuja (NAIA) approved Safety Management System (SMS) Manual version 1.0 of 28<sup>th</sup> April 2017.



## 1.2 INTRODUCTION

*This Safety Management System (SMS) Manual provides comprehensive directions concerning procedures in the handling of safety systems used in day to day operations at Nnamdi Azikiwe International Airport (NAIA).*

*The procedures within this SMS Manual are in accordance with all relevant Nigeria Civil Aviation Regulations (Nig. CARs 12.6.5 and Part 20), directions and approvals. This SMS Manual applies to Management and all Airport staff employed by NAIA in any capacity (full time, part time or casual) and Contractors' and service provider's personnel who will abide by the procedures contained in this Manual.*

*The HOD Safety Services is responsible for carrying out a review of this manual whenever necessary but at least annually to ensure the relevance and currency of all procedures.*

*The Airport Manual Controller (HOD Safety Services) is responsible for ensuring the issued copies are kept up to date.*

## 1.3 SCOPE AND INTEGRATION OF THE SAFETY MANAGEMENT SYSTEM

*The Management of NAIA, Abuja recognises that hazards exist to degrade safety of operations. In response, management instituted a Safety Management System for identifying these hazards, analysing and eliminating them or managing the risks associated with them to an Acceptable Level of Safety (ALoS). This SMS Manual is focused principally on all activities aimed at ensuring Safety regularity and efficiency of aircraft operations.*

*Several airlines operate scheduled and non-scheduled International and domestic flights to the airport while major Handling Companies provide a range of ground handling services. Besides FAAN, Nigerian Airspace Management Agency (NAMA), Nigerian Meteorological Agency (NIMET) and other government agencies provide technical services. Contractors, suppliers and agents also provide services at the airside whenever the need arises.*



*The Safety Management System is applicable to all departments/sections; all airside operators who carry out activities at the airport are obliged to comply with the safety management procedures.*

#### **1.4 PURPOSE**

*The purpose of the SMS include:*

- Identifying hazards and managing associated risks;*
- Ensuring that remedial action necessary to maintain an acceptable level of safety is carried out;*
- Providing continuous monitoring and regular assessment of the safety level achieved;*  
*and*
- Aiming to make continuous improvement to the overall level of safety.*

*...*

## **CHAPTER 2 POLICY AND STRATEGIC OBJECTIVES**

### **2.1 SAFETY POLICY**

#### **2.1.1 NAIA POLICY STATEMENT**

*At NAIA, we ensure that the application of an effective Safety Management System is integral to all our activities with the objective of achieving the highest level of Safety Standards and Performance.*

*In addition to the above, we will strive to develop and embed a Safety Culture in all our activities that recognizes the importance and values of Safety Management and acknowledges at all times that Safety is Paramount.*

*Our commitment is to:*

- Develop, embed and practice a safety culture across our entire aviation activities that recognizes the importance and value of effective aviation safety management and acknowledges, at all times, that safety is paramount.*



- *Support the management of safety by creating an organizational **culture** that encourages safe practices, effective safety reporting and communication, and actively manages safety with the same attention to results that is used in managing all systems that can cause bodily harm or destruction to property.*
- *Define clearly for all staff their accountabilities and responsibilities for the development and delivery of safe practices and procedures.*
- *Establish and operate hazard identification and risk management programmes, including a hazard reporting system, in order to decrease or eliminate hazards resulting from our operations or activities at a minimum- drive hazard levels to a point which is Acceptable Level of Safety (ALoS).*
- *Ensure externally supplied systems and services that affect the safety of our aviation operations meet appropriate regulatory and safety standards.*
- *Establish a 'Just Culture' in which no action will be taken against any employee who discloses a safety concern through the hazard reporting system unless such disclosure indicates beyond any reasonable doubt, an illegal act, gross negligence, a deliberate or wilful [SIC] disregard of regulations or procedures.*
- *Ensure sufficiently skilled and trained staff are available who are fully competent in aviation safety matters.*
- *Establish and measure our safety performance against realistic safety performance indicators and safety performance targets.*
- *Comply with, and wherever possible exceed, legislative and regulatory requirements and standards.*

- ✈ *Enforce the management of safety as the **primary** responsibility of all managers and employees*
- ✈ *Foster a learning environment by which we learn from incidents and accidents, our experiences and the experiences of others through participation in industry activities and initiatives.*

*Airport Manager*

*Nnamdi Azikiwe International Airport, Abuja*

...

## *2.3 SMS ORGANISATIONAL STRUCTURE*

### *2.3.1 Safety Department Organisational Structure*

*The organisational structure and lines of communication can be found in Part 5 of the Aerodrome Manual.*



Figure 1



#### SAFETY DEPARTMENT ORGANISATIONAL STRUCTURE

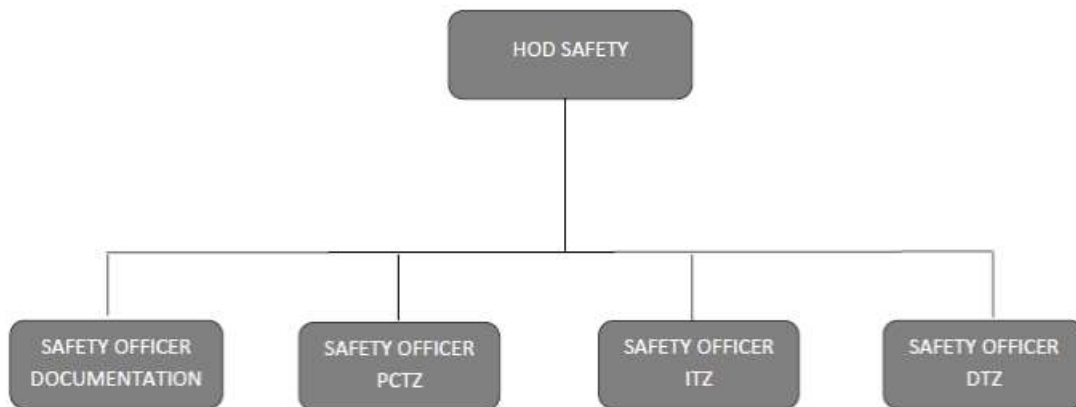


Figure 2

#### 2.4 MANAGEMENT COMMITMENT AND RESPONSIBILITY

- ✈ *Senior management is committed to the following:*
- ✈ *Demonstrating commitment to safety and the Safety Management System;*
- ✈ *Setting the safety standards and policies for the Airport operation;*
- ✈ *Encouraging participation in Safety Management by as many staff as possible;*
- ✈ *Allocating sufficient resources to the Safety Management System;*

*Facilitating the flow of safety information at NAIA, visible commitment by senior management is demonstrated by:*

- ✈ *Designating the HOD Safety and key safety officers;*
- ✈ *Open communication about safety issues; and*
- ✈ *Provision of adequate resources to address safety concerns.*

*The Airport management provides for the following:*

- ✈ *Managers are personally involved in safety activities;*
- ✈ *Safety induction and recurrent training for all employees; and*



- ✈ *A commitment to safety that is evident in terms of resources, namely, finance, time and personnel*

## **2.5 SAFETY ACCOUNTABILITIES AND RESPONSIBILITIES**

### **2.5.1 Airport Manager**

#### **Safety Accountability:**

- ✈ *The Airport Manager is accountable to the FAAN Managing Director/CE to ensure the following services under his supervision are performed in accordance with the*
- ✈ *SMS manual guidelines:*
- ✈ *The Airport Manager is responsible for ensuring that all operations are conducted safely, with an appropriate chain of command, providing appropriate facilities for the Airport and sufficiently qualified staff utilizing procedures and practices documented in the Aerodrome Manual in accordance with Nig. CARs Part 20.*

*Specifically, the Airport Manager will:*

- ❖ *foster a positive safety culture;*
- ❖ *Advise FAAN on any changes;*
- ❖ *produce documents associated with the operation of the Airport, on demand from an Authorised Person, as per Aviation Legislation*

...

## **CHAPTER 3 HAZARD AND RISK MANAGEMENT**

### **3.1 HAZARD IDENTIFICATION AND RISK ASSESSMENT**

*This chapter describes the hazard identification system and how such data is collated and the process for categorization of hazards/risks and their subsequent prioritization for a documented safety assessment. It further describes how the safety assessment process is conducted and how preventive action plans are implemented.*

*The purpose of identifying hazards and assessing the associated risks is to determine whether enough has been done to prevent an incident or accident that may lead to fatalities, injuries and ill health, or damage to aircraft. Risk assessment can also indicate*



*what improvements need to take priority, and thereby assist in developing budgets and business cases. Hazard Identification is the critical first step in managing safety. A formal hazards identification and risk management process will be conducted.*

*It is also important to recognize that hazard identification and risk assessment are not static processes. They need to be performed whenever:*

- ✈ A major organisational change is being planned;*
- ✈ The organisation is undergoing rapid expansion or contraction;*
- ✈ The introduction of new equipment or facilities is being considered;*
- ✈ Existing equipment is being decommissioned;*
- ✈ The introduction of new procedures is being planned;*
- ✈ Existing procedures are being revised and changes to key personnel are taking place;*
- ✈ There are changes to the legislation that the organisation operates under.*

### **3.2 METHODS OF HAZARD IDENTIFICATION**

*NAIA presently uses reactive and proactive processes to provide an effective means of hazards identification.*

#### **Reactive Reporting Process**

*NAIA becomes aware of existing hazards through information contained in reports from those working on the airside. This information ensures awareness of potentially hazardous airside situations before accidents or incidents occur. Incidents and accidents, when they occur, are also reported and investigated to prevent recurrence.*

*The HOD Safety Services is responsible for the airside hazard/incident/accident reporting system. He is also responsible for promoting hazard/incident/accident reporting and addressing hazards identified on the airside. Airside workers are responsible for reporting*



*all hazards/incidents/accidents, whether they become aware during the performance of their duties or under other circumstances.*

*Proactive Hazard Identification Process*

*The airport also uses proactive hazards identification method to identify hazards during airside activities and controlling them, not waiting for reports to come in on incidents before addressing them.*

*The HOD Safety Services and safety officers perform proactive hazard identification and assessment for all safety significant activities:*

- ✈ Describe the system of safety significant activities (systems) at the Airport;*
- ✈ Discuss and describe the associated hazards for each activity; and*
- ✈ List the hazards in a hazard register, along with applicable mitigations, which is retained on file.*

*Proactive Sources of Hazard Identification, include, but are not limited to:*

- ✈ Surveys, assessments, reviews, audits, discussions/brainstorming;*
- ✈ Self-inspections, direct observations, checklists;*
- ✈ Trend and statistical analysis;*
- ✈ Change analysis; and*
- ✈ Exchange information from other airports.*

*Hazard information from identification sources are stored and analysed in the hazard register (soft and hard copy) and managed as required by the document control and management system.*

*A review of hazards is conducted at least annually, or when major changes occur at the Airport (staff, equipment, air carrier frequency, aircraft type or destination, for example). These hazards are referred to the Safety Risk Management process in this section.*



*Major safety risks (those rated high or considered significant for the Airport), as identified in the Hazard Register, are included in the Safety Risk Profile and are prioritized. The Safety Risk Profile are kept in the Hazard Register.*

### **3.6 HAZARD/RISK REGISTER**

*The objective of the processes of hazard identification, risk assessment and risk mitigation is that the NAIA will have a total appreciation of all significant safety hazards, within its areas of responsibility.*

*The Hazard Registration System uses Excel Worksheets and provides a comprehensive database of recorded hazards, including information relating to:*

- Hazard ID*
- Date*
- Location*
- Type of operation or activity*
- State Generic Hazard*
- Identify specific components of the hazard*
- Identify associated Risk(s)*
- Current measures to reduce risk(s) and risk index*
- Further action to reduce risk and resulting risk index*
- Responsibility*

*The Hazard/Risk Register is maintained by the Safety department.*

*...*

### **4.3 CONTINUOUS IMPROVEMENT AND SAFETY AUDIT**

#### **4.3.1 Internal Safety Audits 4.3.1.1 Departmental and Service Provider Audit**

*The number one way to ensure correct operation of the NAIA SMS program is the audit process. Audits focus on the integrity of the NAIA SMS, and periodically assess the status of safety risk controls. Audits are not intended to be in-depth audits of the technical processes but rather they are intended to provide assurance to managers that activities*



*within their areas of responsibility are being conducted safely and conform to the safety management system requirements. It will also demonstrate to all employees that the management is taking a continuing interest in safety. Employees should not see auditing as a threat but rather as a co-operative activity to improve the level of service.*

*There are two types of audits that we will be subject to on a regular basis:*

*Internal audits are performed to confirm conformance with the safety management system using the SMS Internal Audit Checklist. A written summary of the audit findings along with the completed checklist are retained. The HOD Safety Services coordinates the audit, but the task of completing the checklist is assigned to someone other than the HOD Safety Services.*

*The Safety department will evaluate the safety management practices of NAIA technical departments and Airside service providers to ensure compliance with safety practice on the airside of the Airport.*

*a) The Technical Departments to be audited are as follows:*

- i. Operations Department*
- ii. ARFFS*
- iii. Civil/ Building Engineering*
- iv. Electrical Engineering*
- v. Mechanical Engineering*

*b) The service providers include:*

- i. Ground Handling Companies*
- ii. Catering Services*
- iii. Fuelling [SIC] Companies*
- iv. Cleaning Contractors*
- v. Airside Drivers*



vi. *Maintenance Contractors etc.*

#### *4.3.1.2 Purpose of the Internal Safety Audit*

*The purpose of the safety auditing is to ensure that:*

- ✈ Risks are identified and the potential for causing or contributing to an accident/incident are recognized*
- ✈ The Safety Management System structure is sound and appropriate*
- ✈ Adequate arrangements exist to handle foreseeable emergencies*
- ✈ Equipment performance is adequate for the safety levels of the service provided and*
- ✈ Effective arrangements exist for promoting safety, monitoring safety performance and processing safety issues.*

#### **1.17.1.2.2 Implementation of SMS at NAIA**

The Airport Manager is appointed the Accountable Executive to be overall responsible for the implementation of Safety Management System (SMS) at Nnamdi Azikiwe International Airport, Abuja (NAIA). The Airport Manager reports to the Managing Director of the Federal Airports Authority of Nigeria (FAAN). The commitment to ensure safe operations at the airport is enshrined in the Safety Policy of the airport.

The Safety Policy in the NAIA SMS Manual is yet to be signed by the Airport Manager.

NAIA has developed a Hazard/Risk Register (refer to Appendix B) as proactive means of Hazard Identification and Risk Management in the airport. In May 2022, Apron Congestion was identified as a hazard with an initial High Risk (Intolerable). According to the Hazard/Risk Register, the additional mitigation (risk controls) suggested to reduce the residual risk to Low Risk (Acceptable) are:

- (a) Apron expansion
- (b) Control passenger movement
- (c) Adequate Marshalls





- (d) Pilot compliance with parking instruction from Marshalls
- (e) Appropriate spacing between aircraft should be adhered to
- (f) Reduction in turnaround time
- (g) Remove all unserviceable aircraft to the grave yard from the Apron

The following risk controls were found either partially implemented or not implemented:

- (i) Apron expansion: The GAT/Cargo Apron expansion project was ongoing at the time of the occurrence.
- (ii) Adequate Marshalls: The number of Marshalls for the entire airport was 18 and six of them are deployed to GAT/Cargo Apron with just one Marshaller was assigned duty on each shift.
- (iii) Pilot compliance with parking instruction from Marshalls: The 307 Executive Airwing flight crew were not subject to the parking instruction from FAAN Marshalls.

### **1.17.2 Max Air Limited**

Max Air Limited (Max Air), a registered airline with head office and main operational base located in Kano holds an Air Operator Certificate (AOC) with number: MAX/AOC/06-13/01 issued in accordance with the requirements of the existing Nigeria Civil Aviation Regulations (Nig. CARs). It is authorized to conduct passenger and cargo, scheduled operations and charter flight operations. The airline operates a fleet of Boeing 747, Boeing 737 aircraft and an EMB 135 Legacy.

#### **1.17.2.1 Excerpts from Max Air Operations Manual Part A** **8.3.3.4 COMMUNICATION WITH GROUND CREW**

##### ***a) Marshalling***

*The Captain is responsible for the safety of his aircraft when being marshalled, and is to ensure its safety is not jeopardized when under a marshaller's instructions. Safety*



*considerations apart, the signals given by an approved marshaller are to be followed. Failure to do so may constitute an infringement of airport regulations.*

### **1.17.3 307 Executive Airlift Group**

The 307 Executive Air-Lift Group (EAG) of the Nigerian Airforce (NAF) do from time to time park its aircraft on the GAT/Cargo Apron. The EAG deploys military personnel to marshal its aircraft to available parking positions at the GAT/Cargo Apron.

During the occurrence, the ATR 42 (NAF930) was parked on the GAT/Cargo Apron at unmarked spot beyond the edge line of the active Apron and its tail section extended into the Apron Taxi Lane used by 5N-BXK. EAG military personnel normally mount guard around its own aircraft that are parked on the GAT/Cargo Apron to ensure clearance was maintained by any taxiing traffic. At the time of this incident, four military personnel were on GAT/Cargo Apron positioned to mount guard around the parked Nigerian Airforce ATR 42 (NAF 930).

### **1.17.4 Nigeria Civil Aviation Authority**

NCAA is the government agency saddled with the regulation and oversight of aviation activities in Nigeria. The NCAA is established by the Nigerian Civil Aviation Act (2022) which enables the Director-General of NCAA to make regulations in aviation. The current regulations are as enshrined in the Nigeria Civil Aviation Regulations (Nig. CARs) 2015. Relevant sections of the Nig. CARs guide activities of personnel and service providers in the aviation industry. Oversight activities are achieved by continuous and periodic audits by inspectors of the NCAA.



### **1.18 Information**

Not applicable.

### **1.19 Useful or effective investigation techniques**

Not applicable.



## **2.0 ANALYSIS**

### **2.1 General**

The flight crew were certified and qualified to operate the flight. The aircraft had valid Certificate of Airworthiness at the time of occurrence. Weather was not considered to be a factor in this occurrence. This analysis focuses on the taxi procedures, parking of aircraft at the GAT/Cargo Apron and the implementation of Safety Management System by the Airport Authority.

### **2.2 Conduct of aircraft taxi in the congested GAT/Cargo Apron**

#### **2.2.1 The taxi of 5N-BXK**

5N-BXK began its taxi out without the services of either an approved Marshaller or a company Ground Handling Agent. This decision was predicated on previous experience of having taxied in the same GAT/Cargo Apron several times without requesting for a Marshaller. At the onset of the taxi, as indicated in the Cockpit Voice Recorder (CVR) recordings, the flight crew had recognized that the apron was congested and discussed the manner several aircraft were parked.

Therefore, a prior Crew Briefing on taxiing in a congested apron would have led to an appropriate assessment of the hazardous condition of the apron and its associated safety risk and the need for the guidance of a Marshaller and/or Wing Walkers would have been identified as one of the mitigating measures for safe taxi out. All that would be needed at that point was to request for the services of the Marshaller on duty and delay departure until the arrival of the Marshaller to ensure safety of the aircraft operation during the taxi. Moreover, according to 6.2.6.2 Engine Start and Push-back of Nnamdi Azikiwe International Airport (NAIA) Airport Operations Manual, the aircraft operators and/or ground-handling agents are responsible for ensuring appropriate wing tip clearance is maintained during push-backs and any subsequent pull forward.



5N-BXK

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As the 5N-BXK taxi progressed towards the parked ATR 42 (NAF930) belonging to the Executive Airwing Group (EAG) of the Nigerian Air Force (NAF), the Air Traffic Controller advised the flight crew to exercise caution while taxiing as the apron was congested. At this point, the unsafe condition became apparent to the flight crew as they were heard on the CVR lamenting that the military personnel around the NAF930 were not providing assistance to them.

The flight crew's expectation of marshalling or guidance from personnel other than the approved Marshallers while taxiing was at variance with Max Air Limited Operations Manual Part A, Section 8.3.3.4(a) - Communication with Ground Crew (Marshalling), which states that the pilot remains responsible for the safety of his aircraft even when signals by an approved Marshaller are to be followed. Therefore, the flight crew had no reason to expect marshalling signals from those military personnel on the apron as there was no prior arrangement with the military for marshalling or wing walker guidance. Moreover, the military personnel in question were not trained on aircraft marshalling at civil aerodrome, therefore it is not clear the kind of signals they might have given to 5N-BXK.

The appropriate measure to take at that point, to ensure safety of the aircraft, was for the flight crew to stop the taxi and request for marshalling/wing-walk guidance from authorized personnel.

However, while the taxi continued, the Pilot Flying (PF) repeatedly asked if the right side was clear and the Pilot Monitoring (PM) kept giving assurances to the PF that the right side was clear. Furthermore, the PM advised the PF to "go straight first then turn. You clear on this side. Go straight first". With the PF attention initially focused on clearing the right side of the aircraft, he became confident that the left was clear after moving forward as advised before commencing the left turn. Consequently, the left turn was initiated prematurely leading to the collision with the tail section of the parked NAF930. Had the PF deviated slightly towards the right and maintained straight until the left wing clear



passed the parked ATR 42 before initiating the left turn, as advised by the PM, 5N-BXK would have exited the apron uneventfully.

## **2.3 Procedures for parking aircraft at the congested Nnamdi Azikiwe International Airport General aviation Terminal/Cargo apron**

### **2.3.1 Parking of all aircraft**

The aircraft traffic into Nnamdi Azikiwe International Airport (NAIA) has grown in recent days leading to the congestion at all its aprons, including the General Aviation Terminal (GAT)/Cargo Apron. The increase in air traffic therefore, puts more pressure on the limited space for parking aircraft at the apron, especially at the GAT/ Cargo Apron, where aircraft are parked for days, weeks or beyond. General Aviation aircraft both private and chartered category aircraft are parked on this apron. Coincidentally, the 307 Executive Airwing Group (EAG) of the Nigerian Air Force (NAF) parks some its aircraft on operational missions at the GAT/Cargo Apron as well.

The congestion situation of the apron makes it practically impossible to park aircraft only at the designated parking bays. Thus, Federal Airport Authority of Nigeria (FAAN) Marshallers guide aircraft to park at available unmarked positions while ensuring wing tip clearance is kept at 7.5m. The nose and tail of the aircraft are aligned with the apron taxi lanes to allow adequate space for safe taxiing of other traffic.

According to Section 6.2.6.1 - Bay Allocation of the Airside Operations Manual (AOM) of the airport, it is the discretion of the Marshaller in conjunction with the Airfield Officers to allocate a parking Bay at the GAT/Cargo Apron, the details of which is communicated to the pilot upon arrival. Section 6.5 of the AOM states that, airport marshalling services are provided where guidance to parking is required to avoid a safety hazard or to make the most efficient use of limited parking space. Therefore, it is imperative that all users of the GAT/Cargo Apron subject their operations to the direction of the assigned FAAN



Marshallers on duty at the apron to ensure safety of operations and also to make good use of the limited parking space on the apron.

However, the EAG uses its own procedures and deploys military personnel to marshal its aircraft to parking at the GAT/Cargo Apron. It is worthy of note to state that, the military personnel on duty who marshalled ATR 42 (NAF930) to its parking position minutes before the occurrence, were not provided with the required training to perform the safety-critical duties assigned to them. Consequent upon this, NAF930 was parked with its right wing extending beyond the edge line of the apron while its tail section protruding into the taxi lane used by 5N-BXK. According to the NAF pilots that operated NAF930 to its parking position, there was no abnormality in the parking of the aircraft.

The GAT/Cargo Apron Management Services Unit was aware that EAG resorted to self marshalling of its aircraft in the congested apron using own procedures. It was also a common knowledge that the military personnel deployed to provide the marshalling services have not attended FAAN training on marshalling aircraft at the GAT/Cargo apron. As a result, the combination of both civil and military operations at a civil aerodrome posed some operational challenges as a result of procedural differences. Therefore, it would have been prudent for FAAN to consider additional measures such as a more frequent apron inspection regime to monitor the parking arrangement of all aircraft on the apron, including military aircraft, as a safety net to mitigate associated risk. The NAF930 was on that spot for approximately forty minutes before the collision took place. A more frequent inspection of the apron condition would have afforded FAAN the opportunity to timely detect that the NAF930 as parked had constituted a safety hazard to other traffic on the apron. Thus, the unsafe condition generated by the improper parking of the NAF930 would have been communicated to EAG and realignment of the parked NAF930 would have been carried out to avert the occurrence.





### **2.3.2 Parking of ATR 42 (NAF930)**

Considering the dimensions of NAF930, there was much space to its front that it could be moved into without having to project onto the apron taxi lane. Since the military personnel stationed to provide marshalling and sentry duty were not trained in aircraft marshalling, it behoves on the pilots flying Nigerian Airforce aircraft parking at jointly used ramps to ensure that the services of qualified FAAN Marshallers were requested while taxiing on the GAT/Cargo apron. It also incumbent on the pilots that NAF aircraft are properly parked.

The stationing of NAF personnel at the aircraft might at best be regarded as due to security or other military expediency considering that the personnel were neither trained nor equipped for aircraft marshalling.

NAF930 was not properly parked in accordance with the lateral and longitudinal parking alignment relative to the other parked aircraft at the apron. The protrusion of NAF930 constituted a serious hazard that was readily discernible. However, the crew of NAF930 asserted that it was not obvious to them when they carried out the post-flight walk-around. It seemed sufficed that their aircraft was aligned with the other aircraft that was parked across the taxi lane. It is however worth noting that aligning an aircraft with another in the opposite bay without considering its alignment with the aircraft parked adjacent to it might bring about a protrusion of the tail as observed in this scenario. Furthermore, the alignment should also take into consideration the forward limits of the bay and the apron taxi lane.

## **2.4 Implementation of Safety Management System by the airport**

The Nnamdi Azikiwe International Airport (NAIA) Abuja has established the four components of a Safety Management System (SMS), including safety policy and objectives, safety risk management, safety assurance and safety promotion. The Airport Manager is the appointed Accountable Executive of the SMS. The SMS processes are



documented in the airport's SMS manual version 1 dated 28 April 2017, which contains amongst others, safety policy of the airport. Signing the safety policy is a demonstration of the buy-in of the top management of the airport to SMS implementation and commitment to attaining the safety goals and safety objectives of the airport. Also, the Accountable Executive was expected to read through the safety policy, safety objectives and management commitment prior to signing the document. In this way, the Accountable Executive demonstrates awareness to the ideals of SMS in the airport.

However, the safety policy in the SMS manual provided to the investigation was not signed as required.

NAIA uses both reactive and proactive hazard identification approach to catch hazards in its operations. The proactive hazard identification is documented in the Hazard and Risk Register (refer to Appendix B). The Hazard Register seemed to be updated as new hazard is identified. For each hazard identified, associated risk is assessed and measures to eliminate the hazard or to mitigate the risk are proffered with responsibilities assigned to concerned departments of the airport.

In May 2022, Apron Congestion was identified as a HAZARD to safe operation of aircraft at the aprons of the airport. The following were the measures proffered to mitigate the hazard and their status of implementation:

- (1) Apron expansion;
- (2) Control passenger movement;
- (3) Adequate Marshalls;
- (4) Pilot compliance with parking instruction from Marshalls;
- (5) Appropriate spacing between aircraft should be adhered to;
- (6) Reduction in turnaround time; and
- (7) Remove all unserviceable aircraft to the grave yard from the Apron



As at the time of this occurrence, a construction project for the expansion of GAT/Cargo Apron was ongoing, which means the apron congestion will remain for a longer time until the expanded portion of the apron is commissioned for use.

It has also been established that the EAG flight crew do not subject their operations on the GAT/Cargo Apron to the control of FAAN Marshaller on duty at the apron for guidance during taxi for parking.

This investigation revealed that FAAN had just 18 Marshallers for the entire airport. Six (6) of the Marshallers were deployed to the GAT/Cargo Apron and just one (1) Marshaller is assigned duty to each shift. This condition exerts tremendous pressure on the Marshaller on duty and could lead to degradation of safety performance.

The shortage of FAAN Marshallers manifested during this occurrence; in that the only Marshaller on duty at the apron had been attending to another traffic while 5N-BXK was ready to begin its taxi.

Therefore, it goes without hesitation to state that, the number of Marshallers at NAIA was grossly inadequate, especially in the face of highly congested and increasing traffic.

From the above, it is evident that the three important risk controls (mitigating measures) envisaged through the airport's proactive safety risk management process, to reduce the assessed UNACCEPTABLE LEVEL of safety risk associated with apron congestion to an ACCEPTABLE LEVEL of safety risk have not been realized.

According to NAIA SMS Manual Section 4.3 - Continuous Improvement and Safety Audit, safety audit process is the number one way to ensure correct operation of the NAIA SMS program, which periodically assesses the status of safety risk controls. Although, the investigation was made to understand that the shortage of Marshallers at the airport had been identified by the management, however, the process to recruit and train more Marshallers was not concluded.



## **3.0 CONCLUSION**

### **3.1 Findings**

1. The incident occurred at daytime in visual meteorological conditions (VMC).
2. The flight crew were certified to operate the aircraft.
3. The Pilot was the Pilot flying.
4. Inadequate Marshallers to provide guidance on the three aprons of NAIA. The airport had a total of 18 Marshallers on a 6-hourly shift regime, six of whom were deployed to the General Aviation Terminal (GAT)/Cargo Apron. Just one Marshaller was scheduled to marshalling duty per shift at GAT/Cargo Apron.
5. The FAAN Marshaller on duty at the GAT/Cargo Apron was attending to another aircraft at the time 5N-BXK commenced taxi out.
6. No Max Air ground handling agents available for marshalling and wing clear guidance to 5N-BXK.
7. No Briefing was conducted on taxiing in a congested apron prior to commencing the taxi. However, the flight crew were heard on Cockpit Voice Recorder (CVR) discussing manner aircraft were parked on the GAT/Cargo Apron.
8. The flight crew were heard on the CVR during the taxi expressing concern that some people were just watching them without rendering any assistance even though the military personnel stated during post occurrence interview that they passed signals to the flight crew to stop taxi but there was no response.
9. The 307 Executive Air Group (EAG) of the Nigerian Airforce (NAF) parks some of its aircraft at the GAT Apron from time to time.



10. EAG deploys military personnel to provide marshalling service to its aircraft at the GAT/Cargo Apron and also mount guard on the parked aircraft to ensure clearance with any taxiing aircraft.
11. At 08:30 h, ATR 42 NAF930 landed Abuja and was marshalled to park at the GAT/Cargo Apron by military personnel. The ATR 42 NAF930 parked at an unmarked spot on the GAT/Cargo Apron, its right wing extended beyond the active apron edge line and its Tail Section protruded into the Apron Taxi Lane in use by 5N-BXK.
12. The ATR 42 was not properly parked in accordance with the lateral and longitudinal parking alignment relative to the other parked aircraft at the apron. The protrusion of NAF930 constituted a safety hazard that was readily discernible.
13. The ATR 42 was on that spot for approximately forty minutes before the collision took place. A more frequent inspection of the apron condition would have afforded the opportunity to timely detect that ATR 42 as parked had constituted a safety hazard to other traffic on the apron.
14. The military personnel that provided marshalling services to ATR 42 NAF930 prior to the occurrence did not have any formal training on aircraft marshalling.
15. At 09:07:08 h, 5N-BXK commenced taxi to the Holding Point RWY 22 from its unmarked parking spot at a bay on the GAT/Cargo Apron.
16. The condition of the GAT/Cargo Apron was such that it was impracticable to park aircraft at the few marked parking positions only. Therefore, FAAN Marshallers guided all civil aircraft to park at both marked and unmarked spots while maintaining the required wingtip clearance of 7.5 meters and properly aligned laterally and longitudinally with one another.



17. As the 5N-BXK taxi progresses, Air Traffic Control advised the flight crew to exercise caution as the GAT/Cargo Apron was congested and the flight crew acknowledged.
18. As at the time of the occurrence, Link A2 which would have been normally used to taxi out of the GAT/Cargo Apron to runway 22 was blocked by a large body aircraft (Airbus 350) on a Special Parking provisions.
19. A construction work for the expansion of the GAT/Cargo Apron was going on at the time of the occurrence.
20. The NAIA has established and implements a safety Management System (SMS) to ensure safety of operations at the airport. However, the Safety Policy was not signed in the SMS Manual Version 1 dated 28 April 2017 made available to the investigation.
21. Apron Congestion was identified as a HAZARD to operation of aircraft at the aprons of the airport and the associated high risk level was in the unacceptable region.
22. The three important risk controls (apron expansion, Pilot compliance with parking instruction from Marshalls and adequate Marshalls) envisaged through the airport's proactive safety risk management process, to reduce the assessed UNACCEPTABLE LEVEL of safety risk associated with apron congestion to an ACCEPTABLE LEVEL of safety risk have not been realized.

### **3.2 Causal factor**

The decision to embark on taxi in the congested GAT/Cargo Apron without recourse to the services of FAAN Marshalls and/or Wing-Walkers.



### **3.3 Contributory factors**

1. Continuing the taxi of 5N-BXK even when the flight crew were in desperate need of ground assistance to proceed.
2. Non-conduct of flight crew BRIEFING on Taxiing in a congested apron prior to commencing the taxi.
3. The inappropriate parking of the military aircraft NAF 930 with its tail section protruding into the Taxi Lane used by 5N-BXK on the congested apron.
4. The use of non-standard marshalling techniques together with the deployment of untrained personnel to marshal the NAF930 to that parking spot on the congested GAT/Cargo Apron.
5. Inadequate number of FAAN Marshallers to provide the required taxi and parking guidance to all traffic on the congested GAT/Cargo Apron.
6. Inability of the continual improvement process enshrined in the safety management system of the airport to timely detect as a safety hazard to other traffic, the inappropriate parking of the ATR 42 (NAF930) on the GAT/Cargo apron.





## **4.0 SAFETY RECOMMENDATIONS**

### **4.1 Safety Recommendation 2024-032**

Max Air Limited should develop procedures requiring the flight crew to conduct BRIEFING, including requirement to ensure the use of the services of authorized Marshallers or ground staff/agent prior to commencing taxi in a congested apron.

### **4.2 Safety Recommendation 2024-033**

Max Air Limited should ensure its flight crew limits communication to only authorized ground crew while on flight duty in line with Section 8.3.3.4(a) of the Max Air Ltd Operations Manual Part A to avoid expecting guidance from unknown persons or entities.

### **4.3 Safety Recommendation 2024-034**

Max Air Limited should ensure that its flight crew adhere to the requirements of Section 6.2.6.2 of the Airfield Operations Manual of Nnamdi Azikiwe International Airport by using the services of authorized Marshallers and/or the airline's trained ground staff/handling agent to ensure appropriate wing tip clearance is maintained during push-backs and any subsequent pull forward of the aircraft.

### **4.4 Safety Recommendation 2024-035**

Federal Airport Authority of Nigeria (FAAN) should provide adequate resources to ensure effective implementation of its safety management system, including the immediate recruitment, subsequent training and deployment of adequate number of Marshallers to provide guidance to aircraft for safe operation at the Nnamdi Azikiwe International Airport.



#### **4.5 Safety Recommendation 2024-036**

Federal Airport Authority of Nigeria (FAAN) should adhere to Section 3.6 of Nnamdi Azikiwe International Airport Safety Management System Manual to ensure the implementation of all the outstanding Risk Control measures contained in its Hazard and Risk Register, including the timely completion of the GAT/Cargo Apron expansion project to ensure additional parking space is made available to reduce the congestion of the apron.

#### **4.6 Safety Recommendation 2024-037**

Federal Airport Authority of Nigeria (FAAN) should adhere to Section 4.3 of Nnamdi Azikiwe International Airport safety management system manual to ensure the continual improvement measures, such as periodic audits and frequent inspections of Movement/Safety Areas of the airport are implemented to ensure early detection of hazards to safe operations in the airport, including inappropriately parked aircraft on the GAT/Cargo apron.

#### **4.7 Safety Recommendation 2024-038**

Federal Airport Authority of Nigeria (FAAN) should Carry out sensitization of all airport users, including the military, on the procedures, instructions, safety rules and guidance contained in the relevant manuals of the airport to ensure the users understand their safety responsibilities when operating in the airport in line with Chapter 1 of the Airfield Operations Manual of Nnamdi Azikiwe International Airport to ensure improvement of safety of operations.



#### **4.8 Safety Recommendation 2024-039**

Nigerian Air Force should adhere to the procedures, instructions, safety rules and guidance established by the airport authority in its relevant manuals, including Section 6.5 of the Airfield Operations Manual of Nnamdi Azikiwe International Airport for appropriate guidance and allocation of parking bay in the congested GAT/Cargo Apron to avoid safety hazards and to make the most efficient use of the limited parking space.

#### **4.9 Safety Recommendation 2024-040**

Nigerian Air Force should ensure that all its personnel deployed to perform duties at the GAT/Cargo Apron of Nnamdi Azikiwe International Airport are provided with the required training, tools and equipment to enable them perform the assigned duties in line with the procedures, instructions, safety rules and guidance established by the airport authority to ensure safety of operations.

#### **4.10 Safety Recommendation 2024-041**

Nigerian Civil Aviation Authority should ensure through its safety oversight activities that, the airport operator and all users of the airport adhere to the established procedures, instructions, safety rules and guidance contained in the relevant documents of Nnamdi Azikiwe International Airport to ensure safety of operations.

#### **4.11 Safety Recommendation 2024-042**

Nigerian Civil Aviation Authority should facilitate cooperation between the Federal Airports Authority of Nigeria and the military authorities, in particular, the Nigerian Air Force to ensure coordination and harmony is achieved in order to improve safety of operations at the Nnamdi Azikiwe International Airport.



5N-BXK

## APPENDICES

### Appendix A

Hazard Register Register: Nnamdi Azikiwe International Airport, Abuja

(A relevant portion of the above Hazard Register)

#### SAFETY SERVICES DEPARTMENT HAZARD REGISTER

S/N	Hazard/Location	Date / Time	Consequences	Current Mitigation	Initial Risk Level	Additional Mitigation Suggested	Residual Risk Level	Concerned Dept.
1	FODs  At SAHCOL equipment Staging area DTZ  ITZ baggage area  NAIICO equipment staging area  Access road close to Terminal D departure hall and ITZ baggage area	09:00hrs 10/02/2021  09:00hrs 11/02/2021  09:30hrs 12/02/2021  08:35hrs 22/02/2021	Injecting into Aircraft engine. And causes damage to the engine of the Air craft	Regular and frequent inspection are carried out  Daily	3C	Implementing FOD control awareness and training program	2D	Env. Operations.
2	Oil Spillage at equipment staging	09:00hrs 10/02/2021	Affects the pavement surface. Which causes softening and	Affected areas are flushed off by Eummanpop	3C	GSE with leakages should be evacuated from the Apron	2D	Env. Operations.



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potholes, spalling and FOD) between taxiway A1 and A5		Damage to engine in the event of ingestion of debris particle				
76. Apron Congestion due to increased operations and personnel/passenger movement on the Apron	May 2022	It can lead to: -Confusion on the Apron -Possible collisions on the Apron	-Control passenger movement -Appropriate spacing between aircraft should be adhered to -Reduction in turnaround time	4B	Apron expansion Control passenger movement Adequate marshalls Pilot compliance with parking instruction from marshalls Appropriate spacing between aircraft should be adhered to Reduction in turnaround time Remove all unserviceable aircraft to the grave yard from the Apron	1B Airfield Operations
77. Passenger movement on the Apron	May 2022	It can lead to: -rowdiness on the Apron - possible Aircraft incident such as engine ingestion and jet blast	In situations where buses are not available, an airline staff should properly guide passenger movement on the Apron	4B	Provision of adequate co-buses to convey passengers In situations where buses are not available, an airline staff should properly guide passenger movement on the Apron	1B Airfield Operations
78. Oil Spillage by NAHCO GSE at DTZ parking bay and	04/05/2022 0915hrs 13/05/2022	It can result to damage of	Awareness and Sensitization,	3C	Constant maintenance of	1C Airfield, Operation