UNITED REPUBLIC OF TANZANIA

MINISTRY OF WORKS AND TRANSPORT

AIRCRAFT ACCIDENT AND INCIDENT INVESTIGATION BRANCH TANZANIA

PRELIMINARY REPORT

Accident No. CAV/ACC/6/22

Aircraft registration and type*:*	5H-PWF, ATR 42-500
Date of event:	6 November 2022
Place:	Lake Victoria near Bukoba airport
Type of flight:	Scheduled Commercial flight
Numbers on board:	**Crew:** 4 **Passengers:** 39
Damage to aircraft:	Damaged beyond economic repair
Commander's age and License*:*	64 years, ATPL
Commander's total flying experience:	23,515 hours of which 11,929 were on type
First Officer's age and license:	45 years, CPL
First Officer's total flying experience*:*	2,109 hours of which 1,700 were on type
Aircraft total time*:*	16,843 hours
Aircraft total cycles:	23,267 cycles

FOREWORD

This preliminary report was produced by the Ministry of Works and Transport (Transport), Aircraft Accident Investigation Branch (AAIB), Tanzania.

The report is based on the investigation carried out by the Aircraft Accident and Incident Investigation Branch (AAIB), in accordance with Annex 13 to the Convention on International Civil Aviation, Tanzanian Civil Aviation Act and Civil Aviation (Aircraft Accident and Incident Investigation) Regulations 2017.

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.

The purpose of this report is to provide details of initial facts, discussions and findings surrounding the occurrence; it includes information gathered from witness statements and a preliminary inspection of the incident site and aircraft.

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

AAIB Tanzania 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 AAIB as the source.

ACKNOWLEDGEMENT

Aircraft Accident Investigation Branch (AAIB), Tanzania acknowledges with profound gratitude the dedicated involvement of BEA of France, ATR Manufacturer, Precision Air, Pratt & Whitney of Canada and UK AAIB in the investigation process.

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GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

AAIB	Aircraft Accident Investigation Bureau
AOC	Air Operator Certificate
ATPL	Airline Transport Pilot Licence
AVSEC	Aviation Security
BEA	Bureau d'Enquête et d'Analyse pour la sécurité de l'aviation civile (France)
CB	Cumulonimbus
CoA	Certificate of Airworthiness
CRM	Crew Resource Management
CRS	Certificate of Release to Service
CSO	Cycles Since Overhaul
CVR	Cockpit Voice Recorder
daN	DecaNewtons
EASA	European Aviation Safety Agency
EGPWS	Enhanced Ground Proximity Warning System
ELT	Emergency Locator Transmitter
FDR	Flight Data Recorder
FL	Flight Level
FO	First Officer
GPS	Global Positioning System
HF	High Frequency
ICAO	International Civil Aviation Organization
MLG	Main Landing Gear
N/A	Not Applicable
NLG	Nose Landing Gear
PA	Public Address
PIC	Pilot In Command

PF	Pilot Flying
P/N	Part Number
S/N	Serial Number
QNH	Quarry Navigation Height
RA	Radio Altitude (Altitude Above Ground Level)
VFR	Visual Flight Rules

SYNOPSIS

The ATR 42 - 500 aircraft with registration 5H-PWF was on the Visual Flight Rules (VFR) final approach to runway 31 of Bukoba airport in marginal weather conditions when the Enhanced Ground Proximity warning SINK RATE, about the excessively high descent rate came on three times. The warning was not followed by corrective action of the flight crew. Instead, the flight crew pushed the control column into a nose down position. The aircraft continued to descend fast until the ground proximity SINK RATE PULL- UP warning sounded and this time the aircraft was descending at a rate of 1,500 feet per minute. The aircraft crashed in water and THE PULL-UP action coincided with the noise of the aircraft striking the lake surface. The aircraft broke up on impact with the water but there was no fire. Of the 43 persons on board, 24 survived without serious injuries but 19 lost their lives including the two pilots. The aircraft was destroyed by the impact with water.

1 FACTUAL INFORMATION

1.1 History of the flight

On 6 November 2022 at 0310 hours (0610 hours Local Time) an ATR 42-500 aircraft with registration 5H-PWF and flight number PW 494 took-off from Julius Nyerere International Airport, Dar es Salaam for a scheduled commercial passenger flight to Bukoba. The subsequent destinations were Mwanza and Dar es Salaam. It was carrying a crew of four including two pilots and two cabin crew members as well as 39 passengers, one of whom was an infant. The estimated time of arrival at Bukoba was 0525 hours(0825 hours Local Time)**.** The Pilot in Command (PIC) was the pilot flying**.**

Much of the flight to Bukoba was uneventful, cruising at Flight Level (FL) 200. The flight reached top of descent at 0458 hours (0758 hours Local Time) when the crew initiated descent to FL 160.

At 0504 hours (0804 hours Local Time) there was a public address announcement of expected landing at Bukoba at 0526 hours (0826 hours Local Time). Nine minutes later Mwanza Approach advised the flight crew that the weather at Bukoba was fairly good with “wind calm”, “visibility better than 10 km” “partly cloudy” SCT 011, FEW013 CB, BROKEN 080, T21/17 and QNH 1018. However, as the flight progressed the crew started to experience signs of poor weather conditions. In their discussion they pointed out that they may have to approach the airport from the mountains (i.e. runway 13) if Bukoba remained below the clouds.

At 0519:32 hours the crew reported to Mwanza Approach to have Bukoba in sight[1] and were cleared to change to unmanned frequency of 118.2 MHz.

At 0524:01 hours the crew encountered heavy weather over KEMONDO bay and decided that they were going to land on runway 13 (from the mountains on the mainland).

At 0525:25 hours the PIC said to the First Officer (F/O) “Look for the runway”. Indeed in one minute he gave this instruction three times. The F/O responded “I am looking”.

At 0525:45 hours the flaps were lowered to 15 degrees followed by the landing gears extension 7 seconds later. At this time the runway was not visible according to the conversation between the pilots. The PIC then decided that they should descend to FL 050.

[1] Crew had seen the Bukoba airport

Before landing checklist was perfomed at 0526:59 hours. Subsequent to this, the auto pilot was disengaged, the flaps were retracted to zero degrees and the landing gear was retracted. Evidently, the crew decided not to land and instead climbed to 5500 ft.

At 0529:35 hours the PIC transferred control to the F/O. The crew also started a discussion about the minimum fuel required for diversion from Bukoba to Mwanza. The F/O suggested a diversion to Mwanza would be appropriate but the go-around was continued.

At 0533:24 hours the PIC instructed the F/O to go to Kemondo and try again. This was followed by a Public Address (PA) from the PIC to inform the passengers that they could not land at Bukoba due to heavy rain and they had to wait until the weather improved. If not, they would proceed to Mwanza.

At 05:33:33 selected altitude was changed from 5500ft to 5300ft, aircraft descended to 5300ft.

At 0534:43 hours there was an Enhanced Ground Proximity Warning System (EGPWS) warning "TERRAIN, TERRAIN PULL UP", however the warning was not followed by corrective action of the crew. The crew continued to discuss about the weather and were informed by Bukoba load control[2] that weather information had been transmitted to Mwanza Approach. The advise from Mwanza approach was to wait for 20 minutes before landing as visibility was not good.

The crew continued to encounter storms and heavy rain as they proceeded to Kemondo. They subsequently decided to descent to FL 049.

At 0539:56 hours the PIC asked the F/O to confirm if he had seen Musila Island. The F/O confirmed to have seen it. However, in a span of 78 seconds the crew were trying to locate Musila Island to no avail.

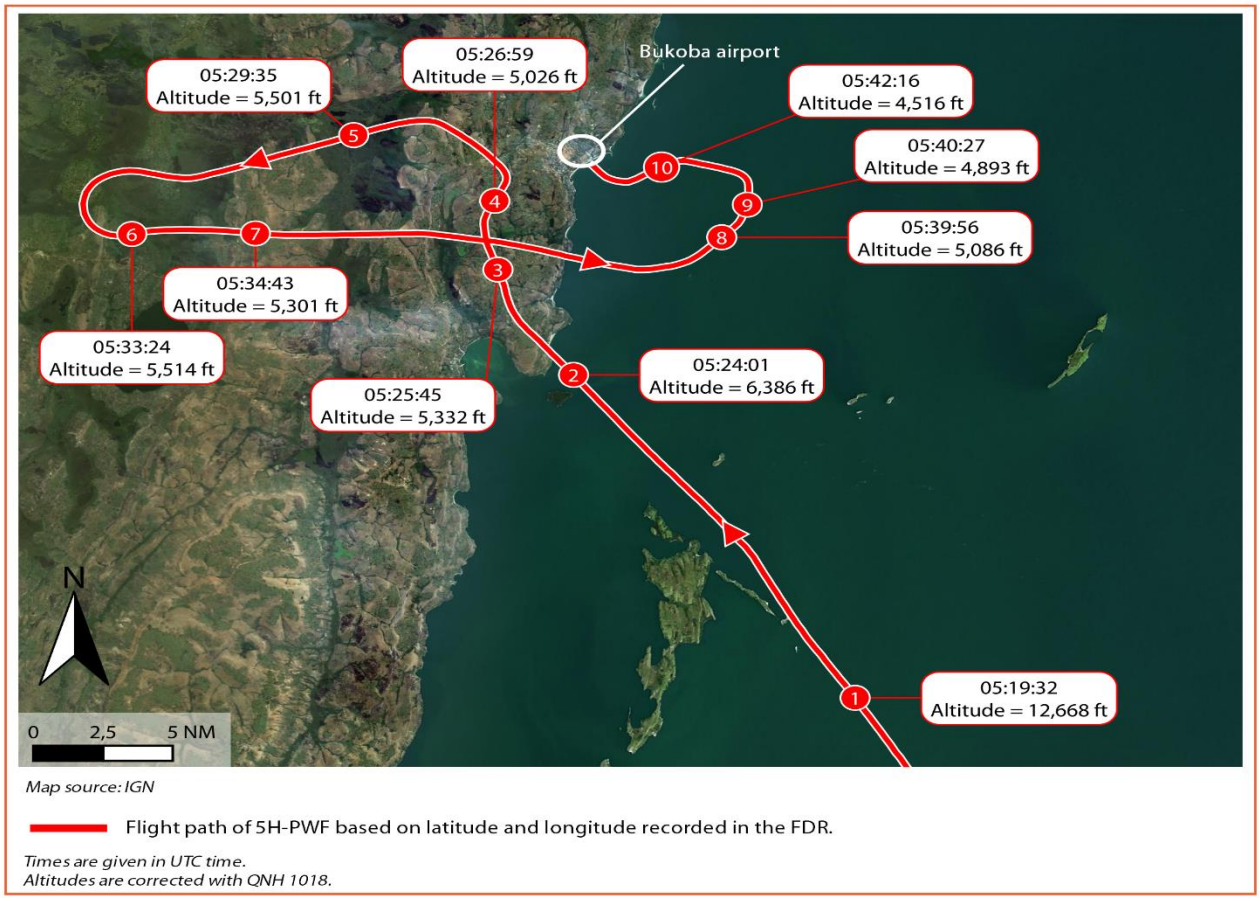
At 0540 hours the flaps were deployed to 15 degrees, the landing gears were extended, the vertical speed was selected to -1,000 ft/min and 4,500 feet altitude was selected.

At 0541 hours Flap 25 degrees was selected followed by Full flaps and the PIC called "speed 102" which was acknowledged by the F/O. A few seconds later the PIC cautioned the F/O : "watch your

[2] Precision Air handling agent

speed, speed, speed, need power, a lot of power". The F/O acknowledged. The power levers moved forward progressively to 62 degrees.

At 0542:16 hours the F/O said that he was in sight of the runway. The PIC proceeded to ask the F/O, "where is the runway"? The F/O replied: " Look below at mine 12 o'clock but the rain is obstructing".



At 0542:54 the aircraft was at 4,500ft (Selected Altitude). The PIC instructed the F/O " Lets go a bit lower". This was followed by the selection of - 400 feet per minute vertical speed (descent) and 4,000 feet altitude.

At 0542:59, at around 900ft Radio Altitude (RA) and at approximately 1.5 Nautical Miles (NM) from the runway threshold, the PIC said he had the runway in sight and he took control from F/O.
At 0543:01 hours the autopilot was disengaged. Power levers were moved backwards to 38 degrees (flight idle position)

At 0543:07 hours the pilot control column effort was above 10 daN[3] in nose down direction (one point recorded) and the Vertical speed was -1,100 ft/min. Distance from runway threshold was

[3] Only effort on the control column above 10daN is recorded on the FDR

estimated to be 2.26 km (1.2 nm). The aircraft RA was 878 ft.The pitch angle of the airplane continued to decrease while the rate of descent increased to 1,700 ft/min.

At 0543:09 hours the PIC called " Watch height calls" and the F/O replied "Ok". At this point the wind speed was reported by the F/O to vary from 19kt to 28 kt. The wind direction in the Flight Data Recorder (FDR) was about 30 degrees.

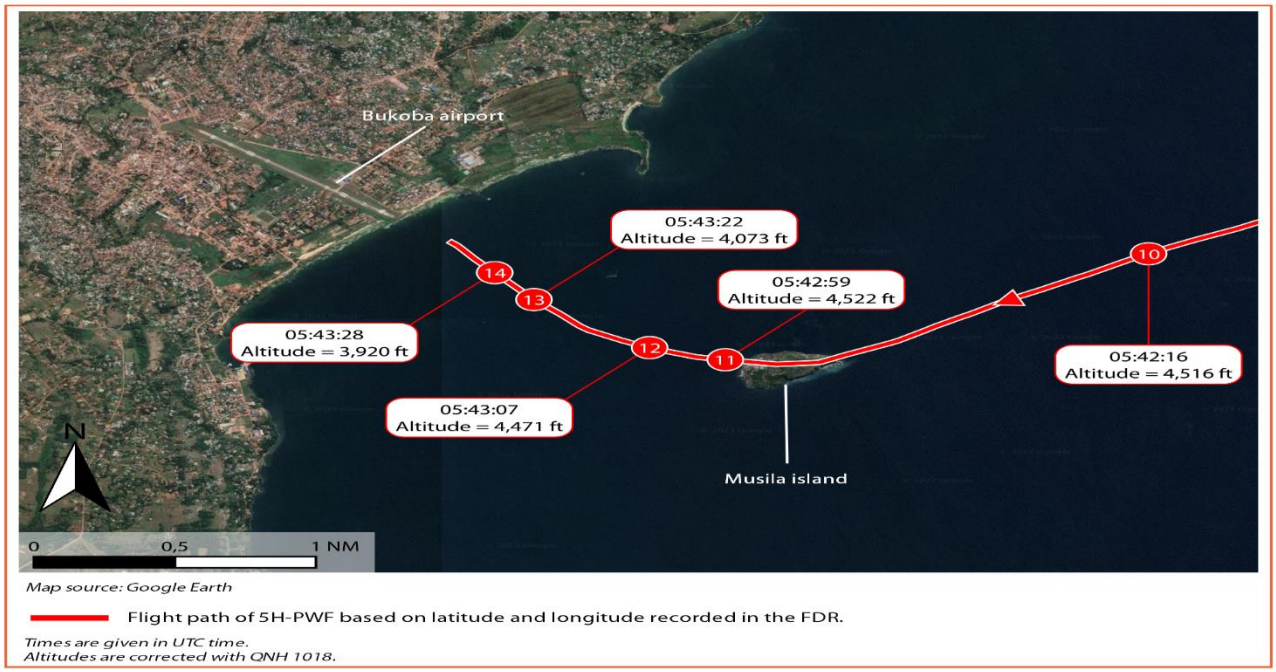
At 0543:20 hours there was a radio altimeter 500 feet called out. Some 2 seconds later there was an EGPWS warning: SINK RATE, SINK RATE, whilst the vertical speed was 1,700 ft/min, wind speed 25 kt and direction 32 degrees.

At 0543:26 hours the PIC instructed the F/O to put the condition lever to maximum. The pilot control column registered effort above 10 daN in nose down direction (one point recorded), vertical speed -1,300 ft/min and the distance to runway 31 threshold was estimated to be 1.11 km (0.60nm). The aircraft RA was 300 ft.

At 0543:28 hours there was an EGPWS warning SINK RATE and one second later, there was a pilot control column effort above 10 daN in nose down direction (four points recorded). Five seconds later there was another SINK RATE warning and the rate of descent increased to 1,700 ft/min.

At 0543:35 hours the F/O called: ''Lift up Captain''. One second later, there was a SINK RATE PULL UP warning from the EGPWS. The rate of descent decreased to 1,500 ft/min. There was no response from the PIC.

At 0543:38 the F/O shouted: "Pull up captain" and the aircraft impacted the water. The impact with water occurred at this time while the aircraft was descending at 1,500 feet per minute and the FDR recorded pilot control column effort of above 10 daN in the nose up direction. This was the last point recorded by the flight data recorder.



1.2 Injuries to persons

Injuries	Crew	Passengers	Others
Fatal	2	17	0
Serious	0	0	0
Minor/none	2	22	0

1.3 Damage to aircraft

The aircraft was substantially damaged by impact with water and it sustained more damage during recovery to the shore. It has since been declared written off.

1.4 Other damages

There was no third party damage.

1.5 Personnel information

1.5.1 Pilot in command

The captain, age 64, held an Airline Transport Pilot's (ATP) license with type rating for ATR 42/72 airplanes issued on 04th August 2010. He had a valid medical certificate class I until 04th January 2023. At the time of the accident, the captain had accumulated about 23,515 hours of total flying time, of which 11,919 hours were as pilot-in-command (PIC) on the type. In the 28 days,7 days, and 24 hours before the accident, the captain had accumulated a total of 29.80 hours, 13.17 hours, and about 03.85 hours of flying time, respectively. Also, he was the company Chief Pilot.

1.5.2 Co-pilot

The Co-pilot, age 46, held Commercial Pilot Licence (CPL) with type rating for ATR 42/72 airplanes issued on 01st November 2018. He had a valid medical certificate class I until 23rd April 2023.

At the time of the accident, the co-pilot had accumulated 2,109 hours of total flying time, of which 1,700 hours were on the type. In the 28 days,7 days, and 24 hours before the accident, the co-pilot had accumulated a total of 74.01 hours, 23.47 hours, and about 03.05 hours of flying time, respectively

1.6 Aircraft information

1.6.1 General

The aircraft type and model (ATR 42-500) was mainly produced for the regional flights by the joint venture between the French company (Aérospatiale, now Airbus) and its Italian partner (Aeritalia, now Leonardo). It is a high-wing aircraft with the retractable main and nose landing gears. The ATR 42-500 is powered by two Pratt & Whitney Canada turboprop engines (PW 127M).

1.6.2 Certification

European Aviation Safety Agency (EASA) Type certificate for the said aircraft was issued on 28 July 1995 to ATR-GIE Avions de Transport Regional of France. The accident aircraft, serial number MSN 819 was manufactured at Toulouse, France in 2010. It was subsequently registered on 25th August 2010 in Tanzania and certificate of airworthiness was issued on 26th August 2010. At the time of accident, the Certificate of Airworthiness (C o A) validity was up to 13th January 2023. The aircraft has been operated under the Air Operator Certificate (AOC) of Precision Air.

1.6.3 Status

At the time of the accident, the aircraft had accumulated 16,893.22 total flight hours with 16,610 total flight cycles. The left and right engines had accumulated 22,811.07 and 21,193.42 hours respectively. The last Certificate of Release to Service (CRS) was issued on 02nd September 2022 at airframe hours 16265.47 and cycles 16016 during the '12YE' + '1A' check. At the time of the accident, it was still valid up to 16th January 2023.

1.6.4 Loading

A review of weight and balance and loading information for the accident flight revealed the aircraft was within weight and centre-of-gravity limits. The passengers and cargo were loaded within the structural limitations for each respective compartment. The accident aircraft's take-off weight was 18.236 tonnes. (The maximum certificated take-off weight is 18.6 tonnes according to its Type Certificate Data Sheet)

1.7 Meteorological information

The Weather information at Bukoba Airport at 0400 hours (0700 hours local Time) and 0500 hours (0800 Local Time) was transmitted from Bukoba MET Office to Mwanza Approach through Meteorological Aviation Information System and the weather was as follows:

METAR HTBU 060400Z 27005KT 9999 SCT010 FEW012CB BKN080 20/17 Q1017=

METAR HTBU 060500Z 00000KT 9999 SCT011 FEW013CB BKN080 20/17 Q1018=

At 0520 hrs (0820 hours Local Time) the weather had changed drastically and the information was transmitted to Mwanza Approach as follows:

SPECI HTBU 060520Z 33010KT 2000 BKN010 FEW012CB OVC080 20/17 Q1019=

The recorded observation after the accident was as follows:

METAR HTBU 060700Z 24005KT 8000 -RA SCT012 FEW014CB BKN080 20/19 Q1019

However, according to the MET officer at Bukoba airport, when the weather changed, information was transmitted to Mwanza Approach advising that the aircraft should wait for the weather to normalise before deciding to land at Bukoba airport.

1.8 Aids to navigation

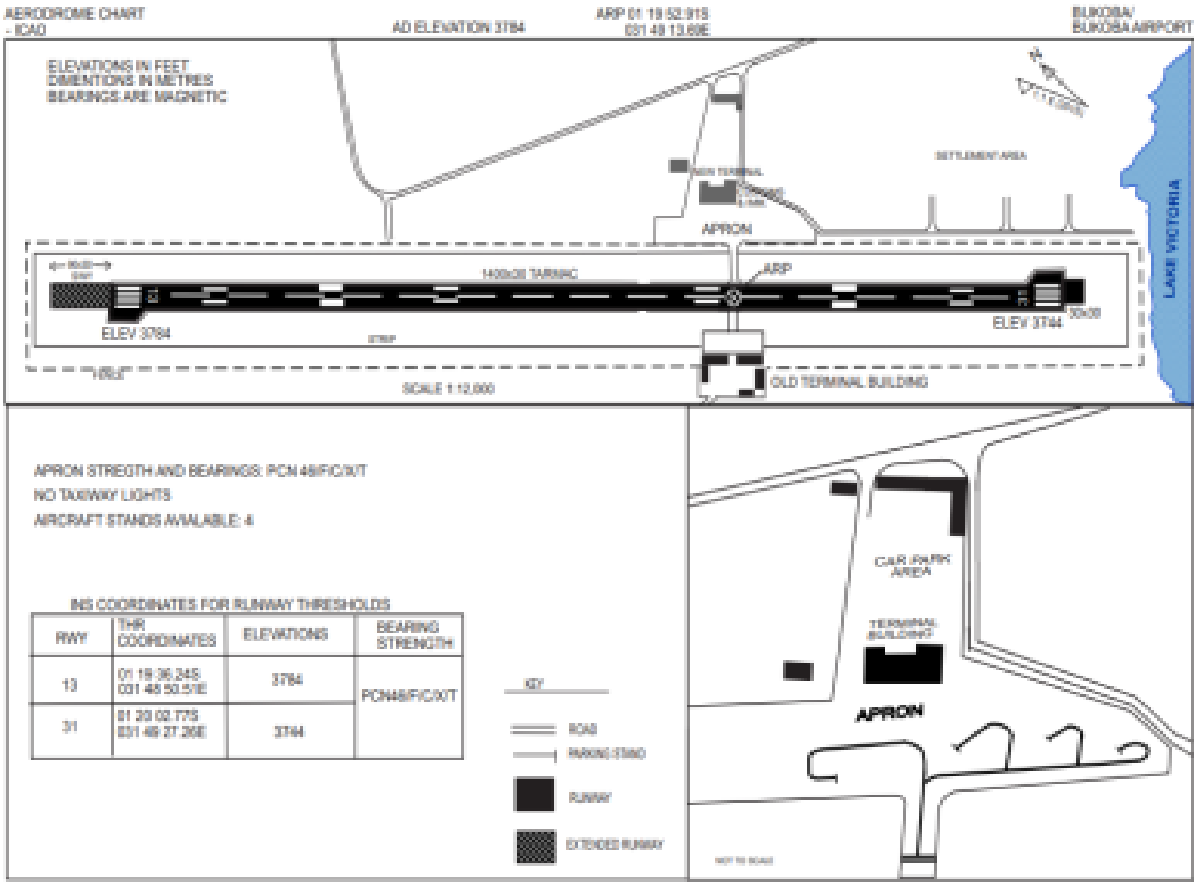
There is no Instrument Flight Rules (IFR) approach procedure available at Bukoba airport hence only Visual Flight Rules (VFR) approaches are being carried out for all aircraft operating into that airport. All aircraft operating into the airport use the services of the Mwanza Approach on frequency **122.8 MHz** until they report Bukoba insight. Subsequently the flight crew switch from the said frequency to **118.2 MHz** which is the unmanned frequency for approach and landing at Bukoba.

1.9 Aerodrome information

Bukoba airport has one paved runway surface which is 1,500 meters long and 30 meters wide, at an elevation of 3,740 above sea level. The runway is designated as runways 13 from the mountain side and 31 from the lake side. The paved surface was in good condition at the time of the accident.

There is a fire station at Bukoba which is equipped by one fire engine and manned by 10 Fire men who provide rescue operations on land occurrences.

Water rescue operations for Bukoba is covered by the Police Marine unit at the nearby Bukoba marine port which also conducts Marine Patrols in the Lake Victoria.



1.10 Flight recorders

1.10.1 The Aircraft was equipped with a Cockpit Voice Recorder (CVR) and a Flight Data Recorder (FDR) as required by the current Civil Aviation (Instruments and Equipment) regulations. At the time of the occurrence both recorders were serviceable.

Both recorders were recovered from the wreckage and examined at the BEA, Le Bourget, France. Downloading and analysis was performed by the experts from BEA with the presence of the Tanzania AAIB investigation team.

1.10.2 Cockpit Voice Recorder (CVR)

It was equipped with a solid state L3 Harris FA2100 CVR, P/N 2100-1020-02, S/N 734631 which is capable of recording 120 minutes of high quality 4-channeled audio data. The CVR records the cockpit area microphone, captain's microphone, first officer's microphone and all received transmission on the aircraft's selected communication radio including the intercom.

The data from the CVR was recovered successfully and the quality of recording was okay.

1.10.3 Flight Data Recorder (FDR)

It was equipped with a L3 Harris FA2100 DFDR, P/N 2100-4043-00, S/N 167754 capable of recording at least 25 flight hours essential parameters. Around 109 hours of flight data parameters with quality and precision were retrieved, including of the accident flight.

1.11 Wreckage and impact information

The aircraft came to rest in water (Lake Victoria) some 500 meters from the threshold of runway 31. The depth of water at this point was 5.4 meters. It was inclined at a shallow angle with much of the front section of the fuselage completely immersed in water. Only the aft section of the fuselage and the tail plane were clear of the water. The rear passenger door on the left side of the fuselage was partially submerged in water.

The damage to the aircraft was consistent with high energy impact with water. The assessment was done after the removal of the wreckage from water, therefore other damages may be associated with the recovering exercise.

1.11.1 Fuselage

The nose and forward fuselage sections were significantly damaged whereas the aft section suffered minor damage. The radome was found completely separated from the fuselage.

The frame 1 bulkhead, the stiffeners and the Nose Landing Gear (NLG) bay were found severely deformed, buckled and fractured, consistent with heavy impact damage. The underneath section of the fuselage were significantly damaged, deformed, wrinkled frames and aircraft skin, detached with broken belly fairing panels.

The floor panels and associated structures were heavily damaged. The skin was completely torn and the fuselage was almost separated between frame number 13 and 23.

1.11.2 Engines

The engine #1 appeared in good extermal general condition, however, the inboard shock mount showed an impact mark while the outboard shock mounts did not show any damage. The chip detectors were removed and no contamination was observed.

The engine #2 appeared in good external general condition with no signs of damage on the shock mounts . The forward chip detector was removed and no contamination was observed

Oil samples and Electronic Engine and Propeller Control modules were taken from both engines for further analysis if deemed necessary.

1.11.3 Propeller

The Left Hand propeller was significantly damaged and all 6 blades were broken at around two-third of their lengths. The blade pitches were found close to the feather positions and they could

not be rotated around their pitches positions. However, the propeller assembly was free to rotate when moved by hand.

The Right Hand propeller was found slightly damaged and none of the six blades was broken. The blade pitch was found around half-course position for all blades. When moved by hand, the blades could not be rotated around their pitch positions however the propeller assembly was free to rotate when moved by hand.

1.11.4 Wings

The left wing was broken, wing tip separated, ruptured wing root at both the leading and trailing edges. The right wing was found complete however it was damaged at the leading and trailing edges. Most of damages on the wing were contributed by the recovery operations as the wreckage was lifted using a crane and cables around the wing roots and empennage section, except for the left wing tip which probably broke when the aircraft impacted the water.

1.11.5 Doors

The passenger door (aft left section) was found open and relatively in a good condition. The closing spring mechanism was found detached from its attachment and its surrounding showed damage in the aft bottom and top corner. The service door was found closed with minor damages at the aft bottom and top corner. The damages seemed to be contributed by the recovery operations.

The left and right hand emergency exit doors were opened and found outside of the aircraft with minor damages. There were missing furnishing panels on the left hand emergency door.

The cockpit emergency hatch door was found separated outside of the aircraft and in good condition.

1.11.6 Landing Gears

The right hand main landing gear was found in extended position and still attached to the aircraft structure. The left main landing gear was found separated from the aircraft, fractured at the middle of the upper leg and a deformed extension/retraction actuator.

The NLG assembly was separated from its main fittings but still attached to the actuator link. The connection with the drag brace was broken.

1.11.7 Flight Controls

The Right Hand aileron was still in place on the wing and showed no visible damage from the ground. Due to lack of access, no check of the aileron movement could be performed. The left hand aileron was broken into two parts and separated from the left hand wing.

The elevators were in good condition, as seen from the ground and the right hand trim tab was intact while the left hand trim tab was damaged.

The rudder was severely damaged at the rudder bottom closing rib and generally it suffered minor damaged on the skin and associated strucures. The damper was still active and free to move.

1.11.8 Cabin

Cabin floor from seat row number 7 forward was significantly damaged, distorted and several passengers seats were partially or completely detached consistent with high energy impact with water sustained after the crash.

Forward cabin crew seat was in place but the aft seat was completely detached and was found outside the wreckage.

1.12 Medical and pathological information

Medical and pathological information were performed at the Regional Hospital in Bukoba. They will be made available in the final report.

1.13 Fire

There was no fire.

1.14 Survival aspects

No search of aircraft was conducted as the accident occurred about 500 metres from the threshold of runway 31 and it was visible to the fishermen who were on the lake at the time of occurrence. Similarly, firefighting unit and AVSEC screeners who were on duty at Bukoba airport said that they heard a loud bang noise and immediately rushed to the accident scene.

Many occupants on the front and middle seats who did not unbuckle themselves immediately were engulfed in water and may have suffocated by drowning. The front section of the fuselage was completely immersed in water after the aircraft came to rest while the rear section remained partially immersed in water.

One of the survivors (seat No. 8) testified that after impact the forward passenger cabin area was immediately filled with water. She untied the seat belt, jumped over the seats and moved to the rear section of the passenger cabin. She was helped to get out of the aircraft by a person whom she could not identify. Another witness (passenger seat number 5) testified that he managed to swim towards an opening just at the front side of the wing attachment, pulled himself, got out of the aircraft. He was then rescued by fishermen.

The cabin crew member who sat on the rear cabin seat testified that after impact she found herself in the mid passenger cabin section with her detached seat. She untied the safety belt, pulled and grabbed a lifejacket and started wearing it while rushing to the passenger door located at the aft left side section. She unlocked and pushed the door into an open position with assistance from a muscular passenger.

Most of the survivors evacuated the aircraft wreckage through this passenger door. These surviving passengers including a child of 18 months as well as its mother were also saved in this way. Canoes and fishermen arrived after about 5 minutes and they transferred the survivors to their boats. 24 survivors including the two cabin crew members were saved. The survivors were brought ashore by fishermen boats which arrived at the accident site soon after the accident.

The cabin crew who was at the forward station testified that after the impact the cabin was immediately filled with water and it was totally dark in the cabin. She stretched herself for a while and managed to reach one of the cabin emergency doors, opened it and swam out where fishermen rescued her out of the water.

The official rescue Marine boat belonging to the Police Marine Unit arrived at 1049 hours (1349 hours local time) and joined the evacuation operation. The reason for late arrival to the accident scene was that it was on patrol duties outside Bukoba port.

Before the arrival of the Police Marine Unit, one of the local fishermen who had his own oxygen equipment, started the process of recovering the dead bodies from the wreckage.

Mid and forward passenger cabin sections were significantly damaged with detached seats and other cabin structures consistent with high energy impact with water. Some seats and floor panels

forward of row 7 were completely detached which might have significantly affected the evacuation of other passengers and cockpit flight crew.

1.15 Tests and research

No test and research have been conducted so far.

1.16 Organizational and management information

1.16.1 Aircaft Operator

Precision Air Service Plc is a company registered and incorporated under the laws of the United Republic of Tanzania in January 1991 as a private airline and started operations in 1993 as a private charter air transport. In November 1993 it changed and started scheduled commercial air transportation.

The airline has been issued with an Air Service Licence (ASL) and Air Operator Certficate (AOC) number CAA/AOC/03 valid to conduct scheduled commercial air transportation within Tanzania and in adjacent States. The airline is also the holder of an Approved Maintenance Organization certificate (AMO) number TCAA/AMO/1.97 (valid up to 19 January 2023) with a capability to perform base maintenance and line maintenance on ATR 42 and ATR 72 aircraft. The principal base of operations is at Julius Nyrere International Airport (JNIA), Dar es Salaam, Tanzania. Precision Air maintenance hangar is located at Terminal one JNIA.

The operator has a fleet number of nine (9) ATR aircraft (five ATR-72-212, two ATR 42-500 and two ATR 42-600). On the date of occurrence four (4) aircraft out of nine were serviceable and in operations including the accidented aircraft. The remaining five (5) aircraft were on ground undergoing maintenance checks.

1.17 Additional information

1.17.1 Aircraft Recovery Operations

Initially the wreckage was pulled by using ropes tied to the wing root and empennage section nearer to lake shore by fishermen and other civilians who arrived at the scene soon after the occurence. Later the wreckage was recovered by a specialized company by lifting it from water using a crane and moved to a place within the airport.

1.18 Useful or effective investigation techniques

The investigation of causes of accident is being carried out in accordance with ICAO Annex 13 to The Chicago Convention on International Civil Aviation and in compliance with the Tanzania Civil Aviation (Aircraft Accident and Incident Investigation), Regulations, 2017.

2 CONCLUSION

2.1 Discussion

The circumstances of the accident show that the flight crew encountered poor weather conditions which had not been expected at the commencement of the flight. In any case, abrupt changes in weather conditions both enroute and around destination airports in the Lake Region are common especially at this time of the year.

The weather was good for almost the entire flight but it changed into rain and violent thunderstorms with Cumulonimbus (CBs) when the aircraft was only five minutes from the destination airport.

This type of weather is common around the Bukoba airport and is well known to pilots. Many pilots often choose to divert to Mwanza or to climb to a safe altitude and circle around until the weather improves.

It is now evident that the crew of 5H-PWF chose the latter option. The flight circled around for about 20 minutes in heavy rain which caused the crew to make right and left turns in order to navigate through narrow weather windows. Indeed at one point the EGPWS warnings (against terrain) came on but was not heeded.

However, it appears that the PIC was commited to land at Bukoba. Marginal visibility caused high workload among the crew and may have contributed to the failure to react to terrain warnings during the final approach.

At this stage, the analysis of the parameters does not show inconsistencies, in particular between the movements of the controls and the movements of the aircraft.

2.2 Initial findings

On the bases of the initial information gathered during the course of the investigation the following facts have been determined;

i. There is no evidence to suggest the flight crew were not fit and healthy prior to the flight.

ii. The aircraft had valid Registration, Airworthiness and Release to Service Certificates, and the required scheduled maintenance had been completed.

iii. The weather at Bukoba was not favourable in that eventful time.

iv. The VFR approach was conducted in a very poor and adverse weather during the last phase of the flight.

v. The crew did not react from the EGPWS warnings

vi. The aircraft struck the surface of the lake in a left wing low and nose-dive attitude.

vii. The impact with the water was consistent with high energy impact.

viii. The aircraft flight control responses are consistent with the flight crew inputs.

2.3 Way forward

Further course of investigation process may include (but not limited to) advanced analysis of FDR and CVR, related advanced technical analysis of aircraft / engine components, exploration for reasons and causes of the observations discovered so far, and also of any further shortcomings that may be revealed during later part of the investigation.

This may encompass conduct of various activities at AAIB, and deep interaction / visits to relevant organizations to ascertain possible causes and identify proportionate safety recommendations.

A final report will be released at the conclusion of the investigation.